

Groundwater Monitoring System Certification

North-South Impoundment Walter Scott Jr. Energy Center Council Bluffs, Iowa

MidAmerican Energy Company

April 02, 2024



Certification

I certify the WSEC North-South Impoundment groundwater monitoring system has been designed and constructed to meet the requirements of 40 CFR Part 257, Section 91. The groundwater monitoring system includes the minimum number of monitoring wells specified in 40 CFR Part 257, Section 91, Paragraph (c)(1), as described in this report.

MICHAEL J.	I hereby certify that this engineering document was prepared by mo or under my direct personal supervision and that I am a duly licens Professional Engineer under the laws of the State of Iowa.						
	License Number:	18160					
	My license renewal date is:	December 31, 2024					
and the second se	Pages or sheets covered by this seal:	Entire Document					

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1. Introduction

MidAmerican Energy Company (MidAmerican) has installed a groundwater monitoring system at the North-South Impoundment in accordance with 40 CFR Part 257. GHD prepared this report to certify the groundwater monitoring system meets the requirements specified in 40 CFR §257.91 Groundwater Monitoring Systems. A site location map is included as Figure 1.1.

The North-South Impoundment is a closed coal combustion residual (CCR) surface impoundment that received materials from the Walter Scott Jr. Energy Center (WSEC) facility, both located in Pottawattamie County, lowa. The North-South Impoundment is a multi-unit system that consists of two unlined CCR surface impoundments, designated as the North Surface Impoundment and the South Surface Impoundment.

The South Surface Impoundment received and stored wet sluiced CCR materials which include bottom ash, economizer ash, and boiler slag. Wastewater streams that were discharged to the impoundment included ash transport water, polisher wastewater, demineralization neutralizer wastewater, economizer ash hydrovactor water, boiler tube and air heater cleaning water, and pH adjusted demineralizer water. The South Surface Impoundment last received CCR and or non-CCR wastewater on July 31, 2018. The North Surface Impoundment received and stored WSEC facility wastewater and wet sluiced CCR materials. The North Surface Impoundment ceased receiving CCR in 2015, and closure activities began in 2015. MidAmerican substantially completed closure of the North-South Impoundment in December 2023.

MidAmerican originally considered the North and South Surface Impoundments as one unit and conducted groundwater monitoring of the unit as a whole. When a new USEPA CCR rule became finalized and effective, MidAmerican decided to conduct "early closure" of the North Surface Impoundment while maintaining the South Surface Impoundment as an active surface impoundment. In accordance with the rule as defined prior to the vacatur order, the monitoring and closure program timeline diverged for the North and South Surface Impoundments. Thus, the North Surface Impoundment and South Surface Impoundments were defined as individual units.

Following the vacatur of the "early closure" provisions of the rule, the North Surface Impoundment required a groundwater monitoring program that would comply with the requirements applicable to the existing CCR surface impoundments. The background dataset was established, the detection monitoring program was conducted, and the assessment monitoring program was initiated for the North Surface Impoundment.

Following the initial monitoring event of the assessment monitoring program conducted in September 2019, the North Surface Impoundment reached the point in its assessment monitoring program that aligns with the assessment monitoring program at the South Surface Impoundment. Since MidAmerican closed both the North and South Surface Impoundments under the same general timeline, and these impoundments were considered a single unit prior to the implementation of the CCR rule, the North and South Surface Impoundments are now considered a multi-unit system with a single groundwater monitoring system. The site is referred to as the North-South Impoundment.

2. Groundwater Monitoring System

The groundwater monitoring system at the North-South Impoundment consists of 29 monitoring wells as listed in Table 2.1. The location of the site monitoring wells is depicted on Figure 2.1 and Figure 2.2. Details of the use of each well in the monitoring network is provided in Table 2.1.

The site is located in the Missouri River valley south of Council Bluffs, Iowa. A Hydrogeologic Investigation Report (HIR) dated September 2006 was prepared for the nearby Monofill CCR unit (located approximately a half mile to the southwest of the North-South Impoundment) which details 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 Monofill CCR 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 Monofill CCR unit to a depth of approximately 117 feet below ground surface (bgs), however, bedrock at the site is believed to be Pennsylvanian-age shale or limestone. Based on previous groundwater monitoring event data collected from May 2016 through October 2019 from monitoring wells in the North-South Impoundment well network, the water table has an average elevation of approximately 961 feet above mean sea level (amsl). Based on interpolation of groundwater elevation data during monitoring events from May 2016 through October 2022, groundwater flow direction at the site has been variable and has been to the north, northwest, west, or southwest. A summary of the groundwater elevations from the monitoring network is provided in Table 2.2.

Due to drought conditions in the area, three additional monitoring wells were installed in February 2024 to accommodate for the lower water table. These wells are MW-5D, MW-22D, and MW-307D and are depicted on Figure 2.1.

3. References

MWH, 2006. Hydrogeological Investigation Report, Coal Combustion Residue Monofill, Walter Scott Jr. Energy Center, Pottawattamie County, Iowa. September 2006.

4. Record of Revisions

Revision	Date	Revisions Made	By Whom
0	Jan. 20, 2020	Initial Groundwater Monitoring System Certification.	Terracon Consultants, Inc.
1	Apr. 27, 2023	Monitoring wells MW-34, MW-307, TW-1, and TW-2 added as background/upgradient sampling locations. Monitoring well MW-133 removed from North-South Impoundment monitoring network.	GHD
2	Apr. 2, 2024	Monitoring wells MW-5D, MW-22D, and MW-307D added to the monitoring network due to drought conditions.	GHD

Figures



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Data Source: USGS Quadrangle Map, Council Bluffs South, IA (2022).



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Data Source: 05157640T5C08 Terracon Consulting Engineers and Scientists, Rec'd 10/2022



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Tables

Groundwater Monitoring Well Network Walter Scott Jr. Energy Center - North-South Impoundment Council Bluffs, Iowa

	Use in	Role in		Decommissioning
Monitoring Well	Monitoring Network	Monitoring Network	Installation Date	Date
MW-1	Gauged and Sampled	Cross- to Upgradient	8-Nov-2000	
MW-1B	Gauged and Sampled	Cross- to Upgradient	13-Jul-2018	
MW-5R	Gauged and Sampled	Downgradient	17-Mar-2008	
MW-5D	Gauged and Sampled	Downgradient	20-Feb-2024	
MW-9R	Gauged and Sampled	Upgradient	29-Apr-2016	
MW-12	Gauged and Sampled	Downgradient	18-Mar-2008	
MW-18	Gauged and Sampled	Downgradient	1-Apr-2016	
MW-19	Gauged and Sampled	Downgradient	27-Oct-2015	
MW-20	Gauged and Sampled	Cross- to Downgradient	26-Oct-2015	
MW-21	Gauged and Sampled	Crossgradient	26-Oct-2015	
MW-22	Gauged and Sampled	Cross- to Upgradient	27-Oct-2015	
MW-22D	Gauged and Sampled	Cross- to Upgradient	19-Feb-2024	
MW-23	Gauged and Sampled	Cross- to Upgradient	1-Apr-2016	
MW-24	Gauged and Sampled	Cross- to Downgradient	1-Apr-2016	
MW-25	Gauged and Sampled	Downgradient	6-Aug-2018	
MW-26	Gauged and Sampled	Downgradient	6-Aug-2018	
MW-27A	Gauged and Sampled	Downgradient	3-Aug-2018	
MW-27B	Gauged and Sampled	Downgradient	3-Aug-2018	
MW-28	Gauged and Sampled	Downgradient	1-Aug-2018	
MW-29	Gauged and Sampled	Downgradient	6-Aug-2018	
MW-30	Gauged and Sampled	Downgradient	1-Aug-2018	
MW-31	Gauged and Sampled	Cross- to Downgradient	13-Jul-2018	
MW-32	Gauged and Sampled	Cross- to Downgradient	13-Jul-2018	
MW-33	Gauged and Sampled	Cross- to Upgradient	16-Jul-2018	
MW-34	Gauged and Sampled	Background	9-Jul-2020	
MW-307	Gauged and Sampled	Background	7-Dec-2011	
MW-307D	Gauged and Sampled	Background	20-Feb-2024	
TW-1	Gauged and Sampled	Background	9-Jul-2020	
TW-2	Gauged and Sampled	Background	9-Jul-2020	

Decommissioned Wells

MW-9

Gauged and Sampled

Upgradient

29-Apr-2016

Groundwater Elevation Summary Walter Scott Jr. Energy Center - North-South Impoundment Council Bluffs, Iowa

	Top of Casing	Total Well Depth Below														
Well	Elevation (NAVD88)	Top of Casing (feet BTOC)	18-May-2016 (NAVD88)	20-Jul-2016 (NAVD88)	3-Oct-2016 (NAVD88)	1-Feb-2017 (NAVD88)	27-Feb-2017 (NAVD88)	12-Apr-2017 (NAVD88)	10-Jul-2017 (NAVD88)	14-Aug-2017 (NAVD88)	9-Oct-2017 (NAVD88)	12-Feb-2018 (NAVD88)	30-Apr-2018 (NAVD88)	30-Jul-2018 (NAVD88)	10-Sep-2018 (NAVD88)	8-Oct-2018 (NAVD88)
MW-1	971.69	17.90	-	-	-	-	-	-	-	-	-	-	-	-	963.48	963.18
MW-1B	971.86	42.20	-	-	-	-	-	-	-	-	-	-	-	-	963.58	963.30
MW-5R	984.46	34.90	960.96	957.87	956.97	955.37	956.08	958.10	958.97	957.13	957.42	954.40	958.56	961.72	-	-
MW-5D	981.72	42.56	-	-	-	-	-	-	-	-	-	-	-	-	964.58	-
MW-9R	972.26	17.80	967.67	967.59	967.07	966.80	966.95	967.29	965.46	963.63	967.45	964.99	965.83	965.75	-	-
MW-12	980.43	32.50	-	-	-	-	-	-	-	-	-	-	-	-	959.95	959.88
MW-18	978.89	37.70	960.97	957.55	956.63	955.40	956.12	958.01	958.97	957.08	957.09	954.52	958.46	961.86	-	-
MW-19	980.08	37.90	961.00	958.54	957.93	955.81	956.37	958.49	959.50	957.62	958.22	955.12	958.57	961.59	-	-
MW-20	980.59	34.00	960.33	960.05	958.60	955.26	956.83	957.78	960.08	956.79	957.54	954.58	957.44	960.51	-	-
MW-21	979.76	40.00	960.35	958.62	959.16	956.00	956.05	959.37	960.39	957.88	958.89	956.14	957.51	960.29	-	-
MW-22	980.24	27.00	965.13	964.04	964.20	962.15	962.09	963.25	963.45	962.34	963.89	961.45	962.47	965.07	-	-
MW-22D	980.47	33.88	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-23	986.69	38.60	962.55	961.29	960.97	959.61	959.59	960.71	961.50	960.63	962.92	960.06	962.44	965.28	-	-
MW-24	982.30	38.80	962.08	960.94	960.47	958.91	958.93	960.29	961.35	960.17	962.29	959.36	961.76	964.63	-	-
MW-25	983.24	38.20	-	-	-	-	-	-	-	-	-	-	-	-	965.17	965.03
MW-26	982.31	37.10	-	-	-	-	-	-	-	-	-	-	-	-	964.20	964.06
MW-27A	982.10	39.20	-	-	-	-	-	-	-	-	-	-	-	-	961.50	962.09
MW-27B	982.03	51.20	-	-	-	-	-	-	-	-	-	-	-	-	961.52	962.10
MW-28	976.86	35.70	-	-	-	-	-	-	-	-	-	-	-	-	961.04	961.70
MW-29	978.92	36.70	-	-	-	-	-	-	-	-	-	-	-	-	959.78	960.27
MW-30	975.28	33.70	-	-	-	-	-	-	-	-	-	-	-	-	959.70	959.97
MW-31	974.76	30.50	-	-	-	-	-	-	-	-	-	-	-	-	960.85	961.34
MW-32	972.29	27.10	-	-	-	-	-	-	-	-	-	-	-	-	961.46	960.75
MW-33	969.53	24.60	-	-	-	-	-	-	-	-	-	-	-	-	964.78	964.94
MW-34	971.27	21.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-307	971.12	20.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-307D	971.36	27.10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TW-1	967.14	20.43	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TW-2	968.57	20.40	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Groundwater Elevation Summary Walter Scott Jr. Energy Center - North-South Impoundment Council Bluffs, Iowa

Well	30-Oct-2018 (NAVD88)	12-Nov-2018 (NAVD88)	3-Dec-2018 (NAVD88)	17-Dec-2018 (NAVD88)	7-Jan-2019 (NAVD88)	4-Feb-2019 (NAVD88)	20-Mar-2019 (NAVD88)	15-Apr-2019 (NAVD88)	4-Jun-2019 (NAVD88)	18-Sep-2019 (NAVD88)	7-Oct-2019 (NAVD88)	9-Dec-2019 (NAVD88)
MW-1	961.15	958.63	958.83	961.00	961.75	961.51	967.56	-	968.48	965.90	-	965.93
MW-1B	961.20	958.55	958.99	961.10	961.80	961.56	967.59	-	968.53	965.95	-	965.98
MW-5R	-	-	-	-	-	-	-	963.74	-	-	967.43	962.16
MW-5D	-	-	-	-	-	-	-	-	-	-	-	-
MW-9R	-	-	-	-	-	-	-	967.38	-	-	967.94	967.14
MW-12	959.09	956.96	958.01	958.48	958.49	958.02	964.87	-	969.02	963.62	-	965.43
MW-18	-	-	-	-	-	-	-	964.18	-	-	968.13	962.47
MW-19	-	-	-	-	-	-	-	963.42	-	-	966.68	962.01
MW-20	-	-	-	-	-	-	-	962.95	-	-	965.55	961.17
MW-21	-	-	-	-	-	-	-	962.63	-	-	966.21	961.73
MW-22	-	-	-	-	-	-	-	964.81	-	-	967.52	965.54
MW-22D	-	-	-	-	-	-	-	-	-	-	-	-
MW-23	-	-	-	-	-	-	-	965.80	-	-	968.36	963.96
MW-24	-	-	-	-	-	-	-	965.04	-	-	967.97	964.95
MW-25	964.40	963.73	964.00	961.31	960.62	959.58	970.01	-	970.11	967.19	-	964.92
MW-26	964.08	964.19	963.78	960.85	960.46	958.38	966.86	-	969.15	965.94	-	964.76
MW-27A	961.25	960.61	959.67	957.94	956.62	954.63	967.64	-	970.22	965.40	-	962.27
MW-27B	961.23	960.63	959.69	957.92	956.63	954.63	967.56	-	970.18	965.39	-	962.28
MW-28	960.97	960.43	959.83	958.63	957.28	955.31	962.18	-	969.36	963.24	-	962.89
MW-29	959.71	958.70	958.59	957.83	956.79	955.28	961.23	-	969.14	962.28	-	963.06
MW-30	959.54	957.10	959.86	958.35	957.86	957.19	963.04	-	968.72	962.95	-	964.90
MW-31	959.32	957.40	958.01	959.08	959.62	959.51	965.27	-	968.87	965.02	-	966.39
MW-32	959.10	956.81	957.76	959.70	960.54	960.67	965.19	-	968.56	965.80	-	966.74
MW-33	963.51	960.48	961.74	961.72	961.69	961.10	967.70	-	968.57	966.05	-	964.85
MW-34	-	-	-	-	-	-	-	-	-	-	-	-
MW-307	-	-	-	-	-	-	-	-	-	-	-	-
MW-307D	-	-	-	-	-	-	-	-	-	-	-	-
TW-1	-	-	-	-	-	-	-	-	-	-	-	-
TW-2	-	-	-	-	-	-	-	-	-	-	-	-

10-Feb-2020 (NAVD88)	27-Jul-2020 (NAVD88)	12-Oct-2020 (NAVD88)	23-Oct-2020 (NAVD88)
964.64	-	-	957.34
964.66	-	-	957.35
957.43	-	-	955.54
-	-	-	-
966.80	-	-	962.93
962.74	-	-	955.48
957.67	-	-	955.60
957.33	-	-	956.19
956.67	-	-	954.74
957.92	-	-	956.39
962.64	-	-	962.03
-	-	-	-
961.52	-	-	959.78
960.88	-	-	958.90
960.98	-	-	957.37
959.76	-	-	957.21
957.53	-	-	954.73
957.53	-	-	954.74
958.41	-	-	954.47
958.94	-	-	953.79
961.51	-	-	954.45
964.38	-	-	957.01
965.07	-	-	957.64
963.10	-	-	955.33
-	963.09	961.37	-
-	960.16	957.27	-
-	-	-	-
-	962.07	959.96	-
-	963.02	960.67	-

Groundwater Elevation Summary Walter Scott Jr. Energy Center - North-South Impoundment Council Bluffs, Iowa

Well	16-Nov-2020 (NAVD88)	22-Apr-2021 (NAVD88)	23-Apr-2021 (NAVD88)	3-May-2021 (NAVD88)	5-May-2021 (NAVD88)	3-Nov-2021 (NAVD88)	8-Nov-2021 (NAVD88)	16-Nov-2021 (NAVD88)	7-Jun-2022 (NAVD88)	9-Nov-2022 (NAVD88)	16-Jan-2023 (NAVD88)	24-Apr-2023 (NAVD88)	2-Oct-2023 (NAVD88)
MW-1	958.37	-	958.34	957.51	-	-	956.57	-	Dry	956.32	956.70	957.47	957.56
MW-1B	958.41	-	958.32	957.46	-	-	956.59	-	958.15	956.35	956.75	957.49	957.60
MW-5R	955.65	-	955.67	955.87	-	-	953.49	-	Dry	949.80	949.35	950.16	950.82
MW-5D	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-9R	963.27	-	966.95	967.29	-	-	967.23	-	966.36	960.88	963.07	967.00	963.08
MW-12	956.71	-	954.96	953.81	-	-	952.71	-	953.62	952.95	952.91	954.35	954.08
MW-18	955.91	-	955.96	956.21	-	-	953.01	-	948.64	949.54	947.89	950.42	950.65
MW-19	956.09	-	956.15	956.77	-	-	954.33	-	951.35	949.81	948.78	949.82	950.59
MW-20	954.90	-	954.50	956.59	-	-	953.74	-	Dry	948.62	947.43	948.89	949.35
MW-21	956.05	-	-	957.98	-	-	954.94	-	951.39	949.01	948.71	949.05	949.97
MW-22	961.55	-	962.27	962.52	-	-	959.00	-	Dry	953.42	Dry	953.84	954.10
MW-22D	-	-	-	-	-	-	-	-	-	-	-	-	-
MW-23	960.27	-	960.81	960.77	-	-	957.34	-	953.27	953.50	954.13	954.78	955.38
MW-24	959.69	-	959.69	959.81	-	-	954.85	-	Dry	951.75	952.09	953.09	953.73
MW-25	959.01	-	959.19	959.07	-	-	954.55	-	Dry	952.50	953.02	953.96	953.51
MW-26	958.30	-	958.10	958.19	-	-	953.07	-	Dry	951.06	950.97	952.36	952.79
MW-27A	955.54	-	955.45	955.62	-	-	951.96	-	947.88	949.19	947.75	950.82	950.19
MW-27B	955.56	-	955.45	955.69	-	-	951.98	-	947.86	949.25	947.80	950.86	950.22
MW-28	955.74	-	955.47	955.49	-	-	950.97	-	946.52	949.41	948.54	951.43	950.55
MW-29	955.49	-	954.87	954.81	-	-	950.06	-	947.92	949.62	948.97	951.72	950.82
MW-30	956.17	-	954.37	953.57	-	-	951.18	-	951.59	951.65	951.51	953.57	952.93
MW-31	957.60	-	955.95	954.43	-	-	954.54	-	956.11	954.65	954.79	955.77	955.62
MW-32	958.35	-	956.15	954.37	-	-	955.63	-	957.43	955.77	956.04	956.90	956.85
MW-33	957.55	-	957.96	957.24	-	-	955.21	-	954.81	954.94	955.42	956.25	956.50
MW-34	961.80	963.42	-	-	963.42	962.81	-	962.08	-	957.50	957.84	959.22	958.02
MW-307	956.38	954.68	-	-	954.64	953.24	-	952.98	-	Dry	Dry	Dry	Dry
MW-307D	-	-	-	-	-	-	-	-	-	-	-	-	-
TW-1	960.01	964.15	-	-	964.21	964.39	-	963.93	-	958.57	957.98	960.22	957.65
TW-2	960.43	962.05	-	-	962.13	961.15	-	959.96	-	954.94	954.93	955.57	954.43

Notes: BTOC - Below top of casing. NAVD88 - North American Vertical Datum, 1988.

GHD 12592594-RPT-4(r1)-Tables.xlsx



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→ The Power of Commitment