Prepared for
Illinois Power Resources Generating, LLC

Date
January 31, 2021

Project No.
1940074916

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

DUCK CREEK BOTTOM ASH BASIN, DUCK CREEK POWER STATION

RAMBOLL Bright ideas. Sustainable change.

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
DUCK CREEK BOTTOM ASH BASIN, DUCK CREEK POWER STATION

Project name	**Duck Creek Power Station**
Project no.	**1940074916**
Recipient	**Illinois Power Resources Generating, LLC**
Document type	**Annual Groundwater Monitoring and Corrective Action Report**
Version	**FINAL**
Date	**January 31, 2021**
Prepared by	**Kristen L. Theesfeld**
Checked by	**Scott S. Woods**
Approved by	**Lauren D. Cook**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA

T 414-837-3607
F 414-837-3608
https://ramboll.com

Kristen L. Theesfeld
Hydrogeologist

Scott S. Woods
Hydrogeologist

CONTENTS

TABLES (IN TEXT)

TABLES (ATTACHED)

FIGURES

ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
CCR	Coal Combustion Residuals
CMA	Corrective Measures Assessment
BAB	Bottom Ash Basin
GWPS	Groundwater Protection Standard
SAP	Sampling and Analysis Plan
SSI	Statistically Significant Increase
SSL	Statistically Significant Level

EXECUTIVE SUMMARY

This report has been prepared to provide the information required by Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.90(e) for the Duck Creek Bottom Ash Basin (BAB) located at Duck Creek Power Station near Canton, Illinois.

Groundwater is being monitored at Duck Creek BAB in accordance with the Detection Monitoring Program requirements specified in 40 C.F.R. § 257.94.

No changes were made to the monitoring system in 2020 (no wells were installed or decommissioned).

No Statistically Significant Increases (SSIs) of 40 C.F.R. Part 257 Appendix III parameter concentrations greater than background concentrations were determined and Duck Creek BAB remains in the Detection Monitoring Program.

1. INTRODUCTION

This report has been prepared by Ramboll on behalf of Illinois Power Resources Generating, LLC, to provide the information required by 40 C.F.R. § 257.90(e) for Duck Creek BAB located at Duck Creek Power Station near Canton, Illinois.

In accordance with 40 C.F.R. § 257.90(e), the owner or operator of a Coal Combustion Residuals (CCR) unit must prepare an Annual Groundwater Monitoring and Corrective Action Report for the preceding calendar year that documents the status of the Groundwater Monitoring and Corrective Action Program for the CCR unit, summarizes key actions completed, describes any problems encountered, discusses actions to resolve the problems, and projects key activities for the upcoming year. At a minimum, the annual report must contain the following information, to the extent available:

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.
2. 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.
3. 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.
4. 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 SSI relative to background levels).
5. Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.
6. A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:
   i. At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95.
   ii. At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95.
   iii. If it was determined that there was a SSI over background for one or more constituents listed in Appendix III of §257 pursuant to §257.94(e):
      A. Identify those constituents listed in Appendix III of §257 and the names of the monitoring wells associated with the SSI(s).
      B. Provide the date when the assessment monitoring program was initiated for the CCR unit.

iv. If it was determined that there was a Statistically Significant Level (SSL) above the Groundwater Protection Standard (GWPS) for one or more constituents listed in Appendix IV of §257 pursuant to §257.95(g) include all of the following:

   A. Identify those constituents listed in Appendix IV of §257 and the names of the monitoring wells associated with the SSL(s).

   B. Provide the date when the Corrective Measures Assessment (CMA) was initiated for the CCR unit.

   C. Provide the date when the public meeting was held for CMA for the CCR unit.

   D. Provide the date when the CMA was completed for the CCR unit.

v. Whether a remedy was selected pursuant to §257.97 during the current annual reporting period, and if so, the date of remedy selection.

vi. Whether remedial activities were initiated or are ongoing pursuant to §257.98 during the current annual reporting period.

This report provides the required information for Duck Creek BAB for calendar year 2020.

2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

No changes have occurred to the monitoring program status in calendar year 2020, and Duck Creek BAB remains in the Detection Monitoring Program in accordance with 40 C.F.R. § 257.94.

3. KEY ACTIONS COMPLETED IN 2020

The Detection Monitoring Program is summarized in Table A. The groundwater monitoring system, including the CCR unit and all background and downgradient monitoring wells, is presented in Figure 1. No changes were made to the monitoring system in 2020. In general, one groundwater sample was collected from each background and downgradient well during each monitoring event.[1] All samples were collected and analyzed in accordance with the Sampling and Analysis Plan (SAP) (NRT/OBG, 2017a). All monitoring data obtained under 40 C.F.R. §§ 257.90 through 257.98 (as applicable) in 2020, and analytical results for the July 2019 sampling event, are presented in Table 1. Analytical data were evaluated in accordance with the Statistical Analysis Plan (NRT/OBG, 2017b) to determine any SSIs of Appendix III parameters relative to background concentrations.

Statistical background values are provided in Table 2.

[1] Sampling was limited to BA01 and BA06 during the June 2020 sampling event to confirm Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event to confirm SSIs, as allowed by the Statistical Analysis Plan.

Table A – 2019–2020 Detection Monitoring Program Summary

Sampling Date	Analytical Data Receipt Date	Parameters Collected	SSI(s)	SSI(s) Determination Date
July 10 - 17, 2019	October 15, 2019	Appendix III	None	January 13, 2020
January 13, 2020	April 15, 2020	Appendix III	None	July 14, 2020
June 9, 2020 [1]	June 22, 2020	Appendix III Greater than Background [2]		
August 13 - 17, 2020	October 15, 2020	Appendix III	TBD	TBD
November 19, 2020	November 24, 2020	Appendix III Greater than Background [2]		

Notes:
NA: Not Applicable
TBD: To Be Determined
1. Sampling was limited to BA01 and BA06 during the June 2020 sampling event to confirm Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event to confirm SSIs, as allowed by the Statistical Analysis Plan.
2. Groundwater sample analysis was limited to Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event to confirm SSIs, as allowed by the Statistical Analysis Plan.

4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

No problems were encountered with the Groundwater Monitoring Program during 2020. Groundwater samples were collected and analyzed in accordance with the SAP (NRT/OBG, 2017a), and all data were accepted.

5. KEY ACTIVITIES PLANNED FOR 2021

The following key activities are planned for 2021:

- Continuation of the Detection Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2021.
- Complete evaluation of analytical data from the downgradient wells, using background data to determine whether an SSI of Appendix III parameters detected at concentrations greater than background concentrations has occurred.
- If an SSI is identified, potential alternate sources (*i.e.*, a source other than the CCR unit caused the SSI or that that SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality) will be evaluated. If an alternate source is demonstrated to be the cause of the SSI, a written demonstration will be completed within 90 days of SSI determination and included in the 2021 Annual Groundwater Monitoring and Corrective Action Report.
- If an alternate source(s) is not identified to be the cause of the SSI, the applicable requirements of 40 C.F.R. §§ 257.94 through 257.98 as may apply in 2021 (*e.g.*, Assessment Monitoring) will be met, including associated recordkeeping/notifications required by 40 C.F.R. §§ 257.105 through 257.108.

6. REFERENCES

Natural Resource Technology, an OBG Company (NRT/OBG), 2017a. Sampling and Analysis Plan, Duck Creek Bottom Ash Basin, Duck Creek Power Station, Canton, Illinois, Project No. 2285, Revision 0, October 17, 2017.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017b. Statistical Analysis Plan, Duck Creek Power Station, Edwards Power Station, Illinois Power Resources Generating, LLC, October 17, 2017.

TABLES

TABLE 1.
ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
DUCK CREEK POWER STATION
205 - BOTTOM ASH BASIN
CANTON, IL

Well ID	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft) 6020A	Groundwater Elevation (ft NAVD88) 6020A	Boron, total (mg/L) 6020A	Calcium, total (mg/L) 6020A	Chloride, total (mg/L) 9251	Fluoride, total (mg/L) 9214	pH (field) (STD) SM4500 H+B	Sulfate, total (mg/L) 9036	Total Dissolved Solids (mg/L) SM 2540C
BA01 Downgradient	40.46888738	-89.98214074	7/1/2019	12	575.09							
			7/10/2019			0.032	130	8.4	0.278	7.0	140	610
			1/13/2020	13.29	573.8	0.033	130	11	0.251	6.7	140	570
			6/9/2020	12.48	574.61					6.9		
			8/6/2020	16.35	570.74							
			8/13/2020			0.021	120	13	<0.25	6.5	150	540
			11/19/2020	16.71	570.38					6.9		
BA02 Downgradient	40.46841895	-89.98132488	7/1/2019	5.06	574.87							
			7/10/2019			0.061	110	10	0.282	7.3	16	520
			1/13/2020	4.71	575.22	0.058	92	9.6	<0.25	7.4	19	450
			8/6/2020	11.01	568.92							
			8/13/2020			0.065	100	10	<0.25	6.6	15	490
			11/19/2020	13.8	566.13					7.1		
BA03 Downgradient	40.46808253	-89.98213626	7/1/2019	3.98	574.36							
			7/10/2019			0.032	110	6	0.314	7.3	18	480
			1/13/2020	3.55	574.79	0.027	110	6.3	<0.25	7.1	20	490
			8/6/2020	10.04	568.3							
			8/13/2020			0.038	100	5.9	<0.25	6.9	17	410
			11/19/2020	8.3	570.04					7.0		
BA04 Downgradient	40.46837409	-89.98299132	7/1/2019	5	573.19							
			7/17/2019			0.09	120	36	0.326	7.1	120	700
			1/13/2020	5.67	572.52	0.33	150	35	<0.25	7.0	150	710
			8/6/2020	7.49	570.7							
			8/13/2020			1.9	130	66	0.289	6.8	160	690
			11/19/2020	7.82	570.37					6.9		
BA05 Background	40.46934723	-89.9830749	7/1/2019	14.76	581.26							
			7/17/2019			0.16	200	10	0.295	7.2	490	1200
			1/13/2020	16.05	579.97	0.14	210	11	<0.25	7.0	470	1100
			8/6/2020	22.24	573.78							

TABLE 1.
ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
DUCK CREEK POWER STATION
205 - BOTTOM ASH BASIN
CANTON, IL

Well ID	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft) 6020A	Groundwater Elevation (ft NAVD88) 6020A	Boron, total (mg/L) 6020A	Calcium, total (mg/L) 6020A	Chloride, total (mg/L) 9251	Fluoride, total (mg/L) 9214	pH (field) (STD) SM4500 H+B	Sulfate, total (mg/L) 9036	Total Dissolved Solids (mg/L) SM 2540C
BA05 Background	40.46934723	-89.9830749	8/17/2020			0.13	190	8.9	<0.25	6.9	500	1200
			11/19/2020	22.55	573.47					6.9		
BA06 Background	40.46931646	-89.98096151	7/1/2019	19.6	576.33							
			7/17/2019			5.2	380	700	0.314	7.2	500	2100
			1/13/2020	19.9	576.03	4.9	390	690	<0.25	6.7	480	2000
			6/9/2020	19.64	576.29					6.5		
			8/6/2020	27.11	568.82							
			8/13/2020			6	360	680	0.269	6.7	480	2200
			11/19/2020	28.15	567.78					6.6		

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
ft = foot/feet
mg/L = milligrams per liter
NAVD88 = North American Vertical Datum of 1988
S.U. = Standard Units
< = concentration is less than the concentration shown, which corresponds to the reporting limit for the method; estimated concentrations below the reporting limit and associated qualifiers are not provided since not utilized in statistics to determine Statistically Significant Increases (SSIs) over background.
4-digit numbers below parameter represent SW-846 analytical methods and alpha-numeric values that begin with SM represent Standard Methods for the Examination of Water and Wastewater.

TABLE 2.
STATISTICAL BACKGROUND VALUES
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
DUCK CREEK POWER STATION
205 - BOTTOM ASH BASIN
CANTON, ILLINOIS
DETECTION MONITORING PROGRAM

Parameter	Statistical Background Value (UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	3.90
Calcium (mg/L)	409
Chloride (mg/L)	650
Fluoride (mg/L)	0.529
pH (S.U.)	6.9 / 7.7
Sulfate (mg/L)	596.3
Total Dissolved Solids (mg/L)	2164

[O: RAB 12/20/19, C: KLT 12/23/19]

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
mg/L = milligrams per liter
S.U. = Standard Units
UPL = Upper Prediction Limit

FIGURES

- BACKGROUND MONITORING WELL LOCATION
- DOWNGRADIENT MONITORING WELL LOCATION
- CCR MONITORED UNIT

0 125 250 Feet

MONITORING WELL LOCATION MAP
DUCK CREEK BOTTOM ASH BASIN
UNIT ID:205

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
VISTRA CCR RULE GROUNDWATER MONITORING
DUCK CREEK POWER STATION
CANTON, ILLINOIS

FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL