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Illinois Power Resources Generating, LLC

Date
January 31, 2022

Project No.
1940100711-006

**2021 ANNUAL GROUNDWATER
MONITORING AND CORRECTIVE
ACTION REPORT**

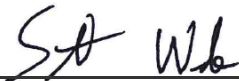
**ASH POND
EDWARDS POWER PLANT
BARTONVILLE, ILLINOIS
CCR UNIT 301**

**2021 ANNUAL GROUNDWATER MONITORING AND
CORRECTIVE ACTION REPORT
EDWARDS POWER PLANT ASH POND**

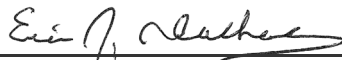
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ACRONYMS AND ABBREVIATIONS

§	Section
40 C.F.R.	Title 40 of the Code of Federal Regulations
AP	Ash Pond
ASD	Alternate Source Demonstration
CCR	coal combustion residuals
CMA	Corrective Measures Assessment
EPP	Edwards Power Plant
GWPS	groundwater protection standard
NA	not applicable
NRT/OBG	Natural Resource Technology, an OBG Company
Ramboll	Ramboll Americas Engineering Solutions, Inc.
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.) Section (§) 257.90(e) for the Ash Pond (AP) located at Edwards Power Plant (EPP) near Bartonville, Illinois.

Groundwater is being monitored at the AP in accordance with the Assessment Monitoring Program requirements specified in 40 C.F.R. § 257.95. Assessment Monitoring was initiated at the AP on April 9, 2018.

No changes were made to the monitoring system in 2021 (no wells were installed or decommissioned).

No Statistically Significant Levels (SSLs) of 40 C.F.R. § 257 Appendix IV parameters were determined. Consequently, a Corrective Measures Assessment (CMA) is not required and the AP remains in the Assessment Monitoring Program.

1. INTRODUCTION

This report has been prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll) on behalf of Illinois Power Resources Generating, LLC, to provide the information required by 40 C.F.R. § 257.90(e) for the AP located at the EPP near Bartonville, 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 Statistically Significant Increase [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 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 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 the AP for calendar year 2021.

2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

No changes have occurred to the Monitoring Program status in calendar year 2021 and the AP remains in the Assessment Monitoring Program in accordance with 40 C.F.R. § 257.95.

3. KEY ACTIONS COMPLETED IN 2021

The Assessment Monitoring Program is summarized in **Table A** on the following page. The groundwater monitoring system, including the CCR unit and all background and compliance monitoring wells, is presented in **Figure 1**. No changes were made to the monitoring system in 2021. In general, one groundwater sample was collected from each background and compliance well during each monitoring event. All samples were collected and analyzed in accordance with the Sampling and Analysis Plan (SAP; Natural Resource Technology, an OBG Company [NRT/OBG], 2017a). All monitoring data obtained under 40 C.F.R. § 257.90 through 257.98 (as applicable) in 2021, and analytical results for the August 31 to September 2020 sampling event, are presented in **Tables 1 to 3**. Analytical data were evaluated in accordance with the Statistical Analysis Plan (NRT/OBG, 2017b) to determine any SSLs of Appendix IV parameters over GWPSs.

Statistical background values are provided in **Table 4** and GWPSs in **Table 5**. The background values reported in **Table 4** are slightly different from those reported previously because different software was utilized to calculate these values in 2021.

Table A. 2020-2021 Assessment Monitoring Program Summary

Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSL(s)	SSL(s) Determination Date	ASD Completion Date
August 31 to September 1, 2020	October 15, 2020	Appendix III Appendix IV Detected ¹	none	January 13, 2021	NA
February 23, 2021	April 14, 2021	Appendix III Appendix IV	none	July 13, 2021	NA
August 30, 2021	September 28, 2021	Appendix III Appendix IV Detected ¹	none	December 26, 2021	NA

Notes:

ASD: Alternate Source Demonstration

NA: not applicable

¹ Groundwater sample analysis was limited to Appendix IV parameters detected during previous events in accordance with 40 C.F.R. § 257.95(d)(1).

4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

No problems were encountered with the Groundwater Monitoring Program during 2021. Groundwater samples were collected and analyzed in accordance with the SAP (NRT/OBG, 2017a), and all data were accepted.

5. KEY ACTIVITIES PLANNED FOR 2022

The following key activities are planned for 2022:

- All or part of the monitoring well network that was proposed for compliance with Title 35 of the Illinois Administrative Code § 845 is under evaluation for incorporation into the current monitoring system.
- Continuation of the Assessment Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2022.
- Complete evaluation of analytical data from the compliance wells, using GWPSs to determine whether an SSL of Appendix IV parameters has occurred.
- If an SSL is identified, potential alternate sources (*i.e.*, a source other than the CCR unit caused the SSL or that the SSL 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 SSL, a written demonstration will be completed within 90 days of SSL determination and included in the 2022 Annual Groundwater Monitoring and Corrective Action Report.
 - If an alternate source(s) is not identified to be the cause of the SSL, the applicable requirements of 40 C.F.R. § 257.94 through 257.98 (*e.g.*, assessment of corrective measures) as may apply in 2022 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, Edwards Ash Pond, Edwards Power Station, Bartonville, 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
GROUNDWATER ELEVATIONS
 2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
 EDWARDS POWER PLANT
 301 - ASH POND
 BARTONVILLE, IL

Well ID	Well Type	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft BMP)	Groundwater Elevation (ft NAVD88)
AP05S	Background	40.59881	-89.66191	08/31/2020	5.21	438.32
				02/09/2021	5.92	437.61
				02/11/2021	5.58	437.95
				03/02/2021	5.60	437.93
				03/22/2021	5.10	438.43
				04/12/2021	4.94	438.59
				05/04/2021	5.10	438.43
				06/15/2021	5.23	438.30
				06/28/2021	5.29	438.24
				07/21/2021	4.86	438.67
08/30/2021	5.40	438.13				
AW-06	Compliance	40.59424	-89.67005	08/31/2020	27.97	433.60
				02/09/2021	27.17	434.40
				02/11/2021	27.07	434.50
				03/02/2021	26.95	434.62
				03/22/2021	26.87	434.70
				04/12/2021	26.72	434.85
				05/04/2021	27.09	434.48
				06/15/2021	27.31	434.26
				06/28/2021	26.97	434.60
				07/21/2021	27.17	434.40
08/30/2021	25.56	436.01				
AW-08	Background	40.59396	-89.66200	08/31/2020	22.45	440.09
				02/09/2021	24.26	438.28
				02/11/2021	28.38	434.16
				03/02/2021	24.77	437.77
				03/22/2021	23.27	439.27
				04/12/2021	22.45	440.09
				05/04/2021	23.07	439.47
				06/15/2021	22.40	440.14
				06/28/2021	23.13	439.41
				07/21/2021	20.80	441.74
08/30/2021	23.05	439.49				
AW-09	Compliance	40.59042	-89.66878	08/31/2020	26.16	435.29
				02/09/2021	25.72	435.73
				02/11/2021	25.78	435.67
				03/02/2021	26.82	434.63
				03/22/2021	25.68	435.77
				04/12/2021	25.49	435.96
				05/04/2021	25.82	435.63
				06/15/2021	25.81	435.64
				06/28/2021	24.94	436.51
				07/21/2021	25.55	435.90
08/30/2021	26.10	435.35				
AW-10	Compliance	40.59073	-89.66383	08/31/2020	1.09	438.84
				02/09/2021	Not Measured	

TABLE 1
GROUNDWATER ELEVATIONS
 2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
 EDWARDS POWER PLANT
 301 - ASH POND
 BARTONVILLE, IL

Well ID	Well Type	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft BMP)	Groundwater Elevation (ft NAVD88)
AW-10	Compliance	40.59073	-89.66383	02/11/2021	Not Measured	
				03/02/2021	1.09	438.84
				03/22/2021	1.09	438.84
				04/12/2021	1.08	438.85
				05/04/2021	1.13	438.80
				06/15/2021	1.31	438.62
				06/28/2021	1.32	438.61
				07/21/2021	1.33	438.60
				08/30/2021	2.00	437.93
AW-11	Compliance	40.58726	-89.66378	08/31/2020	5.69	434.18
				02/09/2021	5.70	434.17
				02/11/2021	5.74	434.13
				03/02/2021	5.36	434.51
				03/22/2021	5.27	434.60
				04/12/2021	5.22	434.65
				05/04/2021	5.31	434.56
				06/15/2021	6.47	433.40
				06/28/2021	5.49	434.38
				07/21/2021	5.31	434.56
08/30/2021	5.82	434.05				

Notes:
 BMP = below measuring point
 ft = foot/feet
 NAVD88 = North American Vertical Datum of 1988

TABLE 2
ANALYTICAL RESULTS - APPENDIX III PARAMETERS
 2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
 EDWARDS POWER PLANT
 301 - ASH POND
 BARTONVILLE, IL

Well ID	Well Type	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (field) (SU)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
AP05S	Background	40.59881	-89.66191	09/01/2020	0.38	110	41	<0.25	6.9	<1	760
				02/23/2021	0.39	120	47	<0.25	6.8	<1	530
				08/30/2021	0.33	140	44	<0.25	6.8	1.4	840
AW-06	Compliance	40.59424	-89.67005	08/31/2020	0.12	100	34	0.372	7.3	25	540
				02/23/2021	0.13	130	36	0.355	7.1	27	390
				08/30/2021	0.11	110	35	0.379	7.1	28	550
AW-08	Background	40.59396	-89.66200	09/01/2020	0.17	130	16	0.278	7.1	2.3	660
				02/23/2021	0.12	150	5.2	0.318	6.9	<1	410
				08/30/2021	0.094	150	18	0.564	7.2	<1	720
AW-09	Compliance	40.59042	-89.66878	08/31/2020	0.26	120	26	<0.25	6.9	<1	760
				02/23/2021	0.28	140	8.1	<0.25	6.9	<1	470
				08/30/2021	0.24	130	27	<0.25	7.0	<1	810
AW-10	Compliance	40.59073	-89.66383	08/31/2020	0.54	140	88	<0.25	6.8	<1	1200
				02/23/2021	0.55	130	110	<0.25	6.9	<1	680
				08/30/2021	0.49	130	94	<0.25	7.0	<1	1200
AW-11	Compliance	40.58726	-89.66378	08/31/2020	0.21	150	29	<0.25	6.9	<1	970
				02/23/2021	0.25	160	33	<0.25	7.0	<1	510
				08/30/2021	0.23	160	32	<0.25	6.9	<1	1000

Notes:

mg/L = milligrams per liter

SU = 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 they are not utilized in statistics to determine Statistically Significant Increases (SSIs) over background

TABLE 3
ANALYTICAL RESULTS - APPENDIX IV PARAMETERS
 2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
 EDWARDS POWER PLANT
 301 - ASH POND
 BARTONVILLE, IL

Well ID	Well Type	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Antimony, total (mg/L)	Arsenic, total (mg/L)	Barium, total (mg/L)	Beryllium, total (mg/L)	Cadmium, total (mg/L)	Chromium, total (mg/L)	Cobalt, total (mg/L)	Fluoride, total (mg/L)	Lead, total (mg/L)	Lithium, total (mg/L)	Mercury, total (mg/L)	Molybdenum, total (mg/L)	Radium 226+228, total (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
AP05S	Background	40.59881	-89.66191	09/01/2020	--	0.003	1.2	<0.001	--	0.0076	0.004	<0.25	0.0033	0.036	--	<0.001	3.16	<0.001	--
				02/23/2021	<0.003	0.0059	1.3	<0.001	<0.001	0.02	0.0083	<0.25	0.0091	0.044	<0.0002	0.002	2.9	<0.001	<0.001
				08/30/2021	--	0.0072	1.2	<0.001	--	0.032	0.014	<0.25	0.016	0.051	--	0.0027	9.63	0.0014	--
AW-06	Compliance	40.59424	-89.67005	08/31/2020	--	0.0024	0.15	<0.001	--	<0.004	<0.002	0.372	<0.001	<0.02	--	0.0046	0.945	<0.001	--
				02/23/2021	<0.003	0.026	0.4	<0.001	<0.001	0.026	0.014	0.355	0.014	0.033	<0.0002	0.0063	1.97	0.0014	<0.001
				08/30/2021	--	0.0029	0.16	<0.001	--	<0.004	<0.002	0.379	<0.001	<0.02	--	0.0053	0.982	<0.001	--
AW-08	Background	40.59396	-89.66200	09/01/2020	--	0.0086	0.17	<0.001	--	<0.004	<0.002	0.278	<0.001	<0.02	--	0.0023	0.124	<0.001	--
				02/23/2021	<0.003	0.018	0.28	<0.001	<0.001	0.0095	0.0041	0.318	0.0044	<0.02	<0.0002	0.0033	1.82	<0.001	<0.001
				08/30/2021	--	0.018	0.25	<0.001	--	<0.004	<0.002	0.564	<0.001	<0.02	--	0.0017	0.33	<0.001	--
AW-09	Compliance	40.59042	-89.66878	08/31/2020	--	0.02	0.46	<0.001	--	0.0089	0.0059	<0.25	0.0044	0.022	--	0.016	1.43	<0.001	--
				02/23/2021	<0.003	0.017	0.46	<0.001	<0.001	0.022	0.013	<0.25	0.013	0.034	<0.0002	0.018	1.01	0.0011	<0.001
				08/30/2021	--	0.018	0.46	<0.001	--	<0.004	0.0022	<0.25	<0.001	<0.02	--	0.012	0.876	<0.001	--
AW-10	Compliance	40.59073	-89.66383	08/31/2020	--	0.014	1.3	<0.001	--	0.0095	0.0062	<0.25	0.0051	0.051	--	<0.001	3.43	<0.001	--
				02/23/2021	<0.003	0.01	1	<0.001	<0.001	0.0051	0.0037	<0.25	0.0024	0.047	<0.0002	<0.001	3.1	<0.001	<0.001
				08/30/2021	--	0.011	1.1	<0.001	--	0.004	0.003	<0.25	0.0015	0.038	--	<0.001	3.21	<0.001	--
AW-11	Compliance	40.58726	-89.66378	08/31/2020	--	0.011	0.77	<0.001	--	<0.004	0.0024	<0.25	<0.001	0.025	--	0.0021	1.52	<0.001	--
				02/23/2021	<0.003	0.011	0.98	<0.001	<0.001	<0.004	0.0023	<0.25	0.0011	0.024	<0.0002	0.0016	2.46	<0.001	<0.001
				08/30/2021	--	0.011	0.93	<0.001	--	<0.004	<0.002	<0.25	<0.001	<0.02	--	0.0018	2.31	<0.001	--

Notes:

mg/L = milligrams per liter

pCi/L = picoCuries per liter

< = 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 they are not utilized in statistics to determine Statistically Significant Levels (SSLs) over the groundwater protection standard.

-- = not analyzed

TABLE 4
STATISTICAL BACKGROUND VALUES
 2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
 EDWARDS POWER PLANT
 301 - ASH POND
 BARTONVILLE, IL

Parameter	Statistical Background Value (LPL/UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	0.429
Calcium (mg/L)	177
Chloride (mg/L)	44.0
Fluoride (mg/L)	0.376
pH (field) (SU)	6.6/7.4
Sulfate (mg/L)	80.7
Total Dissolved Solids (mg/L)	955

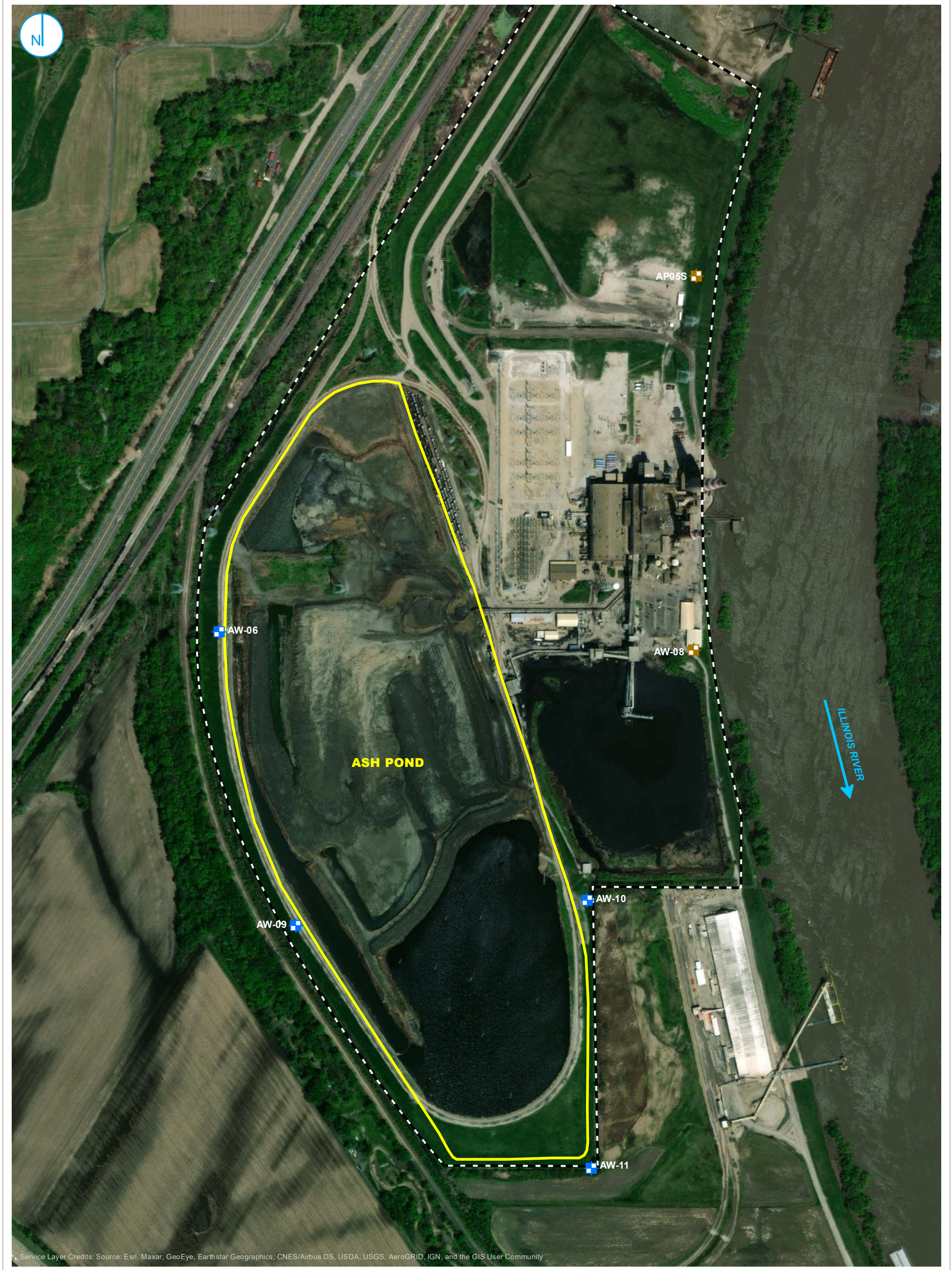
Notes:
 40 C.F.R. = Title 40 of the Code of Federal Regulations
 LPL = Lower Prediction Limit (applicable for pH only)
 mg/L = milligrams per liter
 SU = Standard Units
 UPL = Upper Prediction Limit

TABLE 5
GROUNDWATER PROTECTION STANDARDS
 2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
 EDWARDS POWER PLANT
 301 - ASH POND
 BARTONVILLE, IL

Parameter	Groundwater Protection Standard*
40 C.F.R. Part 257 Appendix IV	
Antimony (mg/L)	0.006
Arsenic (mg/L)	0.019
Barium (mg/L)	2
Beryllium (mg/L)	0.014
Cadmium (mg/L)	0.005
Chromium (mg/L)	0.1
Cobalt (mg/L)	0.006
Fluoride (mg/L)	4.0
Lead (mg/L)	0.015
Lithium (mg/L)	0.054
Mercury (mg/L)	0.002
Molybdenum (mg/L)	0.1
Radium-226 + Radium 228 (pCi/L)	5
Selenium (mg/L)	0.05
Thallium (mg/L)	0.002

Notes:
 * Groundwater Protection Standard is the higher of the Maximum Contaminant Level/Health-Based Level or background.
 40 C.F.R. = Title 40 of the Code of Federal Regulations
 mg/L = milligrams per liter
 pCi/L = picoCuries per liter

FIGURES



Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- BACKGROUND WELL
- COMPLIANCE WELL
- PART 257 REGULATED UNIT (SUBJECT UNIT)
- PROPERTY BOUNDARY

0 212.5 425
 Feet

MONITORING WELL LOCATION MAP

FIGURE 1

2021 ANNUAL GROUNDWATER MONITORING
 AND CORRECTIVE ACTION REPORT
ASH POND
 EDWARDS POWER PLANT
 BARTONVILLE, ILLINOIS

RAMBOLL AMERICAS
 ENGINEERING SOLUTIONS, INC.

