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**Electric Energy, Inc.**

Date  
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Project No.  
**1940100711-009**

**2021 ANNUAL GROUNDWATER  
MONITORING AND CORRECTIVE  
ACTION REPORT**  
**EAST ASH POND**  
**JOPPA POWER PLANT**  
**JOPPA, ILLINOIS**  
**CCR UNIT 401**

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

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Description **Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

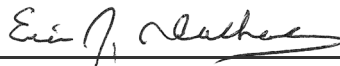
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## ACRONYMS AND ABBREVIATIONS

§	Section
40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
CCR	coal combustion residuals
CMA	Corrective Measures Assessment
EAP	East Ash Pond
GWPS	groundwater protection standard
JPP	Joppa Power Plant
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
TBD	to be determined

## 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 East Ash Pond (EAP) located at Joppa Power Plant (JPP) near Joppa, Illinois.

Groundwater is being monitored at the EAP in accordance with the Assessment Monitoring Program requirements specified in 40 C.F.R. § 257.95. Assessment Monitoring was initiated at the EAP 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 EAP remains in the Assessment Monitoring Program.

## 1. INTRODUCTION

This report has been prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll) on behalf of Electric Energy, Inc., to provide the information required by 40 C.F.R. § 257.90(e) for the EAP located at the JPP near Joppa, 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 EAP 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 EAP 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 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
September 23, 2020	October 16, 2020	Appendix III Appendix IV Detected <sup>1</sup>	none	January 14, 2021	NA
March 24 - 25, 2021	April 16, 2021	Appendix III Appendix IV	none	July 15, 2021	NA
September 20, 2021	October 12, 2021	Appendix III Appendix IV Detected <sup>1</sup>	TBD	TBD	NA

**Notes:**

ASD: Alternate Source Demonstration

NA: not applicable

TBD: to be determined

<sup>1</sup> 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, Joppa East Ash Pond, Joppa Power Station, Joppa, Illinois, Project No. 2285, Revision 0, October 17, 2017.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017b, Statistical Analysis Plan, Joppa Power Station, Electric Energy, Inc., October 17, 2017.

## **TABLES**

**TABLE 1  
GROUNDWATER ELEVATIONS**  
2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT  
JOPPA POWER PLANT  
401 - EAST ASH POND  
JOPPA, IL

Well ID	Well Type	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft BMP)	Groundwater Elevation (ft NAVD88)
G01D	Background	37.22043	-88.85718	09/24/2020	43.87	320.32
				03/03/2021	58.92	305.27
				03/24/2021	37.17	327.02
				04/14/2021	38.27	325.92
				05/12/2021	40.07	324.12
				06/01/2021	43.73	320.46
				06/14/2021	42.09	322.10
				07/06/2021	42.81	321.38
				07/21/2021	43.30	320.89
				09/20/2021	44.14	320.05
G02D	Background	37.22071	-88.85331	09/24/2020	43.51	320.14
				03/03/2021	41.88	321.77
				03/24/2021	37.74	325.91
				04/14/2021	38.94	324.71
				05/12/2021	39.93	323.72
				06/01/2021	42.42	321.23
				06/14/2021	41.79	321.86
				07/06/2021	43.91	319.74
				07/21/2021	43.03	320.62
				09/20/2021	44.79	318.86
G51D	Compliance	37.21602	-88.85565	09/24/2020	44.94	318.91
				03/03/2021	42.38	321.47
				03/24/2021	37.75	326.10
				04/14/2021	38.40	325.45
				05/11/2021	40.71	323.14
				06/01/2021	42.75	321.10
				06/14/2021	43.01	320.84
				07/06/2021	41.18	322.67
				07/20/2021	44.26	319.59
				09/20/2021	46.00	317.85
G52D	Compliance	37.20963	-88.85294	09/24/2020	25.70	322.71
				03/03/2021	20.95	327.46
				03/24/2021	25.05	323.36
				04/14/2021	26.54	321.87
				05/12/2021	38.62	309.79
				06/01/2021	24.18	324.23
				06/15/2021	24.50	323.91
				07/06/2021	25.05	323.36
				07/20/2021	25.50	322.91
				09/20/2021	27.31	321.10
G53D	Compliance	37.21507	-88.84937	09/24/2020	38.06	317.41
				03/03/2021	36.07	319.40
				03/24/2021	30.32	325.15
				04/14/2021	31.24	324.23
				05/11/2021	34.48	320.99
				06/01/2021	35.82	319.65

**TABLE 1**  
**GROUNDWATER ELEVATIONS**  
 2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT  
 JOPPA POWER PLANT  
 401 - EAST ASH POND  
 JOPPA, IL

Well ID	Well Type	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft BMP)	Groundwater Elevation (ft NAVD88)
G53D	Compliance	37.21507	-88.84937	06/14/2021	35.30	320.17
				07/06/2021	37.45	318.02
				07/20/2021	37.64	317.83
				09/20/2021	39.21	316.26
G54D	Compliance	37.21226	-88.85749	09/24/2020	43.85	313.18
				03/03/2021	39.34	317.69
				03/24/2021	32.95	324.08
				04/14/2021	34.58	322.45
				05/12/2021	38.01	319.02
				06/01/2021	42.24	314.79
				06/14/2021	42.10	314.93
				07/06/2021	42.30	314.73
				07/20/2021	42.26	314.77
				09/20/2021	44.49	312.54

**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  
 JOPPA POWER PLANT  
 401 - EAST ASH POND  
 JOPPA, 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)
G01D	Background	37.22043	-88.85718	09/23/2020	<0.025	24.4	10	0.21	6.7	34	294
				03/24/2021	<0.025	24.8	9	0.21	6.5	21	300
				09/20/2021	<0.025	26	9	0.21	6.5	18	294
G02D	Background	37.22071	-88.85331	09/23/2020	0.0442	45.8	19	0.18	6.6	22	234
				03/24/2021	0.033	34.4	22	0.2	6.3	18	244
				09/20/2021	0.0313	34.3	20	0.18	6.3	19	240
G51D	Compliance	37.21602	-88.85565	09/23/2020	0.863	42.1	6	<0.1	5.7	121	314
				03/24/2021	0.786	31.7	5	<0.1	5.6	122	322
				09/20/2021	0.689	31.2	6	<0.1	5.5	131	312
G52D	Compliance	37.20963	-88.85294	09/23/2020	<0.025	59	15	0.26	6.5	84	336
				03/25/2021	<0.025	48.6	14	0.27	6.2	75	332
				09/20/2021	<0.025	47.8	13	0.26	6.3	83	318
G53D	Compliance	37.21507	-88.84937	09/23/2020	0.411	44.4	20	0.74	6.7	79	342
				03/25/2021	0.355	38.6	19	0.71	6.5	71	334
				09/20/2021	0.402	38.5	19	0.7	6.3	78	324
G54D	Compliance	37.21226	-88.85749	09/23/2020	0.819	122	25	0.33	6.7	173	508
				03/24/2021	0.404	78.1	23	0.32	6.6	186	532
				09/20/2021	0.35	72.8	24	0.29	6.5	175	474

**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  
 JOPPA POWER PLANT  
 401 - EAST ASH POND  
 JOPPA, 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)
G01D	Background	37.22043	-88.85718	09/23/2020	--	0.0014	0.123	--	--	0.004	0.0016	0.21	0.0014	<0.003	--	--	2.27	0.0011	--
				03/24/2021	<0.001	<0.001	0.136	<0.001	<0.001	0.0022	<0.001	0.21	<0.001	<0.003	<0.0002	<0.0015	0	0.0016	<0.002
				09/20/2021	--	<0.001	0.145	--	--	0.0023	<0.001	0.21	<0.001	<0.003	--	--	0.0588	0.0016	--
G02D	Background	37.22071	-88.85331	09/23/2020	--	<0.001	0.253	--	--	<0.0015	<0.001	0.18	<0.001	<0.003	--	--	5.93	0.0052	--
				03/24/2021	<0.001	<0.001	0.206	<0.001	<0.001	<0.0015	<0.001	0.2	<0.001	<0.003	<0.0002	<0.0015	2.7	0.0024	<0.002
				09/20/2021	--	<0.001	0.189	--	--	<0.0015	<0.001	0.18	<0.001	<0.003	--	--	1.01	0.0025	--
G51D	Compliance	37.21602	-88.85565	09/23/2020	--	<0.001	0.0445	--	--	<0.0015	0.002	<0.1	<0.001	0.0071	--	--	1.4	0.0063	--
				03/24/2021	<0.001	<0.001	0.04	<0.001	<0.001	<0.0015	0.0022	<0.1	<0.001	0.0061	<0.0002	<0.0015	1.74	0.0055	<0.002
				09/20/2021	--	<0.001	0.0405	--	--	0.0018	0.0018	<0.1	<0.001	0.0065	--	--	0.295	0.0047	--
G52D	Compliance	37.20963	-88.85294	09/23/2020	--	0.0014	0.278	--	--	<0.0015	0.0015	0.26	<0.001	<0.003	--	--	0.61	<0.001	--
				03/25/2021	<0.001	0.0015	0.254	<0.001	<0.001	<0.0015	0.0016	0.27	<0.001	<0.003	<0.0002	<0.0015	0.966	<0.001	<0.002
				09/20/2021	--	<0.001	0.232	--	--	<0.0015	0.0011	0.26	<0.001	<0.003	--	--	1.43	<0.001	--
G53D	Compliance	37.21507	-88.84937	09/23/2020	--	<0.001	0.122	--	--	<0.0015	0.0024	0.74	<0.001	<0.003	--	--	1.16	<0.001	--
				03/25/2021	<0.001	<0.001	0.112	<0.001	<0.001	<0.0015	0.0026	0.71	<0.001	<0.003	<0.0002	<0.0015	0.321	<0.001	<0.002
				09/20/2021	--	<0.001	0.103	--	--	0.0033	0.0021	0.7	<0.001	<0.003	--	--	1.5	<0.001	--
G54D	Compliance	37.21226	-88.85749	09/23/2020	--	<0.001	0.16	--	--	<0.0015	0.0163	0.33	<0.001	0.0047	--	--	1.18	<0.001	--
				03/24/2021	<0.001	<0.001	0.0941	<0.001	<0.001	<0.0015	0.0045	0.32	<0.001	0.0036	<0.0002	<0.0015	0.576	<0.001	<0.002
				09/20/2021	--	<0.001	0.0879	--	--	<0.0015	0.0083	0.29	<0.001	0.0034	--	--	3.17	<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  
 JOPPA POWER PLANT  
 401 - EAST ASH POND  
 JOPPA, IL

Parameter	Statistical Background Value (LPL/UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	0.0552
Calcium (mg/L)	46.7
Chloride (mg/L)	29.0
Fluoride (mg/L)	0.290
pH (field) (SU)	6.2/6.9
Sulfate (mg/L)	203
Total Dissolved Solids (mg/L)	541

**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  
 JOPPA POWER PLANT  
 401 - EAST ASH POND  
 JOPPA, IL





Parameter	Groundwater Protection Standard*
40 C.F.R. Part 257 Appendix IV	
Antimony (mg/L)	0.006
Arsenic (mg/L)	0.010
Barium (mg/L)	2
Beryllium (mg/L)	0.004
Cadmium (mg/L)	0.005
Chromium (mg/L)	0.1
Cobalt (mg/L)	0.037
Fluoride (mg/L)	4.0
Lead (mg/L)	0.015
Lithium (mg/L)	0.04
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

0 200 400 Feet

### MONITORING WELL LOCATION MAP

FIGURE 1

2021 ANNUAL GROUNDWATER MONITORING  
AND CORRECTIVE ACTION REPORT  
EAST ASH POND  
JOPPA POWER PLANT  
JOPPA, ILLINOIS

RAMBOLL AMERICAS  
ENGINEERING SOLUTIONS, INC.

