Prepared for
Dynegy Midwest Generation, LLC

Date
January 31, 2022

Project No.
1940100711-001

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

BOTTOM ASH POND

BALDWIN POWER PLANT

BALDWIN, ILLINOIS

CCR UNIT 601

RAMBOLL Bright ideas. Sustainable change.

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BALDWIN POWER PLANT BOTTOM ASH POND

Project name	**Baldwin Power Plant**
Project no.	**1940100711-001**
Recipient	**Dynegy Midwest Generation, LLC**
Document type	**Annual Groundwater Monitoring and Corrective Action Report**
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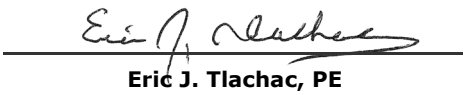
Prepared by	**Eric D. Plante**
Checked by	**Lauren Cook**
Approved by	**Eric J. Tlachac**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

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

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

Eric D. Plante
Geologist



Eric J. Tlachac, PE
Senior Managing Engineer

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ACRONYMS AND ABBREVIATIONS

§	Section
40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
BAP	Bottom Ash Pond
BPP	Baldwin Power Plant
CCR	coal combustion residuals
CMA	Corrective Measures Assessment
GWPS	groundwater protection standard
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 Bottom Ash Pond (BAP) located at Baldwin Power Plant (BPP) near Baldwin, Illinois.

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

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

The following Statistically Significant Levels (SSLs) of 40 C.F.R. § 257 Appendix IV parameters were determined in 2021:

- Lithium at well MW-370

Alternate Source Demonstrations (ASDs) were completed for the SSLs referenced above. Consequently, a Corrective Measures Assessment (CMA) is not required and the BAP remains in the Assessment Monitoring Program.

1. INTRODUCTION

This report has been prepared by Ramboll Americas Engineering Solutions, Inc. (Ramboll) on behalf of Dynegy Midwest Generation, LLC, to provide the information required by 40 C.F.R. § 257.90(e) for the BAP located at the BPP near Baldwin, 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 BAP 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 BAP 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.

Potential alternate sources were evaluated as outlined in the 40 C.F.R. § 257.95(g)(3)(ii). ASDs were completed and certified by a qualified professional engineer. The dates the ASDs were completed are provided in **Table A**. The ASDs are included in **Appendix A**.

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 15 - 17, 2020	October 19, 2020	Appendix III Appendix IV Detected [1]	Lithium (MW-370)	January 17, 2021	April 19, 2021
March 8 - 10, 2021	April 14, 2021	Appendix III Appendix IV	Lithium (MW-370)	July 13, 2021	October 11, 2021
September 14 - 16, 2021	October 13, 2021	Appendix III Appendix IV Detected [1]	TBD	TBD	TBD

Notes:

TBD: to be determined

[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, Baldwin Bottom Ash Pond, Baldwin Energy Complex, Baldwin, Illinois, Project No. 2285, Revision 0, October 17, 2017.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017b. Statistical Analysis Plan, Baldwin Energy Complex, Havana Power Station, Hennepin Power Station, Wood River Power Station, Dynegy Midwest Generation, LLC, October 17, 2017.

TABLES

TABLE 1
GROUNDWATER ELEVATIONS
2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BALDWIN POWER PLANT
601 - BOTTOM ASH POND
BALDWIN, IL

Well ID	Well Type	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft BMP)	Groundwater Elevation (ft NAVD88)
MW-304	Background	38.18833	-89.85344	09/15/2020	9.97	445.52
				12/16/2020	9.82	445.67
				03/08/2021	9.50	445.99
				06/21/2021	9.47	446.02
				09/13/2021	10.09	445.40
MW-306	Background	38.20114	-89.84676	09/15/2020	17.75	435.42
				12/17/2020	17.54	435.63
				03/08/2021	17.12	436.05
				06/22/2021	17.31	435.86
				09/13/2021	10.18	442.99
MW-356	Compliance	38.19896	-89.86958	09/15/2020	3.62	423.98
				12/16/2020	Not Measured	
				03/08/2021	3.94	423.66
				09/13/2021	3.99	423.61
MW-369	Compliance	38.19699	-89.87026	09/15/2020	17.62	405.09
				12/16/2020	Not Measured	
				03/08/2021	9.40	413.31
				09/13/2021	13.80	408.91
MW-370	Compliance	38.19560	-89.86967	09/15/2020	18.92	401.93
				12/16/2020	Not Measured	
				03/08/2021	17.65	403.20
				09/13/2021	18.99	401.86
MW-382	Compliance	38.19454	-89.86804	09/15/2020	16.50	414.69
				12/16/2020	Not Measured	
				03/08/2021	16.25	414.94
				09/13/2021	16.59	414.60

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
BALDWIN POWER PLANT
601 - BOTTOM ASH POND
BALDWIN, 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)
MW-304	Background	38.18833	-89.85344	09/17/2020	1.89	15.3	161	1.79	8.0	196	1320
				03/09/2021	1.57	12.7	159	1.64	7.9	194	1350
				09/14/2021	1.61	13.3	168	1.6	7.7	231	1290
MW-306	Background	38.20114	-89.84676	09/17/2020	0.174	26.9	58	0.56	10.5	37	224
				03/10/2021	0.12	43.4	61	0.52	11.0	37	294
				09/16/2021	<0.025	594	96	0.13	12.0	<20	934
MW-356	Compliance	38.19896	-89.86958	09/15/2020	2.09	11.4	32	2.02	7.8	45	660
				03/09/2021	1.87	11.4	29	1.96	7.7	41	636
				09/15/2021	2.03	11.6	37	2.14	7.7	53	690
MW-369	Compliance	38.19699	-89.87026	09/15/2020	0.683	88.5	105	0.97	7.1	91	756
				03/08/2021	0.621	91.4	94	0.94	7.0	76	774
				09/15/2021	0.647	79.5	289	3.83	8.2	134	1450
MW-370	Compliance	38.19560	-89.86967	09/15/2020	1.97	43.4	1470	3.05	7.5	263	3040
				03/09/2021	1.72	29.4	1370	2.94	7.5	244	2950
				09/15/2021	1.91	45	1560	3.05	7.5	266	3240
MW-382	Compliance	38.19454	-89.86804	09/15/2020	1.75	18.8	32	2.8	7.8	415	1090
				03/09/2021	1.61	27.6	41	2.77	7.7	389	1120
				09/15/2021	1.75	25.7	36	2.9	7.7	459	1120

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
BALDWIN POWER PLANT
601 - BOTTOM ASH POND
BALDWIN, 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)
MW-304	Background	38.18833	-89.85344	09/17/2020	<0.001	0.0024	0.0192	--	--	<0.0015	<0.001	1.79	<0.001	0.091	--	0.0019	0.37	<0.001	--
				03/09/2021	<0.001	0.0024	0.02	<0.001	<0.001	<0.0015	<0.001	1.64	<0.001	0.0737	<0.0002	<0.0015	0.265	<0.001	<0.002
				09/14/2021	<0.001	0.0021	0.0189	--	--	<0.0015	<0.001	1.6	<0.001	0.0777	--	0.0021	0.744	<0.001	<0.002
MW-306	Background	38.20114	-89.84676	09/17/2020	<0.001	0.002	0.0124	--	--	<0.0015	<0.001	0.56	<0.001	0.0143	--	0.0262	1.59	<0.001	--
				03/10/2021	<0.001	0.0018	0.0176	<0.001	<0.001	<0.0015	<0.001	0.52	<0.001	0.0114	<0.0002	0.0275	0.0281	<0.001	<0.002
				09/16/2021	<0.001	<0.001	1.04	--	--	0.0271	0.0035	0.13	0.0052	0.0584	--	0.0086	8.2	<0.001	<0.002
MW-356	Compliance	38.19896	-89.86958	09/15/2020	<0.001	<0.001	0.0291	--	--	<0.0015	<0.001	2.02	<0.001	0.0579	--	<0.0015	1.08	<0.001	--
				03/09/2021	<0.001	<0.001	0.0299	<0.001	<0.001	<0.0015	<0.001	1.96	<0.001	0.0537	<0.0002	<0.0015	0.0883	<0.001	<0.002
				09/15/2021	<0.001	<0.001	0.0299	--	--	<0.0015	<0.001	2.14	<0.001	0.0583	--	0.0016	0.336	<0.001	--
MW-369	Compliance	38.19699	-89.87026	09/15/2020	<0.001	0.0018	0.0894	--	--	<0.0015	0.0033	0.97	<0.001	0.0212	--	0.0092	1.2	<0.001	--
				03/08/2021	<0.001	0.0011	0.0917	<0.001	<0.001	<0.0015	0.0013	0.94	0.0019	0.0177	<0.0002	0.0049	0.509	<0.001	<0.002
				09/15/2021	<0.001	0.0019	0.0691	--	--	<0.0015	<0.001	3.83	<0.001	0.0247	--	0.006	1.28	<0.001	--
MW-370	Compliance	38.19560	-89.86967	09/15/2020	<0.001	<0.001	0.0377	--	--	<0.0015	<0.001	3.05	<0.001	0.151	--	0.0157	0.95	<0.001	--
				03/09/2021	<0.001	<0.001	0.0274	<0.001	<0.001	<0.0015	<0.001	2.94	<0.001	0.14	<0.0002	0.0167	0.418	<0.001	<0.002
				09/15/2021	<0.001	<0.001	0.0407	--	--	<0.0015	<0.001	3.05	<0.001	0.156	--	0.0149	0.248	<0.001	--
MW-382	Compliance	38.19454	-89.86804	09/15/2020	<0.001	<0.001	0.0158	--	--	0.0032	<0.001	2.8	<0.001	0.064	--	0.0033	0.23	<0.001	--
				03/09/2021	<0.001	0.0023	0.0331	<0.001	<0.001	0.013	0.0039	2.77	0.0049	0.0588	<0.0002	0.0034	0.361	<0.001	<0.002
				09/15/2021	<0.001	0.0022	0.0279	--	--	0.0124	0.0033	2.9	0.0043	0.065	--	0.0027	0.921	<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
BALDWIN POWER PLANT
601 - BOTTOM ASH POND
BALDWIN, IL

Parameter	Statistical Background Value (LPL/UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	1.84
Calcium (mg/L)	64.2
Chloride (mg/L)	153
Fluoride (mg/L)	1.88
pH (field) (SU)	7.4/11.5
Sulfate (mg/L)	208
Total Dissolved Solids (mg/L)	1420

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
BALDWIN POWER PLANT
601 - BOTTOM ASH POND
BALDWIN, 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)	0.006
Fluoride (mg/L)	4.0
Lead (mg/L)	0.015
Lithium (mg/L)	0.096
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

- BACKGROUND WELL
- COMPLIANCE WELL
- SOURCE SAMPLE LOCATION
- PART 257 REGULATED UNIT (SUBJECT UNIT)
- FLY ASH POND SYSTEM (CLOSED)
- SITE FEATURE
- CAPPED AREA
- PROPERTY BOUNDARY

0 400 800 Feet

MONITORING WELL LOCATION MAP

2021 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BOTTOM ASH POND
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

APPENDICES

APPENDIX A
ALTERNATE SOURCE DEMONSTRATIONS

Intended for
Dynegy Midwest Generation, LLC

Date
April 19, 2021

Project No.
1940100711-001

40 C.F.R. § 257.95(g)(3)(ii): ALTERNATE SOURCE DEMONSTRATION

BALDWIN BOTTOM ASH POND

RAMBOLL Bright ideas. Sustainable change.

CERTIFICATIONS

I, Jacob J. Walczak, a professional geologist in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Jacob J. Walczak
Professional Geologist
196-001473
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: April 19, 2021

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: April 19, 2021

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA
T 414-837-3607
F 414-837-3608
https://ramboll.com

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TABLES (IN TEXT)

FIGURES (IN TEXT)

FIGURES (ATTACHED)

APPENDICES

ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
A3D	Assessment Monitoring Sampling Event A3D
ASD	Alternate Source Demonstration
BAP	Bottom Ash Pond
CCR	Coal Combustion Residuals
DMG	Dynegy Midwest Generation, LLC
GWPS	Groundwater Protection Standard
LOE	line of evidence
mg/L	milligrams per liter
NRT/OBG	Natural Resource Technology, an OBG Company
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SSI	Statistically Significant Increase
SSL	Statistically Significant Level

1. INTRODUCTION

Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.95(g)(3)(ii) allows the owner or operator of a Coal Combustion Residuals (CCR) unit 90 days from the date of determination of Statistically Significant Levels (SSLs) over Groundwater Protection Standards (GWPSs) of groundwater constituents listed in Appendix IV of 40 C.F.R. Part 257 to complete a written demonstration that a source other than the CCR unit being monitored caused the SSL(s), or that the SSL(s) resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Alternate Source Demonstration [ASD]).

This ASD has been prepared on behalf of Dynegy Midwest Generation, LLC (DMG), by Ramboll Americas Engineering Solutions, Inc. (Ramboll), to provide pertinent information pursuant to 40 C.F.R. § 257.95(g)(3)(ii) for the Baldwin Bottom Ash Pond (BAP) located near Baldwin, Illinois.

The most recent Assessment Monitoring sampling event (A3D) was completed on September 17, 2020 and analytical data was received on October 19, 2020. Analytical data from all sampling events, from December 2015 through A3D, were evaluated in accordance with the Statistical Analysis Plan (Natural Resource Technology, an OBG Company [NRT/OBG], 2017) to determine any Statistically Significant Increases (SSIs) of Appendix III parameters over background concentrations or SSLs of Appendix IV parameters over GWPSs. That evaluation identified one SSL at downgradient monitoring wells as follows:

- Lithium at well MW-370

Pursuant to 40 C.F.R. § 257.95(g)(3)(ii), the following lines of evidence (LOEs) demonstrate that sources other than the Baldwin BAP were the cause of the lithium SSL listed above. This ASD was completed by April 19, 2021, within 90 days of determination of the SSLs (January 17, 2021), as required by 40 C.F.R. § 257.95(g)(3)(ii).

2. ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

This ASD is based on the following LOEs:

1. The median lithium concentration in the BAP porewater is lower than the median concentrations observed in background and downgradient groundwater.
2. The BAP porewater has a different ionic composition than groundwater.

These LOEs are described and supported in greater detail below. Monitoring wells and the BAP porewater sample locations are shown in Figure 1.

2.1 LOE #1: The Median Lithium Concentration in the BAP Porewater is Lower Than Median Concentrations Observed in Background and Downgradient Groundwater.

The table below (Table A) provides summary statistics for groundwater lithium concentrations and BAP porewater lithium concentrations collected from TPZ-164 bottom ash porewater well (see boring log in Attachment A).

Table A – Summary Statistics for Lithium in Groundwater and BAP Porewater (December 2015 to September 2020).

Sample Location	Lithium (milligrams per liter [mg/L])		
	Minimum	Maximum	Median
Background Groundwater[1]	0.013	0.096	0.046
Downgradient Groundwater[2]	0.018	0.18	0.058
BAP Porewater[3]	0.013	0.018	0.015

Note:
[1]Background groundwater was collected at monitoring wells MW-304 and MW-306.
[2]Downgradient groundwater was collected at monitoring wells MW-356, MW-369, MW-370 and MW-382.
[3]BAP porewater was collected at TPZ-164.

The following observations can be made from Table A above:

- Concentrations of lithium in background wells ranged from 0.013 to 0.096 mg/L, with a median concentration of 0.046 mg/L.
- Concentrations of lithium in downgradient wells ranged from 0.018 to 0.18 mg/L, with a median concentration of 0.058 mg/L.
- Concentrations of lithium in BAP porewater ranged from 0.013 to 0.018 mg/L, with a median concentration of 0.015 mg/L. The median lithium concentration observed in porewater is below the median lithium concentrations observed in both background and downgradient groundwater monitoring wells.

If the BAP was the source of lithium in downgradient groundwater, BAP porewater concentrations of lithium would be expected to be higher than the groundwater concentrations. Therefore, the BAP is not the source of lithium in the downgradient groundwater, including at MW-370. Background lithium concentrations were also shown to be higher than BAP porewater, suggesting

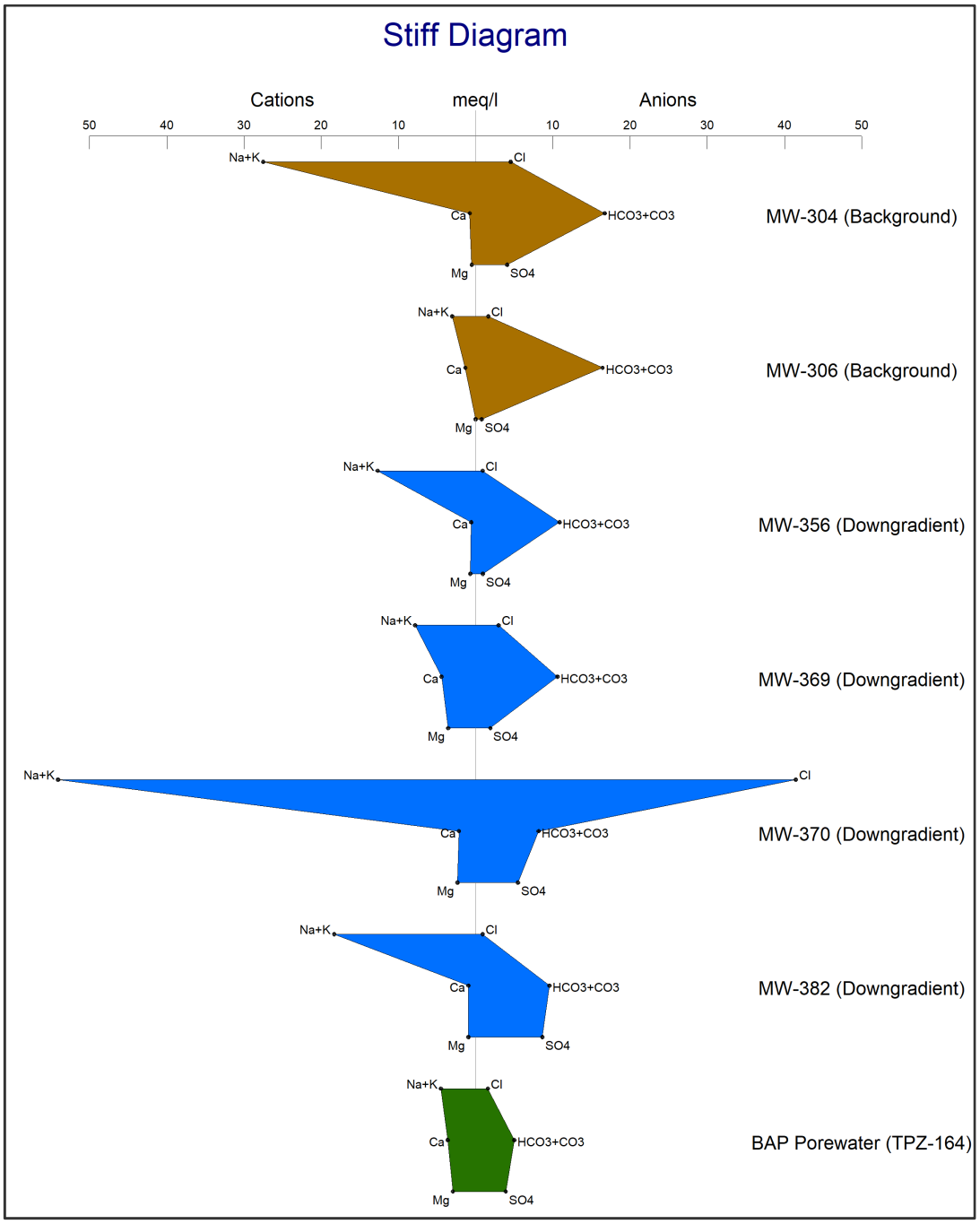
lithium concentrations are either naturally occurring due to geochemical variations within the Uppermost Aquifer or from upgradient anthropogenic sources.

2.2 LOE #2: The BAP Porewater has a Different Ionic Composition Than Groundwater.

Stiff diagrams graphically represent ionic composition of aqueous solutions. Figure A below shows a series of Stiff diagrams that display the ionic compositions of groundwater from background monitoring wells (brown), downgradient monitoring wells (blue), and the BAP porewater (green). Polygons with similar shapes represent solutions with similar ionic compositions, whereas polygons with different shapes indicate solutions with dissimilar ionic compositions; the larger the area of the polygon, the greater the concentration of the various ions.

The ionic compositions of the groundwater and BAP porewater represented by Figure A are discussed in more detail below.

- The ionic composition of the groundwater in downgradient monitoring wells is similar to that in background monitoring well MW-304, with one exception, as represented by the similarity of the Stiff diagram sizes and shapes.
  - The dominant cations in downgradient groundwater monitoring wells and background monitoring well MW-304 are sodium-potassium and the dominant anions are bicarbonate-carbonate. The exception is MW-370, which has chloride as the dominant anion.
- The BAP porewater sample has no dominant cation and the dominant anion is bicarbonate-carbonate.



Note: A poor ionic balance was determined for background well MW-306

Figure A. Stiff Diagram Showing Ionic Composition of Samples of BAP Background (Brown) and Downgradient Groundwater (Blue) and BAP Porewater (Green).

The ionic composition of the BAP porewater is different than the ionic composition of the groundwater, thus the groundwater at MW-370 is not influenced by the BAP.

3. CONCLUSIONS

Based on the following two LOEs, it has been demonstrated that the lithium SSL at MW-370 is not due to the Baldwin BAP but is from a source other than the CCR unit being monitored:

1. The median lithium concentration in the BAP porewater is lower than the median concentrations observed in background and downgradient groundwater.
2. The BAP porewater has a different ionic composition than groundwater.

This information serves as the written ASD prepared in accordance with 40 C.F.R. § 257.95(g)(3)(ii) that the SSL observed during the A3D sampling event was not due to the BAP. Therefore, a corrective measures assessment is not required, and the Baldwin BAP will remain in assessment monitoring.

4. REFERENCES

Natural Resource Technology, an OBG Company (NRT/OBG), 2017, Statistical Analysis Plan, Baldwin Energy Complex, Havana Power Station, Hennepin Power Station, Wood River Power Station, Dynegy Midwest Generation, LLC, October 17, 2017.

FIGURES

- BOTTOM ASH POND DOWNGRADIENT CCR MONITORING WELL LOCATION
- BOTTOM ASH POND BACKGROUND CCR MONITORING WELL LOCATION
- BOTTOM ASH POND POREWATER SAMPLE LOCATION
- BOTTOM ASH POND UNIT BOUNDARY

0 400 800 Feet

SAMPLING LOCATION MAP

BALDWIN BOTTOM ASH POND (UNIT ID: 601)
ALTERNATE SOURCE DEMONSTRATION
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

FIGURE 1

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

APPENDIX A
BORING LOG FOR POREWATER WELL TPZ-164

KELRON ENVIRONMENTAL
Incorporated

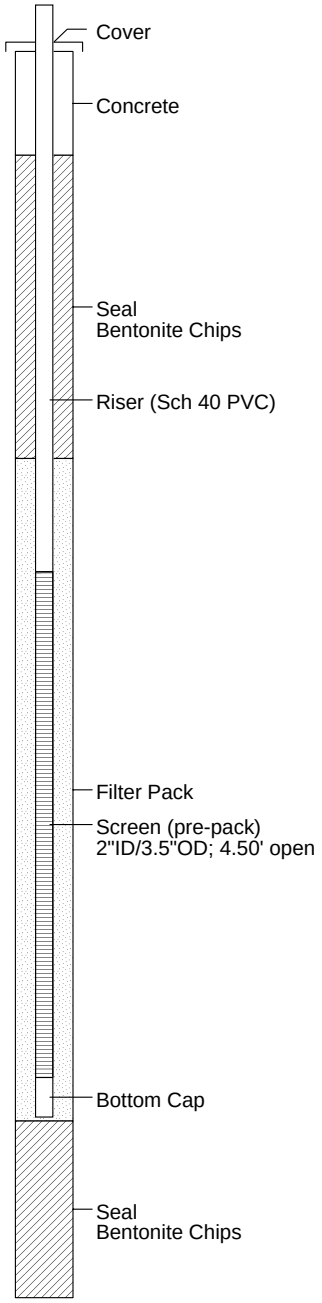
LOG OF PROBEHOLE TPZ-164

Phase II Hydrogeologic Investigation
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.

Date Completed	: 08/26/2013	Driller	: John Gates
Hole Diameter	: 8 1/2" OD / 4 1/4" ID	Geologist	: Stuart Cravens (Kelron)
Drilling Method	: HSA (CME-55LC)	Ground Elevation	: 432.50
Sampling Method	: Split Spoon / Shelby Tube	Casing (MP) Elevation	: 435.10
Drilling Company	: Bulldog Drilling, LLC	X,Y Coordinates	: 2383909, 556829

Depth in Feet	DESCRIPTION	Surf. Elev. 432.50	Samples	Blow Count	Recovery inches	Qp TSF	USCS	GRAPHIC
0	FILL - Bottom Ash, coarse, black (10YR 2/1), dry							
1								
2								
		430						
3	- moist <Shelby Tube Sample ST164-5 @ 3-5'> grain size analysis (Ash): 50% Sand, 42.9% Silt, 7.1% Clay							
		429						
4			1		17/24		AR	
	- wet	428						
5								
		427						
6								
		426						
7								
		425						
8								
		424						
9	CLAY (lean), stiff, medium to high plasticity, dark gray (10YR 4/1), moist - @8.9' - light yellowish brown (10YR 6/4) with <10% light gray mottling - @9.3' - gray (10YR 6/1) with 25-50% brownish-yellow mottling (10YR 6/6)		2	3 3 5	18/18		CL	
		423						
10								
	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422						
11			3		23/24		CL	
		421						
12	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS							
		420						
		419						

Well: TPZ-164
Elev.: 435.10



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Intended for
Dynegy Midwest Generation, LLC

Date
October 11, 2021

Project No.
1940100711-001

40 C.F.R. § 257.95(g)(3)(ii): ALTERNATE SOURCE DEMONSTRATION

BALDWIN POWER PLANT

BOTTOM ASH POND
CCR UNIT 601

RAMBOLL Bright ideas. Sustainable change.

CERTIFICATIONS

I, Nicole M. Pagano, a professional geologist in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used other than for its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Nicole M. Pagano
Professional Geologist
196-000750
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: October 11, 2021

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used other than for its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Ramboll Americas Engineering Solutions, Inc.
Date: October 11, 2021

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA
T 414-837-3607
F 414-837-3608
https://ramboll.com

CONTENTS

TABLES (IN TEXT)

FIGURES (IN TEXT)

FIGURES (ATTACHED)

APPENDICES

ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
A4	Assessment Monitoring Sampling Event A4
ASD	Alternate Source Demonstration
BAP	Bottom Ash Pond
CCR	Coal Combustion Residuals
DMG	Dynegy Midwest Generation, LLC
GWPS	Groundwater Protection Standard
LOE	line of evidence
mg/L	milligrams per liter
NRT/OBG	Natural Resource Technology, an OBG Company
Ramboll	Ramboll Americas Engineering Solutions, Inc.
SSI	Statistically Significant Increase
SSL	Statistically Significant Level

1. INTRODUCTION

Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.95(g)(3)(ii) allows the owner or operator of a Coal Combustion Residuals (CCR) unit 90 days from the date of determination of Statistically Significant Levels (SSLs) over Groundwater Protection Standards (GWPSs) of groundwater constituents listed in Appendix IV of 40 C.F.R. § 257 to complete a written demonstration that a source other than the CCR unit being monitored caused the SSL(s), or that the SSL(s) resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Alternate Source Demonstration [ASD]).

This ASD has been prepared on behalf of Dynegy Midwest Generation, LLC (DMG), by Ramboll Americas Engineering Solutions, Inc. (Ramboll), to provide pertinent information pursuant to 40 C.F.R. § 257.95(g)(3)(ii) for the Baldwin Power Plant Bottom Ash Pond (BAP) located near Baldwin, Illinois.

The most recent Assessment Monitoring sampling event (A4) was completed on March 12, 2021 and analytical data was received on April 14, 2021. Analytical data from all sampling events, from December 2015 through A4, were evaluated in accordance with the Statistical Analysis Plan (Natural Resource Technology, an OBG Company [NRT/OBG], 2017) to determine any Statistically Significant Increases (SSIs) of Appendix III parameters over background concentrations or SSLs of Appendix IV parameters over GWPSs. That evaluation identified one SSL at compliance monitoring wells as follows:

- Lithium at well MW-370

Pursuant to 40 C.F.R. § 257.95(g)(3)(ii), the following lines of evidence (LOEs) demonstrate that sources other than the BAP were the cause of the lithium SSL listed above. This ASD was completed by October 11, 2021, within 90 days of determination of the SSLs (July 13, 2021), as required by 40 C.F.R. § 257.95(g)(3)(ii).

2. ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

This ASD is based on the following LOEs:

1. The median lithium concentration in the BAP porewater is lower than median concentrations observed in background and compliance groundwater.
2. The BAP porewater has a different ionic composition than groundwater.

These LOEs are described and supported in greater detail below. Monitoring wells and the BAP porewater sample locations are shown in Figure 1.

2.1 LOE #1: The Median Lithium Concentration in the BAP Porewater is Lower Than Median Concentrations Observed in Background and Compliance Groundwater.

The table below (Table A) provides summary statistics for groundwater lithium concentrations and BAP porewater lithium concentrations collected from TPZ-164 bottom ash porewater well (see boring log in Attachment A).

Table A. Summary Statistics for Lithium in Groundwater and BAP Porewater (December 2015 to March 2021).

Sample Location	Lithium (milligrams per liter [mg/L])		
	Minimum	Maximum	Median
Background Groundwater[1]	0.011	0.096	0.046
Compliance Groundwater[2]	0.018	0.18	0.058
BAP Porewater[3]	0.010	0.018	0.014

Note:
[1]Background groundwater was collected at monitoring wells MW-304 and MW-306.
[2]Compliance groundwater was collected at monitoring wells MW-356, MW-369, MW-370, and MW-382.
[3]BAP porewater was collected at TPZ-164.

The following observations can be made from Table A above:

- Concentrations of lithium in background wells ranged from 0.011 to 0.096 mg/L, with a median concentration of 0.046 mg/L.
- Concentrations of lithium in compliance wells ranged from 0.018 to 0.18 mg/L, with a median concentration of 0.058 mg/L.
- Concentrations of lithium in BAP porewater ranged from 0.010 to 0.018 mg/L, with a median concentration of 0.014 mg/L. The median lithium concentration observed in porewater is below the median lithium concentrations observed in both background and compliance groundwater monitoring wells.

If the BAP was the source of lithium in downgradient groundwater, BAP porewater concentrations of lithium would be expected to be higher than the groundwater concentrations. Therefore, the BAP is not the source of lithium in the downgradient groundwater, including at MW-370. Background lithium concentrations were also shown to be higher than BAP porewater, suggesting

that lithium concentrations are either naturally occurring due to geochemical variations within the Uppermost Aquifer or from upgradient anthropogenic sources.

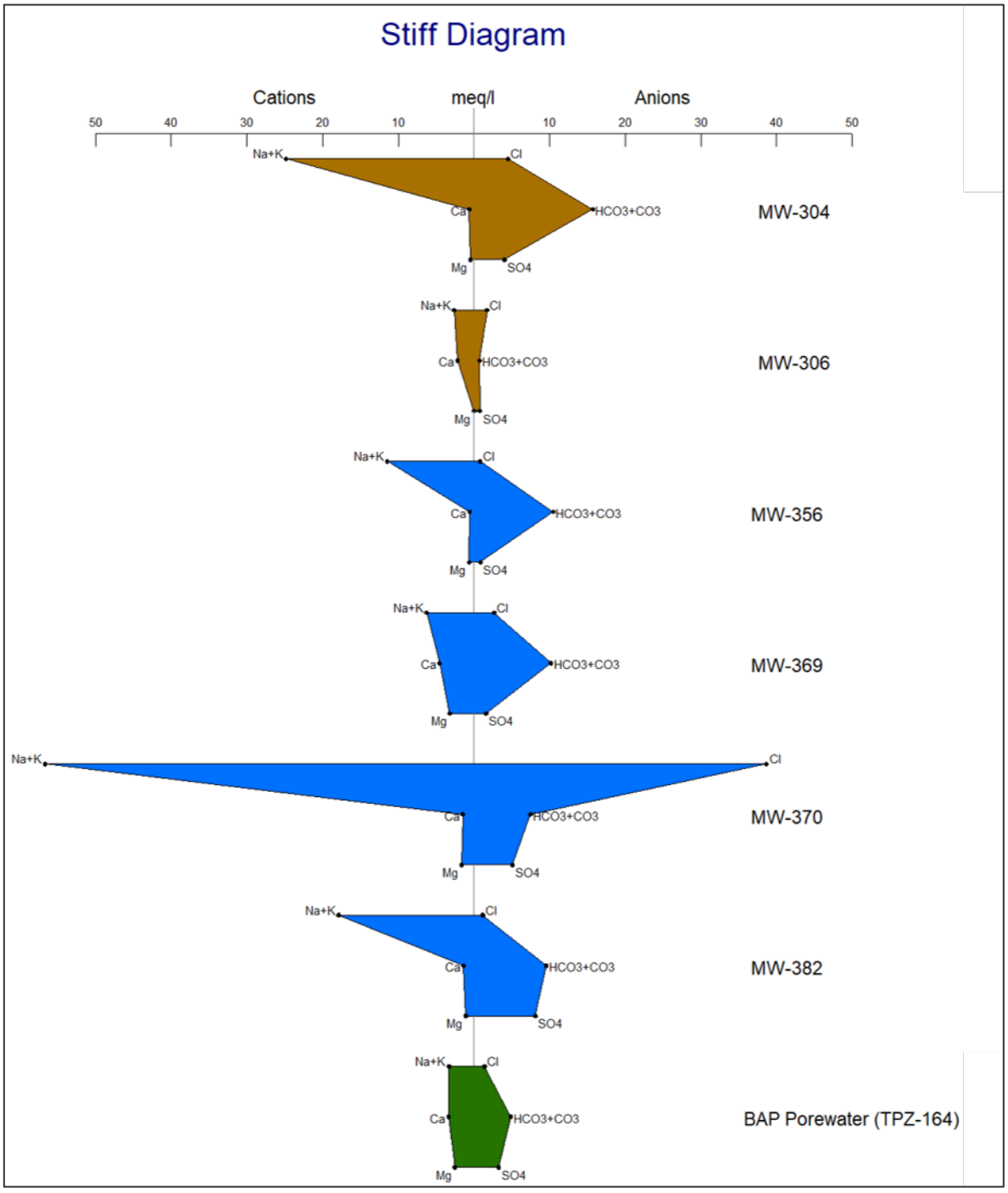
2.2 LOE #2: The BAP Porewater has a Different Ionic Composition Than Groundwater.

Stiff diagrams graphically represent ionic composition of aqueous solutions. Figure A on the following page shows a series of Stiff diagrams that display the ionic compositions of groundwater from background monitoring wells (brown), compliance monitoring wells (blue), and the BAP porewater (green). Polygons with similar shapes indicate solutions with similar ionic compositions, whereas polygons with different shapes indicate solutions with dissimilar ionic compositions. The larger the area of the polygon, the greater the concentration of the various ions.

The ionic compositions of the groundwater and BAP porewater represented by Figure A are discussed in more detail below.

- The ionic composition of the groundwater in compliance monitoring wells is similar to that in background monitoring well MW-304, with one exception, as represented by the similarity of the Stiff diagram sizes and shapes.
  - The dominant cations in compliance monitoring wells and background monitoring well MW-304 are sodium-potassium and the dominant anions are bicarbonate-carbonate. The exception is MW-370, which has chloride as the dominant anion.
- The BAP porewater sample has no dominant cation and the dominant anion is bicarbonate-carbonate.

The ionic composition of the BAP porewater is different than the ionic composition of the groundwater, thus the groundwater at MW-370 is not influenced by the BAP.



Note: A poor ionic balance was determined for background well MW-306

Figure A. Stiff Diagram Showing Ionic Composition of Samples of BAP Background (Brown) and Compliance Groundwater (Blue) and BAP Porewater (Green).

3. CONCLUSIONS

Based on the following two LOEs, it has been demonstrated that the lithium SSL at MW-370 is not due to the BAP but is from a source other than the CCR unit being monitored:

1. The median lithium concentration in the BAP porewater is lower than the median concentrations observed in background and compliance groundwater.
2. The BAP porewater has a different ionic composition than groundwater.

This information serves as the written ASD prepared in accordance with 40 C.F.R. § 257.95(g)(3)(ii) that the SSL observed during the A4 sampling event was not due to the BAP. Therefore, a corrective measures assessment is not required, and the BAP will remain in assessment monitoring.

4. REFERENCES

Natural Resource Technology, an OBG Company (NRT/OBG), 2017, Statistical Analysis Plan, Baldwin Energy Complex, Havana Power Station, Hennepin Power Station, Wood River Power Station, Dynegy Midwest Generation, LLC, October 17, 2017.

United States Environmental Protection Agency, 2020. Disposal of Coal Combustion Residuals from Electric Utilities, 40 C.F.R. § 257 Subpart D, published April 17, 2015, updated 2020. Accessed from URL https://www.ecfr.gov/current/title-40/chapter-I/subchapter-I/part-257/subpart-D#page-top

FIGURES

BACKGROUND WELL
COMPLIANCE WELL
SOURCE SAMPLE LOCATION

PART 257 REGULATED UNIT (SUBJECT UNIT)
PROPERTY BOUNDARY

0 400 800 Feet

SAMPLING LOCATION MAP

ALTERNATE SOURCE DEMONSTRATION
BALDWIN BOTTOM ASH POND (UNIT: 601)
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

Y:\Mapping\Projects\22\2285\MXD\Alt_Source_Dem\Baldwin_AP\Figure 1_Sampling Location Map.mxd

PROJECT: 1690000XXXX | DATED: 10/4/2021 | DESIGNER: STOLZSD

APPENDIX A
BORING LOG FOR POREWATER WELL TPZ-164

KELRON ENVIRONMENTAL
Incorporated

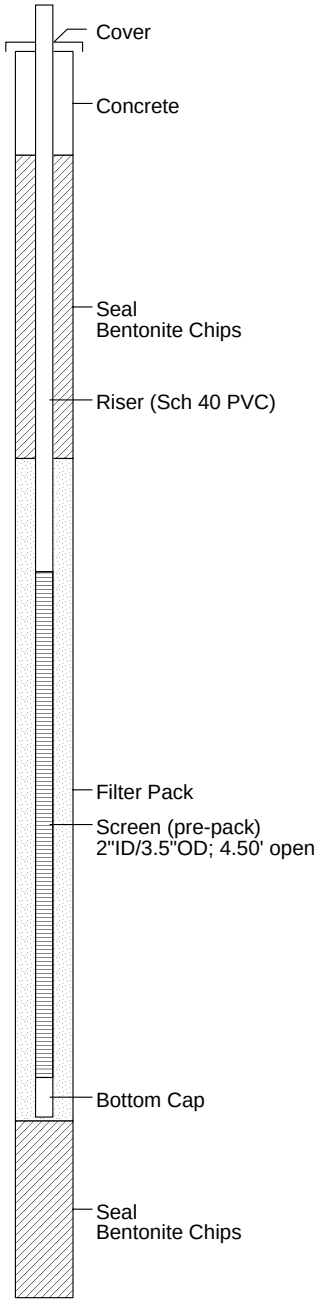
LOG OF PROBEHOLE TPZ-164

Phase II Hydrogeologic Investigation
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.

Date Completed	: 08/26/2013	Driller	: John Gates
Hole Diameter	: 8 1/2" OD / 4 1/4" ID	Geologist	: Stuart Cravens (Kelron)
Drilling Method	: HSA (CME-55LC)	Ground Elevation	: 432.50
Sampling Method	: Split Spoon / Shelby Tube	Casing (MP) Elevation	: 435.10
Drilling Company	: Bulldog Drilling, LLC	X,Y Coordinates	: 2383909, 556829

Depth in Feet	DESCRIPTION	Surf. Elev. 432.50	Samples	Blow Count	Recovery inches	Qp TSF	USCS	GRAPHIC
0	FILL - Bottom Ash, coarse, black (10YR 2/1), dry							
1								
2								
		430						
3	- moist <Shelby Tube Sample ST164-5 @ 3-5'> grain size analysis (Ash): 50% Sand, 42.9% Silt, 7.1% Clay							
		429						
4			1		17/24		AR	
	- wet	428						
5								
		427						
6								
		426						
7								
		425						
8								
		424						
9	CLAY (lean), stiff, medium to high plasticity, dark gray (10YR 4/1), moist - @8.9' - light yellowish brown (10YR 6/4) with <10% light gray mottling - @9.3' - gray (10YR 6/1) with 25-50% brownish-yellow mottling (10YR 6/6)		2	3 3 5	18/18		CL	
		423						
10								
	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422						
11			3		23/24		CL	
		421						
12	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS							
		420						
		419						

Well: TPZ-164
Elev.: 435.10



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