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Dynegy Midwest Generation, LLC

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2019 Annual Groundwater Monitoring and Corrective Action Report

Date

January 31, 2020

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

BALDWIN BOTTOM ASH POND, BALDWIN ENERGY COMPLEX

RAMBOLL Bright ideas. Sustainable change.

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BALDWIN BOTTOM ASH POND, BALDWIN ENERGY COMPLEX

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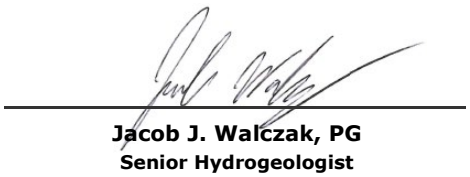
Checked by	**Jacob J. Walczak**
Approved by	**Eric J. Tlachac**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

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

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

Kristen L. Theesfeld
Hydrogeologist



Jacob J. Walczak, PG
Senior Hydrogeologist

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ACRONYMS AND ABBREVIATIONS

ASD	Alternate Source Demonstration
BAP	Bottom Ash Pond
CCR	Coal Combustion Residuals
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 Baldwin Bottom Ash Pond (BAP) located at Baldwin Energy Complex near Baldwin, Illinois.

Groundwater is being monitored at Baldwin BAP in accordance with the Assessment Monitoring Program requirements specified in 40 C.F.R. § 257.95.

No changes were made to the monitoring system in 2019 (no wells were installed or decommissioned).

The following Statistically Significant Levels (SSLs) of 40 C.F.R. Part 257 Appendix IV parameters were determined during one or more sampling events in 2019:

- Lithium at well MW-370

Alternate Source Demonstrations (ASDs) were completed for the SSLs referenced above and Baldwin BAP remains in the Assessment Monitoring Program.

1. INTRODUCTION

This report has been prepared by Ramboll on behalf of Dynegy Midwest Generation, LLC, to provide the information required by 40 C.F.R.§ 257.90(e) for Baldwin BAP located at Baldwin Energy Complex 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 relative to background levels).
5. Other information required to be included in the Annual Report as specified in §§ 257.90 through 257.98.

This report provides the required information for Baldwin BAP for calendar year 2019.

2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

No changes have occurred to the Monitoring Program status in calendar year 2019, and Baldwin BAP remains in the Assessment Monitoring Program in accordance with 40 C.F.R. § 257.95.

3. KEY ACTIONS COMPLETED IN 2019

The Assessment 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 2019 (no wells were installed or decommissioned). In general, one groundwater sample was collected from each background and downgradient well during each monitoring event. 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 2019 are presented in Tables 1 and 2. Analytical data were evaluated in accordance with the Statistical Analysis Plan (NRT/OBG, 2017b) to determine any SSLs of Appendix IV parameters over Groundwater Protection Standards (GWPSs).

Statistical background values are provided in Table 3 and GWPSs in Table 4.

Analytical results for the June and September 2018 sampling events were provided in the 2018 Annual Groundwater Monitoring and Corrective Action Report.

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 completed in 2019 are included in Appendix A.

Table A – 2018-2019 Assessment Monitoring Program Summary

Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSL(s)	SSL(s) Determination Date	ASD Completion Date
June 26-27, 2018	August 22, 2018	Appendix III Appendix IV	NA	NA	NA
September 26, 2018	October 24, 2018	Appendix III Appendix IV Detected [1]	Lithium (MW-370)	January 7, 2019	April 8, 2019
March 19-20, 2019	April 15, 2019	Appendix III Appendix IV	Lithium (MW-370)	July 15, 2019	October 14, 2019
September 24-25, 2019	October 24, 2019	Appendix III Appendix IV Detected [1]	NA	TBD	TBD

Notes:

NA: Not Applicable
TBD: To Be Determined
1. To confirm SSIs, as allowed by the Statistical Analysis Plan, groundwater samples were collected and analyzed for Appendix III parameters initially detected at concentrations greater than statistical background values in the preceding sampling event.

4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE THE PROBLEMS

No problems were encountered with the Groundwater Monitoring Program during 2019. Groundwater samples were collected and analyzed in accordance with the SAP (NRT/OBG, 2017a), and all data were accepted.

5. KEY ACTIVITIES PLANNED FOR 2020

The following key activities are planned for 2020:

- Continuation of the Assessment Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2020.
- Complete evaluation of analytical data from the downgradient 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 that 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 2020 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 2020 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.
2019 ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BALDWIN ENERGY COMPLEX
UNIT ID 601 - BALDWIN BOTTOM ASH POND
BALDWIN, ILLINOIS
ASSESSMENT MONITORING PROGRAM

Well Identification Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date & Time Sampled	Depth to Groundwater (ft)[1]	Groundwater Elevation (ft NAVD88)	40 C.F.R. Part 257 Appendix III						
						Boron, total (mg/L) 6020A[2]	Calcium, total (mg/L) 6020A[2]	Chloride, total (mg/L) 9251[2]	Fluoride, total (mg/L) 9214[2]	pH (field) (S.U.) SM 4500 H+B[2]	Sulfate, total (mg/L) 9036[2]	Total Dissolved Solids (mg/L) SM 2540C[2]
Background / Upgradient Monitoring Wells												
MW-304	38.188332	-89.853441	3/20/2019 15:03	9.33	446.16	1.82	13.7	148	1.88	7.7	177	1390
			9/25/2019 13:11	9.30	446.19	1.84	18.4	152	1.74	7.9	169	1350
MW-306	38.201117	-89.846747	3/20/2019 14:16	16.98	436.19	0.174	50.4	62	0.65	11.4	32	330
			9/25/2019 14:22	18.10	435.07	0.166	46.0	62	0.59	11.0	37	318
Downgradient Monitoring Wells												
MW-356	38.198963	-89.869578	3/19/2019 10:51	2.65	424.95	2.12	11.7	31	2.18	7.8	43	678
			9/24/2019 10:32	3.02	424.58	2.04	11.6	29	2.00	7.7	38	644
MW-369	38.196986	-89.870258	3/19/2019 10:09	19.44	403.27	1.96	70.7	92	1.48	7.3	98	732
			9/24/2019 9:50	13.10	409.61	0.948	85.0	101	1.08	6.7	90	788
MW-370	38.195603	-89.869669	3/19/2019 11:30	17.50	403.35	2.01	46.7	1280	3.45	7.7	224	2950
			9/24/2019 11:10	18.98	401.87	1.95	47.0	1290	3.00	7.5	237	2830
MW-382	38.194540	-89.868044	3/19/2019 12:26	15.42	415.77	1.86	21.5	36	3.30	7.6	426	1180
			9/24/2019 12:10	16.23	414.96	1.78	20.5	34	2.85	7.7	388	1150

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

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.

[1]All depths to groundwater were measured on the first day of the sampling event.

[2]4-digit numbers represent SW-846 analytical methods.

TABLE 2.
2019 ANALYTICAL RESULTS - APPENDIX IV PARAMETERS
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BALDWIN ENERGY COMPLEX
UNIT ID 601 - BALDWIN BOTTOM ASH POND
BALDWIN, ILLINOIS
ASSESSMENT MONITORING PROGRAM

Well Identification Number	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date & Time Sampled	40 C.F.R. Part 257 Appendix IV														
				Antimony, total (mg/L) 6020A[1]	Arsenic, total (mg/L) 6020A[1]	Barium, total (mg/L) 6020A[1]	Beryllium, total (mg/L) 6020A[1]	Cadmium, total (mg/L) 6020A[1]	Chromium, total (mg/L) 6020A[1]	Cobalt, total (mg/L) 6020A[1]	Fluoride, total (mg/L) 6020A[1]	Lead, total (mg/L) 6020A[1]	Lithium, total (mg/L) 6020A[1]	Mercury, total (mg/L) 7470A[1]	Molybdenum, total (mg/L) 6020A[1]	Radium 226/228, Combined (pCi/L) 903/904[1]	Selenium, total (mg/L) 6020A[1]	Thallium, total (mg/L) 6020A[1]
Background / Upgradient Monitoring Wells																		
MW-304	38.188332	-89.853441	3/20/2019 15:03	<0.0010	0.0029	0.0214	<0.0010	<0.0010	<0.0015	<0.0010	1.88	<0.0010	0.0833	<0.00020	0.0019	0.55	<0.0010	<0.0020
			9/25/2019 13:11[2]	<0.0010	0.0017	0.0211	<0.0010	<0.0010	<0.0015	<0.0010	1.74	<0.0010	0.0836	<0.00020	0.0017	0.42	<0.0010	<0.0020
MW-306	38.201117	-89.846747	3/20/2019 14:16	<0.0010	0.0030	0.0192	<0.0010	<0.0010	<0.0015	<0.0010	0.65	<0.0010	0.0143	<0.00020	0.0299	0.74	<0.0010	<0.0020
			9/25/2019 14:22[2]	<0.0010	0.0021	0.0150	<0.0010	<0.0010	<0.0015	<0.0010	0.59	<0.0010	0.0133	<0.00020	0.0267	0.36	<0.0010	<0.0020
Downgradient Monitoring Wells																		
MW-356	38.198963	-89.869578	3/19/2019 10:51	<0.0010	0.0011	0.0322	<0.0010	<0.0010	<0.0015	<0.0010	2.18	<0.0010	0.0578	<0.00020	<0.0015	0.19	<0.0010	<0.0020
			9/24/2019 10:32[2]	NA	<0.0010	0.0307	NA	NA	<0.0015	NA	2.00	NA	0.0580	NA	<0.0015	0.10	NA	NA
MW-369	38.196986	-89.870258	3/19/2019 10:09	<0.0010	0.0021	0.0562	<0.0010	<0.0010	<0.0015	<0.0010	1.48	<0.0010	0.0382	<0.00020	0.0263	0.34	<0.0010	<0.0020
			9/24/2019 9:50[2]	NA	0.0059	0.0849	NA	NA	<0.0015	NA	1.08	NA	0.0259	NA	0.0186	0.84	NA	NA
MW-370	38.195603	-89.869669	3/19/2019 11:30	<0.0010	0.0015	0.0449	<0.0010	<0.0010	<0.0015	<0.0010	3.45	<0.0010	0.147	<0.00020	0.0238	0.61	<0.0010	<0.0020
			9/24/2019 11:10[2]	NA	<0.0010	0.0424	NA	NA	<0.0015	NA	3.00	NA	0.149	NA	0.0188	0.75	NA	NA
MW-382	38.194540	-89.868044	3/19/2019 12:26	<0.0010	0.0012	0.0170	<0.0010	<0.0010	0.0021	<0.0010	3.30	<0.0010	0.0625	<0.00020	0.0019	0.16	<0.0010	<0.0020
			9/24/2019 12:10[2]	NA	0.0012	0.0221	NA	NA	0.0044	NA	2.85	NA	0.0623	NA	0.0025	0.51	NA	NA

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

Notes:

40 C.F.R. = Title 40 of the Code of Federal Regulations

mg/L = milligrams per liter

NA = Not Analyzed

pCi/L = picoCuries per liter

< = concentration is less than 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 Levels (SSLs) over Groundwater Protection Standards.

[1]4-digit numbers represent SW-846 analytical methods and 3-digit numbers represent Clean Water Act analytical methods.

[2]Only the parameters detected during the previous sampling events were analyzed during this sampling event, in accordance with 40 C.F.R. § 257.95(d)(1).

TABLE 3.
STATISTICAL BACKGROUND VALUES
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BALDWIN ENERGY COMPLEX
UNIT ID 601 - BALDWIN BOTTOM ASH POND
BALDWIN, ILLINOIS
ASSESSMENT MONITORING PROGRAM

Parameter	Statistical Background Value (UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	2.11
Calcium (mg/L)	33.5
Chloride (mg/L)	155
Fluoride (mg/L)	1.98
pH (S.U.)	7.8 / 11.2
Sulfate (mg/L)	200
Total Dissolved Solids (mg/L)	1360

[O: RAB 12/22/19, 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

TABLE 4.
GROUNDWATER PROTECTION STANDARDS
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
BALDWIN ENERGY COMPLEX
UNIT ID 601 - BALDWIN BOTTOM ASH POND
BALDWIN, ILLINOIS
ASSESSMENT MONITORING PROGRAM

Parameter	Groundwater Protection Standard[1]
40 C.F.R. Part 257 Appendix IV	
Antimony (mg/L)	0.006
Arsenic (mg/L)	0.032
Barium (mg/L)	2
Beryllium (mg/L)	0.004
Cadmium (mg/L)	0.005
Chromium (mg/L)	0.10
Cobalt (mg/L)	0.006
Fluoride (mg/L)	4
Lead (mg/L)	0.015
Lithium (mg/L)	0.069
Mercury (mg/L)	0.002
Molybdenum (mg/L)	0.10
Radium 226+228 (pCi/L)	5
Selenium (mg/L)	0.05
Thallium (mg/L)	0.002

[O: RAB 12/22/19, C: KLT 12/23/19]

Notes:

40 C.F.R. = Title 40 of the Code of Federal Regulations

mg/L = milligrams per liter

pCi/L = picoCuries per liter

[1]Groundwater Protection Standard is the higher of the Maximum Contaminant Level / Health-Based Level or background.

FIGURES

DOWNGRADIENT MONITORING WELL LOCATION
UPGRADIENT MONITORING WELL LOCATION
CCR MONITORED UNIT

0 400 800 Feet

MONITORING WELL LOCATION MAP
BALDWIN BOTTOM ASH POND
UNIT ID:601

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
VISTRA CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

FIGURE 1

O'BRIEN & GERE ENGINEERS, INC.
A RAMBOLL COMPANY

RAMBOLL

APPENDIX A
ALTERNATE SOURCE DEMONSTRATIONS

40 C.F.R. § 257.95(g)(3)(ii): ALTERNATE SOURCE DEMONSTRATION
BALDWIN BOTTOM ASH POND
APRIL 8, 2019

April 8, 2019

This alternate source demonstration has been prepared on behalf of Dynegy Midwest Generation, LLC (DMG) by OBG, part of Ramboll (OBG) to provide pertinent information pursuant to 40 CFR § 257.95(g)(3)(ii) for the Baldwin Bottom Ash Pond (BAP) located at Baldwin Energy Complex near Baldwin, Illinois.

Initial background groundwater monitoring consisting of a minimum of eight samples as required under 40 CFR § 257.94(b) was initiated in December 2015 and completed prior to October 17, 2017. Comparison of background groundwater quality with concentrations of parameters in downgradient monitoring wells observed during the November 2017 Detection Monitoring Program sampling event identified a statistically significant increase (SSI) for one or more 40 CFR Part 257 Appendix III parameters at Baldwin BAP. Consequently, and in accordance with 40 CFR § 257.94(e) and 40 CFR § 257.95, an assessment monitoring program was established by April 9, 2018 for the Baldwin BAP.

The first Assessment Monitoring sampling event was completed on June 26, 2018 and June 27, 2018. As stipulated in 40 CFR § 257.95(d)(1), all wells were resampled on September 26, 2018 for all Appendix III parameters and the Appendix IV parameters detected during the first Assessment Monitoring sampling event. Groundwater data collected from the first Assessment Monitoring sampling event and resampling event are available in the 2018 Annual Groundwater Monitoring and Corrective Action Report for Baldwin Bottom Ash Pond completed January 31, 2019 (OBG, 2019). Analytical data from all sampling events from December 2015 through the resampling event were evaluated in accordance with the statistical analysis plan (NRT/OBG, 2017) to determine any SSIs of Appendix III parameters over background concentrations or statistically significant levels (SSLs) of Appendix IV parameters over Groundwater Protection Standards (GWPSs). That evaluation identified SSLs at downgradient monitoring wells as follows:

- Lithium at well MW-370

Per 40 CFR § 257.95(g)(3)(ii), the owner or operator of a CCR unit may complete within 90 days from the date of an SSL determination a written demonstration that 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 ("alternate source demonstration"). Pursuant to 40 CFR § 257.95(g)(3)(ii), the following demonstrates that sources other than the Baldwin BAP were the cause of the SSL listed above. This alternate source demonstration (ASD) was completed within 90 days of determination of the SSLs (January 7, 2019) as required by 40 CFR § 257.95(g)(3)(ii).

ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

This ASD is based on the following lines of evidence (LOE):

1. The BAP water has a different ionic composition than groundwater.
2. Lithium concentrations in the BAP water are lower than the concentrations observed in groundwater.

These lines of evidence are described and supported in greater detail below. Monitoring wells and BAP water sample locations are shown Figure 1 (attached).

LOE #1: THE BAP WATER HAS A DIFFERENT IONIC COMPOSITION THAN GROUNDWATER.

Stiff diagrams graphically represent ionic composition of aqueous solutions. Figure 2 shows a series of Stiff diagrams that display the ionic compositions of the BAP water and groundwater from background and downgradient monitoring wells in the monitoring system. Polygons with similar shapes represent solutions with similar ionic compositions, whereas polygons with different shapes indicate solutions with dissimilar ionic compositions.

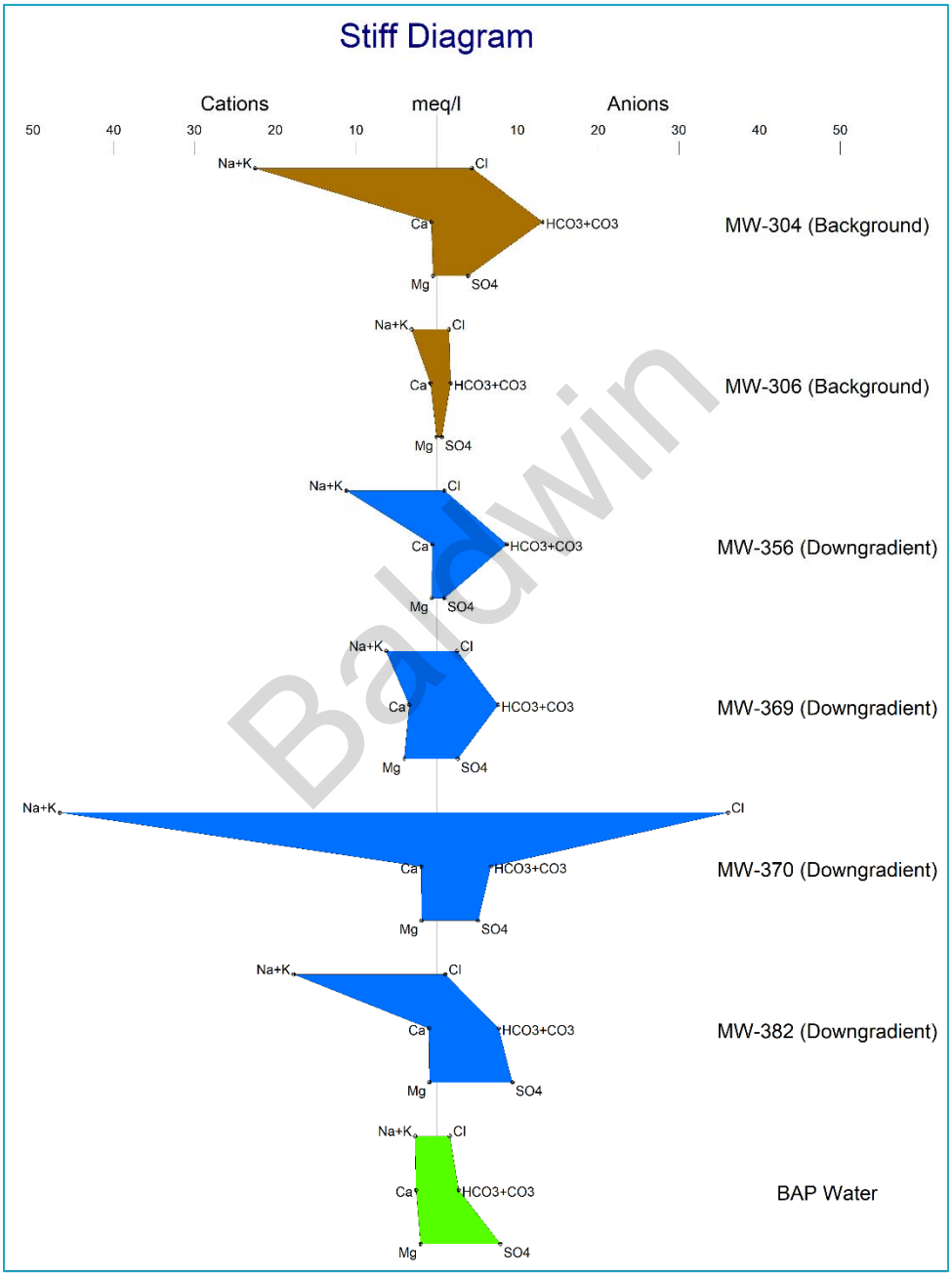

Figure 2. Stiff diagram showing ionic composition of samples of BAP background and downgradient groundwater and BAP water.

The ionic compositions of the BAP water and groundwater represented by Figure 2 are discussed in more detail below.

- The dominant cations in BAP groundwater at background and downgradient monitoring wells are sodium-potassium.
- Figure 2 indicates that MW-369 has a relatively higher proportion of calcium and magnesium cations than other wells in the groundwater monitoring system, although sodium-potassium cations are still dominant.
- The polygon associated with the BAP water sample in Figure 2 is relatively flat on the left side indicating there is no overly dominant cation.
- The dominant anions in most BAP monitoring wells are carbonate-bicarbonate, with the exceptions of downgradient monitoring well locations MW-370 and MW-382.
- MW-370 is the only location analyzed where the major anions are dominated by chloride, this results in a distinct polygon shape when compared to other sample locations as illustrated in Figure 2.
- The dominant anions at MW-382 are sulfate and carbonate-bicarbonate.
- The dominant anion in the BAP water sample is sulfate.

The Stiff diagrams and analysis of ionic composition in the BAP water sample and groundwater indicate the ionic composition of water at MW-370 is not influenced by the BAP.

LOE #2: LITHIUM CONCENTRATIONS IN THE BAP WATER ARE LOWER THAN THE CONCENTRATIONS OBSERVED IN GROUNDWATER

Lithium concentrations in the BAP water, including samples from BAP water and TPZ-164 bottom ash porewater well (see boring log in Attachment A), are lower than lithium concentrations in groundwater. A time-series for lithium concentrations is provided in Figure 3 below.

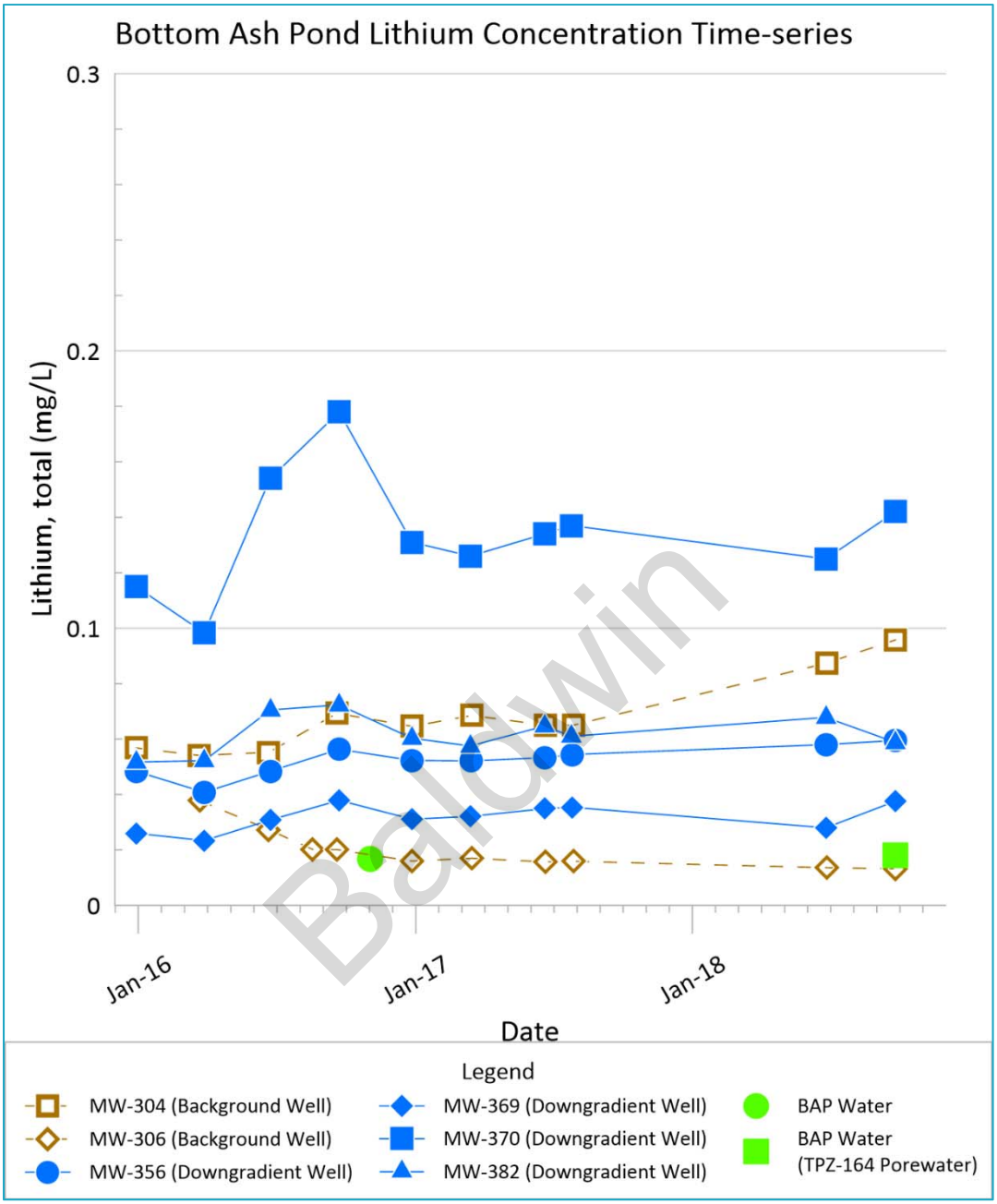

Figure 3. Lithium Concentration Time-series for groundwater samples from the BAP monitoring system and BAP water.

The following observations can be made from Figure 3:

- BAP water ranges from 0.0167 to 0.0182 mg/L of lithium.
- Groundwater from downgradient wells MW-356, MW-369, MW-370 and MW-382 has one to ten times greater lithium concentrations than the maximum lithium concentration (0.0182 mg/L) observed in BAP water.
- Groundwater from background well MW-304 has three to five times greater lithium concentrations than the maximum lithium concentration (0.0182 mg/L) observed in BAP water.

If the BAP were the source of lithium in groundwater, BAP water concentrations would be anticipated to be higher than concentrations of lithium in groundwater monitoring wells. Therefore, the BAP is not the source of the lithium observed in groundwater samples. Background lithium concentrations at MW-304 were also shown to be significantly higher than water in the pond, indicating lithium concentrations are either naturally occurring due to geochemical variations within the Uppermost Aquifer or from upgradient anthropogenic sources.

Based on these two lines of evidence, it has been demonstrated that the Baldwin BAP has not caused the SSL in MW-370.

This information serves as the written alternate source demonstration prepared in accordance with 40 CFR § 257.95(g)(3)(ii) that the SSL observed during the assessment monitoring program was not due to the CCR unit, but was from a combination of naturally occurring conditions and potential upgradient anthropogenic impacts. Therefore, a corrective measures assessment is not required and the Baldwin BAP will remain in assessment monitoring.

Attachment A Boring Log for Porewater Well TPZ-164

REFERENCES

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

O'Brien & Gere Engineers, Inc. (OBG), 2019, 2018 Annual Groundwater Monitoring and Corrective Action Report, Baldwin Bottom Ash Pond – CCR Unit ID 601, Baldwin Energy Complex, Dynegy Midwest Generation, LLC, January 31, 2019.

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
OBG, part of Ramboll
Date: April 8, 2019

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
OBG, part of Ramboll
Date: April 8, 2019

Figures

NOTE:
** BAP WATER SAMPLE LOCATION WAS APPROXIMATED

- DOWNGRADIENT CCR RULE MONITORING WELL LOCATION
- BACKGROUND CCR RULE MONITORING WELL LOCATION
- BOTTOM ASH POND WATER SAMPLE LOCATION
- CCR MONITORED UNIT

DRAWN BY/DATE: SDS 3/25/19
REVIEWED BY/DATE: JJW 3/26/19
APPROVED BY/DATE: JJW 3/27/19

MONITORING WELL AND BOTTOM ASH POND WATER SAMPLE LOCATION MAP
BALDWIN BOTTOM ASH POND

ALTERNATE SOURCE DEMONSTRATION
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 70093

FIGURE NO: 1

OBG
Part of Ramboll

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Attachment A

Boring Log for Porewater Well TPZ-164

KELRON ENVIRONMENTAL
Incorporated

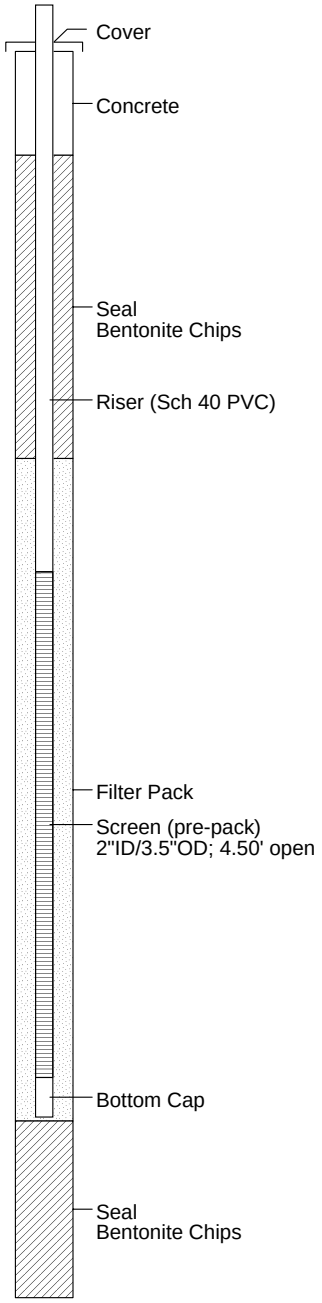
LOG OF PROBEHOLE TPZ-164

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	
5	- wet	428						
6		427						
7		426						
8		425						
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)	424		3				
10		423	2	3 5	18/18		CL	
11	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422						
12	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	421	3		23/24		CL	
		420						
		419						

Well: TPZ-164
Elev.: 435.10



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40 C.F.R. § 257.95(g)(3)(ii): ALTERNATE SOURCE DEMONSTRATION
BALDWIN BOTTOM ASH POND
OCTOBER 14, 2019

October 14, 2019

Title 40 of the Code of Federal Regulations (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 O'Brien & Gere Engineers, Inc, part of Ramboll (OBG), 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 second Assessment Monitoring sampling event (A2) was completed on March 19-20, 2019 and analytical data were received on April 15, 2019. Analytical data from all sampling events, from December 2015 through A2, were evaluated in accordance with the Statistical Analysis Plan[1] to determine any Statistically Significant Increases (SSIs) of Appendix III parameters over background concentrations or SSLs of Appendix IV parameters over Groundwater Protection Standards (GWPSs). That evaluation identified SSLs at downgradient monitoring wells as follows:

- Lithium at well MW-370

Pursuant to 40 C.F.R. § 257.95(g)(3)(ii), the following demonstrates that sources other than the Baldwin BAP were the cause of the SSL listed above. This ASD was completed by October 14, 2019, within 90 days of determination of the SSLs, as required by 40 C.F.R. § 257.95(g)(3)(ii).

ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

This ASD is based on the following lines of evidence (LOE):

1. Lithium concentrations in the BAP porewater are lower than the concentrations observed in groundwater.
2. The BAP porewater has a different ionic composition than groundwater.

These lines of evidence are described and supported in greater detail below. Monitoring wells and the BAP porewater sample location are shown Figure 1 (attached).

LOE #1: LITHIUM CONCENTRATIONS IN THE BAP POREWATER ARE LOWER THAN THE CONCENTRATIONS OBSERVED IN GROUNDWATER

Lithium concentrations in BAP porewater samples collected from TPZ-164 bottom ash porewater well (see boring log in Attachment A) are lower than lithium concentrations in groundwater. A time-series plot of lithium concentrations is provided in Figure 2 below.

[1] Natural Resource Technology, an OBG Company, 2017, Statistical Analysis Plan, Baldwin Energy Complex, Havana Power Station, Hennepin Power Station, Wood River Power Station, Dynegy Midwest Generation, LLC, October 17, 2017.

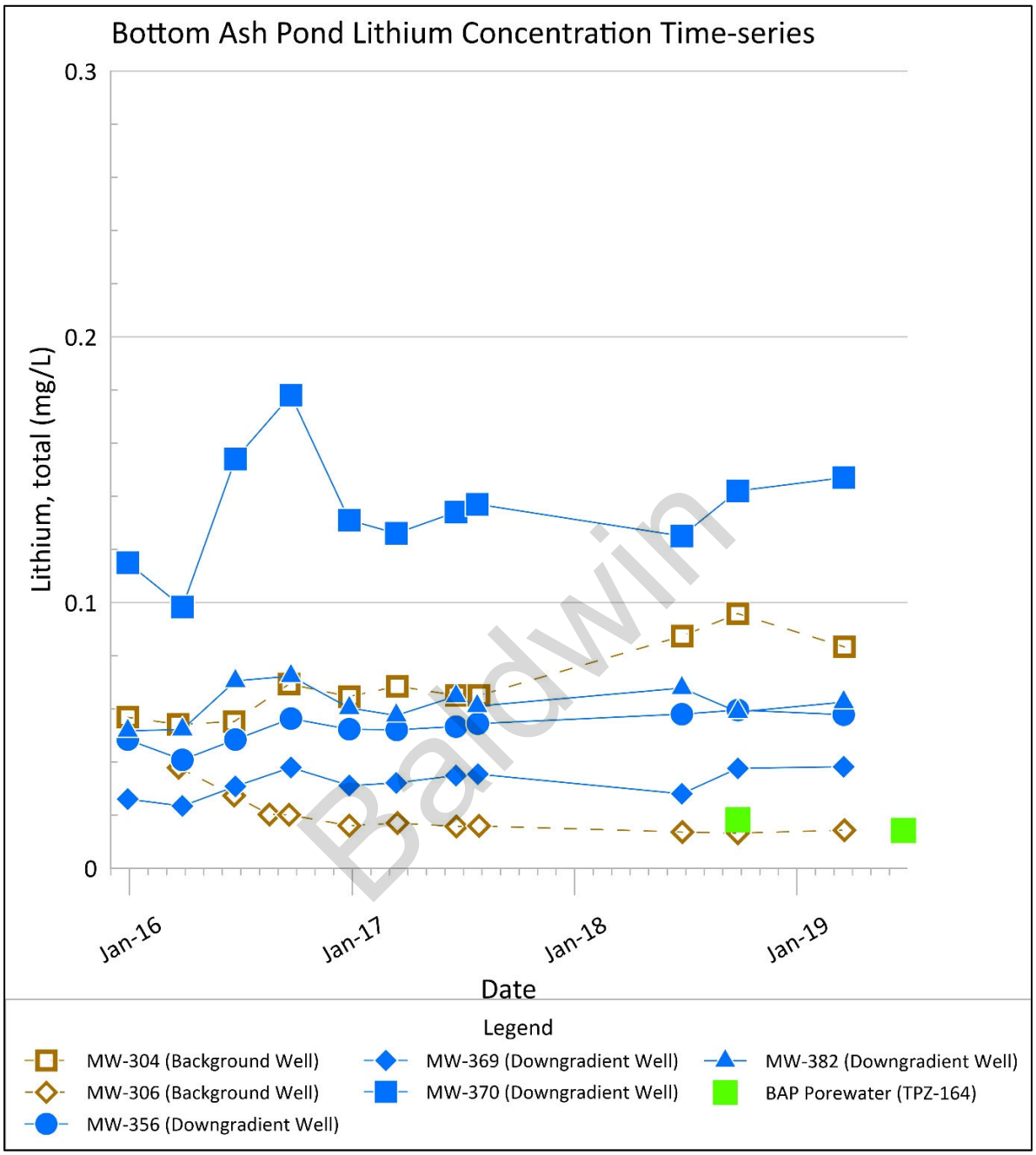

Figure 2. Lithium concentration time-series for background (brown) and downgradient (blue) groundwater samples from the BAP monitoring system, and BAP porewater (green).

The following observations can be made from Figure 2:

- Concentrations of lithium in background wells ranged from 0.0132 to 0.0958 milligrams per liter (mg/L).
- Concentrations of lithium in downgradient wells MW-356, MW-369 and MW-382 ranged from 0.0234 to 0.0723 mg/L, generally within the range of background concentrations.
- Concentrations of lithium in MW-370, where the SSL was identified, ranged from 0.0983 to 0.178 mg/L, above the upper range of lithium concentrations detected in other groundwater monitoring wells.

- Concentrations of lithium in BAP porewater range from 0.0142 to 0.0182 mg/L. These levels of lithium are at or below the lower end of the range of lithium concentrations detected in all groundwater monitoring wells. Lithium concentrations in MW-370 are five to nine times greater than the maximum lithium concentration (0.0182 mg/L) observed in BAP porewater.

If the BAP were the source of lithium in groundwater at MW-370, BAP porewater concentrations of lithium would be anticipated to be higher than concentrations at MW-370. Therefore, the BAP is not the source of the lithium observed at MW-370. Lithium concentrations at background monitoring well MW-304 are higher than BAP porewater, which also indicates lithium concentrations are from a source other than the CCR unit.

LOE #2: THE BAP POREWATER HAS A DIFFERENT IONIC COMPOSITION THAN GROUNDWATER.

Stiff diagrams graphically represent ionic composition of aqueous solutions. Figure 3 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 3 are discussed in more detail below.

- The ionic composition of the groundwater in background and downgradient monitoring wells is similar, as represented by the similarity of the Stiff diagram sizes and shapes. The exception to this is MW-370.
  - The dominant cations in groundwater monitoring wells (background and downgradient) are sodium-potassium. However, the concentration of sodium-potassium in downgradient groundwater monitoring well MW-370 is higher compared to other groundwater monitoring wells.
  - With the exceptions of MW-370 and MW-382, the dominant anions in groundwater monitoring wells are carbonate-bicarbonate.
    - MW-370 is the only location where the dominant anion is chloride. This, coupled with the relatively high concentration of sodium-potassium cations in MW-370, results in a distinct polygon shape when compared to other groundwater sample locations.
    - The dominant anion at MW-382 is sulfate, however the concentration of carbonate-bicarbonate is consistent with the concentrations of carbonate-bicarbonate in other downgradient groundwater monitoring wells.
- The ionic composition of the BAP porewater is different than the ionic composition of the groundwater.
  - The dominant cation in the BAP porewater sample is calcium and the dominant anion is carbonate-bicarbonate. The resulting Stiff diagram is different in both shape and size from the groundwater diagrams.

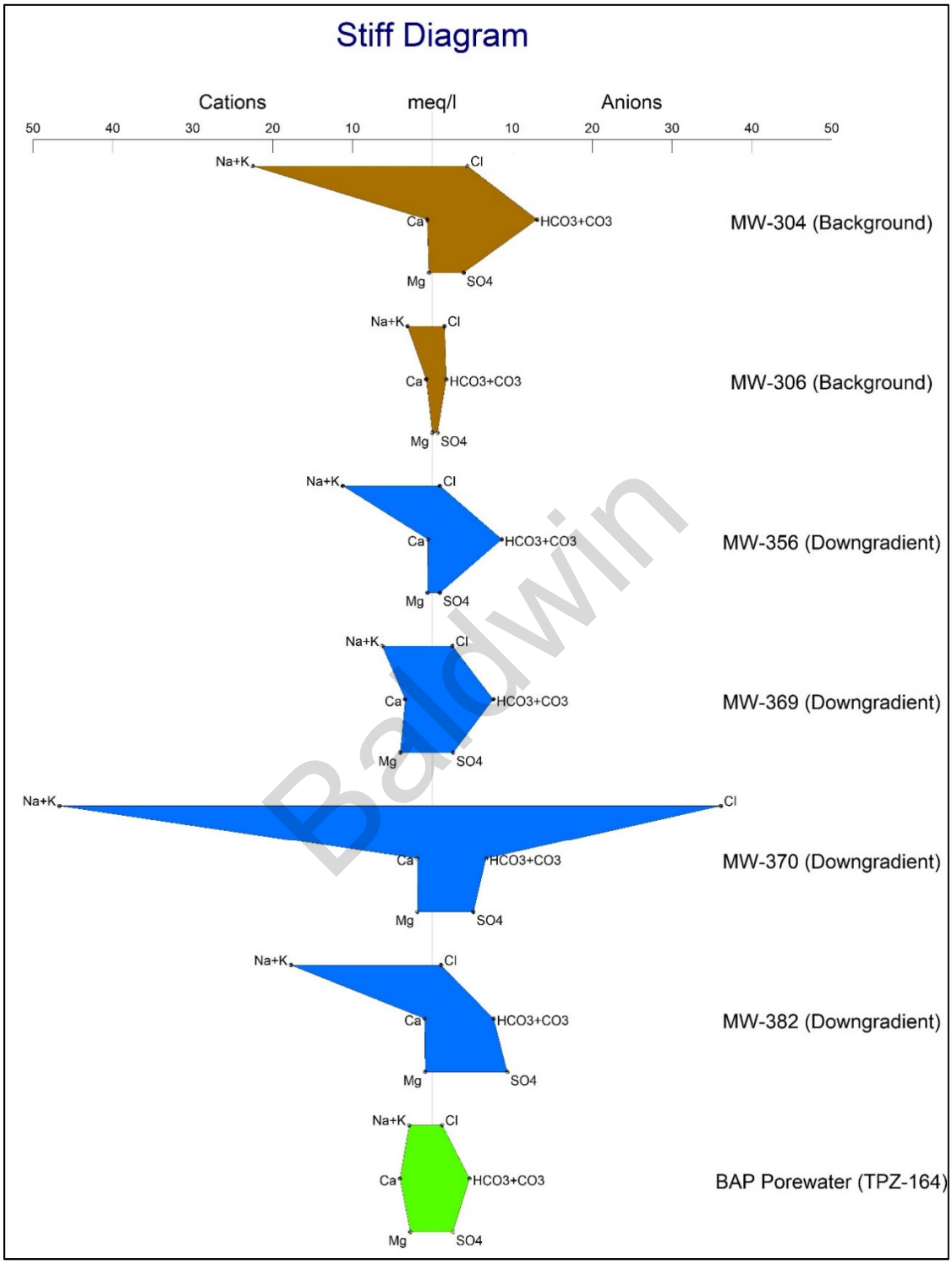

Figure 3. Stiff diagram showing ionic composition of samples of BAP background (brown) and downgradient (blue) groundwater and BAP porewater (green).

The Stiff diagrams and analysis of ionic composition in groundwater and the BAP porewater sample indicate that the ionic composition of groundwater at MW-370 is not influenced by the BAP.

Based on these two lines of evidence, 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.

This information serves as the written ASD prepared in accordance with 40 CFR § 257.95(g)(3)(ii) that the SSL observed during the A2 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.

Attachment A Boring Log for Porewater Well TPZ-164

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
OBG, part of Ramboll
Date: October 14, 2019

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
OBG, part of Ramboll
Date: October 14, 2019

Figures

DRAWN BY/DATE: SDS
REVIEWED BY/DATE: JJW
APPROVED BY/DATE: JJW

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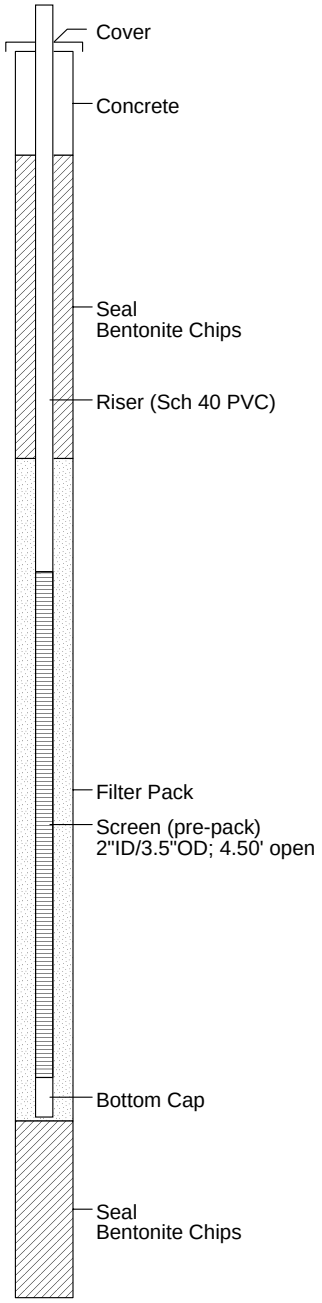

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