Luminant

Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, IL 62234

February 8, 2024

Illinois Environmental Protection Agency
DWPC – Permits MC#15
Attn: Part 845 Coal Combustion Residual Rule Submittal
1021 North Grand Avenue East
Springfield, IL 62794

Re: Baldwin Power Plant Fly Ash Pond System; IEPA ID # W1578510001-01-02-03

Dear Mr. LeCrone:

In accordance with Title 35 of the Illinois Administrative Code (35 I.A.C.) Section (§) 845.650(e), Dynegy Midwest Generation, LLC is submitting this alternative source demonstration (ASD) for exceedances observed from the Quarter 3 2023 sampling event at the Baldwin Power Plant Fly Ash Pond System, identified by Illinois Environmental Protection Agency (IEPA) ID No. W1578510001-01, -02, and -03. This ASD is being submitted within 60 days from the date of determination of an exceedance of a groundwater protection standard (GWPS) for constituents listed in 35 I.A.C. § 845.600. As required by 35 I.A.C. § 845.650(e)(1), the ASD was placed on the facility's website within 24 hours of submittal to the agency.

The ASD determined that groundwater quality at compliance well MW-253 was compromised due to faulty well construction. Review of the data included in the ASD identified two additional wells within the existing monitoring system that appear to be compromised due to faulty well construction - background location MW-306 and compliance well MW-350. The following actions are proposed to resolve this issue:

1. Compliance wells MW-253 and MW-350 will be abandoned and replaced with new monitoring wells located within 10 feet of the original well locations with similar well construction (the well screens will monitor the same hydrostratigraphic unit)
2. Background well MW-306 will be abandoned and will not be replaced. There are two other background monitoring wells (MW-304 and MW-358) which provide sufficient background monitoring data that meet the requirements of 35 I.A.C. § 845.630(a)(1)
3. In recognition of the compromised data collected from background well MW-306, results collected from this well will be removed from the background dataset that applies to both the Baldwin Bottom Ash Pond and the Fly Ash Pond System. Background statistics will be recalculated using the two remaining background wells (MW-304 and MW-358) for use in determination of exceedances starting with data collected in the first quarter of 2024 until a revised groundwater monitoring plan is submitted for approval.
4. Following abandonment and well replacement activities, a revised groundwater monitoring plan will be submitted no later than the second quarter of 2024 which will include updated background statistics using only data from retained background wells MW-304 and MW-358.

Later this month Dynegy Midwest Generation, LLC will be providing a follow-up submittal further detailing the proposed actions to resolve this issue.
One hard copy of the ASD is provided with this submittal.

Sincerely,

Phil Morris, PE
Senior Director, Environmental

Enclosures

Alternative Source Demonstration, Baldwin Power Plant Fly Ash Pond System, Baldwin Power Plant, Baldwin, Illinois. February 2024

Geosyntec consultants

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ALTERNATIVE SOURCE DEMONSTRATION

Baldwin Power Plant Fly Ash Pond System
(Unit ID #605)
IEPA ID: W1578510001-01, -02, -03
35 IAC 845.650

Prepared for

Dynegy Midwest Generation, LLC
1500 Eastport Plaza Drive
Collinsville, Ilinois 62234

Prepared by

Geosyntec Consultants, Inc.
500 W Wilson Bridge Road, Suite 250
Worthington, OH 43085

Project Number: GLP8068

February 6, 2024

Geosyntec consultants

Alternative Source Demonstration

Baldwin Power Plant Fly Ash Pond System
(Unit ID #605)
IEPA ID: W1578510001-01, -02, -03
35 IAC 845.650

Prepared for

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License No.: 062.040562
Expires: 11/30/2025

John Seymour, P.E.
Senior Principal

Project Number: GLP8068

February 6, 2024

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ACRONYMS AND ABBREVIATIONS

ASD	alternative source demonstration
BAP	Bottom Ash Pond
bgs	below ground surface
BPP	Baldwin Power Plant
CCR	coal combustion residuals
cm/s	centimeters per second
DMG	Dynegy Midwest Generation, LLC
EPRI	Electric Power Research Institute
FAPS	Fly Ash Pond System
GWPS	groundwater protection standard
IAC	Illinois Administrative Code
IEPA	Illinois Environmental Protection Agency
LOE	line of evidence
mg/L	milligrams per liter
NAVD88	North American Vertical Datum of 1988
NPDES	National Pollutant Discharge Elimination System
NRT	Natural Resource Technology, Inc.
SU	standard units
USEPA	United States Environmental Protection Agency

1. INTRODUCTION

Geosyntec Consultants, Inc. has prepared this alternative source demonstration (ASD) on behalf of Dynegy Midwest Generation, LLC (DMG), regarding the Fly Ash Pond System coal combustion residuals (CCR) unit at the Baldwin Power Plant (BPP) near Baldwin, Illinois. The ASD is completed pursuant to the Illinois Administrative Code (I.A.C.) Title 35, § 845 ("Standards for the Disposal of CCR in Surface Impoundments") and was completed by February 8, 2024 within 60 days of determination of the exceedances (December 10, 2023), as required by 35 I.A.C. § 845.650(e). This report applies specifically to the CCR Unit referred to as the Fly Ash Pond System (FAPS), identification (ID) number (No.) 605, Illinois Environmental Protection Agency (IEPA) ID No. W1578510001-01, -02, -03, and National Inventory of Dams (NID) ID No. IL50721. This ASD was prepared in conformance with guidance provided in the Electric Power Research Institute (EPRI) guidance for development of ASDs at CCR sites (EPRI 2017), guidance provided by the United States Environmental Protection Agency (USEPA; USEPA 1993, USEPA 2012; USEPA 2015; USEPA 2016), and others (Miller 2019).

A pH exceedance of 11.3 standard units (SU) was identified above the site-specific groundwater protection standard (GWPS) of 11.1 SU at monitoring well MW-253 following the Third Quarter (Q3) 2023 sampling event (Ramboll 2023a). No exceedance of pH was identified for the Second Quarter at monitoring well MW-253 because no groundwater sample could be collected due to problems with the dedicated bladder pump.

Under 35 I.A.C. 845.650(e), the owner or operator of a CCR surface impoundment may submit a demonstration that a source other than the CCR surface impoundment caused the contamination and the CCR surface impoundment did not contribute to the contamination, or that the exceedance of the groundwater protection standard resulted from error in sampling, analysis, or statistical evaluation, natural variation in groundwater quality, or a change in the potentiometric surface and groundwater flow direction.

Pursuant to 35 I.A.C. 845.650(e), the lines of evidence (LOEs) documented in this ASD demonstrate that a source other than the BPP FAPS CCR unit was the cause of the GWPS exceedance for pH at monitoring well MW-253. Grout infiltration potentially from well installation, low magnesium/calcium ratios indicative of grout infiltration, and low concentrations of CCR indicator parameters are three lines of evidence (LOEs) which indicate that the pH exceedance at MW-253 appears to be due to sampling error (due to improper well construction) and not a release from the Baldwin FAPS.

2. BACKGROUND

2.1 Site Location and Description

The BPP is located in Randolph County and St. Clair County in southwest Illinois approximately 0.5 miles west-northwest of the village of Baldwin. The BPP property is bordered by Baldwin Road to the east; the village of Baldwin to the southeast; Illinois Central Gulf railroad tracks, State Road 154, and scattered residences to the south; the Kaskaskia River to the west; and farmland to the north. CCR impoundments present at the BPP include the Bottom Ash Pond (BAP) and the closed FAPS.

Non-CCR impoundments present at the BPP include the Secondary Pond, Tertiary Pond, and Baldwin Lake (BPP Cooling Pond). The location of the CCR and non-CCR impoundments are shown in **Attachment 1**. The FAPS is a closed in-place CCR unit approved for closure by the IEPA on August 16, 2016. Closure was completed on November 17, 2020 (DMG 2020). Prior to closure, the FAPS was comprised of the West Fly Ash Pond, East Fly Ash Pond, and Old East Fly Ash Pond.

2.2 Description of the CCR Unit

The BPP began operation in 1970 and initially burned bituminous coal from Illinois, switching to subbituminous coal in 1999. The FAPS is an unlined surface impoundment, with a surface area of approximately 263 acres. The external perimeter of the three subunits within the FAPS was originally constructed in 1969.The Old East Fly Ash Pond and East Fly Ash Pond were used to store and dispose of fly ash from the BPP, while the West Fly Ash Pond was used to store and dispose of dry-stacked fly ash and to clarify CCR contact stormwater (AECOM 2016).

2.3 Geology and Hydrogeology

Significant site investigation has been completed to fully characterize the geology, hydrogeology, and groundwater quality as provided in the Supplemental Hydrogeologic Site Characterization and Groundwater Monitoring Plan (Natural Resource Technology, Inc. [NRT] 2016), the Hydrogeologic Site Characterization Report (Ramboll 2021), and the Hydrogeologic Site Characterization Report Revision 1 (Ramboll 2023b). These materials are incorporated herein.

Three hydrostratigraphic units are present at the BPP, which include the CCR, an unconsolidated Upper Unit, and a Bedrock Unit.

- CCR: Consists primarily of bottom ash, fly ash, and boiler slag and also includes fill materials comprising predominantly of clays and silts excavated on-site for use in berm and road construction around the impoundment.
- Upper Unit: Predominantly clay with silt and minor sand, silt layers, and occasional sand lenses, and includes lithologies identified as the Cahokia Formation, Peoria Loess, Equality Formation, and Vandalia Till. Thin sand seams present at the contact between the Upper Unit and Bedrock Unit have been identified as potential migration pathways

(PMPs) due to higher hydraulic conductivities in comparison to those in the surrounding clays (e.g., 10^{-4} centimeters per second [cm/s] in sands compared with 10^{-5} cm/s in clays) (Ramboll 2023a). Continuous sand seams have not been observed in the Upper Unit or immediately adjacent to the FAPS. Due to the predominance of clay and only thin and intermittent sand lenses, this unit is not considered a continuous aquifer unit within the site boundary.

- Bedrock Unit: Pennsylvanian and Mississippian-aged interbedded shale and limestone continuously underlies the BPP and is considered the uppermost aquifer at the site. The top of bedrock ranges from 12.5 feet below ground surface (bgs) near the Kaskaskia River to 70 feet bgs underlying the East Fly Ash Pond (part of the FAPS). The Bedrock Unit is the uppermost aquifer.

Groundwater at the site has previously been classified as Class II groundwater in accordance with 35 IAC 620 based on the geometric mean hydraulic conductivity values measured in the monitoring wells screened in both the Upper Unit (3.2×10^{-5} cm/s) and the Bedrock Unit (5.0×10^{-6}) (NRT 2014).

The groundwater monitoring network for the FAPS consists of 18 monitoring wells: 15 downgradient compliance monitoring wells (MW-150, MW-151, MW-152, MW-153, MW-252, MW-253, MW-350, MW-352, MW-366, MW-375, MW-377, MW-383, MW-384, MW-390, and MW-391) and three background monitoring wells (MW-304, MW-306, and MW-358) (**Attachment 1**). Monitoring wells are screened in both the unconsolidated unit from elevation 369 to 432 feet North American Vertical Datum of 1988 (NAVD88) (MW-150, MW-151, MW-152, MW-153, MW-252, and MW-253) and the uppermost aquifer (Bedrock Unit; all other monitoring network wells) from approximately elevation 348 to 408 feet NAVD88.

Groundwater flow in the UA is west to northwest in the east area of the FAPS until groundwater reaches the bedrock valley feature underlying the Secondary and Tertiary Ponds west of the FAPS, at which point the flow direction veers southwest towards this bedrock surface low (**Attachment 2**). Groundwater flow directions are generally consistent across seasons.

3. ALTERNATIVE SOURCE DEMONSTRATION LINES OF EVIDENCE

This ASD for the pH GWPS exceedance at MW-253 is based on three LOEs. These LOEs are described and supported below.

3.1 LOE #1: Grout Infiltration Due to a Poor Seal During Installation Can Result in Elevated Groundwater pH.

The recorded pH values at MW-253 have varied between 9.8 SU and 12.4 SU since 2015. These values are consistently elevated compared to the other monitoring wells in the immediate vicinity of MW-253 (i.e., MW-152, MW-153, MW-304, MW-352, MW-377, and MW-384) (**Figure 1; Attachment 1**). This includes monitoring well MW-153, which is co-located with MW-253 but screened at a shallower interval (**Attachment 3**). If the FAPS were the source of the elevated pH, it would be expected to influence shallower wells nearer to the unit as well as impacting MW-253. Therefore, the pH values at MW-253 are anomalously elevated and appear to be an isolated issue associated with improper well construction.

Bentonite grout slurry, which often contains large proportions of calcium hydroxide ($Ca(OH)_2$) due to the inclusion of cement, was used during well construction to generate a seal above the filter pack at MW-253 (**Attachment 3**). Causes of grout contamination can include fracturing of the grout seal during curing, shrinking of the grout seal away from the casing, or bridging of the grout during placement. If the grout seal is not successfully placed during well installation, it can result in migration of the grout into the filter pack of the screen or surrounding aquifer. Bentonite grout contamination generally increases the pH of groundwater as it migrates across the filter pack and into the well (Aller et. al 1991, FDEP 2005); this is attributed to the dissolution of hydroxide ions from the cement (Blackmer 1988).

Anomalously elevated pH levels at MW-253 (**Figure 1**) appear to be an isolated issue, indicating that the well may have experienced construction issues permitting the infiltration of grout into the proximal groundwater and is not truly representative of naturally occurring distal groundwater unaffected by the well construction. This is supported by the pH behavior at monitoring well MW-352, which was installed by the same drillers during the same event as MW-253 (**Attachment 3**). The recorded pH values at MW-352 (**Figure 1**) were greater than 10.0 SU for the first six events following installation in September 2010 but then underwent a subsequent decline such that they are now consistent with other wells in the vicinity. This pattern suggests that the initial samples at MW-352 may have been affected by grout contamination during well installation which was flushed out during subsequent events. Similar flushing has not been observed at MW-253, likely due to a greater infiltration of grout through the seal and filter pack. The pH trends at MW-253 and MW-352 indicate that the recent pH levels at MW-253 are due to a source other than the FAPS.

3.2 LOE #2: The Low Magnesium/Calcium (Mg/Ca) Ratio at MW-253 is Indicative of Grout Contamination.

When considering the potential for grout contamination of monitoring wells, elevated pH is often correlated with an increase of the proportion of cations associated with the grouting process, particularly calcium (Price 1990). It is anticipated that wells that are affected by grout contamination resulting in a pH of 10 or above would have a notably lower magnesium-to-calcium (Mg/Ca) ratio than those with pH levels less than 10 due to the increasing relative abundance of calcium in groundwater released from the grout (Blackmer 1988).

The Mg/Ca ratio for Q3 2023 at MW-253 was 0.03, which is consistent with wells in other studies where grout contamination was identified as a source of elevated pH in groundwater (Blackmer 1988). The Mg/Ca ratio at MW-253 is notably lower than the surrounding monitoring wells with lower pH values (Mg/Ca ratios ranging between 0.28 to 0.78) (**Figure 2**).[1] The anomalously low Mg/Ca ratio at MW-253 provides further support that grout contamination is the source of high pH values at that location.

3.3 LOE #3: The Low Concentrations of Indicator Parameters at MW-253 Do Not Suggest Influence from the FAPS.

Boron and sulfate are typically considered geochemically conservative parameters due to their limited attenuation by chemical processes in groundwater flow. They therefore function as indicators for potential CCR unit releases due to their high relative concentration in CCR and CCR porewater. Porewater adequately represents the mobile fractions of boron and sulfate from fly ash better than leaching from CCR materials due to variability in leach testing recoveries (Izquierdo and Querol 2012,Wang et al, 2023).

Boron concentrations at MW-253 have been reported at values ranging between 0.03 and 0.24 milligrams per liter (mg/L) for groundwater sampling events completed between November 2010 and July 2023 (**Figure 3**) with concentrations below 0.1 mg/L since 2011. However, boron concentrations collected from temporary CCR porewater piezometers (Attachment 4) representative of the FAPS (TPZ-163, TPZ-167, and TPZ-168) ranged from 36.3 and 94.7 mg/L (NRT 2016), providing evidence that concentrations of boron within the FAPS are over two orders of magnitude higher than the concentrations observed at MW-253. If groundwater at MW-253 had been impacted by CCR from the unit, boron concentrations would be expected to be elevated above the background Upper Tolerance Limit (UTL) of 2.16 mg/L (Ramboll 2023a). Boron

[1] Background well MW-306 and downgradient bedrock well MW-350 also exhibited anomalously high pH and low Mg/Ca values. As these locations are geographically separate from MW-253 and an exceedance for MW-350 was not identified during the Q3 2023 sampling event, the potential for grout contamination at these locations will not be discussed in this report.

concentrations at MW-253 are consistently less than the background UTL (**Figure 3)**, indicating that this well has not been affected by CCR.

Similarly, sulfate concentrations at MW-253 were reported at values between 94 and 806 mg/L during sampling events which occurred between November 2010 and July 2023, with concentrations below 200 mg/L since 2019 (**Figure 4**). The sulfate concentrations in the FAPS piezometers (NRT 2016) ranged between 495 mg/L (TPZ-163) and 2,820 mg/L (TPZ-168), which are either comparable to or substantially higher than sulfate concentrations at MW-253, particularly for recent events. If groundwater at MW-253 had been impacted by CCR from the unit, sulfate concentrations would be expected to be elevated above the background UTL of 762 mg/L (Ramboll 2023a). Sulfate concentrations at MW-253 are consistently less than the background UTL (**Figure 4**), indicating that this well has not been affected by CCR.

If the FAPS, which contains concentrations of boron and sulfate over an order of magnitude higher than MW-253, were impacting groundwater quality at MW-253, an increase in boron and sulfate concentrations would be expected. The current boron and sulfate concentrations at MW-253 do not display increasing trends (**Figure 3** and **Figure 4,** respectively) and have concentrations below their respective background UTLS, which suggests that the elevated pH in groundwater at MW-253 is not attributable to the FAPS.

4. CONCLUSIONS

It has been demonstrated that the pH GWPS exceedance at MW-253 is not caused by a release from the FAPS CCR unit and that the unit has not caused or contributed to the exceedance, but instead is attributed to a source other than the FAPS. The alternative source of the pH exceedance at MW-253 is the contamination of the groundwater by the grout used during well construction. The following summarizes the three LOEs used to support this demonstration:

1. High pH is expected where grout contamination has occurred from a seal that is not effectively placed.

2. A low Mg/Ca ratio can be used as an indicator of grout contamination, and it has been identified at MW-253 where it is lower than the ratio at surrounding monitoring wells. This is caused by the dissolution of grout.

3. Low concentrations of FAPS indicator parameters boron and sulfate relative to CCR porewater were detected at MW-253.

This demonstration fulfills the requirement of both 35 IAC 845.650(e) and the technical manual for the Municipal Solid Waste Landfill federal regulatory program (Code of Federal Regulations, Title 40, Section 258) that a statistically significant increase may result from sampling error.

The information serves as the written ASD prepared in accordance with 35 IAC 845.650(e) demonstrating that the GWPS exceedance for pH at MW-253 is not due to the FAPS CCR unit. Therefore, implementation of corrective measures is not required for pH at the FAPS CCR unit.

5. REFERENCES

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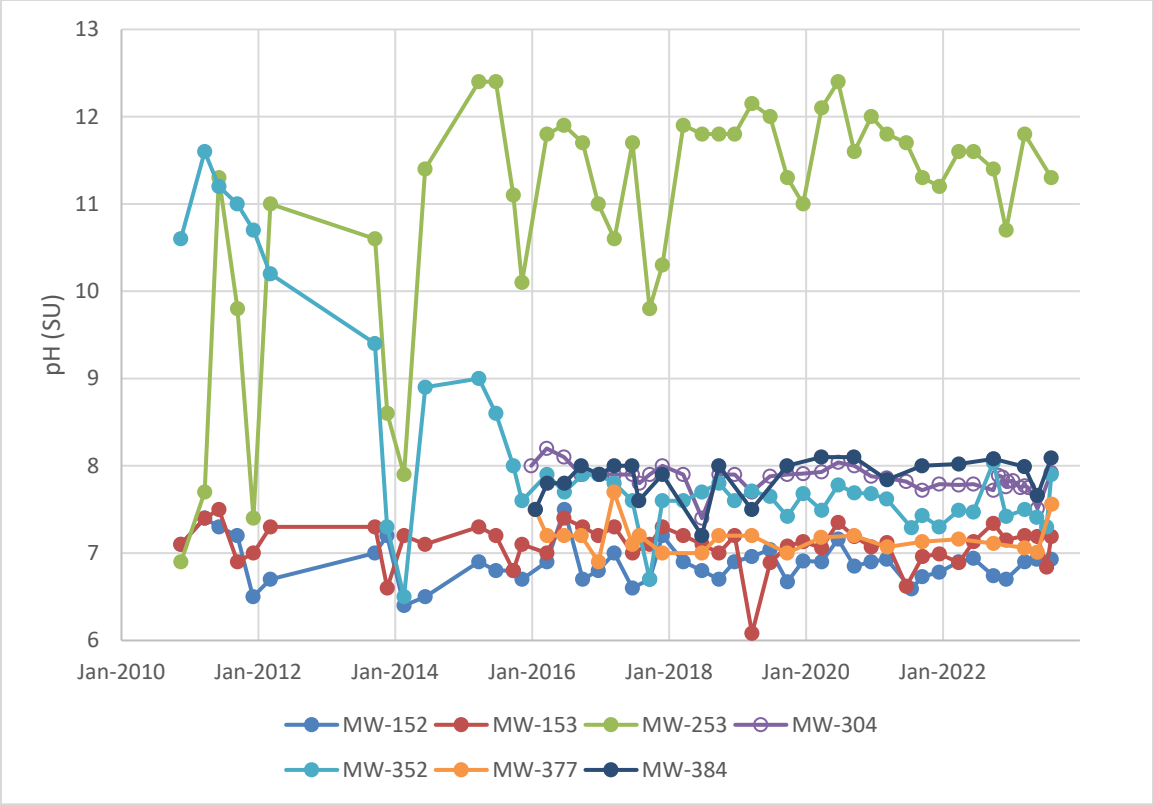
FIGURES



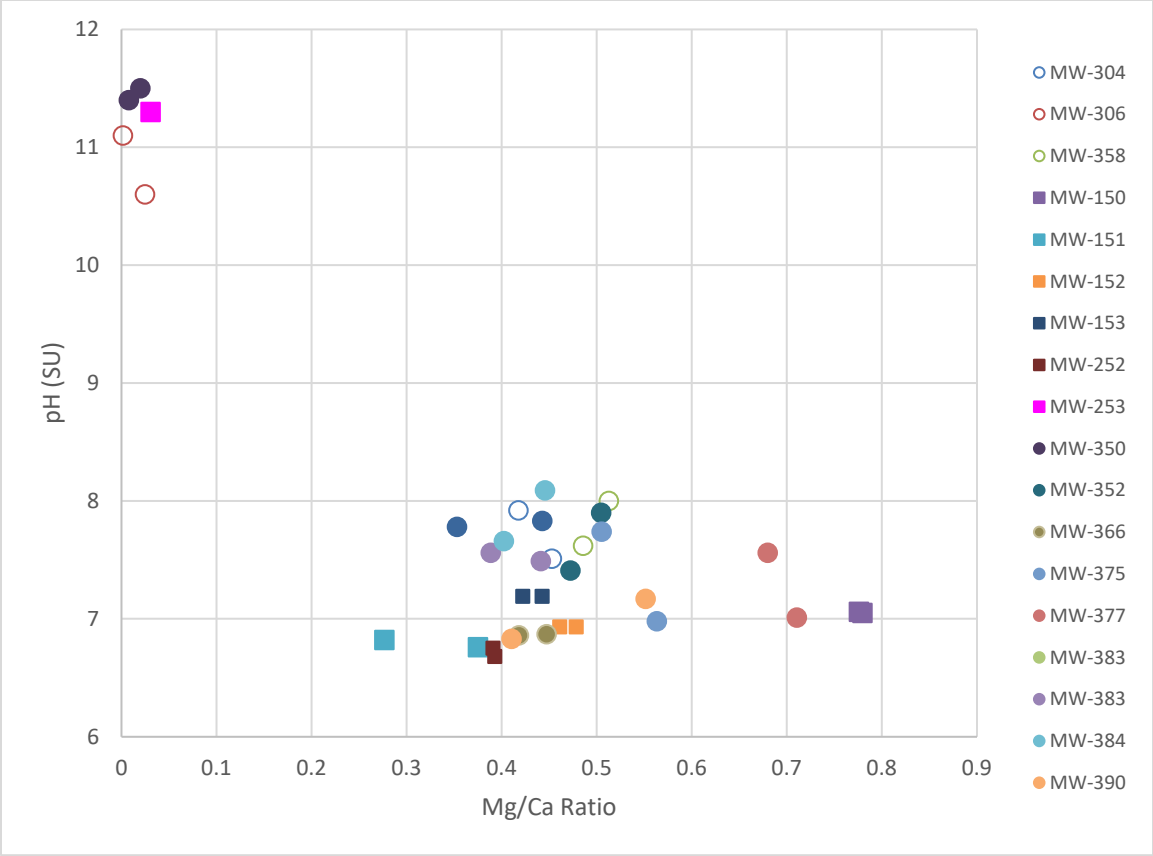
Notes:
1. All pH values are displayed in SU.
2. Monitoring wells included are within relatively close proximity to the monitoring well of concern (MW-253) except MW-304, which is a background monitoring well.
SU: standard units

pH Time Series Graph
Baldwin Plant Fly Ash Pond

Geosyntec consultants

Columbus, Ohio | January 2024

Figure **1**



Notes:
1. All pH values are displayed in SU.
2. Background locations are shown with hollow symbols.
3. Wells screened in the unconsolidated unit are shown with square symbology. Wells screened in the bedrock unit are shown with circle symbology.
4. Total calcium and magnesium results for Q2 and Q3 2023 sampling events were used to calculate the Mg/Ca ratios.

SU: standard units

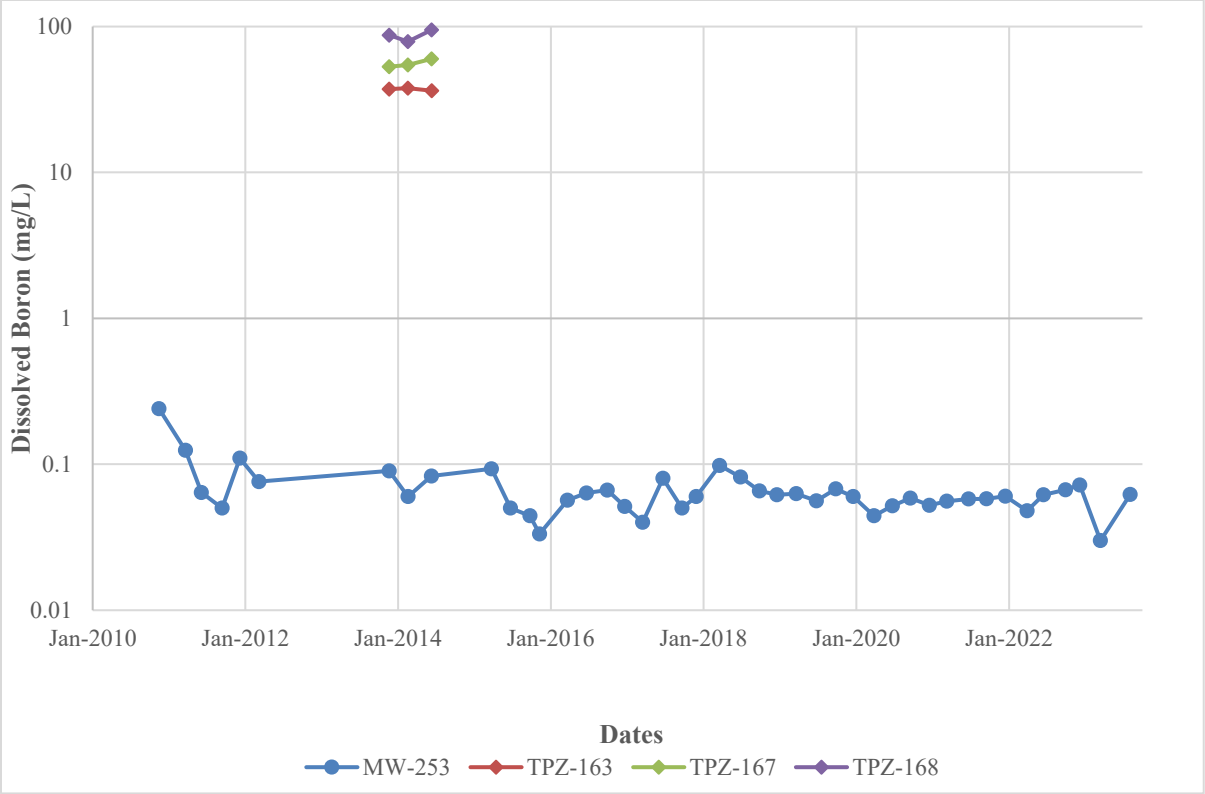
Mg/Ca Ion Ratio Scatter Plot
Baldwin Fly Ash Pond

Geosyntec consultants

Columbus, Ohio | January 2024

Figure **2**

internal info: path, date revised, author



Notes:
1. Dissolved boron values are shown for the piezometers which represent the FAPS (TPZ-163, TPZ-167, and TPZ-168) as well as monitoring well of concern MW-253.

FAPS: Fly Ash Pond System
mg/L: milligrams per liter

MW-253 and FAPS Boron Time Series Comparison
Baldwin Fly Ash Pond System

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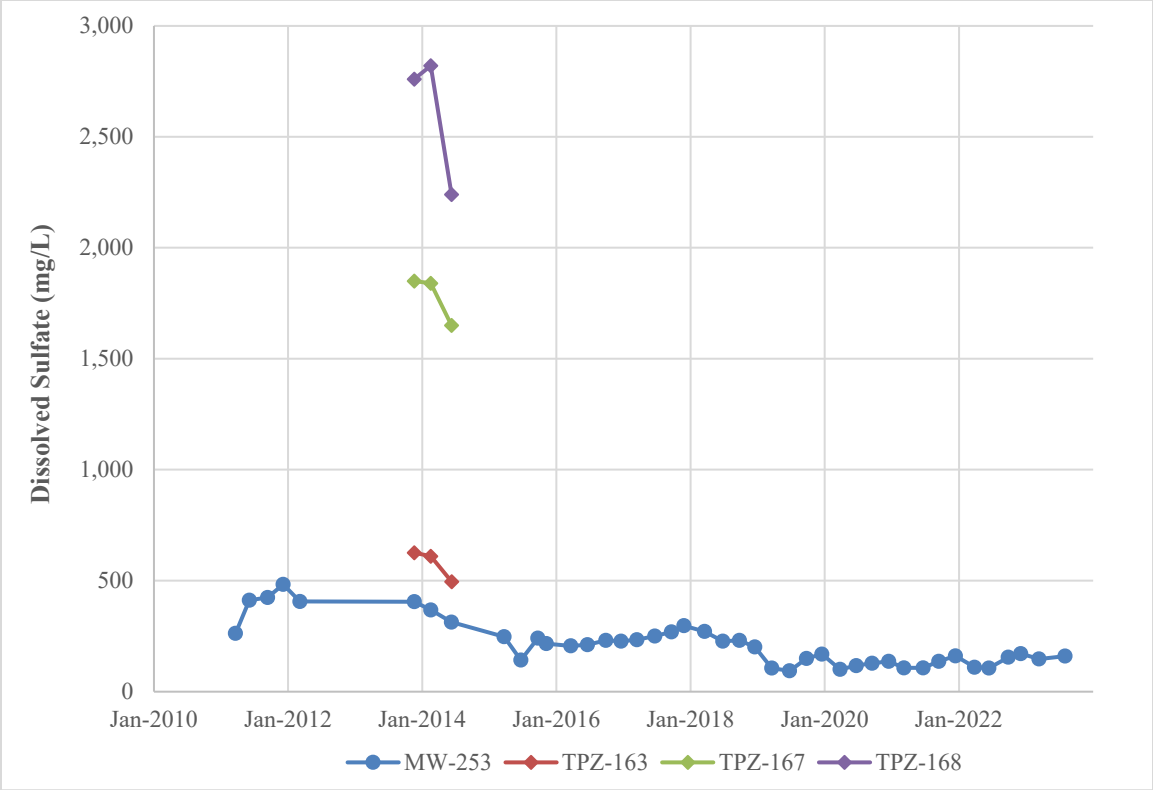
Columbus, Ohio | January 2024

Figure **3**

internal info: path, date revised, author



Notes:
1. Dissolved sulfate values are shown for the piezometers which represent the FAPS (TPZ-163, TPZ-167, and TPZ-168) as well as monitoring well of concern MW-253.
2. The dissolved sulfate result of 806 mg/L on 11/16/2010 at MW-253 appeared to be an outlier and was removed from the graph for clarity.

FAPS: Fly Ash Pond System
mg/L: milligrams per liter

MW-253 and FAPS Sulfate Time Series Comparison
Baldwin Fly Ash Pond

Geosyntec consultants

Columbus, Ohio | January 2024

Figure **4**

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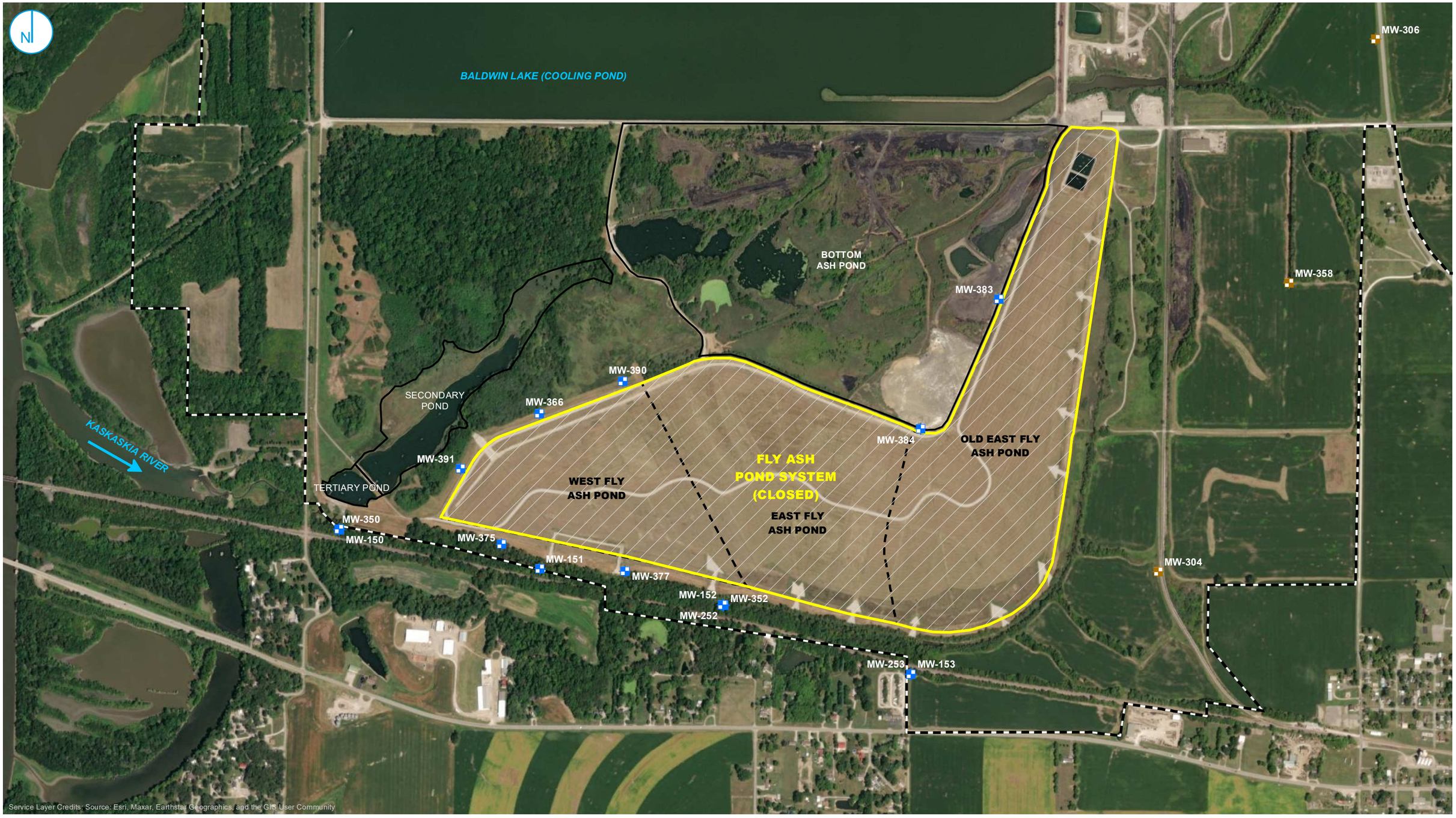
ATTACHMENT 1
Part 845 Groundwater Monitoring Network

Y:\Mapping\Projects\22\2285\MXD\845_Operating_Permit\BaldwinFAPS\GMP\Figure 2-2_BAL FAPS Expanded Monitoring Well Network.mxd
PROJECT: 169000XXXX | DATED: 7/31/2023 | DESIGNER: GALARNMC



BACKGROUND MONITORING WELL
COMPLIANCE MONITORING WELL
REGULATED UNIT (SUBJECT UNIT)
SITE FEATURE
CAPPED AREA
PROPERTY BOUNDARY

0 400 800 Feet

35 I.A.C. § 845 GROUNDWATER MONITORING WELL NETWORK

FLY ASH POND SYSTEM
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

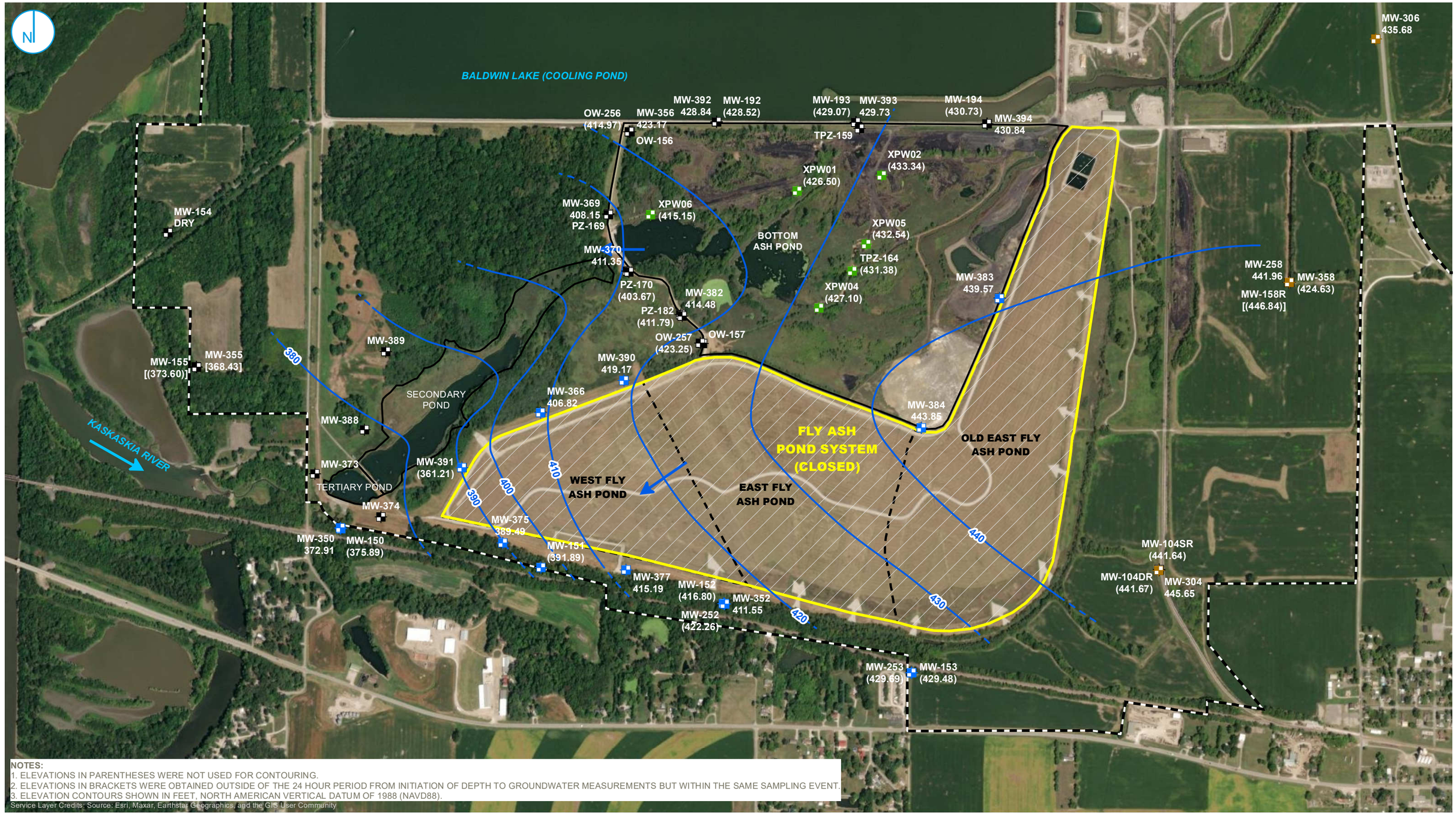
FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

ATTACHMENT 2

Potentiometric Surface Maps – August 2-3, 2023



NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATIONS IN BRACKETS WERE OBTAINED OUTSIDE OF THE 24 HOUR PERIOD FROM INITIATION OF DEPTH TO GROUNDWATER MEASUREMENTS BUT WITHIN THE SAME SAMPLING EVENT.
3. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- PORE WATER WELL
- MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- CAPPED
- PROPERTY BOUNDARY

0 400 800 Feet

POTENTIOMETRIC SURFACE MAP
AUGUST 2-3, 2023

2023 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
FLY ASH POND SYSTEM
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

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PROJECT: 169000XXXX | DATED: 12/19/2023 | DESIGNER: GALARNMC

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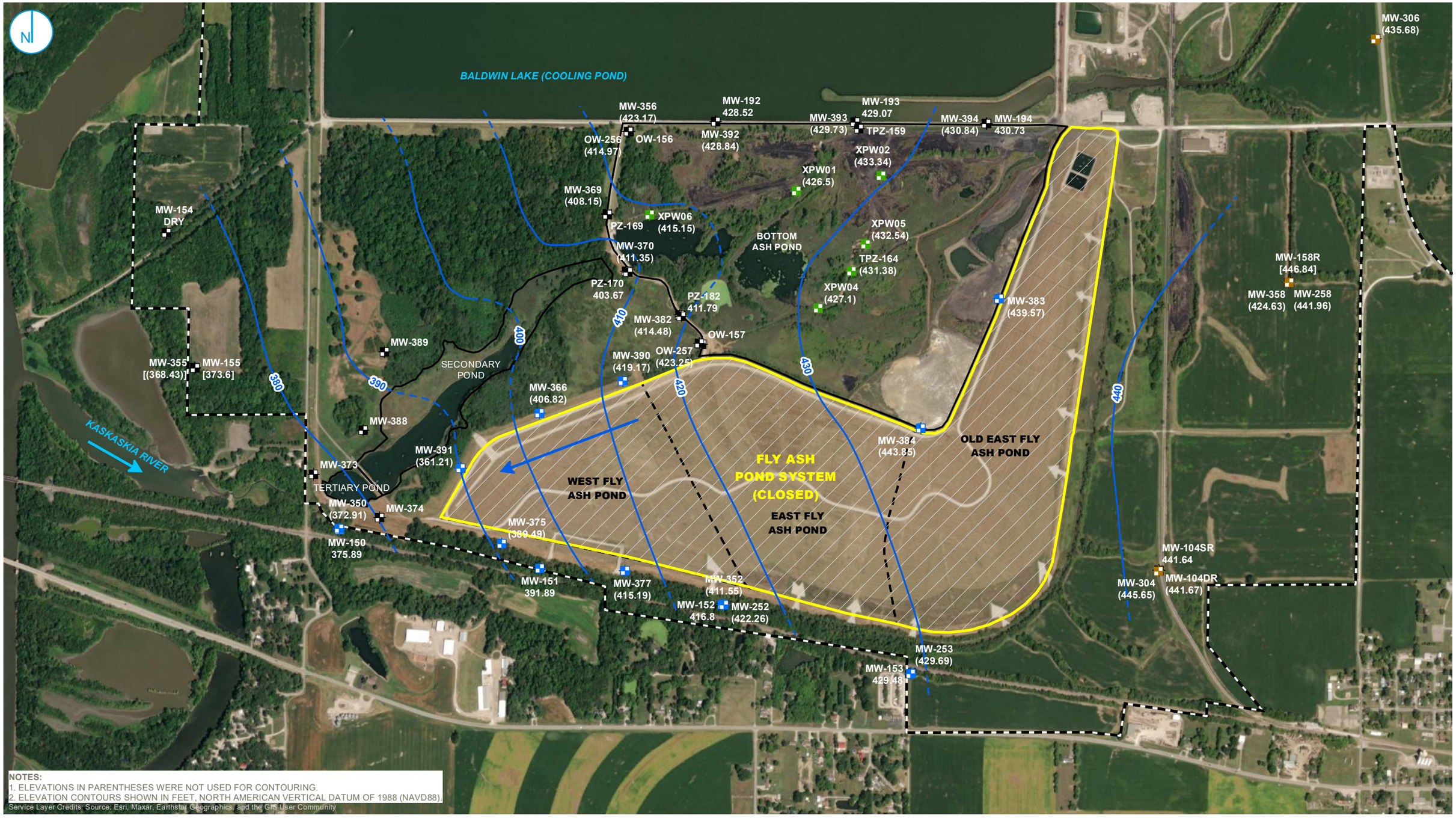


NOTES:
1. ELEVATIONS IN PARENTHESES WERE NOT USED FOR CONTOURING.
2. ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- MONITORING WELL
- PORE WATER WELL
- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- REGULATED UNIT (SUBJECT UNIT)
- SITE FEATURE
- CAPPED
- PROPERTY BOUNDARY

0 400 800 Feet

SHALLOW UNLITHIFIED POTENTIOMETRIC SURFACE MAP AUGUST 2-3, 2023

2023 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
FLY ASH POND SYSTEM
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

PROJECT: 169000XXXX | DATED: 12/21/2023 | DESIGNER: GALARNMC

ATTACHMENT 3

MW-153, MW-253, and MW-352 Boring Logs and Well Construction Logs

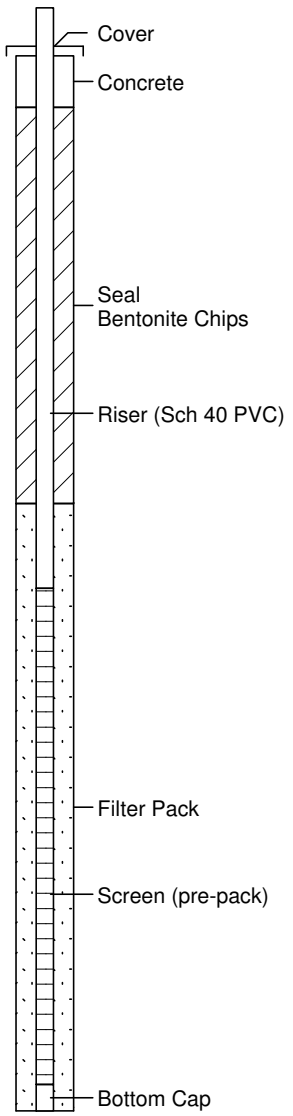
KELRON ENVIRONMENTAL
INCORPORATED

LOG OF BORING MW-153

Ash Pond System Monitoring Well Network
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.
Location: Twp 04S, Rng 07W, 15 SW, SW, NE

Date Completed	: 09/22/2010	Driller	: Matt Cooper
Hole Diameter	: 8 1/2"OD / 4 1/4" ID	Geologist	: Brendon Wilder (PSC)
Drilling Method	: Hollow-Stem/Rotary (CME-550)	Land Surface Elevation	: 442.77
Sampling Method	: MacroCore (60")	Top of Casing Elevation	445.67
Drilling Company	: PSC	X,Y Coordinates	: 2384435, 553298

Depth in Feet	DESCRIPTION	Surf. Elev. 442.77	Samples	Recovery inches	Qp TSF	USCS	GRAPHIC
0	Continuous boring - no soil sampling conducted Refer to boring log for adjacent nested well MW-253 for a description of subsurface materials	442					
5		437					
10		432					
15		427					
20	END BOREHOLE AT 20.5 FEET BLS	422					
25							



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KELRON ENVIRONMENTAL
INCORPORATED

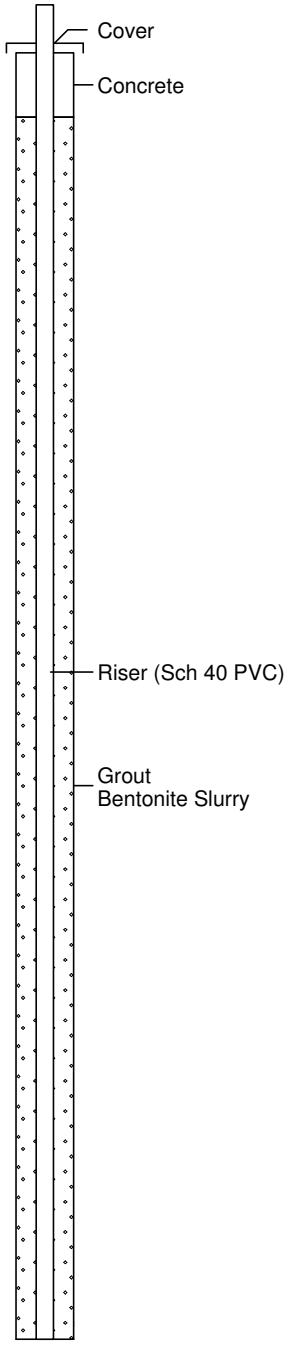
LOG OF BORING MW-253

Ash Pond System Monitoring Well Network
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.
Location: Twp 04S, Rng 07W, 15 SW, SW, NE

Date Completed	: 09/20/2010	Driller	: Matt Cooper
Hole Diameter	: 8 1/2"OD / 4 1/4" ID	Geologist	: Brendon Wilder (PSC)
Drilling Method	: Hollow-Stem/Rotary (CME-550)	Land Surface Elevation	: 442.70
Sampling Method	: MacroCore (60")	Top of Casing Elevation	445.84
Drilling Company	: PSC	X,Y Coordinates	: 2384430, 553298

Depth in Feet	DESCRIPTION	Surf. Elev. 442.70	Samples	Recovery inches	Qp TSF	USCS	GRAPHIC
0	SILTY CLAY, trace gravel, hard, light brown, dry	442	1	25/48	4.5+		
			2		4.5+		
5	- hard, medium plasticity, gray (2.5Y 6/1) with yellow-brown mottling (10YR 5/6), moist	437	3	47/60	4.5	CL	
			4		4.5		
			5		4.5		
10		432	6	53/60	4.5		
	CLAY (fat) with SAND, trace gravel, dark yellow brown with light gray mottling, mottling decreases with depth - grain size analysis @ 11 - 12 ft: 0.7% gravel, 16.4% sand, 41.4% silt, 41.4% clay		7		4.0		
			8		4.0		
			9		3.0		
15		427	10	52/60	4.5	CH	
			11		3.5		
	- soft		12		3.5		
			13		2.0		
	CLAY (lean) with SAND, trace gravel, stiff to hard, medium plasticity, dark yellow brown		14	60/60		CL	
20							

Well: MW-253
Elev.: 445.84



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KELRON ENVIRONMENTAL
INCORPORATED

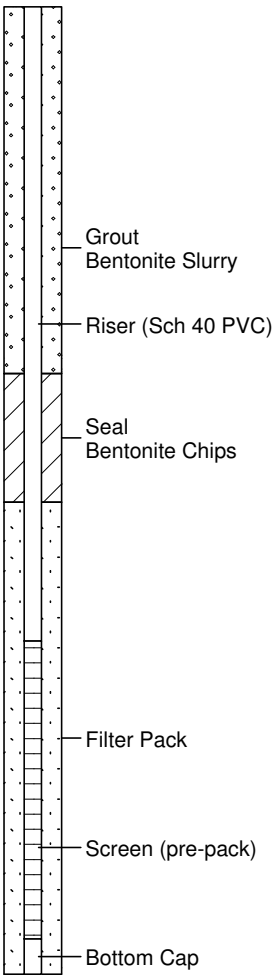
LOG OF BORING MW-253

Ash Pond System Monitoring Well Network
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.
Location: Twp 04S, Rng 07W, 15 SW, SW, NE

Date Completed	: 09/20/2010	Driller	: Matt Cooper
Hole Diameter	: 8 1/2"OD / 4 1/4" ID	Geologist	: Brendon Wilder (PSC)
Drilling Method	: Hollow-Stem/Rotary (CME-550)	Land Surface Elevation	: 442.70
Sampling Method	: MacroCore (60")	Top of Casing Elevation	445.84
Drilling Company	: PSC	X,Y Coordinates	: 2384430, 553298

Depth in Feet	DESCRIPTION	Surf. Elev. 442.70	Samples	Recovery inches	Qp TSF	USCS	GRAPHIC
20	- grain size analysis @ 19 - 19.5 ft: 0.7% gravel, 26.9% sand, 38.1% silt, 34.3% clay	422	14	60/60		CL	
25	- small fine sand seams from 25 to 27 feet	417	15	60/60			
	CLAY (fat), shaley, platy/laminated, soft, low plasticity, light yellow brown (10YR 6/4)		16		3.5		
	- stiff to very stiff, light olive brown (2.5Y 5/4) - grain size analysis @ 29 - 30 ft: 6.7% sand, 21.6% silt, 71.7% clay		17		3.0		
30		412	18	60/60	4.5	CH	
			19		3.5		
			20		3.0		
	- Drove split-spoon 2-inches into bedrock: 34.5 to 34.7 feet bls		21	2/2		LS/SH	
	LIMESTONE with SHALE						
35	Auger refusal at 35.0 feet END BOREHOLE AT 35.0 FEET BLS	407					
40							

Well: MW-253
Elev.: 445.84



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Illinois Environmental Protection Agency

Well Completion Report

Incident No.: None
Site Name: Dynegy-Baldwin Energy Complex
Drilling Contractor: Terra Drill
Driller: Matt Cooper
Drilling Method: Hollow-Stem Auger

Well No.: MW-153
Date Drilled Start: 09/21/10
Date Completed: 09/21/10
Geologist: Brendon Wilder
Drilling Fluids (Type): None

Annular Space Details

Type of Surface Seal: Concrete
Type of Annular Sealant: Bentonite Chips
Type of Bentonite Seal (Granular, Pellet): Bentonite Chips (hydrated)
Type of Sand Pack: Clean Silica Sand

Well Construction Materials

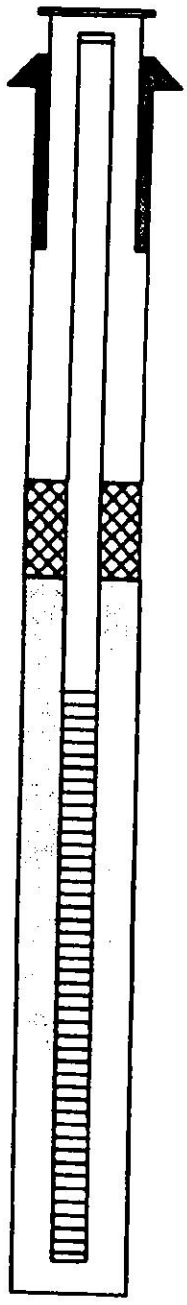
	Stainless Steel Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			
Riser pipe above w.t.		Sch. 40	
Riser Pipe below w.t.		Sch. 40	
Screen		Sch. 40	
Coupling joint screen to riser			
Protective casing			

Measurements

to .01 ft (where applicable)

Riser Pipe Length	13.25
Screen Length	9.25
Screen Slot Size	0.01
Protective casing length	
Depth to water	16.38
Elevation of water	429.29
Free Product thickness	
Gallons removed (develop)	3.44
Gallons removed (purge)	
Other	

Completed by: PSC Industrial Outsourcing, LP



Elevations - .01 ft.

_____ Top of Protective Casing
445.67 Top of Riser Pipe
442.77 Ground Surface
441.77 Top of Annular sealant
_____ Casing Stickup

436.07 Top of Seal
2.00 Total Seal Interval
434.07 Top of Sand

432.42 Top of Screen

9.64 Total Screen Interval

422.78 Bottom of Screen
422.27 Bottom of Borehole

IL 532-2274
LPC 500 Rev June 2004

Illinois Environmental Protection Agency

Well Completion Report

Incident No.: None
Site Name: Dynegy-Baldwin Energy Complex
Drilling Contractor: Terra Drill
Driller: Matt Cooper
Drilling Method: Hollow-Stem Aug.; Mud-Rotary

Well No.: MW-253
Date Drilled Start: 09/20/10
Date Completed: 09/20/10
Geologist: Brendon Wilder
Drilling Fluids (Type): Water w/ Polymer

Annular Space Details

Type of Surface Seal: Concrete
Type of Annular Sealant: Cement-Bentonite Grout
Type of Bentonite Seal (Granular, Pellet): Bentonite Chips (hydrated)
Type of Sand Pack: Clean Silica Sand

Well Construction Materials

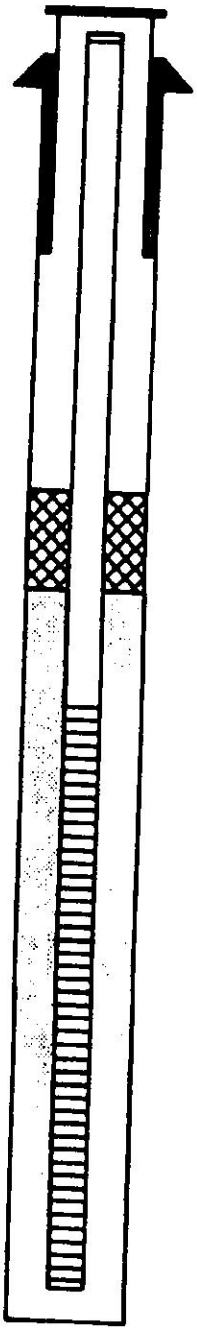
	Stainless Steel Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			
Riser pipe above w.t.		Sch. 40	
Riser Pipe below w.t.		Sch. 40	
Screen		Sch. 40	
Coupling joint screen to riser			
Protective casing			

Measurements

to .01 ft (where applicable)

Riser Pipe Length	33.01
Screen Length	4.63
Screen Slot Size	0.01
Protective casing length	
Depth to water	12.71
Elevation of water	433.13
Free Product thickness	
Gallons removed (develop)	7.89
Gallons removed (purge)	
Other	

Completed by: PSC Industrial Outsourcing, LP



Elevations - .01 ft.

_____ Top of Protective Casing
445.84 Top of Riser Pipe
442.70 Ground Surface
441.70 Top of Annular sealant
_____ Casing Stickup

417.00 Top of Seal
2.00 Total Seal Interval
415.00 Top of Sand

412.84 Top of Screen

4.63 Total Screen Interval

408.21 Bottom of Screen
407.70 Bottom of Borehole

IL 532-2274
LPC 500 Rev June 2004

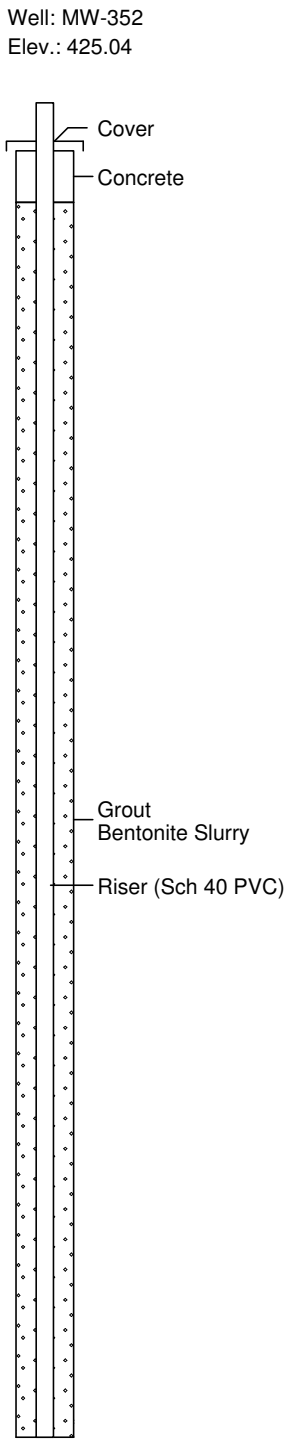
KELRON ENVIRONMENTAL
INCORPORATED

LOG OF BORING MW-352

Ash Pond System Monitoring Well Network
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.
Location: Twp 04S, Rng 07W, 16 SE, NE, NE

Date Completed	: 09/16/2010	Driller	: Matt Cooper
Hole Diameter	: 8 1/2"OD / 4 1/4" ID: 3 7/8" rock	Geologist	: Brendon Wilder (PSC)
Drilling Method	: Hollow-Stem/Rotary (CME-550)	Land Surface Elevation	: 422.36
Sampling Method	: MacroCore (60")/NX Core	Top of Casing Elevation	425.04
Drilling Company	: PSC	X,Y Coordinates	: 2382789, 553901

Depth in Feet	DESCRIPTION	Surf. Elev. 422.36	Samples	Recovery inches	Qp TSF	USCS	GRAPHIC
0	SILTY CLAY, very stiff to hard, yellow brown (10YR 5/6), dry	422	1	46/48	4.5+	CL	
			2	60/60	3.5		
5	CLAY, trace sand and fine gravel, very stiff, high plasticity, few black organic material	417	3		4.0		
			4		2.75		
			5		3.0		
10	- medium hard	412	6	60/60	2.75	CL	
	- soft		7		2.0		
			8		1.0		
			9		1.25		
15	- medium hard	407	10	60/60	1.5		
			11		2.5		
	SAND, poorly graded, loose, wet (4-inch thick)		12		2.75	SP	
	SANDY CLAY, trace fine gravel, yellow brown to olive brown (2.5Y 5/3)		13		3.5		
20		402	14	60/60	4.5+		
			15		2.5	CL	
			16		2.5		
			17		2.75		
25			18	48/60	2.5		



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KELRON ENVIRONMENTAL
INCORPORATED

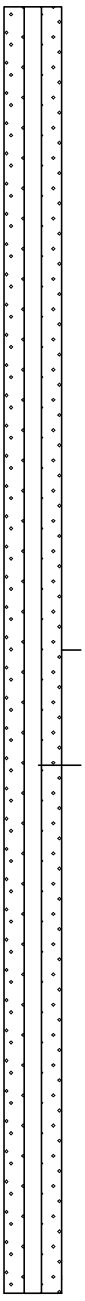
LOG OF BORING MW-352

Ash Pond System Monitoring Well Network
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.
Location: Twp 04S, Rng 07W, 16 SE, NE, NE

Date Completed	: 09/16/2010	Driller	: Matt Cooper
Hole Diameter	: 8 1/2"OD / 4 1/4" ID: 3 7/8" rock	Geologist	: Brendon Wilder (PSC)
Drilling Method	: Hollow-Stem/Rotary (CME-550)	Land Surface Elevation	: 422.36
Sampling Method	: MacroCore (60")/NX Core	Top of Casing Elevation	425.04
Drilling Company	: PSC	X,Y Coordinates	: 2382789, 553901

Depth in Feet	DESCRIPTION	Surf. Elev. 422.36	Samples	Recovery inches	Qp TSF	USCS	GRAPHIC
25	- grain size analysis @ 26.5 - 27.5 ft: 33.7% sand, 27.1% silt, 39.2% clay	397	18	48/60	2.5	CL	
	SAND with few gravel, yellow brown					SP	
	CLAY, some sand and fine gravel, hard to very hard, high plasticity, dark yellow brown (10YR 4/6)					CL	
			19	60/60	3.0		
30	CLAY, lean to fat	392	20		3.0		
	- grain size analysis @ 32 - 33 ft: 13.2% sand, 43.9% silt, 42.8% clay		21		3.5		
			22		3.0		
35		387	23	48/60	1.5		
	- medium hard, high plasticity, gray brown to light olive brown (2.5Y 5/2-5/3)		24		1.5		
	- trace silt, dark yellow brown (10YR 4/4)		25		1.75	CL/CH	
			26		1.5		
40		382	27	54/60	1.75		
			28		2.0		
			29		2.5		
			30		2.5		
45		377	31	57/60	2.0		
			32		1.75		
			33		1.75		
	CLAY, medium hard, low plasticity, olive brown (2.5Y 5/4)		34		2.5	CL	
			35		1.75		
			36	3/3			
50							

Well: MW-352
Elev.: 425.04



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KELRON ENVIRONMENTAL
INCORPORATED

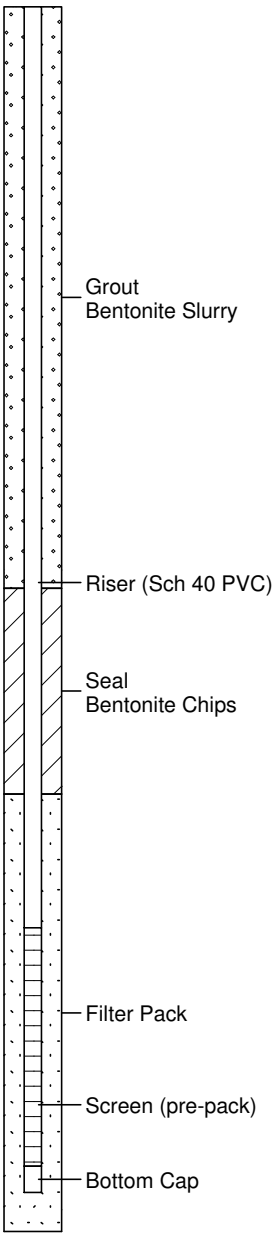
LOG OF BORING MW-352

Ash Pond System Monitoring Well Network
Baldwin Energy Complex
Dynegy Midwest Generation, Inc.
Location: Twp 04S, Rng 07W, 16 SE, NE, NE

Date Completed	: 09/16/2010	Driller	: Matt Cooper
Hole Diameter	: 8 1/2"OD / 4 1/4" ID: 3 7/8" rock	Geologist	: Brendon Wilder (PSC)
Drilling Method	: Hollow-Stem/Rotary (CME-550)	Land Surface Elevation	: 422.36
Sampling Method	: MacroCore (60")/NX Core	Top of Casing Elevation	425.04
Drilling Company	: PSC	X,Y Coordinates	: 2382789, 553901

Depth in Feet	DESCRIPTION	Surf. Elev. 422.36
50		372
	- Auger refusal at 53.7 feet bgs	
	LIMESTONE, weathered, thinly laminated, medium hard to hard, gray	
55		367
	SHALE, clayey, gray	
	LIMESTONE, occasional shale partings	
60		362
	- laminated, fossiliferous, medium gray	
	SHALE, soft, dark gray	
65		357
	LIMESTONE, medium hard to hard, light gray	
	Borehole diameter from 53.7 to 73.8 feet bgs = 3 7/8"	
70	RQD for 53.8 - 73.8' = 57% (Fair) Recovery = 173/240"	352
	END BOREHOLE AT 73.8 FEET BLS	
75		

Samples	Recovery inches	Qp TSF	USCS	GRAPHIC
37	5/5		CL	
38	8/27		LS	
			SH	
39	19/60		LS	
40	54/60			
			SH	
41	59/60		LS	
42	33/34			



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Illinois Environmental Protection Agency

Well Completion Report

Incident No.: None
Site Name: Dynegy-Baldwin Energy Complex
Drilling Contractor: Terra Drill
Driller: Matt Cooper
Drilling Method: Hollow-Stem Aug.; Mud-Rotary

Well No.: MW-352
Date Drilled Start: 09/15/10
Date Completed: 09/17/10
Geologist: Brendon Wilder
Drilling Fluids (Type): Water w/ Polymer

Annular Space Details

Type of Surface Seal: Concrete
Type of Annular Sealant: Cement-Bentonite Grout
Type of Bentonite Seal (Granular, Pellet): Bentonite Chips (hydrated)
Type of Sand Pack: Clean Silica Sand

Well Construction Materials

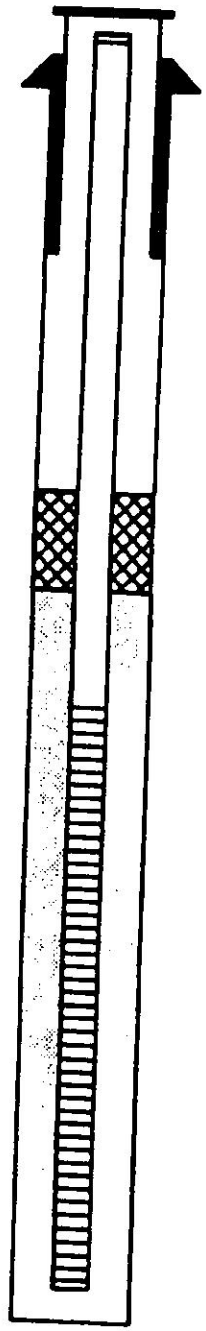
	Stainless Steel Specify Type	PVC Specify Type	Other Specify Type
Riser coupling joint			
Riser pipe above w.t.		Sch. 40	
Riser Pipe below w.t.		Sch. 40	
Screen		Sch. 40	
Coupling joint screen to riser			
Protective casing			

Measurements

to .01 ft (where applicable)

Riser Pipe Length	70.59
Screen Length	4.63
Screen Slot Size	0.01
Protective casing length	
Depth to water	23.85
Elevation of water	401.19
Free Product thickness	
Gallons removed (develop)	13.70
Gallons removed (purge)	
Other	

Completed by: PSC Industrial Outsourcing, LP



Elevations - .01 ft.

____ Top of Protective Casing
425.04 Top of Riser Pipe
422.36 Ground Surface
421.36 Top of Annular sealant
____ Casing Stickup

361.06 Top of Seal
4.00 Total Seal Interval
357.06 Top of Sand

354.46 Top of Screen

4.63 Total Screen Interval

349.83 Bottom of Screen
348.56 Bottom of Borehole

ATTACHMENT 4

Location of CCR Porewater Piezometers TPZ-163, TPZ-167, and TPZ-168

Y:\Mapping\Projects\22\2285Baldwin\MXD\GMP_Addendum\FAPS\Figure 2-1_Monitoring Well Location Map.mxd

PROJECT: 169000XXXX | DATED: 10/15/2021 | DESIGNER: HOTCALD

- MONITORING WELL AND PIEZOMETER LOCATIONS
- ABANDONED MONITORING WELL AND PIEZOMETER LOCATIONS
- PART 845 REGULATED UNIT (SUBJECT UNIT)
- FLY ASH POND SYSTEM (CLOSED)
- SITE FEATURE
- LIMITS OF FINAL COVER
- PROPERTY BOUNDARY

0 400 800 Feet

MONITORING WELL LOCATION MAP

ADDENDUM TO THE GROUNDWATER MONITORING PLAN
FLY ASH POND SYSTEM
BALDWIN POWER PLANT
BALDWIN, ILLINOIS

FIGURE 2-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL