Cynthia Vodopivec
Dynegy Midwest Generation, LLC
Luminant
6555 Sierra Dr.
Irving, TX 75039

November 19, 2020

Sent via email

Mr. Andrew R. Wheeler, EPA Administrator
Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Mail Code 5304-P
Washington, DC 20460

Re: Baldwin Power Station Revised Alternative Closure Demonstration

Dear Administrator Wheeler:

Dynegy Midwest Generation, LLC (Dynegy) submits this revised request to the U.S. Environmental Protection Agency (EPA) for approval of a site-specific alternative deadline to initiate closure pursuant to 40 C.F.R. § 257.103(f)(2) for the Bottom Ash Pond located at the Baldwin Power Station near Baldwin, Illinois. Dynegy is requesting an extension pursuant to 40 C.F.R. § 257.103(f)(2) so that the Bottom Ash Pond may continue to receive CCR and non-CCR wastestreams after April 11, 2021, and complete closure no later than October 17, 2028.

The enclosed demonstration prepared by Burns & McDonnell replaces the demonstration that was previously submitted by Dynegy to EPA on September 29, 2020. This demonstration addresses all of the criteria in 40 C.F.R. § 257.103(f)(2)(i)-(iv) and contains the documentation required by 40 C.F.R. § 257.103(f)(2)(v). As allowed by the agency, in lieu of hard copies of these documents, electronic files were submitted to Kirsten Hillyer, Frank Behan, and Richard Huggins via email. The demonstration is also available on Dynegy's publicly available website: https://www.luminant.com/ccr/

Sincerely,

Cynthia Vodopivec
VP - Environmental Health & Safety

Enclosure

cc: Kirsten Hillyer
Frank Behan
Richard Huggins

CCR Surface Impoundment Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

Dynegy Midwest Generation, LLC

Baldwin Power Station
Project No. 122702

Revision 1
11/19/2020

CCR Surface Impoundment Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline

prepared for

Dynegy Midwest Generation, LLC
Baldwin Power Station
Baldwin, Illinois

Project No. 122702

Revision 1
11/19/2020

prepared by

Burns & McDonnell Engineering Company, Inc.
Kansas City, Missouri

INDEX AND CERTIFICATION

Dynegy Midwest Generation, LLC
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Project No. 122702

Report Index

Certification

I hereby certify, as a Professional Engineer in the state of Illinois, that the information in this document as noted in the above Report Index was assembled under my direct personal charge. This report is not intended or represented to be suitable for reuse by the Dynegy Midwest Generation, LLC or others without specific verification or adaptation by the Engineer.

Edward T. Tohill, P.E. (Illinois License No. 062-056915)

Date: 11/19/20

LICENSED PROFESSIONAL ENGINEER
EDWARD T. TOHILL
062-056915
STATE OF ILLINOIS

11/19/20
LIC EXPIRES
11/30/21

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LIST OF ABBREVIATIONS

Abbreviation	**Term/Phrase/Name**
ASD	Alternate Source Demonstration
Baldwin	Baldwin Power Station
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
Dynegy	Dynegy Midwest Generation, LLC
ELG Rule	Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category
EPA	Environmental Protection Agency
POTW	Publicly Owned Treatment Works
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
SWPPP	Stormwater Pollution Prevention Plan
TSS	total suspended solids

1.0 EXECUTIVE SUMMARY

Dynegy Midwest Generation, LLC ("Dynegy") submits this request to the U.S. Environmental Protection Agency ("EPA") for approval of a site-specific alternative deadline to initiate closure pursuant to 40 C.F.R. § 257.103(f)(2) —"Permanent Cessation of a Coal-Fired Boiler(s) by a Date Certain"— for the Bottom Ash Pond located at the Baldwin Energy Complex ("Baldwin") in Illinois. The Bottom Ash Pond is a 177-acre CCR surface impoundment used to manage CCR and non-CCR wastestreams at Baldwin. As discussed herein, the remaining two coal-fired boilers at the station will cease coal-fired operations no later than December 31, 2025, and the impoundment will complete closure no later than October 17, 2028. Therefore, Dynegy is requesting an extension pursuant to 40 C.F.R. § 257.103(f)(2) from EPA so that the Bottom Ash Pond may continue to receive CCR and non-CCR wastestreams after April 11, 2021, and complete closure no later than October 17, 2028.

2.0 INTRODUCTION

Baldwin is a 1,185-megawatt coal-fueled electric generating station near Baldwin, Illinois, that utilizes the 177-acre Bottom Ash Pond to manage sluiced bottom ash/boiler slag, economizer ash, SCR ash, air heater ash, dry fly ash (when not hauled offsite for beneficial use), and non-CCR wastewaters. The impoundment was constructed in the 1960's and has been in service for the life of the plant. Units 1 and 2 remain in operation, and Unit 3 has already ceased operation. Units 1 and 2 will cease operation no later than December 31, 2025. The various non-CCR wastewaters routed to the Bottom Ash Pond originate from the Unit 1 boiler room sump, Unit 1 boiler low point drains, oil/water separator, demineralizer regeneration flows, SDA emergency discharge, floor drains, water treatment system wastes, chemical metal cleaning waste pond, nonchemical metal cleaning wastewater (including boiler wash water), sewage treatment plant, Unit 1 and 2 polisher precoat system wastewater and stormwater sources. All fly ash is now handled dry. The Fly Ash Pond system, which includes the Old East, East, and West Fly Ash Ponds, is no longer active and has been closed under an approved closure plan with CCR material in place; therefore, it is not subject to this demonstration request. A site plan is provided on Figure 1 in Appendix A, and the plant water balance diagram is included in Appendix B. Note that the Bottom Ash Pond is referred to as the Primary Slag Field on the water balance diagram.

On April 17, 2015, the Environmental Protection Agency ("EPA") issued the federal Coal Combustion Residual ("CCR") Rule, 40 C.F.R. Part 257, Subpart D, to regulate the disposal of CCR materials generated at coal-fueled units. The rule is being administered under Subtitle D of the Resource Conservation and Recovery Act (RCRA, 42 U.S.C. § 6901 et seq.). On August 28, 2020, the EPA Administrator issued revisions to the CCR Rule that require all unlined surface impoundments to initiate closure by April 11, 2021, unless an alternative deadline is requested and approved. 40 C.F.R. § 257.101(a)(1) (85 Fed. Reg. 53,516 (Aug. 28, 2020)). Specifically, owners and operators of a CCR surface impoundment may continue to receive CCR and non-CCR wastestreams if the facility will cease operation of the coal-fired boiler(s) and complete closure of the impoundments within certain specified timeframes. 40 C.F.R. § 257.103(f)(2). To qualify for an alternative closure deadline under § 257.103(f)(2), a facility must meet the following four criteria:

1. **§ 257.103(f)(2)(i)** – No alternative disposal capacity is available on-site or off-site. An increase in costs or the inconvenience of existing capacity is not sufficient to support qualification.
2. **§ 257.103(f)(2)(ii) -** Potential risks to human health and the environment from the continued operation of the CCR surface impoundment have been adequately mitigated;

3. **§ 257.103(f)(2)(iii) -** The facility is in compliance with the CCR rule, including the requirement to conduct any necessary corrective action; and
4. **§ 257.103(f)(2)(iv) -** The coal-fired boilers must cease operation and closure of the impoundment must be completed within the following timeframes:
   a. For a CCR surface impoundment that is 40 acres or smaller, the coal-fired boiler(s) must cease operation and the CCR surface impoundment must complete closure no later than October 17, 2023.
   b. For a CCR surface impoundment that is larger than 40 acres, the coal-fired boiler(s) must cease operation, and the CCR surface impoundment must complete closure no later than October 17, 2028.

Section 257.103(f)(2)(v) sets out the documentation that must be provided to EPA to demonstrate that the four criteria set out above have been met. Therefore, this demonstration is organized based on the documentation requirements of §§ 257.103(f)(2)(v)(A) – (D).

3.0 DOCUMENTATION OF NO ALTERNATIVE DISPOSAL CAPACITY

To demonstrate that the criteria in § 257.103(f)(2)(i) has been met, the following provides documentation that no alternative disposal capacity is currently available on-site or off-site for each CCR and non-CCR wastestream that Dynegy seeks to continue placing into the Bottom Ash Pond after April 11, 2021. Consistent with the regulations, neither an increase in costs nor the inconvenience of existing capacity was used to support qualification under this criteria. Instead, as EPA explained in the preamble to the proposed Part A revisions, "it would be illogical to require [] facilities [ceasing power generation] to construct new capacity to manage CCR and non-CCR wastestreams." 84 Fed. Reg. 65,941, 65,956 (Dec. 2, 2019). EPA again reiterated in the preamble to the final revisions that "[i]n contrast to the provision under § 257.103(f)(1), the owner or operator does not need to develop alternative capacity because of the impending closure of the coal fired boiler. Since the coal-fired boiler will shortly cease power generation, it would be illogical to require these facilities to construct new capacity to manage CCR and non-CCR wastestreams." 85 Fed. Reg. at 53,547. Thus, new construction or the development of new alternative disposal capacity was not considered a viable option for any wastestream discussed below.

3.1 Site-Layout and Wastewater Processes

The Bottom Ash Pond receives all the CCR sluice flows and many of the non-CCR wastewater flows onsite, as shown on the water balance diagram included in Appendix B. The remaining impoundments onsite (cooling pond, coal pile runoff pond, metal cleaning waste pond, sewage treatment ponds, cove pond, secondary pond, and tertiary pond) are not authorized to receive the CCR material. These wastestreams are discussed in more detail in the following sections.

There is no on-site CCR landfill that is permitted to receive the dry fly ash. The Fly Ash Pond system is no longer active and has been closed under an approved closure plan.

3.2 CCR Wastestreams

Dynegy evaluated each CCR wastestream placed in the Bottom Ash Pond at Baldwin. For the reasons discussed below in, each of the following CCR wastestreams must continue to be placed in the Bottom Ash Pond due to lack of alternative capacity both on and off-site.

Table 3-1: Baldwin CCR Wastestreams

CCR Wastestreams	Estimated Average Flow (MGD)	Alternative Disposal Capacity Available? YES/NO	Details
Unit 1 & 2 dry fly ash	NA (Dry) 69,200 tons/year based on 2019 rates	NO	The fly ash is collected dry and is currently conditioned and beneficially used on-site. The conditioned fly ash is placed in the Bottom Ash Pond, which will facilitate pond closure in the near future. This beneficial reuse of the fly ash will be reflected in the Bottom Ash Pond final closure plan. Dynegy does not have a CCR landfill or another CCR surface impoundment located onsite that would be available to accept this material. Consequently, there are no on-site alternatives for this wastestream, and alternative capacity would need to be designed, permitted, and installed. Currently, off-site alternative capacity is not available as discussed below.
Unit 1 & 2 bottom ash sluice	2.8	NO	Currently, alternative capacity is not available. On-site alternative capacity would need to be designed, permitted, and installed. Off-site alternative capacity would include development of on-site temporary tanks and transporting of this sluice material offsite for disposal.
Unit 1 & 2 SCR ash, air heater ash, and economizer ash sluice	0.03	NO	Currently, alternative capacity is not available. On-site alternative capacity would need to be designed, permitted, and installed. Off-site alternative capacity would include development of on-site temporary tanks and transporting of this sluice material offsite for disposal

Dynegy evaluated the following on-site and off-site alternative capacity options for these CCR wastestreams:

- Dry fly ash (Approx. 69,200 tons/year handled dry in 2019):
  - On-site alternative capacity is currently not available and would need to be developed. There is no on-site CCR landfill that is permitted to receive the dry fly ash. The Fly Ash Pond system is no longer active and has been closed under an approved closure plan.
  - On-site alternative capacity would require the design, permitting, and installation of a new CCR impoundment. The environmental permitting would include a general NPDES stormwater construction permit (includes threatened and endangered species and historic preservation assessments), a construction & operating permit under the Illinois CCR rule (35 IAC 845), and a Stormwater Pollution Prevention Plan (SWPPP) at a minimum. Based on our experience with environmental permitting, this effort could require three to four years.
  - Off-site alternative capacity is currently not available and would need to be developed. Developed off-site alternative capacity for fly ash would consist of off-site transportation to a contracted landfill. The fly ash is normally conditioned (@ 10% moisture) in an on-site pug mill due to fugitive dusting concerns. This low-sulfur Powder River Basin Class C fly ash develops cementitious characteristics when conditioned with water rather quickly. Because of this, off-site transportation must be limited to less than a one-hour haul time, or within 40 miles of the station, to prevent the fly ash from setting up and hardening and causing adverse disposal / unloading issues at the offsite landfill. There are three landfills within approximately 40 miles of the station (see Figure 2 in Appendix A), so Dynegy is continuing to have discussions with these offsite landfills to determine if they have the capacity and the infrastructure to handle this daily quantity of fly ash. This will also include efforts to characterize the waste. Dynegy will update EPA in forthcoming progress reports if offsite disposal capacity becomes available. Off-site alternative capacity would consist of off-site transportation utilizing approximately 11 trucks daily. The daily truck traffic would result in increased potential for safety and noise impacts and further increases in fugitive dust, greenhouse gas emissions and carbon footprint which may require a Prevention of Significant Deterioration (PSD) permit and modification under the Clean Air Act Permit Program if the calculated increases in emissions is over the PSD limits.
- Bottom ash, economizer ash, and non-CCR mil rejects sluice (2.8 MGD average):
  - On-site alternative capacity is currently not available and would need to be developed. The cooling pond, coal pile runoff pond, metal cleaning waste pond, sewage treatment ponds,

cove pond, secondary pond, and tertiary pond are not CCR surface impoundments and cannot receive CCR materials.

- Development of on-site alternative capacity would require the design, permitting, and installation of a new treatment system including CCR ponds, clarifiers, and/or storage tank(s), to provide the necessary retention time to meet the NPDES permit limits. The environmental permitting would include a modification to the current individual NPDES permit (to allow for the rerouting of this wastestream to another outfall), a general NPDES stormwater construction permit (includes threatened and endangered species and historic preservation assessments), a construction & operating permit under the Illinois CCR rule (35 IAC 845), and a SWPPP at a minimum which would require a minimum of three years to implement.
- Off-site alternative capacity is currently not available and would need to be developed. Developed off-site alternative capacity would consist of both temporary on-site wet storage (frac tanks) and off-site transportation via tanker trucks. With an average daily flow of 2.8 MGD of sluice water, approximately 134 frac tanks and 374 daily tanker trucks (~7,500 gallons per truck to maintain DOT weight restrictions) would be required, if a local POTW could be identified to receive it. The daily tanker truck traffic would result in increased potential for safety and noise impacts and further increases in fugitive dust, greenhouse gas emissions and carbon footprint which may require a PSD permit and modification under the Clean Air Act Permit Program if the calculated increases in emissions are over the PSD limits. Setting up arrangements for a local POTW to accept the wastewater would prove to be difficult since this amount of wastewater would most likely upset their treatment systems causing them to exceed their NPDES discharge limits. The potential for leaks/spills from the tank system or transportation of the wastewater offsite does exist. Furthermore, the temporary wet storage needed to accommodate off-site disposal would require reconfiguration, design, installation, and associated environmental permitting which would require a minimum of two years to implement. For all of these reasons, Dynegy has determined that offsite disposal is not feasible for these flows at Baldwin.

As stated previously, because Dynegy has elected to pursue the option to permanently cease coal-fired operations of the two remaining boilers at the station by no later than December 31, 2025, developing alternative disposal capacity is “illogical,” to use EPA’s words, and also counterproductive to the work to cease coal-fired operations of the boilers and close the impoundment. As long as Dynegy continues to wet handle the bottom ash material and Unit 1 and 2 SCR ash, air heater ash and economizer ash material, there are no other on-site CCR impoundments available to receive and treat these flows. The remaining impoundments onsite (cooling pond, coal pile runoff pond, metal cleaning waste pond, sewage treatment ponds, cove pond, secondary pond, and tertiary pond) are not authorized to receive the CCR material. Also, it is not feasible to dispose of the wet-generated material off-site. As EPA explained in the preamble of the 2015 rule, it is not possible for sites that sluice CCR material to an impoundment to eliminate the impoundment and dispose of the material offsite. *See* 80 Fed. Reg. 21,301, 21,423 (Apr. 17, 2015) ("[W]hile it is possible to transport dry ash off-site to [an] alternate disposal facility that is simply not feasible for wet-generated CCR. Nor can facilities immediately convert to dry handling systems."). As a result, the conditions at Baldwin satisfy the demonstration requirement in § 257.103(f)(2)(i).

Consequently, in order to continue to operate and generate electricity, Baldwin must continue to use the 177-acre CCR surface impoundment to manage the CCR wastestreams discussed above. Dynegy is working with nearby offsite landfills to characterize waste and determine potential for offsite disposal, which currently does not exist. Accordingly, the fly ash must be placed in the only available onsite disposal location (i.e., the Bottom Ash Pond) unless alternative offsite capacity can be established.

3.3 Non-CCR Wastestreams

Dynegy evaluated each non-CCR wastestream placed in the Bottom Ash Pond at Baldwin. For the reasons discussed below in Table 3-2, each of the following non-CCR wastestreams must continue to be placed in the Bottom Ash Pond due to lack of alternative capacity both on and off-site.

Table 3-2: Baldwin Non-CCR Wastestreams

<table>
<tr><th>Non-CCR Wastestreams</th><th>Estimated Average Flow (MGD)</th><th>Alternative Disposal Capacity Currently Available? YES/NO</th><th>Details</th></tr>
<tr><td>Chemical Metal Cleaning Wastewater</td><td>Intermittent</td><td>YES</td><td>This wastewater can be and has been transported offsite for disposal.</td></tr>
<tr><td>Non-Chemical Metal Cleaning Wastewater</td><td>Intermittent (6.0 during discharge)</td><td>NO</td><td rowspan="4">Currently, alternative capacity is not available nor is there a feasible option for all these wastestreams as discussed below.

On-site alternative capacity would need to be designed, permitted, and installed.</td></tr>
<tr><td>Sewage Treatment Plant Effluent</td><td>Intermittent (0.028)</td><td>NO</td></tr>
<tr><td>Unit 2 Polisher Precoat System Wastewater</td><td>Intermittent (0.01)</td><td>NO</td></tr>
<tr><td>Cove Area Discharge *</td><td>Intermittent (0.5)</td><td>NO</td></tr>
</table>

Non-CCR Wastestreams	Estimated Average Flow (MGD)	Alternative Disposal Capacity Currently Available? YES/NO	Details
Regen Wastewater	Intermittent (0.03)	NO	Off-site alternative capacity would include development of on-site temporary tanks and transporting of this sluice material offsite for disposal.

* Includes Unit 1 boiler room sump, Unit 1 boiler low point drains, oil/water separator, SDA emergency discharge, water treatment system, Unit 1 Polisher Precoat system, and floor drains

Dynegy evaluated on-site and off-site alternative capacity options for the non-CCR wastestreams. Development of on-site alternative capacity would require the design, permitting, and installation of a new treatment system including non-CCR ponds, clarifiers, and/or storage tank(s) to provide the necessary retention time for TSS removal to meet the NPDES permit limits. The environmental permitting would include a modification to the current individual NPDES permit (to allow for the rerouting of this wastestream to another outfall), general NPDES stormwater construction permit (includes threatened and endangered species and historic preservation assessments), a construction & operating permit, and a SWPPP at a minimum which would require a minimum of three years to implement.

Development of off-site alternative capacity would consist of both temporary on-site wet storage (frac tanks) and off-site transportation via tanker trucks assuming a local POTW could be identified to receive these streams. The required daily frac tanks and tanker trucks (~7,500 gallons per truck to maintain DOT weight restrictions) for each wastestream during each sluicing event is provided in Table 3-3. The daily tanker truck traffic would result in increased potential for safety and noise impacts and further increases in fugitive dust, greenhouse gas emissions and carbon footprint which may require a PSD permit and modification under the Clean Air Act Permit Program if the calculated increases in emissions are over the PSD limits. Setting up arrangements for a local POTW to accept this wastewater could prove to be difficult if this amount of wastewater would upset their treatment systems, causing them to exceed their NPDES discharge limits. Dynegy is continuing to have discussions with local POTW's to determine if they have the capacity and the infrastructure to handle these daily volumes of wastewater. This will also include efforts to characterize the waste. Dynegy will update EPA in forthcoming progress reports if offsite disposal capacity becomes available. The potential for leaks/spills from the tank system or transportation of the wastewater offsite does also exist. Furthermore, the temporary wet storage needed to accommodate off-site disposal would require reconfiguration, design, installation, and associated environmental permitting which would require a minimum of one year to implement. For all of these reasons, Dynegy has determined that offsite disposal is not feasible for these flows at Baldwin at this time.

Table 3-3: Non-CCR Wastestream Offsite Disposal

Non-CCR Wastestreams	Estimated Flow (MGD)	No. of Frac Tanks required (21,000 gallons each)	No. of Trucks required per day (7,500 gallons each)
Non-Chemical Metal Cleaning Wastewater	6.0 (during outages)	286	800
Sewage Treatment Plant Effluent	0.028	NA	4
Unit 2 Polisher Precoat System Wastewater	0.01	1	2
Cove Area Discharge	0.5	NA	67
Regen Wastewater	0.03	2	4
	Total	**289**	**877**

As stated previously, because Dynegy has elected to pursue the option to permanently cease the use of the two remaining coal fired boilers at the station by no later than December 31, 2025, developing the above-referenced alternative disposal capacity methods is "illogical," to use EPA's words, and also counterproductive to the work to cease coal-fired operations of the boilers and close the impoundment. There is no currently available infrastructure at the plant to support reroute of these flows. For the reasons discussed above, each of the non-CCR wastestreams must continue to be placed in the Bottom Ash Pond due to lack of alternative capacity both on and off-site. Consequently, in order to continue to operate and generate electricity, Baldwin must continue to use the 177-acre Bottom Ash Pond to manage the non-CCR wastestreams discussed above.

4.0 RISK MITIGATION PLAN

To demonstrate that the criteria in § 257.103(f)(2)(ii) has been met, Dynegy has prepared and attached a Risk Mitigation Plan for the Baldwin Bottom Ash Pond (see Attachment 1).

5.0 DOCUMENTATION AND CERTIFICATION OF COMPLIANCE

In the Part A rule preamble, EPA reiterates that compliance with the CCR rule is a prerequisite to qualifying for an alternative closure extension, as it "provides some guarantee that the risks at the facility are properly managed and adequately mitigated." 85 Fed. Reg. at 53,543. EPA further stated that it "must be able to affirmatively conclude that facility meets this criterion prior to any continued operation." 85 Fed. Reg. at 53,543. Accordingly, EPA "will review a facility's current compliance with the requirements governing groundwater monitoring systems." 85 Fed. Reg. at 53,543. In addition, EPA will also "require and examine a facility's corrective action documentation, structural stability documents and other pertinent compliance information." 85 Fed. Reg. at 53,543. Therefore, EPA is requiring a certification of compliance and specific compliance documentation be submitted as part of the demonstration. 40 C.F.R. § 257.103(f)(2)(v)(C).

To demonstrate that the criteria in § 257.103(f)(2)(iii) has been met, Dynegy is submitting the following information as required by § 257.103(f)(2)(v)(C):

5.1 Owner's Certification of Compliance - § 257.103(f)(2)(v)(C)(1)

I hereby certify that, based on my inquiry of those persons who are immediately responsible for compliance with environmental regulations for the Bottom Ash Pond, the facility is in compliance with all of the requirements contained in 40 C.F.R. Part 257, Subpart D – Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments. The Baldwin CCR compliance website is up-to-date and contains all the necessary documentation and notification postings.

On behalf of Dynegy:

Cynthia Vodopivec
VP - Environmental Health & Safety
November 19, 2020

5.2 Visual representation of hydrogeologic information - § 257.103(f)(2)(v)(C)(2)

Consistent with the requirements of § 257.103(f)(2)(v)(C)(2)(i) – (iii), Dynegy has attached the following items to this demonstration:

- Map(s) of groundwater monitoring well locations in relation to the CCR unit (Attachment 2)
- Well construction diagrams and drilling logs for all groundwater monitoring wells (Attachment 3)
- Maps that characterize the direction of groundwater flow accounting for seasonal variations (Attachment 4)

5.3 Groundwater monitoring results - § 257.103(f)(2)(v)(C)(3)

Tables summarizing constituent concentrations at each groundwater monitoring well through the first 2020 semi-annual monitoring period are included as Attachment 5.

5.4 Description of site hydrogeology including stratigraphic cross-sections - § 257.103(f)(2)(v)(C)(4)

A description of site hydrogeology and stratigraphic cross-sections of the site are included as Attachment 6.

5.5 Corrective measures assessment - § 257.103(f)(2)(v)(C)(5)

Background sampling at Baldwin began in late 2015 and continued for eight consecutive quarters. The first semiannual detection monitoring samples were collected in November 2017. The first assessment monitoring samples were collected in June 2018. The results from the 2020 monitoring period indicated a potential SSL for Lithium, an Appendix IV constituent. However, successful Alternate Source Demonstrations (ASDs) were completed for the March 2019, September 2019, and March 2020 sampling events. The Bottom Ash Pond remains in assessment monitoring, with no exceedances of the Appendix IV parameters. Accordingly, an assessment of corrective measures is not currently required for the Bottom Ash Pond. Baldwin will continue to conduct groundwater monitoring in accordance with all state and federal requirements.

The most recent ASD was completed in accordance with 40 C.F.R. § 257.95(g)(3)(ii) on October 26, 2020 for a sampling event that took place on March 26, 2020. The sampling event indicated a potential SSL for Lithium. The following two lines of evidence were used to demonstrate that another source was responsible for the SSL:

- The median lithium concentration in the Bottom Ash Pond porewater is lower than the median concentrations observed in background and downgradient groundwater.
- The Bottom Ash Pond porewater has a different ionic composition than groundwater.

The complete ASD is available in Attachment 1.

5.6 Remedy selection progress report - § 257.103(f)(2)(v)(C)(6)

As noted above, an assessment of corrective measures and the resulting selection of remedy are not currently required for the Bottom Ash Pond.

5.7 Structural stability assessment - § 257.103(f)(2)(v)(C)(7)

Pursuant to § 257.73(d), the initial structural stability assessment for the Bottom Ash Pond was prepared in October 2016 and is included as Attachment 7.

5.8 Safety factor assessment - § 257.103(f)(2)(v)(C)(8)

Pursuant to § 257.73(e), the initial safety factor assessment for the Bottom Ash Pond was prepared in October 2016 and is included as Attachment 8.

6.0 DOCUMENTATION OF CLOSURE COMPLETION TIMEFRAME

To demonstrate that the criteria in § 257.103(f)(2)(iv) has been met, "the owner or operator must submit the closure plan required by § 257.102(b) and a narrative that specifies and justifies the date by which they intend to cease receipt of waste into the unit in order to meet the closure deadlines." The closure plan for the Bottom Ash Pond, along with an addendum, is included as Attachment 9.

In order for a CCR surface impoundment over 40 acres to continue to receive CCR and non-CCR wastestreams after the initial April 11, 2021 deadline, the coal-fired boiler(s) at the facility must cease operation and the CCR surface impoundment must complete closure no later than October 17, 2028. As discussed below, Baldwin will begin construction of the Bottom Ash Pond closure by April 17, 2025, the remaining two boilers will cease coal-fired operations no later than December 31, 2025, and Baldwin will cease placing wastestreams into the Bottom Ash Pond by July 17, 2027 in order for closure to be completed by this deadline.

Table 6-1 is included below to summarize the major tasks and durations associated with closing the Bottom Ash Pond in place. These durations are consistent with the durations experienced with the closure of approximately 500 acres of other CCR impoundments already completed by Dynegy and its affiliates to date as noted below:

- Baldwin Fly Ash Pond System – 230 acres closed in-place with an approximate 30-month construction schedule
- Hennepin West Ash Ponds System – 35 acres closed in-place with an approximate 24-month construction schedule (includes closure by removal of an adjacent 6-acre settling pond and installing a sheet pile wall)
- Hennepin East Ash Ponds 2 and 4 – 25 acres closed in-place with an approximate 6-month construction schedule
- Coffeen Ash Pond 2 – 60 acres closed in-place with an approximate 24-month construction schedule
- Duck Creek Ash Ponds 1 and 2 – 130 acres closed in-place with an approximate 24-month construction schedule

Each CCR impoundment closure indicated above utilized a closely coordinated passive or gravity dewatering method, which consisted of the use of trenches excavated to lower the phreatic surface in portions of the impoundment to obtain a stable ash surface to permit the safe construction of the final cover system. The phreatic water in the trenches flows by gravity to sumps constructed within the impoundment.

The major benefit associated with this passive or gravity dewatering method is that the sumps are designed to provide holding time to allow the TSS to settle within the impoundment prior to discharge (an active dewatering method with wells would result in potential discharges of unsettled TSS). After solids settling, the water is discharged through the NPDES outfall in compliance with permitted limits.

Construction progressed sequentially as the dewatering of an area stabilized the ash surface. The CCR was graded to subgrade level, then overlain with the compacted clay layers and/or geomembrane liners. Vegetative soil cover was then placed on top of the infiltration layer. As each section of the impoundment was closed, this sequencing progressed to the completion of the pond closure. A similar process will be utilized to close the Baldwin Bottom Ash Pond in order to allow the final open section of the impoundment to be large enough for the impoundment to remain in operation until the pond ceases the receipt of waste on July 17, 2027. This would provide sufficient time for closure to be completed by October 17, 2028.

The first construction effort will involve modifying the pond operations by relocating the influent lines, minimizing the pond water levels, and isolating flow to a smaller portion of the current 177-acre impoundment that can be closed during the last two construction seasons. The smaller active portion of the pond will remain in operation while Dynegy begins dewatering and closing the impoundment as described above. This reduction in footprint may require the addition of chemical feeds to provide adequate treatment but that has not been the case at our other sequenced closures. This approach simultaneously allows for continued operation of the plant to maintain generating capacity for the MISO markets and minimizes the risk to the environment both by minimizing the pond size and the potential for any impacts to groundwater and by opening up a significant portion of the remaining impoundment to allow for dewatering, grading, and closure (in Phase 1).

Table 6-1 provides estimates for the durations required to close a portion of pond footprint after the date noted to begin closure (Phase 1), as well as the estimates for the closure of the active area (Phase 2, remaining 40-50 acres). In order to dewater the closure area, Dynegy will likely release pond water through the existing Outfall 001.

Table 6-1: Baldwin Bottom Ash Pond Closure Schedule

Action	Estimated Timeline (Months)
Spec, bid, and Award Engineering Services for CCR Impoundment Closure	3
Finalize CCR unit closure plan and seek IEPA approval for CCR unit closure	12
Obtain environmental permits (based on IEPA approval of closure plan): • State Waste Pollution Control Construction/Operating Permit • NPDES Industrial Wastewater Permit Modification (*modification would be required to allow the associated ponded and subsurface free liquids generated before the pond closure to be discharged to Waters of the US and to allow reconfiguration of the various wastestreams to either other NPDES-permitted outfalls or newly-constructed NPDES-permitted outfalls*) • General NPDES Permit for Storm Water Discharges from Construction Site Activities and a SWPPP • Proposed 35 Ill. Admin Code 845 operating permit application is due NLT September 2021. Construction permit application is anticipated to be due NLT July 2023.	21
Spec, bid, and Award Construction Services for CCR Impoundment Closure	3
Begin Construction of Closure	April 17, 2025
Minimize Active Area of Impoundment / Dewater Phase 1 Area	6
Cease Coal-Fired Operations of Remaining Two Boilers Onsite (No Later Than)	December 31, 2025
Regrade CCR Material in Phase 1 Area	18
Install Cover System – Phase 1 Area*	13
Establish Vegetation – Phase 1 Area**	2
Cease Placement of Waste (No Later Than, allowing for plant cleanup and dredging of other impoundments following coal pile and plant closure)	July 17, 2027

Action	Estimated Timeline (Months)
Dewater Impoundment – Phase 2 Area	3
Regrade CCR Material – Phase 2 Area	6
Install Cover System – Phase 2 Area	5
Establish Vegetation, Perform Site Restoration Activities, Complete Closure, and Initiate Post-Closure Care**	2
Total Estimated Time to Complete Closure	81 months (including design, permitting, and procurement)
Date by Which Closure Must be Complete	October 17, 2028

* Activity expected to overlap with grading operations, finishing 2 months after grading is completed

** Activity expected to overlap with cover system installation, finishing 1 month after cover installation is completed

7.0 CONCLUSION

Based upon the information included in and attached to this demonstration, Dynegy has demonstrated that the requirements of 40 C.F.R. § 257.103(f)(2) are satisfied for the 177-acre Baldwin Pond System. This CCR surface impoundment is needed to continue to manage the CCR and non-CCR wastestreams identified in Section 3.2 and 3.3 above, is larger than 40 acres, and the remaining two boilers at the station will cease coal-fired operation no later than December 31, 2025 and the Bottom Ash Pond will be closed by the October 17, 2028 deadline. Therefore, this CCR unit qualifies for the site-specific alternative deadline for the initiation of closure authorized by 40 C.F.R. § 257.103(f)(2).

Therefore, it is requested that EPA approve Dynegy's demonstration and authorize the Bottom Ash Pond at Baldwin to continue to receive CCR and non-CCR wastestreams notwithstanding the deadline in § 257.101(a)(1) and to grant the alternative deadline of October 17, 2028, by which to complete closure of the impoundment.

APPENDIX A – SITE PLAN AND NEARBY LANDFILLS

BURNS McDONNELL

date 03/18/2020

designed A. MYERS

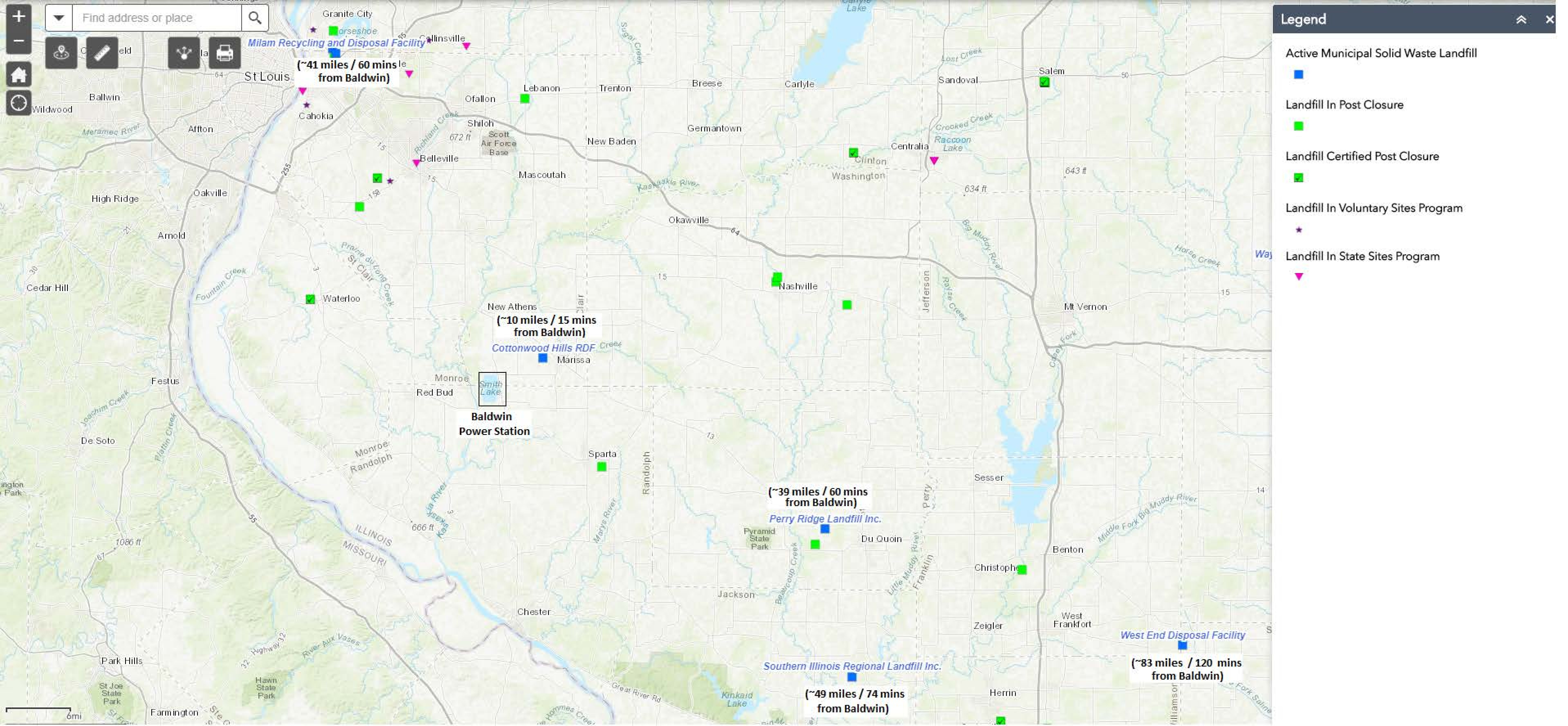
LUMINANT

BALDWIN ENERGY COMPLEX
SITE PLAN

project 122702

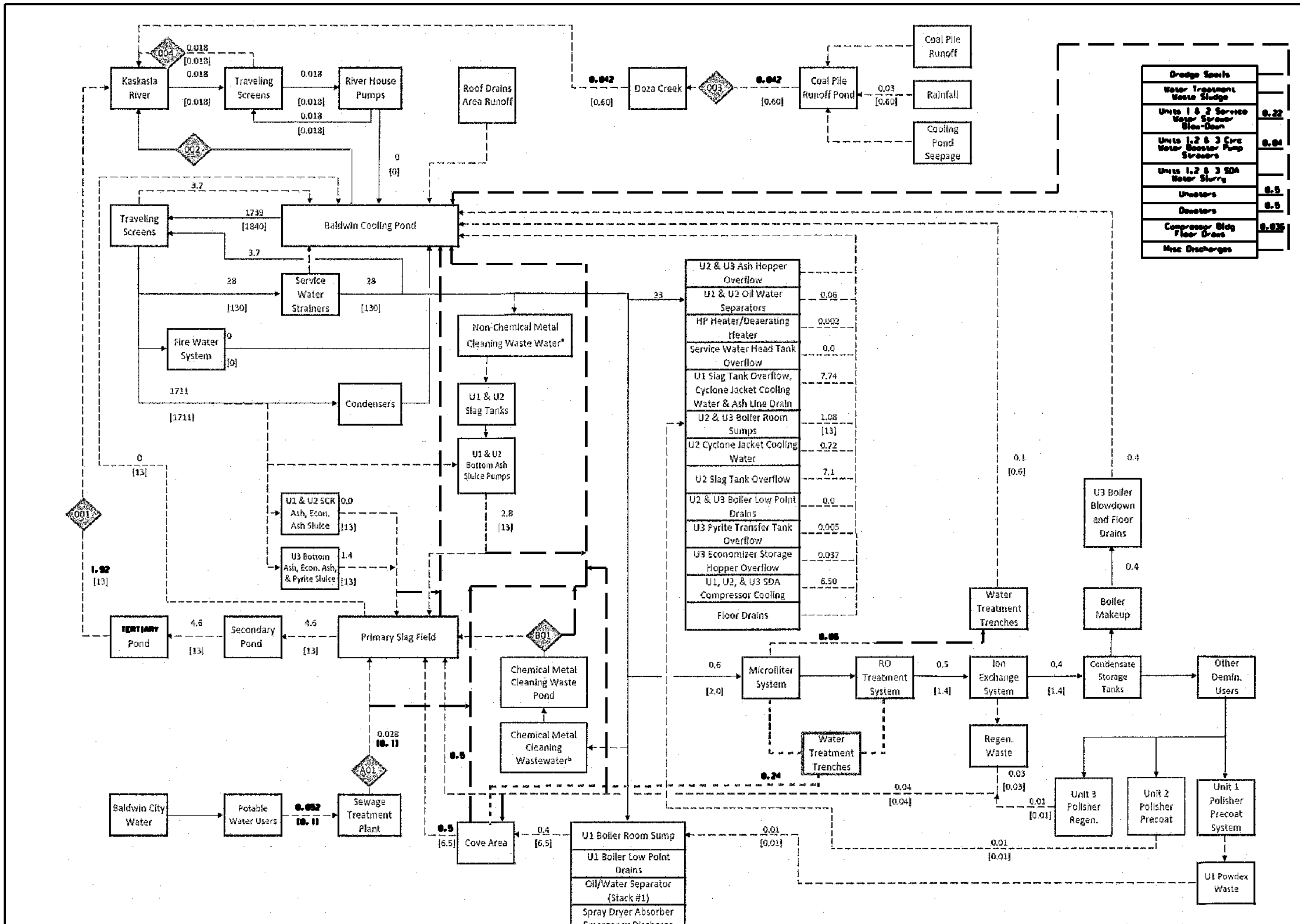
contract -

dwg **FIGURE 1** -



Milam Recycling and Disposal Facility
(~41 miles / 60 mins from Baldwin)
(~10 miles / 15 mins from Baldwin)
Cottonwood Hills RDF
Baldwin Power Station
(~39 miles / 60 mins from Baldwin)
Perry Ridge Landfill Inc.
West End Disposal Facility
(~83 miles / 120 mins from Baldwin)
Southern Illinois Regional Landfill Inc.
(~49 miles / 74 mins from Baldwin)
Granite City
Collinsville
St Louis
Cahokia
Ballwin
Wildwood
Affton
Lebanon
Trenton
Breese
Carlyle
Sandoval
Salem
Ofallon
Shiloh
Scott Air Force Base
Germantown
New Baden
Centralia
Clinton
Washington
Belleville
Mascoutah
Oakville
High Ridge
Arnold
Okawville
Nashville
Mt Vernon
Cedar Hill
Waterloo
New Athens
Marissa
Festus
Red Bud
Smith Lake
De Soto
Sparta
Sesser
ILLINOIS
MISSOURI
Pyramid State Park
Du Quoin
Benton
Christopher
Jackson
Chester
Zeigler
West Frankfort
Park Hills
St Joe State Park
Hawn State Park
Farmington
Kinkaid Lake
Herrin
6mi
Find address or place
Legend
Active Municipal Solid Waste Landfill
Landfill In Post Closure
Landfill Certified Post Closure
Landfill In Voluntary Sites Program
Landfill In State Sites Program

APPENDIX B – WATER BALANCE DIAGRAM



Notes:

1 Flows shown as: Average (Maximum)

2 Flow units = Million Gallons per Day

3 Average Outfall 001 Discharge based on DMR records from **4/3/2018 through 3/19/2019.**

4 Pretreatment Filter and RO Wastewater is based on total pretreatment microfilter and RO wastewater flows indicated on Drawing BAL-M1204-1.

5 **Demineralizer Regeneration Waste based on three 3-Bed Demineralizer Train regenerations once per month, three Mixed Bed regenerations every 3 weeks and three Strong Anion regenerations once every 4 days.**

6 Non-chemical metal cleaning waste (boiler fire side cleaning and air heater wash water) is delivered to the ash ponds with the bottom ash sluicing system.

7 Outfall 002 does not normally discharge

8 Contributors to Cove Area, based on instantaneous maximum flow from one U1 Boiler Room Sump Pump

9 Average Outfall 003 Discharge based on DMR records from **4/20/2018** through **3/19/2019.**

10 Outfall 004 Travelling Screen Washwater flow from DMR records from **1/31/2018** through **11/26/2018.**

11 Average Outfall A01 Sewage Treatment Plant Effluent Flow from DMR records from **5/31/2018 through 4/30/2019**

12 Maximum Circulating Water Pump Flow is based on nine (3 per unit) 132,000 gpm circulating water pumps operating simultaneously. Pump flows from Unit Engineering Data Books.

13 Maximum Service Water Pump Flow is based on six (2 per unit) 15,000 gpm circulating water pumps operating simultaneously. Pump flows from Unit Engineering Data Books.

14 Unit 2 Boiler Room Sump pump capacities are one 4500 gpm and one 1500 gpm pump from Engineering Data Book

15 Unit 3 Boiler Room Sump pump capacities are 2 1500 gpm pumps from Engineering Data Book

16 Source of flows not otherwise indicated is the Baldwin NPDES Permit, effective January 1, 2015.

17 Components representing Unit 1 and Unit 2 bottom ash stack, and U3 bottom ash ponds have been added between bottom ash sluicing and the secondary ash ponds.

a. Non-Chemical Metal Cleaning Waste Water Includes:
Boiler Fire-side Water Washing
Economizer Cleaning
U1 & U2 Air Heater Cleaning
Condenser Tube Cleaning
Misc. Non-Chemical Metal Cleaning Waste Water

b. Chemical Metal Cleaning Waste Water
Boiler Tube Cleaning
Misc. Chemical Metal Cleaning Waste Water

Drawing Release Record

Rev	Date	Prepared	Reviewed	Approved	Purpose
A0	4-Sep-15	M. Heermann	M. Rosen	A. Baker	Initial Issue
A1	16-Oct-15	M. Heermann	M. Rosen	A. Baker	Client Comments Incorporated
A2	9-Nov-15	M. Heermann	M. Rosen	A. Baker	Plant Comments Incorporated

NO	DATE	REVISIONS	E	C	A
1	05-22-09	FIELD REVISIONS			
2	9/29/17	FIELD REVISIONS BY [illegible]	CWB		KE
3	10/5/17	FIELD REVISIONS BY P. [illegible]	CWB		PM
4	6/25/19	FIELD REVISIONS BY T. [illegible]	CWB		TA

ILLINOIS POWER COMPANY
BALDWIN POWER STATION

PROJECT NO. 1244 WASTEWATER TREATMENT

EXISTING WASTEWATER INVENTORY DIAGRAM

PLOTTED 02-07-91

CHICAGO, ILLINOIS DATE 08-18-08 DWG REF CE-BAL1-M2001

ATTACHMENT 1 – RISK MITIGATION PLAN

RISK MITIGATION PLAN - 40 C.F.R. § 257.103(f)(2)(v)(B)

INTRODUCTION

To demonstrate that the criteria in 40 C.F.R. § 257.103(f)(2)(ii) has been met, Dynegy Midwest Generation, L.L.C. (DMG) has prepared this Risk Mitigation Plan for the Baldwin Energy Complex (BEC) Bottom Ash Pond.

- EPA is requiring a risk mitigation plan to "address the potential risk of continued operation of the CCR surface impoundment while the facility moves towards closure of their coal-fired boiler(s), to be consistent with the court's holding in *USWAG* that RCRA requires EPA to set minimum criteria for sanitary landfills that prevent harm to either human health or the environment." 85 Fed. Reg. at 53,516, 53,548 (Aug. 28, 2020).

As required by § 257.103(f)(2)(v)(B), the Risk Mitigation Plan must describe the "measures that will be taken to expedite any required corrective action," and contain the three following elements:

- First, "a discussion of any physical or chemical measures a facility can take to limit any future releases to groundwater during operation." § 257.103(f)(2)(v)(B)(1). In promulgating this requirement, EPA explained that this "might include stabilization of waste prior to disposition in the impoundment or adjusting the pH of the impoundment waters to minimize solubility of contaminants [and that] [t]his discussion should take into account the potential impacts of these measures on Appendix IV constituents." 85 Fed. Reg. at 53,548.

- Second, "a discussion of the surface impoundment's groundwater monitoring data and any found exceedances; the delineation of the plume (if necessary based on the groundwater monitoring data); identification of any nearby receptors that might be exposed to current or future groundwater contamination; and how such exposures could be promptly mitigated." § 257.103(f)(2)(v)(B)(2).

- Third, "a plan to expedite and maintain the containment of any contaminant plume that is either present or identified during continued operation of the unit." § 257.103(f)(2)(v)(B)(3). In promulgating this final requirement, EPA explained that "the purpose of this plan is to demonstrate that a plume can be fully contained and to define how this could be accomplished in the most accelerated timeframe feasible to prevent further spread and eliminate any potential for exposures." 85 Fed. Reg. at 53,549. In addition, EPA stated that "this plan will be based on relevant site data, which may include groundwater chemistry, the variability of local hydrogeology, groundwater elevation and flow rates, and the presence of any surface water features that would influence rate and direction of contamination movement. For example, based on the rate and direction of groundwater flow and potential for diffusion of the plume, this plan could identify the design and spacing of extraction wells necessary to prevent further downgradient migration of contaminated groundwater." 85 Fed. Reg. at 53,549.

Consistent with these requirements and guidance, Dynegy plans to continue to mitigate the risks to human health and the environment from the BEC Bottom Ash Pond as detailed in this Risk Mitigation Plan.

1 OPERATIONAL MEASURES TO LIMIT FUTURE RELEASES TO GROUNDWATER – 40 C.F.R. § 257.101(F)(2)(V)(B)(1)

The BEC Bottom Ash Pond is a 177-acre CCR surface impoundment. Consistent with the requirements of the CCR rule, compliance documents on Baldwin's CCR public website reflect the characterization of the BEC Bottom Ash Pond as a single unit for purposes of groundwater monitoring and closure activities.

The Baldwin CCR surface impoundment receives CCR transport waters from bottom ash, economizer ash, SCR ash and air heater Ash plus non-CCR process waters onsite before discharging to the Baldwin Cooling Pond via Outfall 002 or the Tertiary Pond via Outfall 001 in accordance with NPDES Permit No. IL0004171.

At Baldwin, none of the Appendix IV parameter have reported statistically significant levels (SSLs) above their respective Ground Water Protection Standards (GWPSs), as sampled and analyzed per the facility's groundwater monitoring program. Therefore, Baldwin's current physical treatment operation adequately limits potential risks to human health and the environment during operation. Baldwin will continue this treatment process for the CCR surface impoundment until such time as closure is required per 40 CFR 257. The facility's current physical treatment process is discussed below, followed by a discussion of other treatment processes that could be implemented, as required per § 257.103(f)(2)(v)(B)(1).

1.1 CURRENT OPERATION OF PHYSICAL TREATMENT

Fly ash is captured dry. Therefore, current operations do not add fly ash transport waters to the CCR Impoundment.

As part of normal operations, bottom ash, economizer ash, SCR ash and air heater ash are transported through the sluice lines into the CCR surface impoundment where it is dewatered and transported offsite for beneficial reuse. The CCR surface impoundment is also a wastewater treatment settling system which allows the solids to settle.

Therefore, since fly ash transport water is not conveyed to the impoundment and bottom ash solids are removed from the impoundment, the current operation of Edwards' CCR impoundment limits future releases to groundwater during operation, and consequently no potential safety impacts or exposure to human health or environmental receptors are expected to result.

If Appendix IV releases are discovered per the facility's groundwater monitoring program, DMG will test, evaluate, and implement a chemical treatment method (i.e. pH adjustment, coagulation, precipitation, or other method as determined) for the Baldwin CCR Impoundment to limit potential risks to human health and the environment during operation.

2 GROUNDWATER IMPACTS, RECEPTORS, AND POTENTIAL EXPOSURE MITIGATION - 40 C.F.R. § 257.101(F)(2)(V)(B)(2)

The Baldwin Bottom Ash Pond is currently in assessment monitoring, with the first SSLs with GWPS exceedances reported in August 2019. As seen on Table 1, SSL exceedances have been reported for lithium at one monitoring well - MW-370 (see Figure 1 for well locations). Alternate Source Demonstrations (ASDs) have been completed for lithium following each SSL determination (see Appendix A of Attachment 1, 2019 Annual Groundwater Monitoring and Corrective Action Report, Baldwin Bottom Ash Pond [Ramboll, 2020], Attachment 2, Alternate Source Demonstration Baldwin Ash Pond [Ramboll, Oct. 2020]). The latest ASD for lithium was completed in October 2020 and will be included in the 2020 Annual Groundwater Monitoring and Corrective Action Report, due in January 2021.

Since there have been no SSL exceedances of GWPS(s)for any Appendix IV constituents attributable to the Bottom Ash Pond to date, plume delineation has not been required. However, if one or more Appendix IV constituents are detected at SSLs above the GWPS(s), the nature and extent of the release would be characterized to delineate the contaminant plume. The existing conceptual site model and description of site hydrogeology provides site characterization data that will be used as the basis for executing supplemental plume delineation activities. A demonstration may also be made that a source other than the CCR unit caused the contamination, or that the SSL resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (§257.95(g)(3)(ii)).

Receptors

For constituents of potential concern (COPCs) found in groundwater to pose a risk to human health or the environment, a complete exposure pathway must be present to a receptor with elevated concentrations of COPCs via that pathway.

Should a release of one or more Appendix IV parameters from the Baldwin Bottom Ash Pond to groundwater occur in the future, the two primary risks to human health and environmental receptors are via groundwater exposure and surface water exposure. Groundwater exposure would be via ingestion or dermal contact, both of which are likely an incomplete pathway for the reasons discussed below. Impacted groundwater potentially migrating to nearby surface water bodies – specifically the Kaskaskia River to the west and the Baldwin Plant Cooling Lake to the north is another potential exposure pathway; however, this is also likely incomplete for the reasons discussed below.

Ambient groundwater flow in the Uppermost Aquifer (Pennsylvanian and Mississippian bedrock; mainly shale and interbedded non-karst limestone) and overlying unlithified materials (clay, silt, and intermittent sand lenses) beneath the Bottom Ash Pond is generally to the west and southwest. Changes in groundwater elevation near the Bottom Ash Pond generally mimic bedrock surface topography. General groundwater flow direction is west and southwest toward the Kaskaskia River (i.e., regional discharge area) with localized flow toward bedrock surface lows, specifically the former bedrock valley feature beneath the non-CCR Secondary Pond and Tertiary Pond. The hydraulic gradient beneath the impoundments (Bottom Ash Pond and closed/capped Fly Ash Ponds) has ranged from 0.01 to 0.02 ft/ft as groundwater flows from east to west, with a flow velocity of approximately 0.0005 to 0.001 ft/day based on a bedrock hydraulic conductivity of 5 x 10-6 cm/s and a median effective porosity of 30 percent (refer to the description of hydrogeology attached to the alternative closure demonstration letter).

There are no potable industrial, commercial or domestic use water wells located in a downgradient or cross-gradient groundwater flow direction relative to the Bottom Ash Pond that are at risk of impacts from a release to groundwater. Two shallow Community Water Supply (CWS) wells for the villages of Baldwin and Red Bud, installed in sand and gravel alluvial deposits, are located along the opposite bank of the Kaskaskia River downstream from the BEC. The closest CWS well is located approximately 6,500 feet (1.2 miles) from the Bottom Ash Pond and 3,000 feet downstream from the BEC's outfall to the Kaskaskia River. Neither of these CWS wells are considered at risk because of their hydrogeologic location relative to the BEC property, including the Bottom Ash Pond.

The southerly-flowing Kaskaskia River is located approximately 1,110 feet west of the BEC property at its closest point and approximately 5,000 feet (0.95 miles) from the Bottom Ash Pond. There is one CWS surface water intake for the village of Sparta (i.e., Sparta intake), located within a meander of the Kaskaskia River approximately 1,200 feet southwest of the nearest site boundary, approximately 4,800 feet (~0.9 mile) feet southwest of the Bottom Ash Pond, and 2,200 feet downstream from the NPDES permitted outfall for the ash pond system. The Sparta intake was studied by the Illinois State Water Survey (ISWS,1995). Based upon comprehensive field sampling and analysis of water from the Kaskaskia River, Sparta intake, and BEC's outfall, followed by modeling, statistical analysis, and risk-assessment analyses of the data, the ISWS concluded that the probability of the river standard for boron of 1.0 milligrams per Liter (mg/L) being exceeded was "small", with a proposed adjusted surface water quality standard of 1.23 mg/L being exceeded only once every 25 years downstream of BEC's outfall. Groundwater flow is to the southwest and away from the Baldwin Plant Cooling Lake, therefore the risk to the lake via a groundwater pathway from the Bottom Ash Pond is considered very low.

Since there have been no SSLs above the GWPS attributable to the Bottom Ash Pond to date, there is no risk to ecological receptors located near the Baldwin Bottom Ash Pond. If a release to groundwater were to occur, ecological receptors could potentially be exposed to COPCs through ingestion or direct contact with impacted groundwater; however, should any surface water or sediment come into contact with impacted groundwater, the risk of exposure is likely low due to expected attenuation and dilution. Depending on the magnitude of the release and other factors, it may or may not be possible to estimate potential increases in COPC concentrations in surface water using mixing calculations.

Although current conditions do not pose a risk concern to human health or the environment, measures presented in the Contaminant Plume Containment Plan (Section 3.1 of this RMP) would address any future potential exposures and risks by containing potential groundwater impacts and mitigating impacts to potential receptors.

If one or more Appendix IV parameters are detected and confirmed in groundwater at a SSL above GWPS(s), and the SSL is not attributed to an alternate source, via an alternate source demonstration (ASD), the first steps to mitigating risk will involve the immediate implementation of source control, which, if necessary, could include installation and operation of a groundwater extraction well or recovery trench system. This immediate source control would allow for capture of impacted groundwater and prevention of further plume migration towards the principal potential receptors. Furthermore, to characterize the nature and extent of the release, plume delineation wells will be installed as necessary to define the magnitude and limits of the groundwater impacts.

Exposure Mitigation

Mitigation of future potential exposures to groundwater contamination from continued operation of the Bottom Ash Pond is discussed in detail in the following section.

3 CONTAMINANT PLUME CONTAINMENT: OPTIONS EVALUATION AND PLAN - 40 C.F.R. § 257.101(F)(2)(V)(B)(3)

Appropriate corrective measure(s) to address future potential impacted groundwater associated with the Bottom Ash Pond are based on impacts to the Uppermost Aquifer (shale and non-karst limestone bedrock) and overlying unlithified materials. The shallow bedrock yields water through interconnected secondary porosity features (e.g. cracks, fractures, crevices, joints, bedding planes and other secondary openings). The shallow bedrock is the only water-bearing unit that is continuous across the Site. Groundwater in the Pennsylvanian and Mississippian-aged bedrock mainly occurs under semi-confined to confined conditions with the overlying unlithified unit behaving as the upper confining unit to the Uppermost Aquifer. Based on field testing, the geometric mean horizontal hydraulic conductivity for the Uppermost Aquifer (Bedrock Unit) was 5.0 x 10-6 cm/s (refer to the description of hydrogeology attached to the alternative closure demonstration letter).

If one or more Appendix IV parameters are detected and confirmed in groundwater at a SSL above GWPS(s), and the SSL is not attributed to an alternate source, via an alternate source demonstration (ASD), the first steps to mitigating risk will involve the immediate implementation of source control, which, if necessary, could include installation and operation of a groundwater extraction well or recovery trench system. This immediate source control would allow for capture of impacted groundwater and prevention of further plume migration towards the principal potential receptors. Furthermore, to characterize the nature and extent of the release, plume delineation wells will be installed as necessary to define the magnitude and limits of the groundwater impacts. If applicable, notifications will be made to all persons who own the land or reside on the land that directly overlies any part of the groundwater plume. Additional soil and groundwater data will be collected as necessary to support a Corrective Measures Assessment (CMA), which will be initiated within 90 days of detecting the SSL. Further discussion of short-term and long-term corrective measures is further discussed in Section 3.1.

Since there has been no release of Appendix IV parameters to groundwater above GWPS(s), which would trigger a Corrective Measures Assessment (CMA) under 40 C.F.R. § 257.96 based on specific parameter concentrations and contaminant plume dimensions, several options are evaluated to address potential future plume containment. The evaluation criteria for assessing remedial options are the following: performance; reliability; ease of implementation; potential impacts of the remedies (safety, cross-media, and control of exposure to residual contamination); time required to begin and complete the remedy; and, institutional requirements that may substantially affect implementation of the remedy(s), such as permitting, environmental or public health requirements.

Although future potential source control measures (e.g. closure in place, closure by removal to off-site landfill, in-situ solidification/stabilization) are typically considered as part of a CMA process, the shorter-term options considered for mitigating groundwater impacts relative to a potential future release of one or more Appendix IV constituents at Baldwin are as follows:

- Groundwater Extraction
- Groundwater Cutoff Wall
- Permeable Reactive Barrier
- In-Situ Chemical Treatment
- Monitored Natural Attenuation (MNA)

These same groundwater remedial corrective measures will be evaluated for all Appendix IV constituents that present a future risk to human health or the environment.

Groundwater Extraction

This corrective measure includes installation of one or more groundwater pumping wells or trenches to control and extract impacted groundwater. Groundwater extraction captures and contains impacted groundwater and can limit plume expansion and/or off-site migration. Construction of a groundwater extraction system typically includes, but is not limited to, the following primary project components:

- Designing and constructing a groundwater extraction system consisting of a series of extraction wells or trenches located around the perimeter of the contaminant plume and operating at a rate to allow capture of CCR impacted groundwater.
- Designing a system to manage extracted groundwater, which may include modification to the existing NPDES permit, including treatment prior to discharge, if necessary.
- Ongoing inspection and maintenance of the groundwater extraction system.

Installation of a groundwater extraction system, whether wells or trenches, can be expedited with the assumption that there is a good conceptual site model (CSM) of the hydrogeological system around the CCR unit, groundwater flow and transport model, and aquifer testing. Upon notification of an SSL exceedance of a GWPS for one or more Appendix IV parameters, an aquifer test will be conducted, and groundwater model developed for designing a groundwater extraction system for optimization of contaminant plume capture.

Implementation of a groundwater extraction system presents design challenges due to the low permeability and heterogeneous lithology of the Uppermost Aquifer. Details of the bedrock bedding planes, fracture distribution and density, as well as the contaminant distribution within the fracture system, would be needed to effectively design the extraction system. Extracted groundwater would need to be managed, which may include modification to the existing NPDES permit and treatment prior to discharge, if necessary. Additional data collection and analyses would be required to design an extraction system. Construction could be completed within 1 year.

A schematic of a typical groundwater extraction well is shown on Figure 2. Based on site specific hydrogeology and future potential plume width and depth, a groundwater extraction system would likely consist of one to three extraction wells with pitless adapter's manifolded together with HDPE conveyance pipe to a common tank or lined collection vault prior to treatment, if necessary, and discharge.

Groundwater Cutoff Wall

Vertical cutoff walls are used to control and/or isolate impacted groundwater. Low permeability cutoff walls can be used to prevent horizontal off-site migration of potentially impacted groundwater. Cutoff walls act as barriers to migration of impacted groundwater and can isolate soils that have been impacted by CCR to prevent contact with unimpacted groundwater. Cutoff walls are often used in conjunction with an interior pumping system to establish a reverse gradient within the cutoff wall. The reverse gradient imparted by the pumping system maintains an inward flow through the wall, keeping it from acting as a groundwater dam and controlling potential end-around or breakout flow of contaminated groundwater.

A commonly used cutoff wall construction technology is the slurry trench method, which consists of excavating a trench and backfilling it with a soil-bentonite mixture, often created with the soils excavated from the trench. The trench is temporarily supported with bentonite slurry that is pumped into the trench as it is excavated. Excavation for cutoff walls is conducted with conventional hydraulic excavators, hydraulic excavators equipped with specialized booms to extend their reach (*i.e.*, long-stick excavators), or chisels and clamshells, depending upon the depth of the trench and the material to be excavated.

Cutoff walls could be used in combination with groundwater extraction. The strength of the bedrock and the required cutoff wall design depth are not known; verifying whether a cutoff wall could be constructed in the Uppermost Aquifer would be necessary. The effectiveness of a cutoff wall as a hydraulic barrier also relies on the contrast between the hydraulic conductivity of the aquifer and the cutoff wall. The most effective barriers have hydraulic conductivity values that are several orders of magnitude lower than the aquifer that it is in contact with. A cutoff wall designed with hydraulic conductivity of 1x10-7 cm/sec would be less than two orders of magnitude lower than the aquifer with a mean conductivity of 5x10-6 cm/sec.

Additional data collection and analyses would be required to design a cutoff wall. Construction could be completed within 2 to 3 years following characterization, design, permitting and construction. To attain GWPS, cutoff walls require a separate groundwater corrective measures to operate in concert with the hydraulic barriers. Cutoff walls are commonly coupled with MNA and/or groundwater extraction as groundwater corrective measures. The time to attain GWPS is dependent on the selected groundwater corrective measure or measures that are coupled with the cutoff walls. Cutoff walls require approval by the Illinois Environmental Protection Agency (IEPA) to be implemented.

Permeable Reactive Barrier

Chemical treatment via a Permeable Reactive Barrier (PRB) is defined as an emplacement of reactive materials in the subsurface designed to intercept a contaminant plume, provide a flow path through the reactive media, and transform or otherwise render the contaminant(s) into environmentally acceptable forms to attain remediation concentration goals downgradient of the barrier (EPRI, 2006).

As groundwater passes through the PRB under natural gradients, dissolved constituents in the groundwater react with the media and are transformed or immobilized. A variety of media have been used or proposed for use in PRBs. Zero-valent iron has been shown to effectively immobilize CCR constituents, including arsenic, chromium, cobalt, molybdenum, selenium, and sulfate. Zero-valent iron has not been proven effective for boron, antimony, or lithium (EPRI, 2006).

System configurations include continuous PRBs, in which the reactive media extends across the entire path of the contaminant plume; and funnel-and-gate systems, where barrier walls are installed to control groundwater flow through a permeable gate containing the reactive media. Continuous PRBs intersect the entire contaminant plume and do not materially impact the groundwater flow system. Design may or may not include keying the PRB into a low-permeability unit at depth. Funnel-and-gate systems utilize a system of barriers to groundwater flow (funnels) to direct the contaminant plume through the reactive gate. The barriers, typically some form of cutoff wall, are keyed into a low-permeability unit at depth to prevent short circuiting of the plume. Funnel-and-gate design must consider the residence time to allow chemical reactions to occur. Directing the contaminant plume through the reactive gate can significantly increase the flow velocity, thus reducing residence time.

The Uppermost Aquifer is a Bedrock Unit consisting mainly of limestone and shale overlain by unlithified, fine-grained soil deposits of variable thickness. Constructing an effective PRB system, including emplacement of reactive media, within the bedrock of the Uppermost Aquifer would be difficult, and may not be possible. In addition, CCR constituents in the Uppermost Aquifer that could potentially exceed their GWPS(s) may not be amenable to transformation or immobilization using reactive media. Therefore, PRB is not retained as a viable corrective measure to address future potential SSLs above GWPS(s) in the Uppermost Aquifer.

<u>In-Situ Chemical Treatment</u>

In-situ chemical treatment for inorganics are being tested and applied with increasing frequency. In-situ chemical treatment includes the targeted injection of reactive media into the subsurface to mitigate groundwater impacts. Inorganic contaminants are typically remediated through immobilization by reduction or oxidation followed by precipitation or adsorption (EPRI, 2006). Chemical reactants that have been applied or are in development for application in treating inorganic contaminants include ferrous sulfate, nanoscale zero-valent iron, organo-phosphorus nutrient mixture (PrecipiPHOS™) and sodium dithionite (EPRI, 2006). Zero-valent iron has been shown to effectively immobilize cobalt and molybdenum.

The Uppermost Aquifer is a Bedrock Unit consisting mainly of limestone and shale overlain by unlithified, fine-grained soil deposits of variable thickness. Constructing an effective PRB system, including emplacement of reactive media, within the bedrock of the Uppermost Aquifer would be difficult, and may not be possible. In addition, CCR constituents in the Uppermost Aquifer that could potentially exceed their GWPS(s) may not be amenable to transformation or immobilization using reactive media. Therefore, in-situ chemical treatment is not retained as a viable corrective measure to address future potential SSLs above GWPS(s) in the Uppermost Aquifer.

<u>Monitored Natural Attenuation (MNA)</u>

Upon notification of a release of one or more Appendix IV parameter(s) to groundwater, MNA will be evaluated with site-specific characterization data and geochemical analysis as a long term remedial option, combined with source control measures, through application of the USEPA’s tiered approach to MNA (USEPA 1999, 2007 and 2015):

1. Demonstrate that the area of groundwater impacts is not expanding.
2. Determine the mechanisms and rates of attenuation.
3. Determine that the capacity of the aquifer is sufficient to attenuate the mass of constituents in groundwater and that the immobilized constituents are stable and will not remobilize.
4. Design a performance monitoring program based on the mechanisms of attenuation and establish contingency remedies (tailored to site-specific conditions) should MNA not perform adequately.

MNA is not regarded as a short-term remedial option for contaminant plume containment, but as a potential long- term option following implementation of shorter term control measures.

3.1 CONTAINMENT PLAN

Based on the options evaluated for containment of a future potential groundwater contaminant plume originating from the Baldwin Bottom Ash Pond for one or more Appendix IV constituents exceeding their GWPS(s), the most viable short-term option of those evaluated is a groundwater extraction system, which would allow for capture of impacted groundwater and prevent further plume migration towards the principal receptor, which is the Kaskaskia River to the west and southwest.

In circumstances where there is not an immediate concern of endangerment to human health or the environment, other longer-term corrective measures may be more viable and will be further evaluated at the Baldwin Bottom Ash Pond.

Depending on the location, depth, and plume geometry of any future potential Appendix IV exceedances of GWPSs, the specific parameter(s) with exceedances, and distance from potential receptors, other groundwater corrective measures discussed as part of the corrective options evaluation – groundwater cutoff wall and MNA -- are secondary remedial alternatives available for consideration following the current primary option of groundwater extraction for short-term application.

4 REFERENCES

Electric Power Research Institute (EPRI), 2006. Groundwater Remediation of Inorganic Constituents at Coal Combustion Product Management Sites, Overview of Technologies, Focusing on Permeable Reactive Barriers. Electric Power Research Institute, Palo Alto, California. Final Report 1012584, October 2006.

Illinois State Water Survey (ISWS), 1995. Illinois Power Company – Baldwin Power Plant Ash-Pond Effluent Boron Mixing with the Kaskaskia River. Office of River Water Quality, Peoria, IL and Office of Surface Water Resources, Champaign, IL; ISWS Contract Report 588. October 1995.

Ramboll, 2020. 2019 Annual Groundwater Monitoring and Corrective Action Report, Baldwin Bottom Ash Pond, Baldwin Energy Complex. Ramboll, Milwaukee, Wisconsin. January 31, 2020.

USEPA, 1999. Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Directive No. 9200.U-17P. Washington, D.C.: EPA, Office of Solid Waste and Emergency Response.

USEPA, 2007. Monitored Natural Attenuation of Inorganic Contaminants in Ground Water, Volume 1 – Technical Basis for Assessment. EPA/600/R-07/139. National Risk Management Research Laboratory, Office of Research and Development, U.S. Environmental Protection Agency, Cincinnati, Ohio. October 2007.

USEPA, 2015. Use of Monitored Natural Attenuation for Inorganic Contaminants in Groundwater at Superfund Sites. Directive No. 9283.1-36. U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. August 2015.

TABLES

Table 1 - Assessment Monitoring Program Summary, Baldwin Bottom Ash Pond

Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSL(s) Appendix IV	SSL(s) Determination Date	ASD Completion Date	CMA Completion / Status
June 26-27, 2018	August 22, 2018	Appendix III Appendix IV	NA	NA	NA	NA
September 26, 2018	October 24, 2018	Appendix III Appendix IV Detected[1]	Lithium (MW-370)	January 7, 2019	April 8, 2019	NA
March 19-20, 2019	April 15, 2019	Appendix III Appendix IV	Lithium (MW-370)	July 15, 2019	October 14, 2019	NA
September 24-25, 2019	October 24, 2019	Appendix III Appendix IV Detected[1]	Lithium (MW-370)	January 22, 2020	April 21, 2020	NA
March 25-26, 2020	April 28, 2020	Appendix III Appendix IV Detected	Lithium (MW-370)	July 27, 2020	TBD	TBD

[O: RAB 9/11/20; C: EJT 9/14/20]

Notes:
CMA = Corrective Measures Assessment
NA = Not Applicable
TBD = To Be Determined
1. Groundwater sample analysis was limited to Appendix IV parameters detected in previous events in accordance with 40 C.F.R. Part 257.95(d)(1).

RAMBOLL

FIGURES

Y:\Mapping\Projects\22\2285_Baldwin\MXD\ASD\Figure 1_MW and BAP Water Sam Loc_ASD.mxd

PROJECT: 169000XXXX | DATED: 4/16/2020 | DESIGNER: galarnmc

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

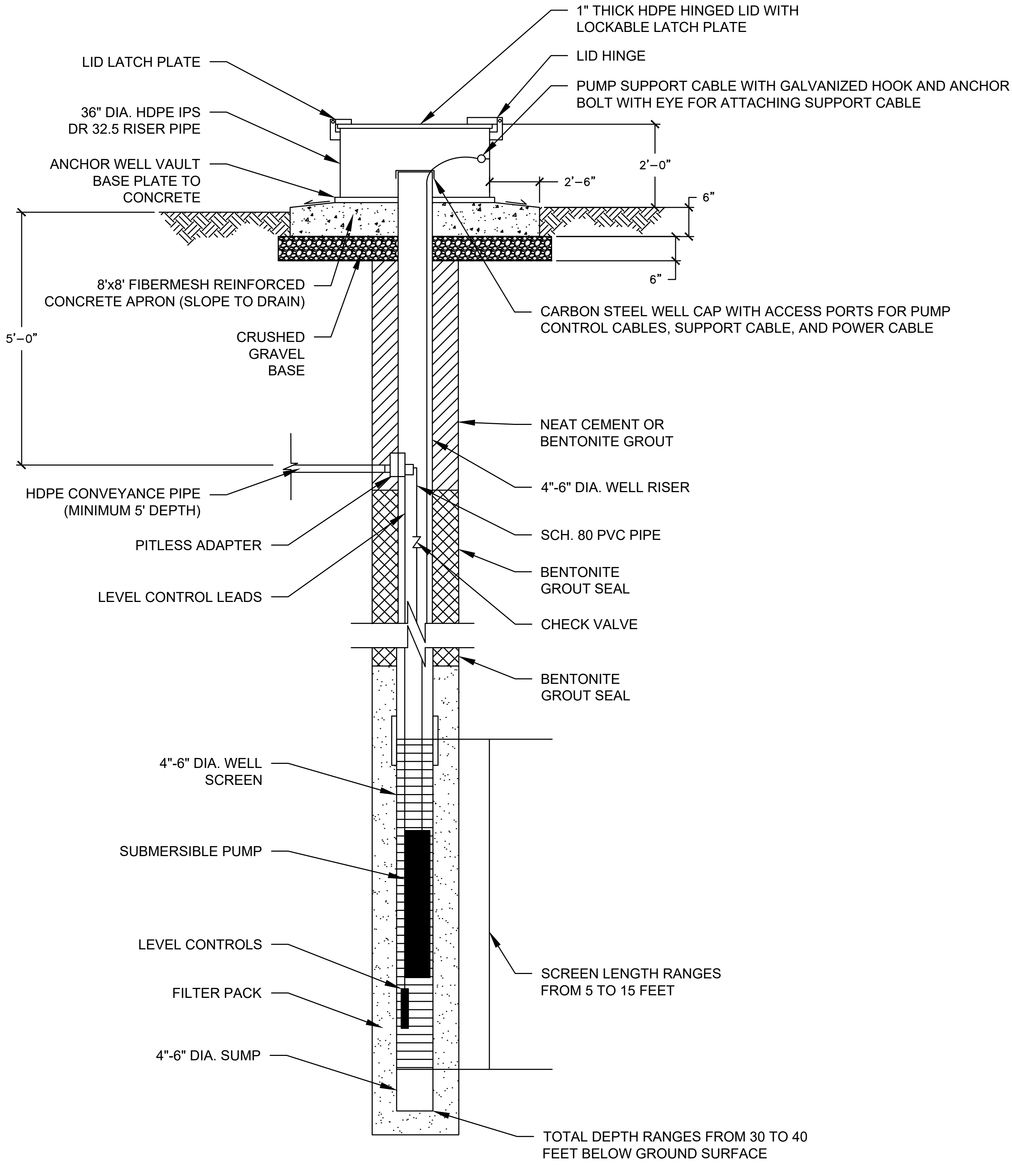
MONITORING WELL AND BOTTOM ASH POND WATER SAMPLE LOCATION MAP

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

FIGURE 1

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL



NOTES

1. NOT TO SCALE

TYPICAL HYDRAULIC GRADIENT CONTROL WELL DETAIL

FIGURE 2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

DYNEGY MIDWEST GENERATION L.L.C
BALDWIN BOTTOM ASH POND
BALDWIN, ILLINOIS

ATTACHMENT 1

Prepared for

Dynegy Midwest Generation, LLC

Document type

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

Project name	**Baldwin Energy Complex**
Project no.	**72751**
Recipient	**Dynegy Midwest Generation, LLC**
Document type	**Annual Groundwater Monitoring and Corrective Action Report**
Version	**FINAL**
Date	**January 31, 2020**
Prepared by	**Kristen L. Theesfeld**
Checked by	**Jacob J. Walczak**
Approved by	**Eric J. Tlachac**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

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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

Y:\Mapping\Projects\22\2285\MXD\2019_AnnualGWM_CAR\Figure 1_GWS_WellLoc_Baldwin_BAP.mxd

PROJECT: 169000XXXX | DATED: 1/13/2020 | DESIGNER: GALARNMC

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.

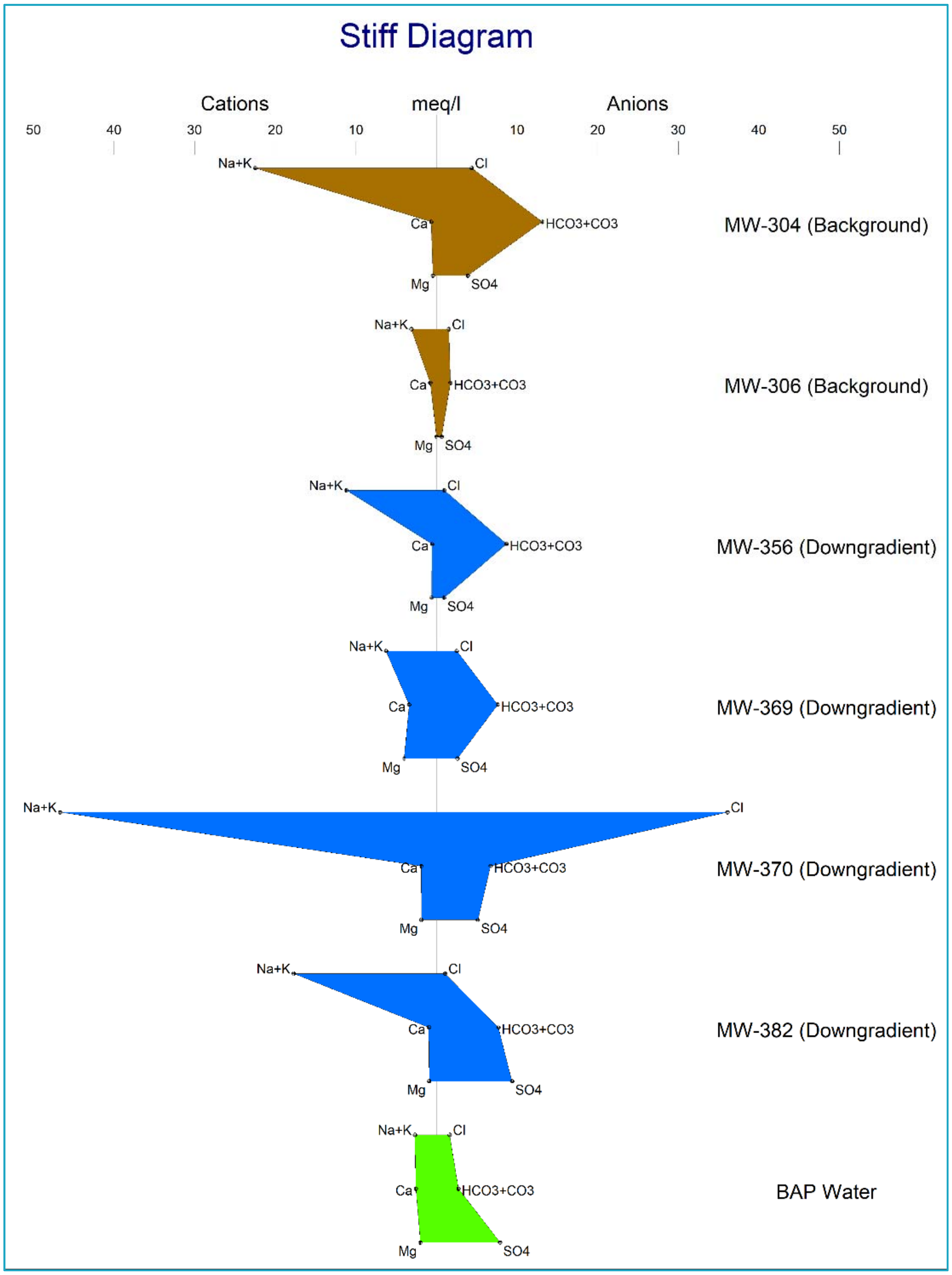

Figure 2. Stiff diagram showing ionic composition of samples of BAP background and downgradient groundwater and BAP water.

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.

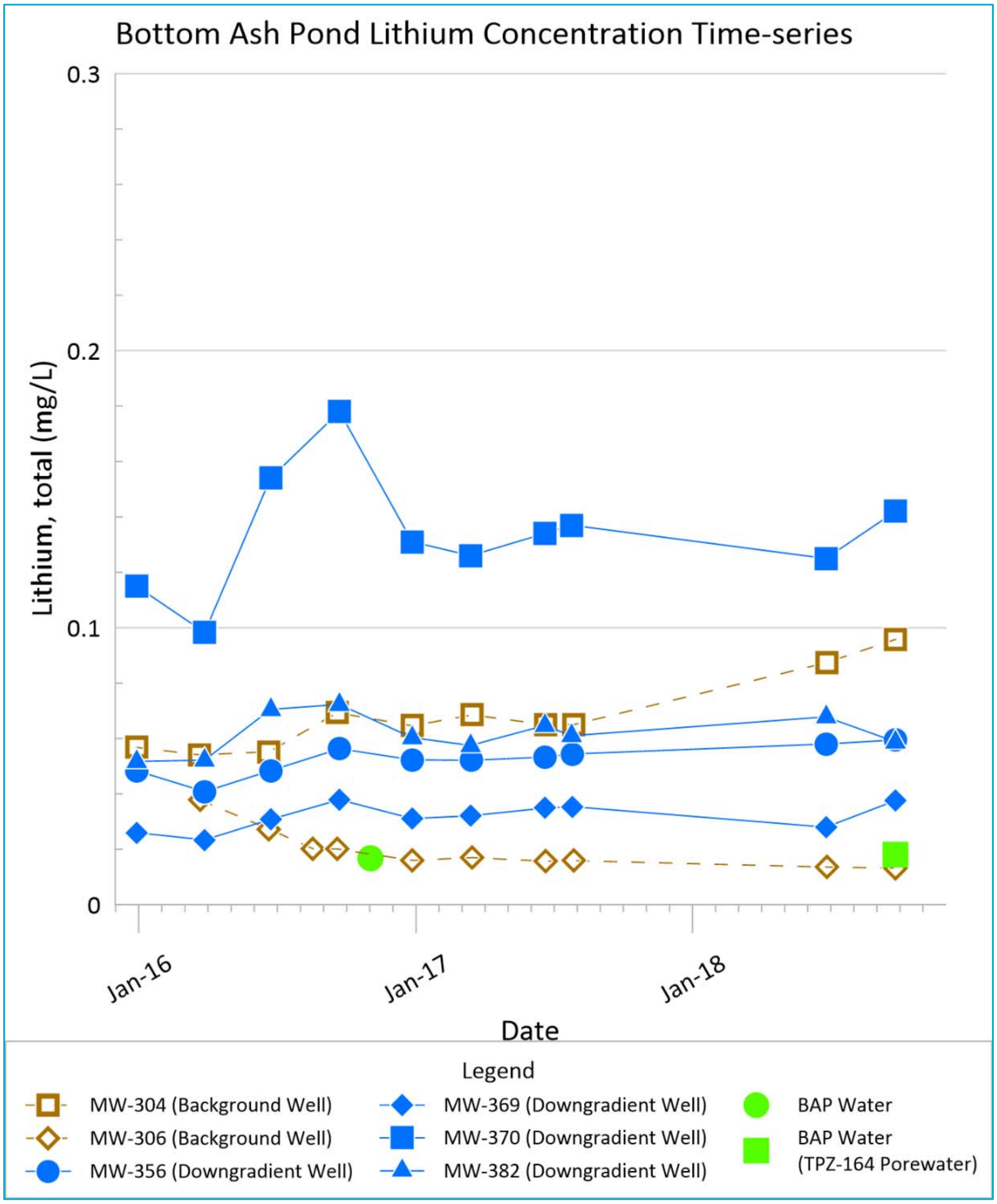

Figure 3. Lithium Concentration Time-series for groundwater samples from the BAP monitoring system and BAP water.

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.

LICENSED PROFESSIONAL ENGINEER
ERIC J. TLACHAC
062-063091
STATE OF ILLINOIS

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.

LICENSED PROFESSIONAL GEOLOGIST
JACOB J. WALCZAK
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Jacob J. Walczak
Professional Geologist
196-001473
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OBG, part of Ramboll
Date: April 8, 2019

Figures

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

Y:\Mapping\Projects\22\2285_Baldwin\MXD\Figure 1_Baldwin_MW MAP Water Samps_ASD.mxd Author: stolzsd; Date/Time: 4/4/2019, 11:12:05 AM

Attachment A

Boring Log for Porewater Well TPZ-164

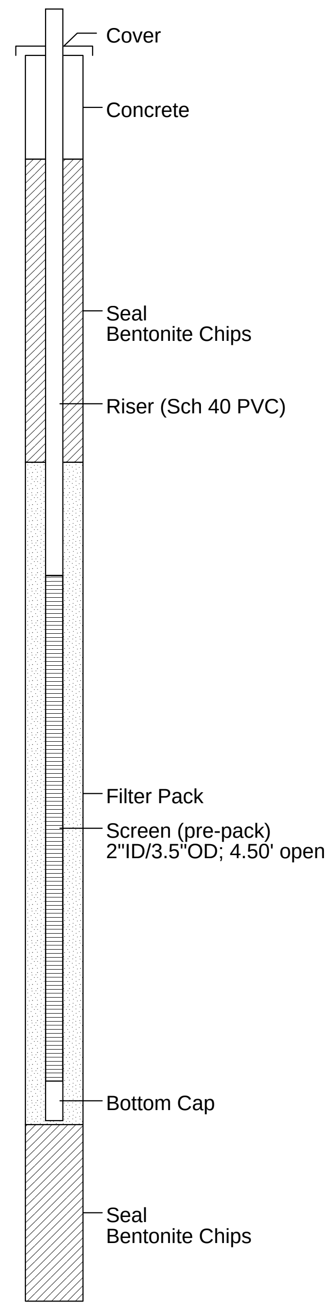
KELRON ENVIRONMENTAL Incorporated	LOG OF PROBEHOLE TPZ-164

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
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	- wet	428	1		17/24		AR
5		427					
6		426					
7		425					
8		424		3			
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)	423	2	3 5	18/18		CL
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		421	3		23/24		CL
12	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	420 419					

Well: TPZ-164
Elev.: 435.10



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.

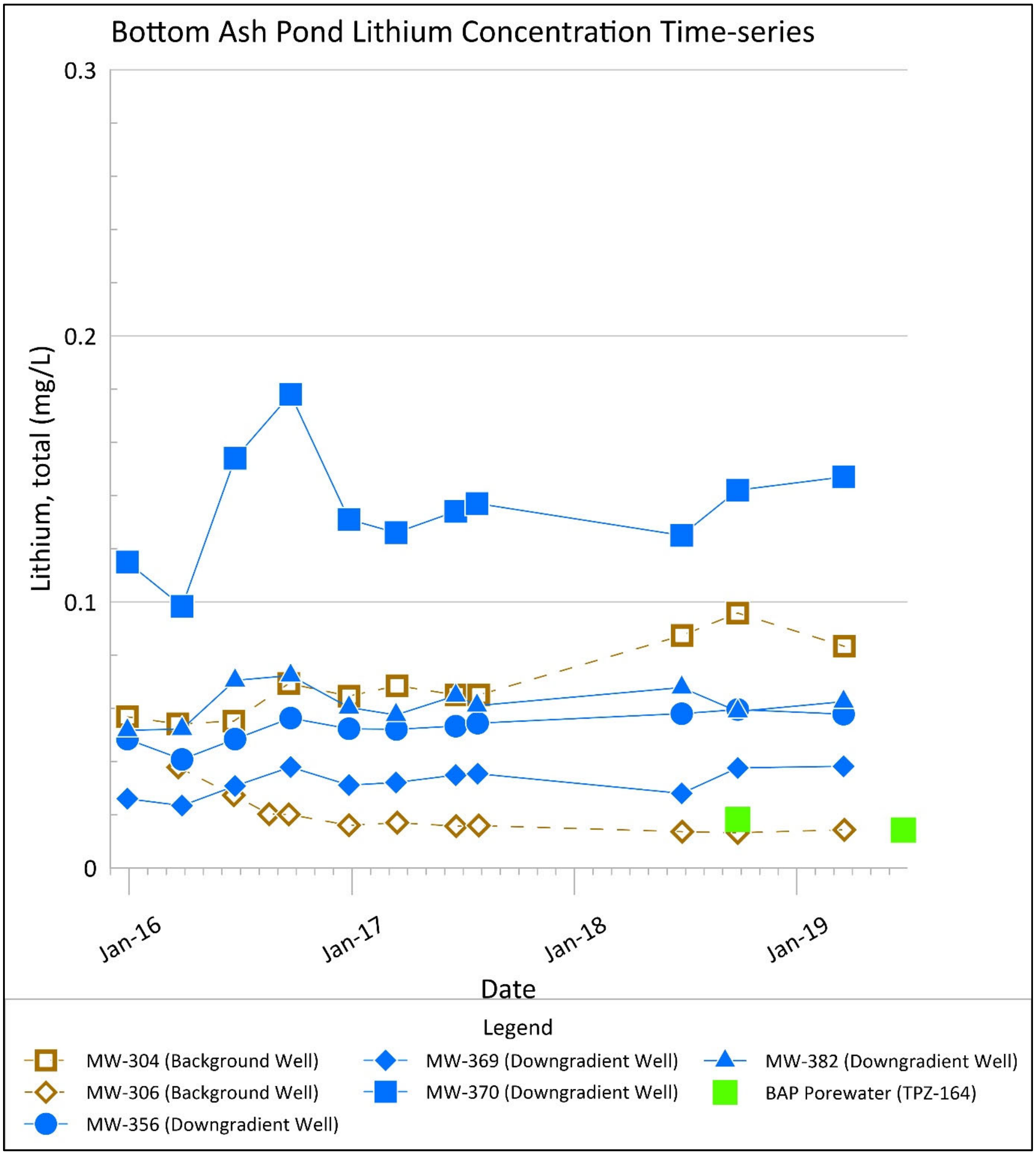


Figure 2. Lithium concentration time-series for background (brown) and downgradient (blue) groundwater samples from the BAP monitoring system, and BAP porewater (green).

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.

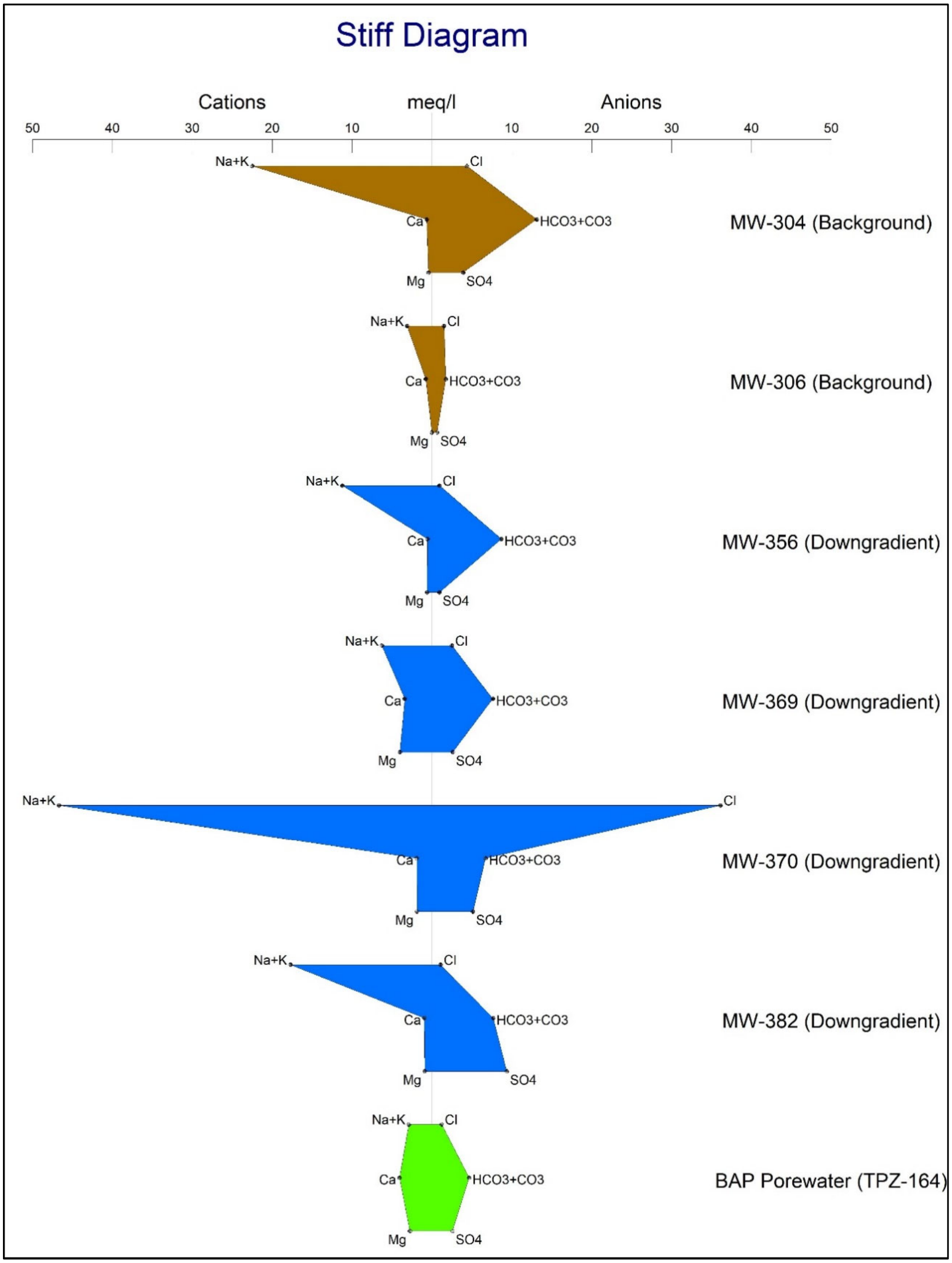


Figure 3. Stiff diagram showing ionic composition of samples of BAP background (brown) and downgradient (blue) groundwater and BAP porewater (green).

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

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

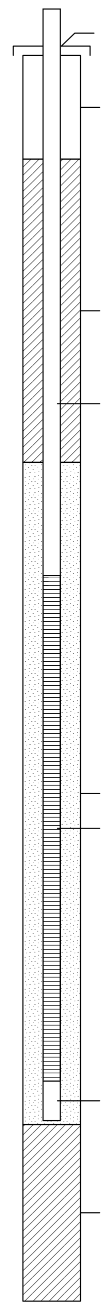
LOG OF PROBEHOLE TPZ-164

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							
2.5		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			
4.5	- wet	428					AR	
5.5		427						
6.5		426						
7.5		425						
8.5		424		3				
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)	423	2	3 5	18/18		CL	
10.3	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422	3		23/24		CL	
11.5	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	421						
12		420						
		419						

Well: TPZ-164
Elev.: 435.10



ATTACHMENT 2

Intended for
Dynegy Midwest Generation, LLC

Date
October 26, 2020

Project No.
1940074914

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

BALDWIN BOTTOM ASH POND

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., f/k/a O'Brien & Gere Engineers, Inc.
Date: October 26, 2020

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., f/k/a O'Brien & Gere Engineers, Inc.
Date: October 26, 2020

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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
ASD	Alternate Source Demonstration
BAP	Bottom Ash Pond
CCR	Coal Combustion Residuals
DMG	Dynegy Midwest Generation, LLC
f/k/a	formerly known as
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., f/k/a O’Brien & Gere Engineers, 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., f/k/a O'Brien & Gere Engineers, 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 (A3) was completed on March 26, 2020 and analytical data were received on April 28, 2020. Analytical data from all sampling events, from December 2015 through A3, 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 October 26, 2020, within 90 days of determination of the SSLs (July 27, 2020), 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 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 of 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 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	0.014

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 0.014 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 anticipated 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.

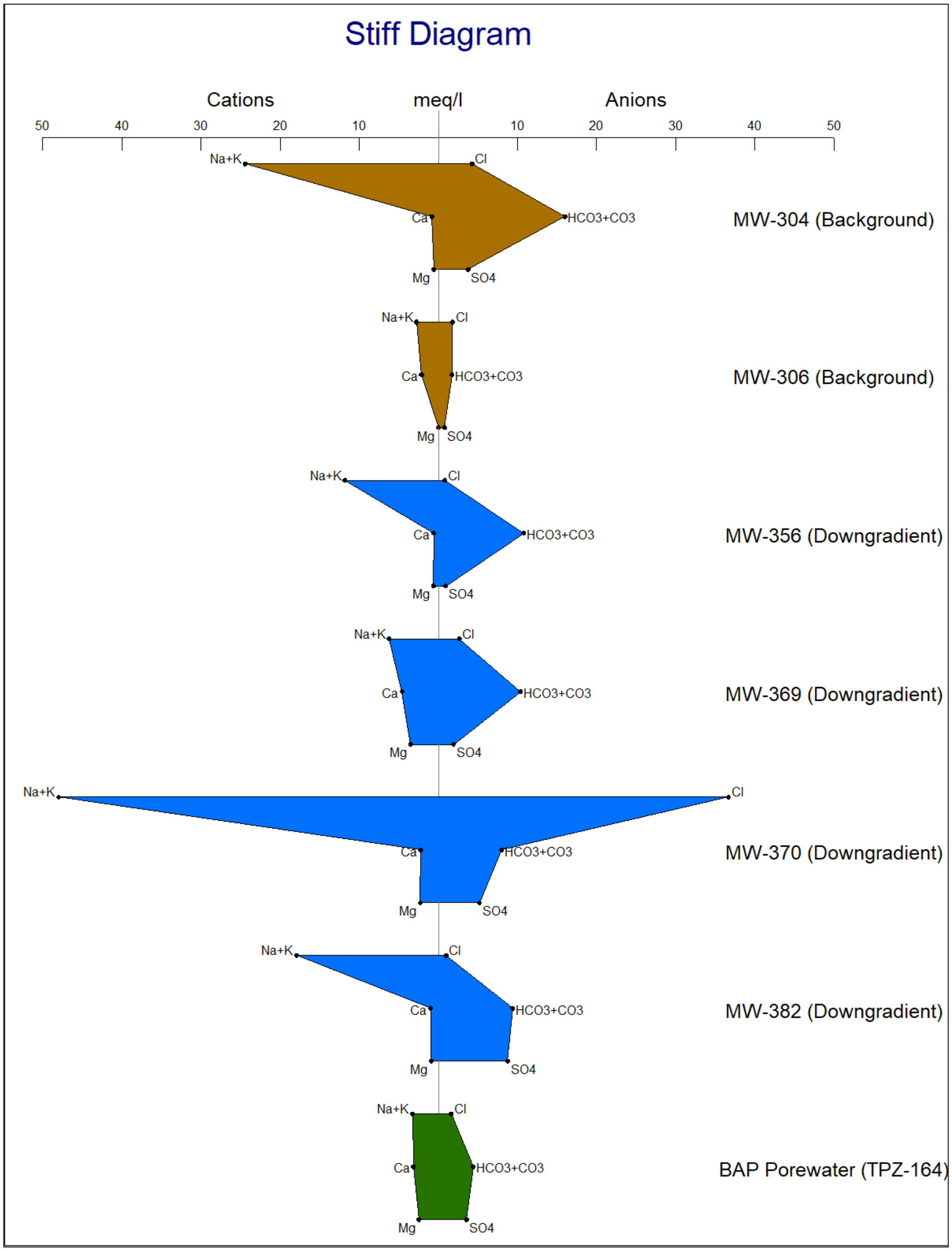


Figure A. Stiff Diagram Showing Ionic Composition of Samples of BAP Background (Brown) and Downgradient Groundwater (Blue) and BAP Porewater (Green).

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 A3 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

Y:\Mapping\Projects\22\2285_Baldwin\MXD\ASD\Figure 1_MW and BAP Water Sam Loc_ASD.mxd

PROJECT: 169000XXXX | DATED: 4/16/2020 | DESIGNER: galarnmc

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

MONITORING WELL AND BOTTOM ASH POND WATER SAMPLE 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

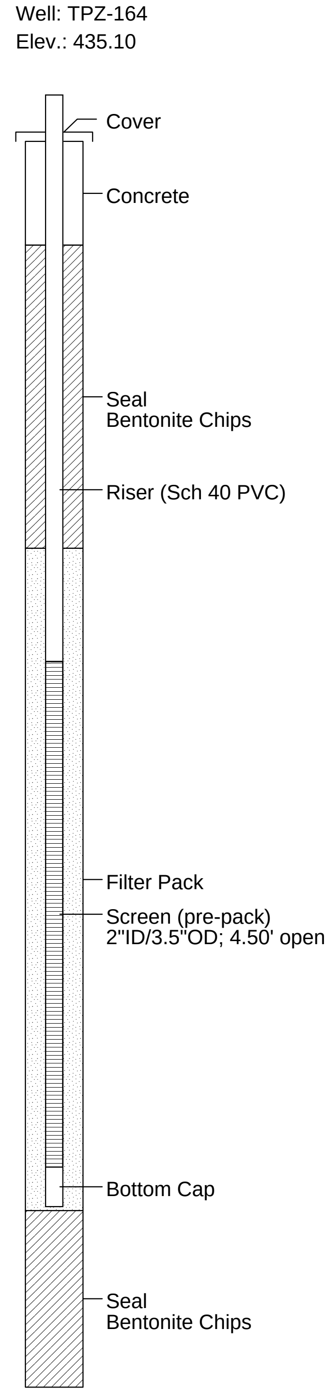
APPENDIX A
BORING LOG FOR POREWATER WELL TPZ-164

KELRON ENVIRONMENTAL Incorporated	LOG OF PROBEHOLE TPZ-164 (Page 1 of 1)

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
0	FILL - Bottom Ash, coarse, black (10YR 2/1), dry						
2.5		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
4.5	- wet	428					
5.5		427					
6.5		426					
7.5		425					
8.5		424		3			
8.7	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)	423	2	3 5	18/18		CL
10.3	- light olive brown <Shelby Tube Sample ST164-12 @ 10-12'> grain size analysis: 7.2% Sand, 62.2% Silt, 30.6% Clay	422	3		23/24		CL
11.5	END BOREHOLE AT 10.3 FEET BLS END Split-Spoon Sampling at 12 feet BLS	421					
12		420					



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ATTACHMENT 2 – MAP OF GROUNDWATER MONITORING WELL LOCATIONS

Y:\Mapping\Projects\22\2285_Baldwin\MXD\ASD\Figure 1_MW and BAP Water Sam Loc_ASD.mxd

PROJECT: 169000XXXX | DATED: 4/16/2020 | DESIGNER: galarnmc

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

MONITORING WELL AND BOTTOM ASH POND WATER SAMPLE LOCATION MAP

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

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

ATTACHMENT 3 – WELL CONSTRUCTION DIAGRAMS AND DRILLING LOGS

NATURAL RESOURCE TECHNOLOGY

SOIL BORING LOG INFORMATION

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Energy Complex		MW-304

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
John Gates Bulldog Drilling	10/9/2015	10/20/2015	4 1/4 HSA and rotary

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW-304	Feet (NAVD88)	453.03 Feet (NAVD88)	8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 554,194.03 N, 2,386,608.77 E E/Ⓦ
1/4 of 1/4 of Section , T N, R

Lat 38° 11' 17.9952"
Long -89° 51' 12.39"

Local Grid Location ☐ N ☐ S Feet ☐ E ☐ W Feet

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	Illinois	Baldwin

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0 - 5.8	0 - 5.8' **SILTY CLAY** CL/ML.	CL/ML									0-35.4' Blind Drilled. See log MW-104DR for soil description details.
			5.8 - 12	5.8 - 13.5' **FAT CLAY:** CH.	CH									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature Brad Rodes

Firm Natural Resource Technology
234 W. Florida St., Fifth Floor, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-304

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13	5.8 - 13.5' **FAT CLAY:** CH. *(continued)*	CH									
			14	13.5 - 15' **LEAN CLAY:** CL.	CL									
			15, 16, 17, 18, 19, 20, 21, 22, 23	15 - 23.5' **SILTY CLAY** CL/ML.	CL/ML									
			24	23.5 - 24.5' **SANDY FAT CLAY:** s(CH).	s(CH)									
			25, 26, 27	24.5 - 27.3' **POORLY-GRADED SAND:** SP.	SP									
			28, 29	27.3 - 30' **SILTY CLAY** CL/ML.	CL/ML									
			30, 31, 32	30 - 35.4' **SHALE:** BDX (SH).	BDX (SH)									

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-304

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			33–35	30 - 35.4' **SHALE:** BDX (SH). *(continued)*	BDX (SH)									
1 CORE	60 31		36–41	35.4 - 41.3' **LEAN CLAY:** CL, gray, 2" of wood on top of unit, stiff, dry. 36.3' stiff to very hard, dry. 36.7' trace chert gravel. 40.2' dry.	CL									
2 CORE	60 59.5													
			42–46	41.3 - 46.8' **SHALEY LIMESTONE:** BDX (LS/SH), thinly to medium bedded with shale, intensely to moderately fractured (extremely narrow apertures). 41.6' - 42' vertical fracture. 45.4' intensely fractured.	BDX (LS/SH)									
3 CORE	60 63													Core 3, RQD=75%
			47–52	46.8 - 55.6' **SHALE:** BDX (SH), gray, trace chert gravel, thickly bedded, highly to moderately decomposed, intensely fractured. 50.4' moderately fractured.	BDX (SH)									
4 CORE	60 65													Core 4, RQD=95%

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-304

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			53	46.8 - 55.6' **SHALE:** BDX (SH), gray, trace chert gravel, thickly bedded, highly to moderately decomposed, intensely fractured. *(continued)*	BDX (SH)									
			54–55	54.4' intensely fractured.										
5 CORE	60 57		56–59	55.6 - 60.2' **LIMESTONE:** BDX (LS), shaley, thickly bedded, fossiliferous, unfractured to slightly fractured.	BDX (LS)									Core 5, RQD=95%
			59–60											Bedrock corehole reamed 6" in diameter to 59' for well installation.
6 CORE	60 64		60–69	60.2 - 81.6' **SHALEY LIMESTONE:** BDX (LS/SH), medium bedded, mostly fossiliferous limestone, highly decomposed dark gray shale beds, intensely to moderately fractured.	BDX (LS/SH)									Core 6, RQD=73%
7 CORE	60 66		65											Core 7, RQD=64%
8 CORE	60 63		70–72	70.3' thickly bedded with dark gray shale.										Core 8, RQD=88%

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-304

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			73	60.2 - 81.6' **SHALEY LIMESTONE:** BDX (LS/SH), medium bedded, mostly fossiliferous limestone, highly decomposed dark gray shale beds, intensely to moderately fractured. *(continued)*										
			74											
9 CORE	60 60		75	75' diagonal fracture (narrow aperture). 75.3' intensely fractured.										Core 9, RQD=50%
			76											
			77		BDX (LS/SH)									
			78											
			79											
10 CORE	60 72		80	80.3' moderately fractured.										Core 10, RQD=43%
			81											
			82	81.6 - 91.9' **SHALE:** BDX (SH), gray, highly decomposed, intensely fractured.										
			83											
			84											
11 CORE	60 65		85	85.4' moderately to highly decomposed, intensely to moderately fractured.										Core 11, RQD=57%
			86											
			87		BDX (SH)									
			88											
			89											
12 CORE	60 61.5		90	90.5' extremely narrow to very narrow apertures.										Core 12, RQD=50%
			91											
			92											

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-304

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			93	91.9 - 115.3' **SHALEY LIMESTONE:** BDX (LS/SH), thinly to medium bedded with shale, slightly to moderately decomposed shale, intensely to moderately fractured (extremely narrow to narrow apertures). *(continued)*										
			94											
			95											
13 CORE	60 62			95.3' tight to very narrow apertures.										Core 13, RQD=48%
			96											
			97											
			98											
			99											
			100											
14 CORE	60 65			100.4' thickly bedded, moderately fractured.										Core 14, RQD=65%
			101											
			102		BDX (LS/SH)									
			103											
			104											
			105											
15 CORE	60 60			105.3' medium bedded, slightly fractured (very narrow apertures).										Core 15, RQD=98%
			106											
			107											
			108											
			109											
			110											
16 CORE	60 72			110.3' moderately fractured.										Core 16, RQD=91%
			111											
			112											

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-304

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			113–115	91.9 - 115.3' **SHALEY LIMESTONE:** BDX (LS/SH), thinly to medium bedded with shale, slightly to moderately decomposed shale, intensely to moderately fractured (extremely narrow to narrow apertures). *(continued)*	BDX (LS/SH)									
17 CORE	60 60.5		116	115.3 - 135.4' **LIMESTONE:** BDX (LS), fossiliferous, thinly to medium bedded, slightly fractured (narrow apertures).	BDX (LS)									Core 17, RQD=100%
18 CORE	60 59		121	120.4' trace cherty limestone, slightly to moderately fractured (extremely narrow to very narrow apertures).										Core 18, RQD=97%
19 CORE	60 60.5		126	125.3' slightly fractured (very narrow to narrow apertures).										Core 19, RQD=98%
20 CORE	60 60		131	130.4' very narrow apertures.										Core 20, RQD=98%
			132											

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-304

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			133 134 135	115.3 - 135.4' **LIMESTONE:** BDX (LS), fossiliferous, thinly to medium bedded, slightly fractured (narrow apertures). *(continued)*	BDX (LS)									
				135.4' End of Boring.										

RECORD OF SUBSURFACE EXPLORATION

MONITORING WELL BAMW-306 Renamed MW-306

PROJECT: IP BALDWIN
PHASE III, AREA 1

JOB NO.: 124081

DATE DRILLED: 09/25/91

DRILLING METHOD: H.S.A. & NX Rock Core

DRILLED BY: Crank

LOGGED BY: Brooks

BOREHOLE NUMBER: BTB-38

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	REMARKS	RECOVERY RATIO in/in	PENETROMETER, HAND, tsf
0				Augered to 53.2'. No Samples Taken. See BAMW-124; BTB-39 for sample descriptions from 0-53.5'		
5						
10						
15						
20						
25						
30	Boring Continues					

RECORD OF SUBSURFACE EXPLORATION

MONITORING WELL BAMW-306 Renamed MW-306

PROJECT: IP BALDWIN
PHASE III. AREA 1

JOB NO.: 124081

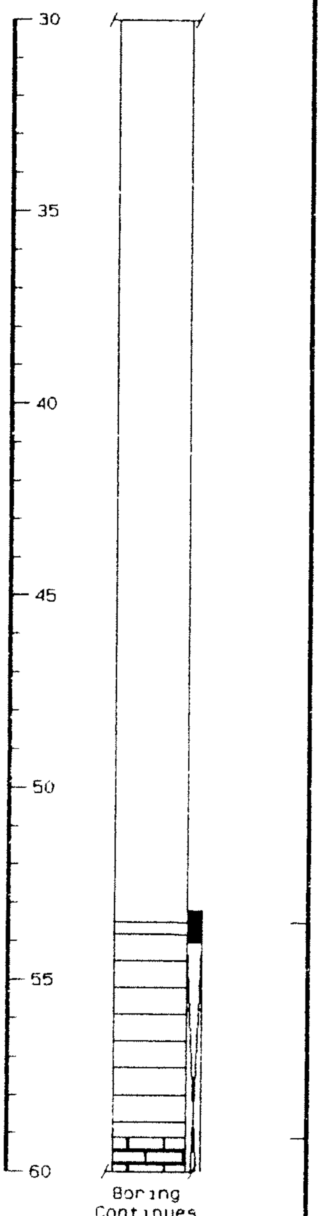
DATE DRILLED: 09/25/91

DRILLING METHOD: H.S.A. & NX Rock Core

DRILLED BY: Crank

LOGGED BY: Brooks

BOREHOLE NUMBER: BTB-38



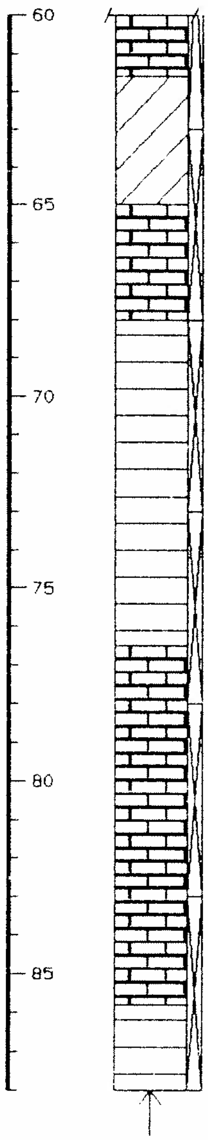
ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	REMARKS	RECOVERY RATIO in/in	PENETROMETER, HAND. tsf
30				Augered to 53.2'. No Samples Taken. See BAMW-124; BTB-39 sample descriptions from 0-53.5'		
			Gray Clayey SHALE		4/10 62/108	
			Light Gray LIMESTONE			

RECORD OF SUBSURFACE EXPLORATION

MONITORING WELL BAMW-306 Renamed MW-306

PROJECT: IP BALDWIN
PHASE III, AREA 1
JOB NO.: 124081
DATE DRILLED: 09/25/91
DRILLING METHOD: H.S.A. & NX Rock Core
DRILLED BY: Crank
LOGGED BY: Brooks
BOREHOLE NUMBER: BTB-38

ELEVATION / DEPTH	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	DESCRIPTION	REMARKS	RECOVERY RATIO in/in	PENETROMETER, HAND, tsf
60			Light Gray LIMESTONE			
		CL	Gray Shaley CLAY			
					60/60	
65			Light Gray LIMESTONE			
			Olive Clayey SHALE		37/60	
70			-Dark Gray, Calcareous below 70.3'			
					60/60	
75						
			Light Gray LIMESTONE			
					60/60	
80						
					59/60	
85						
			Dark Gray Clayey SHALE			



SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Energy Complex		MW-356

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
John Gates Bulldog Drilling	9/28/2015	10/1/2015	4 1/4 HSA and rotary

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW-356	Feet (NAVD88)	425.18 Feet (NAVD88)	8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒		Local Grid Location
State Plane 558,050.37 N, 2,381,958.49 E E/Ⓦ	Lat 38° 11' 56.2662"	☐ N ☐ E
1/4 of 1/4 of Section , T N, R	Long -89° 52' 10.4808"	Feet ☐ S Feet ☐ W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	Illinois	Baldwin

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–10	0 - 10' **SILTY CLAY** CL/ML.	CL/ML									0-37.3' Blind Drilled. See logs OW-156 and OW-256 for soil description.
			10–12	10 - 17.7' **LEAN CLAY WITH SAND:** (CL)s.	(CL)s									

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature	Firm
[signature]	Natural Resource Technology 234 W. Florida St., Fifth Floor, Milwaukee, WI 53204 Tel: (414) 837-3607 Fax: (414) 837-3608

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-356

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			13–17	10 - 17.7' **LEAN CLAY WITH SAND:** (CL)s. *(continued)*	(CL)s									
			18–27	17.7 - 27.3' **SILTY CLAY** CL/ML.	CL/ML									
			28	27.3 - 28.6' **POORLY-GRADED SAND:** SP.	SP									
			29–32	28.6 - 33.9' **SILTY CLAY** CL/ML.	CL/ML									

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-356

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			33	28.6 - 33.9' **SILTY CLAY** CL/ML. *(continued)*	CL/ML									
			34–35	33.9 - 35.7' **LEAN CLAY:** to **SHALE:** CL.	CL									
			36–37	35.7 - 37.3' **SHALE:** BDX (SH).	BDX (SH)									
1 CORE	28 24.5		38	37.3 - 53.8' **SHALE:** BDX (SH), weathered shale and clay, brown to dark gray, soft, slightly fractured.	BDX (SH)									Core 1, RQD=92%
2 CORE	60 57		40	39.6' light to dark gray to tan.										Core 2, RQD = 58%
			42–43	42.3' - 43.2' limestone.										
			43–44	43.2' light to dark gray/tan, very weak.										
3 CORE	60 41		45	45' - 50' dark gray, intensely fractured.										Low recovery, possible washout. Core 3, RQD = 18%
4 CORE	36 36		50–52	50' - 53.1' thin beds of limestone, limestone is more competent, slightly fractured, wet.										Core 4, RQD=92%

SOIL BORING LOG INFORMATION SUPPLEMENT

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-356

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			53	37.3 - 53.8' **SHALE:** BDX (SH), weathered shale and clay, brown to dark gray, soft, slightly fractured. *(continued)*	BDX (SH)								
5 CORE	24 21.5			53.1' - 53.8' intensely fractured.									Core 5, RQD=58%
			54	53.8 - 55.4' **LIMESTONE:** BDX (LS), white, thickly bedded, moderately fractured (moderately wide to very narrow apertures).	BDX (LS)								
6 CORE	60 60.5		55										Core 6, RQD=84%
			56	55.4 - 57.2' **SHALE:** BDX (SH), dark gray, trace limestone beds, moderately fractured.	BDX (SH)								
			57	56.8' soft, highly weathered bed, decomposed. 57.1' soft, highly weathered bed.									
			58	57.2 - 60' **LIMESTONE:** BDX (LS), trace shale beds, moderately fractured (moderately wide to very wide apertures).	BDX (LS)								
			59	59.4' - 59.7' vertical fractures with pyrite mineralization.									
7 CORE	60 61		60	60 - 65.8' **SHALE:** BDX (SH), gray, moderately fractured.									Core 7 RQD=75%
			61	61' -62' dark gray.									
			62	62' - 62.4' soft, clayey.									
			63		BDX (SH)								
			64										
8 CORE	60 61.5		65	65' dark gray, narrow to moderately wide apertures. 65.3' - 65.8' fossiliferous.									Core 8, RQD=67%
			66	65.8 - 68.8' **SHALEY LIMESTONE:** BDX (LS/SH), fossiliferous, slightly to moderately fractured.									
			67		BDX (LS/SH)								
			68										
			69	68.8 - 70' **SHALE:** BDX (SH), gray, fossiliferous, moderately fractured (moderately wide to narrow apertures).	BDX (SH)								Bedrock corehole reamed 6" in diameter to 69' for well installation.
9 CORE	60 61		70	70 - 75' **SHALEY LIMESTONE:** BDX (LS/SH), gray to dark gray, fossiliferous, medium bedded, moderately fractured (narrow apertures).									Core 9, RQD=87%
			71		BDX (LS/SH)								
			72										

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-356

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			73, 74	70 - 75' **SHALEY LIMESTONE:** BDX (LS/SH), gray to dark gray, fossiliferous, medium bedded, moderately fractured (narrow apertures). *(continued)*	BDX (LS/SH)									
10 CORE	60 60		75	75 - 75.9' **SHALE:** BDX (SH), dark gray, soft, moderately fractured (narrow to moderately narrow apertures).	BDX (SH)									Core 10, RQD=95%
			76	75.9 - 76.2' **SHALEY LIMESTONE:** BDX (LS/SH), fossiliferous, narrow to moderately narrow apertures.	BDX (LS/SH)									
			77, 78, 79	76.2 - 101.8' **LIMESTONE:** BDX (LS), light gray, fossiliferous, thickly bedded, narrow to moderately narrow apertures.										
11 CORE	60 60.5		80, 81, 82, 83, 84	80' light gray to gray, unfractured.	BDX (LS)									Core 11, RQD=100%
12 CORE	60 61.5		85, 86, 87, 88, 89											Core 12, RQD=100%
13 CORE	60 59.5		90, 91, 92											Core 13, RQD=100%

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-356

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			92-95	76.2 - 101.8' **LIMESTONE:** BDX (LS), light gray, fossiliferous, thickly bedded, narrow to moderately narrow apertures. *(continued)*	BDX (LS)									
14 CORE	61 61		95											Core 14, RQD=100%
15 CORE	60 59.5		100	99.7' slightly weathered, decomposed. 100' gray, no fossils.										Core 15, RQD=100%
			101.8	101.8 - 106.5' **SHALE:** BDX (SH), dark gray, thickly bedded, slightly fractured.	BDX (SH)									
16 CORE	60 58.5		105											Core 16, RQD=56%
			106.2	106.2' weathered, decomposed.										
			106.5	106.5 - 108.4' **LIMESTONE:** BDX (LS), light gray to green, highly decomposed, intensely fractured.	BDX (LS)									
			108.4	108.4 - 109.8' **SHALE:** BDX (SH), dark reddish-brown, highly decomposed.	BDX (SH)									
17 CORE	60 55		109.8	109.8 - 111.1' **LIMESTONE:** BDX (LS), gray, highly disintegrated (healed dissolution cracks with green highly decomposed infilling). 109.9' - 110.7' angular gravel-sized fragments. 110.7' moderately decomposed, very intensely fractured.	BDX (LS)									Core 17, RQD=49%
			111.1-112		BDX (SH)									

SOIL BORING LOG INFORMATION SUPPLEMENT

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-356

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			113	111.1 - 114' **SHALE:** BDX (SH), dark gray, moderately to highly decomposed, moderately fractured. *(continued)*	BDX (SH)									
18 CORE	60 61		114–116	114 - 116.3' **LIMESTONE:** BDX (LS), gray, moderately fractured.	BDX (LS)									Core 18, RQD=61%
				116.3 - 116.7' **SHALEY LIMESTONE:** BDX (LS/SH), intensely fractured.	BDX (LS/SH)									
			117–119	116.7 - 119.7' **SHALE:** BDX (SH), gray, slightly decomposed, intensely fractured.	BDX (SH)									
19 CORE	60 64		120	119.7 - 120.9' **SHALEY LIMESTONE:** BDX (LS/SH), gray, slightly decomposed, intensely fractured.	BDX (LS/SH)									Core 19, RQD=86%
			121–122	120.9 - 122.2' **SHALE:** BDX (SH), dark gray, moderately fractured.	BDX (SH)									
20 CORE	48 48		123–126	122.2 - 126.1' **LIMESTONE:** BDX (LS), gray, moderately fractured. 123.3' - 123.4' fossiliferous. 124.1' - 124.1' fossiliferous. 124.7' - 124.8' fossiliferous.	BDX (LS)									Core 20, RQD =88%
			127	126.1 - 127.6' **SHALE:** BDX (SH), dark gray, slightly decomposed. 126.7' - 127' limestone, gray. 127' moderately decomposed.	BDX (SH)									
			128–129	127.6 - 129.2' **LIMESTONE:** BDX (LS), slightly decomposed.	BDX (LS)									
21 CORE	12 12		130	129.2 - 130' **SHALE:** BDX (SH), gray, intensely fractured.	BDX (SH)									Core 21, RQD=0%
22 CORE	60 60			130 - 130.4' **SHALEY LIMESTONE:** BDX (LS/SH), fossiliferous, moderately fractured.	BDX (LS/SH)									Core 22, RQD=94%
			131	130.4 - 131' **LIMESTONE:** BDX (LS), gray, fossiliferous, moderately fractured.	BDX (LS)									
			132	131 - 134' **SHALEY LIMESTONE:** BDX (LS/SH), fossiliferous, moderately fractured.										

SOIL BORING LOG INFORMATION SUPPLEMENT

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-356

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			133	131 - 134' **SHALEY LIMESTONE:** BDX (LS/SH), fossiliferous, moderately fractured. *(continued)*	BDX (LS/SH)									The casing dropped 3" during drilling.
			134	134 - 135' **LIMESTONE:** BDX (LS), gray, thickly bedded, moderately fractured.	BDX (LS)									
			135	135' End of Boring.										

SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Energy Complex		MW-369

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Mark Baetje Bulldog Drilling	11/17/2015	11/18/2015	4 1/4 HSA and rotary

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW-369	Feet (NAVD88)	420.49 Feet (NAVD88)	8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒

State Plane 557,329.71 N, 2,381,765.41 E E/Ⓦ

1/4 of 1/4 of Section , T N, R

Lat 38° 11' 49.1496"

Long -89° 52' 12.9288"

Local Grid Location ☐ N ☐ S Feet ☐ E ☐ W Feet

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	Illinois	Baldwin

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0	0 - 0.2' **SILT:** ML.	ML								0-43' Blind Drilled. See log PZ-169 for soil description.
			0.2	0.2 - 2' **SILTY CLAY** CL/ML.	CL/ML								
			2	2 - 4' Shelby Tube Sample.									
			4	4 - 10' **SILTY CLAY** CL/ML.	CL/ML								
			10	10 - 12' **SILTY CLAY** to **LEAN CLAY:** CL/ML.	CL/ML								
			12										

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature [signature]

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NATURAL RESOURCE TECHNOLOGY

SOIL BORING LOG INFORMATION SUPPLEMENT

Boring Number MW-369

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			12 - 14	12 - 14' Shelby Tube Sample.										
			14 - 20	14 - 20' **LEAN CLAY:** CL.	CL									
			20 - 22	20 - 22' **SILTY CLAY** CL/ML.	CL/ML									
			22 - 24	22 - 24' Shelby Tube Sample.										
			24 - 28	24 - 28' **LEAN CLAY WITH SAND:** (CL)s.	(CL)s									
			28 - 30	28 - 30' **SILTY CLAY** CL/ML.	CL/ML									
			30 - 32	30 - 32' **LEAN CLAY:** to **SILTY CLAY** CL.	CL									

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			32–38	32 - 38' **LEAN CLAY:** CL.	CL								
			38–40	38 - 40' No Recovery.									
			40–42	40 - 42' **LEAN CLAY:** CL.	CL								
1 SS	24 0	10 18 30 40	42–45	42 - 45' No Recovery.									
2 SS	5 9	50/5"	45	45 - 45.3' **LEAN CLAY:** CL, dark brown (10YR 3/3), 30-50% pale brown (10YR 6/4) and brown (10YR 4/3) mottling, trace subrounded fine gravel, cohesive, low plasticity, moist.	CL								
			45.3	45.3 - 48.7' **SHALE:** BDX (SH), dark grayish brown, highly decomposed.	BDX (SH)								
3 SS	5 8	50/5"	47	47' trace clay layers (< 1" thick), highly decomposed, very weak.									
1 CORE	66 30		48.7	48.7 - 50.8' **LIMESTONE:** BDX (LS), white, fossiliferous, intensely fractured (extremely narrow to narrow apertures), microcrystalline, slightly to moderately decomposed.	BDX (LS)								Core 1, RQD=17%
			50.8	50.8 - 53.4' **SHALE:** BDX (SH), dark gray, intensely fractured (extremely narrow to narrow apertures), highly decomposed, very weak.	BDX (SH)								

SOIL BORING LOG INFORMATION SUPPLEMENT

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-369

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
			53	50.8 - 53.4' **SHALE:** BDX (SH), dark gray, intensely fractured (extremely narrow to narrow apertures), highly decomposed, very weak. *(continued)*	BDX (SH)									
2 CORE	60 46		54, 55, 56, 57, 58, 59	53.4 - 59.3' **LIMESTONE:** BDX (LS), white, moderately fractured (very narrow to narrow apertures), fossiliferous, microcrystalline, slightly decomposed, very strong, pitted, trace mineralization. 58.4' mud in fracture.	BDX (LS)									Core 2, RQD=83%
3 CORE	60 64		60, 61, 62, 63, 64	59.3 - 64.9' **SHALEY LIMESTONE:** BDX (LS/SH), dark gray, medium bedded shale, intensely fractured (extremely narrow to narrow apertures), fossiliferous, microcrystalline, decomposed, very weak to weak, weathered, highly weathered shale cementing segments together.	BDX (LS/SH)									Core 3, RQD=63%
4 CORE	60 62		65, 66, 67, 68	64.9 - 68.8' **LIMESTONE:** BDX (LS), white, slightly fractured (tight to narrow apertures), fossiliferous, microcrystalline, slightly decomposed, slightly disintegrated, pitted.	BDX (LS)									Core 4, RQD=79%
			69, 70	68.8 - 70.7' Overdrilled for Well Installation.										
				70.7' End of Boring.										Bedrock corehole reamed 6" in diameter to 70.7' for well installation.

SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Energy Complex		MW-370

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Mark Baetje Bulldog Drilling	11/20/2015	11/24/2015	4 1/4 HSA and rotary

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW-370	Feet (NAVD88)	418.67 Feet (NAVD88)	8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 556,826.50 N, 2,381,936.14 E E/Ⓦ
1/4 of 1/4 of Section , T N, R

Lat 38° 11' 44.1702"
Long -89° 52' 10.8084"

Local Grid Location
Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	Illinois	Baldwin

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0-2	0 - 2' **SILTY CLAY** CL/ML.	CL/ML								0-28' Blind Drilled. See log PZ-170 for soil description.
			2-4	2 - 4' Shelby Tube Sample.									
			4-8	4 - 8' **SILTY CLAY** CL/ML.	CL/ML								
			8-10	8 - 10' **SILTY CLAY** to **LEAN CLAY:** CL/ML.	CL/ML								
			10-12	10 - 12' **LEAN CLAY:** CL.	CL								

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signature [signature]

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NATURAL RESOURCE TECHNOLOGY

Boring Number MW-370

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			12	12 - 14' Shelby Tube Sample.										
			14	14 - 24' **SILTY CLAY** CL/ML.	CL/ML									
			24	24 - 26' Shelby Tube Sample.										
			26	26 - 28' **SILTY CLAY** CL/ML.	CL/ML									
1 SS	10 10	23 50/4"	28	28 - 28.4' **LEAN CLAY:** CL, yellowish brown (10YR 5/4), trace angular limestone gravel, soft, medium plasticity, moist.	CL									
1 CORE	60 18.5		28.4	28.4 - 28.9' **SHALE:** BDX (SH), gray, highly decomposed, very weak.	BDX (SH)									Core 1, RQD=51%
			28.9	28.9 - 38.1' **SHALEY LIMESTONE:** BDX (LS/SH), light gray to gray, intensely fractured (extremely narrow to moderately narrow apertures), medium to thickly bedded, microcrystalline, moderately decomposed, very strong.	BDX (LS/SH)									

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-370

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			33	28.9 - 38.1' **SHALEY LIMESTONE:** BDX (LS/SH), light gray to gray, intensely fractured (extremely narrow to moderately narrow apertures), medium to thickly bedded, microcrystalline, moderately decomposed, very strong. *(continued)*									
2 CORE	51.5 12		34	33.9' - 38.1' gray, greenish gray in fractures, trace fossils, moderately to highly decomposed, slightly to moderately disintegrated, clay in shoe with a hard, reddish brown inclusion.									Core 2, RQD=0%
			35		BDX (LS/SH)								
			36	36' - 37.9' vertical fracture.									
			37										
3 CORE	24 25		38	38.1 - 44' **SHALE:** BDX (SH), bluish gray, intensely fractured (extremely narrow to narrow apertures), highly decomposed, weak.									Core 3, RQD=40%
			39										
4 CORE	24 11		40										Core 4, RQD=0%
5 CORE	36 32		41	40.6' - 40.8 shaley limestone layer, light gray to gray, microcrystalline, moderately decomposed, very strong. 41.1' - 43.2 gray, moderately to highly decomposed.	BDX (SH)								Core 5, RQD=78%
			42										
			43										
6 CORE	12 28		44	44 - 45.7' **SHALEY LIMESTONE:** BDX (LS/SH), light gray to gray, intensely fractured (extremely narrow to narrow apertures), thin to medium bedded, microcrystalline, slightly decomposed, clay cement in apertures, very strong.	BDX (LS/SH)								Core 6, RQD=29%
7 CORE	45 27		45	45' shale layer, bluish gray, moderately fractured (extremely narrow to narrow apertures), highly decomposed, weak.									Core 7, RQD=65%
			46	45.7 - 52.2' **SHALE:** BDX (SH), bluish gray, moderately fractured (tight to narrow), highly decomposed, weak.									
			47										
			48										
8 CORE	24 30		49		BDX (SH)								Core 8, RQD=78%
			50										
9 CORE	24 24		51										Core 9, RQD=0%
			52										

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Soil Properties: Moisture Content	Soil Properties: Liquid Limit	Soil Properties: Plasticity Index	Soil Properties: P 200	RQD/ Comments
				52' clay cement.										
10 CORE	24 36		53 54 55	52.2 - 61.7' **SHALEY LIMESTONE:** BDX (LS/SH), light gray to gray, intensely fractured (very narrow to narrow), thin to medium bedded, microcrystalline, slightly decomposed, cemented clay in apertures, very strong. 52.7' - 53' clayey sand in aperture. 53' - 53.1 shale bed, bluish gray, fossiliferous, moderately fractured (very narrow to narrow), highly decomposed, weak. 53.1' white to bluish gray, gray in the fractures (extremely narrow to moderately narrow apertures), thinly to medium bedded, slightly to moderately disintegrated.										Core 10, RQD=0%
11 CORE	24 30		56 57	55.7' moderately disintegrated.	BDX (LS/SH)									Core 11, RQD=18%
12 CORE	30 27		58 59 60	58.1' highly decomposed.										Core 12, RQD=39%
13 CORE	36 53		61											Core 13, RQD=89%
			62 63 64 65	61.7 - 65.3' **LIMESTONE:** BDX (LS).	BDX (LS)									
			66	65.3 - 66' Overdrilled for Well Installation.										
				66' End of Boring.										Bedrock corehole reamed 6" in diameter to 66' for well installation.

SOIL BORING LOG INFORMATION

NATURAL RESOURCE TECHNOLOGY

Facility/Project Name	License/Permit/Monitoring Number	Boring Number
Baldwin Energy Complex		MW-382

Boring Drilled By: Name of crew chief (first, last) and Firm	Date Drilling Started	Date Drilling Completed	Drilling Method
Jim Dittmaier Bulldog Drilling	11/19/2015	11/24/2015	4 1/4 HSA and rotary

Common Well Name	Final Static Water Level	Surface Elevation	Borehole Diameter
MW-382	Feet (NAVD88)	428.67 Feet (NAVD88)	8.3 inches

Local Grid Origin ☐ (estimated: ☐) or Boring Location ☒
State Plane 556,440.86 N, 2,382,404.51 E E/Ⓦ
1/4 of 1/4 of Section , T N, R
Lat 38° 11' 40.344"
Long -89° 52' 4.9578"
Local Grid Location: Feet ☐N ☐S Feet ☐E ☐W

Facility ID	County	State	Civil Town/City/ or Village
	Randolph	Illinois	Baldwin

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram	Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			0–2	0 - 2' **SILTY CLAY** CL/ML.	CL/ML								0-34' Blind Drilled. See log PZ-182 log for soil description details.
			2–4	2 - 4' Shelby Tube Sample.									
			4–12	4 - 12' **SILTY CLAY** CL/ML.	CL/ML								

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Signatur [signature]

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NATURAL RESOURCE TECHNOLOGY

Boring Number MW-382

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			12	12 - 14' Shelby Tube Sample.										
			14	14 - 22' **SILTY CLAY** CL/ML.	CL/ML									
			22	22 - 24' Shelby Tube Sample.										
			24	24 - 27' **SILTY CLAY** CL/ML.	CL/ML									
			27	27 - 29.1' **WELL-GRADED SAND:** SW.	SW									
			29.1	29.1 - 30' **SANDY LEAN CLAY WITH GRAVEL:** s(CL)g.	s(CL)g									
			30	30 - 34' **SILTY CLAY** CL/ML.	CL/ML									

NATURAL RESOURCE TECHNOLOGY

Boring Number MW-382

Sample Number and Type	Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
			30–34	30 - 34' **SILTY CLAY** CL/ML. *(continued)*	CL/ML									
1 SS	23 20	12 20 25 50 for 5"	34–36	34 - 36' **SILTY CLAY** CL/ML, dark gray (10YR 4/1), dark yellowish brown 10YR 4/6 mottling, highly decomposed shale at bottom of spoon, hard (>4.5 tsf).	CL/ML									
1 CORE	53 48.5		36–38.3	36 - 38.3' **SHALE:** BDX (SH), gray, highly decomposed.	BDX (SH)									Core 1, RQD=94%
			38.3–40	38.3 - 40' **LIMESTONE:** BDX (LS), thinly laminated, intensely fractured (extremely narrow apertures).	BDX (LS)									
2 CORE	60 24.5		40–44.5	40 - 44.5' **SHALE:** BDX (SH), gray, highly decomposed.	BDX (SH)									Core 2, RQD=51%
			44.5–45.4	44.5 - 45.4' **LIMESTONE:** BDX (LS), thinly bedded.	BDX (LS)									
3 CORE	54 35		45.4–58.4	45.4 - 58.4' **SHALE:** BDX (SH), gray, highly decomposed.	BDX (SH)									Core 3, RQD=51%
4 CORE	24 23.5		50.1–51.2	50.1' - 51.2' reddish brown and dark gray mottling.										Core 4, RQD=19%
			51.2–52.1	51.2' - 52.1' limestone, intensely fractured.										

Sample: Number and Type	Sample: Length Att. & Recovered (in)	Blow Counts	Depth In Feet	Soil/Rock Description And Geologic Origin For Each Major Unit	U S C S	Graphic Log	Well Diagram		Soil Properties: Compressive Strength (tsf)	Moisture Content	Liquid Limit	Plasticity Index	P 200	RQD/ Comments
5 CORE	41 41			45.4 - 58.4' **SHALE:** BDX (SH), gray, highly decomposed. *(continued)* 52.1' gray.	BDX (SH)									Core 5, RQD=63%
6 CORE	30 25			55.9' gray to dark gray, intensely fractured, few medium limestone beds.										Core 6, RQD=50%
7 CORE	30 30			58.4 - 62' **LIMESTONE:** BDX (LS), cherty, moderately fractured. 59.5' - 59.9' vertical fracture. 60' shale (2" layer).	BDX (LS)									Core 7, RQD=53%
8 CORE	60 59			60.4' - 61.4' shaley, intensely fractured.										Core 8, RQD=70%
				62 - 67.1' **SHALE:** BDX (SH), gray, hard, slightly fractured.	BDX (SH)									
9 CORE	60 59													Core 9, RQD=88%
				67.1 - 70.6' **SHALEY LIMESTONE:** BDX (LS/SH), fossiliferous, slightly fractured, (very narrow apertures).	BDX (LS/SH)									Bedrock corehole reamed 6" in diameter to 69' for well installation.
				70.6' End of Boring.										

NATURAL RESOURCE TECHNOLOGY

MONITORING WELL CONSTRUCTION

Facility/Project Name	Local Grid Location of Well	Well Name
Baldwin Energy Complex	____ft. ☐ N. ☐ S. ____ft. ☐ E. ☐ W.	MW-304
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 17.995" Long. -89° 51' 12.390" or	
Facility ID	St. Plane 554,194.03 ft. N, 2,386,608.77 ft. E. E/Ⓦ	Date Well Installed 10/20/2015
Type of Well mw	Section Location of Waste/Source ____1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) John Gates, Bulldog Drilling
Distance from Waste/Source ft. / State Illinois	Location of Well Relative to Waste/Source: u ☒ Upgradient; s ☐ Sidegradient; d ☐ Downgradient; n ☐ Not Known / Gov. Lot Number	

A. Protective pipe, top elevation ____ ft. (NAVD88)

B. Well casing, top elevation 455.49 ft. (NAVD88)

C. Land surface elevation 453.03 ft. (NAVD88)

D. Surface seal, bottom 452.0 ft. (NAVD88) or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☒ Hollow Stem Auger ☐ Other ☐

15. Drilling fluid used: Water ☒ 0 2 Air ☐ Drilling Mud ☐ 0 3 None ☐

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

17. Source of water (attach analysis, if required):
Village of Baldwin

E. Bentonite seal, top 413.0 ft. (NAVD88) or 40.0 ft.

F. Fine sand, top ____ ft. (NAVD88) or ____ ft.

G. Filter pack, top 410.0 ft. (NAVD88) or 43.0 ft.

H. Screen joint, top 408.0 ft. (NAVD88) or 45.0 ft.

I. Well bottom 398.0 ft. (NAVD88) or 55.0 ft.

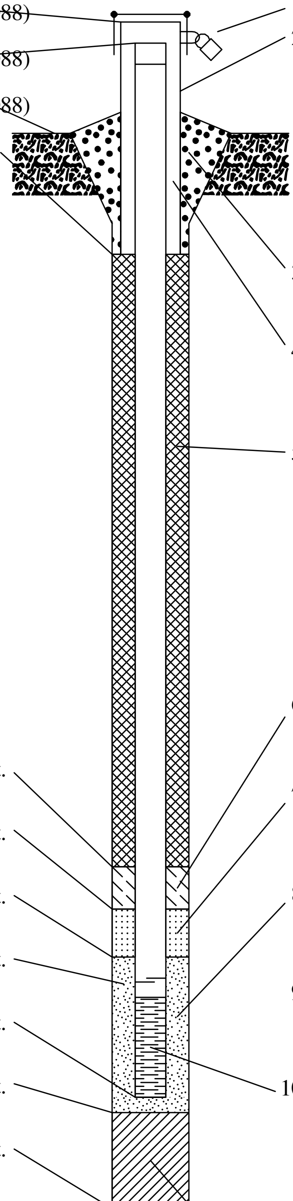
J. Filter pack, bottom 397.0 ft. (NAVD88) or 56.0 ft.

K. Borehole, bottom 394.0 ft. (NAVD88) or 59.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: 4.0 in.
   b. Length: 5.0 ft.
   c. Material: Steel ☒ Other ☐
   d. Additional protection? ☒ Yes ☐ No
   If yes, describe: Three steel bollards
3. Surface seal: Bentonite ☐ Concrete ☒ Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ Sand Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☐
   b. ____Lbs/gal mud weight . . . Bentonite-sand slurry ☐
   c. ____Lbs/gal mud weight . . . Bentonite slurry ☐
   d. 30 % Bentonite . . . Bentonite-cement grout ☒
   e. ____Ft^3 volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
6. Bentonite seal: a. Bentonite granules ☐
   b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
   c. ____ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
   a. ____
   b. Volume added ____ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
   a. Unimin Corporation, FILTERSIL
   b. Volume added ____ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
10. Screen material: Schedule 40 PVC
    a. Screen Type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer ____
    c. Slot size: 0.010 in.
    d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐
    1' of bentonite chips, 2' of bedrock drill cuttings Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge. Date Modified: 2/4/2016

Signature [signature]

Firm Natural Resource Technology
234 W. Florida Street, Floor 5, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

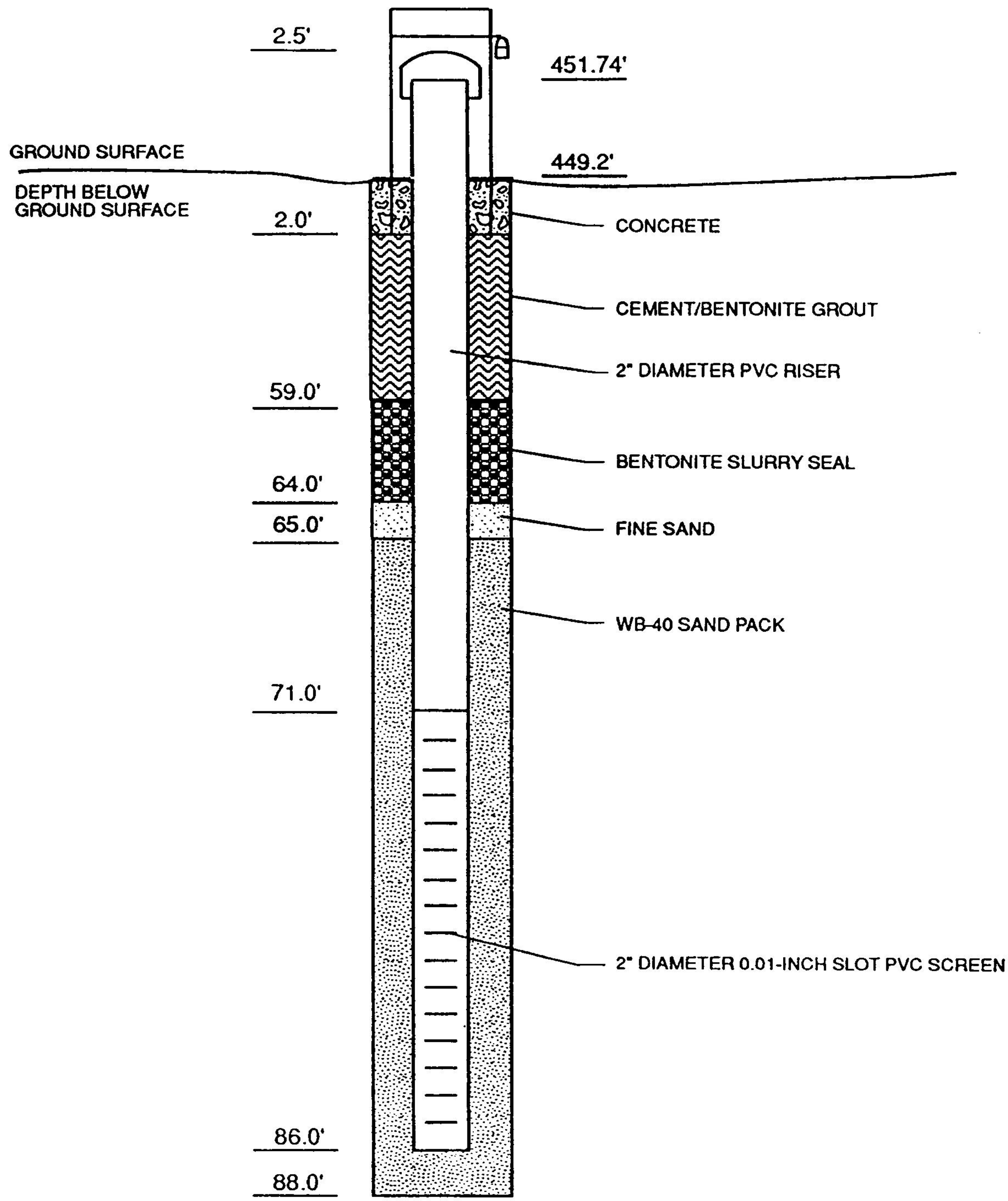
PROJECT MANAGER

PROJECT MANAGER

CHECKED BY

DRAWN BY

MH
REV. DATE 11/20/91



NOT TO SCALE

Burlington Environmental Inc.	
Renamed MW-306 BAMW - 306 MONITORING WELL CONSTRUCTION DIAGRAM	
BALDWIN FGD SOLID WASTE BALDWIN, ILLINOIS 124081	BAMW-306

NATURAL RESOURCE TECHNOLOGY

MONITORING WELL CONSTRUCTION

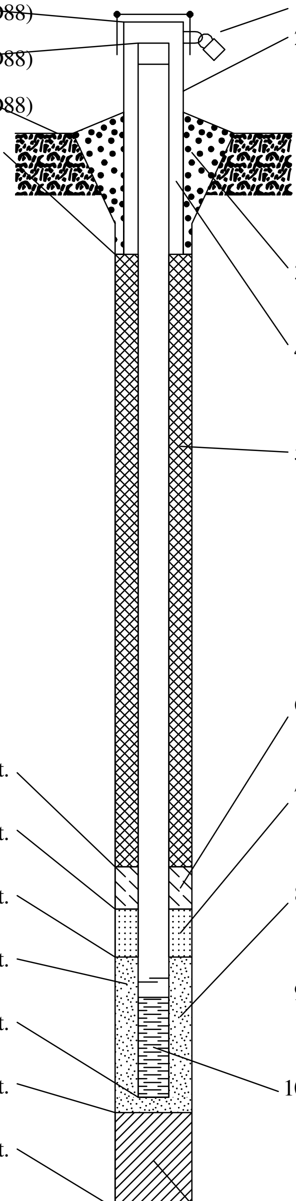
Facility/Project Name	Local Grid Location of Well	Well Name
Baldwin Energy Complex	____ft. ☐ N. ☐ S. ____ft. ☐ E. ☐ W.	MW-356
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 56.266" Long. -89° 52' 10.481" or	
Facility ID	St. Plane 558,050.37 ft. N, 2,381,958.49 ft. E. E /Ⓦ	Date Well Installed 10/01/2015
Type of Well mw	Section Location of Waste/Source ____1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) John Gates, Bulldog Drilling
Distance from Waste/Source ft. / State Illinois	Location of Well Relative to Waste/Source: u ☐ Upgradient; s ☐ Sidegradient; d ☒ Downgradient; n ☐ Not Known / Gov. Lot Number	

A. Protective pipe, top elevation ______ ft. (NAVD88)

B. Well casing, top elevation 427.60 ft. (NAVD88)

C. Land surface elevation 425.18 ft. (NAVD88)

D. Surface seal, bottom 424.2 ft. (NAVD88) or 1.0 ft.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
   - a. Inside diameter: 4.0 in.
   - b. Length: 5.0 ft.
   - c. Material: Steel ☒ Other ☐
   - d. Additional protection? ☒ Yes ☐ No
     If yes, describe: Two steel bollards
3. Surface seal: Bentonite ☐ Concrete ☒ Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ Other ☒ Sand
5. Annular space seal: a. Granular/Chipped Bentonite ☐
   - b. ____Lbs/gal mud weight . . . Bentonite-sand slurry ☐
   - c. ____Lbs/gal mud weight . . . Bentonite slurry ☐
   - d. 30 % Bentonite . . . Bentonite-cement grout ☒
   - e. ____ Ft^3 volume added for any of the above
   - f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
6. Bentonite seal: a. Bentonite granules ☐
   - b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
   - c. ______ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
   - a. ______
   - b. Volume added ______ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
   - a. Unimin Corporation, FILTERSIL
   - b. Volume added ______ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
10. Screen material: Schedule 40 PVC
    - a. Screen Type: Factory cut ☒ Continuous slot ☐ Other ☐
    - b. Manufacturer ______
    - c. Slot size: 0.010 in.
    - d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐ Other ☒ 2' of bedrock drill cuttings

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☒ Hollow Stem Auger ☐ Other ☐

15. Drilling fluid used: Water ☒ 0 2 Air ☐ Drilling Mud ☐ 0 3 None ☐

16. Drilling additives used? ☐ Yes ☒ No

Describe ______

17. Source of water (attach analysis, if required): Village of Baldwin

E. Bentonite seal, top 376.1 ft. (NAVD88) or 49.1 ft.

F. Fine sand, top ______ ft. (NAVD88) or ______ ft.

G. Filter pack, top 371.3 ft. (NAVD88) or 53.9 ft.

H. Screen joint, top 369.2 ft. (NAVD88) or 56.0 ft.

I. Well bottom 359.2 ft. (NAVD88) or 66.0 ft.

J. Filter pack, bottom 358.2 ft. (NAVD88) or 67.0 ft.

K. Borehole, bottom 356.2 ft. (NAVD88) or 69.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Date Modified: 2/26/2016

Signature [signature]

Firm Natural Resource Technology
234 W. Florida Street, Floor 5, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

NATURAL RESOURCE TECHNOLOGY

MONITORING WELL CONSTRUCTION

Facility/Project Name	Local Grid Location of Well	Well Name
Baldwin Energy Complex	______ft. ☐ N. ☐ S. ______ft. ☐ E. ☐ W.	MW-369
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 49.150" Long. -89° 52' 12.929" or	
Facility ID	St. Plane 557,329.71 ft. N, 2,381,765.41 ft. E. E /(W)	Date Well Installed 11/19/2015
Type of Well: mw	Section Location of Waste/Source ____1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) Mark Baetje, Bulldog Drilling
Distance from Waste/Source ft. / State: Illinois	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☒ Downgradient, n ☐ Not Known / Gov. Lot Number	

A. Protective pipe, top elevation ______ ft. (NAVD88)

B. Well casing, top elevation 422.71 ft. (NAVD88)

C. Land surface elevation 420.49 ft. (NAVD88)

D. Surface seal, bottom 419.5 ft. (NAVD88) or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☒ Hollow Stem Auger ☐ Other ☐

15. Drilling fluid used: Water ☒ 0 2 Air ☐ Drilling Mud ☐ 0 3 None ☐

16. Drilling additives used? ☐ Yes ☒ No

Describe ______

17. Source of water (attach analysis, if required):
Village of Baldwin

E. Bentonite seal, top 373.7 ft. (NAVD88) or 46.8 ft.

F. Fine sand, top ______ ft. (NAVD88) or ______ ft.

G. Filter pack, top 368.7 ft. (NAVD88) or 51.8 ft.

H. Screen joint, top 364.5 ft. (NAVD88) or 56.0 ft.

I. Well bottom 354.5 ft. (NAVD88) or 66.0 ft.

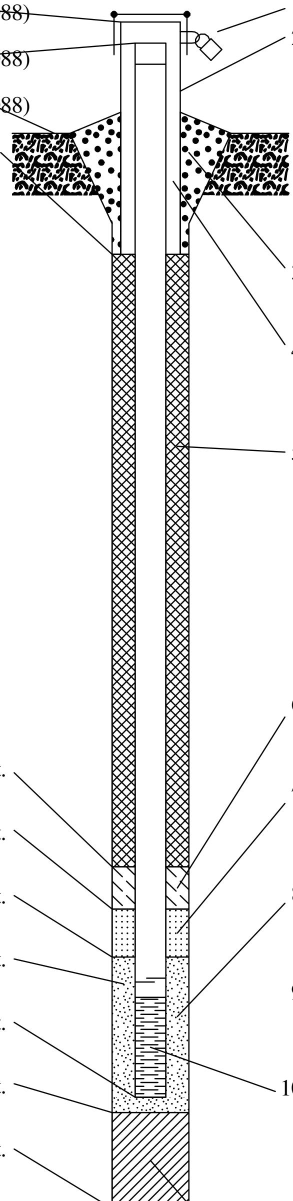
J. Filter pack, bottom 353.3 ft. (NAVD88) or 67.2 ft.

K. Borehole, bottom 349.8 ft. (NAVD88) or 70.7 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: 4.0 in.
   b. Length: 5.0 ft.
   c. Material: Steel ☒ Other ☐
   d. Additional protection? ☒ Yes ☐ No
   If yes, describe: Two steel bollards
3. Surface seal: Bentonite ☐ Concrete ☒ Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ Other ☒ Sand
5. Annular space seal: a. Granular/Chipped Bentonite ☐
   b. ______Lbs/gal mud weight . . . Bentonite-sand slurry ☐
   c. ______Lbs/gal mud weight . . . Bentonite slurry ☐
   d. 30 % Bentonite . . . Bentonite-cement grout ☒
   e. ______Ft³ volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
6. Bentonite seal: a. Bentonite granules ☐
   b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
   c. ______ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
   a. ______
   b. Volume added ______ ft³
8. Filter pack material: Manufacturer, product name & mesh size
   a. Unimin Corporation, FILTERSIL
   b. Volume added ______ ft³
9. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ Other ☐
10. Screen material: Schedule 40 PVC
    a. Screen Type: Factory cut ☒ Continuous slot ☐ Other ☐
    b. Manufacturer ______
    c. Slot size: 0.010 in.
    d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐ Other ☒
    1' of bentonite chips, 2.5' of bedrock drill cuttings

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Date Modified: 2/26/2016

Signature

Firm: Natural Resource Technology, 234 W. Florida Street, Floor 5, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

NATURAL RESOURCE TECHNOLOGY

MONITORING WELL CONSTRUCTION

Facility/Project Name	Local Grid Location of Well	Well Name
Baldwin Energy Complex	____ft. ☐ N. ☐ S. ____ft. ☐ E. ☐ W.	MW-370
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒ Lat. 38° 11' 44.170" Long. -89° 52' 10.808" or	
Facility ID	St. Plane 556,826.50 ft. N, 2,381,936.14 ft. E. E/Ⓦ	Date Well Installed 11/25/2015
Type of Well mw	Section Location of Waste/Source ____1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) Mark Baetje Bulldog Drilling
Distance from Waste/ Source ft. | State Illinois	Location of Well Relative to Waste/Source u ☐ Upgradient s ☐ Sidegradient d ☒ Downgradient n ☐ Not Known | Gov. Lot Number	

A. Protective pipe, top elevation ____ ft. (NAVD88)

B. Well casing, top elevation 420.85 ft. (NAVD88)

C. Land surface elevation 418.67 ft. (NAVD88)

D. Surface seal, bottom 417.7 ft. (NAVD88) or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☒
Hollow Stem Auger ☐
____ Other ☐

15. Drilling fluid used: Water ☒ 0 2 Air ☐
Drilling Mud ☐ 0 3 None ☐

16. Drilling additives used? ☐ Yes ☒ No

Describe ____

17. Source of water (attach analysis, if required):
Village of Baldwin

E. Bentonite seal, top 389.7 ft. (NAVD88) or 29.0 ft.

F. Fine sand, top ____ ft. (NAVD88) or ____ ft.

G. Filter pack, top 367.7 ft. (NAVD88) or 51.0 ft.

H. Screen joint, top 365.7 ft. (NAVD88) or 53.0 ft.

I. Well bottom 355.7 ft. (NAVD88) or 63.0 ft.

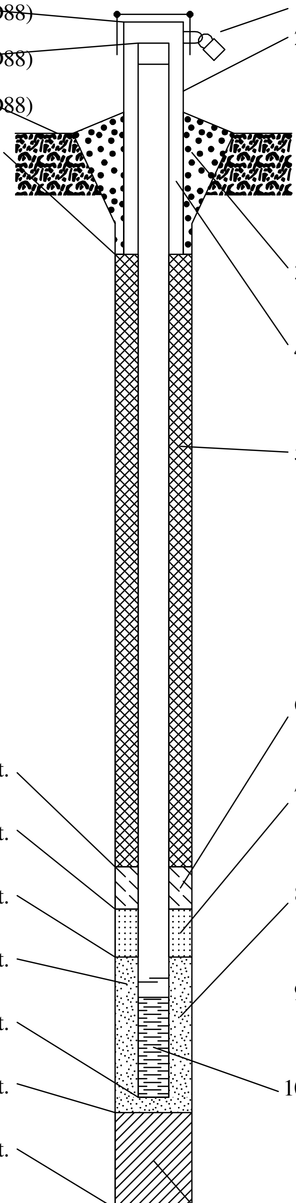
J. Filter pack, bottom 355.2 ft. (NAVD88) or 63.5 ft.

K. Borehole, bottom 352.7 ft. (NAVD88) or 66.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No

2. Protective cover pipe:
a. Inside diameter: 4.0 in.
b. Length: 5.0 ft.
c. Material: Steel ☒
Other ☐
d. Additional protection? ☒ Yes ☐ No
If yes, describe: Three steel bollards

3. Surface seal: Bentonite ☐
Concrete ☒
Other ☐

4. Material between well casing and protective pipe:
Bentonite ☒
Sand Other ☒

5. Annular space seal: a. Granular/Chipped Bentonite ☐
b. ____Lbs/gal mud weight . . . Bentonite-sand slurry ☐
c. ____Lbs/gal mud weight . . . Bentonite slurry ☐
d. 30 % Bentonite . . . Bentonite-cement grout ☒
e. ____ Ft^3 volume added for any of the above
f. How installed: Tremie ☐
Tremie pumped ☒
Gravity ☐

6. Bentonite seal: a. Bentonite granules ☐
b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
c. ____ Other ☐

7. Fine sand material: Manufacturer, product name & mesh size
a. ____
b. Volume added ____ ft^3

8. Filter pack material: Manufacturer, product name & mesh size
a. Unimin Corporation, FILTERSIL
b. Volume added ____ ft^3

9. Well casing: Flush threaded PVC schedule 40 ☒
Flush threaded PVC schedule 80 ☐
Other ☐

10. Screen material: Schedule 40 PVC
a. Screen Type: Factory cut ☒
Continuous slot ☐
Other ☐
b. Manufacturer ____
c. Slot size: 0.010 in.
d. Slotted length: 10.0 ft.

11. Backfill material (below filter pack): None ☐
2.1' of bentonite chips, 0.4' of bedrock drill cuttings Other ☒

I hereby certify that the information on this form is true and correct to the best of my knowledge.

Date Modified: 2/26/2016

Signature [signature]

Firm Natural Resource Technology
234 W. Florida Street, Floor 5, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

NATURAL RESOURCE TECHNOLOGY

MONITORING WELL CONSTRUCTION

Facility/Project Name	Local Grid Location of Well	Well Name
Baldwin Energy Complex	______ ft. ☐ N. ☐ S. ______ ft. ☐ E. ☐ W.	MW-382
Facility License, Permit or Monitoring No.	Local Grid Origin ☐ (estimated: ☐) or Well Location ☒	
	Lat. 38° 11' 40.344" Long. -89° 52' 4.958" or	
Facility ID	St. Plane 556,440.86 ft. N, 2,382,404.51 ft. E. E/Ⓦ	Date Well Installed: 11/23/2015
Type of Well: mw	Section Location of Waste/Source: ____ 1/4 of ____ 1/4 of Sec. ____, T. ____ N, R. ____ ☐ E ☐ W	Well Installed By: (Person's Name and Firm) Jim Dittmaier, Bulldog Drilling
Distance from Waste/Source: ft. / State: Illinois	Location of Well Relative to Waste/Source: u ☐ Upgradient, s ☐ Sidegradient, d ☒ Downgradient, n ☐ Not Known / Gov. Lot Number:	

A. Protective pipe, top elevation ______ ft. (NAVD88)

B. Well casing, top elevation 431.19 ft. (NAVD88)

C. Land surface elevation 428.67 ft. (NAVD88)

D. Surface seal, bottom 427.7 ft. (NAVD88) or 1.0 ft.

12. USCS classification of soil near screen:
GP ☐ GM ☐ GC ☐ GW ☐ SW ☐ SP ☐
SM ☐ SC ☐ ML ☐ MH ☐ CL ☐ CH ☐
Bedrock ☒

13. Sieve analysis attached? ☐ Yes ☒ No

14. Drilling method used: Rotary ☒ Hollow Stem Auger ☐ ______ Other ☐

15. Drilling fluid used: Water ☒ 0 2 Air ☐ Drilling Mud ☐ 0 3 None ☐

16. Drilling additives used? ☐ Yes ☒ No

Describe ______

17. Source of water (attach analysis, if required): Village of Baldwin

E. Bentonite seal, top 392.8 ft. (NAVD88) or 35.9 ft.

F. Fine sand, top ______ ft. (NAVD88) or ______ ft.

G. Filter pack, top 375.8 ft. (NAVD88) or 52.9 ft.

H. Screen joint, top 372.7 ft. (NAVD88) or 56.0 ft.

I. Well bottom 362.7 ft. (NAVD88) or 66.0 ft.

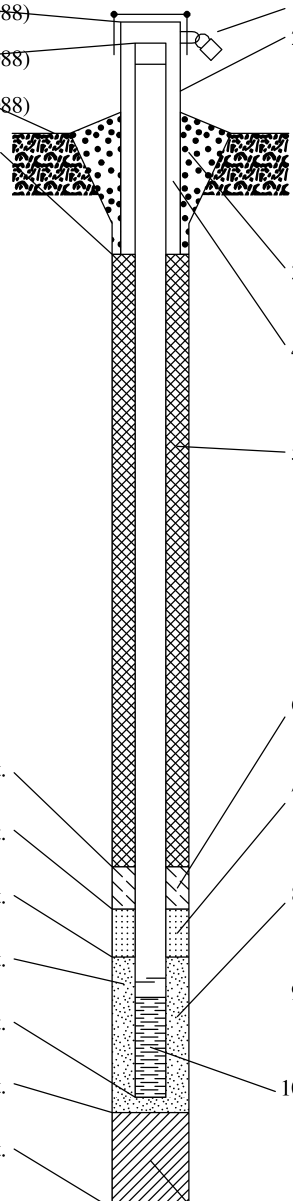
J. Filter pack, bottom 362.3 ft. (NAVD88) or 66.4 ft.

K. Borehole, bottom 359.7 ft. (NAVD88) or 69.0 ft.

L. Borehole, diameter 6.0 in.

M. O.D. well casing 2.38 in.

N. I.D. well casing 2.07 in.



1. Cap and lock? ☒ Yes ☐ No
2. Protective cover pipe:
   a. Inside diameter: 4.0 in.
   b. Length: 5.0 ft.
   c. Material: Steel ☒ ______ Other ☐
   d. Additional protection? ☒ Yes ☐ No
   If yes, describe: Three steel bollards
3. Surface seal: Bentonite ☐ Concrete ☒ ______ Other ☐
4. Material between well casing and protective pipe: Bentonite ☒ Sand Other ☒
5. Annular space seal: a. Granular/Chipped Bentonite ☐
   b. ______ Lbs/gal mud weight . . . Bentonite-sand slurry ☐
   c. ______ Lbs/gal mud weight . . . Bentonite slurry ☐
   d. 30 % Bentonite . . . Bentonite-cement grout ☒
   e. ______ Ft^3 volume added for any of the above
   f. How installed: Tremie ☐ Tremie pumped ☒ Gravity ☐
6. Bentonite seal: a. Bentonite granules ☐
   b. ☐ 1/4 in. ☒ 3/8 in. ☐ 1/2 in. Bentonite chips ☒
   c. ______ Other ☐
7. Fine sand material: Manufacturer, product name & mesh size
   a. ______
   b. Volume added ______ ft^3
8. Filter pack material: Manufacturer, product name & mesh size
   a. Unimin Corporation, FILTERSIL
   b. Volume added ______ ft^3
9. Well casing: Flush threaded PVC schedule 40 ☒ Flush threaded PVC schedule 80 ☐ ______ Other ☐
10. Screen material: Schedule 40 PVC
    a. Screen Type: Factory cut ☒ Continuous slot ☐ ______ Other ☐
    b. Manufacturer ______
    c. Slot size: 0.010 in.
    d. Slotted length: 10.0 ft.
11. Backfill material (below filter pack): None ☐ 2.6' of bedrock drill cuttings Other ☒

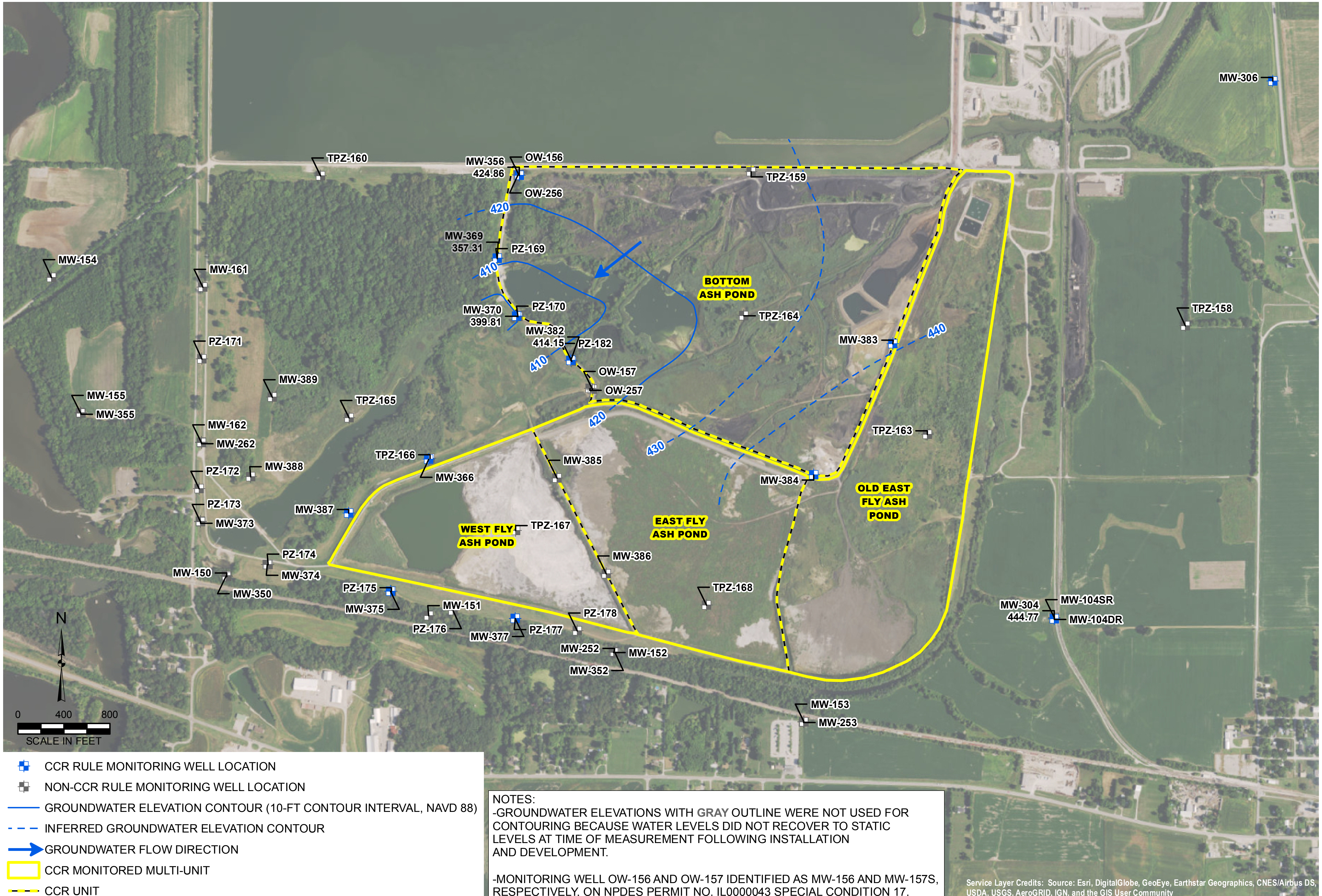
I hereby certify that the information on this form is true and correct to the best of my knowledge.

Date Modified: 2/26/2016

Signature: [signature]

Firm: Natural Resource Technology
234 W. Florida Street, Floor 5, Milwaukee, WI 53204
Tel: (414) 837-3607
Fax: (414) 837-3608

ATTACHMENT 4 – MAPS OF THE DIRECTION OF GROUNDWATER FLOW



- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD 88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED MULTI-UNIT
- CCR UNIT

NOTES:
-GROUNDWATER ELEVATIONS WITH GRAY OUTLINE WERE NOT USED FOR CONTOURING BECAUSE WATER LEVELS DID NOT RECOVER TO STATIC LEVELS AT TIME OF MEASUREMENT FOLLOWING INSTALLATION AND DEVELOPMENT.

-MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.

DRAWN BY/DATE: SDS 1/24/17
REVIEWED BY/DATE: TBN 1/25/17
APPROVED BY/DATE: JJW 2/8/17

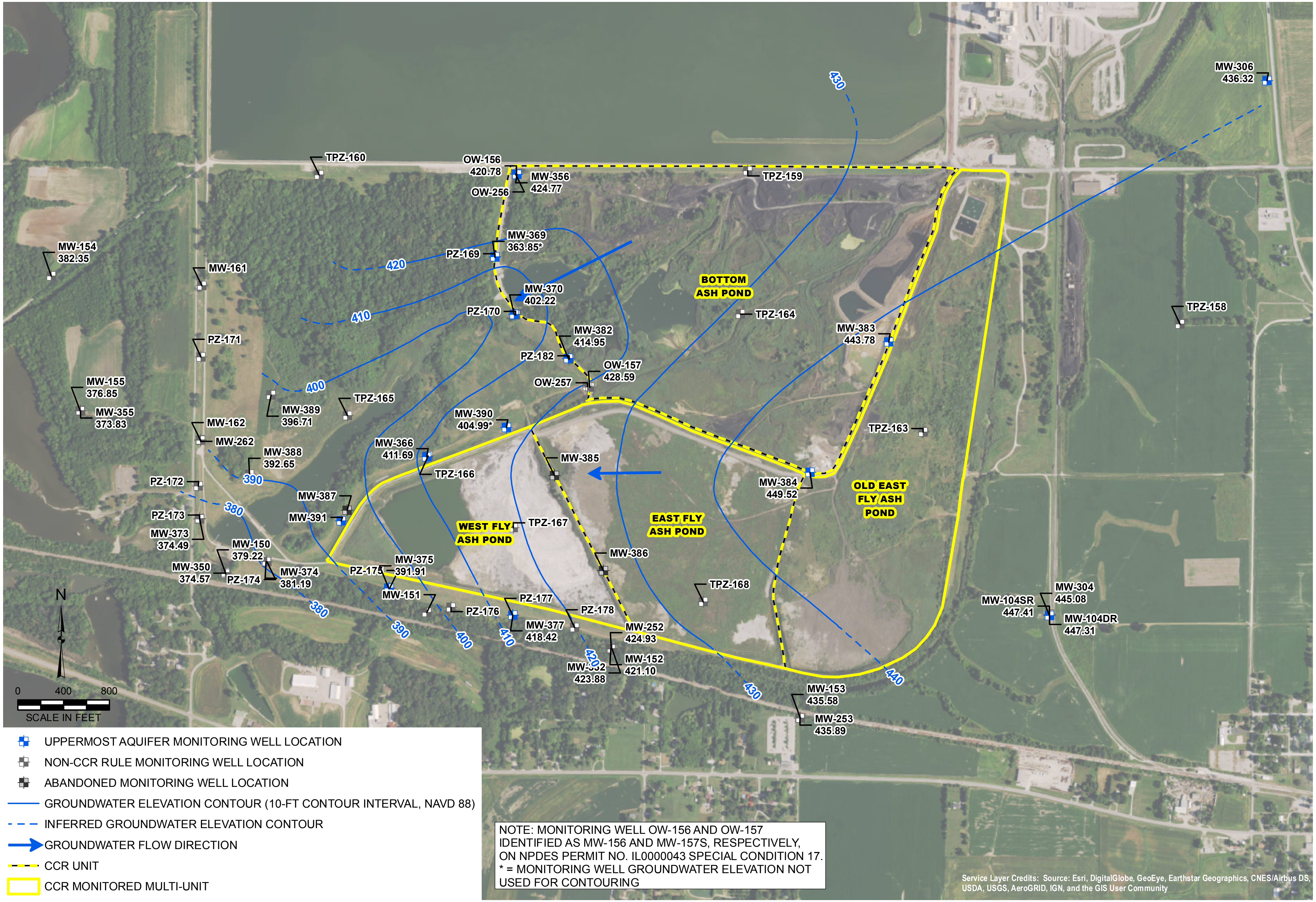
BALDWIN BOTTOM ASH POND (UNIT ID: 601)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 1: DECEMBER 29, 2015

DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING

DRAWN BY/DATE: SDS 1/24/17
REVIEWED BY/DATE: TBN 1/25/17
APPROVED BY/DATE: JJW 2/8/17

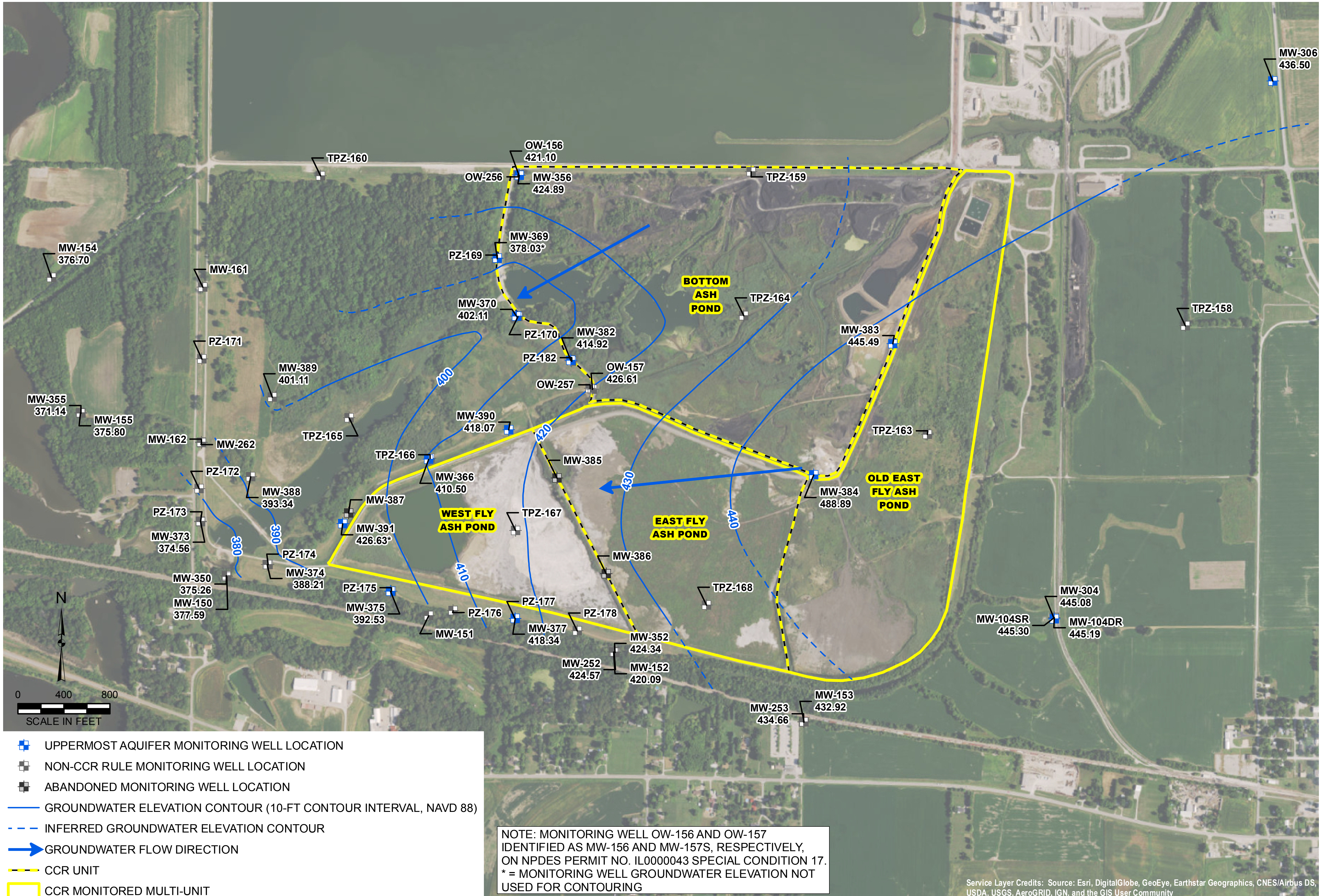
BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT IT: 605) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 2: MARCH 21, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



UPPERMOST AQUIFER MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD 88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR UNIT
CCR MONITORED MULTI-UNIT

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING

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DRAWN BY/DATE: SDS 1/24/17
REVIEWED BY/DATE: TBN 1/25/17
APPROVED BY/DATE: JJW 2/8/17

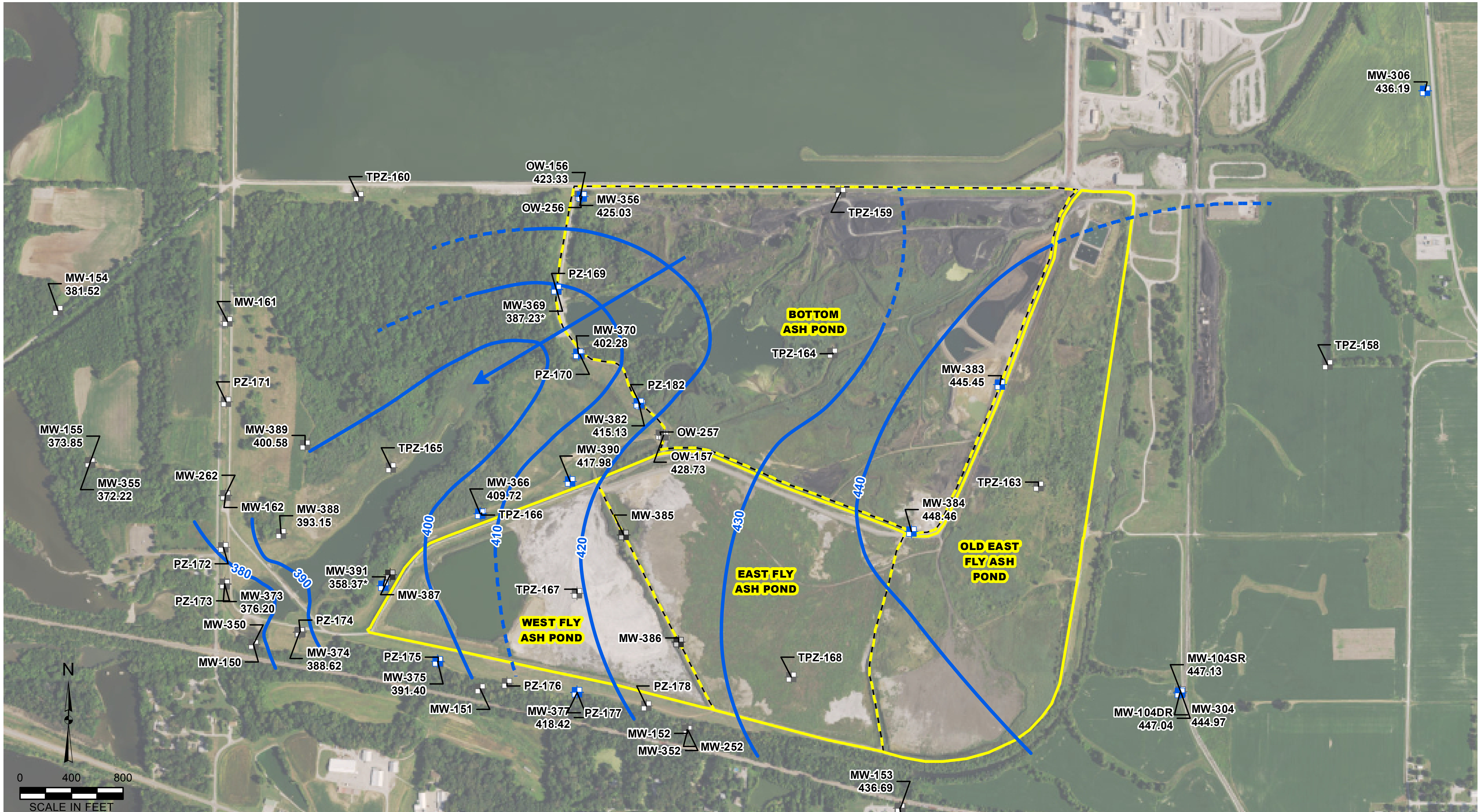
BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT IT: 605) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 3: JUNE 21, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



UPPERMOST AQUIFER MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

ABANDONED MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD 88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR UNIT

CCR MONITORED MULTI-UNIT

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING

DRAWN BY/DATE:
SDS 1/25/17
REVIEWED BY/DATE:
TBN 1/26/17
APPROVED BY/DATE:
JJW 2/8/17

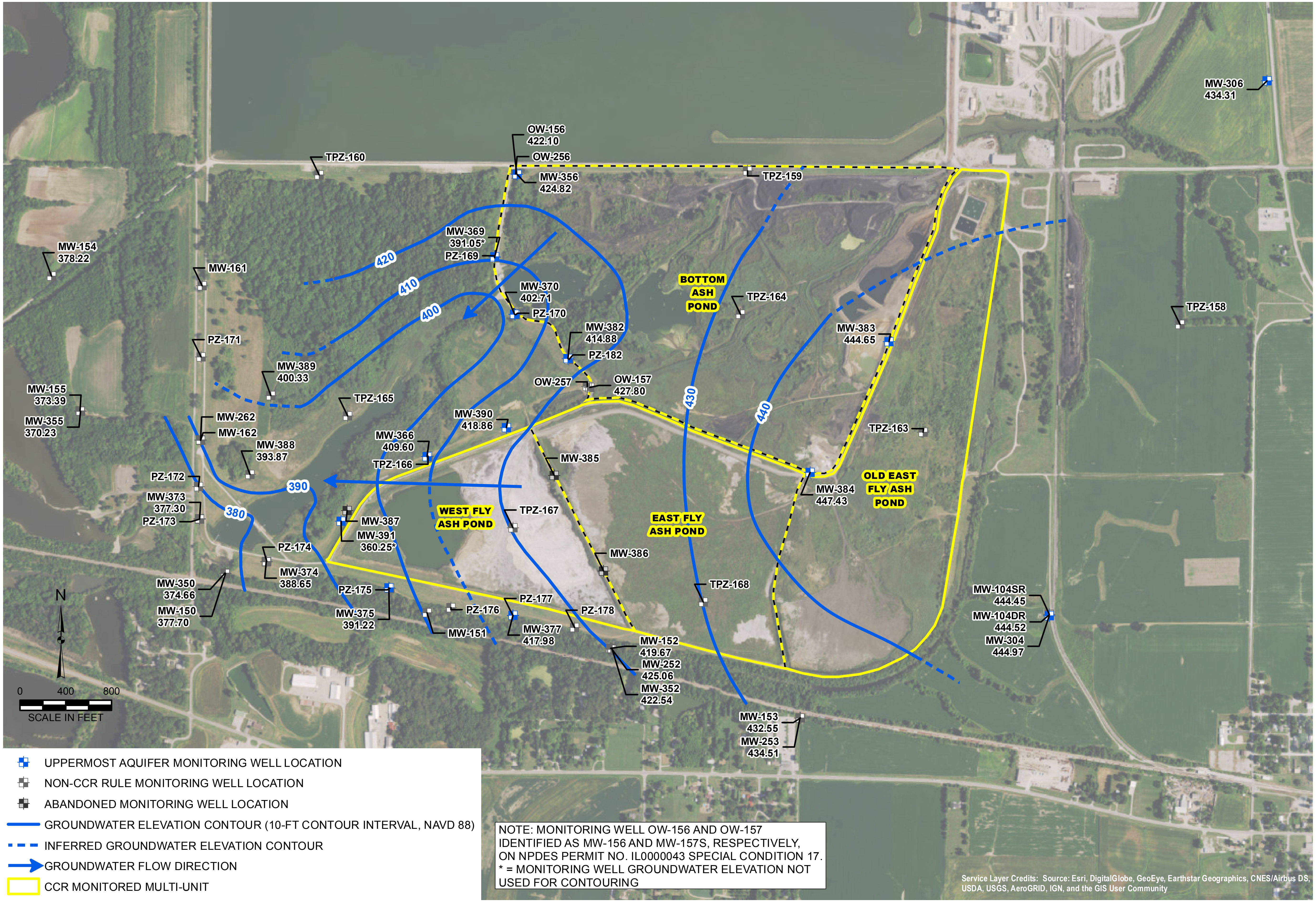
BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT IT: 605) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 4: SEPTEMBER 19, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



DRAWN BY/DATE: SDS 3/6/17
REVIEWED BY/DATE: TBN 3/6/17
APPROVED BY/DATE: JJW 8/30/17

BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 5: DECEMBER 21, 2016

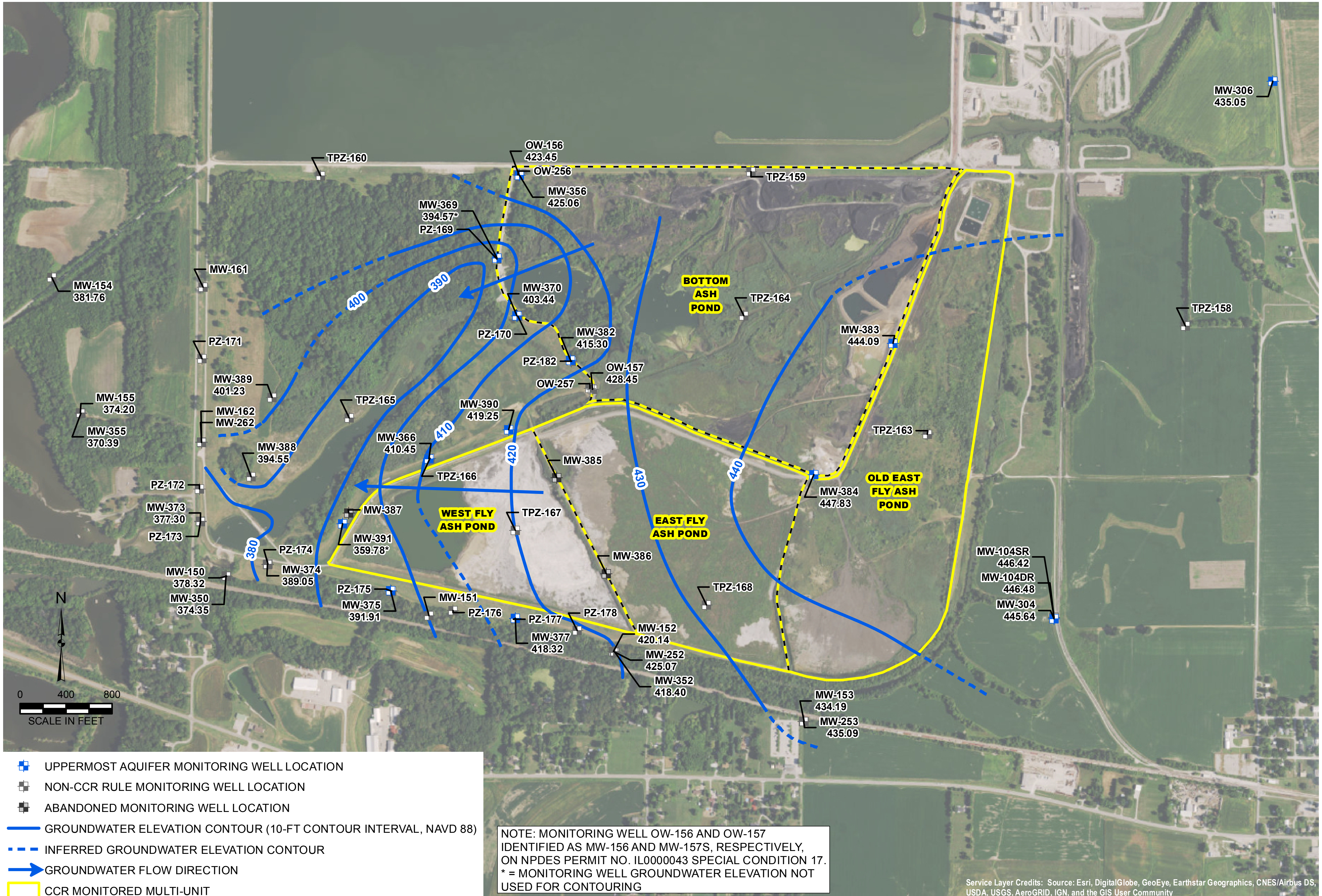
DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY

Y:\Mapping\Projects\22\2285\MXD\GW_Contours\Round_05\R5_Baldwin_GW_Contours.mxd Author: stolzsd; Date/Time: 9/1/2017, 4:27:40 PM



UPPERMOST AQUIFER MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD 88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED MULTI-UNIT

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING

DRAWN BY/DATE:
SDS 4/14/17
REVIEWED BY/DATE:
TBN 4/14/17
APPROVED BY/DATE:
JJW 8/30/17

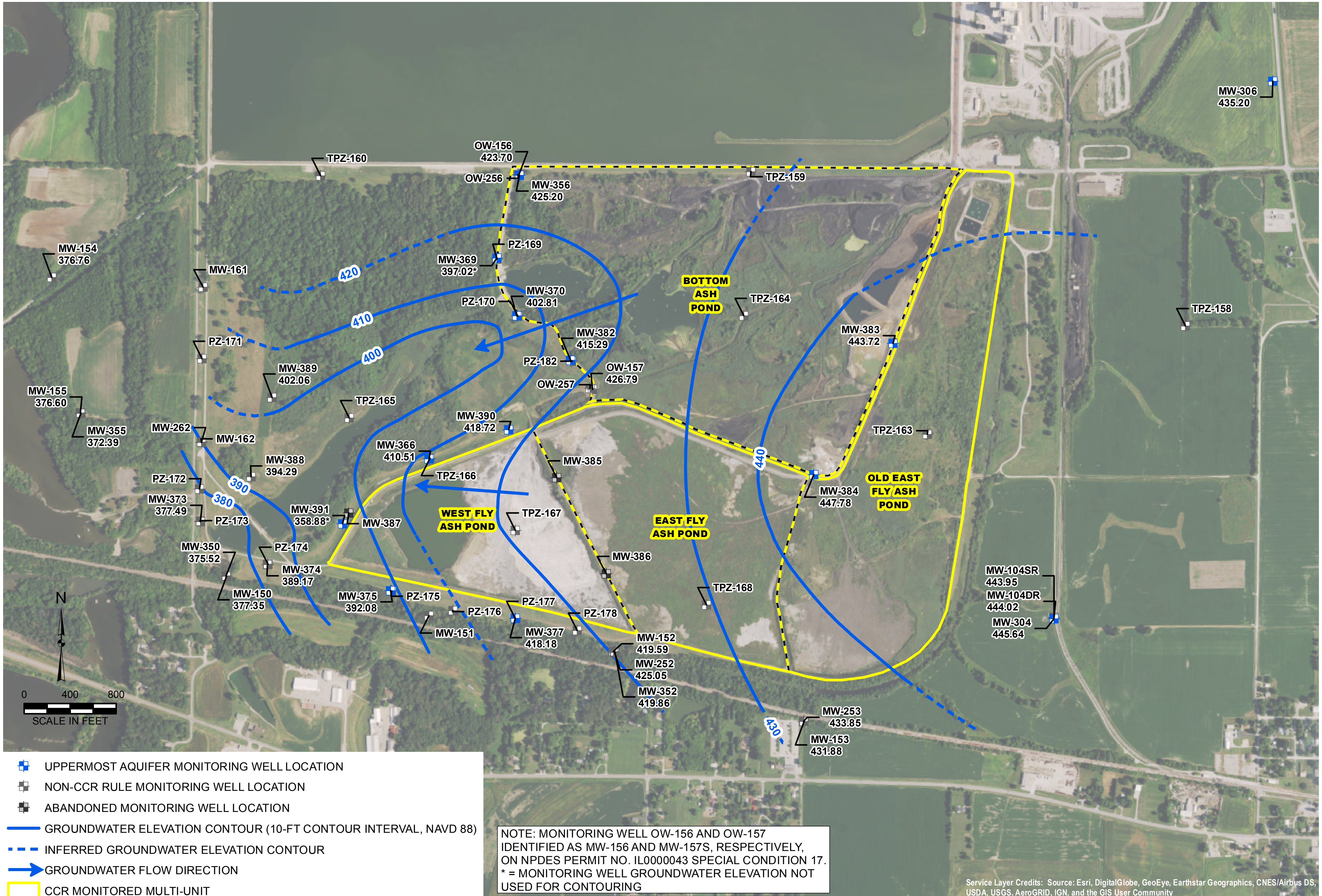
BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 6: MARCH 14, 2017

DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



UPPERMOST AQUIFER MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD 88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED MULTI-UNIT

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING

DRAWN BY/DATE: SDS 7/12/17
REVIEWED BY/DATE: TBN 7/12/17
APPROVED BY/DATE: JJW 8/30/17

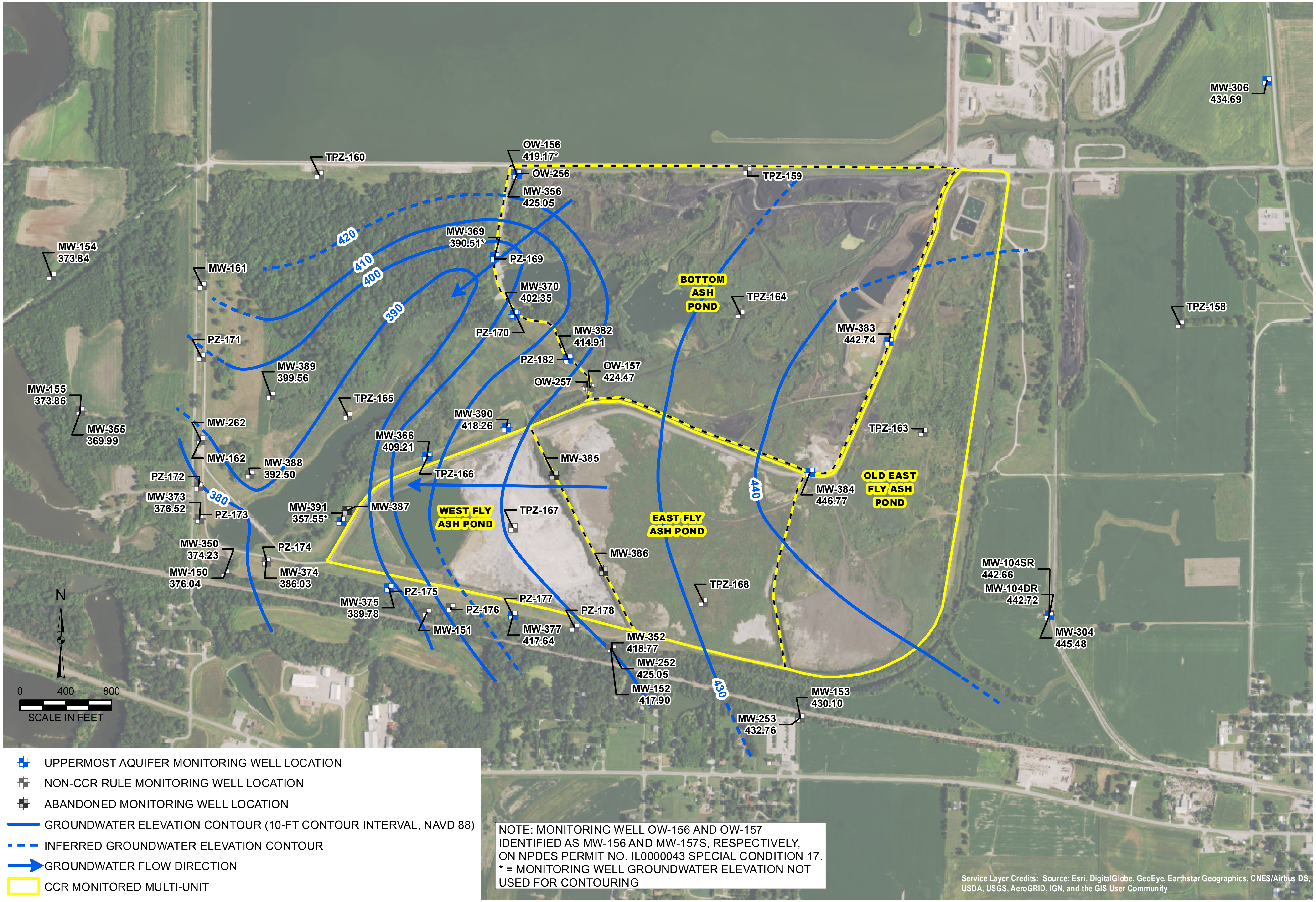
BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 7: JUNE 19, 2017

DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



UPPERMOST AQUIFER MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

ABANDONED MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD 88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED MULTI-UNIT

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING

DRAWN BY/DATE: SDS 8/10/17
REVIEWED BY/DATE: TBN 8/10/17
APPROVED BY/DATE: JJW 8/30/17

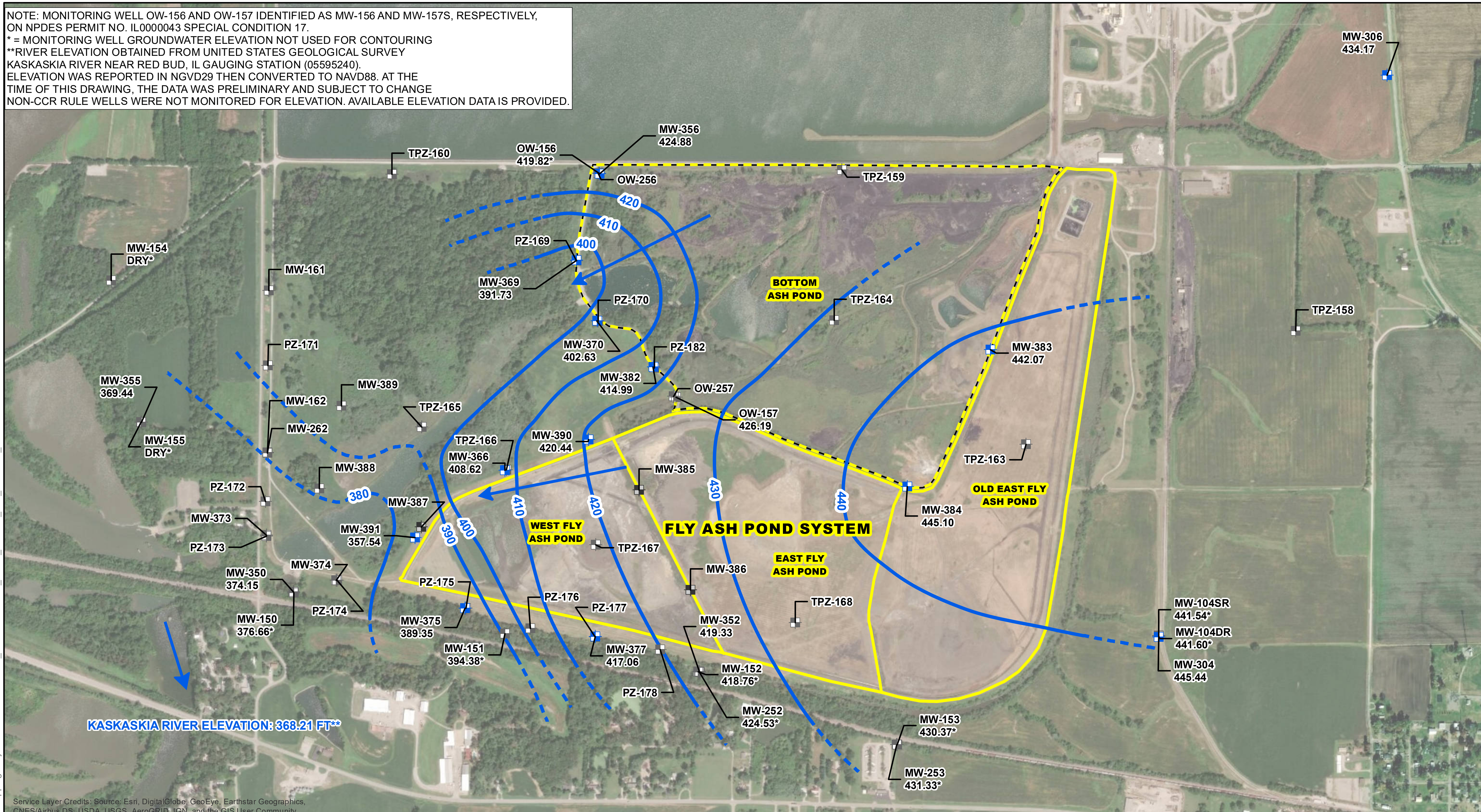
BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605) UPPERMOST AQUIFER UNIT GROUNDWATER ELEVATION CONTOUR MAP ROUND 8: JULY 25, 2017

DYNEGY CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED MULTI-UNIT
CCR MONITORED UNIT

CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

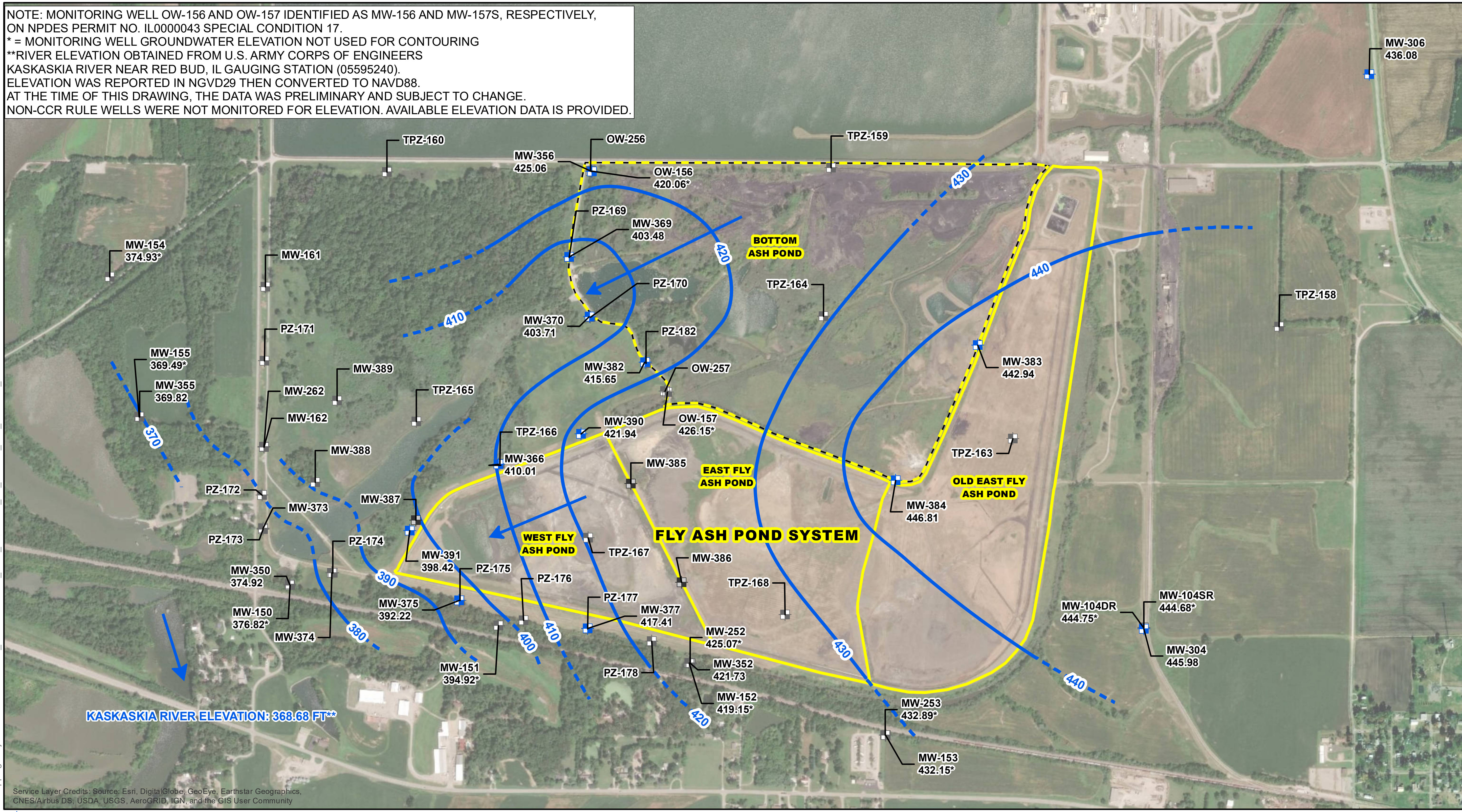
N

0 200 400 800
Feet

BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND
BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605)
GROUNDWATER ELEVATION CONTOUR MAP
NOVEMBER 27, 2017

O'BRIEN & GERE ENGINEERS, INC.

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING
**RIVER ELEVATION OBTAINED FROM U.S. ARMY CORPS OF ENGINEERS KASKASKIA RIVER NEAR RED BUD, IL GAUGING STATION (05595240). ELEVATION WAS REPORTED IN NGVD29 THEN CONVERTED TO NAVD88.
AT THE TIME OF THIS DRAWING, THE DATA WAS PRELIMINARY AND SUBJECT TO CHANGE.
NON-CCR RULE WELLS WERE NOT MONITORED FOR ELEVATION. AVAILABLE ELEVATION DATA IS PROVIDED.

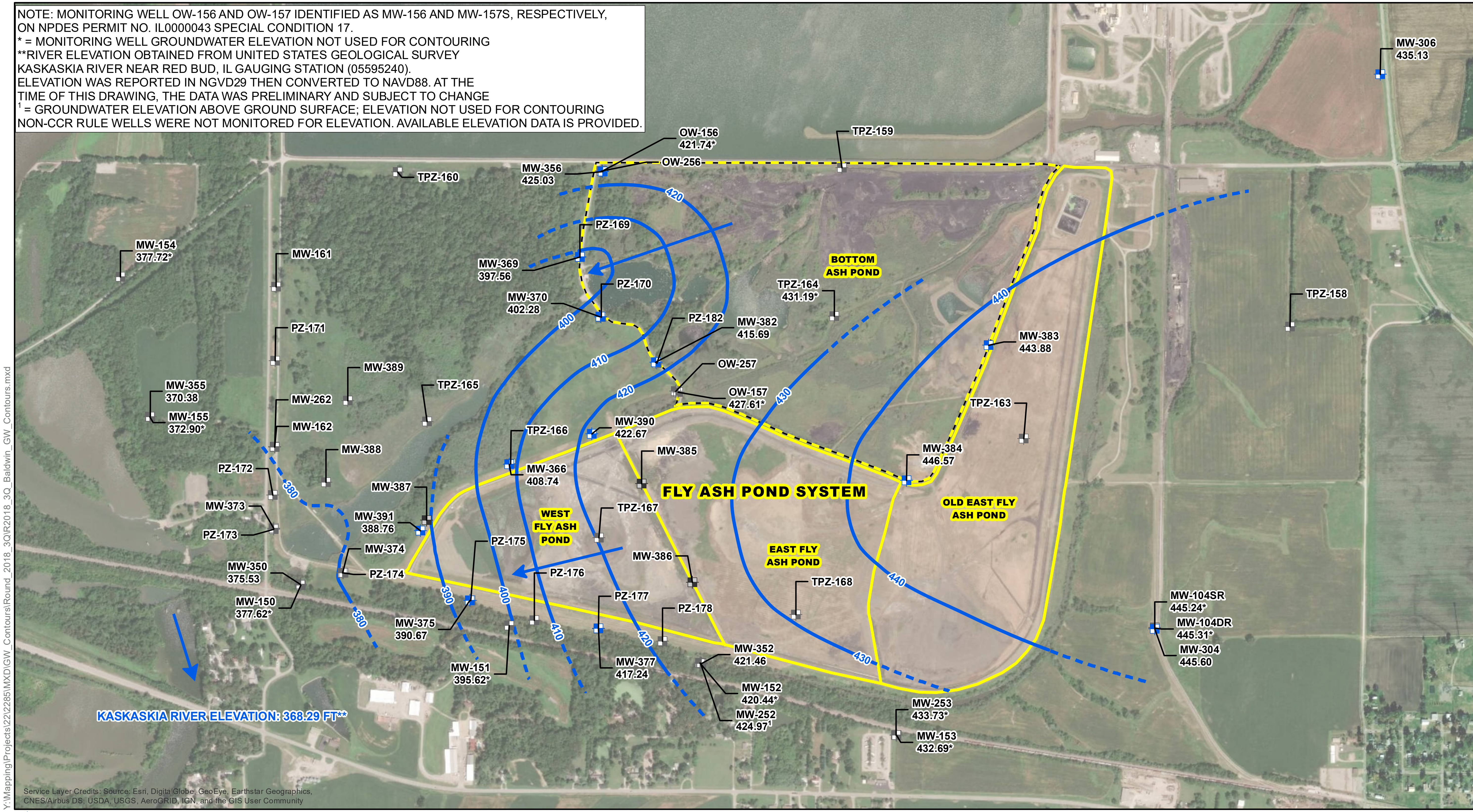


CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED MULTI-UNIT
CCR MONITORED UNIT

CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605)
GROUNDWATER ELEVATION CONTOUR MAP
JUNE 25, 2018

O'BRIEN & GERE ENGINEERS, INC.



CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED MULTI-UNIT
CCR MONITORED UNIT

CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

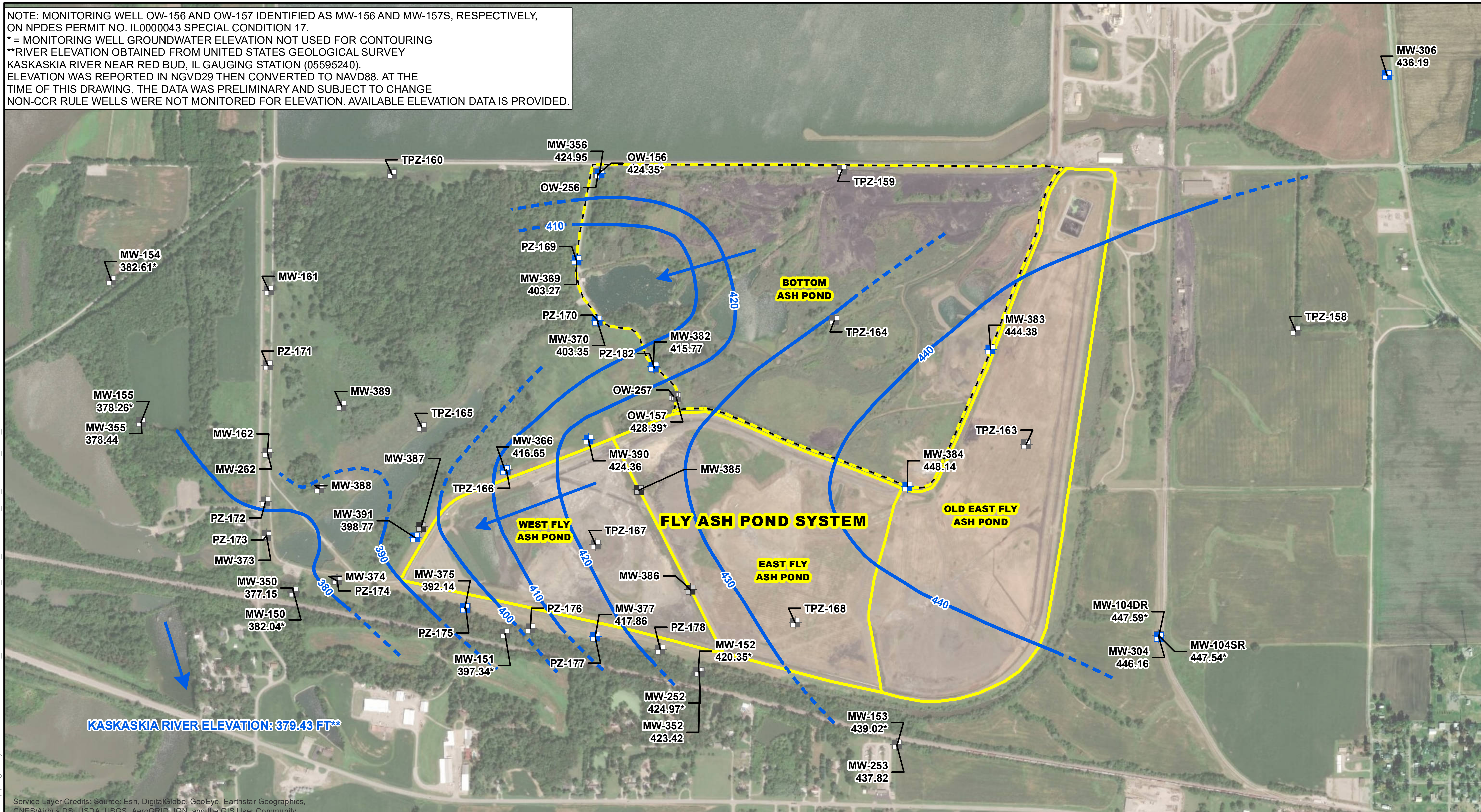
N

0 200 400 800
Feet

BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND
BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605)
GROUNDWATER ELEVATION CONTOUR MAP
SEPTEMBER 25, 2018

O'BRIEN & GERE ENGINEERS, INC.

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING
**RIVER ELEVATION OBTAINED FROM UNITED STATES GEOLOGICAL SURVEY KASKASKIA RIVER NEAR RED BUD, IL GAUGING STATION (05595240). ELEVATION WAS REPORTED IN NGVD29 THEN CONVERTED TO NAVD88. AT THE TIME OF THIS DRAWING, THE DATA WAS PRELIMINARY AND SUBJECT TO CHANGE
NON-CCR RULE WELLS WERE NOT MONITORED FOR ELEVATION. AVAILABLE ELEVATION DATA IS PROVIDED.

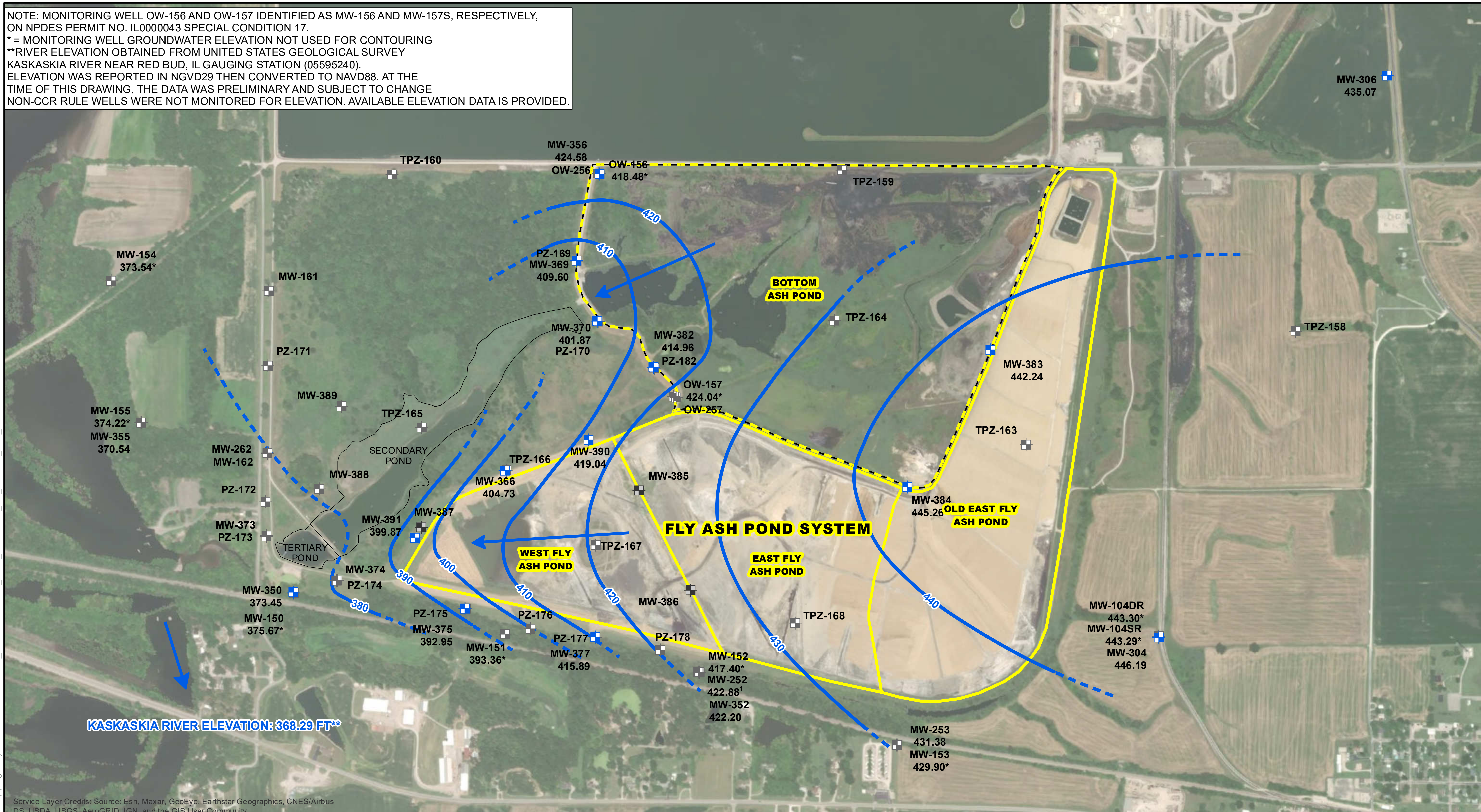


CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED MULTI-UNIT
CCR MONITORED UNIT

CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND
BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605)
GROUNDWATER ELEVATION CONTOUR MAP
MARCH 19, 2019

O'BRIEN & GERE ENGINEERS, INC.



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- CCR RULE MONITORING WELL LOCATION
- NON-CCR RULE MONITORING WELL LOCATION
- ABANDONED MONITORING WELL LOCATION
- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- NON-CCR UNIT
- CCR MONITORED MULTI-UNIT
- CCR MONITORED UNIT

CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

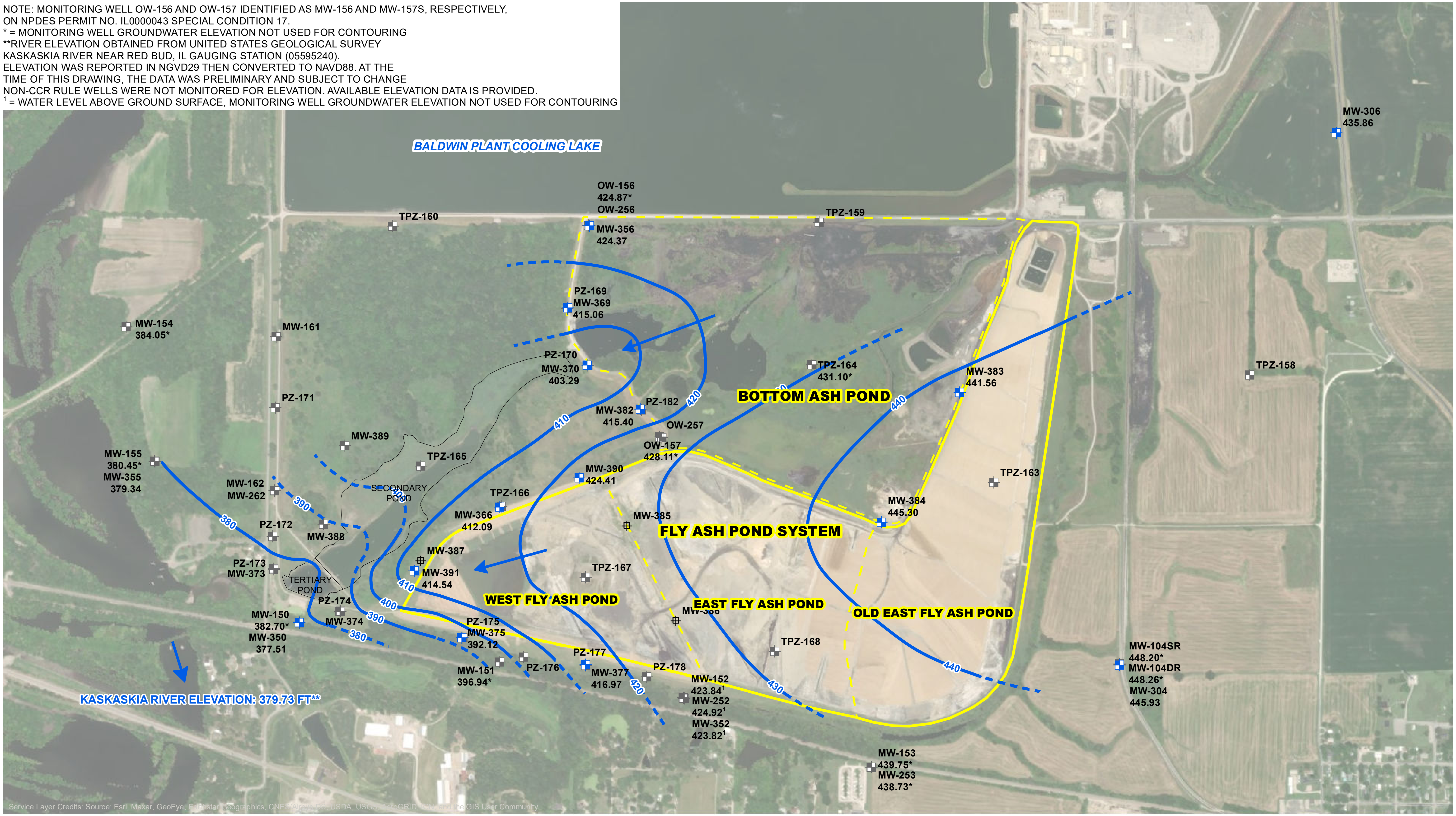
N

0 200 400 800
Feet

BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND
BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605)
GROUNDWATER ELEVATION CONTOUR MAP
SEPTEMBER 24, 2019

O'BRIEN & GERE ENGINEERS, INC.

NOTE: MONITORING WELL OW-156 AND OW-157 IDENTIFIED AS MW-156 AND MW-157S, RESPECTIVELY, ON NPDES PERMIT NO. IL0000043 SPECIAL CONDITION 17.
* = MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING
**RIVER ELEVATION OBTAINED FROM UNITED STATES GEOLOGICAL SURVEY KASKASKIA RIVER NEAR RED BUD, IL GAUGING STATION (05595240). ELEVATION WAS REPORTED IN NGVD29 THEN CONVERTED TO NAVD88. AT THE TIME OF THIS DRAWING, THE DATA WAS PRELIMINARY AND SUBJECT TO CHANGE
NON-CCR RULE WELLS WERE NOT MONITORED FOR ELEVATION. AVAILABLE ELEVATION DATA IS PROVIDED.
1 = WATER LEVEL ABOVE GROUND SURFACE, MONITORING WELL GROUNDWATER ELEVATION NOT USED FOR CONTOURING



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PROJECT: 169000XXXX | DATED: 8/14/2020 | DESIGNER: STOLZSD

- CCR RULE MONITORING WELL
- NON-CCR RULE MONITORING WELL
- ABANDONED MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (10-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED MULTI-UNIT
- CCR MONITORED UNIT
- NON-CCR UNIT

0 400 800 Feet

BALDWIN BOTTOM ASH POND (UNIT ID: 601) AND BALDWIN FLY ASH POND SYSTEM (UNIT ID: 605) GROUNDWATER ELEVATION CONTOUR MAP
MARCH 24, 2020

CCR RULE GROUNDWATER MONITORING
BALDWIN ENERGY COMPLEX
BALDWIN, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

ATTACHMENT 5 – TABLES SUMMARIZING CONSTITUENT CONCENTRATIONS AT EACH MONITORING WELL

Analytical Results - Appendix III
Baldwin Bottom Ash Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
Background Wells								
MW-304	12/29/2015	1.28	9.64	124	1.98	8.0	157	1090
MW-304	3/21/2016	1.27	9.86	131	1.86	8.2	163	1200
MW-304	12/27/2016	1.51	15.4	141	1.61	7.9	177	1230
MW-304	6/21/2016	1.33	14.3	140	1.59	8.1	200	1220
MW-304	9/19/2016	1.95	16.5	138	1.66	7.9	176	1220
MW-304	9/26/2018	1.74	13.1	151	1.64	7.9	201	1420
MW-304	3/16/2017	1.49	6.91	144	1.66	7.9	166	1280
MW-304	6/21/2017	1.55	17.8	152	1.84	7.9	177	1360
MW-304	7/28/2017	1.42	13.2	155	1.75	7.8	187	1330
MW-304	11/28/2017	1.45	11.4	138	1.72	8.0	178	1330
MW-304	6/27/2018	1.75	12.9	151	1.67	7.4	208	1360
MW-304	3/20/2019	1.82	13.7	148	1.88	7.7	177	1390
MW-304	9/25/2019	1.84	18.4	152	1.74	7.9	169	1350
MW-304	3/26/2020	1.66	17.2	153	1.81	7.9	177	1320
MW-306	12/27/2016	0.220	30.7	47	0.58	10.8	26	360
MW-306	6/21/2016	0.478	5.37	33	0.69	10.3	21	408
MW-306	9/19/2016	0.240	35.3	47	0.55	11.0	28	235
MW-306	9/26/2018	0.159	36.9	61	0.54	11.1	34	325
MW-306	3/22/2016	0.634	6.10	34	0.83	9.9	19	482
MW-306	3/16/2017	0.306	19.7	51	0.61	11.2	27	328
MW-306	6/21/2017	0.225	26.3	53	0.62	11.1	30	335
MW-306	8/18/2016	0.322	22.4	41	0.54	10.3	25	314
MW-306	7/28/2017	0.259	15.3	54	0.60	10.9	31	256
MW-306	11/28/2017	0.407	3.40	55	0.65	10.7	39	328
MW-306	6/27/2018	0.139	45.9	64	0.64	10.5	42	376
MW-306	3/20/2019	0.174	50.4	62	0.65	11.4	32	330
MW-306	9/25/2019	0.166	46.0	62	0.59	11.0	37	318
MW-306	3/26/2020	0.180	43.1	63	0.60	11.5	37	288
Downgradient Wells								
MW-356	12/29/2015	1.93	12.7	42	1.91	7.5	47	674
MW-356	3/28/2016	1.83	11.7	41	1.89	7.8	50	666
MW-356	6/23/2016	2.04	12.0	40	1.78	7.6	49	670
MW-356	9/22/2016	2.58	13.7	41	1.78	7.7	51	670
MW-356	12/27/2016	2.06	11.4	40	1.80	7.7	44	678
MW-356	3/15/2017	1.99	11.7	34	1.85	7.8	47	696
MW-356	6/20/2017	1.97	10.6	34	1.88	7.8	45	642
MW-356	7/26/2017	1.93	11.2	34	1.88	7.9	46	670
MW-356	11/27/2017	1.98	12.2	33	1.99	7.6	44	744
MW-356	6/26/2018	2.14	11.4	31	1.96	7.4	46	696
MW-356	9/26/2018	2.29	12.0	36	1.88	7.8	46	718
MW-356	3/19/2019	2.12	11.7	31	2.18	7.8	43	678
MW-356	9/24/2019	2.04	11.6	29	2.00	7.7	38	644
MW-356	3/25/2020	1.94	12.2	29	2.01	7.9	43	654

Analytical Results - Appendix III
Baldwin Bottom Ash Pond

Sample Location	Date Sampled	Boron, total (mg/L)	Calcium, total (mg/L)	Chloride, total (mg/L)	Fluoride, total (mg/L)	pH (s.u.)	Sulfate, total (mg/L)	Total Dissolved Solids (mg/L)
MW-369	12/29/2015	0.729	4.12	154	3.60	8.8	338	1070
MW-369	3/28/2016	1.42	20.4	126	2.69	8.4	220	1280
MW-369	6/23/2016	1.91	27.9	176	2.90	8.5	234	1230
MW-369	9/22/2016	2.40	80.3	89	1.31	8.3	157	784
MW-369	12/27/2016	1.90	54.6	127	1.75	8.5	170	964
MW-369	6/20/2017	1.92	64.1	117	1.54	7.4	154	836
MW-369	7/26/2017	1.92	68.2	89	1.32	7.4	125	700
MW-369	11/27/2017	2.10	74.8	95	1.46	7.5	104	780
MW-369	6/26/2018	1.55	69.3	70	1.09	7.0	107	720
MW-369	9/26/2018	2.14	77.8	71	1.10	7.3	100	704
MW-369	3/19/2019	1.96	70.7	92	1.48	7.3	98	732
MW-369	9/24/2019	0.948	85.0	101	1.08	6.7	90	788
MW-369	3/14/2017	1.98	68.5	94	1.31	7.8	142	784
MW-369	3/25/2020	0.714	92.3	94	0.95	7.1	92	726
MW-370	12/29/2015	1.77	31.6	1120	2.80	7.7	234	2510
MW-370	3/28/2016	1.56	25.8	1140	2.53	7.9	281	2710
MW-370	6/23/2016	2.43	42.1	1100	2.63	8.0	247	2730
MW-370	9/22/2016	1.81	35.4	1120	2.70	7.7	241	2620
MW-370	12/27/2016	1.82	33.6	1140	2.77	7.3	230	2780
MW-370	6/20/2017	1.82	35.1	1240	2.94	7.6	249	2850
MW-370	11/27/2017	1.81	45.9	1290	2.99	7.9	268	2960
MW-370	6/26/2018	1.75	43.1	1390	2.94	7.4	282	3130
MW-370	9/26/2018	2.05	45.5	1530	3.06	7.7	287	3280
MW-370	7/25/2017	1.84	38.2	1280	3.00	7.6	247	2830
MW-370	3/19/2019	2.01	46.7	1280	3.45	7.7	224	2950
MW-370	9/24/2019	1.95	47.0	1290	3.00	7.5	237	2830
MW-370	3/14/2017	1.81	38.1	1120	2.58	7.9	240	2730
MW-370	3/25/2020	1.79	44.5	1340	3.19	7.7	251	2880
MW-382	12/29/2015	1.61	19.3	46	2.77	7.8	457	1120
MW-382	3/28/2016	1.60	17.9	37	2.87	7.9	509	1250
MW-382	6/23/2016	2.17	24.8	39	2.83	8.0	447	1200
MW-382	9/22/2016	2.57	27.3	35	2.78	7.8	481	1170
MW-382	12/27/2016	1.78	18.4	35	2.76	7.7	428	1200
MW-382	6/20/2017	1.71	19.4	39	2.89	7.8	445	1160
MW-382	11/27/2017	1.86	20.3	35	2.91	7.9	443	1240
MW-382	6/26/2018	2.02	17.7	36	2.79	7.4	482	1220
MW-382	9/26/2018	1.77	16.8	40	2.92	7.8	434	1240
MW-382	7/25/2017	1.75	19.0	38	2.88	7.7	450	1180
MW-382	3/19/2019	1.86	21.5	36	3.30	7.6	426	1180
MW-382	9/24/2019	1.78	20.5	34	2.85	7.7	388	1150
MW-382	3/14/2017	1.74	20.6	34	2.76	8.1	451	1200
MW-382	3/25/2020	1.75	19.7	34	3.04	7.9	415	1100

Notes:
1. Abbreviations: mg/L - milligrams per liter; s.u. - standard units.

Sample Location	Date Sampled	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 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
Background Wells																
MW-304	12/29/2015	<0.001	0.0019	0.0191	<0.001	<0.001	<0.001	<0.001	1.98	<0.001	0.0568	<0.0002	0.0052	0	<0.001	<0.001
MW-304	3/21/2016	<0.001	0.0016	0.0195	<0.001	<0.001	<0.001	<0.001	1.86	<0.001	0.0541	<0.0002	0.0076	0	<0.001	<0.001
MW-304	12/27/2016	<0.001	0.0019	0.0199	<0.001	<0.001	<0.001	<0.001	1.61	<0.001	0.0646	<0.0002	0.0053	0.11	<0.001	<0.001
MW-304	6/21/2016	<0.001	0.0016	0.0199	<0.001	<0.001	<0.001	<0.001	1.59	<0.001	0.0552	<0.0002	0.0058	0.49	<0.001	<0.001
MW-304	9/19/2016	<0.001	0.0025	0.0238	<0.001	<0.001	<0.001	<0.001	1.66	<0.001	0.0693	<0.0002	0.0069	0.49	<0.001	<0.001
MW-304	9/26/2018	<0.001	0.0025	0.0229	NA	NA	<0.0015	NA	1.64	NA	0.0958	NA	0.0019	0.26	<0.001	NA
MW-304	3/16/2017	<0.001	0.0016	0.0171	<0.001	<0.001	<0.001	<0.001	1.66	<0.001	0.0685	<0.0002	0.0081	1.18	<0.001	<0.001
MW-304	6/21/2017	<0.001	0.0017	0.0206	<0.001	<0.001	<0.001	<0.001	1.84	<0.001	0.0650	<0.0002	0.0039	1.16	<0.001	<0.001
MW-304	7/28/2017	<0.001	0.0021	0.0193	<0.001	<0.001	<0.001	<0.001	1.75	<0.001	0.0650	<0.0002	0.0034	0.99	<0.001	<0.001
MW-304	11/28/2017	NA	NA	NA	NA	NA	NA	NA	1.72	NA	NA	NA	NA	NA	NA	NA
MW-304	6/27/2018	<0.001	0.0021	0.021	<0.001	<0.001	<0.0015	<0.001	1.67	<0.001	0.0874	<0.0002	0.0022	1.23	<0.001	<0.002
MW-304	3/20/2019	<0.001	0.0029	0.0214	<0.001	<0.001	<0.0015	<0.001	1.88	<0.001	0.0833	<0.0002	0.0019	0.55	<0.001	<0.002
MW-304	9/25/2019	<0.001	0.0017	0.0211	<0.001	<0.001	<0.0015	<0.001	1.74	<0.001	0.0836	<0.0002	0.0017	0.42	<0.001	<0.002
MW-304	3/26/2020	<0.001	0.0016	0.0212	<0.001	<0.001	<0.0015	<0.001	1.81	<0.001	0.0782	<0.0002	0.0015	0.95	<0.001	<0.002
MW-306	12/27/2016	<0.001	0.0044	0.0131	<0.001	<0.001	<0.001	<0.001	0.58	<0.001	0.0160	<0.0002	0.0201	0.21	<0.001	<0.001
MW-306	6/21/2016	<0.001	0.0140	0.0097	<0.001	<0.001	0.0011	<0.001	0.69	<0.001	0.0273	<0.0002	0.0072	1.14	<0.001	<0.001
MW-306	9/19/2016	<0.001	0.0045	0.0157	<0.001	<0.001	<0.001	<0.001	0.55	<0.001	0.0201	<0.0002	0.0198	0.12	<0.001	<0.001
MW-306	9/26/2018	<0.001	0.0019	0.0155	NA	NA	<0.0015	NA	0.54	NA	0.0132	NA	0.0252	0.49	<0.001	NA
MW-306	3/22/2016	<0.001	0.0101	0.0113	<0.001	<0.001	0.0011	<0.001	0.83	<0.001	0.0378	<0.0002	0.0067	0.35	<0.001	<0.001
MW-306	3/16/2017	<0.001	0.0153	0.0096	<0.001	<0.001	<0.001	<0.001	0.61	<0.001	0.0170	<0.0002	0.0182	0.90	<0.001	<0.001
MW-306	6/21/2017	<0.001	0.0046	0.0127	<0.001	<0.001	<0.001	<0.001	0.62	<0.001	0.0157	<0.0002	0.0224	0.89	<0.001	<0.001
MW-306	8/18/2016	<0.001	0.0121	0.0125	<0.001	<0.001	<0.001	<0.001	0.54	<0.001	0.0202	<0.0002	0.0126	0.49	<0.001	<0.001
MW-306	7/28/2017	<0.001	0.0057	0.0085	<0.001	<0.001	0.0015	<0.001	0.60	<0.001	0.0159	<0.0002	0.0237	0.14	<0.001	<0.001
MW-306	11/28/2017	NA	NA	NA	NA	NA	NA	NA	0.65	NA	NA	NA	NA	NA	NA	NA
MW-306	6/27/2018	<0.001	0.0024	0.0205	<0.001	<0.001	<0.0015	<0.001	0.64	<0.001	0.0136	<0.0002	0.0281	0.55	<0.001	<0.002
MW-306	3/20/2019	<0.001	0.0030	0.0192	<0.001	<0.001	<0.0015	<0.001	0.65	<0.001	0.0143	<0.0002	0.0299	0.74	<0.001	<0.002
MW-306	9/25/2019	<0.001	0.0021	0.0150	<0.001	<0.001	<0.0015	<0.001	0.59	<0.001	0.0133	<0.0002	0.0267	0.36	<0.001	<0.002
MW-306	3/26/2020	<0.001	0.0023	0.0163	<0.001	<0.001	<0.0015	<0.001	0.60	<0.001	0.0132	<0.0002	0.0269	1.08	<0.001	<0.002
Downgradient Wells																
MW-356	12/29/2015	<0.001	<0.001	0.0297	<0.001	<0.001	<0.001	<0.001	1.91	<0.001	0.0484	<0.0002	0.0023	0.12	<0.001	<0.001
MW-356	3/28/2016	0.0011	0.0012	0.0288	<0.001	<0.001	<0.001	<0.001	1.89	<0.001	0.0408	<0.0002	0.0027	0.146	<0.001	<0.001
MW-356	6/23/2016	<0.001	<0.001	0.0315	<0.001	<0.001	<0.001	<0.001	1.78	<0.001	0.0484	<0.0002	0.0024	0.77	<0.001	<0.001
MW-356	9/22/2016	<0.001	0.0013	0.0334	<0.001	<0.001	<0.001	<0.001	1.78	<0.001	0.0563	<0.0002	0.0024	0.06	<0.001	<0.001
MW-356	12/27/2016	<0.001	0.0012	0.0301	<0.001	<0.001	<0.001	<0.001	1.80	<0.001	0.0523	<0.0002	0.0020	0.04	<0.001	<0.001
MW-356	3/15/2017	<0.001	0.0010	0.0301	<0.001	<0.001	<0.001	<0.001	1.85	<0.001	0.0521	<0.0002	0.0018	0.39	<0.001	<0.001
MW-356	6/20/2017	<0.001	<0.001	0.0297	<0.001	<0.001	<0.001	<0.001	1.88	<0.001	0.0533	<0.0002	0.0014	1.21	<0.001	<0.001
MW-356	7/26/2017	<0.001	<0.001	0.0299	<0.001	<0.001	<0.001	<0.001	1.88	<0.001	0.0544	<0.0002	0.0014	0.83	<0.001	<0.001
MW-356	11/27/2017	NA	NA	NA	NA	NA	NA	NA	1.99	NA	NA	NA	NA	NA	NA	NA
MW-356	6/26/2018	<0.001	<0.001	0.0309	<0.001	<0.001	<0.0015	<0.001	1.96	<0.001	0.0580	<0.0002	<0.0015	0.56	<0.001	<0.002
MW-356	9/26/2018	NA	<0.001	0.0317	NA	NA	NA	NA	1.88	NA	0.0595	NA	<0.0015	0.08	NA	NA
MW-356	3/19/2019	<0.001	0.0011	0.0322	<0.001	<0.001	<0.0015	<0.001	2.18	<0.001	0.0578	<0.0002	<0.0015	0.19	<0.001	<0.002
MW-356	9/24/2019	NA	<0.001	0.0307	NA	NA	<0.0015	NA	2.00	NA	0.0580	NA	<0.0015	0.10	NA	NA
MW-356	3/25/2020	<0.001	<0.001	0.0303	<0.001	<0.001	<0.0015	<0.001	2.01	<0.001	0.0529	<0.0002	<0.0015	2.18	<0.001	<0.002

Sample Location	Date Sampled	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 + Radium 228, tot (pCi/L)	Selenium, total (mg/L)	Thallium, total (mg/L)
MW-369	12/29/2015	0.0038	0.0139	0.0080	<0.001	<0.001	0.0029	<0.001	3.60	<0.001	0.0260	<0.0002	0.0761	0.01	0.0275	<0.001
MW-369	3/28/2016	0.0021	0.0034	0.0208	<0.001	<0.001	<0.001	<0.001	2.69	<0.001	0.0234	<0.0002	0.0300	0.04	0.0096	<0.001
MW-369	6/23/2016	0.0016	0.0038	0.0228	<0.001	<0.001	<0.001	<0.001	2.90	<0.001	0.0308	<0.0002	0.0264	0.89	0.0064	<0.001
MW-369	9/22/2016	<0.001	0.0020	0.0539	<0.001	<0.001	<0.001	<0.001	1.31	<0.001	0.0379	<0.0002	0.0227	0.027	0.003	<0.001
MW-369	12/27/2016	<0.001	0.0024	0.0395	<0.001	<0.001	<0.001	<0.001	1.75	<0.001	0.0311	<0.0002	0.0256	0.02	0.0023	<0.001
MW-369	6/20/2017	0.0021	0.0022	0.0503	<0.001	<0.001	<0.001	<0.001	1.54	<0.001	0.0349	<0.0002	0.0313	0.84	0.001	<0.001
MW-369	7/26/2017	<0.001	0.0016	0.0480	<0.001	<0.001	0.0012	<0.001	1.32	<0.001	0.0354	<0.0002	0.0235	0.75	<0.001	<0.001
MW-369	11/27/2017	NA	NA	NA	NA	NA	NA	NA	1.46	NA	NA	NA	NA	NA	NA	NA
MW-369	6/26/2018	<0.001	0.0015	0.0567	<0.001	<0.001	<0.0015	<0.001	1.09	<0.001	0.0280	<0.0002	0.0207	0.23	<0.001	<0.002
MW-369	9/26/2018	NA	0.0012	0.0562	NA	NA	NA	NA	1.10	NA	0.0376	NA	0.0213	1.05	NA	NA
MW-369	3/19/2019	<0.001	0.0021	0.0562	<0.001	<0.001	<0.0015	<0.001	1.48	<0.001	0.0382	<0.0002	0.0263	0.34	<0.001	<0.002
MW-369	9/24/2019	NA	0.0059	0.0849	NA	NA	<0.0015	NA	1.08	NA	0.0259	NA	0.0186	0.84	NA	NA
MW-369	3/14/2017	<0.001	0.0015	0.0482	<0.001	<0.001	<0.001	<0.001	1.31	<0.001	0.0321	<0.0002	0.0230	1.01	0.0012	<0.001
MW-369	3/25/2020	<0.001	0.0028	0.0918	<0.001	<0.001	<0.0015	<0.001	0.95	<0.001	0.0182	<0.0002	0.0113	1.72	<0.001	<0.002
MW-370	12/29/2015	0.0031	0.0013	0.0443	<0.001	<0.001	<0.001	<0.001	2.80	<0.001	0.115	<0.0002	0.0075	0.14	0.001	<0.001
MW-370	3/28/2016	0.0022	0.0027	0.0445	<0.001	<0.001	<0.001	0.0014	2.53	<0.001	0.0983	<0.0002	0.0296	0.51	<0.001	<0.001
MW-370	6/23/2016	0.0024	0.0030	0.0582	<0.001	<0.001	<0.001	<0.001	2.63	<0.001	0.154	<0.0002	0.0171	0.73	<0.001	<0.001
MW-370	9/22/2016	0.0023	0.0019	0.0431	<0.001	<0.001	<0.001	<0.001	2.70	<0.001	0.178	<0.0002	0.0181	0.35	<0.001	<0.001
MW-370	12/27/2016	<0.001	0.0023	0.0378	<0.001	<0.001	<0.001	<0.001	2.77	<0.001	0.131	<0.0002	0.0236	0.43	<0.001	<0.001
MW-370	6/20/2017	<0.001	0.0019	0.0379	<0.001	<0.001	<0.001	<0.001	2.94	<0.001	0.134	<0.0002	0.0223	1.41	<0.001	<0.001
MW-370	11/27/2017	NA	NA	NA	NA	NA	NA	NA	2.99	NA	NA	NA	NA	NA	NA	NA
MW-370	6/26/2018	<0.001	0.0012	0.0423	<0.001	<0.001	<0.0015	<0.001	2.94	<0.001	0.125	<0.0002	0.0279	0.23	<0.001	<0.002
MW-370	9/26/2018	NA	0.0010	0.0403	NA	NA	NA	NA	3.06	NA	0.142	NA	0.0214	0.73	NA	NA
MW-370	7/25/2017	<0.001	0.0017	0.0370	<0.001	<0.001	<0.001	<0.001	3.00	<0.001	0.137	<0.0002	0.0207	0.84	<0.001	<0.001
MW-370	3/19/2019	<0.001	0.0015	0.0449	<0.001	<0.001	<0.0015	<0.001	3.45	<0.001	0.147	<0.0002	0.0238	0.61	<0.001	<0.002
MW-370	9/24/2019	NA	<0.001	0.0424	NA	NA	<0.0015	NA	3.00	NA	0.149	NA	0.0188	0.75	NA	NA
MW-370	3/14/2017	0.0015	0.0019	0.0390	<0.001	<0.001	<0.001	<0.001	2.58	<0.001	0.126	<0.0002	0.0151	4.84	<0.001	<0.001
MW-370	3/25/2020	<0.001	<0.001	0.0421	<0.001	<0.001	<0.0015	<0.001	3.19	<0.001	0.132	<0.0002	0.0180	2.01	<0.001	<0.002
MW-382	12/29/2015	<0.001	0.0027	0.0204	<0.001	<0.001	0.003	<0.001	2.77	<0.001	0.0517	<0.0002	0.0034	0.15	<0.001	<0.001
MW-382	3/28/2016	<0.001	0.0030	0.0160	<0.001	<0.001	<0.001	<0.001	2.87	<0.001	0.0522	<0.0002	0.0010	0.06	<0.001	<0.001
MW-382	6/23/2016	<0.001	0.0030	0.0221	<0.001	<0.001	0.003	<0.001	2.83	<0.001	0.0705	<0.0002	0.0013	0.45	<0.001	<0.001
MW-382	9/22/2016	<0.001	0.0023	0.0243	<0.001	<0.001	0.005	<0.001	2.78	0.001	0.0723	<0.0002	0.0016	0.65	<0.001	<0.001
MW-382	12/27/2016	<0.001	0.0012	0.0157	<0.001	<0.001	0.0025	<0.001	2.76	<0.001	0.0603	<0.0002	0.0011	0.23	<0.001	<0.001
MW-382	6/20/2017	<0.001	<0.001	0.0155	<0.001	<0.001	0.0018	<0.001	2.89	<0.001	0.0647	<0.0002	<0.001	2.62	<0.001	<0.001
MW-382	11/27/2017	NA	NA	NA	NA	NA	NA	NA	2.91	NA	NA	NA	NA	NA	NA	NA
MW-382	6/26/2018	<0.001	<0.001	0.0141	<0.001	<0.001	<0.0015	<0.001	2.79	<0.001	0.0678	<0.0002	<0.0015	0.54	<0.001	<0.002
MW-382	9/26/2018	NA	<0.001	0.0140	NA	NA	NA	NA	2.92	NA	0.0588	NA	<0.0015	0.63	NA	NA
MW-382	7/25/2017	<0.001	0.0011	0.0155	<0.001	<0.001	0.003	<0.001	2.88	<0.001	0.0610	<0.0002	0.0017	0.97	<0.001	<0.001
MW-382	3/19/2019	<0.001	0.0012	0.0170	<0.001	<0.001	0.0021	<0.001	3.30	<0.001	0.0625	<0.0002	0.0019	0.16	<0.001	<0.002
MW-382	9/24/2019	NA	0.0012	0.0221	NA	NA	0.0044	NA	2.85	NA	0.0623	NA	0.0025	0.51	NA	NA
MW-382	3/14/2017	<0.001	0.0014	0.0176	<0.001	<0.001	0.0021	<0.001	2.76	0.0013	0.0575	<0.0002	0.0018	0.43	<0.001	<0.001
MW-382	3/25/2020	<0.001	0.0014	0.0196	<0.001	<0.001	0.0028	<0.001	3.04	<0.001	0.0561	<0.0002	0.0021	2.33	<0.001	<0.002

Notes:
1. Abbreviations: mg/L - milligrams per liter; NA - not analyzed; pCi/L - picocurie per liter;

ATTACHMENT 6 – SITE HYDROGEOLOGY AND STRATIGRAPHIC CROSS-SECTIONS OF THE SITE

CONCEPTUAL SITE MODEL AND DESCRIPTION OF SITE HYDROGEOLOGY (BOTTOM ASH POND)

The Baldwin Energy Complex (BEC) conceptual site model (CSM) and Description of Site Hydrogeology for the Bottom Ash Pond (BAP), located near Baldwin, Illinois are described in the following sections.

REGIONAL SETTING

The BEC is located in the Mt. Vernon Hill Country of the Till Plains Section of the Central Lowland Province. The topography of Mt. Vernon Hill Country consists of gently rolling hills and valleys that predominantly follow the surface topography of the underlying bedrock and the surface drainage is primarily toward the Kaskaskia River, located west of the Site. Near the Site, the primary geologic materials encountered from the surficial deposits downward include, lake deposits and fine-grained alluvium of the Equality Formation of the Wisconsinan Glaciation, sand and gravel glacial outwash deposits of the Pearl Formation of the Illinoian Glaciation, till deposits of the Vandalia Till Member of the Glasford Formation of the Illinoian Glaciation, and Pennsylvanian and Mississippian-aged shale and limestone bedrock. Additional regional geologic sequences in the surrounding areas include: the Kaskaskia River bottomlands west of the Site, consisting of alluvium of the Cahokia Formation, glacial outwash of the Henry Formation of the Wisconsinan Glaciation, and Pennsylvanian and Mississippian-aged shale and limestone bedrock; and Upland Areas south and east of the Site, consisting of Peoria Loess and Roxana Silt of the Wisconsinan Glaciation, till deposits of the Vandalia Till Member of the Glasford Formation, and Pennsylvanian and Mississippian-aged shale and limestone bedrock.

SITE GEOLOGY

Geologic units present at the Site include unlithified geologic materials (i.e., Peoria Loess, Equality Formation, and Vandalia Till Member of the Glasford Formation) and Mississippian and Pennsylvanian-aged bedrock as illustrated in the cross-sections attached to this demonstration.

The three principal types of unlithified materials (Upper Groundwater Unit) present above the Bedrock Unit (Uppermost Aquifer), in the vicinity of the BAP, consist of the following, in descending order:

- UNLITHIFIED DEPOSITS (UPPER GROUNDWATER UNIT)
  - Peoria Loess - (silt and silty clay). The Peoria Loess occurs in topographically higher areas and bedrock upland areas and is typically underlain by the Vandalia Till Member of the Glasford Formation. The Peoria Loess is present along the northern end of the BAP and was not noted elsewhere around the ponds. It was categorized as silt and silty clay and ranges from 2 to 23 ft in thickness.
  - Equality Formation - (clay and sandy clay with occasional sand seams and lenses). The stratigraphic position of the Equality Formation varies across the Site and the general position is dependent on the presence or absence of overlying units. The Equality Formation is present in the western and southern portion of the BAP. It is thickest under the southwestern portion of the BAP and pinches out moving east. The Equality Formation was deposited in a slackwater lake formed as a result of back flooding of the Kaskaskia River during flooding events of the Mississippi River. The Equality Formation ranged in thickness from approximately 5 to 25 ft.
  - Vandalia Till Member - (clay and sandy clay diamictons with intermittent and discontinuous sand lenses). The Vandalia Till Member of the Glasford Formation is the lowermost and oldest unlithified geologic material in the vicinity of the Site. The Vandalia Till is a diamicton and occurs beneath the Equality Formation in the central portion of the Site. At the higher topographic elevations

(i.e., bedrock uplands) to the east and southeast of the ash ponds, the Vandalia Till is the principal unlithified geologic material and ranges from approximately 5 to 40 ft thick, but may be mantled in some areas by 4 to 6 ft of the Peoria Loess. The Vandalia Till also exhibits some intermittent and discontinuous sand lenses. The lowermost portion of the Vandalia Till may become shaley within a few feet of the top of bedrock.

- BEDROCK UNIT (UPPERMOST AQUIFER)
  - Bedrock Unit (Uppermost Aquifer) - The Bedrock Unit is the Uppermost Aquifer beneath the Site and consists of Pennsylvanian and Mississippian bedrock, mainly limestone and shale. The shallow bedrock transitions from Mississippian-age limestone and shale beneath the western portion of the Site, to Pennsylvanian-age limestone and shale toward the east. The change from Mississippian bedrock to Pennsylvanian bedrock occurs beneath the central portion of the ash ponds (Willman, 1967). The shallow bedrock is composed of interbedded and undifferentiated limestone and shale. Bedrock topography slopes generally to the west and northwest across the BAP. The topographic relief of the bedrock (change in bedrock elevation beneath the BAP) is approximately 35 ft.

SITE HYDROGEOLOGY

The CCR groundwater monitoring system consists of six monitoring wells installed in the uppermost aquifer and adjacent to the BAP (MW-304, MW-306, MW-356, MW-369, MW-370 and MW-382) (see Monitoring Well Location Map, and Well Construction Diagrams and Drilling Logs attached to this demonstration). The unit utilizes two background monitoring wells (MW-304, MW-306) as part of the CCR groundwater monitoring system.

The Site Uppermost Aquifer is the shallow Pennsylvanian and Mississippian-aged bedrock that immediately underlies the unlithified deposits. Within the boundaries of the Site, only thin and intermittent sand lenses are present within predominantly clay deposits, thus, the unlithified materials do not represent a continuous aquifer unit. Off-site shallow bedrock wells are used for a water supply. The shallow bedrock yields water through interconnected secondary porosity features (e.g. cracks, fractures, crevices, joints, bedding planes and other secondary openings). The shallow bedrock is the only water-bearing unit that is continuous across the Site. Groundwater in the Pennsylvanian and Mississippian-aged bedrock mainly occurs under semi-confined to confined conditions with the overlying unlithified unit behaving as the upper confining unit to the Uppermost Aquifer.

Water quality in the Uppermost Aquifer (i.e., Pennsylvanian and Mississippian-aged bedrock) decreases with increasing depth as water becomes increasingly mineralized. Further, the ability of the unit to store and transmit water is dependent on the density of bedrock features that contribute to secondary porosities and whether those features are interconnected enough to yield water. Therefore, the lower limit of the uppermost aquifer is the depth at which either the groundwater is mineralized to a point that it is no longer a useable water source or the secondary porosities do not yield a sufficient volume of groundwater to produce a useable water supply.

Hydraulic Conductivity

Field measurements indicated that the horizontal hydraulic conductivity for the Upper Groundwater Unit ranged from 3.5×10^{-7} to 6.8×10^{-4} centimeters per second (cm/s), with a geometric mean of 3.2×10^{-5} cm/s. Laboratory testing of vertical hydraulic conductivity measurements from the units that comprise the Upper Groundwater Unit have a geometric mean value of 8.6×10^{-7} cm/s. Based on field testing, the geometric mean horizontal hydraulic conductivity for the Uppermost Aquifer (Bedrock Unit) was 5.0×10^{-6} cm/s (NRT, 2014).

Groundwater Elevations, Flow Direction and Velocity

A discussion of typical Site groundwater elevations, flow directions and groundwater velocities is included in this section using data collected in March and September of 2019. Groundwater elevation contour maps, including maps illustrating groundwater elevations and flow directions in March and September 2019, are provided as an attachment to this demonstration. Piezometric heads measured in bedrock monitoring wells on March 19, 2019 ranged from 377.15 to 448.14 feet above North American Vertical Datum of 1988 (ft NAVD88). The piezometric head at location MW-352 was above the ground surface on March 19, 2019, indicating MW-352 is a flowing artesian well. Piezometric heads measured in bedrock monitoring wells on September 24, 2019 ranged from 370.54 to 446.19 ft msl NAVD88.

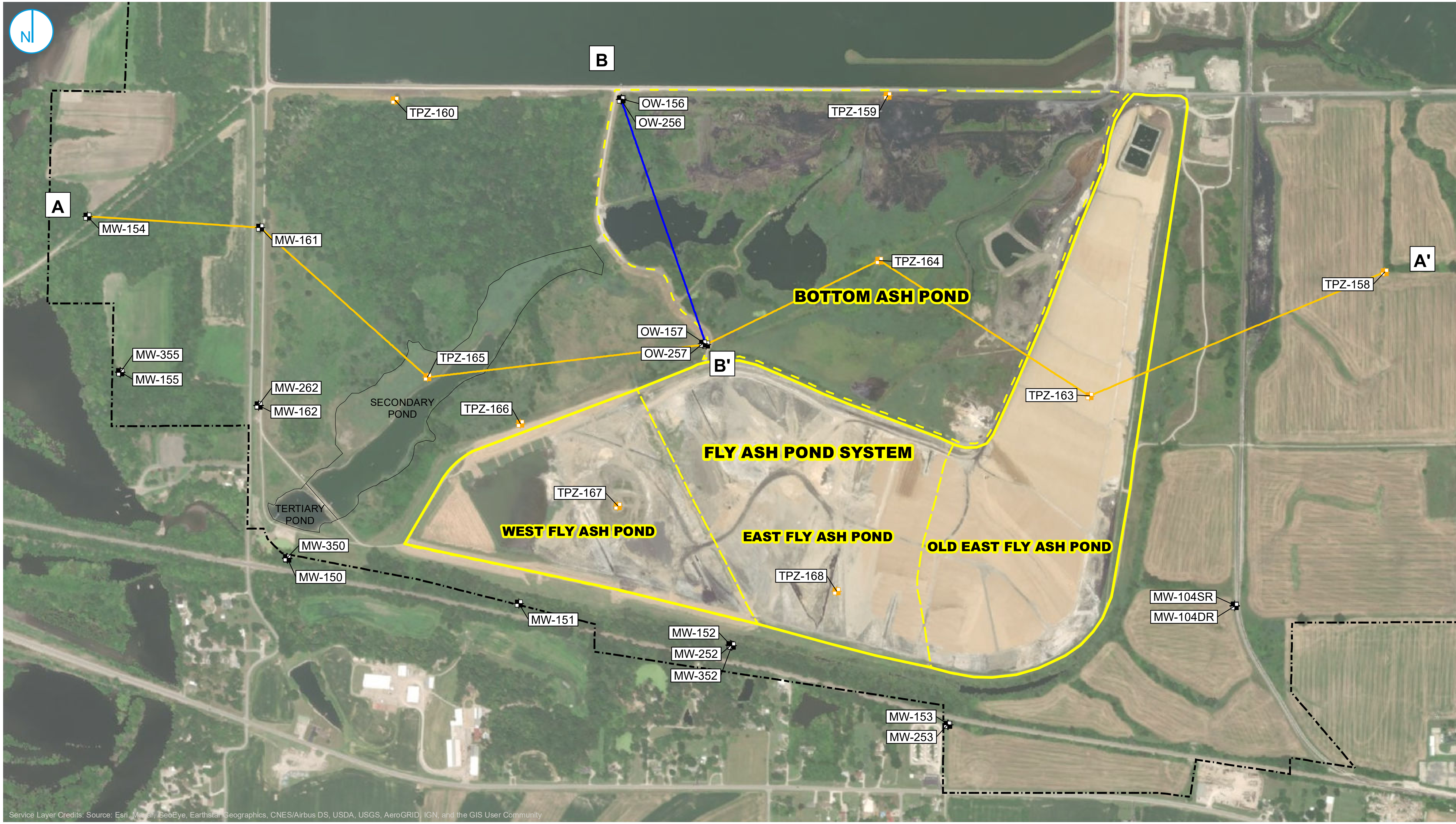
Groundwater flow in the shallow bedrock is generally to the west and southwest, as indicated by elevation measurements collected on March 19, 2019. Changes in groundwater elevation across the Site typically mimic bedrock surface topography. General groundwater flow direction is west toward the Kaskaskia River (i.e., regional discharge area) with localized flow toward bedrock surface lows. For instance, flow is almost due west on the east area of the Site until groundwater reaches the bedrock valley feature at the Secondary and Tertiary Ponds, at which point the flow direction veers toward the bedrock surface low. As indicated by comparison of the March 19, 2019 and September 24, 2019 groundwater elevation contour maps, there is little to no seasonal variation in groundwater flow direction.

A hydraulic conductivity of 5 x 10^{-6} cm/s and a median effective porosity of 30% were used to calculate bedrock groundwater velocities based on data referenced in Groundwater Quality Assessment and Phase II Hydrogeologic Investigation (NRT, 2014). Groundwater flow velocity in the vicinity of the BAP was approximately 0.0017 and 0.0009 feet per day (ft/day) as groundwater flowed from east to west across the BAP on March 19, 2019 and September 24, 2019, respectively. Less than 0.0008 ft/day change in groundwater velocity was observed when comparing March 19, 2019 and September 24, 2019.

REFERENCES

Natural Resource Technology, Inc. (NRT), 2014. Groundwater Quality Assessment and Phase II Hydrogeologic Investigation, Baldwin Ash Pond System, Baldwin, Illinois. Prepared for Dynegy Midwest Generation, LLC by Natural Resource Technology, Inc. June 11, 2014.

Willman, H.B. and others. 1967. Geologic Map of Illinois. Illinois State Geological Survey. Champaign, Illinois.



Y:\Mapping\Projects\22\2285_Baldwin\MXD\Figure 1_Cross Section Locations.mxd

PROJECT: 169000XXXX | DATED: 9/16/2020 | DESIGNER: STOLZSD

MONITORING WELL LOCATION
PIEZOMETER WELL LOCATION
CCR MONITORED MULTI-UNIT
CCR MONITORED UNIT
NON-CCR UNIT
PROPERTY BOUNDARY

CROSS-SECTION TRANSECTS

A to A'
B to B'

0 350 700 Feet

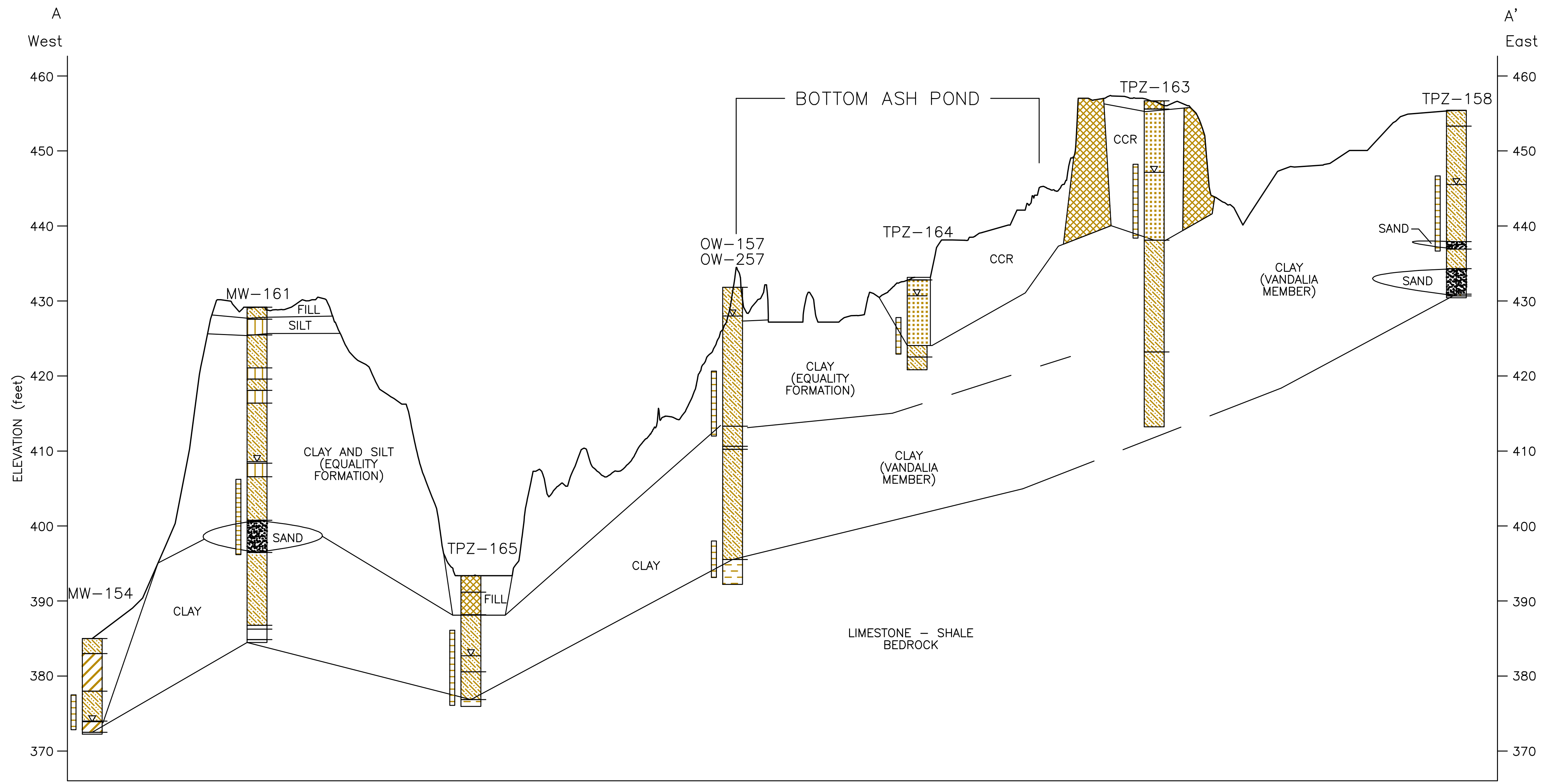
CROSS SECTION LOCATION MAP

FIGURE 1

BALDWIN ASH POND SYSTEM
BALDWIN ENERGY COMPLEX
10901 BALDWIN RD, BALDWIN, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL



LEGEND

- COAL COMBUSTION RESIDUALS, CCRs
- FILL
- CLAY (CL)
- CLAY (CH)
- SILT (ML)
- SAND (SP/SM/SW)
- SHALE
- WELL SCREEN INTERVAL

NOTES

1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 60X.

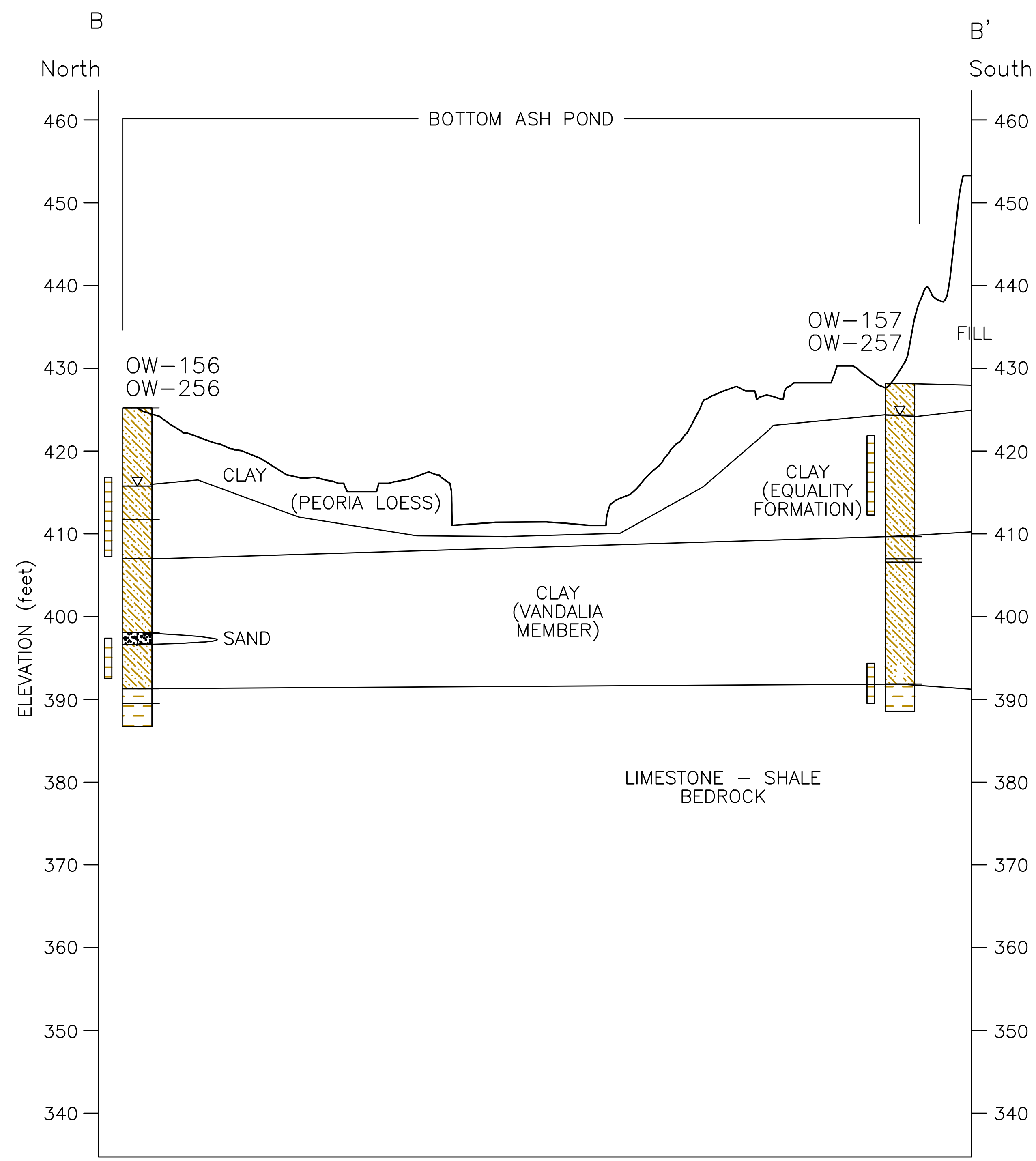
16.6'
0
1,000'

CROSS SECTION A-A'

BALDWIN BOTTOM ASH POND
BALDWIN ENERY COMPLEX
10901 BALDWIN RD, BALDWIN, ILINOIS

FIGURE 2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

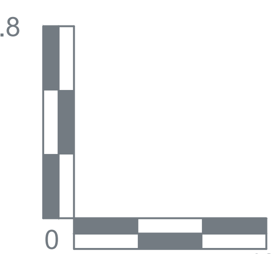


LEGEND

- COAL COMBUSTION RESIDUALS, CCRs
- FILL
- CLAY (CL)
- CLAY (CH)
- SILT (ML)
- SAND (SP/SM/SW)
- SHALE
- WELL SCREEN INTERVAL

NOTES

1. This profile was developed by interpolation between widely spaced boreholes. Only at the borehole location should it be considered as an approximately accurate representation and then only to the degree implied by the notes on the borehole logs.
2. Scale is approximate.
3. Vertical scale is exaggerated 21.25X.



CROSS SECTION B-B'

BALDWIN BOTTOM ASH POND

BALDWIN ENERY COMPLEX

10901 BALDWIN RD, BALDWIN, ILINOIS

FIGURE 3

RAMBOLL US CORPORATION

A RAMBOLL COMPANY

ATTACHMENT 7 – STRUCTURAL STABILITY ASSESSMENT

AECOM

Submitted to
Dynegy Midwest Generation, LLC
1500 Eastport Drive
Collinsville, IL 62234

Submitted by
AECOM
1001 Highlands Plaza Drive West
Suite 300
St. Louis, MO 63110

October 2016

CCR Rule Report: Initial Structural Stability Assessment

For

Bottom Ash Pond

At Baldwin Energy Complex

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Bottom Ash Pond at the Dynegy Midwest Generation, LLC Baldwin Energy Complex meets the structural stability assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(d). The Bottom Ash Pond is located near Baldwin, Illinois in Randolph County, approximately 0.9 miles southwest of the Baldwin Energy Complex. The Bottom Ash Pond serves as the primary wet impoundment for sluiced bottom ash and other non-CCR wastewaters produced at the Baldwin Energy Complex.

The Bottom Ash Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that an initial structural stability assessment for an existing CCR surface impoundment be completed by October 17, 2016. In general, the initial structural stability assessment must document that the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial structural stability assessment was conducted in accordance with the requirements of 40 CFR § 257.73(d). The owner or operator must prepare a periodic structural stability assessment every five years.

2 Initial Structural Stability Assessment

40 CFR §257.73(d)(1)
The owner or operator of the CCR unit must conduct initial and periodic structural stability assessments and document whether the design, construction, operation, and maintenance of the CCR unit is consistent with recognized and generally accepted good engineering practices for the maximum volume of CCR and CCR wastewater which can be impounded therein. The assessment must, at a minimum, document whether the CCR unit has been designed, constructed, operated, and maintained with [the standards in (d)(1)(i)-(vii)].

An initial structural stability assessment has been performed to document that the design, construction, operation and maintenance of the Bottom Ash Pond is consistent with recognized and generally accepted good engineering practices and meets the standards in 257.73(d)(1)(i)-(vii). The results of the structural stability assessment are discussed in the following sections. Based on the assessment and its results, the design, construction, operation, and maintenance of the Bottom Ash Pond were found to be consistent with recognized and generally accepted good engineering practices.

2.1 Foundations and Abutments (§257.73(d)(1)(i))

CCR unit designed, constructed, operated, and maintained with stable foundations and abutments.

The stability of the foundations was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the foundations.

The foundation consists of soft to stiff clay, which indicates stable foundations. Soil conditions at the abutments were found to be similar to the foundation for the remainder of the Bottom Ash Pond. Slope stability analyses exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the foundation. The slope stability analyses are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for Bottom Ash Pond at Baldwin Energy Complex* (October 2016). A review of operational and maintenance procedures as well as current and past performance of the dikes has determined appropriate processes are in place for continued operational performance. Based on the conditions observed by AECOM, the Bottom Ash Pond was designed and constructed with stable foundations and abutments. Operational and maintenance procedures are in place to address any issues related to the stability of the foundations and abutments. Therefore, the Bottom Ash Pond meets the requirements in §257.73(d)(1)(i).

2.2 Slope Protection (§257.73(d)(1)(ii))

CCR unit designed, constructed, operated, and maintained with adequate slope protection to protect against surface erosion, wave action and adverse effects of sudden drawdown.

The adequacy of slope protection was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, adequate slope protection was designed and constructed at the Bottom Ash Pond. No evidence of significant areas of erosion or wave action were observed. The interior slopes are covered with riprap erosion protection in some areas and vegetation in other areas. The exterior slopes are covered in vegetation. Operational and maintenance procedures to repair the vegetation and riprap as needed are appropriate to protect against surface erosion and wave action. Intentional or unintentional sudden drawdown of the pool in the Bottom Ash Pond is not expected to occur due to the characteristics of the spillway structures. Because sudden drawdown conditions are not expected to occur, slope protection to protect against the adverse effects of sudden drawdown is not required. Therefore, the Bottom Ash Pond meets the requirements in §257.73(d)(1)(ii).

2.3 Dike Compaction (§257.73(d)(1)(iii))

CCR unit designed, constructed, operated, and maintained with dikes mechanically compacted to a density sufficient to withstand the range of loading conditions in the CCR unit.

The density of the dike materials was evaluated using soil data from field investigations and reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, slope stability analyses were performed to evaluate slip surfaces passing through the dike over the range of expected loading conditions as defined within §257.73(e)(1).

Based on this evaluation, the dike consists of soft to very stiff material that is stiff on average, which is indicative of mechanically compacted dikes. Slope stability analyses, which are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for Bottom Ash Pond at Baldwin Energy Complex* (October 2016), exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the dike. Thus, the original design and construction of the Bottom Ash Pond included sufficient dike compaction. Operational and maintenance procedures are in place to identify and mitigate deficiencies in order to maintain sufficient compaction of the dikes to withstand the range of loading conditions. Therefore, the Bottom Ash Pond meets the requirements in §257.73(d)(1)(iii).

2.4 Vegetated Slopes (§257.73(d)(1)(iv))[1]

CCR unit designed, constructed, operated, and maintained with vegetated slopes of dikes and surrounding areas, except for slopes which have an alternate form or forms of slope protection.

The adequacy of slope vegetation was evaluated by reviewing design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM.

Based on this evaluation, the vegetation on the exterior and interior slopes is adequate as no substantial bare or overgrown areas were observed. Riprap slope protection is present in some areas on the interior slopes and is used as an alternate form of slope protection, which is adequate as significant areas of erosion or bare soil within or around the riprap were not observed. Therefore, the original design and construction of the Bottom Ash Pond included adequate vegetation of the dikes and surrounding areas. Adequate operational and maintenance procedures are in place to regularly manage vegetation growth, including mowing and seeding any bare areas, as evidenced by the conditions observed by AECOM. Therefore, the Bottom Ash Pond meets the requirements in §257.73(d)(1)(iv).

[1] As modified by court order issued June 14, 2016, Utility Solid Waste Activities Group v. EPA, D.C. Cir. No. 15-1219 (order granting remand and vacatur of specific regulatory provisions).

2.5 Spillways (§257.73(d)(1)(v))

CCR unit designed, constructed, operated, and maintained with a single spillway or a combination of spillways configured as specified in [paragraph (A) and (B)]:

(A) All spillways must be either:

(1) of non-erodible construction and designed to carry sustained flows; or

(2) earth- or grass-lined and designed to carry short-term, infrequent flows at non-erosive velocities where sustained flows are not expected.

(B) The combined capacity of all spillways must adequately manage flow during and following the peak discharge from a:

(1) Probable maximum flood (PMF) for a high hazard potential CCR surface impoundment; or

(2) 1000-year flood for a significant hazard potential CCR surface impoundment; or

(3) 100-year flood for a low hazard potential CCR surface impoundment.

The spillways were evaluated using design drawings, operational and maintenance procedures, and conditions observed in the field by AECOM. Additionally, hydrologic and hydraulic analyses were completed to evaluate the capacity of the spillways relative to inflow estimated for the 1,000-year flood event for the significant hazard potential Bottom Ash Pond. The hazard potential classification assessment was performed by Stantec in 2016 in accordance with §257.73(a)(2).

Three separate spillways are present: a high-density polyethylene (HDPE) pipe conduit and riser, a riprap-lined emergency spillway, and a pumping station with HDPE discharge pipes. All of the spillways are constructed with non-erodible materials that are designed to carry sustained flows. The capacity of the spillways, was evaluated using hydrologic and hydraulic analysis performed per §257.82(a). The analysis found that the spillways can adequately manage flow during peak discharge resulting from the 1,000-year storm event without uncontrolled overtopping of the embankments. The hydrologic and hydraulic analyses are discussed in the *CCR Rule Report: Initial Inflow Design Flood Control System Plan for Bottom Ash Pond at Baldwin Energy Complex* (October 2016). Operational and maintenance procedures are in place to repair any issues with the spillways and remove debris or other obstructions from the spillways, as evidenced by the conditions observed by AECOM. As a result, these procedures are appropriate for maintaining the spillway. Therefore, the Bottom Ash Pond meets the requirements in §257.73(d)(1)(v).

2.6 Stability and Structural Integrity of Hydraulic Structures (§257.73(d)(1)(vi))

CCR unit designed, constructed, operated, and maintained with hydraulic structures underlying the base of the CCR unit or passing through the dike of the CCR unit that maintain structural integrity and are free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris which may negatively affect the operation of the hydraulic structure.

The stability and structural integrity of the hydraulic structure penetrating the dike of the Bottom Ash Pond, the 30-inch HDPE pipe conduit spillway, was evaluated using design drawings, operational and maintenance procedures, closed-circuit televisions (CCTV) pipe inspections, and conditions observed in the field by AECOM. No other hydraulic structures are known to pass through the dike of or underlie the base of the Bottom Ash Pond.

The CCTV inspection of the HDPE outflow pipe found the pipe to be free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris that may negatively affect the operation of the hydraulic structure. Operational and maintenance procedures are in place to remove debris or other obstructions from the hydraulic structure, and address any deficiencies, as evidenced by conditions observed by AECOM. As a result, these procedures are appropriate for maintaining the spillway. Therefore, the Bottom Ash Pond meets the requirements in §257.73(d)(1)(vi).

2.7 Downstream Slope Inundation/Stability (§257.73(d)(1)(vii))

CCR unit designed, constructed, operated, and maintained with, for CCR units with downstream slopes which can be inundated by the pool of an adjacent water body, such as a river, stream or lake, downstream slopes that maintain structural stability during low pool of the adjacent water body or sudden drawdown of the adjacent water body.

The structural stability of the downstream slopes of the Bottom Ash Pond was evaluated using hydraulic and hydrologic analyses, as discussed in the *CCR Rule Report: Initial Inflow Design Flood Control System Plan for Bottom Ash Pond at Baldwin Energy Complex* (October, 2016). This analysis, which considered a 100-year flood condition in the downstream Kaskaskia River, found that the peak water surface elevation of the downstream non-CCR Secondary Pond is 0.6 feet below the elevation of the Bottom Ash Pond embankment toe during 1,000-year Inflow Design Flood conditions. During normal conditions, the pool in the Secondary Pond is approximately 1,000 lateral feet beyond the toe of the Bottom Ash Pond embankment.

Based on this evaluation, the requirements in §257.73(d)(1)(vii) are not applicable to the Bottom Ash Pond, as inundation of the downstream slopes is not expected to occur.

3 Certification Statement

CCR Unit: Dynegy Midwest Generation, LLC; Baldwin Energy Complex; Bottom Ash Pond

I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the initial structural stability assessment dated October 13, 2016 was conducted in accordance with the requirements of 40 CFR § 257.73(d).

VICTOR A MODEER JR.

Printed Name

10/13/16

Date

VICTOR ALBERT MODEER JR.
062-043112
REGISTERED
PROFESSIONAL
ENGINEER
OF
ILLINOIS

11/30/17

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More information on AECOM and its services can be found at www.aecom.com.

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ATTACHMENT 8 – SAFETY FACTOR ASSESSMENT

AECOM

Submitted to
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Collinsville, IL 62234

Submitted by
AECOM
1001 Highlands Plaza Drive West
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St. Louis, MO 63110

October 2016

CCR Rule Report: Initial Safety Factor Assessment

For

Bottom Ash Pond

At Baldwin Energy Complex

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Bottom Ash Pond at the Dynegy Midwest Generation, LLC Baldwin Energy Complex meets the safety factor assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(e). The Bottom Ash Pond is located near Baldwin, Illinois in Randolph County, approximately 0.9 miles southwest of the Baldwin Energy Complex. The Bottom Ash Pond serves as the primary wet impoundment for sluiced bottom ash and other non-CCR wastewaters produced at the Baldwin Energy Complex.

The Bottom Ash Pond is an existing CCR surface impoundment as defined by 40 CFR §257.53. The CCR Rule requires that the initial safety factor assessment for an existing CCR surface impoundment be completed by October 17, 2016.

The owner or operator of the CCR unit must obtain a certification from a qualified professional engineer stating that the initial safety factor assessment meets the requirements of 40 CFR § 257.73(e). The owner or operator must prepare a safety factor assessment every five years.

2 Initial Safety Factor Assessment

40 CFR §257.73(e)(1)
The owner or operator must conduct initial and periodic safety factor assessments for each CCR unit and document whether the calculated factors of safety for each CCR unit achieve the minimum safety factors specified in (e)(1)(i) through (iv) of this section for the critical cross section of the embankment. The critical cross section is the cross section anticipated to be the most susceptible of all cross sections to structural failure based on appropriate engineering considerations, including loading conditions. The safety factor assessments must be supported by appropriate engineering calculations.

(i) The calculated static factor of safety under the long-term, maximum storage pool loading condition must equal or exceed 1.50.
(ii) The calculated static factor of safety under the maximum surcharge pool loading condition must equal or exceed 1.40.
(iii) The calculated seismic factor of safety must equal or exceed 1.00.
(iv) For dikes constructed of soils that have susceptibility to liquefaction, the calculated liquefaction factor of safety must equal or exceed 1.20.

A geotechnical investigation program and stability analyses were performed to evaluate the design, performance, and condition of the earthen dikes of the Bottom Ash Pond. The exploration consisted of hollow-stem auger borings, solid-stem auger borings, piezometer installation, cone penetration tests, and laboratory program including strength and index testing. Data collected from the geotechnical investigation, available design drawings, construction records, inspection reports, previous engineering investigations, and other pertinent historic documents were utilized to perform the safety factor assessment and geotechnical analyses.

In general, the subsurface conditions at the Bottom Ash Pond consist of soft to very stiff embankment fill (clay) intermittently overlying soft to stiff loess (clay), overlying medium stiff to hard residual soils (clay), which in turn overlies shale and limestone bedrock. Phreatic water is typically several feet above the bottom of the embankment.

A representative cross section was analyzed using limit equilibrium slope stability analysis software to evaluate stability of the perimeter dike system and foundations. The cross section was located at the maximum embankment height for the Bottom Ash Pond. Due to the relatively short height of the Bottom Ash Pond embankments and uniform slope orientations, subsurface stratigraphy, and phreatic conditions, a single cross section at the maximum embankment height is sufficient to represent the critical cross section. The cross section was evaluated for each of the loading conditions stipulated in §257.73(e)(1).

A liquefaction susceptibility evaluation did not find soils susceptible to liquefaction within the Bottom Ash Pond dikes or foundation. As a result, the Soils Susceptible to Liquefaction loading condition (§257.73(e)(1)(iv)) is not applicable to the Bottom Ash Pond at the Baldwin Energy Complex.

Results of the Initial Safety Factor Assessments are listed in Table 1.

Table 1 – Summary of Initial Safety Factor Assessments

Loading Conditions	§257.73(e)(1) Subsection	Minimum Factor of Safety	Calculated Factor of Safety
Maximum Storage Pool Loading	(i)	1.50	2.04
Maximum Surcharge Pool Loading	(ii)	1.40	2.04
Seismic	(iii)	1.00	1.43
Soils Susceptible to Liquefaction	(iv)	1.20	Not Applicable

Based on this evaluation, the Bottom Ash Pond meets the requirements in §257.73(e)(1).

3 Certification Statement

CCR Unit: Dynegy Midwest Generation, LLC; Baldwin Energy Complex; Bottom Ash Pond

I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in accordance with the accepted practice of engineering. I certify, for the above-referenced CCR Unit, that the initial safety factor assessment dated October 13, 2016 meets the requirements of 40 CFR §257.73(e).

VICTOR A. MODEER JR.

Printed Name

10/13/16

Date

VICTOR ALBERT MODEER JR.
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PROFESSIONAL
ENGINEER
OF
ILLINOIS

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About AECOM

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ATTACHMENT 9 – CLOSURE PLAN

CLOSURE PLAN FOR EXISTING CCR SURFACE IMPOUNDMENT
40 CFR 257.102(b)
REV 0 – 10/17/2016

SITE INFORMATION

Site Name / Address	Baldwin Energy Complex / 10901 Baldwin Road, Baldwin, IL 62217		
Owner Name / Address	Dynegy Midwest Generation, LLC / 1500 Eastport Plaza Drive, Collinsville, IL 62234		
CCR Unit	Bottom Ash Pond	Closure Method and Final Cover Type	Close In-Place Clayey Soil Cover with Vegetation

CLOSURE PLAN DESCRIPTION

(b)(1)(i) – Narrative description of how the CCR unit will be closed in accordance with this section.	The Bottom Ash Pond will be dewatered, as necessary, to facilitate closure by leaving CCR in place. The CCR in the Bottom Ash Pond will be shaped and graded. The final cover will be sloped to promote drainage and stormwater runoff will be conveyed through a series of drainage channels on the cover system to a perimeter drainage channel. The non-CCR perimeter drainage channel will direct stormwater from the cover system to the existing Secondary Pond located on the southwest side of the Bottom Ash Pond. Existing inlet pipes into the Bottom Ash Pond and the existing outlet pipes from the Bottom Ash Pond to the Secondary Pond and to the Cooling Lake will be removed from service. In accordance with 257.102(b)(3), this initial written closure plan will be amended to provide additional details after the final engineering design for the grading and cover system is completed, if the final design would substantially affect this written closure plan. This initial closure plan reflects the information available to date.
(b)(1)(iii) – If closure of the CCR unit will be accomplished by leaving CCR in place, a description of the final cover system and methods and procedures used to install the final cover.	The soils for the final cover system will be placed directly on top of the graded CCR material to achieve final grades and will include (from bottom up): 1) 18" of compacted earthen material with a permeability of less than or equal to the permeability of the natural subsoils present at the site or no greater than $1x10^{-5}$ cm/sec, whichever is less; 2) 6" of soil capable of sustaining native plant growth; and 3) planted native grasses. Emplaced CCR material will be regraded as fill and supplemented with borrow soils as necessary to achieve design grades. Earthen material will be placed, graded, and compacted to meet the thickness and permeability as discussed above for the cover system. Organic earthen material will be placed on top of the 18" of compacted soils to create a 6" soil layer capable of sustaining native plant growth. The final cover surface will be seeded and vegetated. The final cover slope will have a minimum slope of 2% and will be graded to convey stormwater runoff to drainage channels on the cover system to a perimeter channel, which leads to the existing Secondary Pond.

(b)(1)(iii) – How the final cover system will achieve the performance standards in 257.102(d).

(d)(1)(i) Control, minimize or eliminate, to the maximum extent feasible, post-closure infiltration of liquids into the waste and releases of CCR, leachate, or contaminated run-off to the ground or surface waters or to the atmosphere.	The permeability of the final cover will be equal to or less than the permeability of the natural subsoils present below the CCR material or permeability no greater than $1x10^{-5}$ cm/sec, whichever is less. Therefore, the permeability of the final cover system will not be greater than $1x10^{-5}$ cm/sec. The final cover system will be graded with a minimum 2% slope.
(d)(1)(ii) – Preclude the probability of future impoundment of water, sediment, or slurry.	The final cover will be installed with a minimum 2% slope. Drainage channels will be installed with a minimum 0.5% slope.
(d)(1)(iii) – Include measures that provide for major slope stability to prevent the sloughing or movement of the final cover system during the closure and post-closure care period.	The final cover will have a minimum 2% slope and drainage channels will have minimum 0.5% slope. Drainage channels will be lined with turf reinforced mats where required to reduce the potential for erosion. The final slope of the berms and cover will meet the stability requirements to prevent sloughing or movement of the final cover system.

CLOSURE PLAN DESCRIPTION	
(d)(1)(iv) – Minimize the need for further maintenance of the CCR unit.	The final cover will be vegetated to minimize erosion and maintenance.
(d)(1)(v) – Be completed in the shortest amount of time consistent with recognized and generally accepted good engineering practices.	Closure is estimated to be completed no later than five years upon commencement of closure activities.
(d)(2)(i) – Free liquids must be eliminated by removing liquid wastes or solidifying the remaining wastes and waste residue.	The unit will be dewatered sufficiently, as necessary, to remove the free liquids to provide a stable base for the construction of the final cover system.
(d)(2)(ii) – Remaining wastes must be stabilized sufficiently to support the final cover system.	Dewatering as necessary and regrading of existing in-place CCR will sufficiently stabilize the waste such that the final cover will be supported.
(d)(3) – A final cover system must be installed to minimize infiltration and erosion, and at minimum, meets the requirements of (d)(3)(i).	The final cover will consist of a minimum 18" earthen material layer with permeability equal to or less than the permeability of the natural subsoils or no greater than $1x10^{-5}$ cm/sec, whichever is less. Therefore, the permeability of the final cover system will be not greater than $1x10^{-5}$ cm/sec. Erosion will be minimized with a soil layer of no less than 6" of earthen material capable of sustaining native plant growth. The final cover surface will be seeded and vegetated.
(d)(3)(i) – The design of the final cover system must be included in the written closure plan.	When the design of the final cover system is completed, the written closure plan will be amended if the final design would substantially change this written closure plan. The design of the final cover system will meet the requirements of §(d)(3)(i)(A) – (D) as described below.
(d)(3)(i)(A) – The permeability of the final cover system must be less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than $1x10^{-5}$cm/sec, whichever is less.	The permeability of the final cover will be equal to or less than the permeability of the natural subsoils or no greater than $1x10^{-5}$ cm/sec, whichever is less. Therefore, the permeability of the final cover system will be designed to meet this requirement.
(d)(3)(i)(B) – The infiltration of liquids through the closed CCR unit must be minimized by the use of an infiltration layer than contains a minimum of 18 inches of earthen material.	The final cover will include a minimum of 18" of compacted earthen material with a permeability equal to or less than the permeability of the natural subsoils or no greater than $1x10^{-5}$ cm/sec, whichever is less. Therefore, the permeability of the final cover system will be not greater than $1x10^{-5}$ cm/sec.
(d)(3)(i)(C) – The erosion of the final cover system must be minimized by the use of an erosion layer that contains a minimum of six inches of earthen material that is capable of sustaining native plant growth.	The final cover will include a minimum of 6" of an earthen erosion layer that is capable of sustaining native plant growth. The final cover will be seeded and vegetated.
(d)(3)(i)(D) – The disruption of the integrity of the final cover system must be minimized through a design that accommodates settling and subsidence.	The final cover will be installed with a minimum 2% slope and will incorporate calculated settlement as well as differential settling and subsidence.

INVENTORY AND AREA ESTIMATES	
(b)(1)(iv) – Estimate of the maximum inventory of CCR ever on-site over the active life of the CCR unit	10,320,000 cubic yards
(b)(1)(v) – Estimate of the largest area of the CCR unit ever requiring a final cover	177 acres

CLOSURE SCHEDULE	
(b)(1)(vi) – Schedule for completing all activities necessary to satisfy the closure criteria in this section, including an estimate of the year in which all closure activities for the CCR unit will be completed. The schedule should provide sufficient information to describe the sequential steps that will be taken to close the CCR unit, including major milestones and the estimated timeframes to complete each step or phase of CCR unit closure.	
The milestone and the associated timeframes are initial estimates. Some of the activities associated with the milestones will overlap. Amendments to the milestones and timeframes will be made as more information becomes available.	
Written Closure Plan	October 17, 2016
Notification of Intent to Close Placed in Operating Record	No later than the date closure of the CCR unit is initiated. Closure to commence in accordance with the applicable timeframes in 40 CFR 257.102(e).
Agency coordination and permit acquisition • Coordinating with state agencies for compliance • Acquiring state permits	 Year 1 – 5 (estimated) Year 1 (estimated)
Mobilization	Year 1 (estimated)
Dewater and stabilize CCR • Complete dewatering, as necessary • Complete stabilization of CCR	 Year 2 (estimated) Year 2 (estimated)
Grading • Grading of CCR material in pond to facilitate surface water drainage	Year 2 - 5 (estimated)
Installation of final cover	Year 2 - 5 (estimated)
Estimate of Year in which all closure activities will be completed	Year 5

AMENDMENT AND CERTIFICATION	
(b)(3)(i) – The owner or operator may amend the initial or any subsequent written closure plan developed pursuant to 257.102(b)(1) at any time. (b)(3)(ii) – The owner or operator must amend the written closure plan whenever: (A) There is a change in the operation of the CCR unit that would substantially affect the written closure plan in effect; or (B) Before or after closure activities have commenced, unanticipated events necessitate a revision of the written closure plan. (b)(3)(iii) – The owner or operator must amend the closure plan at least 60 days prior to a planned change in the operation of the facility or CCR unit, or no later than 60 days after an unanticipated event requires the need to revise an existing written closure plan. If a written closure plan is revised after closure activities have commenced for a CCR unit, the owner or operator must amend the current closure plan no later than 30 days following the triggering event.	This initial closure plan will be amended as required by 257.102(b)(3) and, as allowed by 257.102(b)(3), may be amended at any time, including as more information becomes available.
(b)(4) – The owner or operator of the CCR unit must obtain a written certification from a qualified professional engineer that the initial and any amendment of the written closure plan meets the requirements of this 40 CFR 257.102.	Certification by a qualified professional engineer will be appended to this plan.

Certification Statement 40 CFR § 257.102 (d)(3)(iii) – Design of the Final Cover System for a CCR Surface Impoundment

CCR Unit: Dynegy Midwest Generation, LLC; Baldwin Energy Complex; Bottom Ash Pond

I, Victor Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the design of the final cover system as included in the initial written closure plan, dated October 17, 2016, meets the requirements of 40 CFR § 257.102.

Victor Modeer, PE, D.GE

Printed Name

10/11/16

Date

VICTOR ALBERT MODEER JR.
062-043112
REGISTERED
PROFESSIONAL
ENGINEER
OF
ILLINOIS

11/30/17

Certification Statement 40 CFR § 257.102 (b)(4) – Initial Written Closure Plan for a CCR Surface Impoundment

CCR Unit: Dynegy Midwest Generation, LLC; Baldwin Energy Complex; Bottom Ash Pond

I, Victor Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief, that the information contained in this certification has been prepared in accordance with the accepted practice of engineering. I certify, for the above referenced CCR Unit, that the information contained in the initial written closure plan, dated October 17, 2016, meets the requirements of 40 CFR § 257.102.

Victor Modeer, PE, D.GE

Printed Name

10/11/16

Date

VICTOR ALBERT MODEER JR.
062-043112
REGISTERED
PROFESSIONAL
ENGINEER
OF
ILLINOIS

11/30/17

ADDENDUM NO. 1
BALDWIN BOTTOM ASH POND CLOSURE PLAN

This Addendum No. 1 to the Closure Plan for Existing Coal Combustion Residuals (CCR) Impoundment for the Baldwin Bottom Ash Pond at the Baldwin Energy Complex, Revision 0 - October 17, 2016 has been prepared to meet the requirements of Title 40 of the Code of Federal Regulations (40 C.F.R.) Section 257.103(f)(2)(v)(D) as a component of the demonstration that the Baldwin Bottom Ash Pond qualifies for a site-specific alternative deadline to initiate closure due to permanent cessation of a coal-fired boiler by a certain date.

The Baldwin Bottom Ash Pond will begin construction of closure by April 17, 2025 and cease receipt and placement of CCR and non-CCR wastestreams by no later than July 17, 2027 as indicated in the Baldwin Power Station Alternative Closure Demonstration dated September 29, 2020. Closure will be completed by October 17, 2028 within the 5-year timeframe included in the Closure Schedule identified in the Baldwin Bottom Ash Pond Closure Plan in accordance with 40 C.F.R. § 257.102(f)(ii).

All other aspects of the Closure Plan remain unchanged.

CERTIFICATION

I, Eric J. Tlachac, a Qualified Professional Engineer in good standing in the State of Illinois, certify that the information in this addendum 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.

LICENSED PROFESSIONAL ENGINEER
ERIC J. TLACHAC
062-063091
STATE OF ILLINOIS

Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Ramboll Americas Engineering Solutions, Inc., f/k/a O'Brien & Gere Engineers, Inc.
Date: September 29, 2020

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