Cynthia Vodopivec
Illinois Power Resources Generating, LLC
Luminant
6555 Sierra Dr.
Irving, TX 75039

September 29, 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: Edwards Power Station Alternative Closure Demonstration

Dear Administrator Wheeler:

Illinois Power Resources Generating, LLC (IPRG) hereby 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) for the Ash Pond located at the Edwards Power Station near Peoria, Illinois. IPRG is requesting an extension pursuant to 40 C.F.R. § 257.103(f)(2) so that the Ash Pond may continue to receive CCR and non-CCR wastestreams after April 11, 2021, and complete closure no later than October 17, 2028.

Enclosed is a demonstration prepared by Burns & McDonnell that 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. If you have any questions regarding this submittal, please contact Phil Morris at 618-343-7794 or phil.morris@vistracorp.com.

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

Illinois Power Resources Generating, LLC

Edwards Power Station
Project No. 122702

Revision 0
9/28/2020

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

prepared for

Illinois Power Resources Generating, LLC
Edwards Power Station
Peoria, Illinois

Project No. 122702

Revision 0
9/28/2020

prepared by

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

INDEX AND CERTIFICATION

Illinois Power Resources Generating, LLC
CCR Surface Impoundment
Demonstration for a Site-Specific Alternative to Initiation of Closure Deadline
Project No. 122702

Report Index

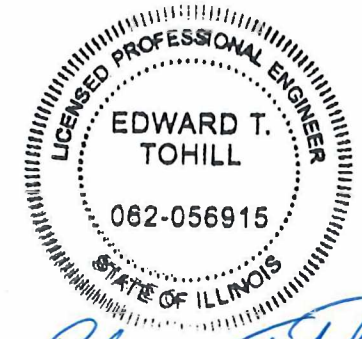
Certification

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 Illinois Power Resources Generating, LLC or others without specific verification or adaptation by the Engineer.

Edward T. Tohill

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

Date: 09/28/20



Edward T. Tohill
09/28/20
LIC. EXPIRES 11/30/21

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LIST OF ABBREVIATIONS

Abbreviation	Term/Phrase/Name
CCR	Coal Combustion Residual
CFR	Code of Federal Regulations
Edwards	Edwards Power Station
ELG Rule	Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category
EPA	Environmental Protection Agency
IPRG	Illinois Power Resources Generating, LLC
RCRA	Resource Conservation and Recovery Act
SWPPP	Stormwater Pollution Prevention Plan

1.0 EXECUTIVE SUMMARY

Illinois Power Resources Generating, LLC ("IPRG") 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 Ash Pond located at the Edwards Power Station ("Edwards") in Illinois. The Ash Pond is a 91-acre CCR surface impoundment used to manage CCR and non-CCR wastestreams at Edwards. As discussed herein, the boilers at the station will retire and the impoundment will complete closure no later than October 17, 2028. Therefore, IPRG is requesting an extension pursuant to 40 C.F.R. § 257.103(f)(2) so that the Ash Pond may continue to receive CCR and non-CCR waste streams after April 11, 2021, and complete closure no later than October 17, 2028.

2.0 INTRODUCTION

Edwards is a 585-megawatt coal-fueled electric generating station near Peoria, Illinois, that utilizes a 91-acre impoundment to manage sluiced bottom ash, economizer ash, dry fly ash (when not hauled offsite for beneficial use), and non-CCR wastewaters. All fly ash is handled dry. The impoundment was constructed in 1960 and has been in service for the life of the plant. Units 2 and 3 remain in operation, and Unit 1 has already ceased operation. Units 2 and 3 are scheduled to cease operation by December 31, 2022, pursuant to a consent decree entered by the U.S. District Court for the Central District of Illinois in *NRDC et al. v. Illinois Power Resources, LLC*, No. 13-01181 (C.D. Ill. Nov. 14, 2019). The various non-CCR wastewaters originate from the boiler and turbine room sumps, water treatment neutralization sump, Unit 1 demineralizer sump, air preheater wash, coal pile runoff, nonchemical metal cleaning wastewater, yard/substation/track drains, and other stormwater sources. The Ash Pond location is shown on Figure 1 in Appendix A, and the plant water balance diagram is included in Appendix B. The Ash Pond is referred to as both the North Ash Pond and the South Ash Pond on the water balance diagram; however, these are two portions of a single CCR unit.

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 IPRG seeks to continue placing into the 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

As shown in Appendix A, Edwards is located between U.S. Highway 24 and the Illinois River. The Ash Pond receives both the CCR sluice flows and the non-CCR wastewater flows onsite (except for boiler blowdown, intake screen backwash, and non-contact cooling water). All remaining plant process flows are routed through the impoundment for treatment, as shown in Appendix B. The remaining impoundment onsite (stormwater runoff impoundment) is not authorized to receive the CCR sluice flows and is not large enough to independently treat the total volume of the plant process water flows.

3.2 CCR Wastestreams

IPRG evaluated each CCR wastestream placed in the Ash Pond at Edwards. For the reasons discussed below in Table 3-1, each of the following CCR wastestreams must continue to be placed in the Ash Pond at Edwards due to lack of alternative capacity both on and off-site.

Table 3-1: Edwards CCR Wastestreams

CCR Wastestreams	Average Flow (MGD)	Alternative Disposal Capacity Available? YES/NO	Details
Dry Fly Ash (includes air heater ash)	NA (dry)	NO	The fly ash is collected dry and is currently conditioned. After conditioning, some of the fly ash is transported off-site for beneficial reuse. The remaining conditioned fly ash is placed in the Ash Pond, which will facilitate pond closure in the near future. This beneficial reuse of the fly ash will be reflected in the pond closure plan. IPRG 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. IPRG does not have a contract with an offsite landfill for this material. The inactive Duck Creek landfill is located approximately 30 miles from Edwards but is not available to accept fly ash. During the operation of the Duck Creek Power Station and the active use of the landfill, fly ash materials from Edwards were periodically transported to and placed in the landfill. However, with Duck Creek's retirement in 2019, the landfill is now used on a very limited and intermittent basis for the disposal of materials generated at the power station during the retirement process and otherwise remains inactive with only the minimal IEPA-required landfill operations and maintenance activities performed to maintain its inactive state until ultimate closure in the near future. Also, no landfill operator remains at the site and the former access and site entrances have been closed/rerouted. Development of alternate offsite disposal capacity would raise both safety and environmental concerns associated with transporting and disposing of significant amounts of material off-site.

CCR Wastestreams	Average Flow (MGD)	Alternative Disposal Capacity Available? YES/NO	Details
Fly Ash Sluice	0	NA	Backup sluicing system has not been used for 4-5 years. IPRG will no longer use this system as required by the ELG rule.
Emergency Silo Ash Sluice	0	NA	IPRG will no longer use this system as required by the ELG rule.
Bottom Ash, Economizer Ash, and non-CCR Pyrites Sluice	1.98	NO	There is no potential alternative for on or off-site disposal of this wet-generated CCR wastestream.

For the bottom ash, economizer ash, and associated non-CCR pyrites sluice flows, there is no currently available onsite infrastructure to support dry handling of the ash or elimination of these wastestreams. As stated previously, since IPRG has elected to pursue the option to permanently cease the use of the coal fired boilers by a date certain, developing alternative disposal capacity is "illogical," to use EPA's words, and also counterproductive to the work to retire the boilers and close the impoundments. As long as IPRG continues to wet handle the bottom ash and economizer ash material, there are no other onsite CCR impoundments to receive and treat these flows and it is not feasible to dispose of the wet-handled material offsite. The remaining impoundment onsite (stormwater runoff pond) is not authorized to receive the CCR sluice flows. 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 Edwards satisfy the demonstration requirement in § 257.103(f)(2)(i).

For the reasons discussed above, the dry fly ash material must also continue to be placed in the Edwards Ash Pond due to lack of existing alternative disposal capacity both on and off-site. Consequently, in order to continue to operate and generate electricity, Edwards must continue to use the 91-acre CCR surface impoundment to manage the CCR wastestreams discussed above.

3.3 Non-CCR Wastestreams

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

Table 3-2: Edwards Non-CCR Wastestreams

Non-CCR Wastestreams	Average Flow (MGD)	Alternative Disposal Capacity Currently Available? YES/NO	Details
Coal Pile Runoff (and coal handling wash water)	0.056	NO	Coal pile runoff would need to be rerouted to a new sump for discharge to an existing or new permitted outfall. This flow would require a new non-CCR impoundment for adequate TSS removal and surge capacity to meet the discharge limits, and there is not adequate space available onsite for this new pond.
Yard Drains (includes service water tower flush), Substation Drains, and Track Drains	0.04	NO	Stormwater basin would need to be expanded and the site drainage system would need to be redesigned and modified. Additional sumps and piping may need to be installed for discharge to an existing or new permitted outfall.
Fly Ash Truck Wash Water	Intermittent	NO	Additional piping would need to be installed to reroute to a new effluent tank and treatment system for discharge to a new or existing permitted outfall.
Boiler and Turbine Room Sumps (including floor drains, ash hopper overflow, and miscellaneous uses and drains)	1.09	NO	Additional piping would need to be installed to reroute the flow to a new effluent tank for discharge to an existing or new permitted outfall. This flow would require a new non-CCR impoundment or a wastewater treatment system for adequate TSS removal to meet the discharge limits. There is not adequate space available onsite for a new pond and there is not an available wastewater treatment system.

Non-CCR Wastestreams	Average Flow (MGD)	Alternative Disposal Capacity Currently Available? YES/NO	Details
Neutralization Sump (including water treatment wastewaters such as clarifier blowdown, pressure filter backwash, RO Reject, and Unit 3 demineralizer regeneration flows)	0.074	NO	Additional sumps and piping would need to be installed to reroute to a new effluent tank for discharge to an existing or new permitted outfall.
Unit 1 Demineralizer Sump	0	NO	Additional piping would need to be installed to reroute to a new effluent tank for discharge to an existing or new permitted outfall.
Air Preheater Wash Water	Intermittent	NO	Additional piping would need to be installed to reroute to the existing neutralization sump. From the sump, water would need to be routed to a new effluent tank and treatment system for discharge to a new or existing permitted outfall.

As noted in Table 3-2, there is potential to discharge a portion of these non-CCR flows to other locations; however, this would require permit modifications and installation of new piping and potentially a new treatment system including non-CCR ponds, clarifiers, and/or storage tank(s). As stated previously, since IPRG has elected to pursue the option to permanently cease the use of the coal fired boilers by a certain date, developing alternative disposal capacity is "illogical," to use EPA's words, and also counterproductive to the work to retire the boilers and close the impoundments. There is currently no available infrastructure at the plant to support reroute of these flows. For the reasons discussed above, each of the following non-CCR wastestreams must continue to be placed in the Ash Pond due to lack of alternative capacity both on and off-site. Consequently, in order to continue to operate and generate electricity, Edwards must continue to use the 91-acre 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, IPRG has prepared and attached a Risk Mitigation Plan for the Edwards Ash Pond (see Attachment 1).

5.0 DOCUMENTATION AND CERTIFICATION OF COMPLIANCE

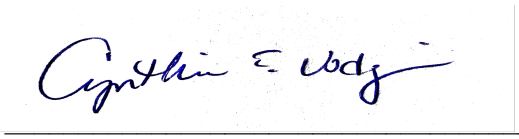
In the Part A rule preamble, EPA reiterates that compliance with the CCR rule is a prerequisite to qualifying for an alternative closure extension, as it "provides some guarantee that the risks at the facility are properly managed and adequately mitigated." 85 Fed. Reg. at 53,543. EPA further stated 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, IPRG 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 Ash Pond at Edwards, 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 Edwards CCR compliance website is up-to-date and contains all the necessary documentation and notification postings.

On behalf of IPRG:



Cynthia Vodopivec
VP - Environmental Health & Safety
September 28, 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), IPRG 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 began at Edwards 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 May 2018. The results, through the 2020 monitoring period, indicate that the Edwards Ash Pond is currently in assessment monitoring, with no exceedances of the Appendix IV parameters. Accordingly, an assessment of corrective measures is not currently required at the site. Edwards will continue to conduct groundwater monitoring in accordance with all state and federal requirements.

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 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 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 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." An addendum to the closure plan for the Ash Pond 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, Edwards will begin construction of the Ash Pond closure by April 17, 2026 in order for closure to be completed by this deadline.

Table 6-1 is included below to summarize the major tasks and estimated durations associated with closing the Ash Pond in place. These durations are consistent with the durations experienced in the closure of over 500 acres of other CCR impoundments already completed by IPRG and its affiliates to date. The design, permitting, and procurement efforts will take place while the unit is still in operation. The first major construction effort will be to dewater the impoundment, which is anticipated to take six months after mobilization. IPRG will likely release pond water through the existing Outfall 001 and employ pumps as necessary, and potentially an engineered dewatering system such as wellpoints to aid in stabilizing the material. As the water level is lowered and the material is stabilized, the contractor will work across the pond re-grading the existing CCR material to achieve positive drainage. As grading is completed in certain areas, the contractor may begin placing the final cover system which will consist of an 18-inch infiltration layer and 6-inch erosion layer in accordance with the requirements of the CCR Rule (or an alternative cover system that meets these minimum standards). The schedule for this cover installation will overlap with the grading schedule and is expected to finish approximately four months after grading is completed. Once cover is placed, the area will be seeded and stabilized. Two months were included to allow vegetation to establish and post-closure care to be initiated. Closure is essentially completed once the erosion control layer is placed, so these two months provide additional float to the schedule.

Table 6-1: Edwards 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 • General NPDES Permit for Storm Water Discharges from Construction Site Activities and Storm Water Pollution Prevention Plan (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 2022.	21
Spec, bid, and Award Construction Services for CCR Impoundment Closure	3
Begin Construction of Closure/Final Receipt of non-CCR Wastestreams	April 17, 2026
Dewater Impoundment	6
Regrade CCR Material	18
Install Cover System*	12
Establish Vegetation, Perform Site Restoration Activities, Complete Closure, and Initiate Post-Closure Care	2
Total Estimated Time to Complete Closure	69 months
Date by Which Closure Must be Complete	October 17, 2028

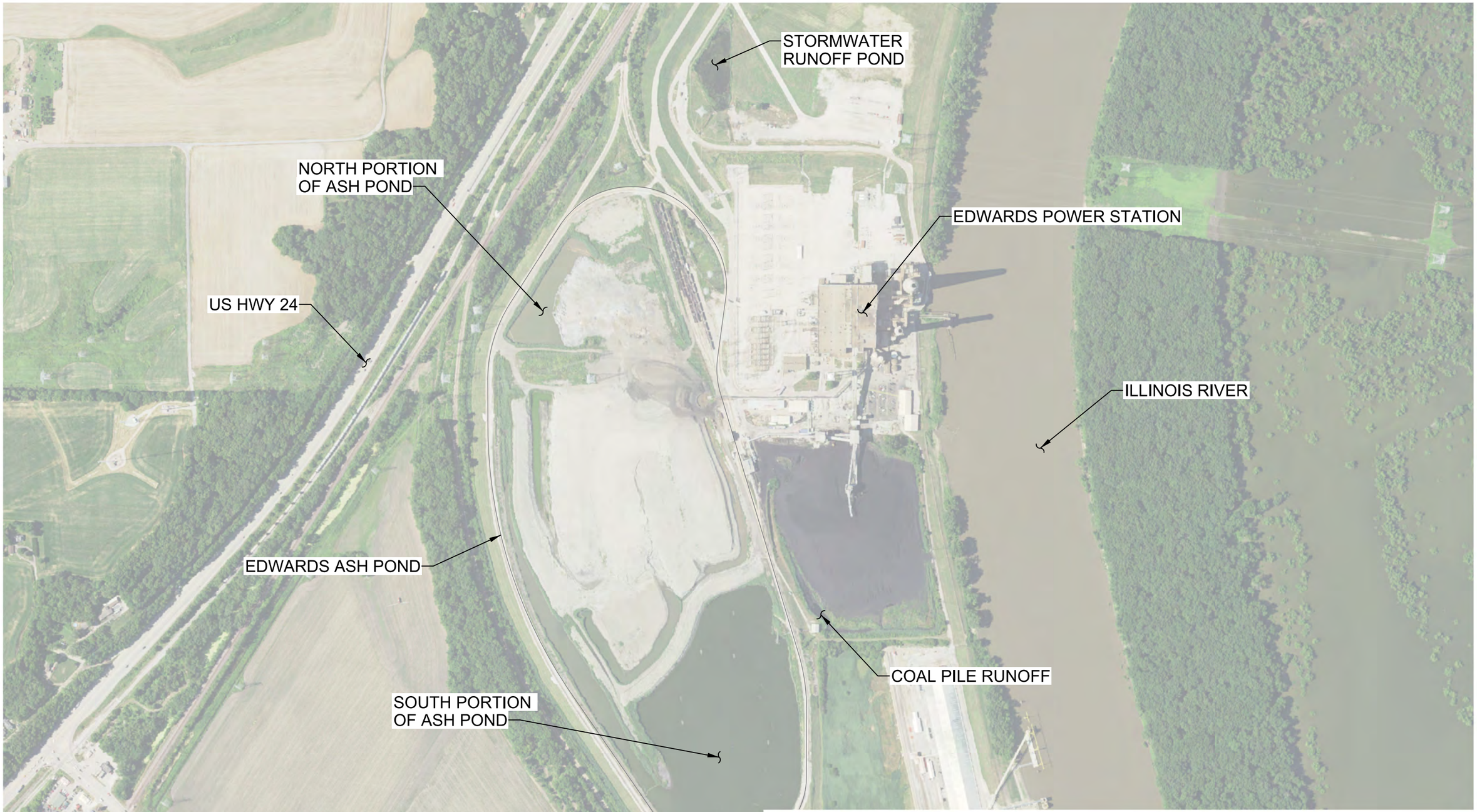
* Activity expected to overlap with grading operations, finishing 4 months after grading is completed.

7.0 CONCLUSION

Based upon the information included in and attached to this demonstration, IPRG has demonstrated that the requirements of 40 C.F.R. § 257.103(f)(2) are satisfied for the 91-acre Ash Pond at Edwards. 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 boilers at the station will cease coal-fired operation and the 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 IPRG's demonstration and authorize the Ash Pond at Edwards 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



BURNS McDONNELL

date 03/05/2020

designed A. MYERS

LUMINANT

EDWARDS POWER STATION
SITE PLAN

project 122702

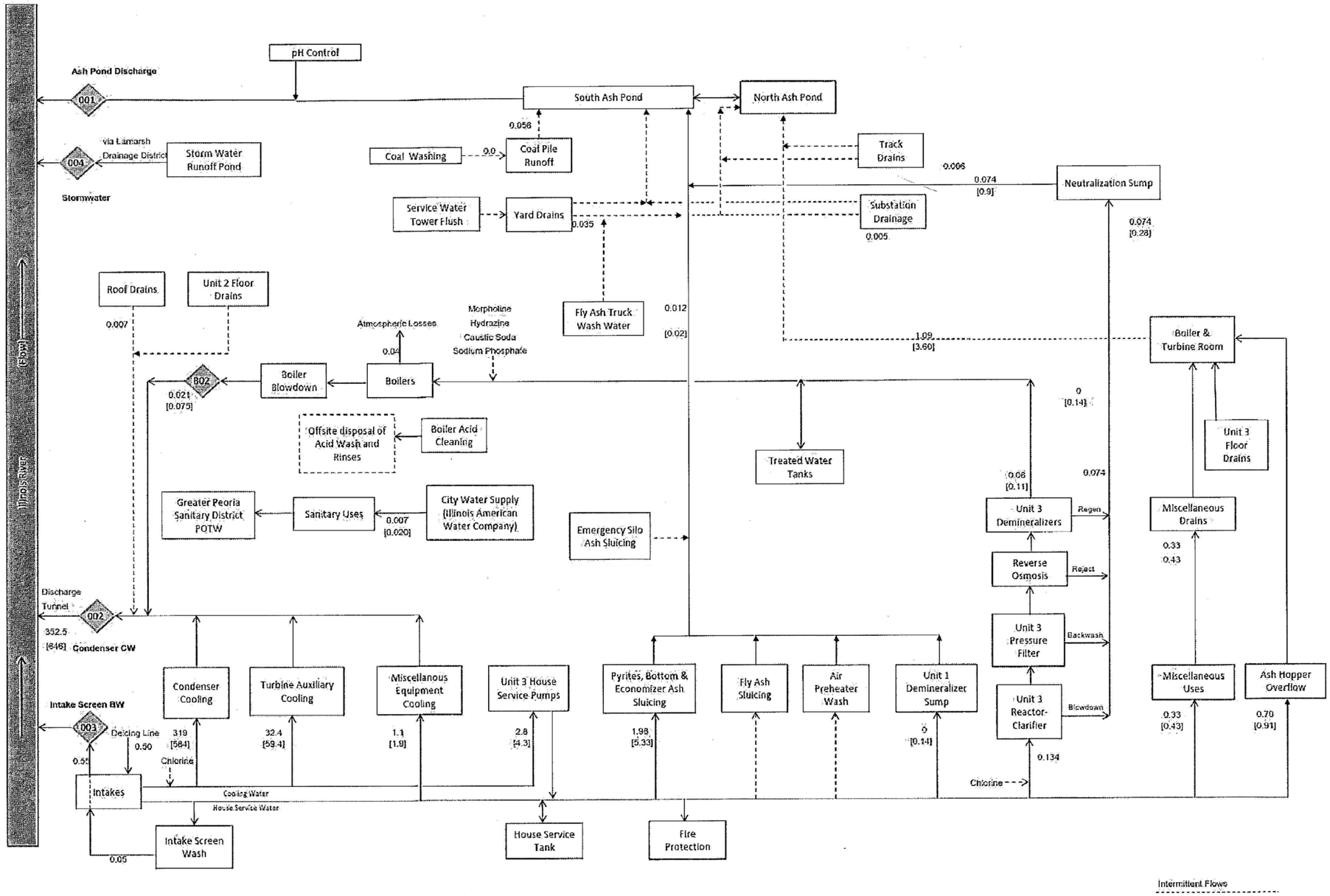
contract -

dwg **FIGURE 1**

9/18/2020

\\bmcd\dfs\Clients\ENR\VistraEnergy\122702_ALTuseDisposal\Design\Civil\Dwgs\Sketches\Edwards_Figure 1.dgn

APPENDIX B – WATER BALANCE DIAGRAM



Notes:
1. Flows shown as: Average [Maximum]
2. Flow units = Million Gallons per Day
3. Flows for Outfalls 001,002, 003 and 004 from 2015 NPDES Balances

REFERENCE DRAWINGS

NO.	DATE	REVISION	BY	APPROVED
B	9/21/17	RECORD REVISION	CWB	M.DAVIS / M.DAVIS
A1	12/11/15	CLIENT REVIEW	KB	MR / AB
A0	11/4/15	INITIAL ISSUE	KC	MH / WP

SCALE: SCALE

DWN. K.CHEONG	DATE 11/4/15
CHK. M.HEERMAN	DATE 11/4/15
APPV. W.PATEL	DATE 11/4/15

DYNEGY

EFFLUENT LIMITATION GUIDELINES COMPLIANCE PLANNING STUDY
PRELIMINARY WATER BALANCE – EDWARDS

PROJECT NO.:
CLIENT: S&L
DWG. NO.: C175-M150
REV. B

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, Illinois Power Resources Generating, L.L.C. ("IPRG") has prepared this Risk Mitigation Plan for the Ash Pond located in at the Edwards Power Station ("Edwards") in Bartonville, Illinois.

- 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, IPRG plans to continue to mitigate the risks to human health and the environment from the Edwards 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 Edwards Ash Pond is a 91-acre CCR surface impoundment. Consistent with the requirements of the CCR rule, compliance documents on Edward's CCR public website reflect the characterization of the Ash Pond as a single unit for purposes of groundwater monitoring and closure activities.

The Edwards CCR surface impoundment receives CCR transport waters from bottom ash and economizer ash plus non-CCR process waters on-site before discharging to the Illinois River via Outfall 001 in accordance with NPDES Permit No. IL0001970.

At the Edwards Ash Pond, none of the Appendix IV parameter have reported SSLs, or SSLs above their respective Ground Water Protection Standards (GWPSs) as sampled and analyzed per the ash impoundment's groundwater monitoring program. Therefore, Edwards' current physical treatment operation adequately limits potential risks to human health and the environment during operation. Edwards 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.

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 surface impoundment.

As part of normal operations, bottom ash is transported through the sluice lines into the CCR surface impoundment. The ash enters a settling basin where the solids settle out. These solids are periodically dipped from the basin and stacked on site for dewatering. Some of the bottom ash is then 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 CCR surface impoundment and bottom ash solids are removed from the CCR surface impoundment, the current operation of Edwards' CCR surface 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, IPRG will test, evaluate, and implement a chemical treatment method (i.e. pH adjustment, coagulation, precipitation, or other method as determined) for the Edwards 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 Edwards Ash Pond, with a footprint of approximately 91 acres (Figure 1), currently remains in assessment monitoring. There have been no statistically significant levels (SSLs) of Appendix IV parameter concentrations since assessment monitoring was established on April 9, 2018 in accordance with 40 CFR § 257.95. The most recent summary of groundwater monitoring activities is provided in the "2019 Annual Groundwater Monitoring and Corrective Action Report, Edwards Ash Pond, Edwards Power Station" (Ramboll, 2020) [see Attachment 1]. A summary of the assessment monitoring program is provided in Table 1. Since there have been no SSLs or GWPS exceedances to date, no plume delineation maps have been necessary.

Receptors

Should a release to groundwater for one or more Appendix IV parameters occur in the future, the two primary risks to human health and the environment are via groundwater exposure and surface water exposure. Groundwater exposure would be via ingestion or dermal contact, both of which are likely an incomplete exposure pathway for CCR-related constituents originating from the Edwards Ash Pond. Impacted groundwater potentially migrating to nearby surface water bodies – specifically the Illinois River located approximately 1,100 feet east of the north end of the Edwards Ash Pond and 1,500 feet east of the south end – could be an exposure pathway, but does not pose a risk for the reasons discussed below.

There are no industrial, commercial or domestic use water wells in a downgradient or cross-gradient groundwater flow direction relative to the Edwards Ash Pond that are at risk of impacts from a release. In addition, there are no surface water intakes on the Illinois River within 2,500 feet of the Edwards property line.

Ambient groundwater flow in the Uppermost Aquifer beneath the Edwards Ash Pond is generally west to west-southwest beneath the north portion of the impoundment, swinging around to southwest and south beneath the south end, eventually discharging into the Illinois River south of Edwards. The hydraulic gradient from the river to the west side of the impoundment under normal ambient conditions typically ranges from 0.002 to 0.003 ft/ft, becoming steeper towards the southern end of the impoundment as groundwater begins flowing southward back towards the Illinois River. Groundwater flow velocity within the Uppermost Aquifer ranged from approximately 0.001 to 0.12 ft/day as groundwater flowed from the Illinois River towards a bedrock channel beneath the impoundment in January 2017. During May 2017 velocities were slightly higher in portions of the site and ranged from 0.001 to 0.185 ft/day. In general, the flow velocity is slower near the river and increases in the southwest portion of the site (refer to the description of hydrogeology attached to the alternative closure demonstration letter).

Exposure Mitigation

Mitigation of future potential exposures to groundwater contamination from continued operation of the Edwards 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 Edwards Ash Pond are based on impacts to the Uppermost Aquifer. The Uppermost Aquifer consists of unconfined clays and silts of the Upper Cahokia, where saturated, and the thin, moderate permeability sands and gravels of the Lower Cahokia Formation which at some locations also includes the bedrock interface. The thickness of the sand and gravel unit was measured up to 4 feet within a bedrock channel, although the sand and gravel is not laterally continuous. The unlithified deposits are underlain by Pennsylvanian age bedrock, much of which is shale, of the Carbondale Formation. The top of rock was described as shale, siltstone, and shaley limestone based on borings which were advanced to rock (refer to the description of hydrogeology attached to the alternative closure demonstration letter).

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 containments. 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 on-site or off-site landfill, in-situ solidification/stabilization) to mitigate groundwater impacts are typically considered as part of a CMA process upon closure of the Edwards Ash Pond, the shorter-term options considered for mitigating groundwater impacts relative to a potential future release of one or more Appendix IV parameters at Newton are as follows:

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

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.

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

Upon notification of a release of one or more Appendix IV constituent(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.

Groundwater Extraction

This corrective measure includes installation of a series of 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 test if a well system is the best option for intercepting the groundwater contaminant plume. 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.

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 will typically 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 at the on-site wastewater treatment plant and discharge via the NPDES permitted outfall.

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 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. For a cutoff wall to be technically feasible, there must be a low-permeability lower confining layer into which the barrier can be keyed, and it must be at a technically feasible depth.

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.

Design of PRB systems requires rigorous site investigation to characterize the site hydrogeology and to delineate the contaminant plume. A thorough understanding of the geochemical and redox characteristics of the plume is critical to assess the feasibility of the process and select appropriate reactive media. Laboratory studies, including batch studies and column studies using samples of site groundwater, are needed to determine the effectiveness of the selected reactive media at the site (EPRI, 2006).

This is a potential viable option for groundwater corrective measures, to be evaluated further, but is not a short-term solution that can be implemented expeditiously.

In-Situ Chemical Treatment

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. Implementation of in-situ chemical treatment requires detailed technical analysis of field hydrogeological and geochemical conditions along with laboratory studies.

This is a potential viable option for groundwater corrective measures, to be evaluated further, but is not a short-term solution that can be implemented expeditiously.

3.1 CONTAINMENT PLAN

Based on the options evaluated for containment of a future potential groundwater contaminant plume originating from the Edwards 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 or recovery trench system, which would allow for capture of impacted groundwater and prevention of further plume migration towards the principal potential receptor, which has been identified as the Illinois River.

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. The principal method under consideration for controlling potential future Appendix IV constituent releases is MNA. MNA is a potentially viable corrective measure that will be further evaluated for use at the Edwards Ash Pond.

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

Ramboll, 2020. 2019 Annual Groundwater Monitoring and Corrective Action Report, Edwards Ash Pond, Edwards Power Station. 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, Edwards Ash Pond

Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSL(s) Appendix IV	SSL(s) Determination Date	ASD Completion Date	CMA Completion / Status
May 5-7 and 29, 2018	July 9, 2018	Appendix III Appendix IV	NA	NA	NA	NA
July 27, August 24, 27, 2018	October 8, 2018	Appendix III Appendix IV Detected[1]	None	January 7, 2019	NA	NA
February 27, 2019	April 15, 2019	Appendix III Appendix IV	None	July 15, 2019	NA	NA
August 6, 2019	October 15, 2019	Appendix III Appendix IV Detected[1]	None	January 13, 2020	NA	NA
February 27-28, 2020	April 15, 2020	Appendix III Appendix IV Detected	None	July 14, 2020	NA	NA

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

Notes:
CMA = Corrective Measures Assessment
NA = Not Applicable
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).

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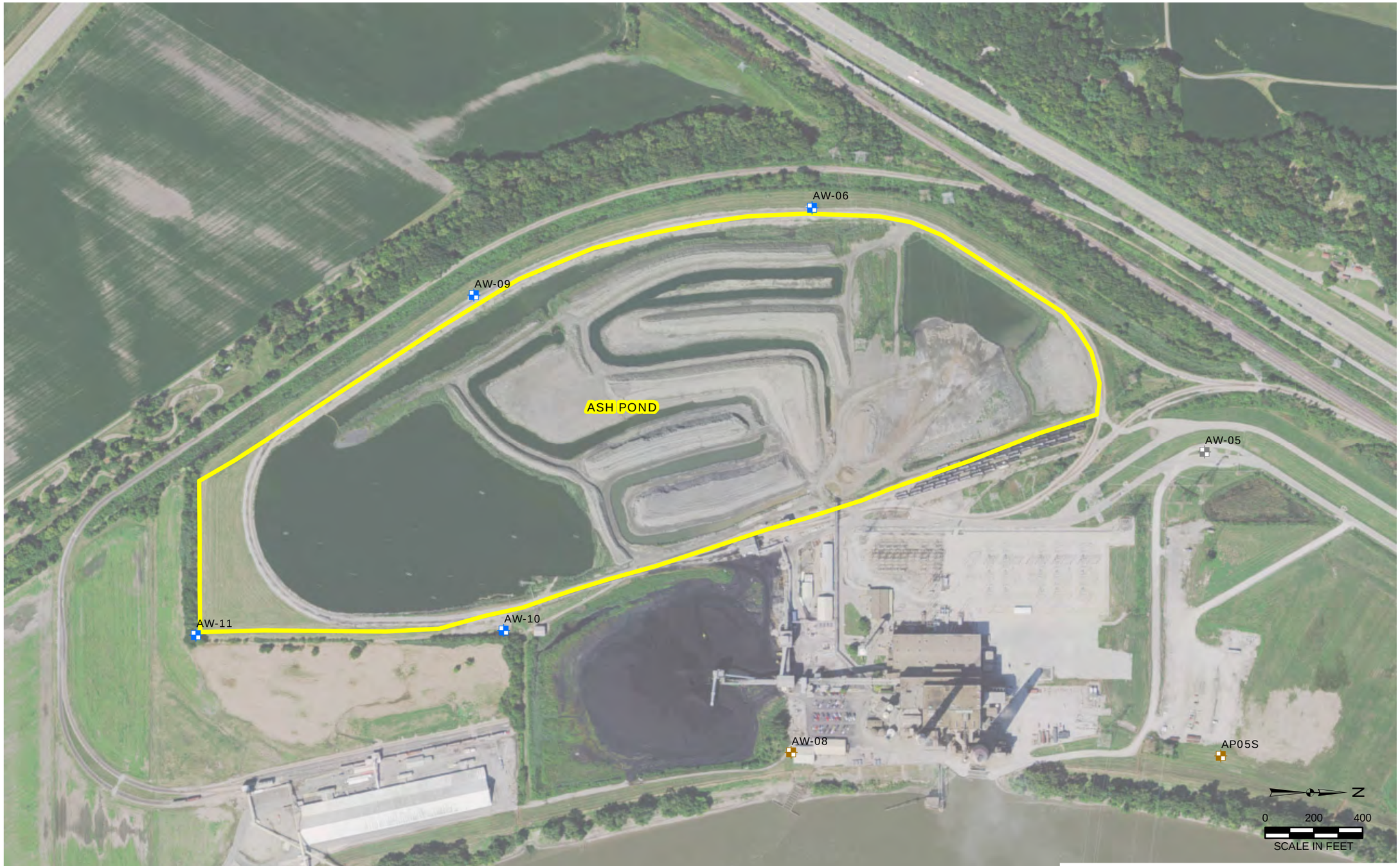
FIGURES



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SITE AND WELL LOCATION MAP
EDWARDS ASH POND
UNIT ID: 301

SAMPLING AND ANALYSIS PLAN
DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

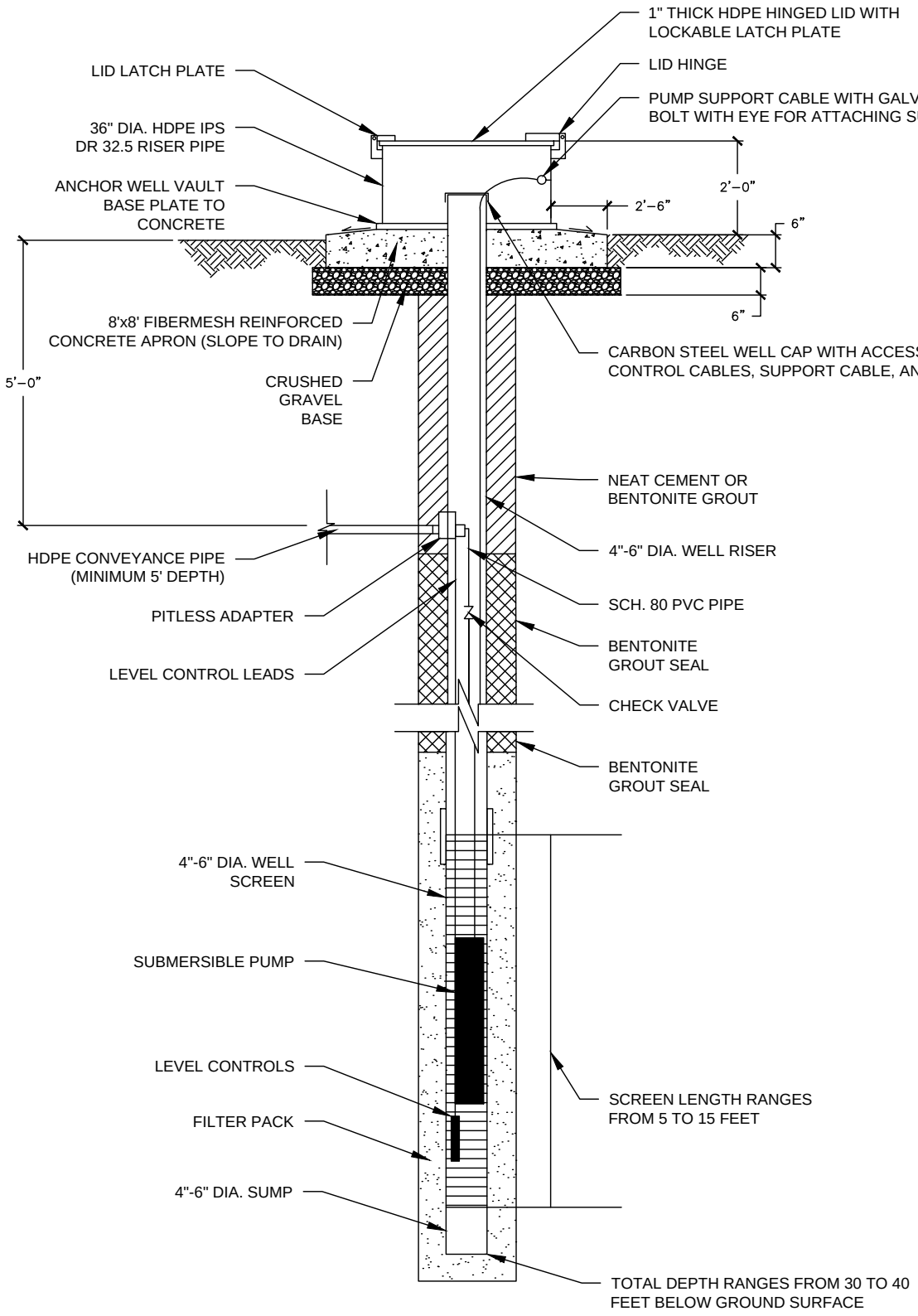
DRAWN BY/DATE: SDS 9/8/17
REVIEWED BY/DATE: YAD 9/8/17
APPROVED BY/DATE: SJC 9/12/17

PROJECT NO: 2285/4.3

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY

Y:\Mapping\Projects\2212285\MXD\SAP\RevisedFigure 1_Site and Well Location Map - Edwards Ash Pond_170908.mxd Author: stolzsd Date/Time: 9/12/2017, 4:25:48 PM



NOTES
1. NOT TO SCALE

TYPICAL HYDRAULIC GRADIENT CONTROL WELL DETAIL

FIGURE 2

ILLINOIS POWER RESOURCES GENERATING, L.L.C
EDWARDS ASH POND
BARTONSVILLE, ILLINOIS

RAMBOLL US CORPORATION
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ATTACHMENT 1

Prepared for

Illinois Power Resources Generating, LLC

Document type

2019 Annual Groundwater Monitoring and Corrective Action Report

Date

January 31, 2020

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

EDWARDS ASH POND, EDWARDS POWER STATION

RAMBOLL Bright ideas. Sustainable change.

2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
EDWARDS ASH POND, EDWARDS POWER STATION

Project name	**Edwards Power Station**
Project no.	**72754**
Recipient	**Illinois Power Resources Generating, LLC**
Document type	**Annual Groundwater Monitoring and Corrective Action Report**
Version	**FINAL**
Date	**January 31, 2020**
Prepared by	**Kristen L. Theesfeld**
Checked by	**Nathaniel R. Keller**
Approved by	**Eric J. Tlachac**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

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ACRONYMS AND ABBREVIATIONS

AP	Ash Pond
CCR	Coal Combustion Residuals
GWPS	Groundwater Protection Standard
SAP	Sampling and Analysis Plan
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 Edwards Ash Pond (AP) located at Edwards Power Station near Bartonville, Illinois.

Groundwater is being monitored at Edwards AP 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).

No Statistically Significant Levels (SSLs) of 40 C.F.R. Part 257 Appendix IV parameters were determined in 2019 and Edwards AP remains in the Assessment Monitoring Program.

1. INTRODUCTION

This report has been prepared by Ramboll on behalf of Illinois Power Resources Generating, LLC, to provide the information required by 40 C.F.R.§ 257.90(e) for Edwards AP located at Edwards Power Station near Bartonville, 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 Edwards AP 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 Edwards AP 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 May and June/July 2018 sampling events were provided in the 2018 Annual Groundwater Monitoring and Corrective Action Report.

Table A – 2018-2019 Assessment Monitoring Program Summary

Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSL(s)	SSL(s) Determination Date
May 5-7 and 29, 2018	October 10, 2018	Appendix III Appendix IV	NA	NA
July 27 - August 27, 2018	October 10, 2018	Appendix III Appendix IV Detected [1]	None	January 7, 2019
February 27, 2019	April 15, 2019	Appendix III Appendix IV	None	July 15, 2019
August 6, 2019	October 15, 2019	Appendix III Appendix IV Detected [1]	NA	TBD

Notes:

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. § 257.95(d)(1).

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, Edwards Ash Pond, Edwards Power Station, Bartonville, Illinois, Project No. 2285, Revision 0, October 17, 2017.

Natural Resource Technology, an OBG Company (NRT/OBG), 2017b. Statistical Analysis Plan, Duck Creek Power Station, Edwards Power Station, Illinois Power Resources Generating, LLC, October 17, 2017.

TABLES

TABLE 1.
2019 ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
EDWARDS POWER STATION
UNIT ID 301 - EDWARDS ASH POND
BARTONVILLE, 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												
AP-05S	40.598814	-89.661916	2/27/2019 10:07	5.50	438.03	0.29	91	40	<0.250	7.1	4.0	880
			8/6/2019 13:16	3.22	440.31	0.24	110	37	<0.250	7.1	<1.0	900
AW-08	40.593964	-89.661996	2/27/2019 7:40	19.50	443.04	0.12	140	17	0.270	7.1	9.6	670
			8/6/2019 14:02	19.74	442.80	0.10	130	19	0.287	7.3	20	700
Downgradient Monitoring Wells												
AW-06	40.594237	-89.670051	2/27/2019 11:09	26.00	435.57	0.13	110	35	0.280	7.3	29	580
			8/6/2019 9:52	27.45	434.12	0.093	120	33	0.393	7.2	29	580
AW-09	40.590422	-89.668777	2/27/2019 8:32	25.74	435.71	0.52	120	29	0.250	7.0	12	780
			8/6/2019 10:41	25.82	435.63	0.20	140	27	<0.250	7.2	<1.0	770
AW-10	40.590733	-89.663826	2/27/2019 13:25	0.94	438.99	0.47	130	85	<0.250	7.2	<1.0	1100
			8/6/2019 14:55	0.92	439.01	0.50	160	100	<0.250	7.3	<1.0	1200
AW-11	40.587261	-89.663781	2/27/2019 12:16	7.62	432.25	0.22	160	30	<0.250	7.2	<1.0	970
			8/6/2019 11:35	7.17	432.70	0.18	160	30	<0.250	7.2	<1.0	980

[O: RAB 12/20/19, 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
EDWARDS POWER STATION
UNIT ID 301 - EDWARDS ASH POND
BARTONVILLE, 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																		
AP-05S	40.598814	-89.661916	2/27/2019 10:07	<0.0030	0.0046	0.87	<0.0010	<0.0010	<0.0040	<0.0020	<0.250	<0.0010	0.020	<0.00020	0.0014	2.30	<0.0010	<0.0010
			8/6/2019 13:16[2]	NA	0.0067	1.1	<0.0010	NA	<0.0040	<0.0020	<0.250	<0.0010	0.031	NA	<0.0010	3.00	<0.0010	NA
AW-08	40.593964	-89.661996	2/27/2019 7:40	<0.0030	0.0190	0.22	<0.0010	<0.0010	<0.0040	<0.0020	0.270	<0.0010	<0.01	<0.00020	0.0049	0.402	<0.0010	<0.0010
			8/6/2019 14:02[2]	NA	0.0074	0.18	<0.0010	NA	<0.0040	<0.0020	0.287	<0.0010	0.017	NA	0.0037	3.95	<0.0010	NA
Downgradient Monitoring Wells																		
AW-06	40.594237	-89.670051	2/27/2019 11:09	<0.0030	0.0046	0.18	<0.0010	<0.0010	<0.0040	<0.0020	0.280	0.0013	<0.01	<0.00020	0.0051	0.357	<0.0010	<0.0010
			8/6/2019 9:52[2]	NA	0.020	0.35	<0.0010	NA	0.024	0.010	0.393	0.011	0.035	NA	0.0055	1.82	0.002	NA
AW-09	40.590422	-89.668777	2/27/2019 8:32	<0.0030	0.0019	0.22	<0.0010	<0.0010	<0.0040	0.0036	0.250	<0.0010	0.013	<0.00020	0.016	0.771	<0.0010	<0.0010
			8/6/2019 10:41[2]	NA	0.026	0.54	<0.0010	NA	0.017	0.011	<0.250	0.011	0.036	NA	0.015	1.94	0.0012	NA
AW-10	40.590733	-89.663826	2/27/2019 13:25	<0.0030	0.012	0.93	<0.0010	<0.0010	<0.0040	0.0037	<0.250	0.0024	0.040	<0.00020	0.028	1.79	<0.0010	<0.0010
			8/6/2019 14:55[2]	NA	0.019	1.5	0.0014	NA	0.050	0.026	<0.250	0.026	0.12	NA	0.0022	4.08	0.0033	NA
AW-11	40.587261	-89.663781	2/27/2019 12:16	<0.0030	0.013	0.76	<0.0010	<0.0010	<0.0040	0.0031	<0.250	0.0012	0.017	<0.00020	0.0053	2.33	<0.0010	<0.0010
			8/6/2019 11:35[2]	NA	0.018	0.88	<0.0010	NA	<0.0040	0.0023	<0.250	<0.0010	0.031	NA	0.0046	1.69	<0.0010	NA

[O: 12/20/19, 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
EDWARDS POWER STATION
UNIT ID 301 - EDWARDS ASH POND
BARTONVILLE, ILLINOIS
ASSESSMENT MONITORING PROGRAM

Parameter	Statistical Background Value (UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	0.42
Calcium (mg/L)	174
Chloride (mg/L)	44
Fluoride (mg/L)	0.376
pH (S.U.)	6.6 / 7.4
Sulfate (mg/L)	77.7
Total Dissolved Solids (mg/L)	940

[O: RAB 12/20/19, 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
EDWARDS POWER STATION
UNIT ID 301 - EDWARDS ASH POND
BARTONVILLE, 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)	0.019
Barium (mg/L)	2
Beryllium (mg/L)	0.014
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)	0.054
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

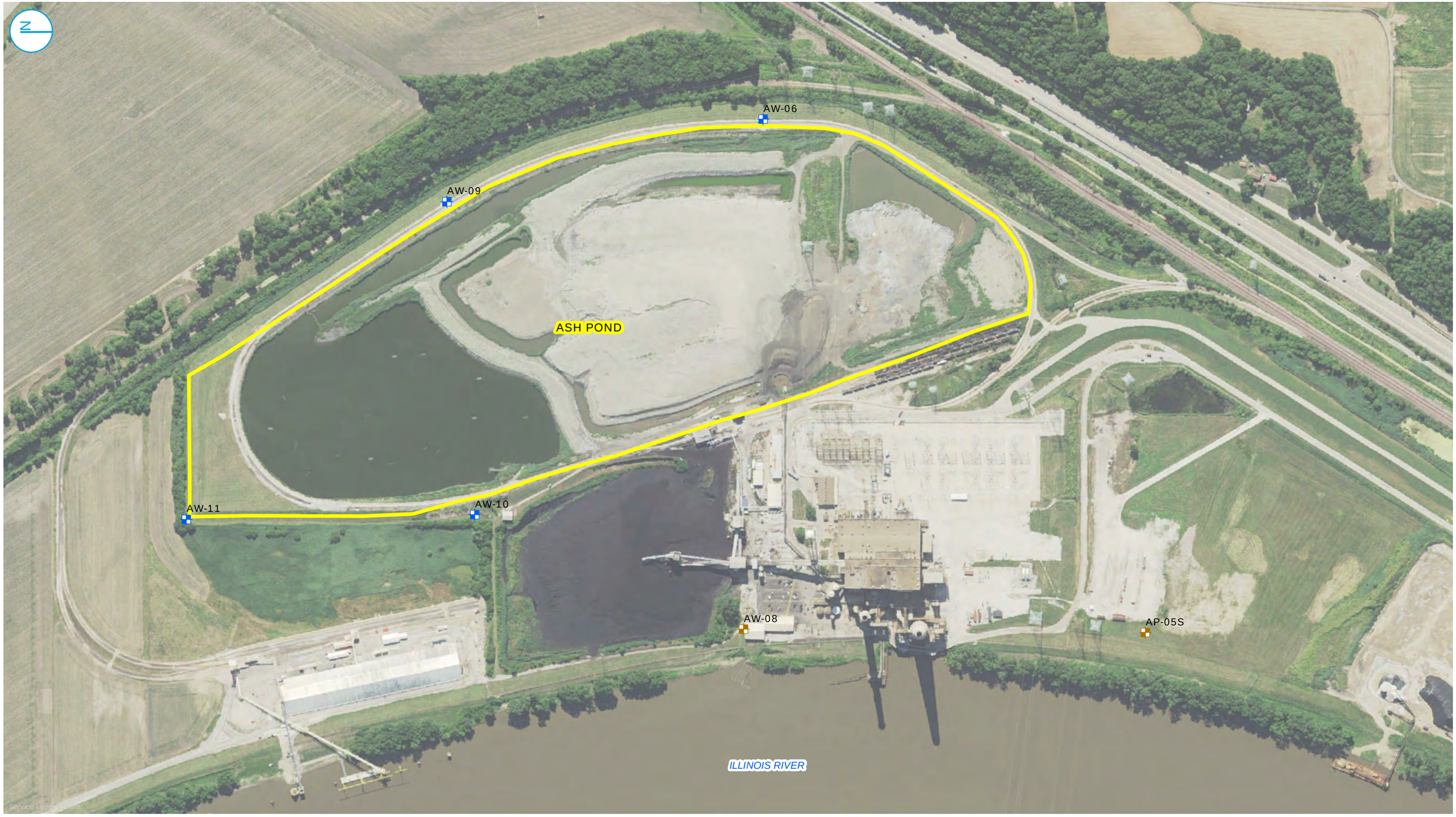
[O: RAB 12/20/19, C: KLT 12/23/19]

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\212285\MXD\2019_AnnualGWM_CAR\Figure 1_GWS_WellLoc_Edwards.mxd

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



- UPGRADIENT MONITORING WELL LOCATION
- DOWNGRADIENT MONITORING WELL LOCATION
- CCR MONITORED UNIT

0 200 400 Feet

MONITORING WELL LOCATION MAP
EDWARDS ASH POND
UNIT ID:301

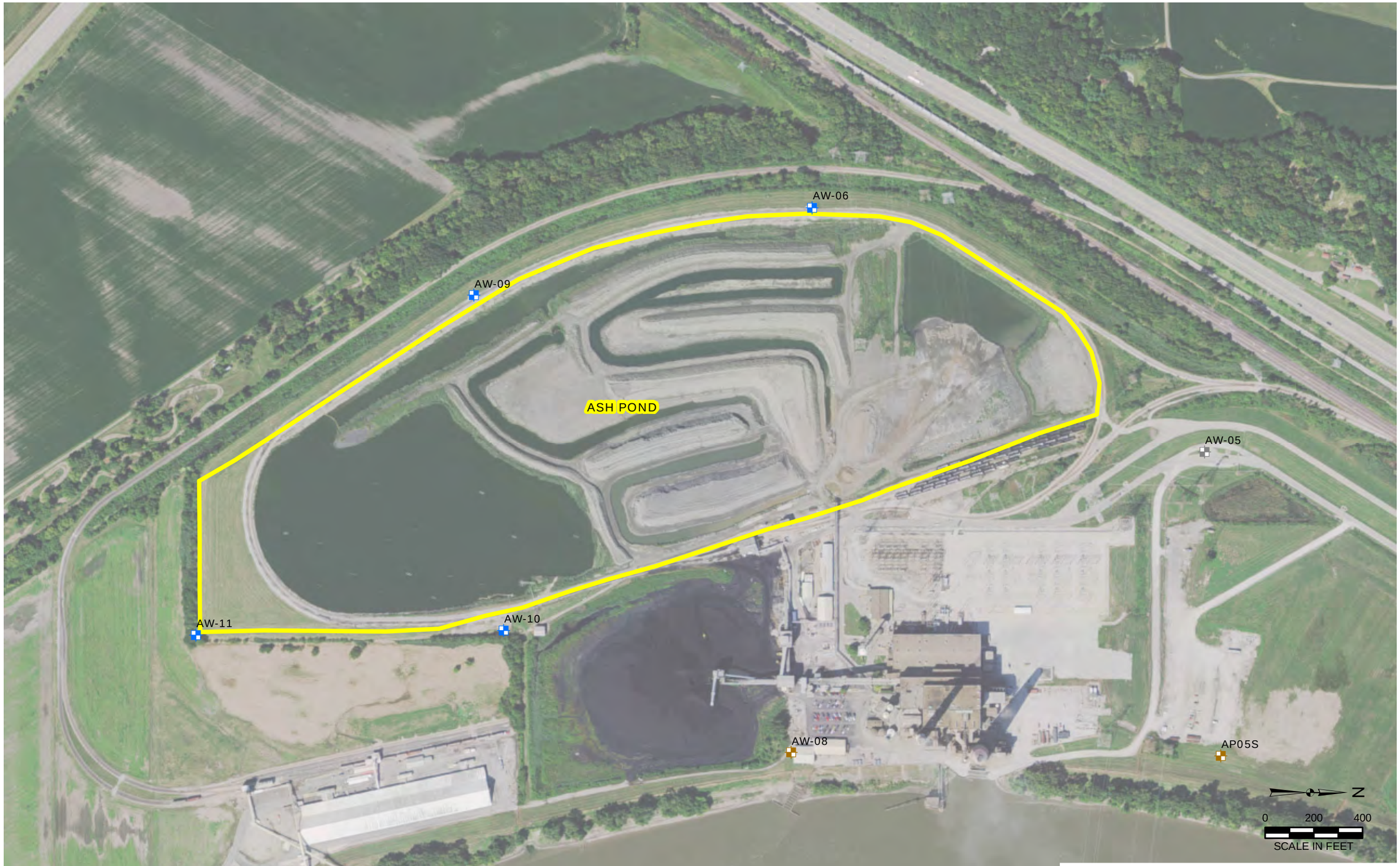
2019 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
VISTRA CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONVILLE, ILLINOIS

FIGURE 1

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

RAMBOLL

ATTACHMENT 2 – MAP OF GROUNDWATER MONITORING WELL LOCATIONS



Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

SITE AND WELL LOCATION MAP
EDWARDS ASH POND
UNIT ID: 301

SAMPLING AND ANALYSIS PLAN
DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

DRAWN BY/DATE: SDS 9/8/17
REVIEWED BY/DATE: YAD 9/8/17
APPROVED BY/DATE: SJC 9/12/17

PROJECT NO: 2285/4.3

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY

Y:\Mapping\Projects\2212285\MXD\SAP\RevisedFigure 1_Site and Well Location Map - Edwards Ash Pond_170908.mxd Author: stolzsd Date/Time: 9/12/2017, 4:25:48 PM

ATTACHMENT 3 – WELL CONSTRUCTION DIAGRAMS AND DRILLING LOGS

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/22/2015
Finish: 7/22/2015
WEATHER: Sunny, warm, mid-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-05
Well ID: AW-05
Surface Elev: 440.55 ft. MSL
Completion: 21.10 ft. BGS
Station: 1,432,339.67N
2,435,498.04E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 11, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 12.00 - during drilling
▼ = 6.62 - 7/22/15
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
							0	Black (10YR2/1), moist, medium, SILT with few clay and trace very fine- to fine-grained sand, roots.		440	
1A	16/24 67%	SS	2-3 2-7 N=5	20		2.00		FILL - Dark yellowish brown (10YR4/4), moist, stiff, SILT with few clay and trace very fine- to fine-grained sand.			
2A	17/24 71%	SS	5-7 7-7 N=14	21		2.00	2			438	
3A	18/24 75%	SS	2-2 2-2 N=4	23		0.80		FILL - Very dark grayish brown (10YR3/2), moist, stiff, silty CLAY with trace very fine-grained sand.			
4A	16/24 67%	SS	2-2 2-2 N=4	22		0.30	4			436	
5A	18/24 75%	SS	2-1 3-2 N=4	31		1.10		Dark grayish brown (10YR4/2) with 5% dark yellowish brown (10YR4/6) mottles, moist, medium, silty CLAY with trace fine-grained sand.			
6A	22/24 92%	SS	1-1 2-2 N=3	31		0.50	6			434	
7A	24/24 100%	SS	2-2 1-1 N=3	52		0.20		Brown (10YR5/3) with 5% gray (10YR5/1) mottles, moist, soft, CLAY with very fine- to fine-grained sand.			
8-1 5-2 8-3	24/24 100%	SH					8			432	
8-4				32		0.80		Gray (10YR5/1) with 15% dark yellowish brown (10YR3/4) mottles, moist, stiff, silty CLAY with trace very fine- to fine-grained sand.			
9A	24/24 100%	SS	1-2 2-4 N=4	32		0.30	10			430	
10A	18/24 75%	SS	1-1 3-14 N=4	39		0.30		Gray (10YR5/1) with 15% dark yellowish brown (10YR3/4) mottles, moist, soft, silty CLAY with trace very fine- to fine-grained sand.			
							12			428	
								Gray (10YR5/1) with 10% yellowish brown (10YR5/6) mottles, moist, soft, silty CLAY with trace coarse-grained sand.			
							14			426	
								Dark gray (10YR4/1), moist, medium, silty CLAY with trace very fine-grained sand.			
							16			424	
							18			422	
								Dark gray (10YR4/1), moist, hard, weathered SHALE.			
							20				

NOTE(S): AW-05 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/22/2015
Finish: 7/22/2015
WEATHER: Sunny, warm, mid-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-05
Well ID: AW-05
Surface Elev: 440.55 ft. MSL
Completion: 21.10 ft. BGS
Station: 1,432,339.67N
2,435,498.04E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 11, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 12.00 - during drilling
▼ = 6.62 - 7/22/15
▽ =

SAMPLE			TESTING						
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
	0/5 *0%*	☒ SS	*50/5"*					Dark gray (10YR4/1), moist, hard, weathered SHALE. *[Continued from previous page]*		420	

End of boring = 21.10 feet

NOTE(S): AW-05 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/29/2015
Finish: 8/3/2015
WEATHER: Sunny, warm, hi-80s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-06
Well ID: AW-06
Surface Elev: 459.19 ft. MSL
Completion: 42.25 ft. BGS
Station: 1,430,727.75N
2,434,495.33E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = Dry - during drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
	24/24 100%	BD					0	GRAVEL FILL	458	sample from cuttings
2A	24/24 100%	BD		24			2	FILL - Dark gray (10YR4/1) and brown (10YR4/3), moist, medium, silty CLAY with trace medium- to coarse-grained sand.	456	
3A	14/24 58%	SS	4-6 29-23 N=35	23			4			
4A	21/24 88%	SS	14-18 21-26 N=39	29			6	FILL - Very dark gray (10YR3/1), moist, hard, FLY ASH.	454	
5A	20/24 83%	SS	7-7 6-4 N=13	37			8	FILL - Very dark gray (10YR3/1), moist, medium, FLY ASH.	452	
6A	18/24 75%	SS	1-1 3-3 N=4	26			10	FILL - Very dark gray (10YR3/1), moist, soft, FLY ASH.	450	
7A	17/24 71%	SS	2-3 4-5 N=7	22		1.30	12	FILL - Dark gray (10YR4/1), moist, medium, SILT and FLY ASH with few clay and trace coarse-grained sand and small gravel.	448	
8A	14/24 58%	SS	1-1 3-3 N=4	22		0.50	14		446	
9A	17/24 71%	SS	4-6 5-6 N=11	23		0.70	16	Gray (10YR5/1) and brown (10YR5/3), moist, medium, SILT with few clay and trace medium- to coarse-grained sand and roots.	444	
10A	22/24 92%	SS	2-2 3-4 N=5	21		1.30	18		442	
							20	Very dark grayish brown (10YR3/2), moist, stiff, silty CLAY with trace very fine- to fine-grained sand.	440	

NOTE(S): AW-06 installed in bore hole. Well was constructed using a pre-packed screen.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/29/2015
Finish: 8/3/2015
WEATHER: Sunny, warm, hi-80s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-06
Well ID: AW-06
Surface Elev: 459.19 ft. MSL
Completion: 42.25 ft. BGS
Station: 1,430,727.75N
2,434,495.33E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = Dry - during drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11-1											
11-2	12/24 *50%*	SH				*0.80*					
11-3											
11-4				20			22	Dark gray (10YR4/1) with 10% dark grayish brown (10YR4/2) mottles, moist, medium, SILT with little clay and trace very fine- to fine-grained sand.		438	
12A	18/24 *75%*	SS	*3-4 6-7* N=10	22		*0.80*					
							24			436	
13A	22/24 *92%*	SS	*3-2 3-3* N=5	24		*0.50*		Dark gray (10YR4/1), moist, medium, SILT with few to little clay and trace fine- to medium-grained sand, woody material and shell fragments.		434	
14-1							26				
14-2	16/24 *67%*	SH				*0.50*				432	
14-3											
14-4				31			28	Dark gray (10YR4/1), moist, medium, SILT with little clay and trace fine- to medium-grained sand and shell fragments.			
15A	20/24 *83%*	SS	*2-3 3-3* N=6	39		*0.80*				430	
	24/24 *100%*	BD					30				
16A										428	
17-1				29			32	Gray (10YR5/1) with 35% yellowish brown (10YR5/6) mottles, moist, stiff, silty CLAY with trace fine-grained sand.			
17-2	24/24 *100%*	SH									
17-3						*1.00*				426	
17-4							34				
18A	16/24 *67%*	SS	*0-3 3-3* N=6	32		*1.20*				424	
19-1							36	Dark gray (10YR4/1), moist, stiff, silty CLAY with trace very fine-grained sand and roots.			
19-2	16/24 *67%*	SH				*0.80*				422	
19-3											
19-4				34			38	Dark gray (10YR4/1) with 5% olive brown (2.5Y4/3) mottles, moist, stiff, silty CLAY with trace fine- to coarse-grained sand and small gravel, trace roots.			
20A	20/24 *83%*	SS	*2-5 6-6* N=11	29						420	
								Gray (10YR4/1) with 15% olive brown (2.5Y4/3) mottles,			
							40				

NOTE(S): AW-06 installed in bore hole. Well was constructed using a pre-packed screen.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/29/2015
Finish: 8/3/2015
WEATHER: Sunny, warm, hi-80s

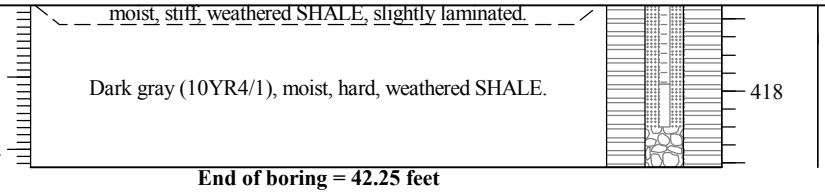
CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-06
Well ID: AW-06
Surface Elev: 459.19 ft. MSL
Completion: 42.25 ft. BGS
Station: 1,430,727.75N
2,434,495.33E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = Dry - during drilling
▼ =
▽ =

SAMPLE			TESTING					
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description
21A	4/4 *100%*	☒ SS	*50/4"*	14				moist, stiff, weathered SHALE, slightly laminated.
22A	3/3 *100%*	☒ SS	*50/3"*	13			42	Dark gray (10YR4/1), moist, hard, weathered SHALE.



End of boring = 42.25 feet

NOTE(S): AW-06 installed in bore hole. Well was constructed using a pre-packed screen.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/20/2015
Finish: 7/21/2015
WEATHER: Sunny, warm, hi-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-08
Well ID: AW-08
Surface Elev: 460.66 ft. MSL
Completion: 57.67 ft. BGS
Station: 1,430,641.18N
2,436,732.68E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 30.00 - during drilling
▼ = 10.58 - 7/21/15
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
1A	16/24 67%	SS	4-3 5-7 N=8	15		3.30	0	FILL - Very dark grayish brown (10YR3/2), moist, medium, clayey SILT with trace fine- to coarse-grained sand, trace small gravel.	460	
2A	16/24 67%	SS	4-3 3-4 N=6	25		3.00	2	FILL - Gray (10YR5/1), moist, medium, SILT with little clay, trace fine- to coarse-grained sand, trace small gravel.	458	
3A	17/24 71%	SS	1-2 1-2 N=3	16		2.50	4	Very dark gray (10YR3/1), moist, soft, silty CLAY with trace fine-grained sand.	456	
4A	19/24 79%	SS	5-6 6-6 N=12	22		1.30	6	Gray (10YR5/1) with 30% dark yellowish brown (10YR4/6) mottles, moist, stiff, silty CLAY with trace fine-grained sand.	454	
5A	21/24 88%	SS	1-2 2-2 N=4	28		2.30	8		452	
6A	24/24 100%	SS	1-2 2-3 N=4	37		0.80	10 ▼	Dark gray (10YR4/1) with 15% dark brown (10YR3/3) mottles, moist, soft, silty CLAY with trace fine-grained sand.	450	
7A	21/24 88%	SS	3-3 4-4 N=7	27		0.80	12		448	
8-1 8-2 8-3	8/24 33%	SH					14	Dark gray (10YR4/1) with 5% dark yellowish brown (10YR4/6) mottles, moist, medium, very fine- to fine-grained sandy CLAY.	446	
8-4				24		0.80	16		444	
9A	22/24 92%	SS	2-2 3-4 N=5	30		0.80	18	Dark gray (10YR4/1) with 5% dark yellowish brown (10YR4/6) mottles, moist, medium, very fine- to fine-grained sandy CLAY with trace very fine- to fine-grained sand seams (wet).	442	
10A	22/24 92%	SS	2-1 2-1 N=3	42		0.30	20	Dark gray (N4/0), moist, soft, SILT with few clay and slight trace shell fragments.		

NOTE(S): AW-08 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/20/2015
Finish: 7/21/2015
WEATHER: Sunny, warm, hi-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-08
Well ID: AW-08
Surface Elev: 460.66 ft. MSL
Completion: 57.67 ft. BGS
Station: 1,430,641.18N
2,436,732.68E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 30.00 - during drilling
▼ = 10.58 - 7/21/15
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11-1											
11-2	18/24 *75%*	SH						Dark gray (10YR4/1), moist, stiff, SILT with trace clay and trace shell fragments.		440	
11-3											
11-4				25		*1.30*	22				
12A	24/24 *100%*	SS	*5-7* *14-15* N=21	18		*3.30*		Dark gray (10YR4/1), moist, very stiff, SILT with few clay, trace medium- to coarse-grained sand, slight trace shell fragments.		438	
13A	24/24 *100%*	SS	*2-3* *4-4* N=7	32		*1.50*	24	Dark gray (10YR4/1), moist, stiff, SILT with few clay and slight trace very fine- to fine-grained sand.		436	
14A	24/24 *100%*	SS	*6-7* *7-8* N=14	28		*1.20*	26			434	
15A	22/24 *92%*	SS	*1-2* *3-3* N=5	27		*1.30*	28			432	
16A	24/24 *100%*	SS	*1-2* *2-2* N=4	29		*1.20*	▼ 30	Dark gray (10YR4/1) with 5% yellowish brown (10YR5/4) mottles, moist, stiff, SILT with few clay and trace fine- to medium-grained sand.		430	
17A	24/24 *100%*	SS	*3-4* *6-7* N=10	29		*1.60*	32			428	
18A	24/24 *100%*	SS	*2-2* *2-4* N=4	32		*0.80*	34			426	
19A	24/24 *100%*	SS	*4-4* *5-6* N=9	28		*1.00*	36	Gray (10YR5/1) with 35% dark yellowish brown (10YR4/4) mottles, moist, medium, SILT with few clay and trace very fine- to fine-grained sand.		424	
20A	24/24 *100%*	SS	*1-1* *1-2* N=2	30		*0.70*	38	Grayish brown (10YR5/2) with 25% yellowish brown (10YR5/4) mottles, moist, medium, SILT with few clay and trace very fine-grained sand.		422	
							40				

NOTE(S): AW-08 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/20/2015
Finish: 7/21/2015
WEATHER: Sunny, warm, hi-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-08
Well ID: AW-08
Surface Elev: 460.66 ft. MSL
Completion: 57.67 ft. BGS
Station: 1,430,641.18N
2,436,732.68E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 30.00 - during drilling
▼ = 10.58 - 7/21/15
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
21A	24/24 100%	ss	0-0 2-2 N=2	28		0.30		Dark gray (10YR4/1) and dark yellowish brown (10YR4/4), moist, soft, SILT with few clay and trace very fine-grained sand.		420	
22A	24/24 100%	ss	3-2 3-3 N=5	27		0.20	42			418	
23A	24/24 100%	ss	3-3 4-4 N=7	41		0.50	44			416	
24A	24/24 100%	ss	4-5 4-4 N=9	41		0.30	46			414	
25A	24/24 100%	ss	0-0 3-3 N=3	48		0.20	48	Dark gray (10YR4/1), moist, very soft to medium, SILT with few clay and trace very fine-grained sand and shell fragments.		412	
26A	24/24 100%	ss	2-2 3-3 N=5	43		0.30	50			410	
27A	24/24 100%	ss	3-3 4-5 N=7	60		0.50	52			408	
28A	24/24 100%	ss	2-4 8-10 N=12	29		1.00	54			406	
							56	Gray (10YR5/1), moist, stiff, very fine-grained sandy SILT, little clay.			
29A	11/24 46%	ss	23-50/5"	20				Gray (10YR5/1), moist, hard, weathered SHALE.		404	

End of boring = 57.67 feet

NOTE(S): AW-08 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/29/2015
Finish: 8/3/2015
WEATHER: Sunny, warm, lo-80s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-09
Well ID: AW-09
Surface Elev: 458.32 ft. MSL
Completion: 52.23 ft. BGS
Station: 1,429,340.11N
2,434,856.97E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = Dry - during drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
	24/24 *100%*	BD						GRAVEL FILL	458	
							2			Sample from cuttings
2A	24/24 *100%*	BD		23				FILL - Dark gray (10YR4/1), very moist, SILT with few clay and gravel.	456	
							4	FILL - Yellowish brown (10YR5/4), moist, medium, silty CLAY with trace fine- to coarse-grained sand.	454	
3A	21/24 *88%*	SS	*1-3* *6-9* N=9	29		*0.50*		FILL - Very dark gray (10YR3/1), moist, stiff, FLY ASH.		
							6		452	
4A	19/24 *79%*	SS	*10-13* *14-15* N=27	28						
							8		450	
5A	22/24 *92%*	SS	*5-5* *5-5* N=10	36						
							10		448	
6A	18/24 *75%*	SS	*2-3* *3-2* N=6	36						
							12	FILL - Very dark gray (10YR3/1), moist, medium, FLY ASH.	446	
7A	20/24 *83%*	SS	*3-4* *7-9* N=11	32						
							14		444	
8A	21/24 *88%*	SS	*2-3* *4-4* N=7	37						
							16		442	
9A	22/24 *92%*	SS	*3-5* *4-3* N=9	38						
							18	Very dark gray (10YR3/1), moist, medium, SILT with few clay and trace very fine - to fine-grained sand.	440	
10A	15/24 *63%*	SS	*2-2* *4-4* N=6	26		*1.50*		Dark gray (10YR4/1) with 35% yellowish brown (10YR5/6) mottles, moist, medium, SILT with few clay, trace very fine- to fine-grained sand and organics.		
							20			

NOTE(S): AW-09 installed in bore hole. Well was constructed using a pre-packed screen.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/29/2015
Finish: 8/3/2015
WEATHER: Sunny, warm, lo-80s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-09
Well ID: AW-09
Surface Elev: 458.32 ft. MSL
Completion: 52.23 ft. BGS
Station: 1,429,340.11N
2,434,856.97E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = Dry - during drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11A	16/24 67%	SS	1-2 4-5 N=6	24		2.30	0	Grayish brown (10YR5/2), moist, medium, SILT with little clay, trace coarse-grained sand and roots.		438	
12A	18/24 75%	SS	7-9 9-9 N=18	26		1.80	22	Gray (10YR5/1) with 25% yellowish brown (10YR5/6) mottles, moist, stiff, silty CLAY with trace fine-grained sand.		436	
13-1						1.80	24			434	
13-2	21/24 88%	SH						Very dark gray (10YR3/1), moist, stiff, SILT with few clay and trace very fine- to fine-grained sand.			
13-3						1.80					
13-4				28			26			432	
14A	19/24 79%	SS	6-6 5-6 N=11	28		0.50		Dark gray (10YR4/1) with 20% very dark grayish brown (10YR3/2) mottles, moist, medium, SILT with few clay and trace very fine- to fine-grained sand.			
15A	22/24 92%	SS	1-3 3-4 N=6	25		1.30	28			430	
16-1								Gray (10YR5/1) with 30% dark yellowish brown (10YR4/4) mottles, moist, stiff, SILT with few clay and trace very fine- to fine-grained sand, woody material and shell fragments.			
16-2	18/24 75%	SH				1.30					
16-3											
16-4				40			32			428	
17A	24/24 100%	SS	1-1 3-4 N=4	31		0.80		Gray (10YR5/1) with 30% dark yellowish brown (10YR4/4) mottles, moist, medium, SILT with few clay and trace very fine- to fine-grained sand and woody material.			
18-1						0.80	34			426	
18-2	24/24 100%	SH				0.80					
18-3						0.80					
18-4				32				Dark gray (10YR4/1), moist, medium, SILT with little clay and trace very fine-grained sand.			
19A	24/24 100%	SS	1-2 3-3 N=5	36		0.70	36			424	
20A	13/24 54%	SS	3-3 3-3 N=6	34		0.50	38	Dark gray (10YR4/1), moist, medium to stiff, SILT with little clay and trace very fine-grained sand and shell fragments.		422	
							40			420	

NOTE(S): AW-09 installed in bore hole. Well was constructed using a pre-packed screen.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/29/2015
Finish: 8/3/2015
WEATHER: Sunny, warm, lo-80s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-09
Well ID: AW-09
Surface Elev: 458.32 ft. MSL
Completion: 52.23 ft. BGS
Station: 1,429,340.11N
2,434,856.97E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = Dry - during drilling
▼ =
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
21-1											
21-2	16/24 *67%*	SH				*1.30*					
21-3											
21-4				40			42			416	
22A	20/24 *83%*	SS	*3-4* *5-5* N=9	52		*0.80*					
	24/24 *100%*	SS	*2-3* *3-4*				44	Dark gray (10YR4/1), moist, medium to stiff, SILT with little clay and trace very fine-grained sand and shell fragments. *[Continued from previous page]*		414	
23A			N=6	81		*0.80*					
24-1							46			412	
24-2	24/24 *100%*	SH									
24-3						*1.00*					
24-4				77			48			410	
	24/24 *100%*	SS	*1-3* *3-5*								
25A			N=6	41		*0.80*					
26-1	11/12 *92%*	SH				*0.50*	50			408	
26-2				13				Dark gray (10YR4/1), moist, hard, weathered SHALE.			
26A	9/12 *75%*	SS	*50-50/3"*								
27A	2/2 *100%*	SS	*50/2"*	14			52				

End of boring = 52.23 feet

NOTE(S): AW-09 installed in bore hole. Well was constructed using a pre-packed screen.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/23/2015
Finish: 7/23/2015
WEATHER: Sunny, warm, calm, mid-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-10
Well ID: AW-10
Surface Elev: 437.64 ft. MSL
Completion: 32.74 ft. BGS
Station: 1,429,461.05N
2,436,231.40E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 7.00 - during drilling
▼ = 6.68 - 7/23/15
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL	Remarks
1A	16/24 67%	ss	6-5 5-5 N=10	25			0	Very dark grayish brown (10YR3/2), moist, very stiff, SILT with few clay and trace very fine- to fine-grained sand and roots.	436	
2A	20/24 83%	ss	2-2 2-3 N=4	30		1.50	2			
3A	15/24 63%	ss	1-1 3-3 N=4	25		2.30	4	Very dark gray (10YR3/1) with 3% dark yellowish brown (10YR4/4) mottles, moist, stiff , silty CLAY with trace very fine- to fine-grained sand.	434	
4A	16/24 67%	ss	4-3 4-3 N=7	29		1.00	6		432	
5A	19/24 79%	ss	1-1 2-2 N=3	29		0.80	8	Gray (10YR5/1) with 5% dark gray (10YR4/1) and 5% dark yellowish brown (10YR4/4) mottles, moist, medium, silty CLAY with trace fine-grained sand.	430	
6A	24/24 100%	ss	1-1 1-2 N=2	45		0.80	10		428	
7A	24/24 100%	ss	2-2 2-3 N=4	43		0.30	12	Dark gray (10YR4/1) with 5% dark yellowish brown (10YR4/4) mottles, moist, medium, SILT with few clay and trace very fine- to fine-grained sand.	426	
8A	24/24 100%	ss	1-1 1-1 N=2	55		0.30	14	Dark gray (10YR4/1), moist, soft, SILT with few clay and trace very fine-grained sand and shell fragments.	424	
9A	24/24 100%	ss	2-2 2-3 N=4	41		0.50	16		422	
10A	24/24 100%	ss	1-1 1-1 N=2	34		0.30	18	Dark gray (10YR4/1), moist, soft, SILT with few clay and trace very fine-grained sand, shell fragments, and woody fragments.	420	
							20		418	

NOTE(S): AW-10 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/23/2015
Finish: 7/23/2015
WEATHER: Sunny, warm, calm, mid-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: S. Keim

BOREHOLE ID: AW-10
Well ID: AW-10
Surface Elev: 437.64 ft. MSL
Completion: 32.74 ft. BGS
Station: 1,429,461.05N
2,436,231.40E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 7.00 - during drilling
▼ = 6.68 - 7/23/15
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
11A	24/24 100%	SS	0-0 1-1 N=1	57		0.30					
12A	24/24 100%	SS	2-1 1-2 N=2	58		0.30	22			416	
13-1							24			414	
13-2	24/24 100%	SH						Dark gray (10YR4/1), moist, soft, SILT with few clay and trace very fine-grained sand, shell fragments, and woody fragments. *[Continued from previous page]*			
13-3											
13-4				89		0.80	26			412	
14A	24/24 100%	SS	1-1 2-2 N=3	100		0.30				410	
15A	24/24 100%	SS	0-1 2-1 N=3	56		0.50	28			408	
16A	24/24 100%	SS	0-6 6-9 N=12	26		1.80	30			406	
17A	9/9 100%	SS	33-50/6"	18			32	Gray (10YR5/1), moist, hard, weathered SHALE.			

End of boring = 32.74 feet

NOTE(S): AW-10 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/24/2015
Finish: 7/28/2015
WEATHER: Sunny, warm, mid-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: R. Hasenyager

BOREHOLE ID: AW-11
Well ID: AW-11
Surface Elev: 437.16 ft. MSL
Completion: 30.00 ft. BGS
Station: 1,428,196.31N
2,436,251.05E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 9.00 - during drilling
▼ = 5.77 - 7/27/15
▽ =

SAMPLE Number	Recov / Total (in) % Recovery	Type	TESTING Blows / 6 in N - Value RQD	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
1	10/24 *42%*	SS	*3-4* *4-5* N=8	23		*2.80*		FILL - Black (10YR2/1), moist, medium, CLAY with some silt and trace sand and small gravel.		436	
2	13/24 *54%*	SS	*2-2* *2-2* N=4	26		*0.80*	2	Very dark gray (10YR3/1) with 20% dark yellowish brown (10YR4/6) mottles, moist, soft, CLAY with some silt and trace sand.		434	
3	10/24 *42%*	SS	*1-1* *2-1* N=3	25		*1.30*	4			432	
4	14/24 *58%*	SS	*1-2* *2-1* N=4	28		*0.50*	6 ▼	Gray (10YR5/1) with 30% yellowish brown (10YR5/6) mottles, moist, soft, CLAY swith some silt and trace very fine-grained sand.		430	
5-1							8	Very dark gray (10YR3/1), wet, very soft, SILT with few clay and trace very fine-grained sand.			
5-2	24/24 *100%*	SH					▼			428	
5-3						*0.80*					
5-4				40			10	Gray (10YR5/1) with 10% yellowish brown (10YR5/6) mottles, moist, soft, SILT with few clay and trace very fine-grained sand.			
6	20/24 *83%*	SS	*1-1* *1-1* N=2	53		*0.30*				426	
7	24/24 *100%*	SS	*2-2* *2-2* N=4	66		*0.30*	12			424	
	24/24 *100%*	SS	*1-1* *1-1* N=2				14	Gray (10YR5/1), moist, soft, SILT with few clay and trace very fine-grained sand.		422	
8				50		*0.30*	16				
9	24/24 *100%*	SS	*1-1* *1-1* N=2	56		*0.00*	18	Gray (10YR5/1), moist, soft, SILT with few clay and trace very fine-grained sand, shell fragments and woody fragments.		420	
10	24/24 *100%*	SS	*woh-1* *1-1* N=2	61		*0.50*	20			418	

NOTE(S): AW-11 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: Bartonville, Illinois
Project: 15E0030
DATES: **Start:** 7/24/2015
Finish: 7/28/2015
WEATHER: Sunny, warm, mid-70s

CONTRACTOR: Ramsey Geotechnical Engineering, LLC
Rig mfg/model: Diedrich D-50
Drilling Method: 4 ¼" HSA, split spoon sampler
FIELD STAFF: **Driller:** B. Williamson
Helper: D. Crump
Eng/Geo: R. Hasenyager

BOREHOLE ID: AW-11
Well ID: AW-11
Surface Elev: 437.16 ft. MSL
Completion: 30.00 ft. BGS
Station: 1,428,196.31N
2,436,251.05E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin Quadrangle (7½' series)
Township: Hollis Township
Section 14, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 9.00 - during drilling
▼ = 5.77 - 7/27/15
▽ =

SAMPLE			TESTING						
Number	Recov / Total (in) *% Recovery*	Type	*Blows / 6 in* N - Value **RQD**	Moisture (%)	Dry Den. (lb/ft³)	Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Elevation ft. MSL
11	22/24 *92%*	ss	*woh-woh 1-1*	61		*0.20*	22		416
12	24/24 *100%*	ss	*1-1 1-1* N=2	86		*0.50*	24	Gray (10YR5/1), moist, soft, SILT with few clay and trace very fine-grained sand, shell fragments and woody fragments. *[Continued from previous page]*	414
13	24/24 *100%*	ss	*1-1 2-1* N=3	84		*0.50*	26		412
14A	22/24 *92%*	ss	*2-3 5-11* N=8	36		*0.50*	28	Gray (10YR5/1), wet, loose, very fine- to very coarse-grained SAND with some small to medium gravel.	410
14B				11					
15A				83				Gray (10YR5/1), moist, soft, SILT with few clay and trace very fine-grained sand, shell fragments and woody fragments.	
15B	24/24 *100%*	ss	*3-39 27-62* N=66	16				Gray (10YR5/1), wet, loose, medium- to very coarse-grained SAND.	408
							30	Gray (10YR5/1), moist, hard, weathered SHALE.	

End of boring = 30.00 feet

Borehole Detail

Remarks

NOTE(S): AW-11 installed in bore hole.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: 7800 S Cilco Ln, Bartonville, Illinois
Project: 16E0433
DATES: **Start:** 11/28/2016
Finish: 11/29/2016
WEATHER: Sunny, cool (hi-30s)

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" Hollow Stem Auger
FIELD STAFF: **Driller:** C. Dutton
Helper: M. Baetje
Eng/Geo: R. Hasenyager

BOREHOLE ID: AP05S
Well ID: AP05S
Surface Elev: 441.13 ft. MSL
Completion: 38.06 ft. BGS
Station: 1,432,405.64N
2,436,746.64E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin
Township: Hollis
Section 11, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 6.25 - During drilling
▼ = 5.23 - 01/18/2017
▽ =

SAMPLE Number	SAMPLE Recov / Total (in) *% Recovery*	SAMPLE Type	TESTING *Blows / 6 in* N - Value **RQD**	TESTING Moisture (%)	TESTING Dry Den. (lb/ft³)	TESTING Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
	0/24 *0%*	BD					0	Black (10YR3/1), moist, soft, CLAY with some silt, trace sand, and trace gravel.		440	
	0/24 *0%*	BD					2	Black (10YR2/1), moist, soft, SILT with few clay, trace sand, and trace gravel.		438	
	0/24 *0%*	BD					4	Dark yellowish brown (10YR4/4), moist, medium, CLAY with some silt and trace sand.		436	
	0/24 *0%*	BD					6	Gray (10YR5/1), moist, soft, CLAY with some silt and trace sand.		434	
	0/24 *0%*	BD					8			432	
	0/24 *0%*	BD					10	Gray (10YR5/1) with 20% yellowish brown (10YR5/6) mottles, moist, soft, CLAY with some silt and trace sand.		430	
	0/24 *0%*	BD					12	Yellowish brown (10YR5/6) with 25% Gray (10YR5/1) mottles, moist, soft, CLAY with some silt and trace sand.		428	
	0/24 *0%*	BD					14	Dark yellowish brown (10YR4/4) with 10% yellowish brown (10YR5/6) mottles, moist, very soft, CLAY with some silt and trace sand.		426	
	0/24 *0%*	BD					16			424	
	0/24 *0%*	BD					18	Gray (10YR5/1) with 15% yellowish brown (10YR5/6) mottles, moist, very soft, SILT with few clay, trace sand, and trace shell fragments.		422	
							20				

NOTE(S): AP05S drilled approx. 5 ft. north of AP05D.

FIELD BORING LOG

CLIENT: Natural Resource Technology, Inc.
Site: Edwards Power Station
Location: 7800 S Cilco Ln, Bartonville, Illinois
Project: 16E0433
DATES: **Start:** 11/28/2016
Finish: 11/29/2016
WEATHER: Sunny, cool (hi-30s)

CONTRACTOR: Bulldog Drilling, Inc.
Rig mfg/model: CME-550X ATV Drill
Drilling Method: 4¼" Hollow Stem Auger
FIELD STAFF: **Driller:** C. Dutton
Helper: M. Baetje
Eng/Geo: R. Hasenyager

BOREHOLE ID: AP05S
Well ID: AP05S
Surface Elev: 441.13 ft. MSL
Completion: 38.06 ft. BGS
Station: 1,432,405.64N
2,436,746.64E

TOPOGRAPHIC MAP INFORMATION:
Quadrangle: Pekin
Township: Hollis
Section 11, **Tier** 7N; **Range** 7E

WATER LEVEL INFORMATION:
▼ = 6.25 - During drilling
▼ = 5.23 - 01/18/2017
▽ =

SAMPLE Number	SAMPLE Recov / Total (in) *% Recovery*	SAMPLE Type	TESTING *Blows / 6 in* N - Value **RQD**	TESTING Moisture (%)	TESTING Dry Den. (lb/ft³)	TESTING Qu (tsf) *Qp* (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
	0/24 *0%*	BD									
	0/24 *0%*	BD					22			420	
	0/24 *0%*	BD					24			418	
	0/24 *0%*	BD					26			416	
	0/24 *0%*	BD					28	Gray (10YR5/1), moist, very soft, CLAY with some silt, trace sand, and trace shell fragments.		414	
	0/24 *0%*	BD					30			412	
	0/24 *0%*	BD					32			410	
	0/24 *0%*	BD					34			408	
	0/24 *0%*	BD					36			406	
	0/24 *0%*	BD					38	Medium light gray (N6/1), dry, hard, SILTSTONE with little very fine-grained sand.		404	

End of Boring = 38.06 ft. BGS

NOTE(S): AP05S drilled approx. 5 ft. north of AP05D.

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Peoria County Well #: AW-05

Site Name: Edwards Power Station Borehole #: AW-05

State Plane Coordinate: X 2,435,498.0 Y 1,432,339.7 (or) Latitude: _____ Longitude: _____

Surveyed By: Gary C. Rogers IL Registration #: 035-002957

Drilling Contractor: Ramsey Geotechnical Engineering, LLC Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): None

Logged By: Suzanna L. Keim Date Started: 7/22/2015 Date Finished: 7/22/2015

Report Form Completed By: Suzanna L. Keim Date: 7/24/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 30 minutes

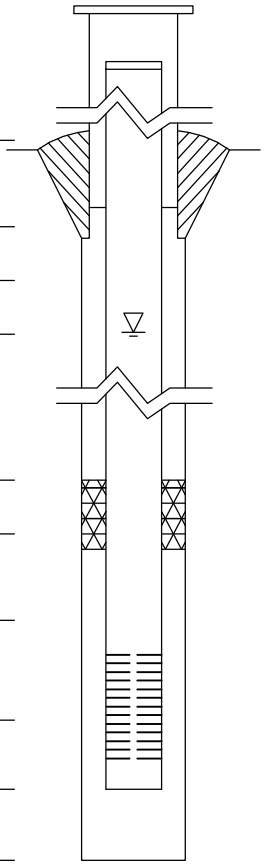
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: _____



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
443.55	-3.00	Top of Protective Casing
443.37	-2.82	Top of Riser Pipe
440.55	0.00	Ground Surface
438.05	2.50	Top of Annular Sealant
431.39	9.16	Static Water Level (After Completion) 9/23/2015
428.55	12.00	Top of Seal
426.35	14.20	Top of Sand Pack
424.68	15.87	Top of Screen
420.08	20.47	Bottom of Screen
419.45	21.10	Bottom of Well
419.45	21.10	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: [Steel]
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	18.69
Bottom of Screen to End Cap	(feet)	0.63
Screen Length (1st slot to last slot)	(feet)	4.60
Total Length of Casing	(feet)	23.92
Screen Slot Size **	(inches)	0.010

Well Completion Form (revised 02/06/02)

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Peoria County Well #: AW-06

Site Name: Edwards Power Station Borehole #: AW-06

State Plane Coordinate: X 2,434,495.3 Y 1,430,727.7 (or) Latitude: _____ Longitude: _____

Surveyed By: Gary C. Rogers IL Registration #: 035-002957

Drilling Contractor: Ramsey Geotechnical Engineering, LLC Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): None

Logged By: Suzanna L. Keim Date Started: 7/29/2015 Date Finished: 8/3/2015

Report Form Completed By: Suzanna L. Keim Date: 8/5/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 1 hour

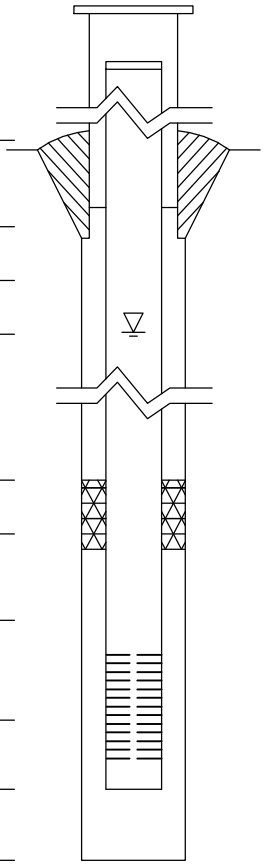
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Slough (if applicable)

Installation Method: Cave-in



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
461.79	-2.60	Top of Protective Casing
461.57	-2.38	Top of Riser Pipe
459.19	0.00	Ground Surface
457.19	2.00	Top of Annular Sealant
432.88	26.31	Static Water Level (After Completion) 9/22/2015
426.89	32.30	Top of Seal
424.69	34.50	Top of Sand Pack
422.59	36.60	Top of Screen
418.10	41.09	Bottom of Screen
417.50	41.69	Bottom of Well
416.94	42.25	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: (Steel)
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	6.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	38.98
Bottom of Screen to End Cap	(feet)	0.60
Screen Length (1st slot to last slot)	(feet)	4.49
Total Length of Casing	(feet)	44.07
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Peoria County Well #: AW-08

Site Name: Edwards Power Station Borehole #: AW-08

State Plane Coordinate: X 2,436,732.7 Y 1,430,641.2 (or) Latitude: _____ Longitude: _____

Surveyed By: Gary C. Rogers IL Registration #: 035-002957

Drilling Contractor: Ramsey Geotechnical Engineering, LLC Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): None

Logged By: Suzanna L. Keim Date Started: 7/20/2015 Date Finished: 7/21/2015

Report Form Completed By: Suzanna L. Keim Date: 7/24/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 30 minutes

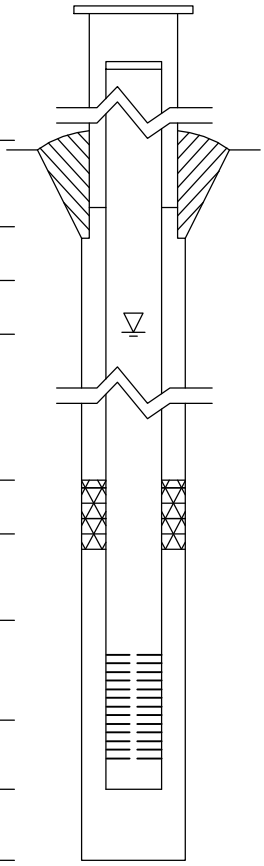
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: _____



Elevations (MSL)*	Depths (BGS)	(0.01 ft.)
462.72	-2.06	Top of Protective Casing
462.54	-1.88	Top of Riser Pipe
460.66	0.00	Ground Surface
458.66	2.00	Top of Annular Sealant
441.09	19.57	Static Water Level (After Completion) 9/21/2015
416.16	44.50	Top of Seal
415.16	45.50	Top of Sand Pack
413.11	47.55	Top of Screen
403.47	57.19	Bottom of Screen
402.99	57.67	Bottom of Well
402.99	57.67	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: [Steel]
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	49.43
Bottom of Screen to End Cap	(feet)	0.48
Screen Length (1st slot to last slot)	(feet)	9.64
Total Length of Casing	(feet)	59.55
Screen Slot Size **	(inches)	0.010

Well Completion Form (revised 02/06/02)

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Peoria County Well #: AW-09

Site Name: Edwards Power Station Borehole #: AW-09

State Plane Coordinate: X 2,434,857.0 Y 1,429,340.1 (or) Latitude: _____ Longitude: _____

Surveyed By: Gary C. Rogers IL Registration #: 035-002957

Drilling Contractor: Ramsey Geotechnical Engineering, LLC Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): None

Logged By: Suzanna L. Keim Date Started: 7/29/2015 Date Finished: 8/3/2015

Report Form Completed By: Suzanna L. Keim Date: 8/7/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >24 hours

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 30 minutes

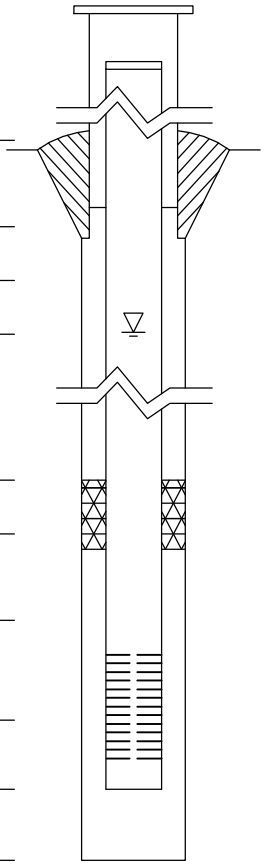
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: _____



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	461.65	-3.33
Top of Riser Pipe	461.45	-3.13
Ground Surface	458.32	0.00
Top of Annular Sealant	455.82	2.50
Static Water Level (After Completion) 9/23/2015	432.22	26.10
Top of Seal	415.12	43.20
Top of Sand Pack	413.22	45.10
Top of Screen	411.18	47.14
Bottom of Screen	406.70	51.62
Bottom of Well	406.09	52.23
Bottom of Borehole	406.09	52.23

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: Steel
Riser Pipe Above W.T.	SS304	SS316	PTFE	PVC	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	PVC	OTHER:
Screen	SS304	SS316	PTFE	PVC	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	6.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	50.27
Bottom of Screen to End Cap	(feet)	0.61
Screen Length (1st slot to last slot)	(feet)	4.48
Total Length of Casing	(feet)	55.36
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Peoria County Well #: AW-10

Site Name: Edwards Power Station Borehole #: AW-10

State Plane Coordinate: X 2,436,231.4 Y 1,429,461.1 (or) Latitude: _____ Longitude: _____

Surveyed By: Gary C. Rogers IL Registration #: 035-002957

Drilling Contractor: Ramsey Geotechnical Engineering, LLC Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): None

Logged By: Suzanna L. Keim Date Started: 7/23/2015 Date Finished: 7/23/2015

Report Form Completed By: Suzanna L. Keim Date: 7/24/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 30 minutes

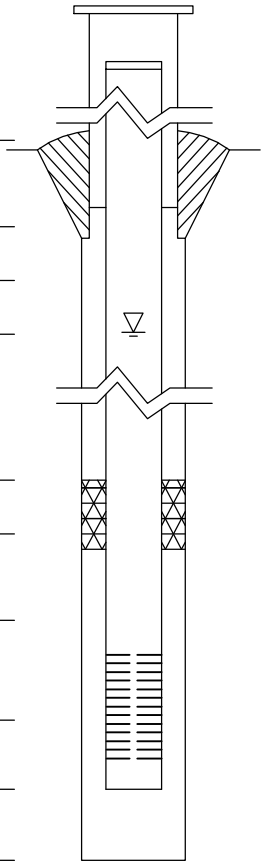
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: _____



Elevations (MSL)*	Depths (BGS) (0.01 ft.)	
440.16	-2.52	Top of Protective Casing
439.93	-2.29	Top of Riser Pipe
437.64	0.00	Ground Surface
434.64	3.00	Top of Annular Sealant
436.64	1.00	Static Water Level (After Completion) 9/22/2015
412.14	25.50	Top of Seal
411.49	26.15	Top of Sand Pack
410.02	27.62	Top of Screen
405.41	32.23	Bottom of Screen
404.90	32.74	Bottom of Well
404.90	32.74	Bottom of Borehole

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: [Steel]
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	29.91
Bottom of Screen to End Cap	(feet)	0.51
Screen Length (1st slot to last slot)	(feet)	4.61
Total Length of Casing	(feet)	35.03
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Peoria County Well #: AW-11

Site Name: Edwards Power Station Borehole #: AW-11

State Plane Coordinate: X 2,436,251.1 Y 1,428,196.3 (or) Latitude: _____ Longitude: _____

Surveyed By: Gary C. Rogers IL Registration #: 035-002957

Drilling Contractor: Ramsey Geotechnical Engineering, LLC Driller: B. Williamson

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): None

Logged By: Rhonald W. Hasenyager Date Started: 7/24/2015 Date Finished: 7/28/2015

Report Form Completed By: Suzanna L. Keim Date: 7/28/2015

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: High-solids bentonite

Installation Method: Tremie

Setting Time: >48 hours

Type of Bentonite Seal -- [Granular] Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 30 minutes

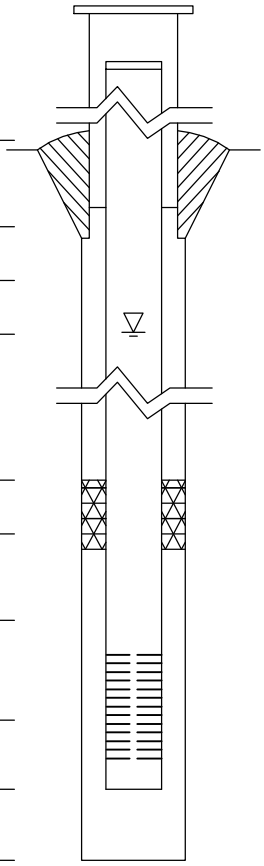
Type of Sand Pack: Quartz Sand

Grain Size: 10-20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: Quartz sand (if applicable)

Installation Method: Gravity



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	440.08	-2.92
Top of Riser Pipe	439.87	-2.71
Ground Surface	437.16	0.00
Top of Annular Sealant	435.16	2.00
Static Water Level (After Completion) 9/21/2015	404.91	32.25
Top of Seal	416.56	20.60
Top of Sand Pack	414.81	22.35
Top of Screen	412.95	24.21
Bottom of Screen	408.35	28.81
Bottom of Well	407.85	29.31
Bottom of Borehole	407.16	30.00

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

Protective Casing	SS304	SS316	PTFE	PVC	OTHER: [Steel]
Riser Pipe Above W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	[PVC]	OTHER:
Screen	SS304	SS316	PTFE	[PVC]	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	26.92
Bottom of Screen to End Cap	(feet)	0.50
Screen Length (1st slot to last slot)	(feet)	4.60
Total Length of Casing	(feet)	32.02
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

Illinois Environmental Protection Agency — Well Completion Report

Site #: _____ County: Peoria Well #: AP05S

Site Name: Edwards Power Station Borehole #: AP05S

State Plane Coordinate: X 2,436,746.6 Y 1,432,405.6 (or) Latitude: 40° 35' 55.705" Longitude: -89° 39' 42.875"

Surveyed By: Andrew D. Canopy IL Registration #: 035-003391

Drilling Contractor: Bulldog Drilling, Inc. Driller: C. Dutton

Consulting Firm: Hanson Professional Services Inc. Geologist: Rhonald W. Hasenyager, LPG #196-000246

Drilling Method: Hollow Stem Auger Drilling Fluid (Type): _____

Logged By: Rhonald W. Hasenyager Date Started: 11/28/2016 Date Finished: 11/29/2016

Report Form Completed By: Rhonald W. Hasenyager Date: 1/12/2017

ANNULAR SPACE DETAILS

Type of Surface Seal: Concrete

Type of Annular Sealant: Bentonite

Installation Method: Tremie

Setting Time: +24 hr

Type of Bentonite Seal -- (Granular) Pellet Slurry (choose one)

Installation Method: Gravity

Setting Time: 55 min.

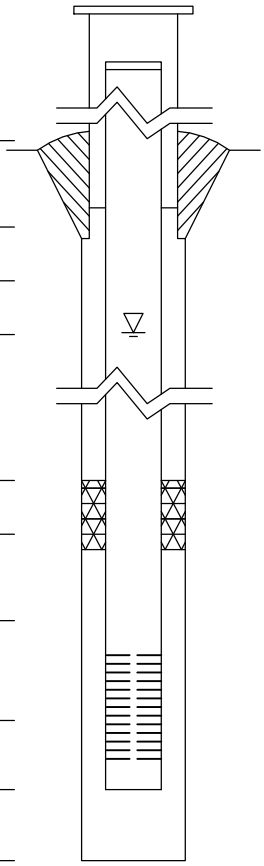
Type of Sand Pack: Quartz sand

Grain Size: 10/20 (sieve size)

Installation Method: Gravity

Type of Backfill Material: n/a (if applicable)

Installation Method: _____



	Elevations (MSL)*	Depths (BGS) (0.01 ft.)
Top of Protective Casing	443.92	-2.79
Top of Riser Pipe	443.53	-2.40
Ground Surface	441.13	0.00
Top of Annular Sealant	441.13	0.00
Static Water Level (After Completion) 1/18/2017	435.90	5.23
Top of Seal	411.02	30.11
Top of Sand Pack	409.98	31.15
Top of Screen	408.26	32.87
Bottom of Screen	403.49	37.64
Bottom of Well	403.07	38.06
Bottom of Borehole	403.07	38.06

* Referenced to a National Geodetic Datum

WELL CONSTRUCTION MATERIALS

(Choose one type of material for each area)

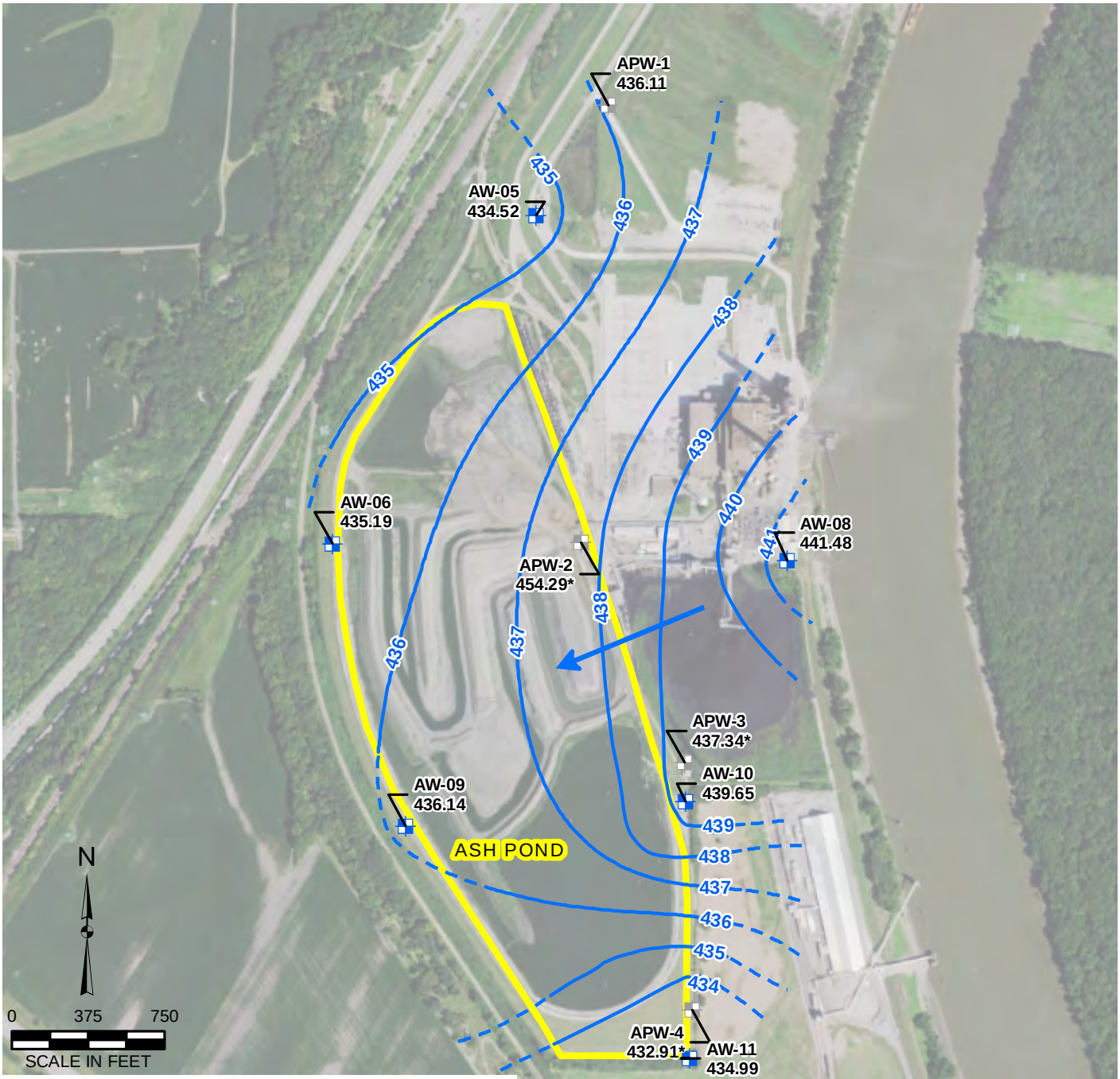
Protective Casing	SS304	SS316	PTFE	PVC	OTHER: (Steel)
Riser Pipe Above W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Riser Pipe Below W.T.	SS304	SS316	PTFE	(PVC)	OTHER:
Screen	SS304	SS316	PTFE	(PVC)	OTHER:

CASING MEASUREMENTS

Diameter of Borehole	(inches)	8.0
ID of Riser Pipe	(inches)	2.0
Protective Casing Length	(feet)	5.0
Riser Pipe Length	(feet)	35.26
Bottom of Screen to End Cap	(feet)	0.42
Screen Length (1st slot to last slot)	(feet)	4.78
Total Length of Casing	(feet)	40.46
Screen Slot Size **	(inches)	0.010

**Hand-Slotted Well Screens Are Unacceptable

ATTACHMENT 4 – MAPS OF THE DIRECTION OF GROUNDWATER FLOW



DRAWN BY/DATE:
SDS 1/23/17
REVIEWED BY/DATE:
ANS 1/25/17
APPROVED BY/DATE:
JJW 2/7/17

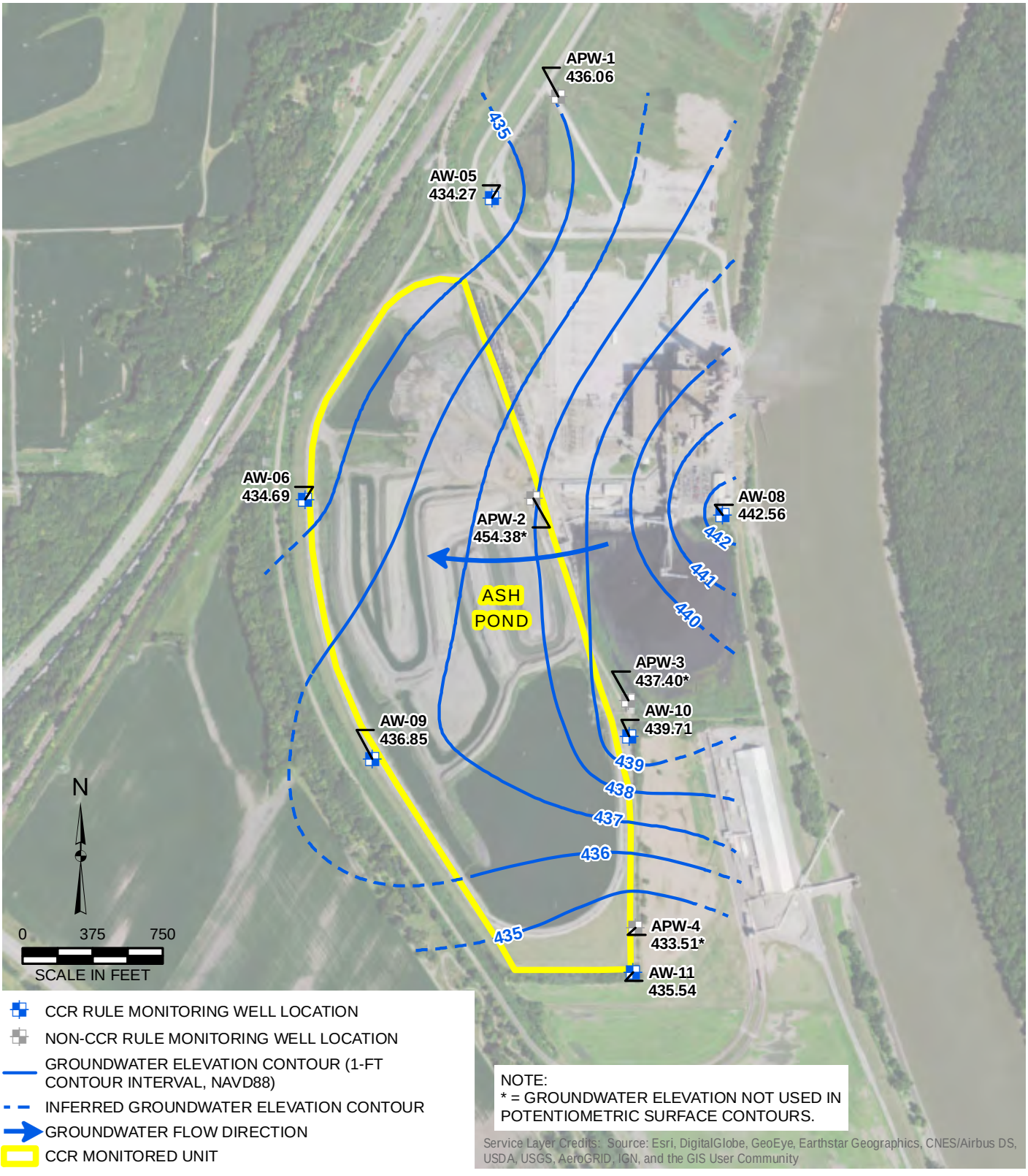
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 1: DECEMBER 21, 2015

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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REVIEWED BY/DATE:
ANS 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

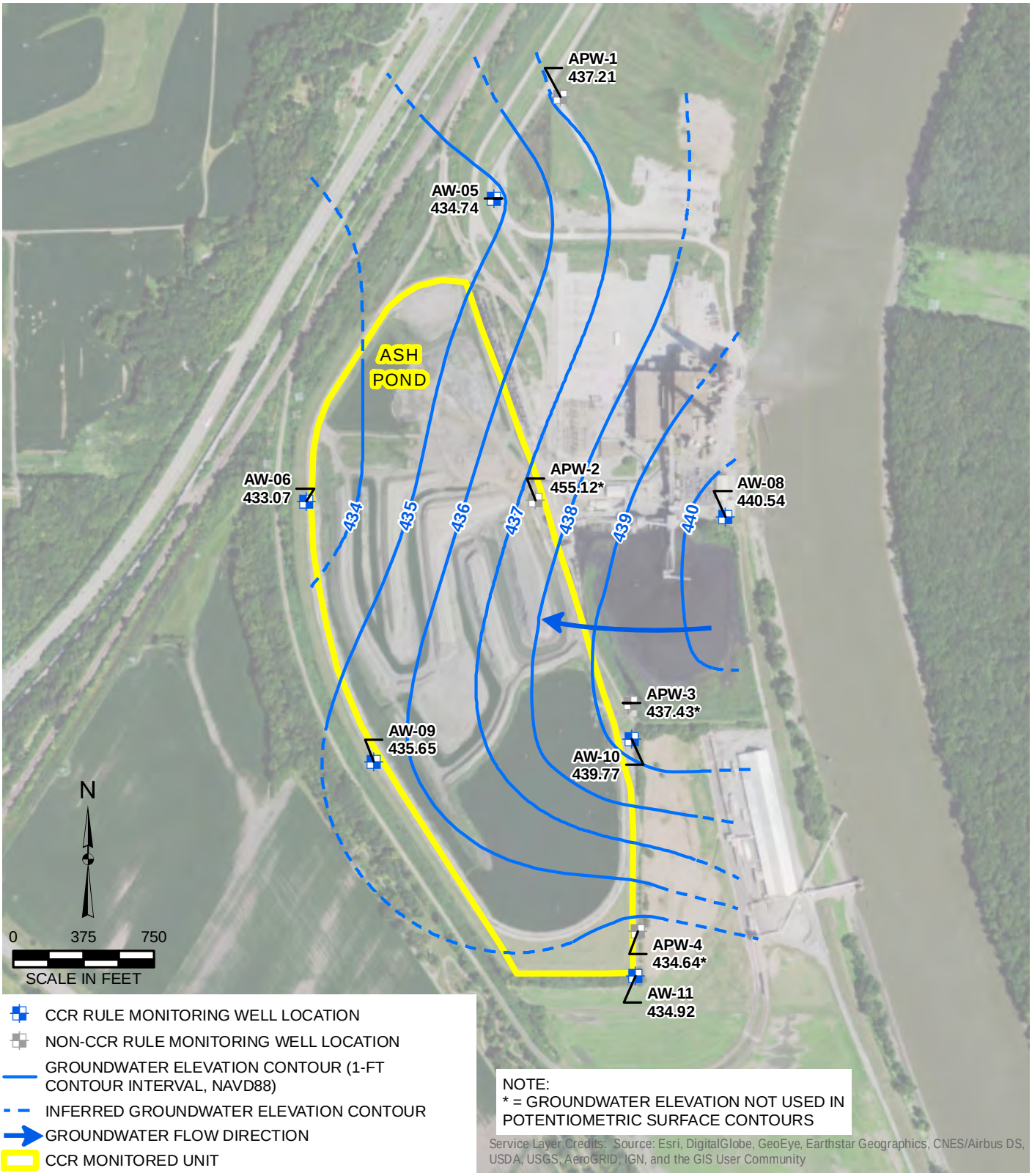
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 2: FEBRUARY 17, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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SDS 1/23/17
REVIEWED BY/DATE:
ANS 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

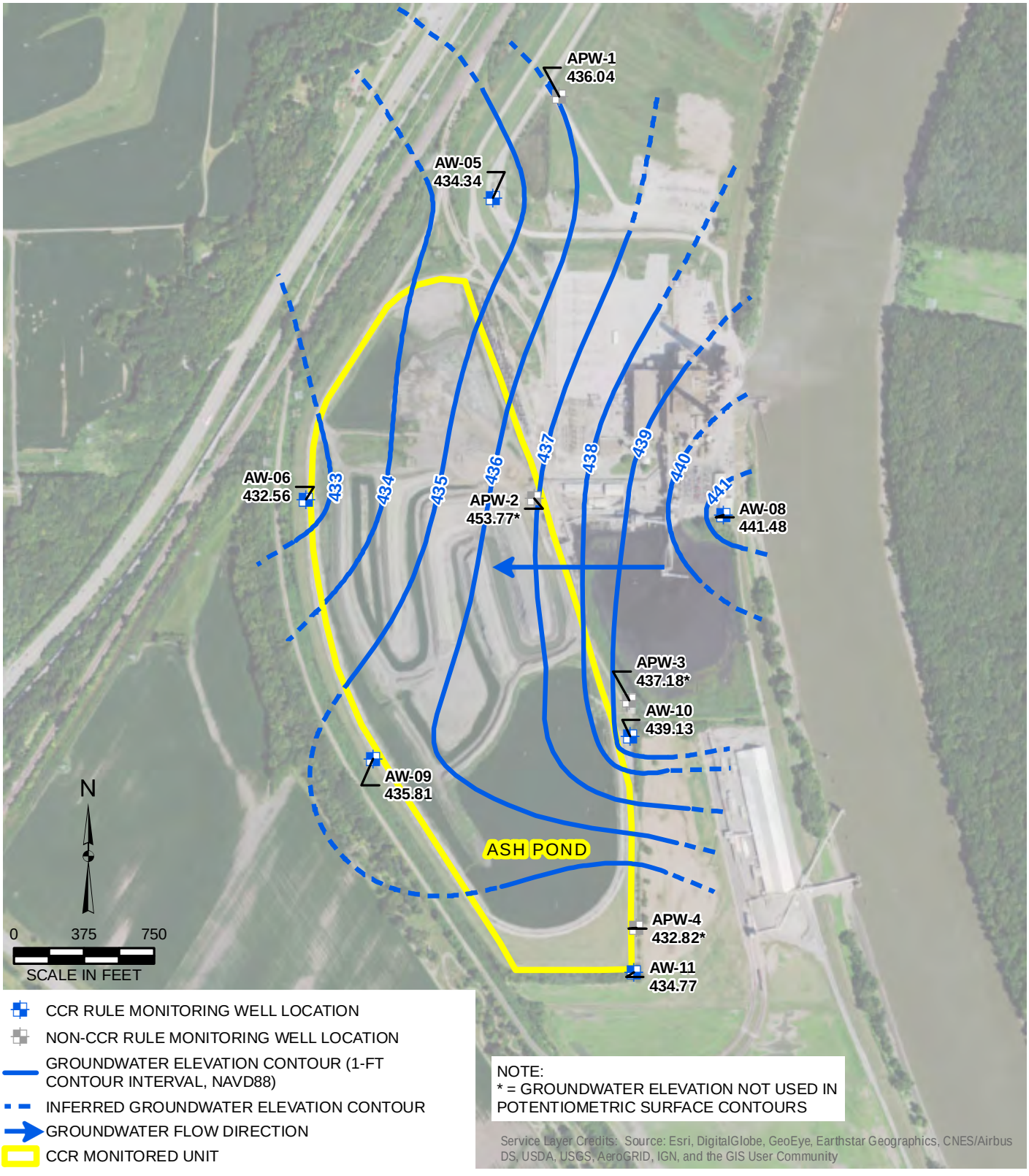
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 3: MAY 17, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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REVIEWED BY/DATE:
ANS 1/25/17
APPROVED BY/DATE:
JJW 2/8/17

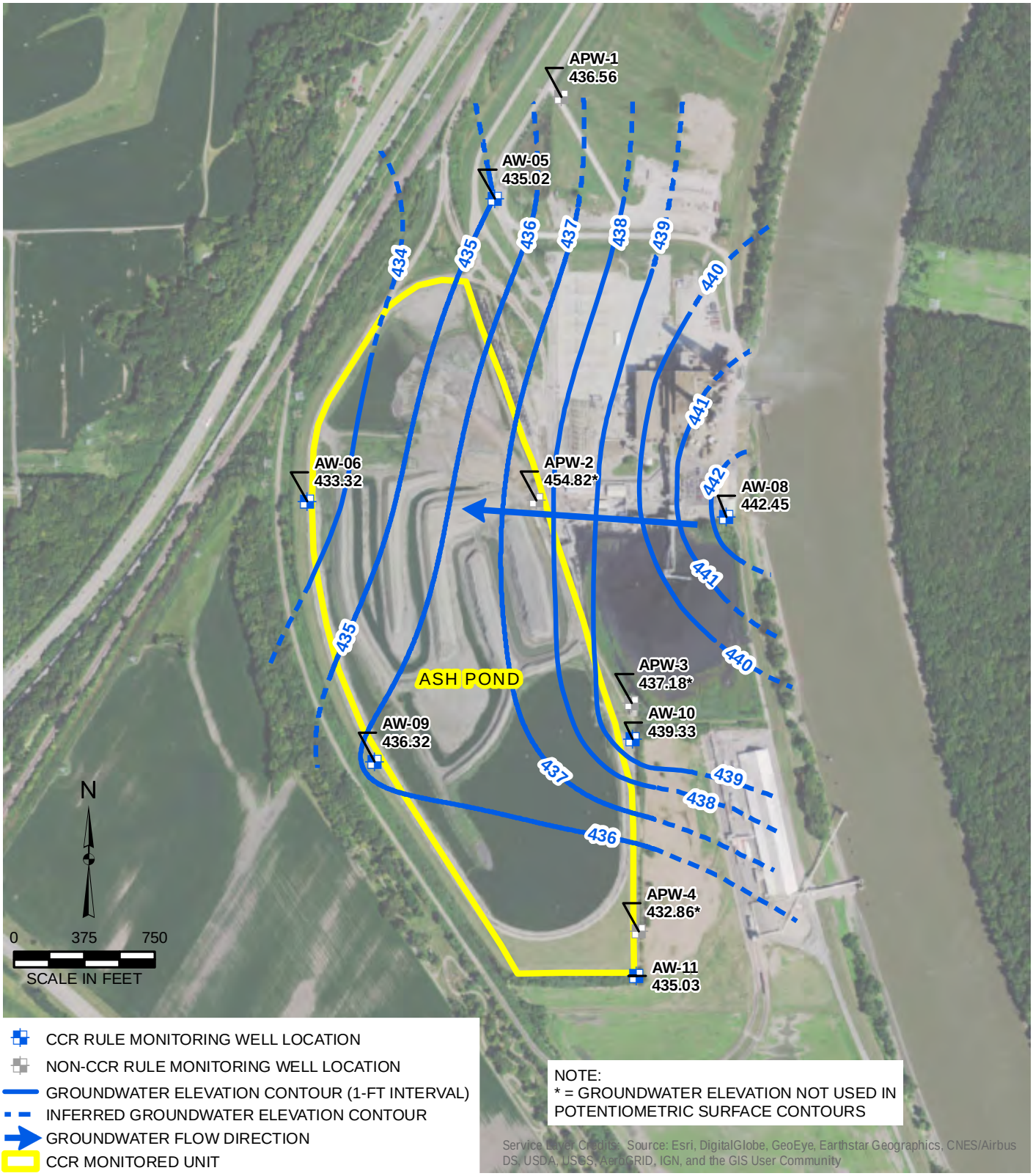
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 4: JULY 21, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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REVIEWED BY/DATE:
ANS 3/6/17
APPROVED BY/DATE:
JJW 9/1/17

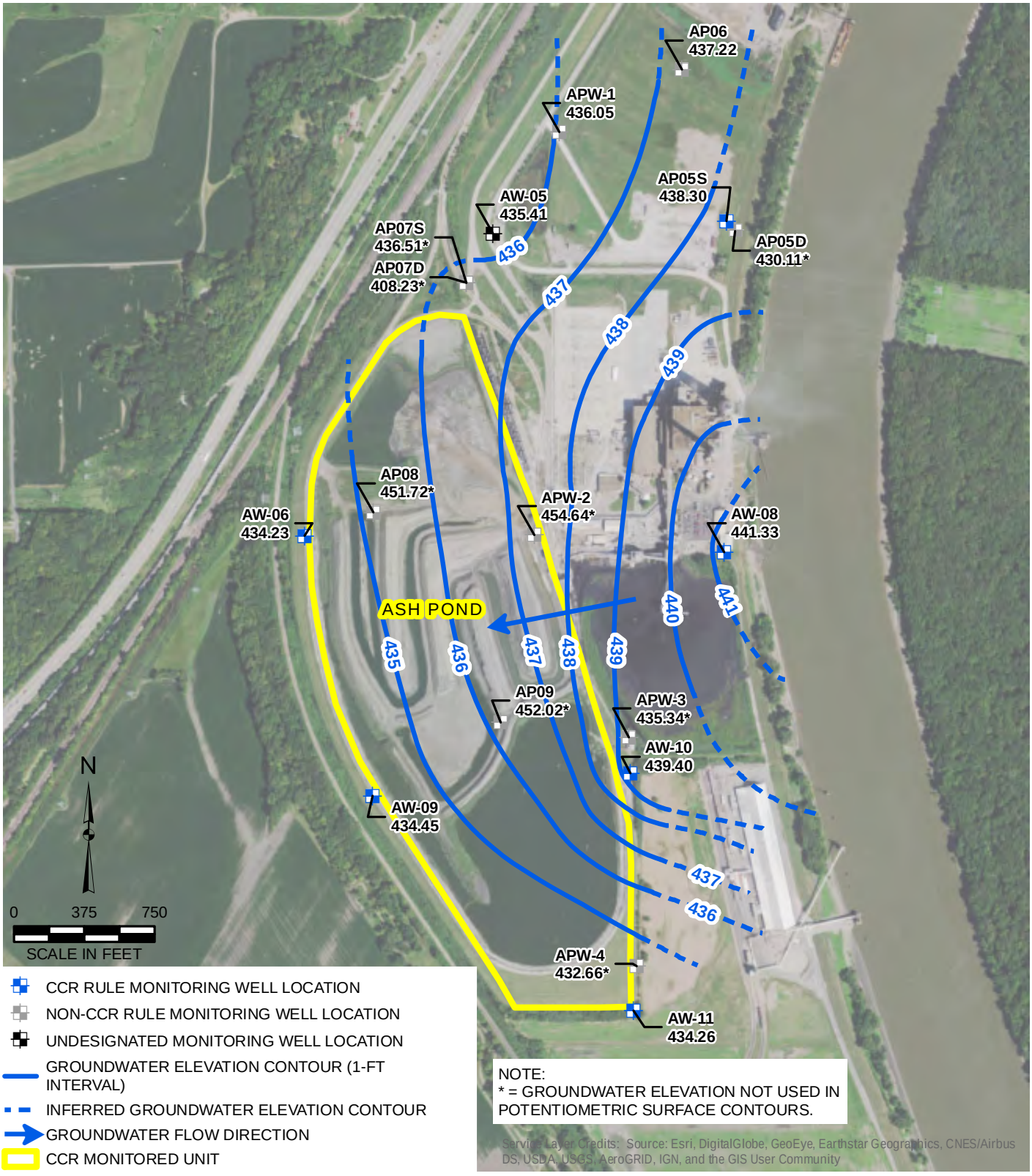
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 5: NOVEMBER 10, 2016

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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REVIEWED BY/DATE:
ANS 3/6/17
APPROVED BY/DATE:
JJW 9/1/17

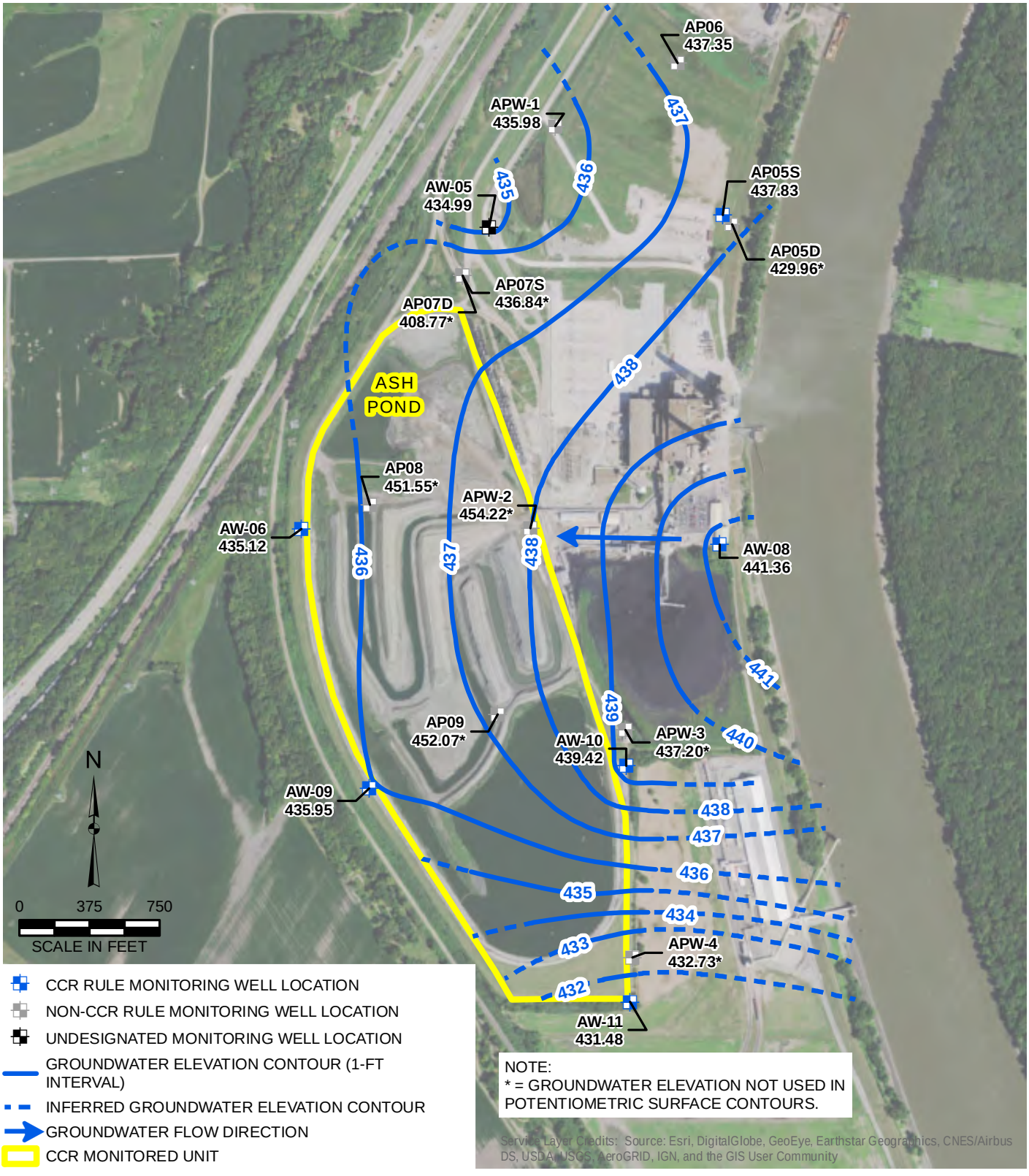
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 6: JANUARY 16, 2017

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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DRAWN BY/DATE:
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REVIEWED BY/DATE:
ANS 6/21/17
APPROVED BY/DATE:
JJW 9/1/17

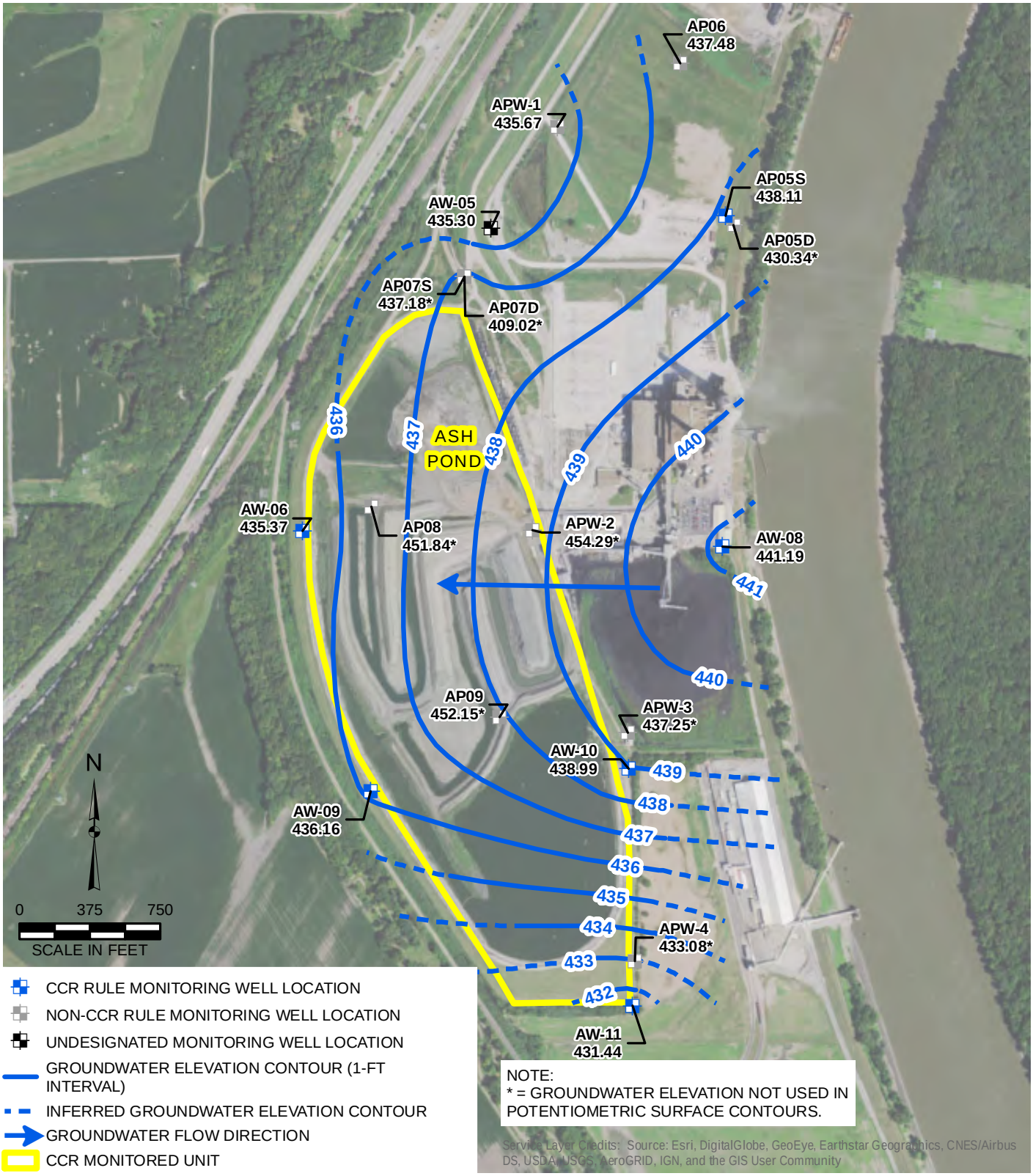
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 7: MAY 8, 2017

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



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SDS 7/29/17
REVIEWED BY/DATE:
ANS 7/29/17
APPROVED BY/DATE:
JJW 9/1/17

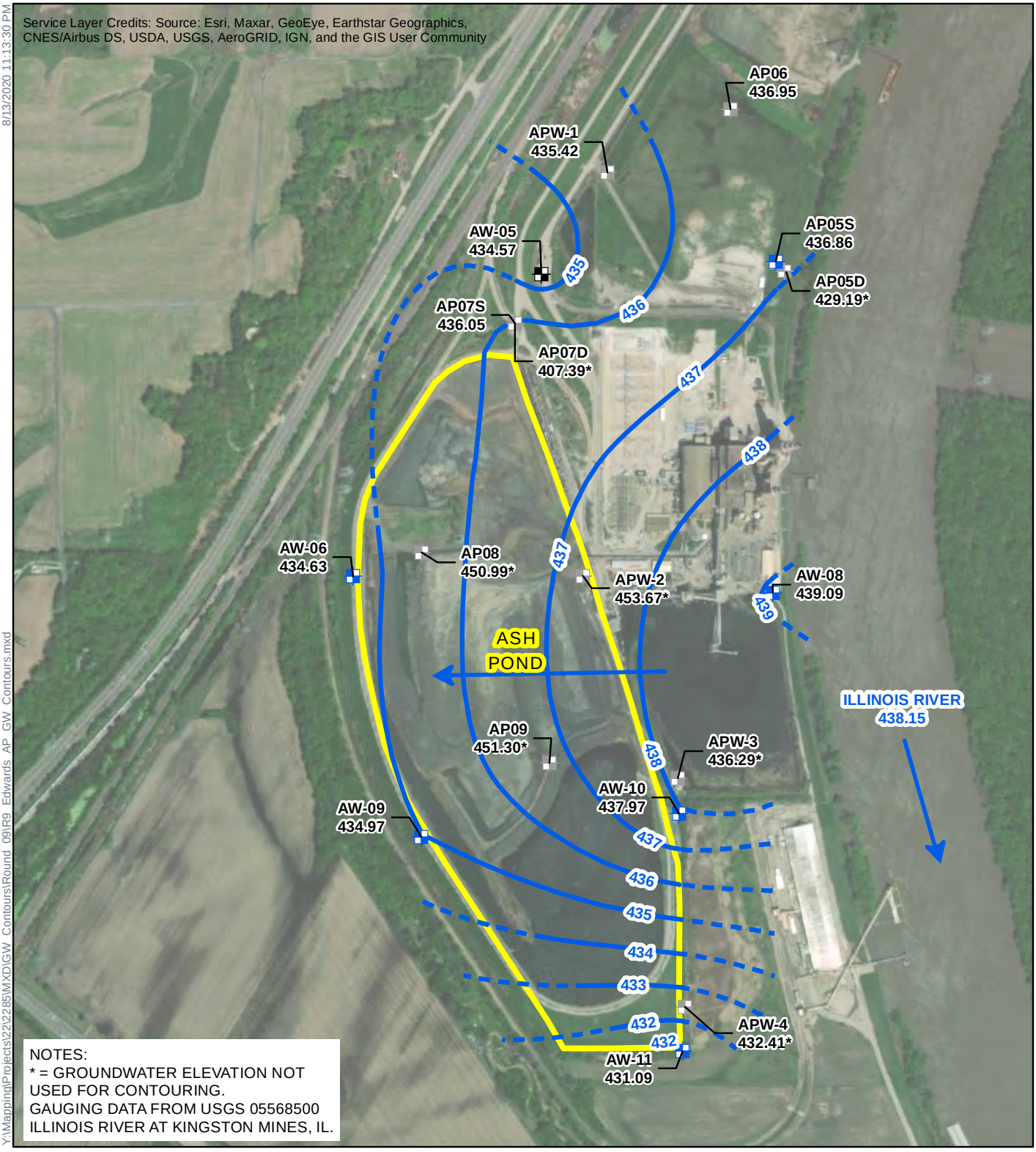
EDWARDS ASH POND (UNIT ID: 301)
UPPERMOST AQUIFER UNIT
GROUNDWATER ELEVATION CONTOUR MAP
ROUND 8: JULY 19, 2017

DYNEGY CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONSVILLE, ILLINOIS

PROJECT NO: 2285

FIGURE NO: 1

Natural Resource Technology
AN OBG COMPANY



CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
UNDESIGNATED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED UNIT

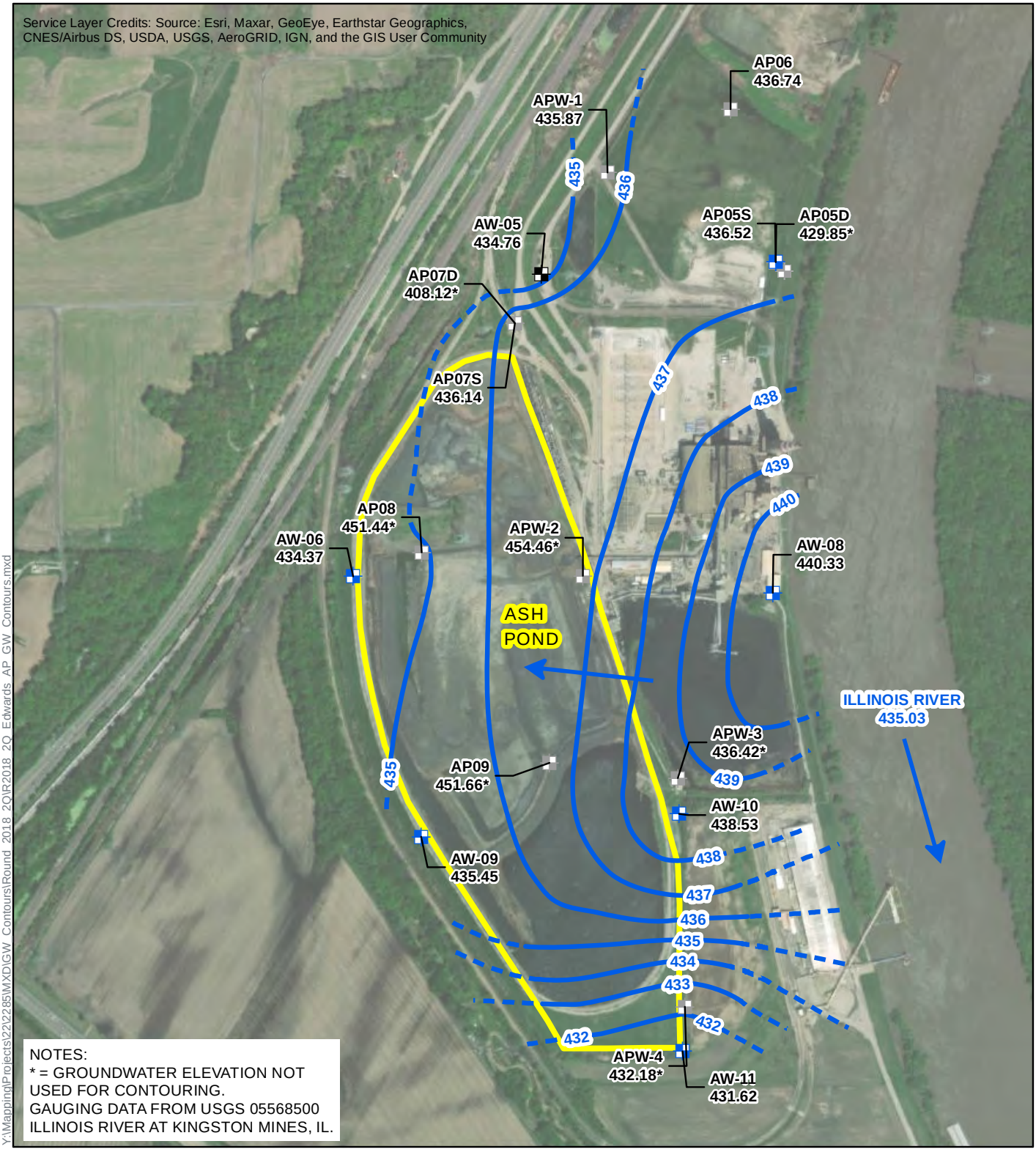
EDWARDS ASH POND (UNIT ID: 301)
GROUNDWATER ELEVATION CONTOUR MAP
NOVEMBER 1, 2017

CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONVILLE, ILLINOIS

0 187.5 375 750
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
UNDESIGNATED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED UNIT

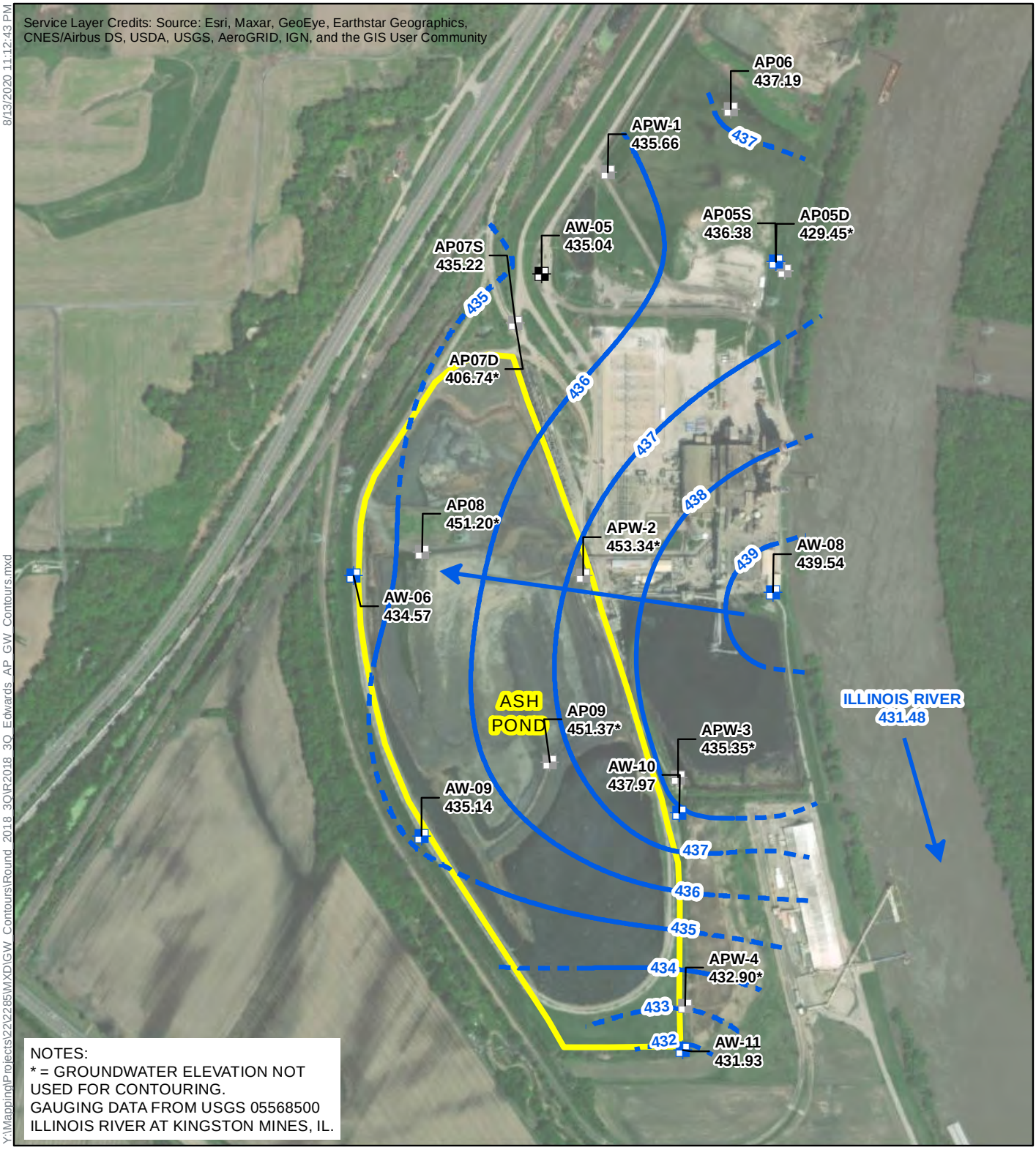
EDWARDS ASH POND (UNIT ID: 301)
GROUNDWATER ELEVATION CONTOUR MAP
MAY 4, 2018

CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONVILLE, ILLINOIS

0 187.5 375 750
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
UNDESIGNATED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED UNIT

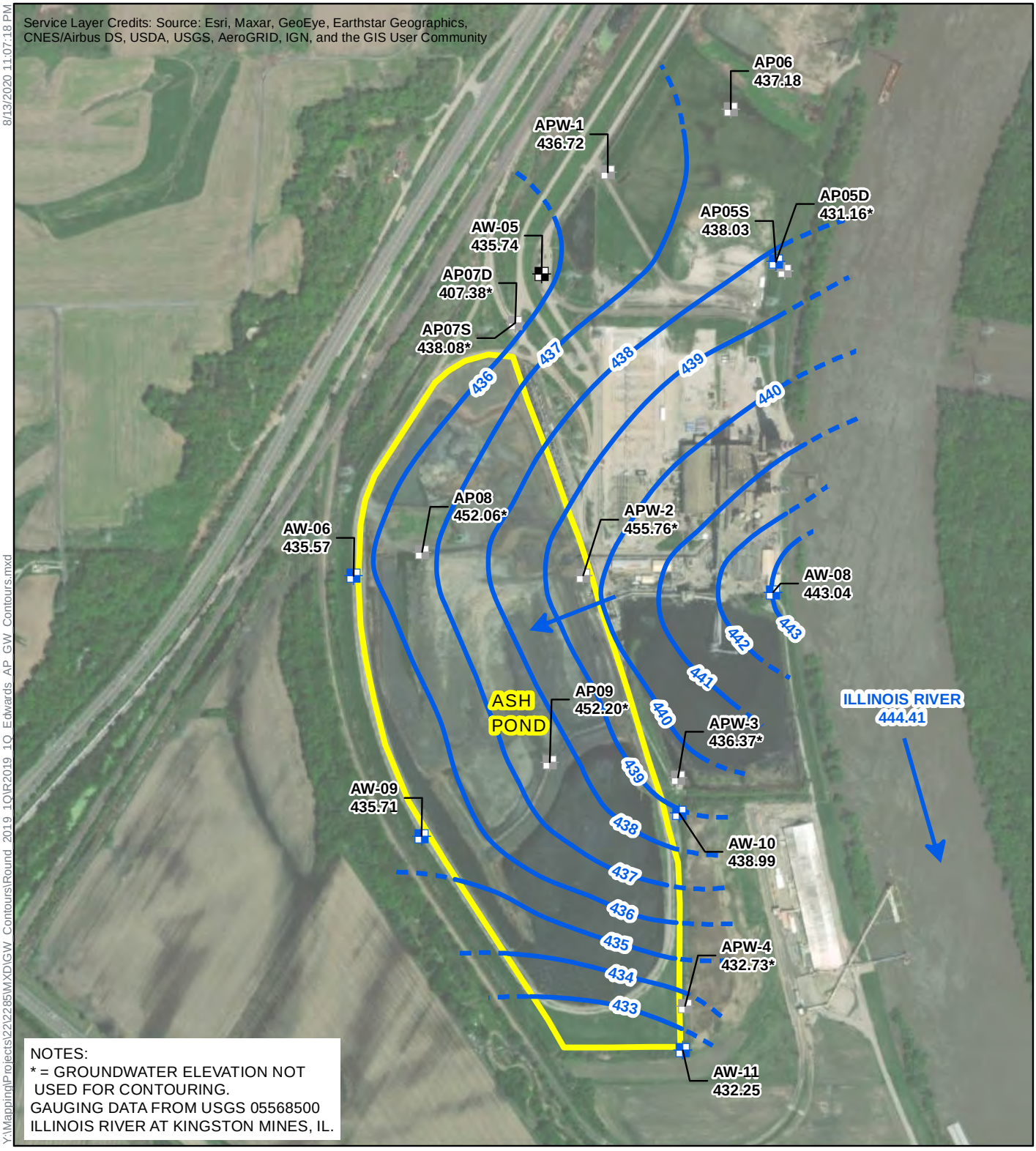
EDWARDS ASH POND (UNIT ID: 301)
GROUNDWATER ELEVATION CONTOUR MAP
JULY 26, 2018

CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONVILLE, ILLINOIS

0 187.5 375 750
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



CCR RULE MONITORING WELL LOCATION

NON-CCR RULE MONITORING WELL LOCATION

UNDESIGNATED MONITORING WELL LOCATION

GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)

INFERRED GROUNDWATER ELEVATION CONTOUR

GROUNDWATER FLOW DIRECTION

CCR MONITORED UNIT

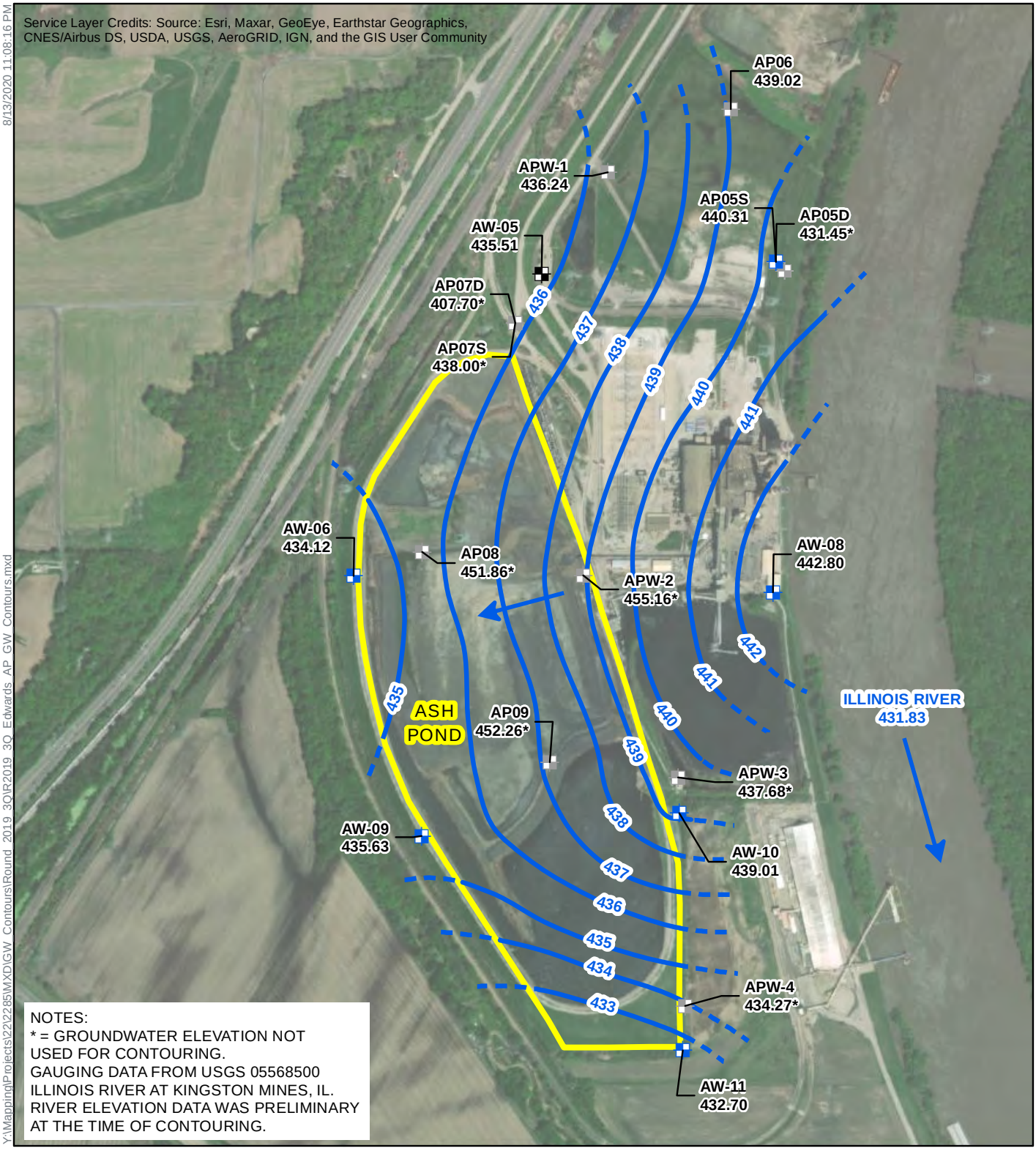
EDWARDS ASH POND (UNIT ID: 301)
GROUNDWATER ELEVATION CONTOUR MAP
FEBRUARY 25, 2019

CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONVILLE, ILLINOIS

0 187.5 375 750
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



CCR RULE MONITORING WELL LOCATION
NON-CCR RULE MONITORING WELL LOCATION
UNDESIGNATED MONITORING WELL LOCATION
GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
CCR MONITORED UNIT

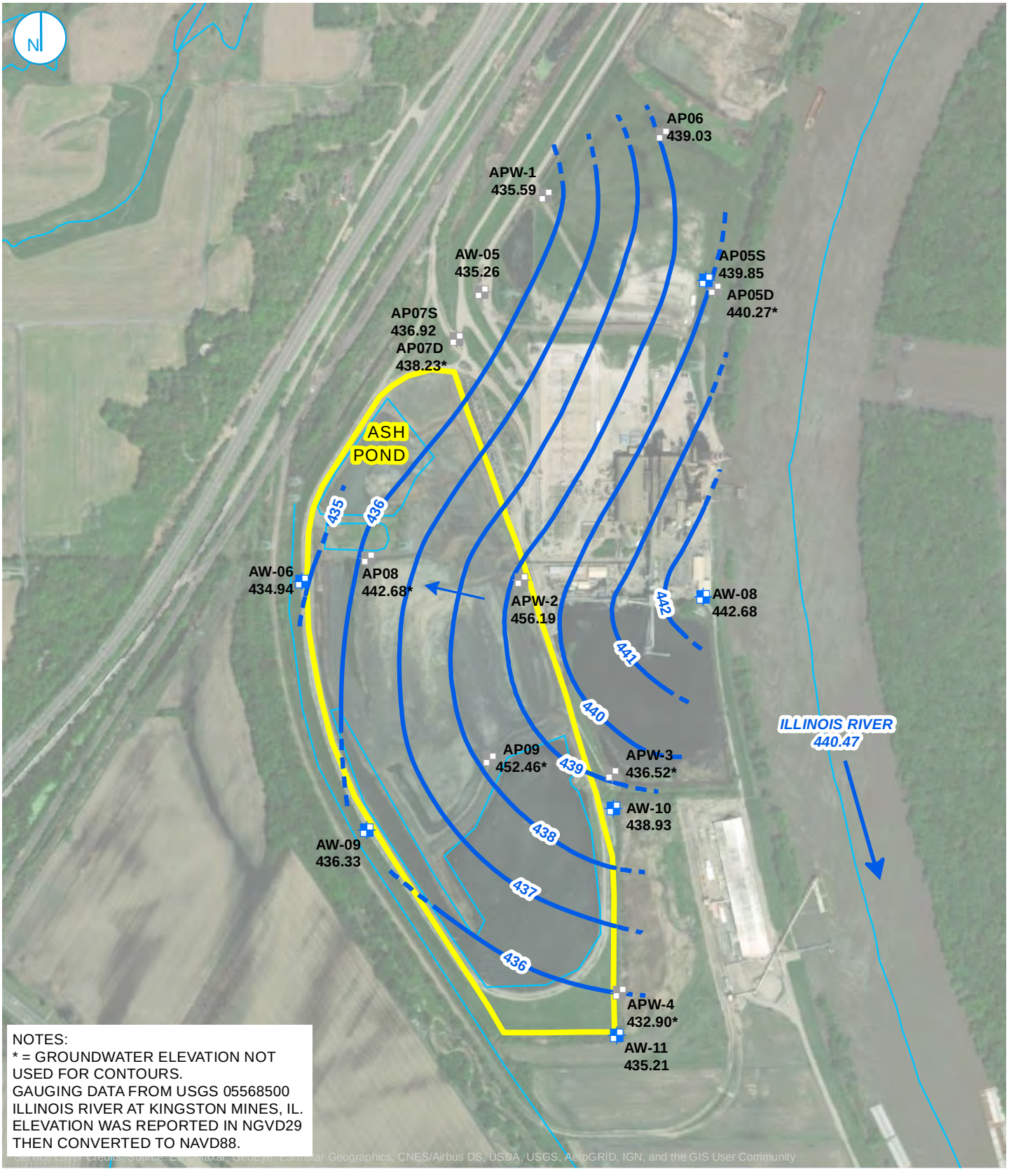
EDWARDS ASH POND (UNIT ID: 301)
GROUNDWATER ELEVATION CONTOUR MAP
AUGUST 6, 2019

CCR RULE GROUNDWATER MONITORING
EDWARDS POWER STATION
BARTONVILLE, ILLINOIS

0 187.5 375 750
Feet

N

O'BRIEN & GERE ENGINEERS, INC.



NOTES:
* = GROUNDWATER ELEVATION NOT USED FOR CONTOURS.
GAUGING DATA FROM USGS 05568500 ILLINOIS RIVER AT KINGSTON MINES, IL. ELEVATION WAS REPORTED IN NGVD29 THEN CONVERTED TO NAVD88.

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

- CCR RULE MONITORING WELL
- NON-CCR RULE MONITORING WELL
- GROUNDWATER ELEVATION CONTOUR (1-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION
- CCR MONITORED UNIT
- SURFACE WATER FEATURE

0 450 900 Feet

GROUNDWATER ELEVATION CONTOUR MAP
FEBRUARY 27, 2020

EDWARDS ASH POND (UNIT ID: 301)
VISTRA ENERGY
EDWARDS POWER STATION
BARTONVILLE, ILLINOIS

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

ATTACHMENT 5 – TABLES SUMMARIZING CONSTITUENT CONCENTRATIONS AT EACH MONITORING WELL

Analytical Results - Appendix III
Edwards 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								
AP-05S	1/18/2017	0.36	110	44	<0.25	6.9	38	860
AP-05S	5/10/2017	0.34	110	42	<0.25	7.1	32	810
AP-05S	6/7/2017	0.34	110	42	<0.25	6.8	29	500
AP-05S	6/22/2017	0.32	110	42	<0.25	7.2	26	880
AP-05S	7/21/2017	0.27	120	41	<0.25	6.9	23	840
AP-05S	7/31/2017	0.29	130	44	<0.25	7.0	19	750
AP-05S	8/7/2017	0.30	120	41	<0.25	7.0	17	840
AP-05S	8/23/2017	0.31	98	43	<0.25	6.9	12	820
AP-05S	11/2/2017	0.37	100	39	<0.25	7.2	10	820
AP-05S	5/7/2018	0.29	94	42	<0.25	7.2	8.1	860
AP-05S	7/27/2018	0.33	110	41	<0.25	7.1	6.2	940
AP-05S	8/27/2018	NA	NA	NA	NA	7.0	NA	NA
AP-05S	2/27/2019	0.29	91	40	<0.25	7.1	4.0	880
AP-05S	8/6/2019	0.24	110	37	<0.25	7.1	<1	900
AP-05S	2/27/2020	0.31	170	40	<0.25	6.7	<1	840
AW-08	11/9/2015	0.16	140	19	<0.25	6.6	80	740
AW-08	12/21/2015	NA	NA	NA	NA	NA	NA	NA
AW-08	2/17/2016	0.17	150	20	0.324	6.8	61	660
AW-08	5/17/2016	0.21	160	18	0.376	6.8	59	680
AW-08	7/21/2016	0.14	100	23	0.340	7.0	55	680
AW-08	11/10/2016	0.15	160	20	0.346	7.1	46	710
AW-08	1/17/2017	0.13	110	20	<0.25	7.2	64	640
AW-08	5/8/2017	0.11	160	16	0.331	7.1	23	780
AW-08	7/19/2017	0.085	160	16	<0.25	7.3	19	640
AW-08	11/1/2017	0.14	150	16	0.334	7.1	11	680
AW-08	5/5/2018	0.096	130	18	0.338	7.1	7.5	640
AW-08	7/27/2018	0.13	130	17	0.313	7.2	6.0	600
AW-08	8/27/2018	NA	NA	NA	NA	7.1	NA	NA
AW-08	2/27/2019	0.12	140	17	0.270	7.1	9.6	670
AW-08	8/6/2019	0.10	130	19	0.287	7.3	20	700
AW-08	2/27/2020	0.11	140	16	0.300	6.9	<1	680
Downgradient Wells								
AW-06	11/10/2015	0.31	110	61	<0.25	7.0	36	560
AW-06	2/17/2016	0.29	72	75	0.441	7.2	40	650
AW-06	5/18/2016	0.17	110	43	0.465	7.2	41	490
AW-06	7/22/2016	0.21	120	50	0.414	7.1	42	540
AW-06	11/11/2016	0.16	110	45	0.429	7.2	39	530
AW-06	1/17/2017	0.17	100	39	0.351	7.2	39	540
AW-06	5/9/2017	0.18	110	37	0.415	7.2	38	560
AW-06	7/20/2017	0.19	140	34	0.314	7.3	34	480
AW-06	11/2/2017	0.18	100	32	0.405	7.1	32	500
AW-06	5/5/2018	0.17	120	37	0.286	7.2	29	430
AW-06	8/24/2018	0.14	110	35	0.366	7.9	31	540
AW-06	2/27/2019	0.13	110	35	0.280	7.3	29	580
AW-06	8/6/2019	0.093	120	33	0.393	7.2	29	580
AW-06	2/27/2020	0.12	110	33	0.413	7.0	23	500
AW-09	11/10/2015	0.79	170	31	<0.25	6.8	28	700
AW-09	12/21/2015	NA	NA	NA	NA	NA	NA	NA
AW-09	2/17/2016	0.86	210	31	0.313	6.6	23	700
AW-09	5/17/2016	1.3	120	32	0.338	6.5	37	640
AW-09	7/22/2016	0.51	180	32	0.342	6.6	19	660
AW-09	11/11/2016	0.38	140	29	0.334	6.7	8.6	790
AW-09	1/17/2017	0.84	120	32	<0.25	6.9	28	710
AW-09	5/9/2017	0.49	140	28	0.281	7.1	13	760

Analytical Results - Appendix III
Edwards 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)
AW-09	7/20/2017	0.31	160	28	<0.25	6.9	1.6	700
AW-09	11/2/2017	0.90	110	32	0.279	7.0	29	690
AW-09	5/5/2018	0.29	130	26	0.294	7.0	<1	670
AW-09	8/24/2018	0.72	120	36	0.334	7.0	26	720
AW-09	2/27/2019	0.52	120	29	0.250	7.0	12	780
AW-09	8/6/2019	0.20	140	27	<0.25	7.2	<1	770
AW-09	2/27/2020	0.24	130	24	<0.25	6.9	<1	740
AW-10	11/9/2015	0.42	140	94	<0.25	6.6	2.8	1100
AW-10	2/18/2016	0.56	280	99	<0.25	7.0	1.2	1200
AW-10	5/18/2016	0.53	170	83	0.324	7.1	<1	1100
AW-10	7/21/2016	0.46	130	100	<0.25	7.1	<1	1100
AW-10	11/11/2016	0.44	140	92	<0.25	7.1	<1	1100
AW-10	1/17/2017	0.44	110	85	<0.25	7.1	1.8	1100
AW-10	5/10/2017	0.49	120	89	<0.25	6.9	4.1	1200
AW-10	7/20/2017	0.43	130	84	<0.25	7.0	<1	980
AW-10	11/2/2017	0.54	100	85	<0.25	7.2	2.8	1000
AW-10	5/7/2018	0.42	110	85	<0.25	7.3	<1	1000
AW-10	7/27/2018	0.48	170	88	<0.25	7.2	<1	1100
AW-10	8/27/2018	NA	NA	NA	NA	7.1	NA	NA
AW-10	2/27/2019	0.47	130	85	<0.25	7.2	<1	1100
AW-10	8/6/2019	0.50	160	100	<0.25	7.3	<1	1200
AW-10	2/27/2020	0.46	140	83	<0.25	6.8	<1	1200
AW-11	11/9/2015	0.23	170	33	<0.25	6.5	1.4	870
AW-11	2/18/2016	0.24	210	36	0.29	6.9	2.0	900
AW-11	5/18/2016	0.25	170	31	0.38	7.0	1.8	860
AW-11	7/22/2016	0.22	160	36	<0.25	7.0	1.9	880
AW-11	11/11/2016	0.25	220	33	<0.25	7.1	<1	880
AW-11	1/17/2017	0.22	150	35	<0.25	7.2	2.2	920
AW-11	5/9/2017	0.23	210	34	<0.25	7.0	4.9	940
AW-11	7/20/2017	0.23	240	30	<0.25	7.2	<1	920
AW-11	11/2/2017	0.23	140	33	<0.25	7.2	3.2	920
AW-11	5/7/2018	0.21	140	30	<0.25	7.2	<1	880
AW-11	8/27/2018	0.30	290	31	0.270	7.2	1.1	980
AW-11	2/27/2019	0.22	160	30	<0.25	7.2	<1	970
AW-11	8/6/2019	0.18	160	30	<0.25	7.2	<1	980
AW-11	2/27/2020	0.22	170	30	<0.25	6.7	<1	970

Notes:
1. Abbreviations: mg/L - milligrams per liter; NA - not analyzed; s.u. - standard units.

Analytical Results - Appendix IV
Edwards Ash Pond

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																
AP-05S	1/18/2017	0.0041	0.003	0.54	<0.001	<0.001	<0.004	0.0025	<0.25	0.001	0.040	<0.0002	0.019	1.05	<0.001	<0.001
AP-05S	5/10/2017	<0.003	0.0041	0.54	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.038	<0.0002	0.015	1.32	<0.001	<0.001
AP-05S	6/7/2017	<0.003	0.0055	0.59	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.034	<0.0002	0.015	1.43	<0.001	<0.001
AP-05S	6/22/2017	<0.003	0.0063	0.65	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.036	<0.0002	0.015	1.89	<0.001	<0.001
AP-05S	7/21/2017	<0.003	0.0077	0.69	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.035	<0.0002	0.014	1.75	<0.001	<0.001
AP-05S	7/31/2017	<0.003	0.0074	0.77	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.038	<0.0002	0.012	1.38	<0.001	<0.001
AP-05S	8/7/2017	<0.003	0.0077	0.77	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.035	<0.0002	0.011	2.20	<0.001	<0.001
AP-05S	8/23/2017	<0.003	0.0072	0.79	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.044	<0.0002	0.0076	2.63	<0.001	<0.001
AP-05S	5/7/2018	<0.003	0.0028	0.46	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.032	<0.0002	0.0038	NA	<0.001	<0.001
AP-05S	5/29/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.68	NA	NA
AP-05S	7/27/2018	NA	0.0047	0.70	<0.001	NA	<0.004	<0.002	<0.25	<0.001	0.025	NA	0.0029	3.19	<0.001	NA
AP-05S	2/27/2019	<0.003	0.0046	0.87	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.020	<0.0002	0.0014	2.30	<0.001	<0.001
AP-05S	8/6/2019	NA	0.0067	1.1	<0.001	NA	<0.004	<0.002	<0.25	<0.001	0.031	NA	<0.001	3.00	<0.001	NA
AP-05S	2/27/2020	<0.003	0.0088	1.4	<0.001	<0.001	0.028	0.013	<0.25	0.0099	0.059	<0.0002	0.0026	2.85	0.0016	<0.001
AW-08	11/9/2015	<0.003	0.0011	0.15	<0.001	<0.001	<0.004	0.0038	<0.25	<0.001	0.025	<0.0002	0.0028	1.12	0.0012	<0.001
AW-08	2/17/2016	<0.003	0.0014	0.16	<0.001	<0.001	<0.004	0.0034	0.324	<0.001	0.025	<0.0002	0.0027	1.27	<0.001	<0.001
AW-08	5/17/2016	<0.003	0.0056	0.19	0.014	<0.001	<0.004	0.0053	0.376	<0.001	0.019	<0.0002	0.0044	0.454	<0.001	<0.001
AW-08	7/21/2016	<0.003	0.0018	0.13	<0.0005	<0.001	<0.004	0.002	0.340	<0.001	0.019	<0.0002	0.0040	0.357	<0.001	<0.001
AW-08	11/10/2016	<0.003	0.011	0.20	<0.001	<0.001	<0.004	0.0034	0.346	<0.001	0.016	<0.0002	0.0085	0.433	<0.001	<0.001
AW-08	1/17/2017	<0.003	0.0012	0.15	<0.001	<0.001	<0.004	0.003	<0.25	<0.001	0.020	<0.0002	0.0032	0.408	<0.001	<0.001
AW-08	5/8/2017	<0.003	0.017	0.21	<0.001	<0.001	<0.004	<0.002	0.331	<0.001	0.014	<0.0002	0.0072	0.975	<0.001	<0.001
AW-08	7/19/2017	<0.003	0.016	0.22	<0.001	<0.001	<0.004	<0.002	<0.25	<0.001	0.014	<0.0002	0.0062	0.394	<0.001	<0.001
AW-08	11/1/2017	NA	NA	NA	NA	NA	NA	NA	0.334	NA	NA	NA	NA	NA	NA	NA
AW-08	5/5/2018	<0.003	0.027	0.24	<0.001	<0.001	<0.004	<0.002	0.338	<0.001	0.014	<0.0002	0.0044	NA	<0.001	<0.001
AW-08	5/29/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.422	NA	NA
AW-08	7/27/2018	NA	0.020	0.19	<0.001	NA	<0.004	<0.002	0.313	<0.001	<0.01	NA	0.0043	0.807	<0.001	NA
AW-08	2/27/2019	<0.003	0.019	0.22	<0.001	<0.001	<0.004	<0.002	0.270	<0.001	<0.01	<0.0002	0.0049	0.402	<0.001	<0.001
AW-08	8/6/2019	NA	0.0074	0.18	<0.001	NA	<0.004	<0.002	0.287	<0.001	0.017	NA	0.0037	3.95	<0.001	NA
AW-08	2/27/2020	<0.003	0.019	0.23	<0.001	<0.001	<0.004	<0.002	0.300	<0.001	<0.02	<0.0002	0.0051	0.933	<0.001	<0.001
Downgradient Wells																
AW-06	11/10/2015	<0.003	0.0034	0.29	<0.001	<0.001	0.014	0.006	<0.25	0.006	0.035	<0.0002	0.0034	2.54	0.001	<0.001
AW-06	2/17/2016	<0.003	0.0018	0.20	<0.001	<0.001	0.0071	0.0024	0.441	0.0023	0.029	<0.0002	0.0038	2.62	<0.001	<0.001
AW-06	5/18/2016	<0.003	0.0014	0.18	<0.001	<0.001	<0.004	<0.002	0.465	<0.001	0.017	<0.0002	0.0044	1.21	<0.001	<0.001
AW-06	7/22/2016	<0.003	0.0082	0.32	0.00085	<0.001	0.026	0.014	0.414	0.014	0.042	0.0018	0.0052	2.08	0.0022	<0.001
AW-06	11/11/2016	<0.003	0.0045	0.25	<0.001	<0.001	0.024	0.0068	0.429	0.0064	0.030	<0.0002	0.0064	0.498	<0.001	<0.001
AW-06	1/17/2017	<0.003	0.0036	0.19	<0.001	<0.001	0.0084	0.0028	0.351	0.0063	0.020	<0.0002	0.0066	0.372	<0.001	<0.001
AW-06	5/9/2017	<0.003	0.0014	0.16	<0.001	<0.001	<0.004	<0.002	0.415	0.0012	0.018	<0.0002	0.0095	0.399	<0.001	<0.001
AW-06	7/20/2017	<0.003	0.032	0.46	0.0011	<0.001	0.033	0.019	0.314	0.019	0.049	<0.0002	0.0086	0.813	0.0023	<0.001
AW-06	11/2/2017	NA	NA	NA	NA	NA	NA	NA	0.405	NA	NA	NA	NA	NA	NA	NA
AW-06	5/5/2018	<0.003	0.037	0.45	0.0014	<0.001	0.034	0.018	0.286	0.019	0.048	<0.0002	0.008	NA	0.0028	<0.001
AW-06	5/29/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.09	NA	NA
AW-06	8/24/2018	NA	0.0048	0.18	<0.001	NA	<0.004	<0.002	0.366	0.0018	<0.01	NA	0.0057	1.98	<0.001	NA
AW-06	2/27/2019	<0.003	0.0046	0.18	<0.001	<0.001	<0.004	<0.002	0.280	0.0013	<0.01	<0.0002	0.0051	0.357	<0.001	<0.001
AW-06	8/6/2019	NA	0.020	0.35	<0.001	NA	0.024	0.01	0.393	0.011	0.035	NA	0.0055	1.82	0.002	NA
AW-06	2/27/2020	<0.003	0.0053	0.21	<0.001	<0.001	0.0068	<0.002	0.413	0.0016	0.020	<0.0002	0.0049	0.242	<0.001	<0.001
AW-09	11/10/2015	<0.003	0.018	0.62	0.0029	<0.001	0.075	0.040	<0.25	0.038	0.11	<0.0002	0.014	7.71	0.0067	<0.001

Analytical Results - Appendix IV
Edwards Ash Pond

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)
AW-09	2/17/2016	<0.003	0.046	1.1	0.007	0.0028	0.2	0.093	0.313	0.11	0.26	0.00026	0.020	5.97	0.0091	0.0016
AW-09	5/17/2016	<0.003	<0.001	0.15	<0.001	<0.001	<0.004	0.0023	0.338	<0.001	0.022	<0.0002	0.015	0.464	<0.001	<0.001
AW-09	7/22/2016	<0.003	0.025	0.57	0.0025	0.0012	0.073	0.043	0.342	0.036	0.11	<0.0002	0.024	3.46	0.0036	<0.001
AW-09	11/11/2016	<0.003	0.02	0.39	<0.001	<0.001	0.03	0.017	0.334	0.0097	0.04	<0.0002	0.026	2.23	0.0013	<0.001
AW-09	1/17/2017	<0.003	<0.001	0.18	<0.001	<0.001	<0.004	0.0029	<0.25	<0.001	0.022	<0.0002	0.012	0.729	<0.001	<0.001
AW-09	5/9/2017	<0.003	0.0049	0.22	<0.001	<0.001	<0.004	0.0051	0.281	<0.001	0.022	<0.0002	0.020	0.00	<0.001	<0.001
AW-09	7/20/2017	<0.003	0.031	0.57	0.0013	<0.001	0.039	0.024	<0.25	0.024	0.06	<0.0002	0.028	1.86	0.002	<0.001
AW-09	11/2/2017	NA	NA	NA	NA	NA	NA	NA	0.279	NA	NA	NA	NA	NA	NA	NA
AW-09	5/5/2018	<0.003	0.036	0.37	<0.001	<0.001	0.015	0.01	0.294	0.0076	0.029	<0.0002	0.037	NA	0.0015	<0.001
AW-09	5/29/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.633	NA	NA
AW-09	8/24/2018	NA	<0.001	0.18	<0.001	NA	<0.004	0.0034	0.334	<0.001	0.011	NA	0.015	0.466	<0.001	NA
AW-09	2/27/2019	<0.003	0.0019	0.22	<0.001	<0.001	<0.004	0.0036	0.250	<0.001	0.013	<0.0002	0.016	0.771	<0.001	<0.001
AW-09	8/6/2019	NA	0.026	0.54	<0.001	NA	0.017	0.011	<0.25	0.011	0.036	NA	0.015	1.94	0.0012	NA
AW-09	2/27/2020	<0.003	0.017	0.46	<0.001	<0.001	0.0092	0.0051	<0.25	0.0035	0.023	<0.0002	0.012	1.51	<0.001	<0.001
AW-10	11/9/2015	<0.003	0.010	0.98	<0.001	<0.001	0.015	0.0083	<0.25	0.0054	0.073	<0.0002	0.0017	3.83	0.0013	<0.001
AW-10	2/18/2016	<0.003	0.097	6.3	0.015	0.0031	0.45	0.25	<0.25	0.27	0.85	0.00033	0.0094	7.06	0.016	0.0023
AW-10	5/18/2016	<0.003	0.040	3.4	0.0011	<0.001	0.056	0.034	0.324	0.035	0.11	<0.0002	0.0028	5.73	0.0021	<0.001
AW-10	7/21/2016	<0.003	0.010	1.0	<0.0005	<0.001	0.015	0.0097	<0.25	0.0074	0.08	<0.0002	0.0016	6.07	0.001	<0.001
AW-10	11/11/2016	<0.003	0.018	1.4	0.0012	<0.001	0.038	0.026	<0.25	0.022	0.12	<0.0002	0.0029	3.57	0.0025	<0.001
AW-10	1/17/2017	<0.003	0.0023	0.58	<0.001	<0.001	<0.004	0.0022	<0.25	<0.001	0.056	<0.0002	0.0023	1.23	<0.001	<0.001
AW-10	5/10/2017	<0.003	0.0032	0.66	<0.001	<0.001	<0.004	0.0027	<0.25	<0.001	0.057	<0.0002	0.0032	1.12	<0.001	<0.001
AW-10	7/20/2017	<0.003	0.0052	0.67	<0.001	<0.001	0.0042	0.0033	<0.25	0.0018	0.052	<0.0002	0.0043	0.875	<0.001	<0.001
AW-10	11/2/2017	NA	NA	NA	NA	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	NA	NA
AW-10	5/7/2018	<0.003	0.0089	0.88	<0.001	<0.001	<0.004	0.0031	<0.25	0.001	0.042	<0.0002	0.0020	NA	<0.001	<0.001
AW-10	5/29/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.40	NA	NA
AW-10	7/27/2018	NA	0.018	1.4	0.0022	NA	0.063	0.036	<0.25	0.035	0.11	NA	0.0030	8.03	0.0035	NA
AW-10	2/27/2019	<0.003	0.012	0.93	<0.001	<0.001	<0.004	0.0037	<0.25	0.0024	0.040	<0.0002	0.028	1.79	<0.001	<0.001
AW-10	8/6/2019	NA	0.019	1.5	0.0014	NA	0.05	0.026	<0.25	0.026	0.12	NA	0.0022	4.08	0.0033	NA
AW-10	2/27/2020	<0.003	0.011	1.2	<0.001	<0.001	0.023	0.0098	<0.25	0.0092	0.065	<0.0002	0.0012	2.19	0.0012	<0.001
AW-11	11/9/2015	<0.003	0.011	1.2	<0.001	<0.001	0.029	0.011	<0.25	0.0099	0.067	<0.0002	0.0043	2.78	0.0019	<0.001
AW-11	2/18/2016	<0.003	0.014	1.6	0.0013	<0.001	0.044	0.023	0.290	0.026	0.078	<0.0002	0.0066	3.20	0.0021	<0.001
AW-11	5/18/2016	<0.003	0.0053	0.83	<0.001	<0.001	0.0095	0.0067	0.380	0.0049	0.033	<0.0002	0.0065	0.558	<0.001	<0.001
AW-11	7/22/2016	<0.003	0.0054	0.84	<0.0005	<0.001	0.0042	0.0034	<0.25	0.0019	0.033	<0.0002	0.0037	2.69	<0.001	<0.001
AW-11	11/11/2016	<0.003	0.021	2.0	0.0027	0.0014	0.095	0.044	<0.25	0.049	0.14	<0.0002	0.0088	2.69	0.0061	<0.001
AW-11	1/17/2017	<0.003	0.0042	0.56	<0.001	0.0015	0.0063	0.0038	<0.25	0.0015	0.031	<0.0002	0.010	0.394	0.0012	<0.001
AW-11	5/9/2017	<0.003	0.014	1.4	0.0012	<0.001	0.031	0.023	<0.25	0.024	0.080	<0.0002	0.0073	5.75	0.003	<0.001
AW-11	7/20/2017	<0.003	0.025	2.5	0.0028	0.0017	0.091	0.046	<0.25	0.05	0.14	<0.0002	0.0077	4.47	0.0042	<0.001
AW-11	11/2/2017	NA	NA	NA	NA	NA	NA	NA	<0.25	NA	NA	NA	NA	NA	NA	NA
AW-11	5/7/2018	<0.003	0.011	0.73	<0.001	<0.001	<0.004	0.0029	<0.25	<0.001	0.021	<0.0002	0.0064	NA	<0.001	<0.001
AW-11	5/29/2018	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.75	NA	NA
AW-11	8/27/2018	NA	0.029	3.0	0.0046	NA	0.15	0.070	0.270	0.08	0.16	NA	0.0099	7.60	0.0083	NA
AW-11	2/27/2019	<0.003	0.013	0.76	<0.001	<0.001	<0.004	0.0031	<0.25	0.0012	0.017	<0.0002	0.0053	2.33	<0.001	<0.001
AW-11	8/6/2019	NA	0.018	0.88	<0.001	NA	<0.004	0.0023	<0.25	<0.001	0.031	NA	0.0046	1.69	<0.001	NA
AW-11	2/27/2020	<0.003	0.013	1.3	<0.001	<0.001	0.0081	0.0041	<0.25	0.0033	0.029	<0.0002	0.0028	3.68	<0.001	<0.001

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 (ASH POND AREA)

The Edwards Power Station (Power Station) conceptual site model (CSM) and Description of Site Hydrogeology for the Edwards Ash Pond (AP) located in Bartonville, Illinois are described in the following sections.

REGIONAL SETTING

The AP is located in the Illinois Valley where the general sequence of unlithified Quaternary deposits, from ground surface down is:

- Poorly sorted sand, silt, and clay of the Cahokia Formation. Fine-grained deposits are predominant near the land surface, and coarse-grained deposits typically occur near the base of this formation, and have been observed to be 20 feet thick in the area.
- Glacial outwash belonging to the Henry and Banner Formations. The sands of the Henry and Banner Formations fill the deepest parts of the Illinois Valley, and are generally 75 to 150 feet thick in the area.

The Sankoty Sand Member of the Banner Formation rests directly on bedrock and fills the deepest part of the Illinois Valley in the area. Its thickness varies greatly from about 50 to 150 feet due to erosion and irregularities on the bedrock surface (Burch and Kelly, 1993). The Sankoty Sand is the most extensive aquifer in the region and is characterized by coarse- to medium-grained sand. Gravel is present in some beds but is not common (Willman and Frye, 1970).

SITE GEOLOGY

The major unconsolidated materials present at the AP include:

- Upper Cahokia Unit – Low permeability clays and silts of the Upper Cahokia Formation, saturated in portions of the site.
- Uppermost Aquifer (Groundwater Monitoring Zone) – Thin (generally less than 4 feet), moderate permeability sand, silty sand, and clayey gravel units which also includes the Lower Cahokia and the bedrock interface.
- Lower Confining Unit – Thick, very low permeability shales and siltstones of the Carbondale formation.

There is significant thickness of clay and/or silt overlying shaley bedrock. The bedrock surface dips toward the river and also toward a channel located in the southwest portion of the AP which is illustrated in the cross-sections attached to this demonstration.

SITE HYDROGEOLOGY

The CCR groundwater monitoring system consists of seven monitoring wells installed in the uppermost aquifer and adjacent to the AP (AW-05, AP-05S, AW-06, AW-08, AW-09, AW-10 and AW-11) (see Monitoring Well Location Map, and Well Construction Diagrams and Drilling Logs attached to this demonstration). The unit utilizes two background monitoring wells (AW-08 and AP-05S) as part of the CCR groundwater monitoring system.

The Uppermost aquifer consists of unconfined clays and silts of the Upper Cahokia, where saturated, and the thin, moderate permeability sands and gravels of the Lower Cahokia Formation which at some locations also

includes the bedrock interface (AP05S, AW05, AW08, AW09, AW10). The thickness of the sand and gravel unit was measured up to 4 feet within a bedrock channel (EDW-B009), although the sand and gravel is not laterally continuous.

The unlithified deposits are underlain by Pennsylvanian age bedrock, much of which is shale, of the Carbondale Formation. The top of rock was described as shale, siltstone, and shaley limestone based on borings which were advanced to rock. Thicknesses can be over 300 feet (Willman et al., 1967). Wells screened within the bedrock indicate low hydraulic conductivity (geometric mean 2.0 x 10^{-7} cm/sec). Water quality of the bedrock is increasingly mineralized with depth making the groundwater less desirable as a water supply.

Hydraulic Conductivity

Hydraulic conductivity/slug tests were completed in wells screened in the unlithified material as part of the Hydrogeologic Site Characterization (NRT, 2017). The hydraulic characteristics of the Lower Cahokia indicate the unit has a moderate hydraulic conductivity. The results of single-well field permeability tests have hydraulic conductivity values ranging from 5.4 x 10^{-6} to 3.25 x 10^{-3} cm/sec, with a geometric mean of 2.1 x 10^{-4} cm/sec. The effective porosity of this aquifer likely varies significantly in magnitude due to its variable composition. For purposes of groundwater velocities, a value of 0.1 and 0.15 was used to represent different portions of the aquifer.

GROUNDWATER ELEVATIONS, FLOW DIRECTION AND VELOCITY

Measured groundwater elevations typically range from about 430 ft in the south and southwest portion of the site, to 440 ft in the upgradient well along the Illinois River (AW-08). Groundwater elevations within the aquifer unit vary up to 4 feet based on river levels and appear to be influenced by the presence of a bedrock channel that is present along the western side of the AP. Piezometric head in the bedrock at depth ranges from about 408 ft msl in AP07D to about 430 ft msl in AP05D.

Groundwater generally flows from AW08 to the west, northwest toward AW-05 and southwest toward a buried bedrock channel. It is expected that groundwater discharges to the Illinois River south of the site property, where the bedrock channel potentially intersects the Illinois River. Groundwater flow within the shallow clay till is not mapped but based on the water surface in the pond and the range of Illinois River elevations, this shallow groundwater flows towards the Illinois River except during flood events. The horizontal gradient between wells AW-08 and AW-09, as measured in January and May 2017, is 0.003 and 0.002, respectively. Vertical gradients are generally upward between the Lower Cahokia/bedrock interface and Upper Cahokia, and downward between the bedrock interface and bedrock wells.

The Illinois River Valley is a regional discharge zone. Although gradients appear downward between the bedrock surface and the deep bedrock wells, it is expected that groundwater within the bedrock discharges to the Illinois River through fractures and more permeable portions of the bedrock.

Groundwater flow velocity within the Uppermost Aquifer ranged from approximately 0.001 to 0.12 ft/day as groundwater flowed from the Illinois River towards the bedrock channel in January 2017. During May 2017, velocities were slightly higher in portions of the site and ranged from 0.001 to 0.185 ft/day. In general, the flow velocity is slower near the river and increases near the sand and gravel unit in the southwest portion of the site. Groundwater flow within the shallow clay where saturated is assumed to be negligible and flow velocities were not calculated.

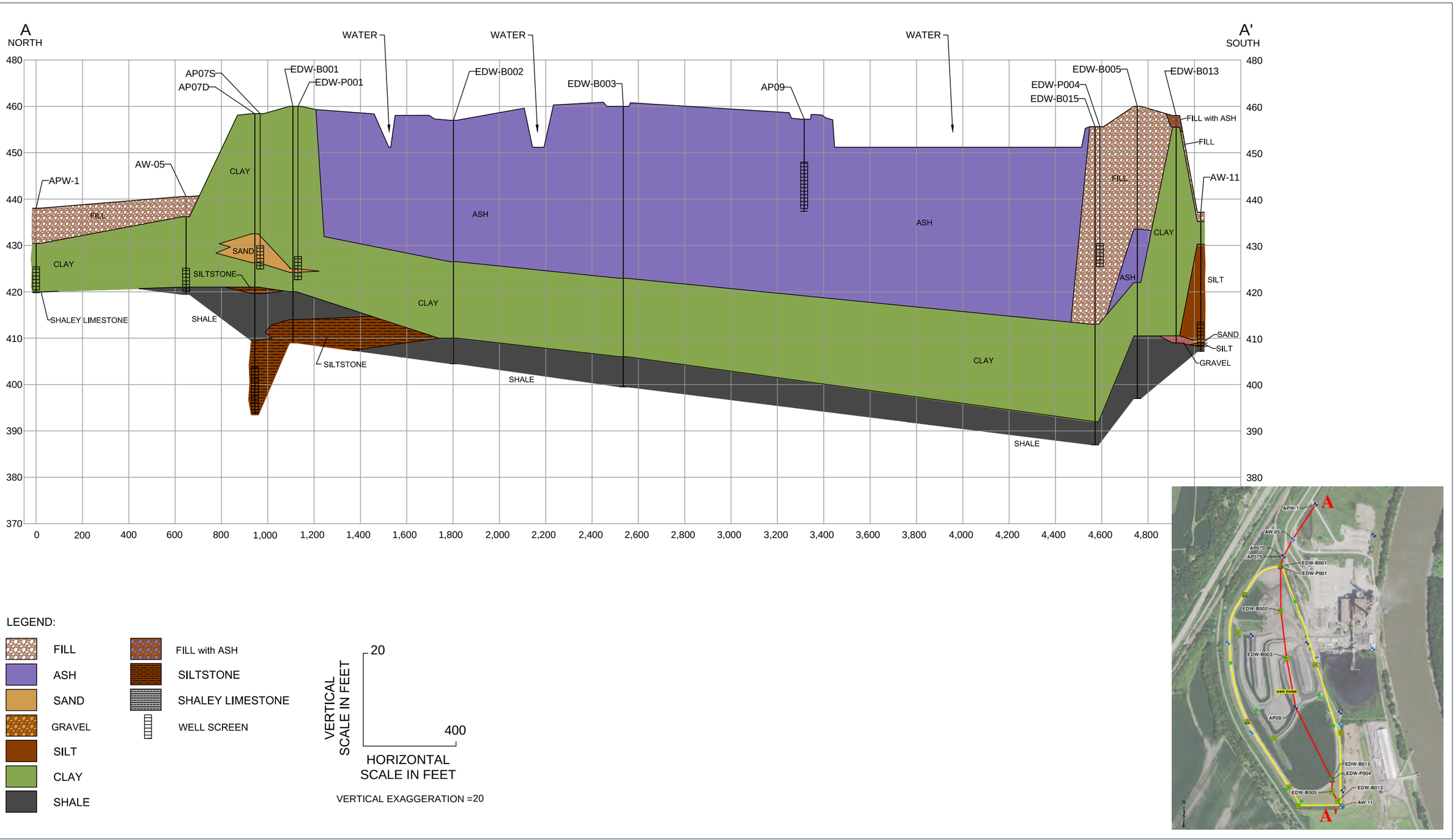
REFERENCES

NRT, 2013. Phase I Hydrogeological Assessment Report, Coal Combustion Product Impoundment, E.D. Edwards Energy Center, Peoria County IL, March 2013.

NRT, an OBG Company (NRT), 2017. Hydrogeologic Monitoring Plan, Edwards Ash Pond CCR Unit ID 301, Edwards Power Station, Bartonville, Illinois, October 2017

Willman, H.B., and J.C. Frye, 1970, Pleistocene Stratigraphy of Illinois: Illinois State Geological Survey, Bulletin 94, 204 p.

Willman, H.B., J.C. Frye, J.A. Simon, K.E. Clegg, D.H. Swann, E. Atherton, C. Collinson, J.A. Lineback, T.C. Buschbach, and H.B. Willman, 1967, Geologic Map of Illinois: Illinois State Geological Survey map, scale 1:500,000.



LEGEND:

- FILL
- ASH
- SAND
- GRAVEL
- SILT
- CLAY
- SHALE
- FILL with ASH
- SILTSTONE
- SHALEY LIMESTONE
- WELL SCREEN

VERTICAL SCALE IN FEET: 20

HORIZONTAL SCALE IN FEET: 400

VERTICAL EXAGGERATION =20

GEOLOGICAL CROSS SECTION A-A'

HYDROGEOLOGIC MONITORING PLAN

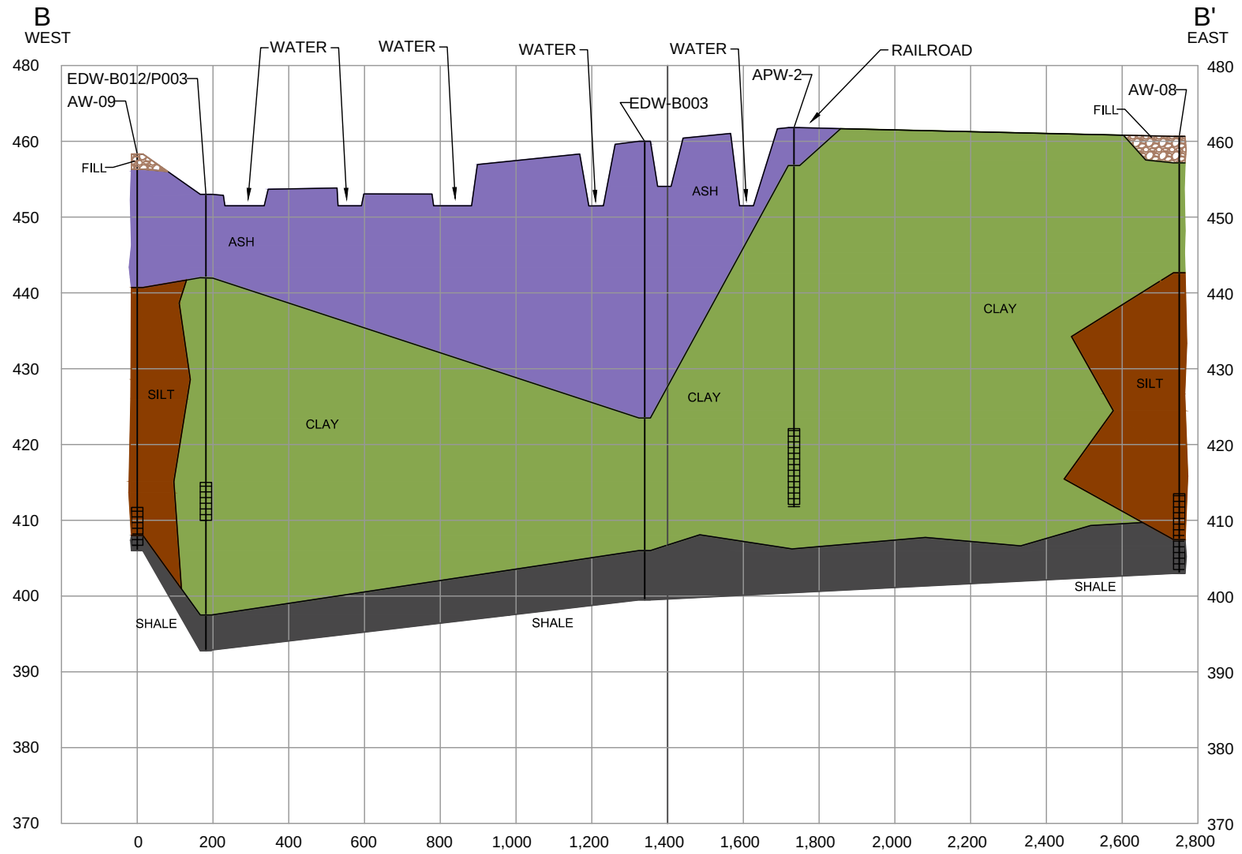
EDWARDS ASH POND

EDWARDS POWER STATION

BARTONSVILLE, ILLINOIS

FIGURE 1

RAMBOLL US CORPORATION
A RAMBOLL COMPANY



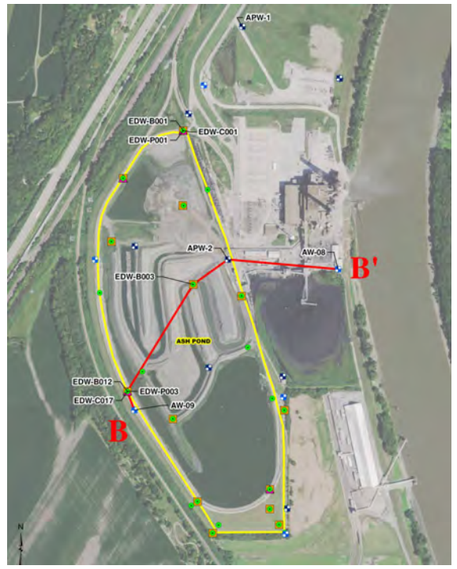
LEGEND:

- FILL
- ASH
- CLAY
- SILT
- SHALE
- WELL SCREEN

VERTICAL SCALE IN FEET: 20

HORIZONTAL SCALE IN FEET: 400

VERTICAL EXAGGERATION =20



GEOLOGICAL CROSS SECTION B-B'

HYDROGEOLOGIC MONITORING PLAN

EDWARDS ASH POND

EDWARDS POWER STATION

BARTONSVILLE, ILLINOIS

FIGURE 2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL

ATTACHMENT 7 – STRUCTURAL STABILITY ASSESSMENT

AECOM

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Submitted by
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October 2016

CCR Rule Report: Initial Structural Stability Assessment

For

Ash Pond

At Edwards Power Station

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Ash Pond at the Illinois Power Resources Generating, LLC Edwards Power Station meets the structural stability assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(d), except as noted herein. The Ash Pond is located near Bartonville, Illinois in Peoria County, approximately 0.1 miles west of the Edwards Power Station. The Ash Pond serves as the wet impoundment basin for CCR materials produced by the Edwards Power Station.

The 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 Ash Pond is consistent with recognized and generally accepted good engineering practices. 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 Ash Pond were found to be consistent with recognized and generally accepted good engineering practices, and meets the standards in 257.73(d)(1)(i)-(vii), except as noted herein.

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 and the abutments.

The foundation consists of soft to stiff soil. Slope stability analyses exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the foundation and abutments. The slope stability analyses are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for Ash Pond at Edwards Power Station* (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 Ash Pond was designed and constructed with stable foundations. Operational and maintenance procedures are in place to address any issues related to the stability of foundations. Therefore, the 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 Ash Pond. No evidence of significant areas of erosion or wave action were observed. The interior slopes are covered with vegetation in some areas and crushed stone in other areas. The exterior slopes are covered in vegetation with some limited areas of crushed stone. Operational and maintenance procedures to repair the vegetation and crushed stone as needed are appropriate to protect against surface erosion and wave action. Intentional or unintentional sudden drawdown of the pool in the Ash Pond is not expected to occur due to the characteristics of the spillway structure.

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 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 factors of safety exceed the criteria listed in §257.73(e)(1) for slip surfaces passing through the dike. The slope stability analyses are discussed in the *CCR Rule Report: Initial Safety Factor Assessment for the Ash Pond at Edwards Power Station* (October 2016); therefore, the original design and construction of the Ash Pond included sufficient dike compaction and density. 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 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. Crushed stone is present in some locations on the interior and exterior slopes, which is an alternate form of slope protection. Therefore, the original design and construction of the 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 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 spillway was 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 spillway relative to inflow estimated for the probable maximum flood event for the high hazard potential Ash Pond. The hazard potential classification assessment was performed by Stantec in 2016 in accordance with §257.73(a)(2).

The primary spillway is comprised of a drop inlet riser structure that is constructed of either a corrugated metal pipe (CMP) or reinforced concrete pipe (RCP), and a CMP outlet pipe. The CMP and concrete (if present) are non-erodible materials designed to carry sustained flows. The capacity of the spillway was evaluated using hydrologic and hydraulic analysis performed per §257.82(a). The analysis found that the spillway can adequately manage flow during peak discharge resulting from the Probable Maximum Flood storm event without overtopping of the embankments. The hydrologic and hydraulic analyses are discussed in the *CCR Rule Report: Initial Inflow Design Flood Control System Plan for Ash Pond at Edwards Power Station* (October 2016). Operational and maintenance procedures are in place to repair any issues with the spillway and remove debris or other obstructions from the spillway, as evidenced by the conditions observed by AECOM. As a result, these procedures are appropriate for maintaining the spillway. Therefore, the 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.

Two hydraulic structures are present which pass through the dike of the Ash Pond: the CMP primary spillway outlet pipe and a high-density polyethylene (HDPE) sewer force main. The stability and structural integrity of the pipes were evaluated using design drawings, operational and maintenance procedures, 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 Edwards Ash Pond.

The evaluation of design drawings and operational and maintenance procedures and conditions observed in the field did not identify any issues with either hydraulic structure. However, the evaluation of the stability and structural integrity of both hydraulic structures has not been fully completed, as high pipe flows in the primary spillway, required for operation of the Edwards Power Station, preclude closed circuit television (CCTV) inspection. Additionally, access issues preclude complete inspection of the sewer force main pipe, although a partial inspection was performed which found the inspected portions of the hydraulic structure to be free of significant deterioration, deformation, distortion, bedding deficiencies, sedimentation, and debris that may negatively affect the operation of the hydraulic structure.

Based on this evaluation, the hydraulic structures at the Edwards Power Station cannot be certified to meet the requirements of §257.73(d)(1)(vi) because a complete CCTV inspection of both hydraulic structures has not yet been performed, thus, precluding completion of the evaluation of the stability and structural integrity of the pipes. In accordance with §257.73(d)(2), AECOM recommends that a CCTV pipe inspection of both hydraulic structures be completed as soon as feasible and that this assessment be updated once the inspection is completed.

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 Ash Pond was evaluated by comparing the location of the Ash Pond relative to adjacent water bodies using published Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs), aerial imagery, and conditions observed in the field by AECOM.

Based on this evaluation, water bodies are not expected to inundate the downstream slopes of the Ash Pond. Although the Ash Pond is shown within the 100-year flood zone for the Illinois River on the FEMA FIRM map for the area, the Ash Pond is located behind a United States Army Corps of Engineers (USACE) levee. The levee was constructed to an elevation of 462 feet, which is 3 feet higher than the 100-year elevation of the Illinois River listed on the FIRM map (459 feet). Therefore, inundation of the downstream slopes is not expected to occur.

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

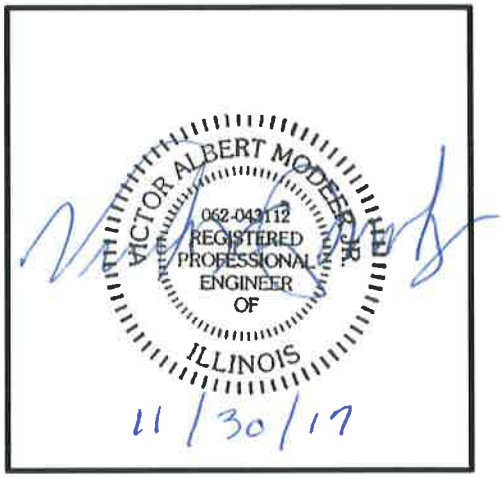
3 Certification Statement

CCR Unit: Illinois Power Resources Generating, LLC; Edwards Power Station; 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 SR.
Printed Name

10/13/16
Date



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ATTACHMENT 8 – SAFETY FACTOR ASSESSMENT

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Submitted by
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St. Louis, MO 63110

October 2016

CCR Rule Report: Initial Safety Factor Assessment

For

Ash Pond

At Edwards Power Station

1 Introduction

This Coal Combustion Residual (CCR) Rule Report documents that the Ash Pond at the Illinois Power Resources Generating, LLC Edwards Power Station meets the safety factor assessment requirements specified in 40 Code of Federal Regulations (CFR) §257.73(e). The Ash Pond is located near Bartonville, Illinois in Peoria County, approximately 0.1 miles west of the Edwards Power Station. The Ash Pond serves as the wet impoundment basin for CCR material produced by the Edwards Power Station.

The 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 Ash Pond. The exploration consisted of auger borings, cone penetrating testing, and laboratory program including index, strength, and consolidation 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 Ash Pond consist of a soft to very stiff compacted ash and clay dike, overlying stiff alluvial clay, overlying soft to medium stiff alluvial clay, which in turn overlies shale bedrock. Phreatic water is typically located above the embankment/foundation interface beneath the crest of the dike, and at the embankment/foundation interface near the toe of the dike.

Ten (10) representative cross sections were analyzed using limit equilibrium slope stability analysis software to evaluate stability of the perimeter dike system and foundations. The cross sections were located to represent critical surface geometry, subsurface stratigraphy, and phreatic conditions across the site. Each cross section was evaluated for each of the loading conditions stipulated in §257.73(e)(1).

The Soils Susceptible to Liquefaction loading condition, §257.73(e)(1)(iv), was not evaluated because a liquefaction susceptibly evaluation did not find soils susceptible to liquefaction within the Ash Pond dikes. As a result, this loading condition is not applicable to the Ash Pond at the Edwards Power Station.

Results of the Initial Safety Factor Assessments, for the critical cross-section, (i.e., the lowest calculated factor of safety out of the cross sections analyzed for each loading condition) are listed in Table 1.

Table 1 – Summary of Initial Safety Factor Assessment

Loading Conditions	§257.73(e)(1) Subsection	Minimum Factor of Safety	Calculated Factor of Safety
Maximum Storage Pool Loading	(i)	1.50	1.54
Maximum Surcharge Pool Loading	(ii)	1.40	1.54
Seismic	(iii)	1.00	1.08
Soils Susceptible to Liquefaction	(iv)	1.20	Not Applicable

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

3 Certification Statement

CCR Unit: Illinois Power Resources Generating, LLC; Edwards Power Station; Ash Pond

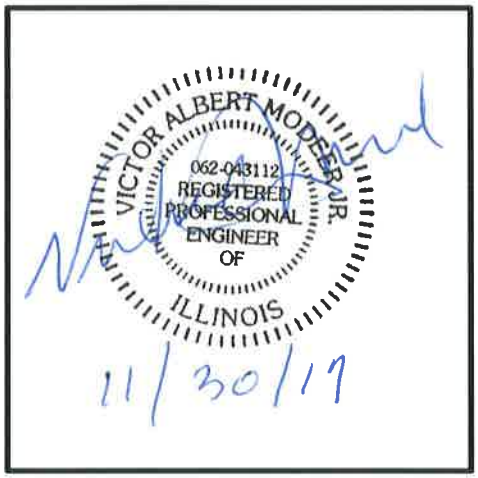
I, Victor A. Modeer, being a Registered Professional Engineer in good standing in the State of Illinois, do hereby certify, to the best of my knowledge, information, and belief that the information contained in this CCR Rule Report, and the underlying data in the operating record, has been prepared in 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



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ATTACHMENT 9 – ADDENDUM TO THE CLOSURE PLAN (SEPTEMBER 2020)

ADDENDUM NO. 1
EDWARDS ASH POND CLOSURE PLAN

This Addendum No. 1 to the Closure Plan for Existing Coal Combustion Residuals (CCR) Impoundment for the Edwards Ash Pond at the Edwards Power Station, 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 Edwards 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 Edwards Ash Pond will begin construction of closure and cease receipt of CCR and non-CCR wastestreams no later than April 17, 2026 as indicated in the Edwards 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 Edwards 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.

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Eric J. Tlachac
Qualified Professional Engineer
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Illinois
Ramboll Americas Engineering Solutions, Inc., f/k/a O'Brien & Gere Engineers, Inc.
Date: 9/29/2020

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