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Illinois Power Resources Generating, LLC
Date
December 28, 2022

Project No.
1940103307

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN

ASH POND EDWARDS POWER PLANT BARTONVILLE, ILLINOIS

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN EDWARDS POWER PLANT ASH POND


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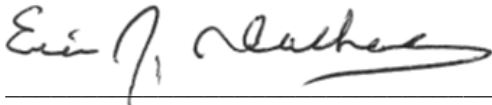
LICENSED PROFESSIONAL CERTIFICATIONS

40 C.F.R. § 257.91(f) Groundwater Monitoring System Certification

In accordance with Title 40 of the Code of Federal Regulations (40 C.F.R.), Part 257, Subpart D, Section (§) 257.91(f) the owner or operator of a coal combustion residuals (CCR) unit must obtain certification from a qualified professional engineer stating that the groundwater monitoring system at the CCR unit has been designed and constructed to meet the requirements of 40 C.F.R. § 257.91. If the groundwater monitoring system includes the minimum number of monitoring wells specified in 40 C.F.R. § 257.91(c)(1), the certification must document the basis supporting use of the minimum number of monitoring wells. Further, in accordance with 40 C.F.R. § 257.91(e)(1), when completing the groundwater monitoring system certification, the qualified professional engineer must be given access to documentation regarding the design, installation, development, and decommissioning of any monitoring wells, piezometers, and other measurement, sampling, and analytical devices.

The groundwater monitoring system designed and constructed for the Edwards Power Plant (EPP) Ash Pond (AP) includes more than the minimum number of wells specified in 40 C.F.R. § 257.91(c)(1). The undersigned has been given access to documentation regarding the design, installation, development, and decommissioning of monitoring wells, piezometers and other measurement, sampling, and analytical devices concerning the EPP AP.

I, Eric J. Tlachac, a qualified professional engineer in good standing in the State of Illinois, certify that the groundwater monitoring system at the EPP AP has been designed and constructed to meet the requirements of 40 C.F.R. § 257.91.



Eric J. Tlachac
Qualified Professional Engineer
062-063091
Illinois
Date: December 28, 2022



I, Brian G. Hennings, a qualified professional geologist in good standing in the State of Illinois, certify that the groundwater monitoring system at the EPP AP has been designed and constructed to meet the requirements of 40 C.F.R. § 257.91.



Brian G. Hennings
Professional Geologist
196-001482
Illinois
Date: December 28, 2022



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ACRONYMS AND ABBREVIATIONS

35 I.A.C.	Title 35 of the Illinois Administrative Code
40 C.F.R.	Title 40 of the Code of Federal Regulations
§	section
AP	Ash Pond, also referred to as Site
ASD	Alternate Source Demonstration
bgs	below ground surface
CCA	compliance commitment agreement
CCR	coal combustion residuals
CMA	Corrective Measures Assessment
CSM	conceptual site model
EPP	Edwards Power Plant
GMP	Groundwater Monitoring Plan
GWPS	groundwater protection standard
HBL	health-based level
HCR	Hydrogeologic Site Characterization Report
ID	identification
IEPA	Illinois Environmental Protection Agency
IPRG	Illinois Power Resources Generating, LLC
LCL	lower confidence limit
LPL	lower prediction limit
MCL	maximum contaminant level
NA	not applicable
NAVD88	North American Vertical Datum of 1988
NID	National Inventory of Dams
No.	number
NRT/OBG	Natural Resource Technology, an OBG Company
PMP	potential migration pathway
QAPP	Multi-Site Quality Assurance Project Plan
QA/QC	quality assurance/quality control
Ramboll	Ramboll Americas Engineering Solutions, Inc.
RL	reporting limit
SAP	Multi-Site Sampling and Analysis Plan
SI	surface impoundment
SSI	statistically significant increase
SSL	statistically significant level
TDS	total dissolved solids
UA	Uppermost Aquifer
UPL	upper prediction limit
UTL	upper tolerance limit
USEPA	United States Environmental Protection Agency
WLO	water level only

1. INTRODUCTION

1.1 Overview

Ramboll Americas Engineering Solutions, Inc. (Ramboll) has prepared this Groundwater Monitoring Plan (GMP) on behalf of EPP, operated by Illinois Power Resources Generating, LLC (IPRG) to align the 40 C.F.R. § 257 compliance groundwater monitoring program with the Title 35 of the Illinois Administrative Code (35 I.A.C.) § 845 compliance groundwater monitoring program.

This GMP applies specifically to the CCR unit referred to as the AP (CCR unit identification [ID] Number [No.] 301, Illinois Environmental Protection Agency [IEPA] ID No. W1438050005-01, and National Inventory of Dams [NID] No. IL50710). The Ash Pond is a 91-acre unlined CCR surface impoundment (SI) used to manage CCR and non-CCR waste streams at the EPP. This GMP includes content requirements specific to 40 C.F.R. § 257.91 (Groundwater Monitoring Systems), 40 C.F.R. § 257.93 (Groundwater Sampling and Analysis Requirements), 40 C.F.R. § 257.94 (Detection Monitoring Program), and 40 C.F.R. § 257.95 (Assessment Monitoring Program) for the AP at EPP.

1.2 Site Location and Background

The EPP is located in Peoria County between Mapleton and Bartonville in Section 11, Township 7 North, Range 7 East (**Figure 1-1**). The EPP is located on the floodplain of the Illinois River adjacent to a levee and has one CCR SI, the AP.

The EPP is situated in a predominantly agricultural area with industrial properties bordering the property. Historically, several coal mines were operated at depths of 100 to 160 feet below ground surface (bgs) in the vicinity of the EPP. The EPP property is bordered by a salt processing facility to the north, railroad right-of-way and former Orchard Mines to the west, the Illinois River and a fertilizer production facility to the east, and agricultural land to the south. **Figure 1-1** shows the location of the EPP; **Figure 1-2** is a site map showing the location of the AP (the subject of this GMP). The AP CCR unit will hereinafter be referred to as the Site.

1.3 Conceptual Site Model

Multiple site investigations have been completed at the EPP to characterize the geology, hydrogeology, and groundwater quality as required by 40 C.F.R. § 257.91 (Groundwater Monitoring Systems). The AP has been well characterized and detailed in the Hydrogeologic Site Characterization Report (HCR) (Ramboll, 2021) [<https://www.luminant.com/ccr/illinois-ccr/?dir=il-ccr%2FEdwards%2F2021>], that was included with the Operating Permit application submitted to the IEPA. The HCR was prepared to comply with the requirements specified in 35 I.A.C. § 845.620 and expands upon the Hydrogeologic Monitoring Plan (Natural Resource Technology, an OBG Company [NRT/OBG], 2017). A conceptual site model (CSM) has been developed and is discussed below.

The Site is characterized by four hydrostratigraphic units:

- **CCR:** Saturated CCR consisting primarily of fly ash within the AP. CCR is present at thicknesses up to 46.5 feet and at elevations as low as 413.9 feet North American Vertical Datum of 1988 (NAVD88) in the central and northern portion of the AP.

- **Upper Cahokia Formation/Potential Migration Pathway (PMP):** Low permeability clays and silts of the Upper Cahokia Formation are present at the surface. This unit is considered a PMP at elevations similar to the base of the AP, and in places where thin discontinuous sand lenses occur within the Upper Cahokia Formation adjacent to the AP.
- **Uppermost Aquifer (UA):** Thin (generally less than 4 feet), moderate permeability sand, silty sand, and clayey gravel material within the Lower Cahokia Formation, bedrock, and/or weathered shale bedrock, where present. In locations where higher permeability materials and coarser grained materials are absent, the UA is interpreted as the interface between the Lower Cahokia Formation and shale bedrock.
- **Bedrock Confining Unit:** Thick, very low permeability shales and siltstones of the Carbondale and Modesto Formations. This unit was encountered at elevations ranging from approximately 400 to 422 feet NAVD88 with higher bedrock elevations occurring beneath the northern portion of the AP.

In general, the Upper Cahokia Formation consists of low permeability clays and silts, with limited occurrences of thin discontinuous sand lenses. In several locations, generally near the southern and western portions of the unit, coarser grained materials are present at the base of the Lower Cahokia Formation and/or the top of the bedrock is weathered resulting in relatively higher hydraulic conductivities. Because the interface is laterally continuous, and has relatively higher conductivity, the unlithified/lithified contact was designated as the UA.

Occasional sand lenses within the Upper Cahokia Formation, and clay intervals downgradient at elevations similar to the base of ash in the AP were identified as PMPs. The underlying bedrock is interpreted as the lower confining unit and has hydraulic conductivities are generally an order of magnitude lower than those measured in the UA.

Groundwater occurs within both the unlithified materials and bedrock and consistently flows from east to west/southwest at the central portion of the AP towards what is interpreted as a former channel of the Illinois River, and south/southeast at the south end of the AP (**Figure 1-3**). Upward vertical gradients have been calculated between the bedrock and the UA, indicating the Illinois Rive may be a regional discharge zone for bedrock near the AP.

Additional monitoring wells were installed in 2022 and groundwater samples were collected from the installed wells. The additional monitoring wells were installed for further hydrogeologic investigation and water quality delineation. Following investigation activities and collection of background groundwater quality, a subset of monitoring wells will be proposed for inclusion with the groundwater monitoring well network.

2. GROUNDWATER MONITORING SYSTEMS

2.1 Existing Monitoring Well Network and Analysis

Two monitoring programs specific to the AP exist, the 40 C.F.R. § 257 monitoring program and the 35 I.A.C. § 845 monitoring program. This GMP is being provided to expand the 40 C.F.R. § 257 groundwater monitoring network and monitoring program specific to the AP to align with the monitoring network established for 35 I.A.C. § 845. Monitoring networks and programs that apply to other units are not discussed in this GMP. IPRG entered into a compliance commitment agreement (CCA) with the IEPA on December 28, 2022. Groundwater monitoring in accordance with the CCA and the proposed 35 I.A.C. § 845 groundwater monitoring plan and sampling methodologies provided in the operating permit application for the AP is scheduled to commence no later than the second quarter of 2023. After the AP has been issued an approved operating permit, groundwater monitoring shall be conducted in accordance with that operating permit. As specified in the CCA, groundwater sampling requirements that apply to the CCR SI under other existing permit programs will become void upon issuance of an approved operating permit pursuant to 35 I.A.C § 845.

2.1.1 Existing 40 C.F.R. § 257 Monitoring Program

The 40 C.F.R. § 257 well network for the AP consists of seven monitoring wells installed nearby or adjacent to the AP within the UA. The AP 40 C.F.R. § 257 well network consists of two background monitoring wells (AP05S and AW-08) and four compliance monitoring wells (AW-06, AW-09, AW-10, and AW-11). The boring logs, well construction forms, and other related monitoring well forms are available in the AP Operating Record as required by 40 C.F.R. § 257.91 for each monitored CCR unit or CCR Multi-Unit and are included in Appendix C of the HCR (Ramboll, 2021).

Assessment monitoring in accordance with 40 C.F.R. § 257.95 was initiated on April 9, 2018. Details on the procedures and techniques used to fulfill the groundwater sampling and analysis program requirements are found in the Multi-Site Sampling and Analysis Plan (SAP) (Ramboll, 2022a).

Groundwater samples are collected semiannually and analyzed for the following laboratory and field parameters from Appendix III and Appendix IV of 40 C.F.R. § 257, summarized in **Table A** on the following page.

Table A. 40 C.F.R. § 257 Groundwater Monitoring Program Parameters

Field Parameters¹			
Groundwater Elevation	pH		
Appendix III Parameters (Total, except total dissolved solids [TDS])			
Boron	Chloride	Sulfate	
Calcium	Fluoride	TDS	
Appendix IV Parameters (Total)			
Antimony	Cadmium	Lead	Selenium
Arsenic	Chromium	Lithium	Thallium
Barium	Cobalt	Mercury	Radium 226 and 228 combined
Beryllium	Fluoride	Molybdenum	

¹Dissolved oxygen, temperature, specific conductance, oxidation/reduction potential, and turbidity are recorded during sample collection.

Results and analysis of groundwater sampling are reported annually by January 31 of the following year and made available on the CCR public website as required by 40 C.F.R. § 257.

2.1.2 35 I.A.C. § 845 Well Installation and Monitoring

In 2021, 13 additional monitoring wells (AW-12, AW-13, AW-14, AW-15, AW-15S, AW-15C, AW-16, AW-17, AW-18, AW-19, AW-20, AW-21 and AW-22) were installed along the perimeter of the AP to assess the vertical and horizontal lithology, stratigraphy, chemical properties, and physical properties of geologic layers to a minimum of 100 feet bgs as specified in 35 I.A.C. § 845.620(b). Additionally, three leachate monitoring wells (XPW01A, XPW02, and XPW03) were installed within the AP to characterize the CCR materials.

Prospective 35 I.A.C. § 845 monitoring wells were sampled for eight rounds from February to August 2021 and the results were assessed for selection of the AP 35 I.A.C. § 845 monitoring well network. Groundwater samples were collected and analyzed for 35 I.A.C. § 845.600 parameters as summarized in **Table B** on the following page.

In 2022, five additional wells (AW-23, OW-01, OW-02, PTW-01, and PTW-02) were installed along the perimeter of the AP. AW-23 was installed to delineate water quality west of the AP. Pilot wells PTW-01 and PTW-02 and observation wells OW-01 and OW-02 were installed to characterize aquifer properties. Following investigation activities and groundwater sample collection, the monitoring network may be updated to include AW-23. The results of the aquifer characterization will be used during remedy selection and design, if required.

Table B. 35 I.A.C. § 845 Groundwater Monitoring Program Parameters

Field Parameters¹			
Groundwater Elevation	pH	Turbidity	
Metals (Total)			
Antimony	Boron	Cobalt	Molybdenum
Arsenic	Cadmium	Lead	Selenium
Barium	Calcium	Lithium	Thallium
Beryllium	Chromium	Mercury	
Inorganics (Total)			
Fluoride	Sulfate	Chloride	TDS
Other (Total)			
Radium 226 and 228 combined			

¹ Dissolved oxygen, temperature, specific conductance, and oxidation/reduction potential were recorded during sample collection.

Data and results from the 35 I.A.C. § 845 background monitoring were included in the water quality discussion included in the HCR (Ramboll, 2021). The data collected from background locations during the 35 I.A.C. § 845 monitoring were used to evaluate and calculate background concentrations for the AP.

2.2 Expansion of Existing 40 C.F.R. § 257 Monitoring Well Network

The existing 40 C.F.R. § 257 network is being expanded to include 17 monitoring wells screened in the UA (AP05S, AP07S, AW-01, AW-05, AW-06, AW-08, AW-09, AW-10, AW-14, AW-15, AW-15S, AW-16, AW-17, AW-18, AW-19, AW-21 and AW-22) and one temporary water level only surface water staff gage (SG-01). The proposed network is summarized in **Table C** on the following page and displayed on **Figure 2-1**. Seventeen wells (two background and fifteen compliance) will be used to monitor groundwater concentrations within the UA.

The groundwater samples collected from the 17 wells will be used to monitor and evaluate groundwater quality and demonstrate compliance with the groundwater quality standards included in 40 C.F.R. § 257.94(e) and 40 C.F.R. § 257.95(h). The proposed monitoring wells will yield groundwater samples that accurately represent the quality of background groundwater that has not been affected by leakage from the AP, as well as downgradient groundwater at the waste boundary of the AP (as required in 40 C.F.R. § 257.91(a)(1) and (2)). Monitoring well depths and construction details are listed in **Table 2-1** and summarized in **Table C** on the following page.

Any future changes to the groundwater monitoring well network as approved by the IEPA under 35 I.A.C. § 845 will also be incorporated into the 40 C.F.R. § 257 network.

Table C. Expanded 40 C.F.R. § 257 Monitoring Well Network

Well ID	Monitored Unit	Well Screen Interval (feet bgs)	Well Type ⁴
AP05S	UA	33-38	Background
AP07S	PMP	30-35	Compliance
AW-01 ¹	PMP	TBD	Compliance
AW-05	UA	16-20	Compliance
AW-06	UA	37-41	Compliance
AW-08	UA	48-57	Background
AW-09	UA	47-52	Compliance
AW-10	UA	28-32	Compliance
AW-11	UA	24-29	Compliance
AW-14	UA	24-29	Compliance
AW-15	UA	33-38	Compliance
AW-15S	PMP	8-18	Compliance
AW-16	UA	55-60	Compliance
AW-17	UA	51-56	Compliance
AW-18	UA	46-51	Compliance
AW-19	UA	35-40	Compliance
AW-21	UA	32-37	Compliance
XPW01A ^{2,3}	CCR	33-43	WLO
XPW02 ^{2,3}	CCR	36-46	WLO
XPW03 ^{2,3}	CCR	27-37	WLO
SG-01 ^{2,4}	Surface Water	NA	WLO

¹ Well location is planned, construction details unavailable.

² Location is temporary pending implementation of impoundment closure per an approved Construction Permit Application.

³ Well is to be used for water level data collection only.

⁴ SG-01 is a surface water level measuring point.

⁵ Well type refers to the role of the well in the monitoring network.

NA – Not applicable, surface water location.

PMP – potential migration pathway

UA – Uppermost Aquifer

WLO – water level only

2.3 Well Abandonment

No wells are currently proposed for abandonment.

2.4 Groundwater Monitoring System Maintenance Plan

Maintenance procedures provided in the SAP will be performed as needed to assure that the monitoring wells provide representative groundwater samples (Ramboll, 2022a).

3. GROUNDWATER MONITORING PLAN

The GMP will monitor and evaluate groundwater quality to demonstrate compliance with the groundwater quality standards included in 40 C.F.R. § 257.94(e) and 40 C.F.R. § 257.95(h). The groundwater monitoring program will include sampling and analysis procedures that are consistent and that provide an accurate representation of groundwater quality at the background and downgradient wells as required by 40 C.F.R. § 257.91. As discussed in **Section 2**, two monitoring programs specific to the AP exist, the 40 C.F.R. § 257 monitoring program and the 35 I.A.C. § 845 monitoring program. As specified in the CCA, groundwater sampling requirements that apply to the CCR SI under other existing permit programs will become void upon issuance of an approved operating permit pursuant to 35 I.A.C § 845.

3.1 Sampling Schedule

Groundwater sampling for the 40 C.F.R. § 257 monitoring well network was initially performed quarterly between 2015 and 2017 to establish baseline groundwater quality. Detection monitoring began in the first quarter of 2017 with semiannual sampling. Assessment monitoring began in the second quarter of 2018. The AP is currently in assessment monitoring and sampling will continue in 2023 according to the schedule summarized in **Table D** on the following page.

Table D. 40 C.F.R. § 257 Sampling Schedule

Frequency	Duration
Quarterly (groundwater quality)	<p>Baseline</p> <p>Began: monitoring began in 2015.</p> <hr/> <p>Ended: monitoring was completed in 2017 to establish baseline groundwater quality for existing landfills and SIs</p>
At least Semi-annually (groundwater quality)	<p>Detection Monitoring</p> <p>Began: monitoring began no later than October 17, 2017, for existing landfills and SIs, following collection of a minimum of eight independent samples for constituents from Appendix III and Appendix IV from each background and downgradient well.</p> <p>At least semiannual sampling continues for Appendix III constituents throughout the active life of the CCR unit and the post-closure period.</p> <p>For new landfills and SIs, and lateral expansion of existing CCR units, a minimum of eight independent samples from each background well must be collected and analyzed for the constituents in Appendix III and Appendix IV during the first six months of sampling.</p> <hr/> <p>Ends: Following 30-year post-closure care period or statistically significant increase (SSI) determination and unsuccessful Alternate Source Demonstration (ASD) evaluation within 90 days of SSI determination.</p> <hr/> <p>Assessment Monitoring</p> <p>Begins: within 90 days of unsuccessful ASD evaluation for SSIs determined during Detection Monitoring; samples must be collected and analyzed for all constituents listed in Appendix IV. Within 90 days of obtaining the of the initial sample results, and on at least a semiannual basis thereafter, wells must be resampled for Appendix III and for those constituents in Appendix IV that have been detected during sampling.</p> <hr/> <p>Ends: Following demonstration that concentrations of all constituents in Appendices III and IV are below background values for two consecutive sampling events.</p>

Groundwater monitoring for the 40 C.F.R. § 257 well network will continue to follow a schedule in accordance with the requirements of 40 C.F.R. § 257.94 and 40 C.F.R. § 257.95. Upon United States Environmental Protection Agency (USEPA) approval of 35 I.A.C. § 845 as a State CCR Permit Program, the 40 C.F.R. § 257 monitoring will be discontinued and replaced by the 35 I.A.C. § 845 monitoring.

3.2 Groundwater Sample Collection

Groundwater sampling procedures have been developed in the SAP (Ramboll, 2022a) and the collection of groundwater samples is being implemented to meet the requirements of 40 C.F.R. § 257.93. In addition to groundwater well samples, quality assurance samples will be collected as described in the Multi-Site Quality Assurance Project Plan (QAPP) (Ramboll, 2022b).

3.3 Laboratory Analysis

Laboratory analysis will be performed consistent with the specifications of the QAPP. Laboratory methods may be modified based on laboratory equipment availability or procedures, but the Reporting Limit (RL) for all parameters analyzed, regardless of method, will be lower than the

applicable groundwater quality standard. Data reporting requirements and workflow are provided in the Multi-Site Data Management Plan (Ramboll, 2022c).

3.4 Quality Assurance Program

The QAPP includes procedures and techniques for laboratory quality assurance/quality control (QA/QC). Additionally, the SAP includes requirements for field data collection QA/QC.

3.5 Statistical Analysis

A Multi-Site Statistical Analysis Plan (Ramboll, 2022d) has been developed to describe procedures that will be used to establish background conditions and determine SSIs over background concentrations and statistically significant levels (SSLs) over groundwater protection standards (GWPSs) as required by 40 C.F.R. § 257.94 and 257.95. The Multi-Site Statistical Analysis Plan was prepared in accordance with the requirements of 40 C.F.R. § 257.93(f), with reference to the acceptable statistical procedures provided in *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (USEPA, 2009). The determination of SSIs over background concentrations and SSLs over GWPSs will be completed at least Semiannually in accordance with the sampling schedule provided in **Section 3.1**.

3.6 Data Reporting

Data reporting for the 40 C.F.R. § 257 monitoring well network will be consistent with recordkeeping, notification, and internet posting requirements described in 40 C.F.R. § 257.105 through 257.107.

3.7 Compliance with Groundwater Quality Standards

Compliance with the groundwater quality standards for the detection monitoring program referenced in 40 C.F.R. § 257.94(e) and the assessment monitoring program referenced in 40 C.F.R. § 257.95(h) will be determined as described in the following sections.

3.7.1 SSI Determination in Detection Monitoring

One-sided upper prediction limits (UPL) will be calculated for each Appendix III constituent using the background samples, with the exception of pH, for which both upper and lower prediction limits will be calculated. A tabular summary of UPLs will be provided in the Annual Groundwater Monitoring and Corrective Action Reports. Individual sampling event concentrations for each constituent detected in the downgradient monitoring wells will then be compared to the background UPL. An exceedance of the UPL for any constituent measured at any downgradient well constitutes an SSI. For pH, a measurement above the UPL or below the lower prediction limit (LPL) constitutes an SSI. As required by 40 C.F.R. § 257.93(h)(2), SSI determination will be completed within 90 days of sampling and analysis.

3.7.2 GWPS and SSL Determination in Assessment Monitoring

A GWPS will be established for Appendix IV constituents. The GWPS will be either the USEPA maximum contaminant levels (MCLs) or the health-based levels (HBLs) established in 40 C.F.R. § 257.95(h)(2) for cobalt, lead, lithium, and molybdenum. The exception to this is when the background concentration is greater than the established MCL or HBL. For this exception, background concentrations will be used to define the GWPS. The background will be calculated using a parametric or non-parametric upper tolerance limit (UTL), depending on the data

distribution. A tabular summary of GWPSs will be provided in the Annual Groundwater Monitoring and Corrective Action Reports.

Compliance will be determined by comparing the lower confidence limit (LCL) of the downgradient concentrations to the GWPS. An SSL will be identified when the LCL exceeds the GWPS. The method of calculating the LCL is described in the Multi-Site Statistical Analysis Plan. If there are too few data points to calculate an LCL (a minimum of four data points is required), the most recent data point is compared to the GWPS. If all the downgradient samples for a well constituent pair are non-detect, the most recent RL is compared to the GWPS. Additionally, an SSL will be identified if all previous samples at a downgradient well were not-detect, and the two most recent samples have both detections and GWPS exceedances. SSL determination will be completed within 90 days of sampling and analysis.

3.8 Alternate Source Demonstrations

An ASD may be completed for a unit under the detection monitoring program in 40 C.F.R. § 257.94(e)(2) or assessment monitoring program in 40 C.F.R. § 257.95(g)(3)(ii) to provide lines of evidence that a source other than the monitored unit caused the SSI/SSL or that the SSI/SSL resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The ASD will include information and analysis that supports the conclusions and a certification of accuracy by a qualified professional engineer. ASDs will be completed within 90 days of SSI/SSL determination and be provided in the Annual Groundwater Monitoring and Corrective Action Reports as required by 40 C.F.R. § 257.94(e)(2) and 40 C.F.R. § 257.95(g)(3)(ii).

3.8.1 Detection Monitoring Program

As allowed in 40 C.F.R. § 257.94(e)(2), following the determination of an SSI over background for groundwater constituents listed in Appendix III of 40 C.F.R. § 257, an ASD will be evaluated, and if completed within 90 days of the SSI determination, detection monitoring will continue.

If an ASD has not been successfully completed within 90 days of the SSI determination, Assessment Monitoring in accordance with 40 C.F.R. § 257.95 will be initiated within 90 days and the associated notification will be made to the CCR unit operating record and state director (and/or appropriate tribal authority, if applicable).

3.8.2 Assessment Monitoring Program

As allowed in 40 C.F.R. § 257.95(g)(3)(ii), following the determination of an SSL over the GWPS of constituents listed in Appendix IV of 40 C.F.R. § 257, an ASD will be evaluated and, if completed within 90 days of the SSL determination, assessment monitoring will continue.

If an ASD has not been successfully completed within the 90 days of the SSL determination, a Corrective Measures Assessment (CMA) in accordance with 40 C.F.R. § 257.96 will be initiated and the associated notification will be made to the CCR unit operating record and state director (and/or appropriate tribal authority, if applicable).

3.9 Corrective Action

As described in 40 C.F.R. § 257.96, if the ASD summarized in **Section 3.8** has not been successfully completed, the CMA must be completed within 90 days, unless the owner or

operator demonstrates the need for up to an additional 60 days to complete the CMA due to site-specific conditions of circumstances.

Remedy selection will follow the CMA and be documented in a remedy selection report in accordance 40 C.F.R. § 257.97. A corrective action monitoring plan will be developed to monitor the performance of the selected remedy.

3.10 Annual Report

An Annual Groundwater Monitoring and Corrective Action Report will be completed and placed in the CCR unit operating record by January 31st of the following calendar 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 40 C.F.R. §§ 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 an SSI relative to background levels).
5. Other information required to be included in the annual report as specified in 40 C.F.R. §§ 257.90 through 257.98.
6. A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:
 - i) At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in § 257.94 or the assessment monitoring program in 40 C.F.R. § 257.95.
 - ii) At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in 40 C.F.R. § 257.94 or the assessment monitoring program in 40 C.F.R. § 257.95.
 - iii) If it was determined that there was an SSI over background for one or more constituents listed in Appendix III of 40 C.F.R. § 257 pursuant to 40 C.F.R. § 257.94(e):
 - A. Identify those constituents listed in Appendix III of 40 C.F.R. § 257 and the names of the monitoring wells associated with such an increase.
 - B. Provide the date when the assessment monitoring program was initiated for the CCR unit.

- iv) If it was determined that there was an SSL above the groundwater protection standard for one or more constituents listed in Appendix IV of 40 C.F.R. § 257 pursuant to 40 C.F.R. § 257.95(g) include all of the following:
 - A. Identify those constituents listed in Appendix IV of 40 C.F.R. § 257 and the names of the monitoring wells associated with such an increase.
 - B. Provide the date when the CMA was initiated for the CCR unit.
 - C. Provide the date when the public meeting was held for the CMA.
 - D. Provide the date when the CMA was completed.
- v) Whether a remedy was selected pursuant to 40 C.F.R. § 257.97 during the current annual reporting period, and if so, the date of remedy selection.
- vi) Whether remedial activities were initiated or are ongoing pursuant to 40 C.F.R. § 257.98 during the current annual reporting period.

4. REFERENCES

- Illinois Environmental Protection Agency, 2021. *Standards for the Disposal of Coal Combustion Residuals in Surface Impoundments: Title 35 of the Illinois Administrative Code § 845*. April 15, 2021.
- Natural Resource Technology, an OBG Company (NRT/OGB), 2017. *Hydrogeologic Monitoring Plan, Edwards Ash Pond, Edwards Ash Pond- CCR Unit ID 301, Edwards Power Station, Bartonville, Illinois*. October 17, 2017.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2021. *Hydrogeologic Site Characterization Report, Edwards Ash Pond, Edwards Power Plant, Bartonville, Illinois*. October 25, 2021.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022a. *Multi-Site Sampling and Analysis Plan*. December 28, 2022.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022b. *Multi-Site Quality Assurance Project Plan*. December 28, 2022.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022c. *Multi-Site Data Management Plan*. December 28, 2022.
- Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2022d. *Multi-Site Statistical Analysis Plan*. December 28, 2022.
- United States Environmental Protection Agency (USEPA), 2009. *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance*. Office of Resource Conservation and Recovery, Program Implementation and Information Division, United States Environmental Protection Agency, Washington D.C. EPA/530/R-09/007. March 2009.
- United States Environmental Protection Agency (USEPA), 2015. *Title 40 of the Code of Federal Regulations, Part 257*.

TABLES

TABLE 2-1. MONITORING WELL LOCATIONS AND CONSTRUCTION DETAILS

GROUNDWATER MONITORING PLAN
EDWARDS POWER PLANT
ASH POND
BARTONVILLE, ILLINOIS

Well Number	Type	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft BGS)	Screen Bottom Depth (ft BGS)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft BGS)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
AP05S	B	UA	11/29/2016	443.53	443.53	Top of PVC	441.13	32.87	37.64	408.26	403.49	38.06	403.10	4.8	2	40.598807	-89.66191
AP07S	C	UCF	12/02/2016	461.08	461.08	Top of PVC	458.31	29.95	34.74	428.36	423.57	35.00	423.30	4.8	2	40.59793	-89.666919
AW-01 ¹	C	PMP	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
AW-05	C	UA	07/22/2015	--	443.37	Top of Disk	440.55	15.87	20.47	424.68	420.08	21.10	419.50	4.6	2	40.598645	-89.666407
AW-06	C	UA	08/03/2015	--	461.57	Top of Disk	459.19	36.60	41.09	422.59	418.10	41.69	416.90	4.5	2	40.594237	-89.670051
AW-08	B	UA	07/21/2015	--	462.54	Top of Disk	460.66	47.55	57.19	413.11	403.47	57.70	403.00	9.6	2	40.593964	-89.661996
AW-09	C	UA	08/03/2015	--	461.45	Top of Disk	458.32	47.14	51.62	411.18	406.70	52.23	406.10	4.5	2	40.590422	-89.668777
AW-10	C	UA	07/23/2015	--	439.93	Top of Disk	437.64	27.62	32.23	410.02	405.41	32.74	404.90	4.6	2	40.590733	-89.663826
AW-11	C	UA	07/28/2015	--	439.87	Top of Disk	437.16	24.21	28.81	412.95	408.35	29.31	407.20	4.6	2	40.587261	-89.663781
AW-14	C	UA	01/08/2021	439.40	439.40	Top of PVC	436.83	24.00	29.00	412.83	407.83	29.00	401.80	5	2	40.58729	-89.665621
AW-15	C	UA	01/08/2021	441.51	441.51	Top of PVC	438.95	33.00	38.00	405.95	400.95	38.00	399.00	5	2	40.587964	-89.666822
AW-15S	C	UCF	01/08/2021	440.71	440.71	Top of PVC	437.92	8.00	18.00	429.92	419.92	18.00	417.90	10	2	40.587955	-89.666841
AW-16	C	UA	01/08/2021	461.79	461.79	Top of PVC	459.45	55.00	60.00	404.45	399.45	60.00	396.50	5	2	40.589457	-89.667799
AW-17	C	UA	01/08/2021	462.10	462.10	Top of PVC	459.69	51.00	56.00	408.69	403.69	56.00	402.70	5	2	40.591698	-89.669404
AW-18	C	UA	01/09/2021	462.65	462.65	Top of PVC	460.28	46.00	51.00	414.28	409.28	51.00	405.30	5	2	40.593044	-89.669822
AW-19	C	UA	01/09/2021	460.74	460.74	Top of PVC	458.53	35.00	40.00	423.53	418.53	40.00	415.50	5	2	40.595434	-89.66972
AW-21	C	UA	01/10/2021	460.61	460.61	Top of PVC	458.28	32.00	37.00	426.28	421.28	37.00	420.30	5	2	40.597294	-89.667734
XPW01A	WLO	CCR	01/09/2021	464.16	464.16	Top of PVC	460.99	33.00	43.00	427.99	417.99	43.00	418.00	10	2	40.596306	-89.667345
XPW02	WLO	CCR	01/09/2021	473.79	473.79	Top of PVC	471.16	36.00	46.00	435.16	425.16	46.00	424.20	10	2	40.594351	-89.668312
XPW03	WLO	CCR	01/10/2021	466.04	466.04	Top of PVC	462.62	27.00	37.00	435.62	425.62	37.00	422.60	10	2	40.591416	-89.666188
SG-01	WLO	SW	--	--	--	--	--	--	--	--	--	--	--	--	--	40.596075	-89.661625

TABLE 2-1. MONITORING WELL LOCATIONS AND CONSTRUCTION DETAILS

GROUNDWATER MONITORING PLAN
 EDWARDS POWER PLANT
 ASH POND
 BARTONVILLE, ILLINOIS

Well Number	Type	HSU	Date Constructed	Top of PVC Elevation (ft)	Measuring Point Elevation (ft)	Measuring Point Description	Ground Elevation (ft)	Screen Top Depth (ft BGS)	Screen Bottom Depth (ft BGS)	Screen Top Elevation (ft)	Screen Bottom Elevation (ft)	Well Depth (ft BGS)	Bottom of Boring Elevation (ft)	Screen Length (ft)	Screen Diameter (inches)	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)
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Notes:

¹ Well location is planned, construction details unavailable.

All elevation data are presented relative to the North American Vertical Datum 1988 (NAVD88), GEOID 12A

Type refers to the role of the well in the monitoring network: background (B), compliance (C), or water level measurements only (WLO)

WLO wells are temporary pending implementation of impoundment closure per an approved Construction Permit application

-- = data not available

BGS = below ground surface

CCR = Coal Combustion Residual

ft = foot or feet

HSU = Hydrostratigraphic Unit

PMP = potential migration pathway

PVC = polyvinyl chloride

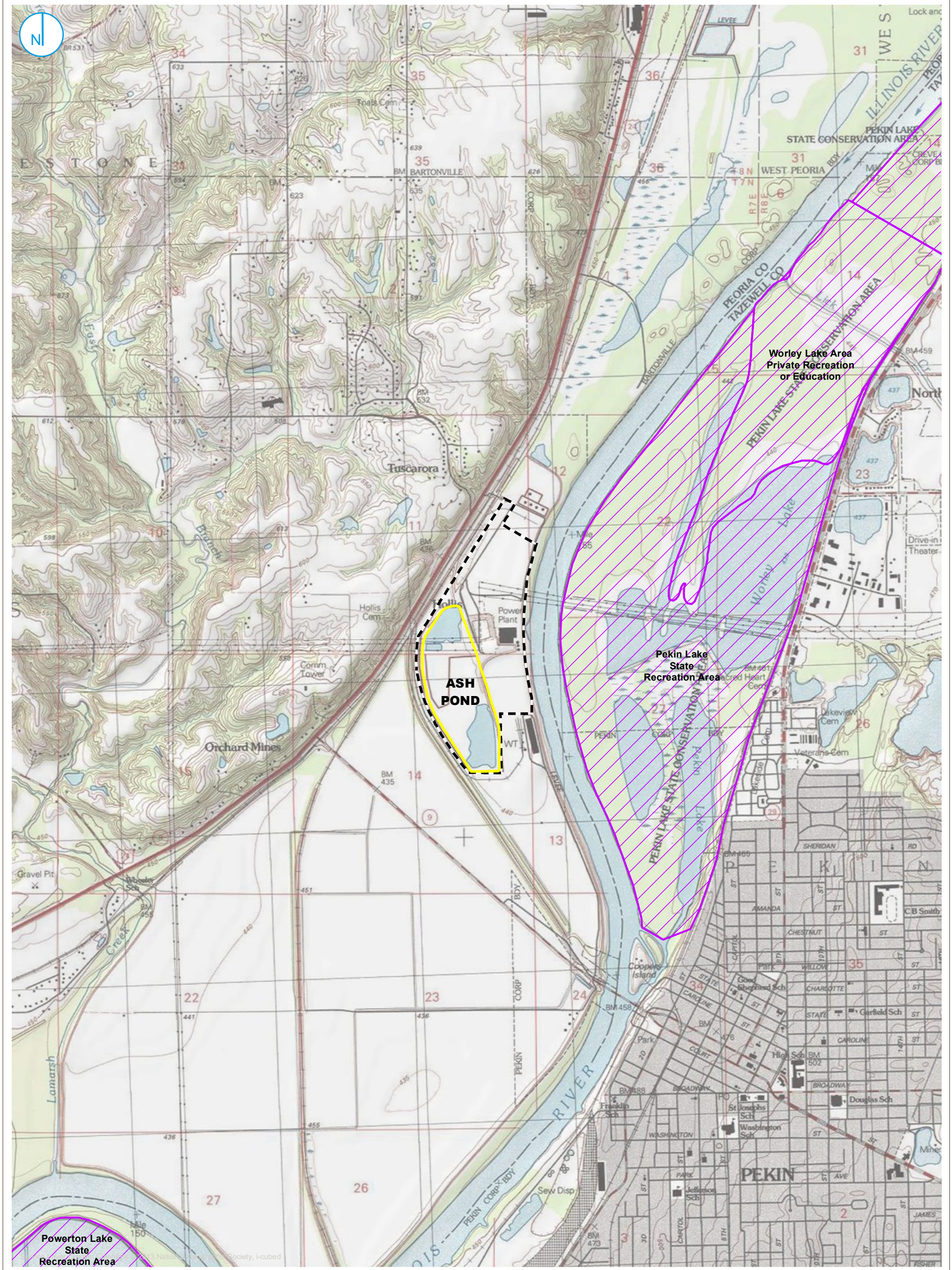
SW = surface water

UA = Uppermost Aquifer

UCF = Upper Cahokia Formation

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FIGURES



- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- PROPERTY BOUNDARY
- PROTECTED AREA

SITE LOCATION MAP

FIGURE 1-1

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
ASH POND
 EDWARDS POWER PLANT
 BARTONVILLE, ILLINOIS

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.



0 1,000 2,000
 Feet



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

- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- FORMER ORCHARD MINES AREA PROPERTY
- BOUNDARY

SITE MAP

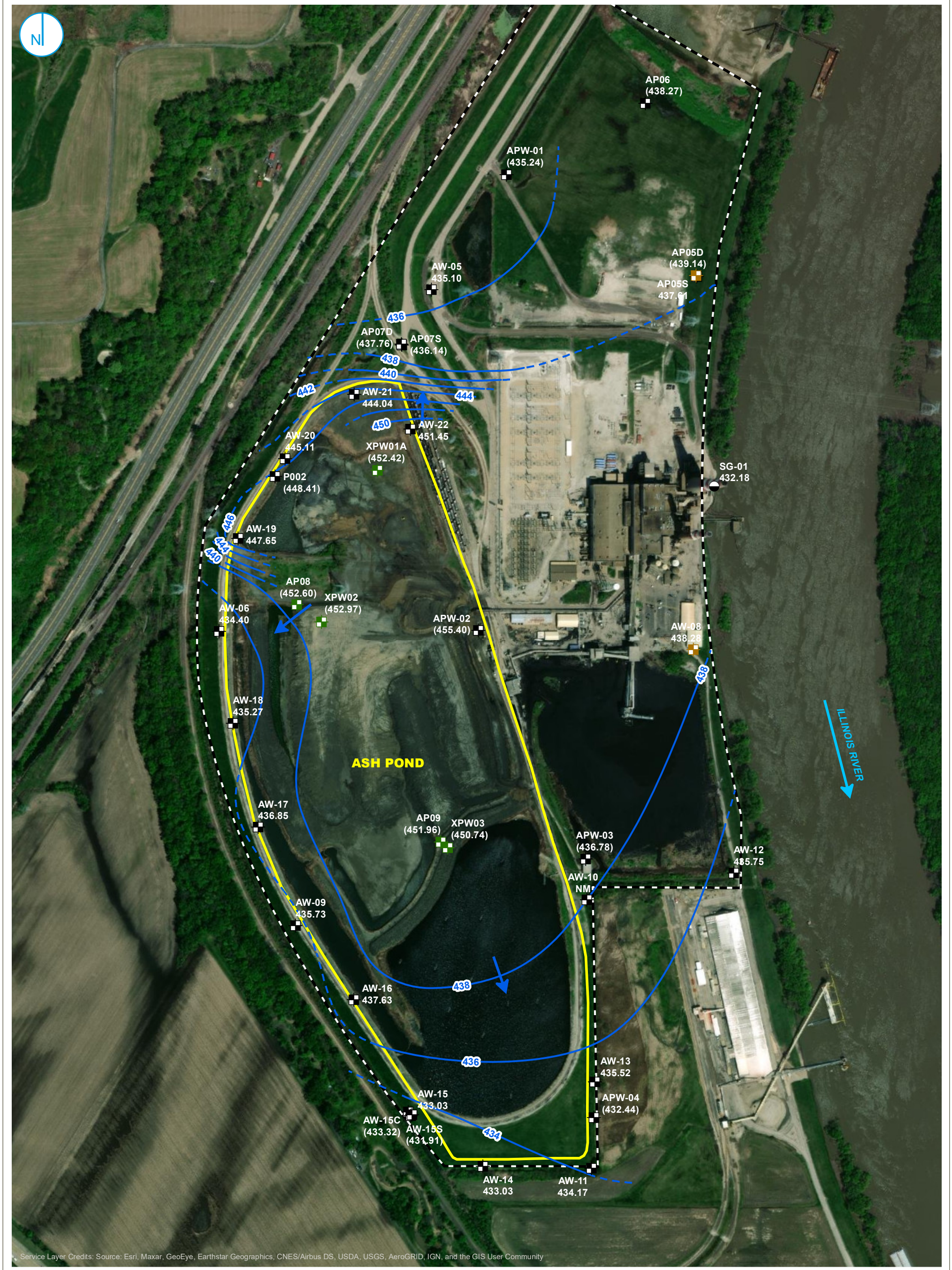
FIGURE 1-2

0 250 500
 Feet

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
 ASH POND
 EDWARDS POWER PLANT
 BARTONVILLE, ILLINOIS

RAMBOLL AMERICAS
 ENGINEERING SOLUTIONS, INC.





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

- BACKGROUND WELL
- MONITORING WELL
- PORE WATER WELL
- STAFF GAGE
- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- PROPERTY BOUNDARY
- GROUNDWATER ELEVATION CONTOUR (2-FT CONTOUR INTERVAL, NAVD88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

NOTES

- PARENTHESIS INDICATES WELL NOT USED FOR CONTOURING
- ELEVATION CONTOURS SHOWN IN FEET, NORTH AMERICAN VERTICAL DATUM OF 1988

**UPPERMOST AQUIFER
POTENTIOMETRIC SURFACE MAP
FEBRUARY 9, 2021**

**40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
ASH POND
EDWARDS POWER PLANT
BARTONVILLE, ILLINOIS**

FIGURE 1-3

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.



0 212.5 425
Feet



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

- COMPLIANCE MONITORING WELL
- BACKGROUND MONITORING WELL
- PORE WATER WELL
- STAFF GAGE, RIVER
- 40 C.F.R. § 257 REGULATED UNIT (SUBJECT UNIT)
- PROPERTY BOUNDARY

0 200 400
Feet

EXPANDED 40 C.F.R. § 257 GROUNDWATER MONITORING WELL NETWORK

40 C.F.R. § 257 GROUNDWATER MONITORING PLAN
ASH POND
EDWARDS POWER PLANT
BARTONVILLE, ILLINOIS

FIGURE 2-1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

