



2021 Annual Groundwater Monitoring and Corrective Action Report - Former Emery Pond

Southern Illinois Power Cooperative Marion Power Plant

Prepared Pursuant to 35 IAC §845.610(e)

Submitted to:

Southern Illinois Power Cooperative

11543 Lake of Egypt Road

Marion, Illinois 62959

Submitted by:

Golder Associates Inc.

670 North Commercial Street, Suite 103

Manchester, NH 03101

+1 603 668-0880

21467997

January 31, 2022

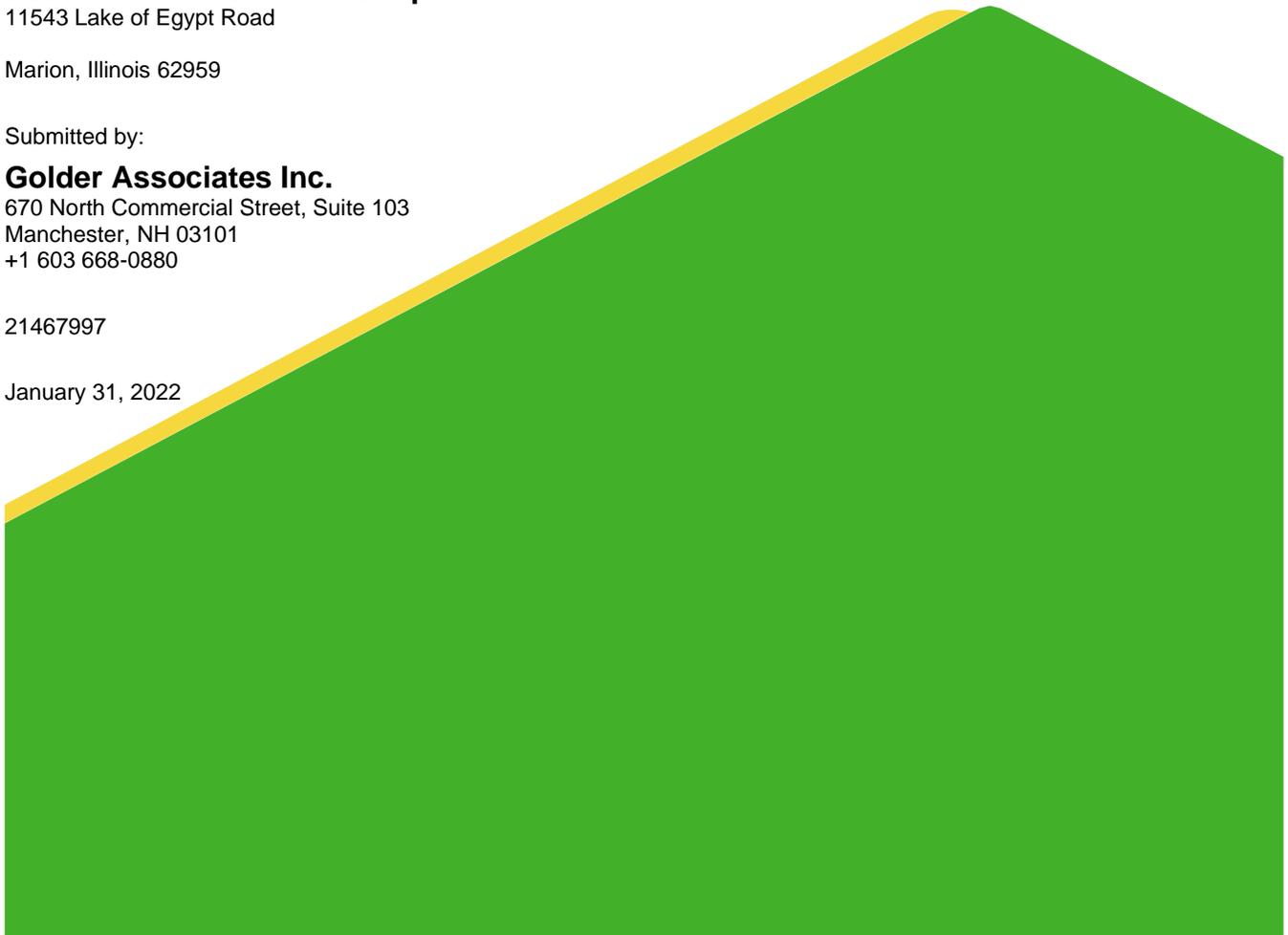


Table of Contents

1.0 INTRODUCTION..... 1

 1.1 Key Actions Completed - 2021..... 1

2.0 STATUS OF PERMIT APPLICATIONS..... 2

3.0 SITE INFORMATION 2

 3.1 Monitoring Well Network 2

 3.2 Geology and Hydrogeology..... 2

 3.2.1 Geology..... 2

 3.2.2 Site Hydrogeology..... 3

 3.2.3 Groundwater Flow..... 3

4.0 FIELD ACTIVITIES 5

 4.1 Problems Encountered and Follow-Up Corrective Actions..... 5

5.0 GROUNDWATER MONITORING PROGRAM RESULTS..... 5

 5.1 Background Monitoring 6

 5.2 Corrective Action 6

6.0 STATISTICAL EVALUATION..... 6

 6.1 First Corrective Action Monitoring Event Statistical Analysis..... 7

 6.2 Second CAM Event Statistical Analysis..... 8

 6.3 Third Corrective Action Monitoring Event Statistical Evaluation 9

7.0 KEY ACTIVITIES PROJECTED FOR 2022 9

8.0 REFERENCES 10

TABLES

Table 1	Monitoring Well Construction Details
Table 2	2021 Groundwater Water Levels
Table 3	Analytical Data

FIGURES

Figure 1	Site Location Map
Figure 2	Monitoring Well Location Map
Figure 3	January 2021, Groundwater Surface Elevation Contour Map
Figure 4	April 2021, Groundwater Surface Elevation Contour Map
Figure 5	May 2021, Groundwater Surface Elevation Contour Map
Figure 6	June 2021, Groundwater Surface Elevation Contour Map
Figure 7	July 2021, Groundwater Surface Elevation Contour Map
Figure 8	August 2021, Groundwater Surface Elevation Contour Map
Figure 9	September 2021, Groundwater Surface Elevation Contour Map
Figure 10	October 2021, Groundwater Surface Elevation Contour Map
Figure 11	November 2021, Groundwater Surface Elevation Contour Map
Figure 12	December 2021, Groundwater Surface Elevation Contour Map
Figure 13	May 2021, Extent of Groundwater Protection Standard Exceedances
Figure 14	August 2021, Extent of Groundwater Protection Standard Exceedances

APPENDICES

Appendix A	Boring Logs
------------	-------------

EXECUTIVE SUMMARY

This *2021 CCR Annual Groundwater Monitoring and Corrective Action Report* (2021 Annual Report) was prepared on behalf of Southern Illinois Power Cooperative (SIPC) for the Marion Power Plant former Emery Pond located in Marion, Illinois (Site). The former Emery Pond is subject to the Illinois Environmental Protection Agency (IEPA) coal combustion residual (CCR) groundwater monitoring requirements in 35 Illinois Administrative Code (IAC) Part 845. Pursuant to the 35 IAC Part 845 CCR Rule, SIPC is required to complete an *Annual Groundwater Monitoring and Corrective Action Report* by January 31st annually.

SIPC completed an IEPA approved closure by removal of CCR prior to July 30, 2021. As the closure was by removal, no post-closure care requirements apply (35 IAC §845.780(a)(2)). This 2021 Annual Report documents the status of the CCR groundwater monitoring program for the former Emery Pond, summarizes key actions completed, describes issues encountered, actions taken to resolve identified concerns, and proposes key activities for calendar year 2022.

In accordance with 35 IAC §845.610(e)(4), the following information provides as an overview of groundwater monitoring and corrective action status for the Unit:

- In accordance with the Groundwater Monitoring Plan (GMP) Addendum #1, the first Corrective Action statistical analysis will be completed following the first quarter 2022 monitoring event, which will be the fourth Corrective Action Monitoring event following the completion of the closure by removal. Due to the a) timing of the CCR Unit closure completion, and b) initiation of post-closure monitoring activities that generate the data on which statistics would be performed, no statistically significant increases of GPS exceedances were identified in 2021.
- The Assessment of Corrective Measures (ACM) was initiated in January 2019 and completed in March 2019 (Hanson, Revised March 30, 2021).
- The remedy was selected for Emery Pond on June 19, 2019 (SIPC, 2019).
- The selected remedy included closure by removal of all CCR from Emery Pond, installation of a perimeter drain, and ongoing groundwater monitoring. Closure by removal of CCR was completed on April 5, 2021 and final inspection by a licensed professional engineer was complete as of May 28, 2021 (SIPC, 2021). Upon completion of these closure by removal actions, all references to and reports for the former CCR unit transitioned to the current nomenclature, former Emery Pond.

Following the completed closure activities in 2021, in 2022 SIPC plans on continuing quarterly post-closure or Corrective Action Monitoring of groundwater as described in the Site's GMP Addendum #1 (Golder, 2021a).

1.0 INTRODUCTION

On behalf of Southern Illinois Power Cooperative (SIPC), Golder Associates USA Inc. (Golder), a member of WSP, prepared this 2021 CCR Annual Groundwater Monitoring and Corrective Action Report (2021 Annual Report) for the Marion Power Plant's (i.e., Facility's) former Emery Pond, 10825 Lake Egypt Road, Marion, Williamson County, Illinois (Site, see Figure 1). The former Emery Pond was an on-site settling pond, approximately (1) acre in size, closed via removal by April 5, 2021. The former Emery Pond is subject to the Illinois Environmental Protection Agency (IEPA) coal combustion residual (CCR) groundwater monitoring requirements in 35 Illinois Administrative Code (IAC) Part 845. Pursuant to the 35 IAC Part 845 CCR Rule, the Facility is required to complete an *Annual Groundwater Monitoring and Corrective Action Report* by January 31st annually.

This 2021 Annual Report provides the monitoring data and presents the relevant data evaluations from background monitoring performed between 2017 and January 2021 and provides the monitoring data from the Corrective Action Monitoring (CAM) events that were performed in May and August 2021. An additional CAM event was performed in December 2021; the results from this sampling event will be provided in the 2022 Annual Groundwater Monitoring and Corrective Action Report (2022 Annual Report). In accordance with the Groundwater Monitoring Plan (GMP) Addendum #1, the first Corrective Action statistical analysis will be completed following the first quarter 2022 monitoring event, which will be the fourth CAM event following the completion of the closure by removal. The results from this statistical evaluation will also be included in the 2022 Annual Report.

In conformance with the applicable requirements of 35 IAC §845.610(e), the 2021 Annual Report:

- Documents the status of the groundwater monitoring and corrective action activities
- Provides figures showing the CCR Unit and monitoring well locations
- Summarizes key actions completed including the status of permit applications
- Includes CCR Rule groundwater monitoring data obtained
- Describes any problems encountered during the monitoring activities
- Discusses actions taken to resolve the problems, if applicable
- Projects key activities for the upcoming year

1.1 Key Actions Completed - 2021

SIPC completed the following key actions relative to 35 IAC Part 845 CCR Rule groundwater monitoring and corrective action regulations at the Site in 2021:

- Performance of the last background sampling event in January 2021 (35 IAC §845.650(b)(1))
- Preparation of the revised Groundwater Monitoring Program Plan (GMP) in March 2021 ([Hanson, revised March 24, 2021], 35 IAC §845.630)
- Preparation of the revised Corrective Action and Selected Remedy Plan in March 2021 (Hanson, revised March 30, 2021, 35 IAC §845.670 and 720)
- Completion of closure by removal of Emery Pond in April 2021 (35 IAC §845.740)

- Performance of the first Corrective Action sampling event in May 2021 (35 IAC §845.650(b)(1))
- Performance of the second Corrective Action sampling event in August 2021 (35 IAC §845.650(b)(1))
- Preparation of the Addendum #1 to the Groundwater Monitoring Plan in October 2021 (Golder, 2021a, 35 IAC §845.630)
- Certification of the revised groundwater monitoring system in October 2021 (35 IAC §845.630(g))
- Certification of the Corrective Action statistical method in October 2021 (35 IAC §845.640(f)(2))
- Completion and submission to IEPA of the Initial Operating Permit Application in October 2021 (Golder, 2021b, 35 IAC §845.230(d)(3))
- Performance of the third Corrective Action sampling event in December 2021 (35 IAC §845.650(b)(1))

2.0 STATUS OF PERMIT APPLICATIONS

In accordance with 35 IAC §845.230(d)(3) SIPC submitted to IEPA the Initial Operating Permit Application on October 31, 2021. The application is currently under review by IEPA. Because SIPC completed an IEPA approved closure by removal for Emery Pond, prior to July 30, 2021, no other permits are required.

3.0 SITE INFORMATION

The following section summarizes Site information including the current monitoring well network and a description of the Site's Geology and Hydrogeology.

3.1 Monitoring Well Network

The groundwater monitoring system was installed in 2017 (AECOM, 2017). One background monitoring well (EBG) is located approximately 800 feet (ft) upgradient of the former Emery Pond and four downgradient monitoring wells (EP-1, EP-2, EP-3, and EP-4) are located along the southern, eastern, and northeastern boundaries of the former Emery Pond. Three additional wells (EP-5, EP-6, and EP-7) were installed in October 2021 between the former Emery Pond and the Lake of Egypt to evaluate groundwater at the limits of the groundwater management zone (GMZ, Figure 2). The monitoring wells are screened at the unlithified/bedrock unit interface which occurs at the Site at ten to twenty ft below ground surface (bgs) dependent on location. Table 1 provides a summary of the well rationale/purpose and date of installation and monitoring well construction details.

3.2 Geology and Hydrogeology

The following section describes the geology and hydrogeology of the Site as it pertains to potential contaminant transport and fate at the Site.

3.2.1 Geology

The Site is underlain by glacially-derived deposits of the Illinoian Stage overlying the Pennsylvanian Age Bedrock. (Hanson, revised March 24, 2021). Golder's interpretation of the Site's geology is based on soil borings (Appendix A) and bedrock geology maps and includes:

- Fill Materials: Where present, the fill materials generally consist of light gray to yellowish brown gravel with some silt and clay, and trace amounts of sand and asphalt from the ground surface to as deep as 14 ft bgs.

- Silt (upper discontinuous silt layer): Yellowish brown silt with little clay and trace very fine-grained sand from the ground surface to as deep as 8 ft bgs.
- Clay: Yellowish brown to black clay with some silt, little sand, and trace gravel from ground surface to approximately 20 ft bgs.
- Silt (lower discontinuous silt layer): Black to yellowish brown silt with little clay and trace very fine-grained sand from approximately 14 ft bgs to 20 ft bgs.
- Bedrock: Yellowish brown, weathered, sandstone and shale. The upper bedrock layer is at least 190 feet thick. The depth to bedrock is approximately 20 ft bgs.

The uppermost water bearing zone monitored by the groundwater monitoring system extends from the clay layer to the shallowest 11 feet of bedrock.

3.2.2 Site Hydrogeology

The uppermost water bearing zone is a shallow, hydraulically “perched” zone comprised of fill and residuum (silts and clays) from the weathering of underlying bedrock and is not considered a usable water source. No confining layer was identified. The fill and residuum unit has only 3-5 feet of saturated thickness. Because the former Emery Pond was constructed directly on top of the bedrock, groundwater monitoring wells are screened at the unlithified/bedrock unit interface. This zone has a low hydraulic conductivity (<1E-04 centimeters per second [cm/s]) and only a few feet of saturated thickness (5-10 ft; Hanson, 2019b).

3.2.3 Groundwater Flow

The 2021 static water levels are summarized in Table 2. Consistent with the requirements of the CCR Rule, the rate and direction of groundwater flow within the uppermost aquifer was determined after each sampling event. The potentiometric surface maps, Figures 3 through 12, were prepared using static water level data obtained in January 2021 and monthly between April and December 2021. Groundwater in the vicinity of the former Emery Pond generally flows east/northeast toward the Lake of Egypt. The average groundwater elevation varies between approximately 501 to 519 feet above mean sea level (ft amsl) with an average depth to groundwater of less than ten feet.

Golder calculated the horizontal hydraulic gradient (i) for the unconfined aquifer in the vicinity of the former Emery Pond at 0.039 as shown below using average groundwater elevation data for EP-1 and EP-2 from January 2021 through December 2021. Groundwater elevation data was not collected in February and March 2021.

$$i = h_L / L$$

Where: i = hydraulic gradient (unitless)
 h_L = head loss (elevation difference in feet)
 L = length (horizontal distance in feet)

As presented in the following table, the groundwater flow rate between EP-1 and EP-2 was calculated at approximately 7-18 feet per year using the following formula:

$$V = ki/\theta$$

Where: V= Groundwater Velocity (ft/min)
 k = Hydraulic conductivity (ft/min)
 i = Hydraulic gradient (unitless)
 θ = Assumed effective porosity (unitless)

The hydraulic conductivity used to calculate the groundwater flow rate was the geometric mean of the hydraulic conductivities estimated through analysis of slug test data from wells EP-1 and EP-4 (Hanson, 2019b).

Date	Head Loss (h_L , feet)	Flow Length (feet)	Hydraulic Gradient (i)	Effective Porosity (\emptyset)	Hydraulic Conductivity (k, feet/min)	Estimated Groundwater Velocity	
						(feet/min)	(feet/year)
January 2021	7.33	155	4.73E-02	0.2	1.04E-04	2.46E-05	13
April 2021	4.13	155	2.66E-02	0.2	1.04E-04	1.39E-05	7
May 2021	5.58	155	3.60E-02	0.2	1.04E-04	1.88E-05	10
June 2021	5.23	155	3.37E-02	0.2	1.04E-04	1.76E-05	9
July 2021	5.13	155	3.31E-02	0.2	1.04E-04	1.72E-05	9
August 2021	6.13	155	3.95E-02	0.2	1.04E-04	2.06E-05	11
September 2021	5.43	155	3.50E-02	0.2	1.04E-04	1.82E-05	10
October 2021	5.23	155	3.37E-02	0.2	1.04E-04	1.76E-05	9
November 2021	5.13	155	3.31E-02	0.2	1.04E-04	1.72E-05	9
December 2021	10.46	155	6.75E-02	0.2	1.04E-04	3.52E-05	18

Notes: feet/min = feet per minute

h_L = Head loss in feet

i = hydraulic gradient

k = hydraulic conductivity

\emptyset = estimated value based on soil and bedrock properties

4.0 FIELD ACTIVITIES

Pursuant to the requirements in 35 IAC §845.650(b)(1) four quarterly monitoring events were completed for the former Emery Pond in 2021. A summary of the sampling events is presented below.

Monitoring Event	Sample Parameters	Sample Dates
Background monitoring event	Detected 35 IAC §845.600(a)(1) Constituents	January 21, 2021
1 st Corrective Action Monitoring Event	35 IAC §845.600(a)(1) Constituents except Radium 226 and 228 combined	May 31, 2021
2 nd Corrective Action Monitoring Event	35 IAC §845.600(a)(1) Constituents	August 30, 2021
3 rd Corrective Action Monitoring Event	35 IAC §845.600(a)(1) Constituents	December 21-22, 2021

In January 2021 groundwater samples from all background and downgradient monitoring wells were analyzed for boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids. Based on historical detections, the groundwater sample collected from downgradient monitoring EP-3 was also analyzed for arsenic and cobalt and the groundwater sample collected from EP-4 was also analyzed for arsenic, cobalt, and lead.

During each of the sampling events, the monitoring wells were sampled in accordance with the procedures presented in the GMP (Hanson, revised March 24, 2021) and the GMP Addendum #1 (Golder, 2021a). Samples were collected by Teklab, Inc. (Teklab) and delivered to the Teklab laboratory in Collinsville, Illinois in secured coolers under chain-of-custody control. Radium samples were then shipped to Summit Environmental Technologies, Inc. in Cuyahoga Falls, Ohio for analysis.

4.1 Problems Encountered and Follow-Up Corrective Actions

Due to field oversight, radium 226 and 228 were not included in the May 2021 sampling event. Radium 226 and 228 were included in both the August and December 2021 sampling events.

During the third CAM event (December 2021), groundwater was sampled from monitoring wells EBG, EP-1, EP-4, and EP-6 at turbidity levels of 12.52, 12.68, 10.32, and 7.52 nephelometric turbidity units (NTUs), respectively. According to the GMP Addendum #1 (Golder, 2021a), groundwater samples are to be collected once a well has achieved a turbidity level below 5 NTUs. Due to time constraints in the field, wells were purged for a minimum of two hours and sampled when turbidity appeared to stabilize (e.g., no downward or upward trend over three consecutive readings five minutes apart). Moving forward, wells will be purged for two hours, and professional judgement will then be used to determine when the purge water is representative of groundwater for sampling.

5.0 GROUNDWATER MONITORING PROGRAM RESULTS

This section includes a description of the 35 IAC Part 845 CCR Rule monitoring program status, a discussion of the groundwater data, and a summary of the Corrective Actions completed.

5.1 Background Monitoring

Per the requirements of 35 IAC §845.650(b)(1), fifteen independent background groundwater samples were collected from each background and downgradient well between March 2017 and January 2021 on behalf of SIPC. SIPC submitted the samples to a contract laboratory, in accordance with chain of custody and quality assurance/quality control procedures. For ten of the sample events, samples were submitted for analysis of the constituents listed in 35 IAC §845.600(a) except for pH. In addition, field water quality parameters were measured including pH, specific conductance, temperature, dissolved oxygen, turbidity, and oxidation-reduction potential. For the remaining five sampling events, samples were submitted for analysis of a subset of the constituents listed in 35 IAC §845.600(a) and the field water quality parameters listed above. The sampling dates, number of groundwater samples collected from each background and downgradient well, purpose of sampling, and analytical results are presented in Table 3.

5.2 Corrective Action

The Assessment of Corrective Measures (ACM) was completed in March 2019 and a public meeting was held on May 23, 2019 at the Marion Public Library in Marion, Illinois to discuss the results of the ACM. The “Corrective Action and Selected Remedy Plan” (Hanson, revised March 30, 2021), outlines the selected remedy including:

- Closure of the then-operating Emery Pond and adjacent FGD storage area by removal of all CCR
- Construction of a composite liner system compliant with 35 IAC Part 845 in the footprint of the former Emery Pond to continue storm water management functions
- Construction of a perimeter drain at the toe of the liner system to protect the liner from external hydrostatic pressure and recover contaminated groundwater
- Installation of three new monitoring wells, continuing to monitor groundwater for changes resulting from the natural attenuation of contaminants, source removal and the perimeter drain collection of impacted groundwater, and the establishment of a GMZ.

Emery Pond ceased receipt of CCR materials in the fall of 2020. Closure construction activities began in late 2020. Emery Pond, and the adjacent FGD storage area, were dewatered and excavated. The removal and decontamination of Emery Pond was completed April 5, 2021, and the final inspection was completed May 28, 2021, in accordance with the Site’s Closure Plan (Hanson, revised April 15, 2021).

In accordance with the Site’s Closure Plan (Hanson, revised April 15, 2021) and the GMP Addendum #1 (Golder, 2021a), Corrective Action Monitoring is completed on a quarterly basis. The first Corrective Action Monitoring sampling events were completed in May, August, and December 2021. The results from the May and August 2021 sampling events are presented in Table 3 and discussed in Sections 6.1 and 6.2, respectively. The results from the December sampling event will be included in the 2022 Annual Report.

6.0 STATISTICAL EVALUATION

The former Emery Pond is currently in Corrective Action Monitoring (CAM). After four quarterly CAM groundwater sampling events have been completed, the groundwater sampling results will be statistically evaluated to determine if statistically significant decreases (SSDs) have occurred after closure through removal of the former Emery Pond as described in the Site’s GMP Addendum #1 (Golder, 2021a). The statistical evaluation of the first four CAM groundwater sampling events is anticipated to be completed in the second quarter of 2022.

6.1 First Corrective Action Monitoring Event Statistical Analysis

Because closure activities were completed in April 2021, the May 2021 sampling event is considered the first CAM event. In accordance with the procedures identified in GMP Addendum #1 (Golder, 2021a), Golder calculated the GPS and the facility background concentration, including all data collected from the background monitoring well (EBG) prior to the former Emery Pond closure, for each analyte using a tolerance/prediction limit procedure in accordance with 35 IAC §845.640(f)(1)(C). The GPS are the higher of the values provided in 35 IAC §845.600(a) and the background concentration.

The first CAM event (May 2021) data were compared to facility background concentrations and GPS established by Golder in 2021. Concentrations identified above background for the first CAM event based on a value-to-standard evaluation are summarized in the table below. The spatial extent of the value-to-standard GPS exceedances are presented on Figure 13.

Constituent	Facility Background Concentration	Illinois CCR Groundwater Protection Standard	Monitoring Well	May 2021 Concentration
Boron (mg/L)	0.14	2	EP-1	0.816
			EP-2	0.544
			EP-4	11.9
Calcium (mg/L)	63		EP-1	478
			EP-2	372
			EP-4	179
Chloride (mg/L)	86	200	EP-3	127
			EP-4	484
pH	6.00 - 7.04	6.0 - 9.0	EP-2	5.74
			EP-4	5.79
Sulfate (mg/L)	101	400	EP-1	1450
			EP-2	1370
			EP-3	148
			EP-4	670
Total Dissolved Solids (mg/L)	591	1200	EP-1	2500
			EP-2	2120
			EP-3	692
			EP-4	1860

Constituent	Facility Background Concentration	Illinois CCR Groundwater Protection Standard	Monitoring Well	May 2021 Concentration
Arsenic (mg/L)	QL	0.010	EP-3	0.0075
			EP-4	0.0075
Beryllium (mg/L)	QL	0.004	EP-2	0.0011
Cadmium (mg/L)	QL	0.005	EP-2	0.0015
Cobalt (mg/L)	0.018	0.018	EP-3	0.0912
			EP-4	0.287

mg/L = milligram per liter

QL = quantitation limit

The former Emery Pond has completed closure by removal of all CCR material and is in Corrective Action Monitoring, therefore, no actions beyond reporting these exceedances in this Annual Report are required.

6.2 Second CAM Event Statistical Analysis

The second CAM event (August 2021) data were compared to facility background concentrations and GPS established by Golder in 2021. Concentrations identified above background for the second CAM event based on a value-to-standard evaluation are summarized in the table below. The spatial extent of the value-to-standard GPS exceedances are shown on Figure 14.

Constituent	Facility Background Concentration	Illinois CCR Groundwater Protection Standard	Monitoring Well	August 2021 Concentration
Boron (mg/L)	0.14	2	EP-1	0.931
			EP-2	0.499
			EP-4	11.8
Calcium (mg/L)	63		EP-1	483
			EP-2	363
			EP-4	162
Chloride (mg/L)	86	200	EP-3	129
			EP-4	446
pH	6.00 - 7.04	6.0 – 9.0	EP-2	5.91
			EP-4	5.70

Constituent	Facility Background Concentration	Illinois CCR Groundwater Protection Standard	Monitoring Well	August 2021 Concentration
Sulfate (mg/L)	101	400	EP-1	1640
			EP-2	1590
			EP-3	114
			EP-4	565
Total Dissolved Solids (mg/L)	591	1200	EP-1	2520
			EP-2	2370
			EP-3	672
			EP-4	1750
Arsenic (mg/L)	QL	0.010	EP-3	0.0076
			EP-4	0.0073
Cadmium (mg/L)	QL	0.005	EP-2	0.0016
Cobalt (mg/L)	0.018	0.018	EP-3	0.0882
			EP-4	0.326
Thallium (mg/L)	QL	0.002	EP-1	0.0042
			EP-2	0.009

mg/L = milligram per liter

QL = quantitation limit

The former Emery Pond has completed closure by removal of all CCR material and is in Corrective Action Monitoring, therefore, no actions beyond reporting these exceedances in this Annual Report are required.

6.3 Third Corrective Action Monitoring Event Statistical Evaluation

The third CAM event was completed in December 2021. The laboratory results were not received during calendar year 2021. The data for the third CAM event will be evaluated in accordance with the CCR Rule timeframes and reported in the 2022 Annual Report.

7.0 KEY ACTIVITIES PROJECTED FOR 2022

During calendar year 2022, SIPC anticipates conducting the following key CCR Rule groundwater monitoring activities for the former Emery Pond:

- Prepare and submit the appropriate notifications according to the CCR Rule
- Continue quarterly CAM per CCR Rule requirements

- Statistical evaluation of the first four post-closure groundwater sampling events at the former Emery Pond
- Inspect and maintain the monitoring system including wells, pumps, and equipment.

8.0 REFERENCES

- AECOM (2017). "Draft Monitoring Well Installation Report Col Combustion Residuals (CCR) Rule, Marion Power Plant", September 28, 2017.
- AECOM (2018), "2017 Annual Groundwater Monitoring and Corrective Action Report Coal Combustion Residuals (CCR) Rule", January 30, 2018.
- Golder Associates (2021a), "Groundwater Monitoring Plan Addendum #1, Marion Power Plant, Former Emery Pond, Southern Illinois Power Cooperative", October 28, 2021.
- Golder Associates (2021b), "Southern Illinois Power Cooperative Initial Operating Permit Application, Former Emery Pond", October 30, 2021.
- Hanson (2019a), "2018 Annual Groundwater Monitoring and Corrective Action Report, Marion Power Plant – Emery Pond, Southern Illinois Power Cooperative", January 25, 2019.
- Hanson Professional Services Inc. (2019b), "Emery Pond- Hydrogeologic Investigation Report," March 29, 2019.
- Hanson (2021a), "2020 Annual Groundwater Monitoring and Corrective Action Report, Marion Power Plant – Emery Pond, Southern Illinois Power Cooperative", January 28, 2021.
- Hanson Professional Services Inc. (revised March 24 2021), "Groundwater Monitoring Plan, Marion Power Plant", March 29, 2019 revised March 24, 2021
- Hanson (revised April 15 2021) "Closure Plan, Emery Pond, Marion Power Plant, Southern Illinois Power Cooperative", March, 29 2019 revised April 15, 2021.
- Hanson (Revised March 30, 2021) "Corrective Action and Selected Remedy Plan Including GMZ Petition", March 29, 2019 revised March 30, 2021.
- Illinois Environmental Protection Agency (IEPA, 2008), "South Fork Saline – Lake of Egypt Watershed TMDL Report", June 2008.
- Illinois State Geological Survey and the Prairie Research Institute (ISGS, 2021), "Illinois Water and Related Wells" <https://isgs.illinois.edu/ilwater>, Accessed July 6, 2021.
- Southern Illinois Power Cooperative (SIPC, 2019), "Selection of Remedy (per 40 CFR 257.97)", June 19, 2019.
- Southern Illinois Power Cooperative (SIPC, 2021), "Closure and Decontamination Report for Emery Pond at Marion Power Station", August 2, 2021.

TABLES

Table 1: Monitoring Well Construction Details
Former Emery Pond
Southern Illinois Power Cooperative Marion Power Plant
Marion, Illinois

CCR Unit	Monitoring Well Type	Monitoring Well ID	Installation Date	Ground Surface Elevation (ft-msl)	Total Borehole Depth (ft)	Top of Casing Elevation (ft-msl)	Sounded Well Depth (ft-btoc)	Well Material	Screen Length (ft)	Screen Depth		Screen Elevation		
										Top (ft-btoc)	Bottom (ft-btoc)	Top (ft-btoc)	Middle (ft-msl)	Bottom (ft-msl)
Emery Pond	Background	EBG	2/8/2017	521.74	25.00	524.87	28.13	2" Sch 40 PVC	10	18.13	28.13	506.74	501.74	496.74
	Downgradient	EP-1	2/7/2017	517.07	31.00	519.72	33.65	2" Sch 40 PVC	10	23.65	33.65	496.07	491.07	486.07
	Downgradient	EP-2	2/7/2017	511.15	15.00	513.79	17.64	2" Sch 40 PVC	10	7.64	17.64	506.15	501.15	496.15
	Downgradient	EP-3	2/8/2017	516.24	26.50	518.95	29.21	2" Sch 40 PVC	10	19.21	29.21	499.74	494.74	489.74
	Downgradient	EP-4	2/8/2017	517.07	18.50	519.74	21.17	2" Sch 40 PVC	10	11.17	21.17	508.57	503.57	498.57
	GMZ Boundary	EP-5	10/5/2021	524.64	16.32	527.59	16.32	2" Sch 40 PVC	4.5	11.30	15.79	516.29	514.05	511.80
	GMZ Boundary	EP-6	10/4/2021	502.08	13.62	505.11	13.62	2" Sch 40 PVC	4.5	8.59	13.12	496.52	494.26	491.99
	GMZ Boundary	EP-7	10/4/2021	512.49	18.50	515.44	18.50	2" Sch 40 PVC	9.6	9.36	18.00	506.08	501.26	497.44

Notes:

ft-msl = Feet above mean sea level

ft-btoc = Feet below top of casing

2" Sch 40 PVC = Two-inch diameter well, constructed of schedule 40 polyvinyl chloride materials

AECOM, 2018, 2017 Annual Groundwater Monitoring and Corrective Action Report, January 31, 2018.

GMZ = Groundwater Management Zone

Prepared by: DPJ
 Checked by: SLG
 Reviewed by: MAH

Table 2: 2021 Groundwater Water Levels
Former Emery Pond
Southern Illinois Power Cooperative Marion Power Plant
Marion, Illinois

Monitoring Well ID	Total Depth (feet)	Sounded Well Depth (feet)	Elevation of Top of Casing (feet msl)	1/21/2021		4/23/2021		5/31/2021		6/25/2021		7/30/2021		8/30/2021		9/24/2021		10/29/2021		11/19/2021		12/21/2021	
				DTW (feet)	Elevation (feet msl)																		
EBG	25	28.13	524.87	7.10	517.77	7.2	517.7	7.75	517.12	8.3	516.6	7.8	517.1	8.58	516.29	8.2	516.7	8.1	516.8	6.5	518.4	7.91	516.96
EP-1	31	33.65	519.72	6.60	513.12	5.6	514.1	7.04	512.68	4.8	514.9	6.4	513.3	9.02	510.7	6.3	513.4	6.4	513.3	5.9	513.8	5.46	514.26
EP-2	15	17.64	513.79	8.00	505.79	3.8	510.0	6.69	507.10	4.1	509.7	5.6	508.2	9.22	504.57	5.8	508.0	5.7	508.1	5.1	508.7	9.99	503.8
EP-3	26.5	29.21	518.95	16.10	502.85	16.0	503.0	16.21	502.74	12.6	506.4	13.1	505.9	16.89	502.06	15.9	503.1	15.3	503.7	14.4	504.6	16.49	502.46
EP-4	18.5	21.17	519.74	13.60	506.14	11.2	508.5	7.92	511.82	11.8	507.9	12.7	507.0	7.46	512.28	12.8	506.9	12.6	507.1	12.1	507.6	8.50	511.24
EP-5	16.32	16.32	527.59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NM	-	NM	-	12.84	514.75
EP-6	13.62	13.62	505.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NM	-	NM	-	2.40	502.71
EP-7	18.5	18.5	515.44	-	-	-	-	-	-	-	-	-	-	-	-	-	-	NM	-	NM	-	13.52	501.92

Notes:

Monitoring wells EP-5, EP-6, and EP-7 were installed October 4-5, 2021.

- 1.) MSL = mean sea level.
- 2.) NM = Not measured.
- 3.) DTW = Depth to Water

Created by: DPJ
Checked by: SLG
Reviewed by: MAH

Table 3: Analytical Data
Former Emery Pond
Southern Illinois Power Cooperative Marion Power Plant
Marion, Illinois

Well ID	EBG	EBG														
Sample Date	3/23/2017	4/3/2017	5/25/2017	6/22/2017	6/29/2017	7/24/2017	8/1/2017	8/31/2017	3/22/2018	8/27/2018	1/11/2019	6/27/2019	1/30/2020	6/22/2020	1/21/2021	
Sample Purpose	Background															
ANALYTE	Unit															
Boron	mg/L	0.12	0.079	0.1	0.071	0.073	0.079	0.074	0.056	0.033	0.035	0.041	<0.08	<0.5	0.022	<0.5
Calcium	mg/L	23	10	30	23	32	37	35	35	14	15	13	15.2	12	13	15
Chloride	mg/L	55	11	84	68	79	27	86	82	12	16	12	18	7.2	12	13
Fluoride	mg/L	<0.029	<0.029	<0.029	<0.029	<0.029	0.64	<0.029	<0.029	0.53	0.55	0.5	<0.06	0.56	<0.5	0.46
pH	SU	6.5	6.8	6.41	6.45	6.53	6.59	6.66	6.26	6.35	6.57	6.85	6.21	6.54	6.5	6.57
Sulfate	mg/L	64	54	42	57	50	61	45	44	63	72	75	77	87	81	78
Total Dissolved Solids	mg/L	480	400	440	470	280	420	380	470	300	360	370	470	280	500	320
Antimony	mg/L	0.00057	0.00085 J	<0.0026	0.00069 J	0.0014 J	<0.0026	0.00022 J	<0.0026		<0.0016		<0.0016		<0.00052	
Arsenic	mg/L	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014		<0.002		<0.002		0.0011	
Barium	mg/L	0.13	0.029	0.17	0.049	0.086	0.19	0.18	0.16		0.091		<0.00011		0.068	
Beryllium	mg/L	0.00033 J	<0.0002	<0.00055	<0.0002	<0.0002	<0.00055	<0.0002	<0.00055		<0.00015	0.00038 J	<0.00015		<0.00011	
Cadmium	mg/L	<0.0001	<0.00075	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015		<0.0015		<0.000018		<0.00002	
Chromium	mg/L	0.0062	<0.0016	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031		<0.0031	<0.0026	<0.00014		0.0042	
Cobalt	mg/L	0.008	0.00016 J	0.014	0.00015 J	0.0014 J	0.0093	0.0038 J	0.0073		<0.00063	0.0038	<0.00063		0.0017	
Fluoride	mg/L	<0.029	<0.029	<0.029	<0.029	<0.029	0.64	<0.029	<0.029	0.53	0.55	0.5	<0.06	0.56	<0.5	0.46
Lead	mg/L	<0.0008	<0.0013	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026		<0.0026	<0.0042	<0.00016		<0.0033	
Lithium	mg/L	0.046 J	0.0074 J	<0.0042	0.028 J	0.059 J	<0.0042	0.082 J	<0.0042		<0.0042		<0.04		<0.0042	
Mercury	mg/L		<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019		<0.000093		<0.0001		<0.00019	
Molybdenum	mg/L	0.0034 J	0.0043 J	<0.000095	0.0017 J	0.0016 J	<0.00095	0.0024 J	<0.00095		<0.00014		<0.00028		<0.00019	
Radium 226	pCi/L	0.878	<0.223	0.805	<0.262	<0.245	0.43	0.28	0.77		0.933		0.703		0.468	
Radium 228	pCi/L	1.06	<0.496	0.555	<0.0695	<0.371	0.98	1.24	2.22		0.447		0.911		0.514	
Radium, 226/228 Combined	pCi/L	1.938	<0.496	1.36	<0.262	<0.371	1.41	1.52	2.99		1.38		1.61		0.983	
Selenium	mg/L	0.0019 J	<0.0005	<0.0028	0.0036 J	0.0019 J	<0.0028	0.0028 J	0.007		<0.00033	0.00079 J	<0.00033		<0.00056	
Thallium	mg/L	<0.0007	<0.004	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081		<0.0081	<0.01	<0.00015		<0.004	
Turbidity	NTU															

Notes:
 J = Indicates the result is estimated
 < = Analyte was not detected above the method detection limit, the method
 R = relative percent difference for the laboratory duplicate outside recovery limits
 mg/L = milligrams per liter
 pCi/L = picoCuries per liter
 NTU = Nephelometric Turbidity Unit

Table 3: Analytical Data
Former Emery Pond
Southern Illinois Power Cooperative Marion Power Plant
Marion, Illinois

Well ID	Sample Date	EBG	EBG	EP-1	EP-1	EP-2															
		5/31/2021	8/30/2021	3/23/2017	4/3/2017	5/25/2017	6/22/2017	6/29/2017	7/24/2017	8/1/2017	8/31/2017	3/22/2018	8/27/2018	1/11/2019	6/27/2019	1/30/2020	6/22/2020	1/21/2021	5/31/2021	8/30/2021	3/23/2017
Sample Purpose	Unit	Corrective Action Monitoring	Corrective Action Monitoring	Background	Corrective Action Monitoring	Corrective Action Monitoring	Background														
ANALYTE	Unit																				
Boron	mg/L	<0.009	0.010 J	0.13	0.21	0.28	0.26	0.32	0.21	0.23	0.17	0.38	0.92	0.75	1.12	1.1	0.92	1	0.816	0.931	0.22
Calcium	mg/L	13.3	12.1	220	280	310	310	310	270	250	240	330	410	410	444	540	470	460	478	483	190
Chloride	mg/L	22	17	54	54	48	50	50	51	48	48	60	63	70	55	52	34	39	44	48	42
Fluoride	mg/L	0.6	0.58	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.25	<0.06	<0.06	<0.06	<0.06	<0.5	<0.2	0.22	0.19	<0.029
pH	SU	6.61	6.58	6.94	6.89	6.55	6.52	6.64	6.57	6.82	6.79	6.25	6.36	6.33	6.2	7.39	6.15	6.29	6.18	6.12	6.18
Sulfate	mg/L	85	83	820	910	850	850	440	540	520	440	510	1000	1600	1500	1700	1400	1400	1450	1640	860
Total Dissolved Solids	mg/L	344	340	2000	2300	2300	2300	2200	2200	2100	2100	2400	2700	2800	550	2700	2700	2500	2500	2520	1800
Antimony	mg/L	<0.0010	<0.0010	0.00043 J	<0.0002	<0.0026	0.00057 J	0.00095 J	<0.0026	<0.0002	<0.0026	<0.0016	<0.0016	<0.0016	<0.0016	<0.0026	<0.0016	<0.0010	0.0005 J	0.00029 J	0.00029 J
Arsenic	mg/L	<0.0010	<0.0010	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0010	0.0005 J	<0.0014	<0.0014
Barium	mg/L	0.0505	0.0469	0.045	0.04	0.041	0.032	0.033	0.029	0.028	0.026	0.023	0.023	<0.00011	0.019	0.0216	0.02	0.039			
Beryllium	mg/L	<0.0010	<0.0010	<0.0002	<0.0002	<0.00055	<0.0002	<0.0002	<0.00055	<0.0002	<0.00055	<0.00015	<0.00055	<0.00015	<0.00055	<0.00015	<0.00055	<0.0010	<0.0010	<0.0010	<0.0002
Cadmium	mg/L	<0.0010	<0.0010	<0.0001	0.006	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.000018	<0.00002	<0.0010	<0.0010	<0.0010	<0.0001	<0.0001
Chromium	mg/L	<0.0015	0.0011 J	<0.0001	<0.0016	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	<0.0026	<0.00014	<0.0011	<0.0020	0.0019	<0.0001	<0.0001	<0.0001
Cobalt	mg/L	<0.0001	0.0003 J	0.0017 J	0.00079 J	<0.0018	0.00081 J	0.00057 J	<0.0018	0.00074 J	<0.0018	<0.00063	0.00056 J	<0.00063	<0.00018	0.0012	0.0010 J	0.052			
Fluoride	mg/L	0.6	0.58	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.25	<0.06	<0.06	<0.06	<0.06	<0.5	<0.2	0.22	0.19	<0.029
Lead	mg/L	<0.0010	<0.0010	<0.0008	<0.0013	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026	<0.0042	<0.00016	<0.0033	<0.0010	<0.0010	<0.0010	<0.0008	<0.0008
Lithium	mg/L	0.0207	0.0164	0.024 J	0.028 J	<0.0042	0.032 J	0.029 J	<0.1	0.024 J	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	<0.0042	0.0141	0.0127	0.018 J		
Mercury	mg/L	<0.00020	<0.00020	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.0002	<0.000093	<0.0001	<0.00019	<0.00019	<0.00020	<0.00020	<0.00020	<0.00020		
Molybdenum	mg/L	0.0145	0.0014 J	0.0028 J	0.0016 J	<0.000095	0.00077 J	0.0018 J	<0.00095	0.0019 J	<0.00095	<0.00014	<0.00028	<0.00095	<0.00015	<0.0015	<0.0015	<0.0015	0.0015 J		
Radium 226	pCi/L		<0.21	0.603	0.341	0.37	0.313	<0.139	0.16	0.38	0.24	0.453	0.619	0.42					<0.04	<0.187	
Radium 228	pCi/L		1.02	<0.0552	0.55	<0.609	0.496	<0.0387	<0.27	1.04	1.15	0.992	0.0905	0.405					1.78	0.853	
Radium, 226/228 Combined	pCi/L		<1.23	0.603	0.891	0.37	0.809	<0.139	0.16	1.42	1.39	1.445	0.71	0.825					<1.82	0.853	
Selenium	mg/L	<0.0010	<0.0010	0.0012 J	0.0014 J	<0.0028	0.005 J	0.0025 J	<0.0028	0.0011 J	<0.0028	<0.00033	<0.0028	<0.00033	<0.0028			0.0015	0.0014	0.0038 J	
Thallium	mg/L	<0.0020	0.0054	<0.0007	<0.004	<0.0081	<0.01	<0.010	<0.010	<0.010	<0.010	<0.0081	<0.01	<0.00015	<0.004			<0.0020	0.0042	<0.0007	
Turbidity	NTU	9.95	28.65															49.8	22.65		

Notes:
 J = Indicates the result is estimated
 < = Analyte was not detected above the method detection limit, the method
 R = relative percent difference for the laboratory duplicate outside recovery limits
 mg/L = milligrams per liter
 pCi/L = picoCuries per liter
 NTU = Nephelometric Turbidity Unit

Table 3: Analytical Data
Former Emery Pond
Southern Illinois Power Cooperative Marion Power Plant
Marion, Illinois

Well ID		EP-2	EP-2	EP-3	EP-3	EP-3	EP-3														
	Sample Date	4/3/2017	5/25/2017	6/22/2017	6/29/2017	7/24/2017	8/1/2017	8/31/2017	3/22/2018	8/27/2018	1/11/2019	6/27/2019	1/30/2020	6/22/2020	1/21/2021	5/31/2021	8/30/2021	3/23/2017	4/3/2017	5/25/2017	6/22/2017
	Sample Purpose	Background	Corrective Action Monitoring	Corrective Action Monitoring	Background	Background	Background	Background													
ANALYTE	Unit																				
Boron	mg/L	0.19	0.2	0.23	0.29	0.26	0.31	0.23	0.24	0.2	0.37	0.274	0.56	0.47	0.49 J	0.544	0.499	0.11	0.089	0.081	0.057
Calcium	mg/L	170	200	200	470	200	190	180	230	190	280	236	430	360	340	372	363	34	29	45	93
Chloride	mg/L	39	36	37	36	36	36	36	30	35	25	29	13	19	28	29	34	100	120	140	220
Fluoride	mg/L	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.25	<0.06	<0.06	<0.06	<0.06	<0.5	0.28	0.62	0.4	<0.029	<0.029	<0.029	<0.029
pH	SU	6.39	6.31	6.1	5.75	5.86	5.88	6.33	6.27	6.28	6.62	6.18	6.46	5.81	6.37	5.74	5.91	5.99	5.96	6.03	6.08
Sulfate	mg/L	660	780	780	470	430	770	340	420	740	1100	1100	1100	1200	1300	1370	1590	120	180	190	300
Total Dissolved Solids	mg/L	1800	1900	1800	1900	1800	1800	1800	1700	1800	1900	400	1900	2200	2300	2120	2370	680	820	1400	560
Antimony	mg/L	<0.0002	<0.0026	0.0004 J	0.00073 J	<0.0026	<0.0002	<0.0026		<0.0016		<0.0016		<0.00052		<0.0010	<0.0010	0.00022 J	<0.0002	<0.0026	0.00026 J
Arsenic	mg/L	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014	<0.0014		<0.002		<0.002		<0.00027		<0.0010	0.0005 J	<0.0014	0.0088	0.0076	0.0061
Barium	mg/L	0.035	0.038	0.03	0.029	0.025	0.025	0.025		0.018		<0.00011		0.019		0.0146	0.0198	0.072	0.059	0.059	0.061
Beryllium	mg/L	<0.0002	<0.00055	<0.0002	<0.0002	<0.00055	<0.0002	<0.00055		<0.00015	<0.00055	<0.0016		<0.00011		0.0011	0.0003 J	<0.0002	<0.0002	<0.00055	<0.0002
Cadmium	mg/L	<0.00075	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015		<0.0015		<0.000018		<0.00002		0.0015	0.0016	<0.0001	<0.00075	<0.0015	<0.0015
Chromium	mg/L	<0.0016	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031		<0.0026	<0.00014		<0.0011		<0.0015	<0.0015	<0.0001	<0.0016	<0.0031	<0.0031	<0.0031
Cobalt	mg/L	0.029	0.023	0.016	0.0087	<0.00018	0.00086 J	<0.00018		<0.00063	0.0007 J	<0.00063		<0.00037		0.0017	0.0052	0.11	0.12	0.091	0.037
Fluoride	mg/L	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.25	<0.06	<0.06	<0.06	<0.06	<0.5	0.28	0.62	0.4	<0.029	<0.029	<0.029	<0.029
Lead	mg/L	<0.0013	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026	<0.0026		<0.0026	<0.0042	<0.00016		<0.0033		<0.0010	0.0007 J	<0.0008	0.0056	<0.0026	<0.0026
Lithium	mg/L	0.015 J	<0.0042	0.020 J	0.025 J	<0.1	0.021 J	<0.0042		<0.0042		<0.04		<0.0042		0.0206	0.0148	<0.003	0.0095 J	<0.0042	0.12
Mercury	mg/L	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.0002		<0.000093		<0.0001		<0.00019		<0.00020	<0.00020		<0.00019	<0.00019	<0.00019
Molybdenum	mg/L	0.0017 J	<0.000095	0.0003 J	0.00055 J	<0.00095	0.00082 J	<0.00095		<0.00014		<0.00028		<0.00019		<0.0015	<0.0015	0.00037 J	0.00045 J	<0.000095	<0.0002
Radium 226	pCi/L	0.338	<0.177	0.197	1.9	0.08	0.14	0.08		0		<0.149		0.0467		<0.02	1.64	0.715	1	0.366	
Radium 228	pCi/L	<0.0622	<0.126	<0.127	<0.458	0.4	1.35	0.64		0.443		0.553		0.176		2.51	<0.438	1.92	<0.633	0.42	
Radium, 226/228 Combined	pCi/L	0.338	<0.177	0.197	1.9	0.48	1.49	0.72		0.443		0.553		0.222		2.53	1.64	2.635	1	0.786	
Selenium	mg/L	0.0027 J	<0.0028	0.0074	0.0061	0.0054	0.0046 J	<0.0028		<0.00033	0.0055	<0.00033		0.0031		<0.0010	<0.0010	0.013	0.011	0.016	0.028
Thallium	mg/L	<0.004	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081	<0.0081		<0.0081	<0.01	<0.00015		<0.004		<0.0020	0.009	<0.0007	<0.004	<0.0081	<0.0081
Turbidity	NTU															7.34	9.98				

Notes:
 J = Indicates the result is estimated
 < = Analyte was not detected above the method detection limit, the method
 R = relative percent difference for the laboratory duplicate outside recovery limits
 mg/L = milligrams per liter
 pCi/L = picoCuries per liter
 NTU = Nephelometric Turbidity Unit

Table 3: Analytical Data
Former Emery Pond
Southern Illinois Power Cooperative Marion Power Plant
Marion, Illinois

Well ID		EP-3	EP-4	EP-4	EP-4	EP-4	EP-4	EP-4													
	Sample Date	6/29/2017	7/24/2017	8/1/2017	8/31/2017	3/22/2018	8/27/2018	1/11/2019	6/27/2019	1/30/2020	6/22/2020	1/21/2021	5/31/2021	8/30/2021	3/23/2017	4/3/2017	5/25/2017	6/22/2017	6/29/2017	7/24/2017	8/1/2017
	Sample Purpose	Background	Corrective Action Monitoring	Corrective Action Monitoring	Background	Background	Background	Background	Background	Background											
ANALYTE	Unit																				
Boron	mg/L	0.085	0.083	0.09	0.09	0.078	0.082	0.033	<0.08	<0.5	0.024	<0.25	0.0556	0.075	14	23	14	11	13	11	14
Calcium	mg/L	30	32	34	33	34	38	94	76.3	40	80	66	40.6	35.5	190	170	170	150	190	160	150
Chloride	mg/L	66	110	120	110	110	140	240	150	140	330	230	127	129	460	290	380	430	250	180	210
Fluoride	mg/L	<0.029	<0.029	<0.029	<0.029	<0.25	<0.06	<0.06	<3	<0.06	<0.5	0.35	0.22	0.17	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029
pH	SU	6.01	5.96	6.02	6.13	6.1	6.1	6.11	5.98	6.31	6.01	6.24	6.13	6.07	5.51	5.88	5.77	5.8	5.81	5.8	5.8
Sulfate	mg/L	73	130	140	110	110	150	340	160	190	410	300	148	114	620	530	660	730	410	290	330
Total Dissolved Solids	mg/L	570	720	630	1000	700	690	750	580	750	960	1500	692	672	2300	2300	2400	2000	2100	2300	2200
Antimony	mg/L	0.00091 J	<0.0026	<0.0002	<0.0026		<0.0016		<0.0016		<0.00052		<0.0010	<0.0010	0.00028 J	<0.0002	<0.0026	0.00033 J	0.00051 J	<0.0026	<0.0002
Arsenic	mg/L	<0.0014	0.0093	0.0062	0.0069		<0.002		0.0057 J	0.0067	0.0059	<0.05	0.0075	0.0076	0.035	0.039	0.037	0.053	0.044	0.044	0.035
Barium	mg/L	0.065	0.064	0.057	0.058		0.064		<0.00011		0.041		0.0819	0.101	0.035	0.026	0.028	0.029	0.037	0.026	0.031
Beryllium	mg/L	<0.0002	<0.00055	<0.0002	<0.00055		<0.00015	0.00033 J	<0.00015		<0.00011		<0.00010	<0.00010	<0.0002	<0.0002	<0.00055	<0.0002	<0.0002	<0.00055	<0.0002
Cadmium	mg/L	<0.0015	<0.0015	<0.0015	<0.0015		<0.0015		<0.000018		<0.00002		<0.0010	<0.0010	<0.0001	0.0052	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015
Chromium	mg/L	<0.0031	<0.0031	<0.0031	<0.0031		<0.0031	<0.0026	<0.00014		<0.0011		<0.0015	<0.0015	<0.0001	<0.0016	<0.0031	<0.0031	<0.0031	<0.0031	<0.0031
Cobalt	mg/L	0.11	0.12	0.1	0.11		0.088	0.044	0.032	0.087	0.047	0.031	0.0912	0.0882	0.39	0.41	0.41	0.44	0.34	0.41	0.42
Fluoride	mg/L	<0.029	<0.029	<0.029	<0.029	<0.25	<0.06	<0.06	<3	<0.06	<0.5	0.35	0.22	0.17	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029	<0.029
Lead	mg/L	<0.0026	<0.0026	<0.0026	<0.0026		<0.0026	<0.0042	<0.00016		<0.0033		<0.0010	<0.0010	0.009	0.013	0.011	0.017	<0.0026	0.011	0.012
Lithium	mg/L	0.012 J	<0.1	0.028 J	<0.0042		<0.0042		0.119		0.12		0.0314	0.0169	0.0044 J	0.0062 J	<0.0042	0.0047 J	0.0063 J	<0.1	0.0053 J
Mercury	mg/L	<0.00019	<0.00019	<0.00019	<0.0002		<0.000093		<0.0001		<0.00019		<0.00020	<0.00020		<0.00019	<0.00019	<0.00019	<0.00019	<0.00019	<0.00019
Molybdenum	mg/L	<0.0002	<0.00095	0.00047 J	<0.00095		<0.00014		<0.00028		<0.000019		<0.0015	<0.0015	0.00092 J	0.0011 J	<0.000095	<0.0002	0.00058 J	<0.00095	0.0010 J
Radium 226	pCi/L	0.317	0.19	0.43	0.41		0.679		0.0839		0.513		<0.27	1.1	1.17	<0.0457	0.18	<0.219	0.3	0.15	0.15
Radium 228	pCi/L	<0.397	0.77	2.42	0.77		0.717		0.477		0.304		<0.5	<0.442	<0.353	0.864	0.897	<0.490	0.44	0.96	0.96
Radium, 226/228 Combined	pCi/L	0.317	0.96	2.88	1.18		1.396		0.561		0.817		<0.77	1.1	1.17	0.864	1.077	<0.490	0.74	1.11	1.11
Selenium	mg/L	0.013	0.016	0.012	0.022		<0.00033	<0.0028	<0.00033		<0.00056		<0.0010	<0.0010	0.13	0.12	0.13	0.2	0.13	0.13	0.11
Thallium	mg/L	<0.0081	<0.0081	<0.0081	<0.0081		<0.0081	<0.01	<0.00015		<0.004		<0.0020	0.0019 J	<0.0007	0.065	0.092	0.094	0.058	<0.0081	0.075
Turbidity	NTU												9.96	6.84							

Notes:
 J = Indicates the result is estimated
 < = Analyte was not detected above the method detection limit, the method
 R = relative percent difference for the laboratory duplicate outside recovery limits
 mg/L = milligrams per liter
 pCi/L = picoCuries per liter
 NTU = Nephelometric Turbidity Unit

Table 3: Analytical Data
Former Emery Pond
Southern Illinois Power Cooperative Marion Power Plant
Marion, Illinois

Well ID		EP-4	EP-4								
	Sample Date	8/31/2017	3/22/2018	8/27/2018	1/11/2019	6/27/2019	1/30/2020	6/22/2020	1/21/2021	5/31/2021	8/30/2021
	Sample Purpose	Background	Corrective Action Monitoring	Corrective Action Monitoring							
ANALYTE	Unit										
Boron	mg/L	11	13	11	15	11.5	11	9.9	10	11.9	11.8
Calcium	mg/L	150	200	150	140	159	170	150	140	179	162
Chloride	mg/L	210	200	310	420	440	370	380	390	484	446
Fluoride	mg/L	<0.029	<0.25	<0.5	<0.06	<0.06	<0.06	<0.5	<0.2	0.1	0.09 J
pH	SU	5.85	6.04	5.85	6.07	5.86	5.94	5.79	5.91	5.79	5.7
Sulfate	mg/L	340	320	520	750	710	630	610	580	670	565
Total Dissolved Solids	mg/L	2300	2100	1900	2000	130	2000	2500	1900	1860 R	1750
Antimony	mg/L	<0.0026		<0.0016		<0.0016		<0.00052		<0.0010	<0.0010
Arsenic	mg/L	0.049		<0.002		0.026 J	0.019	0.014	<0.05	0.0075	0.0073
Barium	mg/L	0.023		0.023		<0.00011		0.027		0.0248	0.027
Beryllium	mg/L	<0.00055			<0.00055	<0.00015		<0.00055		<0.0010	<0.0010
Cadmium	mg/L	<0.0015		<0.0015		<0.000018		<0.00002		<0.0010	<0.0010
Chromium	mg/L	<0.0031		0.011	<0.0026	<0.00014		<0.0011		<0.0015	<0.0015
Cobalt	mg/L	0.38		0.31	0.41	0.28	0.26	0.33	0.32	0.287	0.326
Fluoride	mg/L	<0.029	<0.25	<0.5	<0.06	<0.06	<0.06	<0.5	<0.2	0.1	0.09 J
Lead	mg/L	0.012		0.015	<0.0042	<0.00016		0.018	<0.025	<0.0010	<0.0010
Lithium	mg/L	<0.0042		<0.0042		<0.04		<0.0042		<0.0015	0.0023 J
Mercury	mg/L	<0.0002		<0.000093		<0.0001		<0.00019		<0.00020	<0.00020
Molybdenum	mg/L	<0.00095		<0.00014		<0.00028		<0.000019		<0.0015	<0.0015
Radium 226	pCi/L	0.33		0.262		0.77		0.163			<0.11
Radium 228	pCi/L	2.14		0.79		0.929		0.41			<0.14
Radium, 226/228 Combined	pCi/L	2.47		1.052		1.7		0.573			<0.25
Selenium	mg/L	0.16		0.021	<0.0028	<0.00033		0.0012		<0.0010	<0.0010
Thallium	mg/L	0.075		0.14	0.18	<0.00015		<0.004		<0.0020	0.0012 J
Turbidity	NTU									19.22	9.75

Notes:
 J = Indicates the result is estimated
 < = Analyte was not detected above the method detection limit, the method
 R = relative percent difference for the laboratory duplicate outside recovery limits
 mg/L = milligrams per liter
 pCi/L = picoCuries per liter
 NTU = Nephelometric Turbidity Unit

Created by: DPJ
 Checked by: SLG
 Reviewed by: MAH

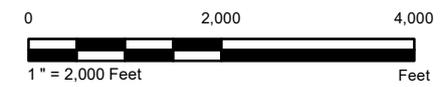
FIGURES

B:\Southern_Illinois_Power_Cooperative\Marion_Power_Plant\99_Proj\21467997_Operating_Permit_Application\001_Water_Wel_Survey\40_PROD\21467997-0001-HS-0004_new.mxd



CRAB ORCHARD LAKE	MARION	CRAB ORCHARD
LICK CREEK	GOREVILLE	CREAL SPRINGS

7 1/2 SERIES QUADRANGLES



NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: GCS WGS 1984
2. BASEMAP CONSISTS OF USGS 7.5 MINUTE QUADRANGLE MAPS.

CLIENT

SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT

ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
FORMER EMERY POND

TITLE

SITE LOCATION MAP

CONSULTANT



YYYY-MM-DD	2022-01-12
DESIGNED	DFS
PREPARED	DTD
REVIEWED	DPJ
APPROVED	MAH

PROJECT NO.
21467997

CONTROL
-

REV.
-

FIGURE
1

1 in IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B



LEGEND

- Background Monitoring Well
- Downgradient Monitoring Well
- Approximate Limits of the Former Emery Pond

NOTE(S)

REFERENCE(S)

1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY
3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT

SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT

ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
FORMER EMERY POND

TITLE

MONITORING WELL LOCATION MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	2

B:\Sullivan_Illinois_Power_Cooperative\MapInfo_Power_Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Map\Map_Survey\410_PROJ\21467997_0001_HIS-0002.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - January 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON JANUARY 21, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 JANUARY 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	3

B:\Sullivan, Illinois, Power, Cooperative\MapInfo, Power, Plant\19, PROJ\21467997, Operating, Permit, Application\0001, Water, Map, Survey\1410, PROJ\21467997-0001-145-0003.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 6 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - April 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON APRIL 23, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 APRIL 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	4

B:\Sullivan, Illinois, Power, Cooperative\MapInfo, Power, Plant\19, PROJ\21467997, Operating, Permit, Application\0001, Water, M&E, Survey\410, PROJ\21467997-0001-145-0004.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 6 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - May 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond



FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON MAY 31, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 MAY 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

B:\Sullivan, Illinois, Power, Cooperative\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Water_Net_Survey\40_PROJ\21467997_0001_HIS-0005.mxd



IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 6 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - June 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON JUNE 25, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
**JUNE 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP**

CONSULTANT	YYYY-MM-DD	2022-01-25
	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	6

B:\Sullivan, Illinois, Power, Cooperative\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_NA\K_M\4_Survey\410_PROJ\21467997_0001_HIS-0008.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 6 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - July 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON JULY 30, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
**JULY 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP**

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

B:\Sullivan, Illinois, Power, Cooperative\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Water_Net_Survey\410_PROJ\21467997_0001_HIS-0007.mxd



IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 6 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - August 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

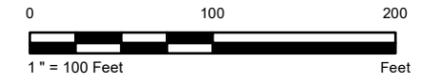


FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON AUGUST 30, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 AUGUST 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

B:\Sullivan, Illinois, Power, Cooperatives\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Note_104_Survey\140_PROJ\21467997_0001_145-0008.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 8 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - September 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON SEPTEMBER 24, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 SEPTEMBER 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	9

B:\Sullivan, Illinois, Power, Cooperative\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_NA\NA_NA_Survey\410_PROJ\21467997_0001_HIS-0000.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 8 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - October 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond



FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON OCTOBER 29, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AEROGRIID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
**OCTOBER 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP**

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	10

B:\Sullivan, Illinois, Power, Cooperatives\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Note_Note_Survey\140_PROJ\21467997_0001-145-0010.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 8 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - November 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON NOVEMBER 19, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 NOVEMBER 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	11

B:\Sullivan, Illinois, Power, Cooperative\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Water_Net_Survey\40_PROJ\21467997_0001_HIS\0011.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANS 6 11m



- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - December 2021 Groundwater Contour
 - Approximate Limits of the Former Emery Pond

FIGURE NARRATIVE
 THIS FIGURE DEPICTS THE GROUNDWATER ELEVATION IN THE UPPER PORTION OF THE SURFICIAL AQUIFER AND IS INTENDED TO REPRESENT THE APPROXIMATE ELEVATION OF THE GROUNDWATER POTENTIOMETRIC SURFACE. THE POSTED DATA WERE CALCULATED FROM DEPTH TO WATER MEASUREMENTS MADE BY SIPC ON DECEMBER 21, 2021. THE DIRECTION OF THE HORIZONTAL GROUNDWATER FLOW AT AND NEAR THE POTENTIOMETRIC SURFACE CAN BE GENERALLY INTERPRETED AS BEING PERPENDICULAR TO THE GROUNDWATER ELEVATION CONTOURS.

- NOTE(S)**
1. THE COORDINATES FOR THIS SITE ARE ILLINOIS STATE PLANE WEST 1201
 2. WELL LOCATIONS AND ELEVATIONS OBTAINED FROM WELL CONSTRUCTION BORING LOGS PROVIDED BY SOUTHERN ILLINOIS POWER COMPANY.
 3. GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL.

- REFERENCE(S)**
1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 DECEMBER 2021, GROUNDWATER SURFACE ELEVATION
 CONTOUR MAP

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	12

B:\Sullivan, Illinois, Power, Cooperative\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Water_Note_Survey\40_PROJ\21467997_0001_HIS-0012.mxd

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B



EP-4	
Boron	11.9 mg/L
Chloride	484 mg/L
pH	5.79
Sulfate	670 mg/L
Cobalt	0.287 mg/L
Total Dissolved Solids	1860 mg/L

EP-3	
Cobalt	0.0912 mg/L

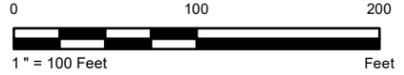
EP-1	
Sulfate	1450 mg/L
Total Dissolved Solids	2500 mg/L

EP-2	
pH	5.74
Sulfate	1370 mg/L
Total Dissolved Solids	2120 mg/L

LEGEND

- Background Monitoring Well
- Downgradient Monitoring Well
- Approximate Limits of the Former Emery Pond

Lake of Egypt



NOTE(S)
 1. ONLY SAMPLE RESULTS COLLECTED IN MAY 2021 AND DETECTED ABOVE A GROUNDWATER PROTECTION STANDARD ARE PROVIDED ON THIS FIGURE.
 2. MG/L- MILLIGRAMS PER LITER

REFERENCE(S)
 1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 MAY 2021, EXTENT OF ILLINOIS CCR GROUNDWATER
 PROTECTION STANDARD EXCEEDANCES

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

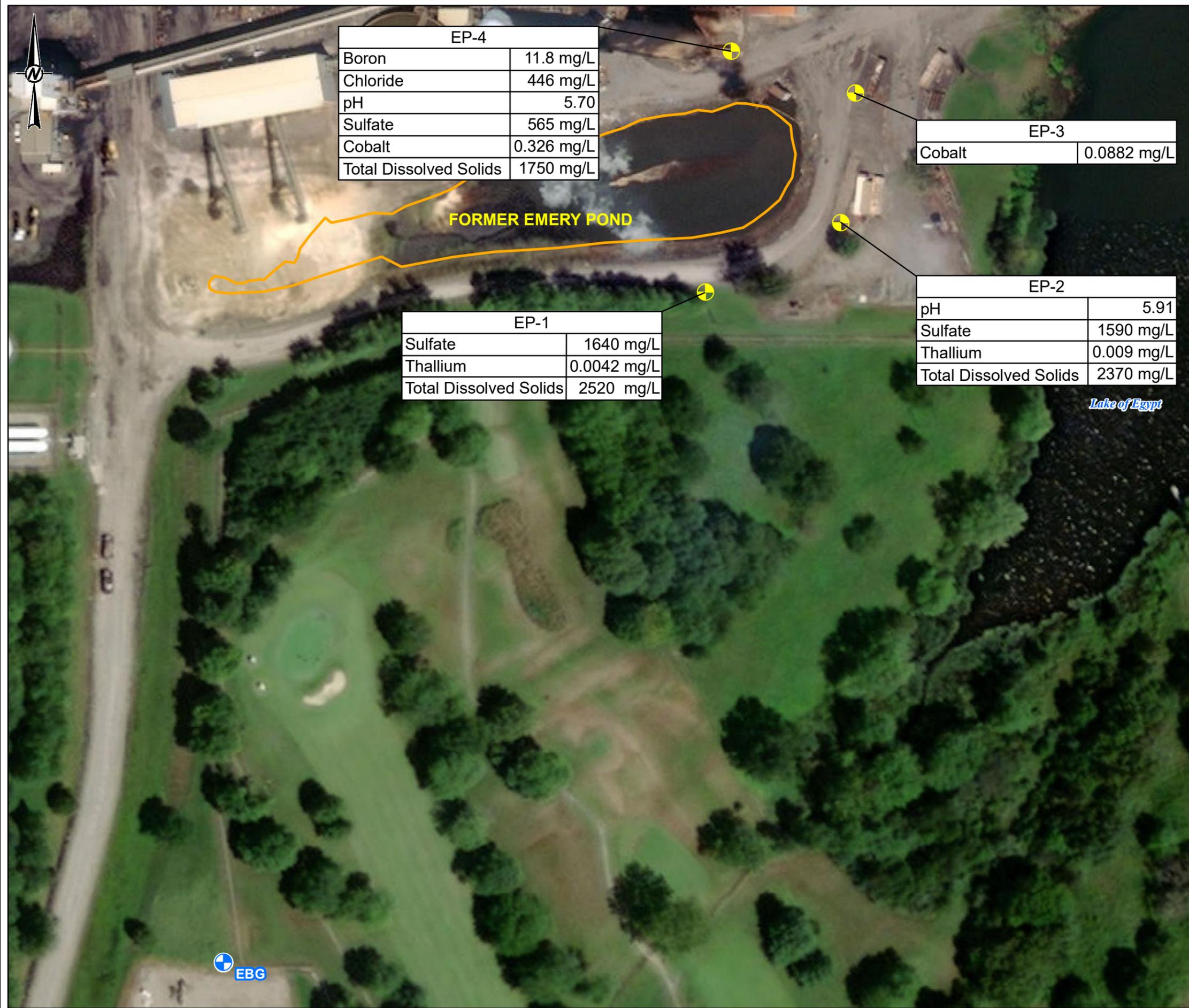
PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	13

B:\Sullivan, Illinois, Power, Cooperatives\Illinois, Power, Plant\99_PROJ\21467997_Operating_Permit_Application\0001_Note_Note_Survey\410_PROJ\21467997_0001-115-0013.mxd



IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B

B:\Sullivan, Illinois, Power, Cooperatives\Illinois, Power, Plant\99_PRC\21467997_Operating_Permit_Application\0001_NaBr_NaCl_Survey\40_PRC\21467997_0001-115-0014.mxd



EP-4	
Boron	11.8 mg/L
Chloride	446 mg/L
pH	5.70
Sulfate	565 mg/L
Cobalt	0.326 mg/L
Total Dissolved Solids	1750 mg/L

EP-3	
Cobalt	0.0882 mg/L

EP-1	
Sulfate	1640 mg/L
Thallium	0.0042 mg/L
Total Dissolved Solids	2520 mg/L

EP-2	
pH	5.91
Sulfate	1590 mg/L
Thallium	0.009 mg/L
Total Dissolved Solids	2370 mg/L

- LEGEND**
- Background Monitoring Well
 - Downgradient Monitoring Well
 - Approximate Limits of the Former Emery Pond

Lake of Egypt



NOTE(S)
 1. ONLY SAMPLE RESULTS COLLECTED IN AUGUST 2021 AND DETECTED ABOVE A GROUNDWATER PROTECTION STANDARD ARE PROVIDED ON THIS FIGURE.
 2. MG/L- MILLIGRAMS PER LITER

REFERENCE(S)
 1. COORDINATE SYSTEM: NAD 1983 STATEPLANE ILLINOIS EAST FIPS 1201 FEET
 2. IMAGERY SOURCE: ESRI, MAXAR, GEOEYE, EARTHSTAR GEOGRAPHICS, CNES/AIRBUS DS, USDA, USGS, AERGRID, IGN, AND THE GIS USER COMMUNITY
 3. MONITORING WELL LOCATION DATA RECEIVED FROM SOUTHERN ILLINOIS POWER COOPERATIVE

CLIENT
 SOUTHERN ILLINOIS POWER COOPERATIVE

PROJECT
 ANNUAL GROUNDWATER AND CORRECTIVE ACTION REPORT
 FORMER EMERY POND

TITLE
 AUGUST 2021, EXTENT OF ILLINOIS CCR GROUNDWATER
 PROTECTION STANDARD EXCEEDANCES

CONSULTANT	YYYY-MM-DD	2022-01-25
GOLDER MEMBER OF WSP	DESIGNED	DPJ
	PREPARED	DTD
	REVIEWED	DPJ
	APPROVED	MAH

PROJECT NO.	CONTROL	REV.	FIGURE
21467997	-	-	14



IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS B

APPENDIX A

Boring Logs



KEY TO SYMBOLS

Hanson Professional Services Inc.
1525 S. Sixth Street
Springfield, Illinois 62703
(217) 788-2450

LITHOLOGIC SYMBOLS (Unified Soil Classification System)

	ASPHALT ASHPALT		MH ELASTIC SILT
	BASALT BASALT		ML SILT
	BLDRCBBL BOULDERS AND COBBLES		OH HIGH PLASTICITY ORGANIC SILT
	BRECCIA BRECCIA		OL LOW PLASTICITY SILT
	CH HIGH PLASTICITY CLAY		PT PEAT
	CL LOW PLASTICITY CLAY		SANDSTONE
	COAL COAL		SC CLAYEY SAND
	CONC. CONCRETE		SHALE
	FILL FILL		SILTSTONE
	GC CLAYEY GRAVEL		SM SILTY SAND
	GM SILTY GRAVEL		SP POORLY GRADED SAND
	GPS SANDY GRAVEL		SW WELL GRADED SAND
	GP POORLY GRADED GRAVEL		TILL GLACIAL TILL
	GW WELL GRADED GRAVEL		TOPSOIL
	LIMESTONE		

SAMPLER SYMBOLS

	GRAB / AUGER CUTTINGS HAND AUGER [AUG or HA]
	SPLIT SPOON / SPT [SS]
	SHELBY TUBE [SH]
	ROCK CORE [RC]
	CONTINUOUS OR MACROSAMPLER [CS or DP]
	BLIND DRILL [BD]
	MODIFIED CALIFORNIA SAMPLER [MC]

WELL SYMBOLS

	CONCRETE SURFACE SEAL
	HIGH-SOLIDS BENTONITE GROUT
	BENTONITE CHIP SEAL
	SAND PACK W/SOLID RISER
	SAND PACK W/SCREEN

ABBREVIATIONS

LL - Liquid Limit (%)	NP - Non-Plastic
PL - Plastic Limit (%)	Qu - Unconfined Compressive Strength (tsf)
woh - Weight of Hammer	Qp (P) - Pocket Penetrometer
wor - Weight of Rods	TV - Torvane
MaxGS - Maximum Grain Size	PID - Photoionization Detector
<#200 - Percent Passing No. 200 Sieve	ppm - Parts per Million

GROUNDWATER LEVELS

▽ Level during drilling,
or as indicated

▽ Level after 24 hours,
or as indicated

▽ Level as indicated

Client: Southern Illinois Power Cooperative

Project Name: SIPC Marion CCR

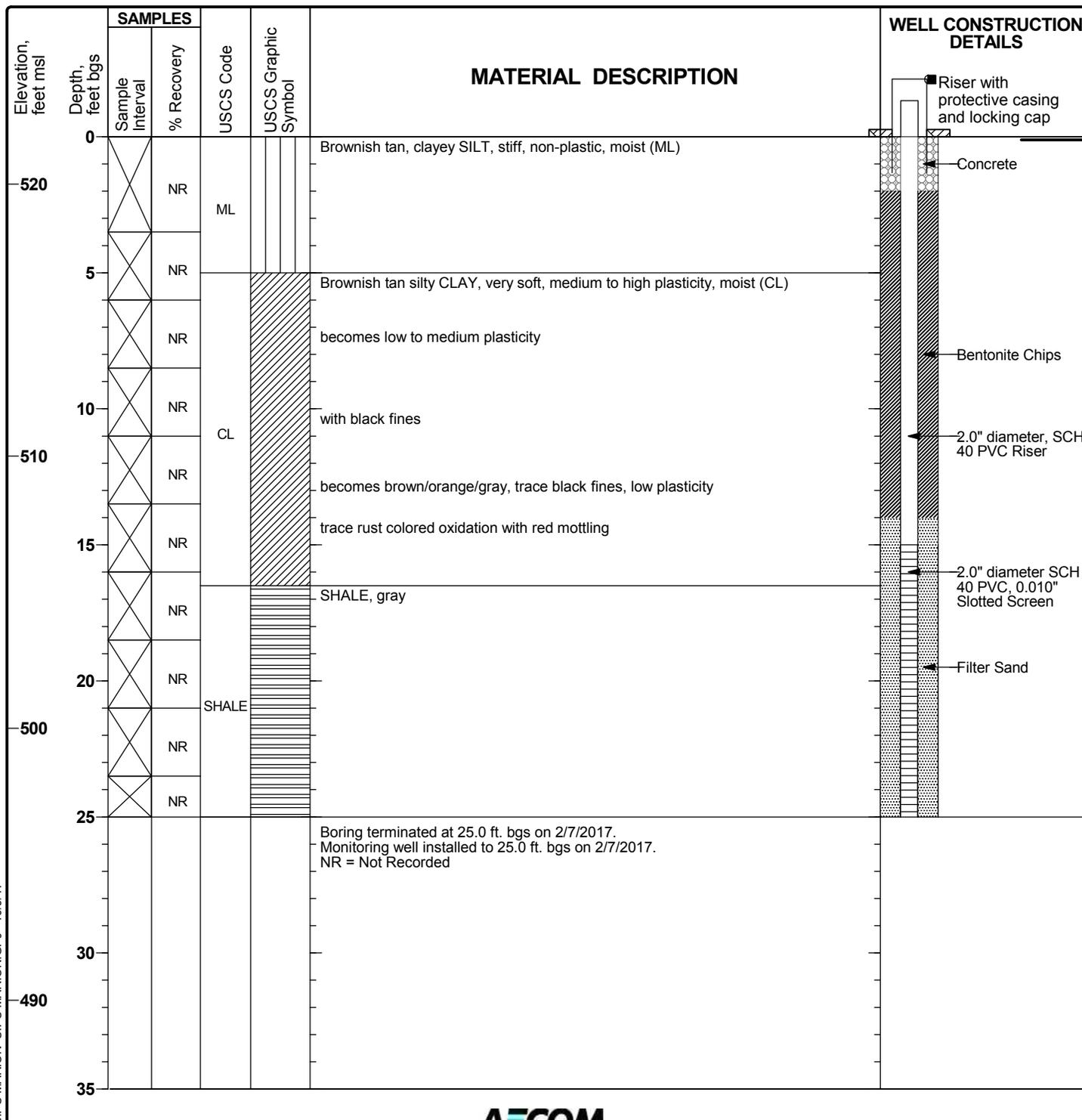
Project Location: SIPC Marion

Project Number: 60535846

Log of EBG

Sheet 1 of 1

Date(s) Drilled and Installed	2/8/2017	Logged By	Suzanne Dale	Reviewed By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Holcomb Engineering	Total Depth of Borehole	25.0 feet, bgs
Sampling Method	Split Spoon	Water Level TOIC	Not measured	TOC Elevation Ground Surface	524.87 ft, msl 521.74 ft, msl
Size and Type of Well Casing	2-Inch Schedule 40 PVC	Screen Perforation	0.010 - inch	Northing (Plant) Easting (Plant)	346358.14 ft 804168.155 ft
Seal or Backfill	Bentonite Chips				



SIPC MARION SIPC MARION.GPJ 10/9/17

Client: Southern Illinois Power Cooperative

Project Name: SIPC Marion CCR

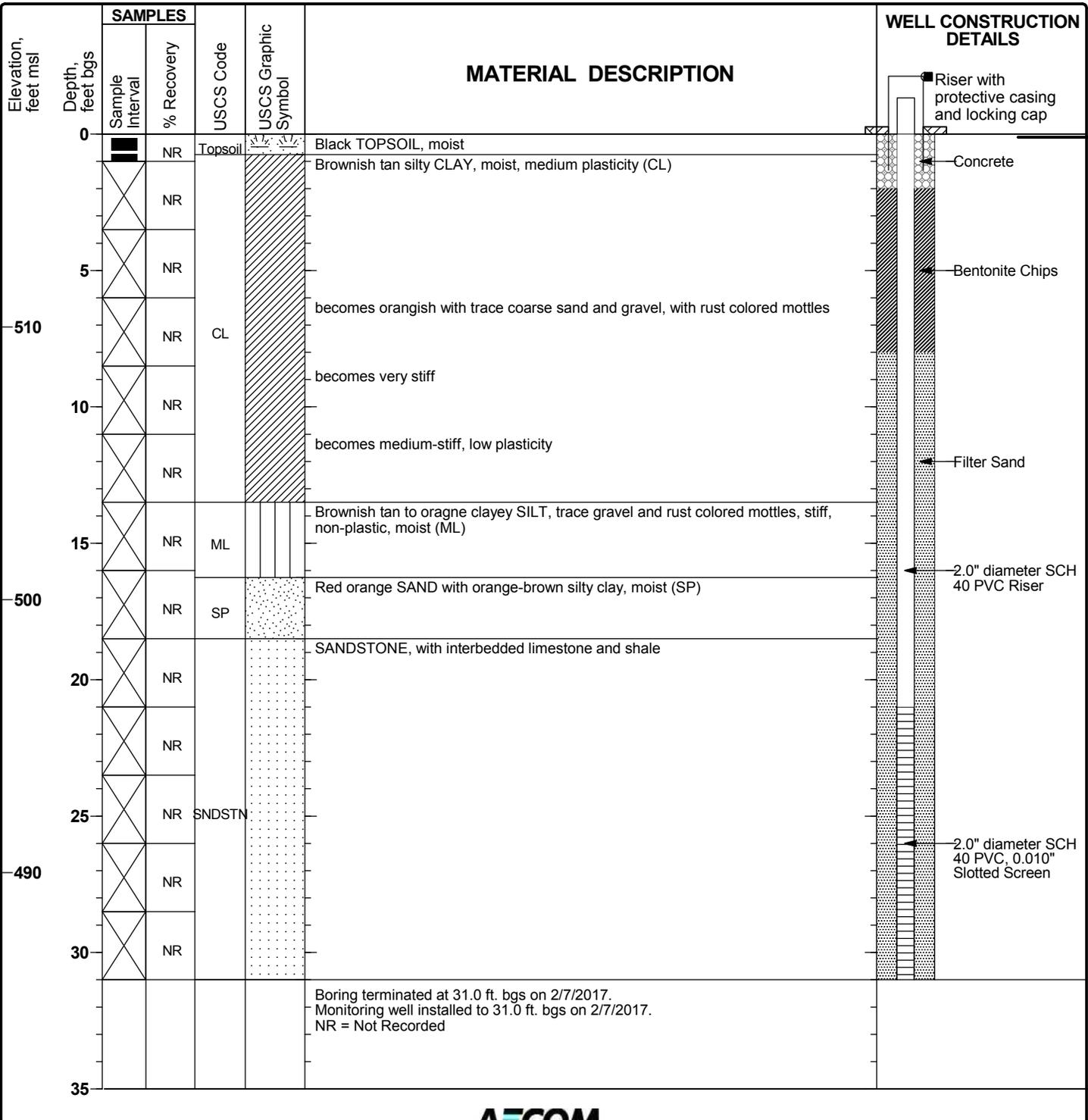
Project Location: SIPC Marion

Project Number: 60535846

Log of EP-1

Sheet 1 of 1

Date(s) Drilled and Installed	2/7/2017	Logged By	Suzanne Dale	Reviewed By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Holcomb Engineering	Total Depth of Borehole	31.0 feet, bgs
Sampling Method	Split Spoon	Water Level TOIC	Not measured	TOC Elevation Ground Surface	519.72 ft, msl 517.07 ft, msl
Size and Type of Well Casing	2-Inch Schedule 40 PVC	Screen Perforation	0.010 - inch	Northing (Plant)	347042.306 ft
Seal or Backfill	Bentonite Chips			Easting (Plant)	804661.174 ft



SIPC MARION SIPC MARION.GPJ 10/9/17

Client: Southern Illinois Power Cooperative

Project Name: SIPC Marion CCR

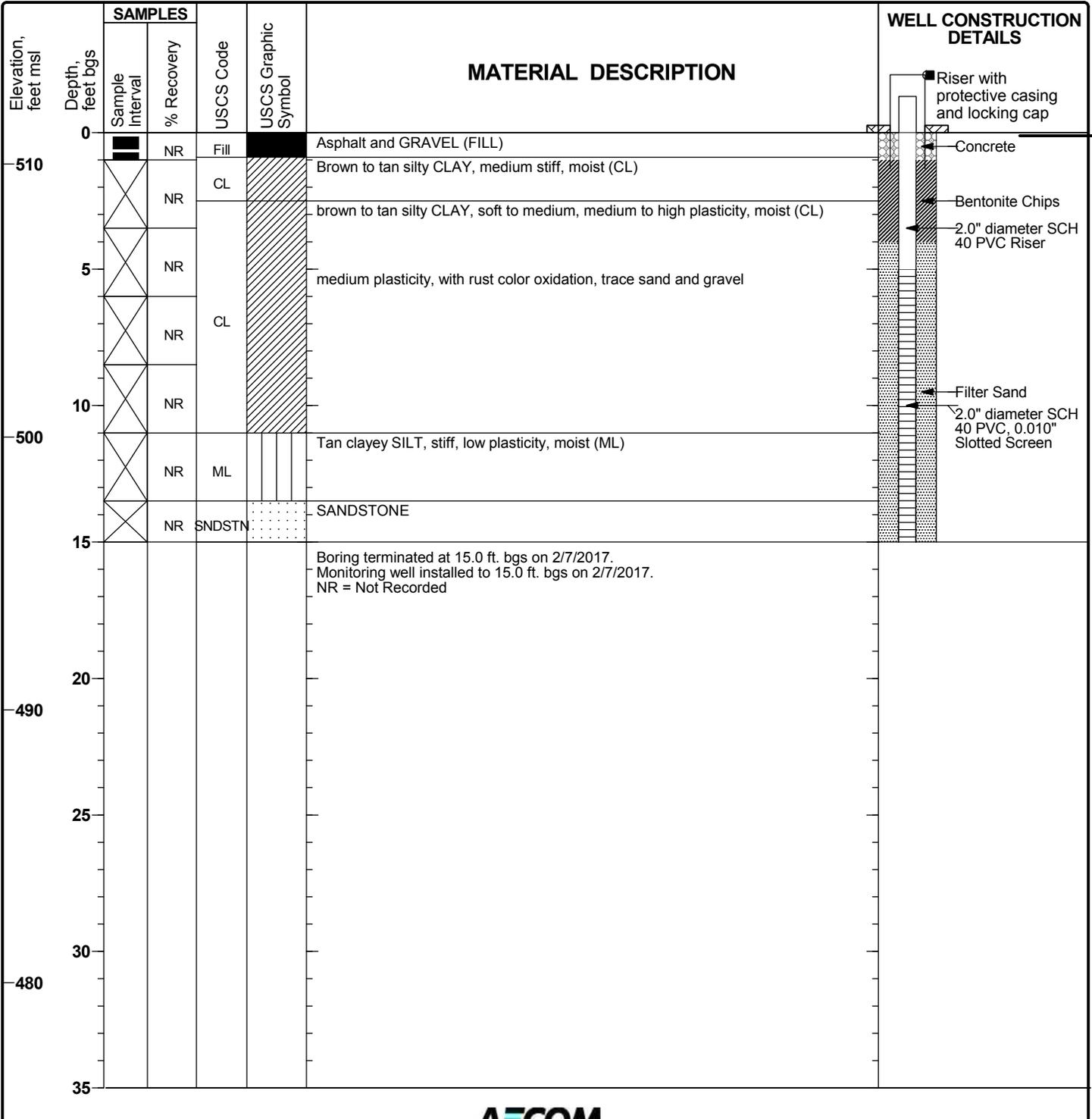
Project Location: SIPC Marion

Project Number: 60535846

Log of EP-2

Sheet 1 of 1

Date(s) Drilled and Installed	2/7/2017	Logged By	Suzanne Dale	Reviewed By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Holcomb Engineering	Total Depth of Borehole	15.0 feet, bgs
Sampling Method	Split Spoon	Water Level TOIC	Not measured	TOC Elevation Ground Surface	513.79 ft, msl 511.15 ft, msl
Size and Type of Well Casing	2-Inch Schedule 40 PVC	Screen Perforation	0.010 - inch	Northing (Plant) Easting (Plant)	347113.029 ft 804799.408 ft
Seal or Backfill	Bentonite Chips				



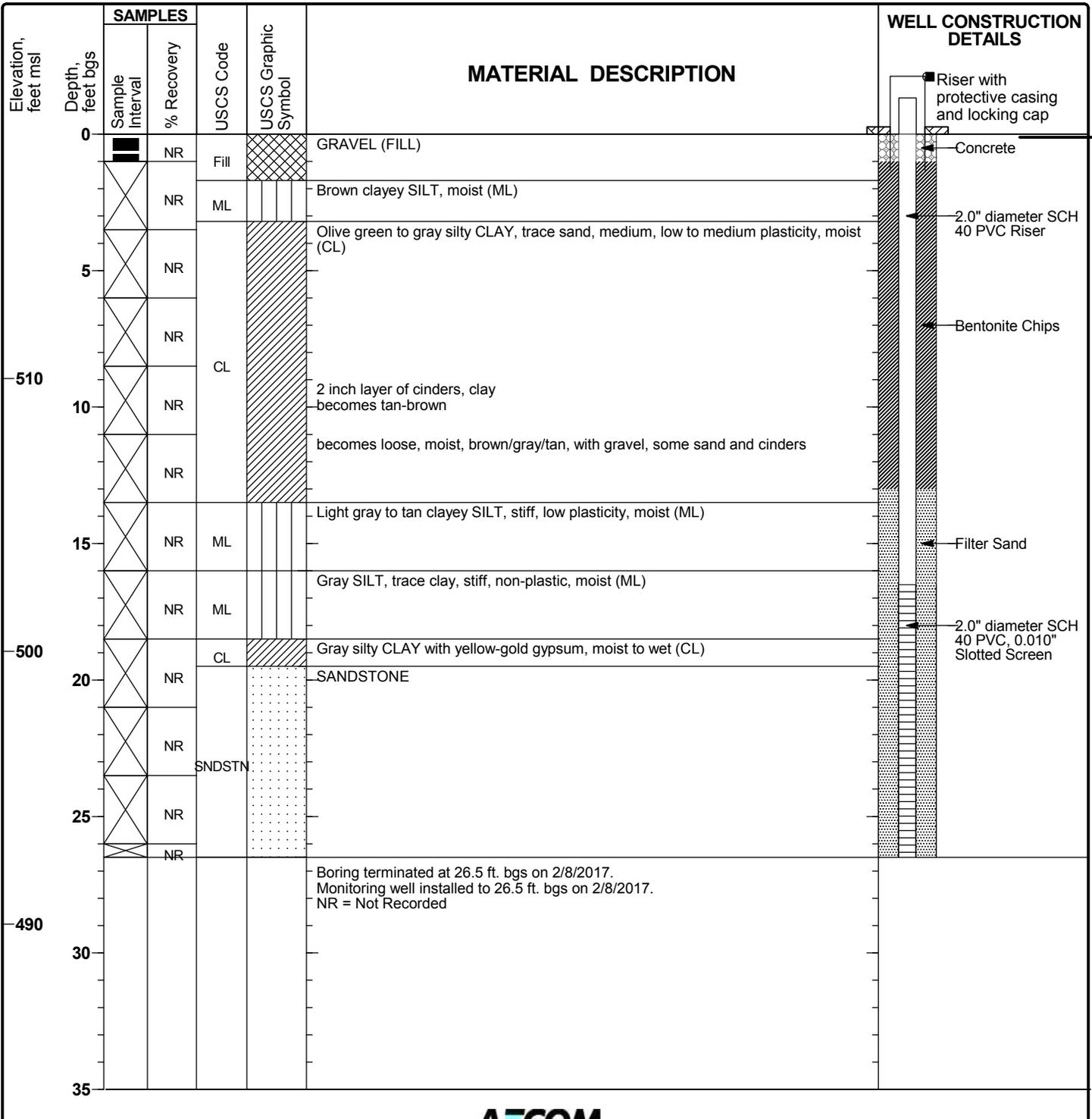
SIPC MARION SIPC MARION.GPJ 10/9/17

Client: Southern Illinois Power Cooperative
 Project Name: SIPC Marion CCR
 Project Location: SIPC Marion
 Project Number: 60535846

Log of EP-3

Sheet 1 of 1

Date(s) Drilled and Installed	2/8/2017	Logged By	Suzanne Dale	Reviewed By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Holcomb Engineering	Total Depth of Borehole	26.5 feet, bgs
Sampling Method	Split Spoon	Water Level TOIC	Not measured	TOC Elevation Ground Surface	518.95 ft, msl 518.95 ft, msl
Size and Type of Well Casing	2-Inch Schedule 40 PVC	Screen Perforation	0.010 - inch	Northing (Plant)	347245.08 ft
Seal or Backfill	Bentonite Chips			Easting (Plant)	804814.534 ft



SIPC MARION SIPC MARION.GPJ 10/9/17

Client: Southern Illinois Power Cooperative

Project Name: SIPC Marion CCR

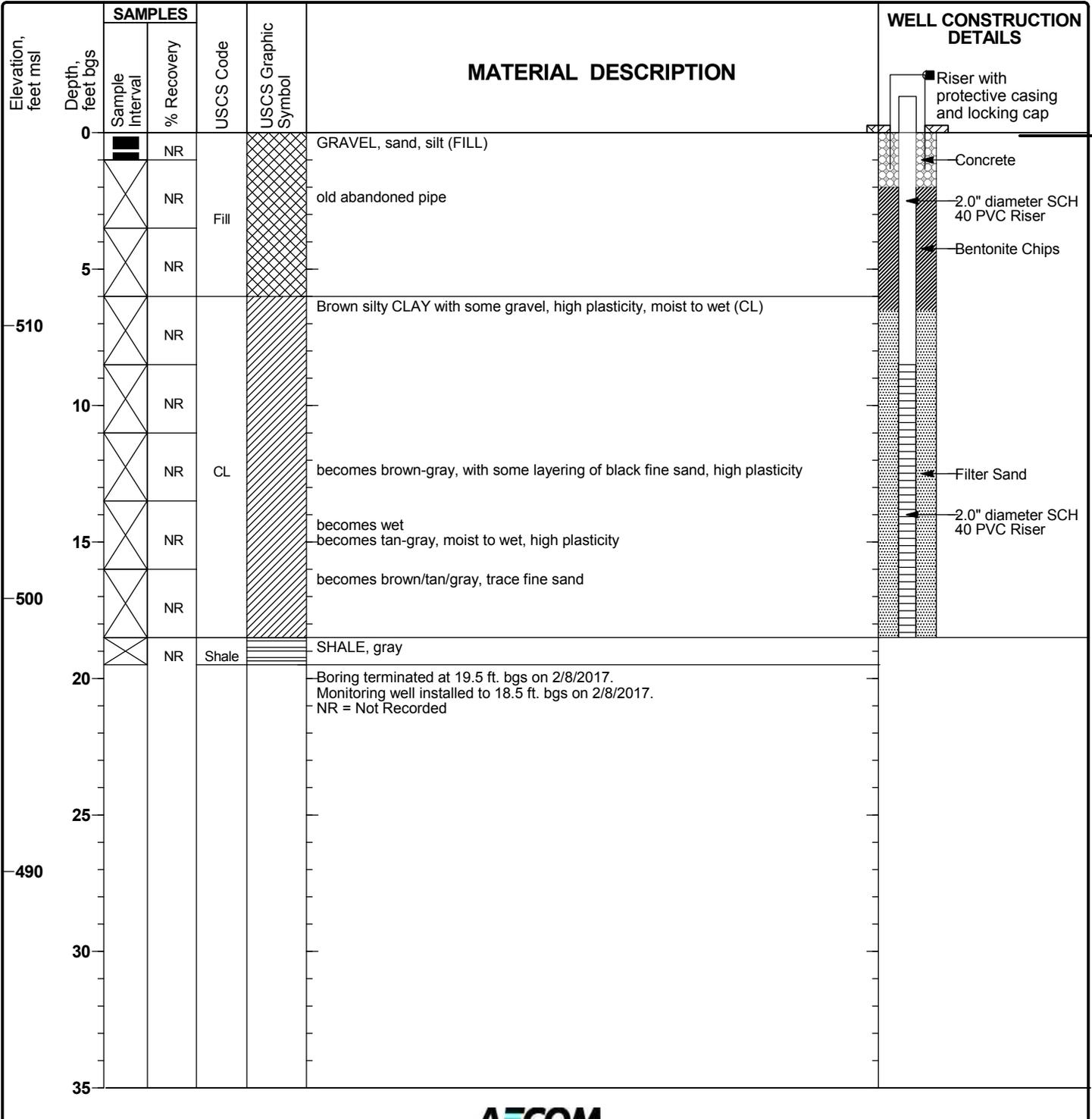
Project Location: SIPC Marion

Project Number: 60535846

Log of EP-4

Sheet 1 of 1

Date(s) Drilled and Installed	2/8/2017	Logged By	Suzanne Dale	Reviewed By	
Drilling Method	Hollow Stem Auger	Drilling Contractor	Holcomb Engineering	Total Depth of Borehole	18.5 feet, bgs
Sampling Method	Split Spoon	Water Level TOIC	Not measured	TOC Elevation Ground Surface	519.74 ft, msl 517.07 ft, msl
Size and Type of Well Casing	2-Inch Schedule 40 PVC	Screen Perforation	0.010 - inch	Northing (Plant) Easting (Plant)	347288.297 ft 804687.527 ft
Seal or Backfill	Bentonite Chips				



SIPC MARION SIPC MARION.GPJ 10/9/17

FIELD BORING LOG



CLIENT: Southern Illinois Power Cooperative
Site: Storm Water Basin Monitoring Wells
Location: Marion Power Station, Marion, IL
Project: 21E0079
DATES: Start: 10/5/2021
 Finish: 10/5/2021

CONTRACTOR: Holcomb Foundation Engineering Co.
Rig mfg/model: Bobcat T630 with auger attachment
Drilling Method: 3/4" Hollow Stem Auger
FIELD STAFF: Driller: J. Carter
 Helper: J. Taylor
 Eng/Geo: R. Hasenyager

BOREHOLE ID: EP-5
Well ID: EP-5
Surface Elev: 524.64 ft. MSL
Completion: 16.32 ft. BGS
Station: 347,001.63N
 804,473.78E

WEATHER: Foggy, cool (low 60's)

SAMPLE			TESTING				TOPOGRAPHIC MAP INFORMATION:		WATER LEVEL INFORMATION:				
Number	Recov / Total (in) % Recovery	Type	Blows / 6 in N - Value RQD	Water Content (%)	Dry Density (lb/ft ³)	Qu (tsf) Qp (tsf) Failure Type	TOPOGRAPHIC MAP INFORMATION:		WATER LEVEL INFORMATION:				
							Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks		
	0/60 0%	AGR					2	Yellowish brown (10YR5/6), moist, medium, CLAY with some silt, little sand, and trace gravel.			524		
	0/60 0%	AGR					4					522	
	0/60 0%	AGR					6					520	
	0/60 0%	AGR					8					518	
	0/60 0%	AGR					10					516	
	0/60 0%	AGR					12					514	
	0/60 0%	AGR					14					512	
	0/16 0%	AGR					16		Yellowish brown (10YR5/8), weathered SANDSTONE.			510	
							EOB = 16.3 ft.						

NOTE(S): Boring drilled adjacent to DP-4d.

FIELD BORING LOG



CLIENT: Southern Illinois Power Cooperative
Site: Storm Water Basin Monitoring Wells
Location: Marion Power Station, Marion, IL
Project: 21E0079

CONTRACTOR: Holcomb Foundation Engineering Co.
Rig mfg/model: CME 550X
Drilling Method: 3/4" Hollow Stem Auger with split spoon

BOREHOLE ID: EP-6
Well ID: EP-6
Surface Elev: 502.08 ft. MSL
Completion: 13.62 ft. BGS
Station: 347,034.68N
 804,941.94E

DATES: Start: 10/4/2021
 Finish: 10/4/2021

FIELD STAFF: Driller: J. Carter
 Helper: J. Taylor

WEATHER: Sunny, mild (high 70's)

Eng/Geo: R. Hasenyager

SAMPLE		TESTING				TOPOGRAPHIC MAP INFORMATION:		WATER LEVEL INFORMATION:					
Number	Recov / Total (in) % Recovery	Type	Blows / 6 in N - Value RQD	Water Content (%)	Dry Density (lb/ft ³)	Qu (tsf) Qp (tsf) Failure Type	Quadrangle: Goreville Township: Southern Section 26, Tier 10S; Range 2E	▽ = Dry - during drilling ▽ = 13.00 - at completion ▽ =	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
	0/12 0%	BD											
2A	17/24 71%	SS	5-7 7-5 N=14	18.7	3.5				2	Yellowish brown (10YR5/4) mottles, moist, medium, SILT with few clay and trace sand.		500	
3A	24/36 67%	SS	2-2 4-4 N=6	24.6	1.5				4	Gray (10YR5/1) with 10% Yellowish brown (10YR5/6) mottles, moist, medium, CLAY with some silt and trace sand.		498	
4A	23/24 96%	SS	1-1 4-4 N=5	20.7	3.5				6	Yellowish brown (10YR5/6) with 20% Gray (10YR6/1) mottles, moist, medium, SILT with few clay, trace sand, and trace gravel.		496	
5A	27/36 75%	SS	7-8 13-13 N=21	12.1	4.0				8	Strong brown (7.5YR5/8), moist, dense, very fine- to coarse-grained SAND with some silt.		494	
6A	21/21 100%	SS	4-10 27-60/3" N=37	15.0	4.0				10	Strong brown (7.5YR5/8) with 10% gray (7.5YHR5/1) mottles, moist, hard, weathered SHALE.		492	
	0/10 0%	BD							12			490	
EOB = 13.6 ft.													

NOTE(S):

FIELD BORING LOG



CLIENT: Southern Illinois Power Cooperative
Site: Storm Water Basin Monitoring Wells
Location: Marion Power Station, Marion, IL
Project: 21E0079
DATES: Start: 10/4/2021
 Finish: 10/4/2021
WEATHER: Sunny, mild (low 70's)

CONTRACTOR: Holcomb Foundation Engineering Co.
Rig mfg/model: CME 550X
Drilling Method: 3/4" Hollow Stem Auger with split spoon
FIELD STAFF: Driller: J. Carter
 Helper: J. Taylor
 Eng/Geo: R. Hasenyager

BOREHOLE ID: EP-7
Well ID: EP-7
Surface Elev: 512.49 ft. MSL
Completion: 18.50 ft. BGS
Station: 347,219.28N
 804,890.26E

SAMPLE		TESTING				TOPOGRAPHIC MAP INFORMATION:		WATER LEVEL INFORMATION:			
Number	Recov / Total (in) % Recovery	Type	Blows / 6 in N - Value RQD	Water Content (%)	Dry Density (lb/ft ³)	Qu (tsf) Qp (tsf) Failure Type	Depth ft. BGS	Lithologic Description	Borehole Detail	Elevation ft. MSL	Remarks
	0/12 0%	BD						Light bluish gray (5PB8/1), moist, dense, GRAVEL with some sand and some silt.		512	
2A	15/24 63%	SS	2-2 3-3 N=5	14.6	1.0		2	Black (10YR2/1), moist, loose, very fine- to coarse-grained SAND with some silt and trace gravel (Bottom Ash).		510	
3A				17.3	2.0		4	Yellowish brown (10YR5/6), moist, soft, CLAY with some silt and trace sand.		508	
4A	32/36 89%	SS	2-5 13-7 N=18	21.4	1.0		6			506	
5A	16/24 67%	SS	2-1 2-1 N=3	21.8	1.0		8	Grayish brown (10YR5/2) with 15% yellowish brown (10YR5/6) mottles, moist, medium CLAY with some silt, trace sand, and trace gravel.		504	
6A	17/36 47%	SS	1-2 2-3 N=4	24.0	1.0		10			502	
7A	15/24 63%	SS	woh-1 3-4 N=4	26.2	1.0		12	Pale brown (10YR6/3), moist, soft, SILT with few clay and trace sand.		500	
8A	27/36 75%	SS	1-2 2-3 N=4	24.3	0.5		14	Yellowish brown (10YR5/4), moist, soft, CLAY with some silt and trace sand.		498	
							16	Gray (10YR5/1), moist, soft, SILT with few clay and trace sand.		496	
	20/24 83%	SS	woh-1 4-5 N=5		0.5		18	Yellowish brown (10YR5/4), moist, soft, CLAY with some silt and trace sand.		496	
	0/6 0%	BD					18	Yellowish brown (10YR5/8), moist, dense, very fine- to medium-grained SANDSTONE.		494	

EOB = 18.5 ft.

NOTE(S):



golder.com