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2022 – 2023 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

LINED POND
NEW MADRID POWER PLANT
NEW MADRID, MISSOURI

by Haley & Aldrich, Inc.
Cleveland, Ohio

for Associated Electric Cooperative, Inc.
Springfield, Missouri

File No. 0129342-045
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31 July 2023
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1. Introduction

This 2022 – 2023 Annual Groundwater Monitoring and Corrective Action Report (Annual Report) addresses the inactive Lined Pond (Lined Pond) at the New Madrid Power Plant (NMPP), operated by Associated Electric Cooperative, Inc. (AECI). This Annual Report was developed in accordance with the U.S. Environmental Protection Agency Coal Combustion Residuals (CCR) Rule effective 19 October 2015 (Rule) including subsequent revisions, specifically Title 40 Code of Federal Regulations (40 CFR), subsection 257.90(e). The Annual Report documents the groundwater monitoring system for the Lined Pond consistent with applicable sections of 257.90 through 257.98, and describes activities conducted in the prior calendar year (2021) and document compliance with the Rule. The specific requirements listed in § 257.90(e)(1)-(6) of the Rule are provided in Sections 1 and 2 of this Annual Report and are in ***bold italic font***, followed by a short narrative describing how each Rule requirement has been met.

1.1 40 CFR § 257.90(e)(6) SUMMARY

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:

1.1.1 40 CFR § 257.90(e)(6)(i) – Initial Monitoring Program

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 § 257.95;

At the start of the current annual reporting period (1 July 2022), the Lined Pond was operating under an assessment monitoring program in compliance with 40 CFR § 257.95.

1.1.2 40 CFR § 257.90(e)(6)(ii) – Final Monitoring Program

At the end 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 § 257.95;

At the end of the current annual reporting period (30 June 2023), the Lined Pond was operating under an assessment monitoring program in compliance with 40 CFR § 257.95.

1.1.3 40 CFR § 257.90(e)(6)(iii) – Statistically Significant Increases

If it was determined that there was a statistically significant increase over background for one or more constituents listed in appendix III to this part pursuant to § 257.94(e):

1.1.3.1 40 CFR § 257.90(e)(6)(iii)(a)

Identify those constituents listed in appendix III to this part and the names of the monitoring wells associated with such an increase; and

The Lined Pond at NMPP is operating under an assessment monitoring program; therefore, no statistical evaluations were conducted on Appendix III constituents from July 2022 through June 2023.

1.1.3.2 40 CFR § 257.90(e)(6)(iii)(b)

Provide the date when the assessment monitoring program was initiated for the CCR unit.

An assessment monitoring program for the Lined Pond was established on 30 December 2019 to meet the requirements of 40 CFR § 257.95. The Lined Pond remained in assessment monitoring from July 2022 through June 2023.

1.1.4 40 CFR § 257.90(e)(6)(iv) – Statistically Significant Levels

If it was determined that there was a statistically significant level above the groundwater protection standard for one or more constituents listed in appendix IV to this part pursuant to § 257.95(g) include all of the following:

1.1.4.1 40 CFR § 257.90(e)(6)(iv)(a) – Statistically Significant Level Constituents

Identify those constituents listed in appendix IV to this part and the names of the monitoring wells associated with such an increase;

Statistically significant levels (SSL) above the groundwater protection standards (GWPS) identified from July 2021 through June 2022 for the February 2022 semi-annual sampling event are listed in Table I.

1.1.4.2 40 CFR § 257.90(e)(6)(iv)(b) – Initiation of the Assessment of Corrective Measures

Provide the date when the assessment of corrective measures was initiated for the CCR unit;

No assessment of corrective measures was required to be initiated from July 2022 through June 2023 for this unit. The Lined Pond remained in assessment monitoring during this annual period.

1.1.4.3 40 CFR § 257.90(e)(6)(iv)(c) – Assessment of Corrective Measures Public Meeting

Provide the date when the public meeting was held for the assessment of corrective measures for the CCR unit; and

An assessment of corrective measures was not initiated for the Lined Pond from July 2022 through June 2023; therefore, a public meeting was not held.

1.1.4.4 40 CFR § 257.90(e)(6)(iv)(d) – Completion of the Assessment of Corrective Measures

Provide the date when the assessment of corrective measures was completed for the CCR unit.

No assessment of corrective measures was required to be completed from July 2022 through June 2023 for this unit. The Lined Pond remained in assessment monitoring during this annual period.

1.1.5 40 CFR § 257.90(e)(6)(v) – Selection of Remedy

Whether a remedy was selected pursuant to § 257.97 during the current annual reporting period, and if so, the date of remedy selection; and

The Lined Pond remains in assessment monitoring; no remedy was required to be selected.

1.1.6 40 CFR § 257.90(e)(6)(vi) – Remedial Activities

Whether remedial activities were initiated or are ongoing pursuant to § 257.98 during the current annual reporting period.

No remedial activities have been initiated from July 2022 through June 2023; therefore, no demonstration or certification is applicable for this unit.

2. 40 CFR § 257.90 Applicability

2.1 40 CFR § 257.90(a)

Except as provided for in § 257.100 for inactive CCR surface impoundments, all CCR landfills, CCR surface impoundments, and lateral expansions of CCR units are subject to the groundwater monitoring and corrective action requirements under §§ 257.90 through 257.99, except as provided in paragraph (g) of this section.

AECI has installed and certified a groundwater monitoring system at the Lined Pond at the NMPP. The Lined Pond is subject to the groundwater monitoring and corrective action requirements described under 40 CFR §§ 257.90 through 257.98. This document addresses the requirement for the Owner/Operator to prepare an Annual Report per § 257.90(e) (Rule).

2.2 40 CFR § 257.90(e) – SUMMARY

Annual groundwater monitoring and corrective action report. For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For new CCR landfills, new CCR surface impoundments, and all lateral expansions of CCR units, the owner or operator must prepare the initial annual groundwater monitoring and corrective action report no later than January 31 of the year following the calendar year a groundwater monitoring system has been established for such CCR unit as required by this subpart, and annually thereafter. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by § 257.105(h)(1).

40 CFR § 257.100(e)(5)(ii)
No later than August 1, 2019, prepare the initial groundwater monitoring and corrective action report as set forth in § 257.90(e)

This Annual Report describes monitoring completed and actions taken at the NMPP Lined Pond as required by the Rule. Groundwater sampling and analysis was conducted in accordance with requirements described in § 257.93, and the status of the groundwater monitoring program described in § 257.94 and § 257.95 is also provided in this report. This Annual Report documents the applicable groundwater-related activities completed from July 2022 through June 2023.

2.2.1 Status of the Groundwater Monitoring Program

Results of the detection monitoring statistical analysis completed in July 2019 identified statistically significant increased (SSI) concentration of Appendix III constituents in downgradient monitoring wells relative to concentrations observed in upgradient monitoring wells. No alternative source was identified

for the SSI constituents. Accordingly, the groundwater monitoring program transitioned to assessment monitoring in December 2019, and AECI is currently implementing an assessment monitoring program.

2.2.2 Key Actions Completed

The July 2021 through June 2022 Annual Groundwater Monitoring and Corrective Action Report was completed in July 2022. Statistical analysis of analytical data from the February 2022 semi-annual assessment monitoring sampling event was completed in July 2022. A summary including the sample names, dates of sample collection, field parameters, and monitoring data obtained for the groundwater monitoring program of the NMPP Lined Pond is presented in Table II of this report. The statistical analyses completed in July 2022 indicated an Appendix IV SSL above the GWPS for cobalt in monitoring well P-7 from the February 2022 sampling event. AECI completed and certified a successful alternative source demonstration (ASD) for cobalt at P-7 in December 2022, determining that a source other than the CCR unit caused the SSL.

A semi-annual assessment monitoring event was completed in August 2022 for detected Appendix IV constituents identified from the December 2021 annual assessment monitoring sampling event. Statistical analysis was completed within 90 days of receipt of verified laboratory data for the August 2022 sampling event, and no Appendix IV SSLs were identified.

An annual assessment monitoring sampling event was completed in November 2022 to identify detected Appendix IV constituents for subsequent semi-annual sampling events in February 2023 and planned for August 2023. GWPSs for detected Appendix IV constituents were established or updated at this time. The background concentrations (upper tolerance limits) and GWPS utilized for the statistical analyses completed for the February 2022 and August 2022 assessment monitoring sampling events are presented in Table III. Statistical analysis of the results from the February 2023 semi-annual assessment monitoring sampling event is due to be completed in July 2023 and will be reported in the next annual report.

2.2.3 Problems Encountered

Problems (i.e., problems could include damaged wells, issues with sample collection or lack of sampling, or problems with analytical analysis) encountered at the NMPP Lined Pond from July 2021 through June 2022 are summarized below:

- At monitoring well P-7, elevated turbidity was observed during the February 2022 semi-annual assessment monitoring sampling event and the subsequent July 2022 confirmation sampling, which resulted in an SSL above the GWPS.
- Due to a laboratory error, the upgradient monitoring well samples collected during the August 2022 semi-annual assessment monitoring sampling event were analyzed past the designated holding times.

2.2.4 Actions to Resolve Problems

Actions to resolve problems encountered at the NMPP Lined Pond from July 2021 through June 2022 outlined in Section 2.2.3 are summarized below:

- Monitoring well P-7 was redeveloped in September 2022 to address elevated turbidity that resulted in an SSL for cobalt above the GWPS during the February 2022 semi-annual assessment monitoring sampling event. Redevelopment included removing any sediment that had accumulated in the bottom of the well casing, collecting a sample of the accumulated sediment, and removing more than 10 well volumes using a high-flow Grundfos pump until field parameters stabilized and the turbidity was below 10 Nephelometric Turbidity Units. A confirmation sample was collected at the end of redevelopment activities. In October 2022, an additional confirmation sample was collected using the original low-flow sampling pump and sample tubing, which confirmed cobalt concentrations that were below the GWPS and consistent with historic cobalt concentrations.
- Upgradient monitoring wells MW-16, B-123, and B-126 were resampled in October 2022 to provide valid analytical results following a laboratory error during the August 2022 semi-annual assessment monitoring sampling event.

2.2.5 Project Key Activities for Upcoming Year

Key activities planned for July 2023 through June 2024 include the July 2022 – June 2023 Annual Groundwater Monitoring and Corrective Action Report; statistical analysis of assessment monitoring analytical data collected in February 2023; conducting semi-annual assessment monitoring and subsequent statistical analyses; and annual assessment monitoring.

2.3 40 CFR § 257.90(e) – INFORMATION

At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:

2.3.1 40 CFR § 257.90(e)(1)

A map, aerial image, or diagram showing the CCR unit and all background (or up gradient) and down gradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

As required by § 257.90(e)(1), a map showing the locations of the CCR unit and associated upgradient and downgradient monitoring wells for the Lined Pond is included in this report as Figure 1. In addition, this information is presented in the CCR Groundwater Monitoring Network Description Report prepared for AECI, which was placed in the facility's operating record by 17 April 2019 as required by § 257.105(h)(2).

2.3.2 40 CFR § 257.90(e)(2) – Monitoring System Changes

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;

No monitoring wells were installed or decommissioned from July 2022 through June 2023.

2.3.3 40 CFR § 257.90(e)(3) – Summary of Sampling Events

In addition to all the monitoring data obtained under §257.90 through §257.98, a summary including the number of groundwater samples that were collected for analysis for each background and down gradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

In accordance with § 257.95(b), three independent assessment monitoring samples were collected from each background and downgradient well from July 2022 through June 2023. A summary including sample names, dates of sample collection, field parameters, and monitoring data obtained for the groundwater monitoring program for the NMPP Lined Pond is presented in Table II of this report.

2.3.4 40 CFR § 257.90(e)(4) – Monitoring Transition Narrative

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and

The assessment monitoring program was established on 30 December 2019 to meet the requirements of 40 CFR § 257.95. The NMPP Lined Pond remained in assessment monitoring from July 2022 through June 2023.

2.3.5 40 CFR § 257.90(e)(5) – Other Requirements

Other information required to be included in the annual report as specified in § 257.90 through § 257.98.

This Annual Report documents activities conducted to comply with §§ 257.90 through 257.95 of the Rule. It is understood that there are supplemental references in §§ 257.90 through 257.98 that must be placed in the Annual Report. The following requirements include relevant and required information in the Annual Report for activities completed from July 2022 through June 2023.

2.3.5.1 40 CFR § 257.94(d)(3) – Demonstration for Alternative Detection Monitoring Frequency

The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the

basis for the alternative monitoring frequency and the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority in the annual groundwater monitoring and corrective action report required by § 257.90(e).

An alternative groundwater detection monitoring sampling and analysis frequency has not been established for this CCR unit; therefore, no demonstration or certification is applicable.

2.3.5.2 40 CFR § 257.94(e)(2) – Detection Monitoring Alternate Source Demonstration

The owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. The owner or operator must complete the written demonstration within 90 days of detecting a statistically significant increase over background levels to include obtaining a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority verifying the accuracy of the information in the report. If a successful demonstration is completed within the 90-day period, the owner or operator of the CCR unit may continue with a detection monitoring program under this section. If a successful demonstration is not completed within the 90-day period, the owner or operator of the CCR unit must initiate an assessment monitoring program as required under § 257.95. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority.

This unit is in assessment monitoring; therefore, no detection monitoring alternative source demonstration or certification is applicable.

2.3.5.3 40 CFR § 257.95(c)(3) – Demonstration for Alternative Assessment Monitoring Frequency

The owner or operator must obtain a certification from a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority stating that the demonstration for an alternative groundwater sampling and analysis frequency meets the requirements of this section. The owner or operator must include the demonstration providing the basis for the alternative monitoring frequency and the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority in the annual groundwater monitoring and corrective action report required by § 257.90(e).

An alternative groundwater assessment monitoring sampling and analysis frequency has not been established for this CCR unit; therefore, no demonstration or certification is applicable.

2.3.5.4 40 CFR § 257.95(d)(3) – Assessment Monitoring Concentrations and Groundwater Protection Standards

Include the recorded concentrations required by paragraph (d)(1) of this section, identify the background concentrations established under § 257.94(b), and identify the groundwater protection standards established under paragraph (d)(2) of this section in the annual groundwater monitoring and corrective action report required by § 257.90(e).

An assessment monitoring program is currently being implemented at the CCR unit. Three rounds of assessment monitoring sampling were completed from June 2022 through July 2023. Analytical results for both downgradient and upgradient wells are provided in Table II. The background concentrations (upper tolerance limits) and GWPSs established for the NMPP Lined Pond that were utilized for statistical analyses completed on the February and August 2022 analytical results are included in Table III.

2.3.5.5 40 CFR § 257.95(g)(3)(ii) – Assessment Monitoring Alternate Source Demonstration

Demonstrate that a source other than the CCR unit caused the contamination, or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality. Any such demonstration must be supported by a report that includes the factual or evidentiary basis for any conclusions and must be certified to be accurate by a qualified professional engineer or approval from the Participating State Director or approval from EPA where EPA is the permitting authority. If a successful demonstration is made, the owner or operator must continue monitoring in accordance with the assessment monitoring program pursuant to this section and may return to detection monitoring if the constituents in appendices III and IV to this part are at or below background as specified in paragraph (e) of this section. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority.

A successful assessment monitoring ASD completed in December 2022 for the February 2022 sampling event SSL for cobalt is included in this report as Attachment 1. The Lined Pond remained in assessment monitoring from July 2022 through June 2023.

2.3.5.6 40 CFR § 257.96(a) – Demonstration for Additional Time for Assessment of Corrective Measures

Within 90 days of finding that any constituent listed in appendix IV to this part has been detected at a statistically significant level exceeding the groundwater protection standard defined under § 257.95(h), or immediately upon detection of a release from a CCR unit, the owner or operator must initiate an assessment of corrective measures to prevent further releases, to remediate any releases and to restore affected area to original conditions. The assessment of corrective measures must be completed within 90 days, unless the owner or operator demonstrates the need for additional time to complete the assessment of corrective measures due to site-specific conditions or circumstances. The owner or operator must obtain a certification from a qualified professional engineer or approval from

the Participating State Director or approval from EPA where EPA is the permitting authority attesting that the demonstration is accurate. The 90-day deadline to complete the assessment of corrective measures may be extended for no longer than 60 days. The owner or operator must also include the demonstration in the annual groundwater monitoring and corrective action report required by § 257.90(e), in addition to the certification by a qualified professional engineer or the approval from the Participating State Director or approval from EPA where EPA is the permitting authority.

No assessment of corrective measures was required to be initiated from July 2022 through June 2023; therefore, no demonstration or certification is applicable for this unit.

2.4 40 CFR § 257.90(f)

The owner or operator of the CCR unit must comply with the recordkeeping requirements specified in § 257.105(h), the notification requirements specified in § 257.106(h), and the internet requirements specified in § 257.107(h).

In order to comply with the Rule recordkeeping requirements, the following actions must be completed:

- Pursuant to § 257.105(h)(1), this Annual Report must be placed in the facility's operating record.
- Pursuant to § 257.106(h)(1), notification must be sent to the relevant State Director and/or Tribal authority within 30 days of this Annual Report being placed in the facility's operating record [§ 257.106(d)].
- Pursuant to § 257.107(h)(1), this Annual Report must be posted to the AECI CCR website within 30 days of this Annual Report being placed in the facility's operating record [§ 257.107(d)].

TABLES

TABLE I
SSL SUMMARY TABLE
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT - LINED POND
NEW MADRID, MISSOURI

Constituent	Sampling Event	Well ID	Groundwater Protection Standard (mg/L)
Cobalt	February 2022	P-7	0.006*

Notes:

** Value obtained from U.S. Environmental Protection Agency Federal CCR Rule Title 40 Code of Federal Regulations § 257.95(h)(2)*

mg/L = milligrams per liter

SSL = statistically significant level

TABLE II
SUMMARY OF ANALYTICAL RESULTS - 2022 THROUGH 2023 ASSESSMENT MONITORING
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT - LINED POND (INACTIVE)
NEW MADRID, MISSOURI

Location	Upgradient								
	B-123	B-123 (Resample)	B-123	B-123	B-126	B-126 (Resample)	B-126	B-126	MW-16
Measure Point (TOC)	292.7	292.70	292.7	292.7	293.63	293.63	293.63	293.63	292.85
Sample Name	B-123	B-123	B-123	B-123-021323	B-126	B-126	B-126	B-126-021423	MW-16
Sample Date	8/8/2022	10/13/2022	11/01/2022	02/13/2023	8/8/2022	10/13/2022	11/01/2022	02/14/2023	8/8/2022
Final Lab Report Date	N/A	10/28/2022	11/17/2022	3/10/2023	N/A	10/28/2022	11/17/2022	3/10/2023	N/A
Final Lab Report Revision Date	N/A	11/9/2022	1/10/2023	N/A	N/A	11/9/2022	1/10/2023	N/A	N/A
Final Radiation Lab Report Date	9/28/2022	N/A	1/4/2023	4/7/2023	9/28/2022	N/A	1/4/2023	4/7/2023	9/28/2022
Final Radiation Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lab Data Reviewed and Accepted	12/20/2022	12/20/2022	1/31/2023	5/18/2023	12/20/2022	12/20/2022	1/31/2023	5/18/2023	12/20/2022
Depth to Water (ft btoc)	19.86	21.20	21.68	21.62	20.06	21.45	23.12	25.33	24.46
Temperature (Deg C)	17.00	15.90	15.78	16.40	19.05	17.41	16.81	16.65	18.43
Conductivity, Field (µS/cm)	694	636	717	675	927	1350	1510	499	1020
Turbidity, Field (NTU)	9.9	3.1	4.4	99.8	34.4	10.0	18.6	298	3.8
Boron, Total (mg/L)	-	**0.023**	-	**0.049**	-	**0.047**	-	**0.069**	-
Calcium, Total (mg/L)	-	**75**	-	**74**	-	**190**	-	**86**	-
Chloride (mg/L)	-	**1.4**	-	**2.2**	-	**13**	-	**8.2**	-
Fluoride (mg/L)	-	**0.475**	-	**0.492**	-	**0.283**	-	**0.451**	-
Sulfate (mg/L)	-	**26**	-	**30**	-	**170**	-	**68**	-
pH (lab) (su)	-	**7.26**	-	**7.20**	-	**7.02**	-	**6.96**	-
TDS (mg/L)	-	**380**	-	**360**	-	**880**	-	**360**	-
Antimony, Total (mg/L)	-	-	< 0.0030	-	-	-	< 0.0030	-	-
Arsenic, Total (mg/L)	-	**0.0020**	**0.0021**	**0.0031**	-	**0.0030**	**0.0021**	**0.0076**	-
Barium, Total (mg/L)	-	**0.18**	**0.20**	**0.18**	-	**0.44**	**0.41**	**0.42**	-
Beryllium, Total (mg/L)	-	-	< 0.0010	-	-	-	< 0.0010	-	-
Cadmium, Total (mg/L)	-	-	< 0.0010	-	-	-	< 0.0010	-	-
Chromium, Total (mg/L)	-	-	< 0.0040	-	-	-	< 0.0040	-	-
Cobalt, Total (mg/L)	-	< 0.0020	< 0.0020	< 0.0020	-	< 0.0020	< 0.0020	**0.0032**	-
Lead, Total (mg/L)	-	-	< 0.00050	< 0.00050	-	-	< 0.00050	**0.0063**	-
Lithium, Total (mg/L)	-	**0.024**	**0.028**	**0.021**	-	**0.025**	**0.032**	**0.017**	-
Molybdenum, Total (mg/L)	-	**0.0042**	**0.0033**	**0.0037**	-	**0.0010**	**0.0011**	**0.0023**	-
Selenium, Total (mg/L)	-	< 0.0010	< 0.0010	< 0.0010	-	< 0.0010	< 0.0010	**0.0021**	-
Thallium, Total (mg/L)	-	-	< 0.0010	-	-	-	< 0.0010	-	-
Mercury, Total (mg/L)	-	-	< 0.00020	-	-	-	< 0.00020	-	-
Fluoride (mg/L)			**0.475**	**0.492**			**0.270**	**0.451**	
Radium 226 & 228 Combined (pCi/L)	0.121 ± 0.239 (0.410)	-	**1.49 ± 0.294 (0.374)**	**1.08 ± 0.321 (0.510)**	**1.02 ± 0.332 (0.463)**	-	0.333 ± 0.327 (0.506)	0.560 ± 0.655 (1.14)	**1.66 ± 0.349 (0.456)**

Notes:

Bold value: *Detection above laboratory reporting limit or minimum detectable concentration (MDC).*

Radiological results are presented as activity plus or minus uncertainty with MDC.

Due to a laboratory error, the upgradient monitoring well samples collected during the August 2022 sampling event were analyzed past the designated hold time. The upgradient monitoring wells were resampled in October 2022.

µS/cm = micro Siemens per centimeter
Deg C = degrees Celsius
ft btoc = feet below top of casing
mg/L = milligrams per liter
N/A = Not Applicable
NTU = Nephelometric Turbidity Unit
pCi/L = picoCuries per liter
su = standard unit
TDS = total dissolved solids
TOC = top of casing

TABLE II
SUMMARY OF ANALYTICAL RESULTS - 2022 THROUGH 2023 ASSESSMENT MONITORING
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT - LINED POND (INACTIVE)
NEW MADRID, MISSOURI

Location	Upgradient				Downgradient				
	MW-16 (Resample)	MW-16	MW-16 (Duplicate)	MW-16	P-6	P-6	P-6	P-7	P-7
Measure Point (TOC)	292.85	292.85	292.85	292.85	310.88	310.88	310.88	308.60	308.60
Sample Name	MW-16	MW-16	DUP-LP	MW-16-021323	P-6	P-6	P-6-020723	P-7	P-7
Sample Date	10/13/2022	11/01/2022	11/01/2022	02/13/2023	8/18/2022	11/03/2022	02/07/2023	7/18/2022	8/18/2022
Final Lab Report Date	10/28/2022	11/17/2022	11/17/2022	3/10/2023	9/9/2022	11/17/2022	2/23/2023	7/29/2022	9/9/2022
Final Lab Report Revision Date	11/9/2022	1/10/2023	1/10/2023	N/A	N/A	1/10/2023	N/A	N/A	N/A
Final Radiation Lab Report Date	N/A	1/4/2023	1/4/2023	4/7/2023	9/28/2022	1/4/2023	3/27/2023	N/A	9/28/2022
Final Radiation Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lab Data Reviewed and Accepted	12/20/2022	1/31/2023	1/31/2023	5/18/2023	12/20/2022	1/31/2023	5/18/2023	8/29/2022	12/20/2022
Depth to Water (ft btoc)	30.06	31.99	-	27.16	43.72	53.19	44.28	38.27	39.53
Temperature (Deg C)	16.65	16.30	-	17.17	18.29	21.06	17.21	16.78	16.94
Conductivity, Field (µS/cm)	785	850	-	916	1020	889	936	1052	1030
Turbidity, Field (NTU)	4.5	1.9	-	9.6	0.0	24.2	9.7	10.0	9.8
Boron, Total (mg/L)	**0.050**	-	-	**0.086**	**1.5**	-	**0.83**	-	**0.12**
Calcium, Total (mg/L)	**110**	-	-	**130**	**160**	-	**170**	-	**150**
Chloride (mg/L)	**2.6**	-	-	< 5.0	**9.5**	-	**6.9**	-	**9.1**
Fluoride (mg/L)	**1.05**	-	-	**1.25**	< 0.250	-	< 0.250	-	< 0.250
Sulfate (mg/L)	**59**	-	-	**60**	**34**	-	**45**	-	**76**
pH (lab) (su)	**7.03**	-	-	**6.90**	**7.03**	-	**6.82**	-	**7.03**
TDS (mg/L)	**570**	-	-	**480**	**580**	-	**560**	-	**600**
Antimony, Total (mg/L)	-	< 0.0030	< 0.0030	-	-	< 0.0030	-	-	-
Arsenic, Total (mg/L)	**0.0023**	**0.0019**	**0.0018**	**0.0032**	**0.0011**	**0.0036**	**0.0011**	**0.0040**	**0.0023**
Barium, Total (mg/L)	**0.57**	**0.54**	**0.57**	**0.58**	**0.22**	**0.26**	**0.25**	-	**0.37**
Beryllium, Total (mg/L)	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	-
Cadmium, Total (mg/L)	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	-
Chromium, Total (mg/L)	-	< 0.0040	< 0.0040	-	-	< 0.0040	-	-	-
Cobalt, Total (mg/L)	< 0.0020	< 0.0020	< 0.0020	< 0.0020	**0.0026**	**0.0036**	< 0.0020	**0.0084**	**0.0087**
Lead, Total (mg/L)	-	< 0.00050	< 0.00050	< 0.00050	-	**0.0043**	< 0.00050	-	-
Lithium, Total (mg/L)	**0.018**	**0.023**	**0.021**	**0.018**	**0.023**	**0.022**	**0.023**	-	**0.034**
Molybdenum, Total (mg/L)	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0013**	< 0.0010	-	**0.0018**
Selenium, Total (mg/L)	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0084**	-	< 0.0010
Thallium, Total (mg/L)	-	< 0.0010	< 0.0010	-	-	< 0.0010	-	-	-
Mercury, Total (mg/L)	-	< 0.00020	< 0.00020	-	-	< 0.00020	-	-	-
Fluoride (mg/L)		**1.16**	**1.14**	**1.25**	-	< 0.250	< 0.250	-	-
Radium 226 & 228 Combined (pCi/L)	-	**1.56 ± 0.365 (0.386)**	**1.06 ± 0.367 (0.502)**	**1.91 ± 0.515 (0.615)**	0.510 ± 0.442 (0.775)	0.454 ± 0.328 (0.487)	1.18 ± 1.05 (1.85)	-	0.396 ± 0.445 (0.738)

Notes:

Bold value: *Detection above laboratory reporting limit or minimum detectable concentration (MDC).*

Radiological results are presented as activity plus or minus uncertainty with MDC.

Due to a laboratory error, the upgradient monitoring well samples collected during the August 2022 sampling event were analyzed past the designated hold time. The upgradient monitoring wells were resampled in October 2022.

µS/cm = micro Siemens per centimeter
Deg C = degrees Celsius
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N/A = Not Applicable
NTU = Nephelometric Turbidity Unit
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su = standard unit
TDS = total dissolved solids
TOC = top of casing

TABLE II
SUMMARY OF ANALYTICAL RESULTS - 2022 THROUGH 2023 ASSESSMENT MONITORING
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT - LINED POND (INACTIVE)
NEW MADRID, MISSOURI

Location	Downgradient								
	P-7	P-7	P-7	P-7	MW-8	MW-8	MW-8	MW-9	MW-9
Measure Point (TOC)	308.60	308.60	308.60	308.60	310.63	310.63	310.63	310.24	310.24
Sample Name	P-7	P-7	P-7	P-7-020723	MW-8	MW-8	MW-8-020723	MW-9	MW-9
Sample Date	9/29/2023	10/13/2022	11/03/2022	02/07/2023	8/15/2022	11/02/2022	02/07/2023	8/15/2022	11/02/2022
Final Lab Report Date	10/28/2022	10/25/2022	11/17/2022	2/23/2023	8/31/2022	11/17/2022	2/23/2023	8/31/2022	11/17/2022
Final Lab Report Revision Date	N/A	N/A	1/10/2023	N/A	N/A	1/10/2023	N/A	N/A	1/10/2023
Final Radiation Lab Report Date	N/A	N/A	1/4/2023	3/27/2023	9/28/2022	1/4/2023	3/27/2023	9/28/2022	1/4/2023
Final Radiation Lab Report Revision Date	N/A	N/A	N/A	N/A	N/A	N/A	4/17/2023	N/A	N/A
Lab Data Reviewed and Accepted	11/15/2022	12/1/2022	1/31/2023	5/18/2023	12/20/2022	1/31/2023	5/18/2023	12/20/2022	1/31/2023
Depth to Water (ft btoc)	-	45.43	47.55	42.49	42.20	50.73	44.92	42.96	53.09
Temperature (Deg C)	17.1	15.65	17.53	15.71	18.79	16.97	17.05	18.25	17.50
Conductivity, Field (µS/cm)	940	1060	1030	826	1360	1250	891	865	861
Turbidity, Field (NTU)	0.86	1.1	9.2	15.9	0.0	0.0	9.6	0.0	0.0
Boron, Total (mg/L)	-	-	-	**0.074**	**18**	-	**6.4**	**2.5**	-
Calcium, Total (mg/L)	-	-	-	**150**	**190**	-	**140**	**110**	-
Chloride (mg/L)	-	-	-	**7.9**	**8.5**	-	**8.0**	**17**	-
Fluoride (mg/L)	-	-	-	< 0.250	**0.269**	-	< 0.250	**0.416**	-
Sulfate (mg/L)	-	-	-	**36**	**240**	-	**64**	**130**	-
pH (lab) (su)	-	-	-	**6.93**	**7.11**	-	**7.07**	**7.07**	-
TDS (mg/L)	-	-	-	**440**	**940**	-	**580**	**540**	-
Antimony, Total (mg/L)	-	-	< 0.0030	-	-	< 0.0030	-	-	< 0.0030
Arsenic, Total (mg/L)	< 0.0010	0.0010	< 0.0010	< 0.0010	**0.0037**	**0.0027**	**0.0049**	< 0.0010	< 0.0010
Barium, Total (mg/L)	-	-	**0.31**	**0.30**	**0.078**	**0.070**	**0.10**	**0.072**	**0.070**
Beryllium, Total (mg/L)	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Cadmium, Total (mg/L)	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Chromium, Total (mg/L)	-	-	< 0.0040	-	-	< 0.0040	-	-	< 0.0040
Cobalt, Total (mg/L)	**0.0051**	**0.0021**	**0.0023**	**0.0036**	< 0.0020	**0.0027**	< 0.0020	< 0.0020	< 0.0020
Lead, Total (mg/L)	-	-	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	-	< 0.00050
Lithium, Total (mg/L)	-	-	**0.020**	**0.018**	**0.016**	**0.020**	**0.017**	**0.024**	**0.024**
Molybdenum, Total (mg/L)	-	-	**0.0017**	**0.0013**	**0.93**	**0.68**	**0.46**	**0.25**	**0.27**
Selenium, Total (mg/L)	-	-	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	**0.0011**
Thallium, Total (mg/L)	-	-	< 0.0010	-	-	< 0.0010	-	-	< 0.0010
Mercury, Total (mg/L)	-	-	< 0.00020	-	-	< 0.00020	-	-	< 0.00020
Fluoride (mg/L)	-	-	< 0.250	< 0.250	-	**0.270**	< 0.250	-	**0.471**
Radium 226 & 228 Combined (pCi/L)	-	-	**1.35 ± 0.307 (0.424)**	0.989 ± 1.00 (1.81)	**0.575 ± 0.350 (0.575)**	**1.14 ± 0.328 (0.525)**	0.558 ± 0.875 (1.67)	0.497 ± 0.302 (0.548)	**1.06 ± 0.285 (0.516)**

Notes:

Bold value: *Detection above laboratory reporting limit or minimum detectable concentration (MDC).*

Radiological results are presented as activity plus or minus uncertainty with MDC.

Due to a laboratory error, the upgradient monitoring well samples collected during the August 2022 sampling event were analyzed past the designated hold time. The upgradient monitoring wells were resampled in October 2022.

µS/cm = micro Siemens per centimeter
Deg C = degrees Celsius
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mg/L = milligrams per liter
N/A = Not Applicable
NTU = Nephelometric Turbidity Unit
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TDS = total dissolved solids
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TABLE II
SUMMARY OF ANALYTICAL RESULTS - 2022 THROUGH 2023 ASSESSMENT MONITORING
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT - LINED POND (INACTIVE)
NEW MADRID, MISSOURI

Location	Downgradient							
	MW-9	MW-17	MW-17	MW-17	MW-18	MW-18	MW-18	MW-18 (Duplicate)
Measure Point (TOC)	310.24	299.20	299.20	299.20	301.19	301.19	301.19	301.19
Sample Name	MW-9-020723	MW-17	MW-17	MW-17-020723	MW-18	MW-18	MW-18-020723	LP-DUP-08-2022-020723
Sample Date	02/07/2023	8/10/2022	11/02/2022	02/07/2023	8/10/2022	11/02/2022	02/07/2023	02/07/2023
Final Lab Report Date	2/23/2023	8/31/2022	11/17/2022	2/23/2023	8/31/2022	11/17/2022	2/23/2023	2/23/2023
Final Lab Report Revision Date	N/A	N/A	1/10/2023	N/A	N/A	1/10/2023	N/A	N/A
Final Radiation Lab Report Date	3/27/2023	9/17/2022	1/4/2023	3/27/2023	9/17/2022	1/4/2023	3/27/2023	3/27/2023
Final Radiation Lab Report Revision Date	4/17/2023	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lab Data Reviewed and Accepted	5/18/2023	12/20/2022	1/31/2023	5/18/2023	12/20/2022	1/31/2023	5/18/2023	5/18/2023
Depth to Water (ft btoc)	43.82	29.04	36.44	33.61	31.04	38.00	36.11	-
Temperature (Deg C)	17.31	18.09	15.65	15.38	17.48	15.33	15.64	-
Conductivity, Field (µS/cm)	787	749	666	677	464	430	495	-
Turbidity, Field (NTU)	7.5	5.0	3.4	9.3	0.0	0.0	2.6	-
Boron, Total (mg/L)	**4.4**	**0.034**	-	**0.032**	**0.037**	-	**0.033**	**0.030**
Calcium, Total (mg/L)	**110**	**93**	-	**99**	**49**	-	**63**	**62**
Chloride (mg/L)	**14**	**12**	-	**9.9**	**14**	-	**10**	**10**
Fluoride (mg/L)	**0.437**	< 0.250	-	< 0.250	**0.268**	-	< 0.250	< 0.250
Sulfate (mg/L)	**110**	**56**	-	**45**	**41**	-	**40**	**40**
pH (lab) (su)	**7.27**	**6.83**	-	**6.86**	**6.77**	-	**7.09**	**6.90**
TDS (mg/L)	**540**	**430**	-	**410**	**260**	-	**270**	**270**
Antimony, Total (mg/L)	-	-	< 0.0030	-	-	< 0.0030	-	-
Arsenic, Total (mg/L)	< 0.0010	**0.0027**	**0.0029**	**0.0037**	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Barium, Total (mg/L)	**0.079**	**0.26**	**0.25**	**0.33**	**0.11**	**0.11**	**0.14**	**0.14**
Beryllium, Total (mg/L)	-	-	< 0.0010	-	-	< 0.0010	-	-
Cadmium, Total (mg/L)	-	-	< 0.0010	-	-	< 0.0010	-	-
Chromium, Total (mg/L)	-	-	< 0.0040	-	-	< 0.0040	-	-
Cobalt, Total (mg/L)	< 0.0020	< 0.0020	< 0.0020	< 0.0020	**0.0024**	**0.0022**	**0.0025**	**0.0025**
Lead, Total (mg/L)	< 0.00050	-	< 0.00050	< 0.00050	-	< 0.00050	< 0.00050	< 0.00050
Lithium, Total (mg/L)	**0.023**	**0.012**	**0.016**	**0.015**	< 0.010	**0.012**	**0.011**	< 0.010
Molybdenum, Total (mg/L)	**0.36**	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Selenium, Total (mg/L)	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010	< 0.0010
Thallium, Total (mg/L)	-	-	< 0.0010	-	-	< 0.0010	-	-
Mercury, Total (mg/L)	-	-	< 0.00020	-	-	< 0.00020	-	-
Fluoride (mg/L)	**0.437**	-	< 0.250	< 0.250	-	**0.262**	< 0.250	< 0.250
Radium 226 & 228 Combined (pCi/L)	1.18 ± 1.05 (1.75)	0.446 ± 0.399 (0.631)	**1.73 ± 0.405 (0.592)**	**1.94 ± 1.15 (1.75)**	**0.938 ± 0.345 (0.579)**	**0.639 ± 0.339 (0.534)**	1.46 ± 1.02 (1.69)	0.817 ± 1.08 (2.03)

Notes:

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µS/cm = micro Siemens per centimeter
Deg C = degrees Celsius
ft btoc = feet below top of casing
mg/L = milligrams per liter
N/A = Not Applicable
NTU = Nephelometric Turbidity Unit
pCi/L = picoCuries per liter
su = standard unit
TDS = total dissolved solids
TOC = top of casing

TABLE III
BACKGROUND CONCENTRATIONS / GROUNDWATER PROTECTION STANDARDS
FEBRUARY AND AUGUST 2022 ASSESSMENT MONITORING SAMPLING EVENTS
ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER PLANT - LINED POND
NEW MADRID, MISSOURI

Constituent	Background Concentration (UTL) (mg/L[1])	Groundwater Protection Standard (mg/L[1])
Arsenic	0.0059	0.010*
Barium	0.690	2*
Cobalt	0.0044	0.006**
Fluoride	2.500	4.0*
Lithium	0.032	0.04**
Molybdenum	0.0046	0.100**
Radium 226 & 228	2.26	5 pCi/L*
Selenium	0.0031	0.05*

Notes:

** Value set equal to the maximum contaminant level.*

*** Values obtained from U.S. Environmental Protection Agency Federal CCR Rule Title 40 Code of Federal Regulations (CFR) § 257.95(h)(2).*

[1] = unit unless otherwise noted

mg/L = milligrams per liter

pCi/L = picoCuries per liter

UTL = upper tolerance limit

FIGURE

LEGEND

MONITORING WELL

LINED ASH POND

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: ESRI, APRIL 21, 2019

N

0 1,100 2,200

SCALE IN FEET

HALEY ALDRICH

ASSOCIATED ELECTRIC COOPERATIVE, INC.
NEW MADRID POWER GENERATING FACILITY
NEW MADRID COUNTY, MISSOURI

INACTIVE LINED POND MONITORING WELL LOCATION MAP

aeci
Associated Electric Cooperative, Inc.

JULY 2023
SCALE AS SHOWN

FIGURE 1

ATTACHMENT 1
Appendix IV SSL Alternate Source Demonstration for Lined Pond, February 2022

HALEY ALDRICH

www.haleyaldrich.com

SUMMARY REPORT
ALTERNATE SOURCE DEMONSTRATION
FOR LINED POND
NEW MADRID POWER PLANT
MARSTON, MISSOURI

By Haley & Aldrich, Inc.
Cleveland, Ohio

For Associated Electric Cooperative, Inc.
Springfield, Missouri

File No. 129342
December 2022

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1. Introduction

Haley & Aldrich, Inc. (Haley & Aldrich) was retained by Associated Electric Cooperative, Inc. (AECI) to perform an evaluation of groundwater quality at the closed Lined Pond coal combustion residual (CCR) management unit at the New Madrid Power Plant (NMPP) located in Marston, Missouri. The purpose of the evaluation is to identify the source of elevated cobalt concentrations detected in groundwater samples collected from monitoring well P-7 located downgradient of the Lined Pond during the February 2022 semi-annual assessment monitoring sampling event. Well modification activities completed in January 2022 created conditions that attributed to elevated cobalt concentrations above the groundwater protection standard (GWPS) at P-7 at the Lined Pond.

1.1 BACKGROUND

Consistent with Code of Federal Regulations Title 40 (40 CFR) § 257.90 through § 257.95, AECI has installed and certified a groundwater monitoring network for the Lined Pond at NMPP (Haley & Aldrich, 2019a) and collected 10 rounds of groundwater samples for the analysis of Appendix III and Appendix IV baseline constituents. Results of the detection monitoring statistical analyses completed in July 2019 identified statistically significant increases (SSI) of Appendix III constituents in downgradient monitoring wells relative to concentrations observed in upgradient monitoring wells. Accordingly, the groundwater monitoring program transitioned to assessment monitoring in December 2019, and AECI is currently implementing an assessment monitoring program.

In September 2022, AECI completed statistical analyses of groundwater quality results collected in February 2022, with data reviewed and accepted in June 2022, to determine if any of the Appendix IV constituents were present in groundwater samples collected from downgradient monitoring wells at concentrations at a statistically significant level (SSL) above background. The statistical evaluation of the Appendix IV constituents detected a potential SSL for cobalt above the GWPS at monitoring well P-7, downgradient of the Lined Pond. The analyses described in this report were conducted to identify the source of the elevated cobalt concentrations.

Pursuant to 40 CFR § 257.95(g)(3)(ii), ***the owner or operator may demonstrate that a source other than the CCR unit caused the statistically significant increase over background levels for a constituent or that the statistically significant increase resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality***. The Rule provides 90 days from determination that a SSL over background exists to complete an Alternate Source Demonstration (ASD) for Appendix IV constituents. If a successful demonstration is completed and certified by a qualified professional engineer, the CCR unit may continue in assessment monitoring. If, however, an alternate source of the Appendix IV SSL is not identified, the owner or operator must initiate the assessment of corrective measures. This report documents the findings and conclusions of an ASD completed for cobalt in monitoring well P-7 at the Lined Pond at the NMPP.

1.2 SITE SETTING

The NMPP is located approximately 2 miles east of Marston on the western bank of the Mississippi River in Marston, Missouri. The location of the NMPP is shown on Figure 1. The site is located within the Southern Lowlands physiographic province which is the northernmost extent of the larger Mississippi Alluvial Plain and is characterized as a relatively flat alluvial plain which is used extensively for

agricultural production. The Lined Pond is a geomembrane lined surface impoundment that encompasses approximately 80 acres and is located approximately 0.5 mile south-southeast of the NMPP plant site. The Lined Pond has ground surface elevations varying from approximately 300 to 310 feet above mean sea level. The Lined Pond and the associated groundwater monitoring network are shown on Figure 1.

1.3 SITE DESCRIPTION

The NMPP is an active energy production facility that generates electricity through coal combustion. The CCR materials are generated as byproducts of the combustion process and include fly ash and boiler slag material. The Lined Pond was constructed in the early 1990s for the purpose of managing fly ash for the NMPP. Fly ash was pneumatically conveyed to the northwestern side of the Lined Pond, and a wetting head sluiced the fly ash into the Lined Pond. The Lined Pond was active until the mid-2000s at which point AECI permitted and constructed an on-site utility waste landfill for disposal of CCRs including fly ash. The Lined Pond has been capped and certified closed as of 15 January 2021.

2. Site Geology and Hydrogeology

Geologic and hydrogeologic conditions beneath the Lined Pond have been characterized based on information obtained during monitoring well installation and geologic information from published sources

2.1 SITE GEOLOGY

The Lined Pond (Figure 1) and the NMPP are located in the Southeastern Lowlands physiographic province. The Southeastern Lowlands are the northernmost extent of the larger Mississippi Alluvial Plain and are characterized by alluvial, fluvial, and deltaic deposits ranging in age from Cretaceous to Holocene. The plant site and the Lined Pond are underlain by an unconsolidated alluvium which constitutes a regionally extensive aquifer.

In order from ground surface downward, the Lined Pond is underlain by unconsolidated alluvium, the Wilcox Group, the Porters Creek Clay, the Clayton, Owl Creek, and McNairy formations. Only the Tertiary formations (unconsolidated alluvium, Wilcox Group, and Porters Creek formation) are described below because they represent the uppermost and regional aquifer system.

According to lithologic records from borings completed near the Lined Pond, the lithology below the liner include alluvium consisting of moderate to poorly sorted clay, silt, sand, and gravel of Holocene age (Miller and Vandike, 1997). The alluvium varies from approximately 250 to 300 feet thick (Gredell Engineering Resources, Inc. [Gredell], 2003). Alluvial sediments were predominantly deposited by the Mississippi and Ohio river systems. The alluvium yields substantial quantities of water to shallow wells installed primarily for irrigation use and is considered the primary local aquifer (Burns & McDonnell, 2006).

The Holocene alluvium is underlain by unconsolidated Tertiary strata representing transgressions and regressions of marine, near-shore, and onshore depositional environments. The uppermost Tertiary unit is the Wilcox Group consisting primarily of sand deposits with some interbedded clays and lignites (Burns & McDonnell, 2006). The Wilcox Group is 400 to 500 feet thick at the plant site, lying approximately 250 to 300 feet below ground surface, and stratigraphically overlies the Porters Creek Clay.

The Porters Creek Clay is approximately 650 feet in thickness in the vicinity of the Lined Pond. The Porters Creek Clay is composed entirely of light grey to black clay (Burns & McDonnell, 2006). The clay is a groundwater flow barrier and barrier to infiltration (Miller and Vandike, 1997). The Porters Creek Clay overlies the Clayton Formation. The Clayton Formation has a total thickness of approximately 30 feet near the plant site and is comprised of sand and limestone (Burns & McDonnell, 2006).

2.2 SITE HYDROGEOLOGY AND HYDROLOGY

The water-bearing geologic formation underlying the Lined Pond is alluvium consisting of moderately to poorly sorted clay, silt, sand, and gravel of Holocene age. Water levels in the uppermost aquifer are influenced by the Mississippi River stage.

The predominate groundwater flow direction beneath the Lined Pond is to the northeast (Figure 2A and Figure 2B); however, since the Lined Pond lies adjacent to the Mississippi River and the alluvial aquifer within the study area is in communication with the river, seasonal fluctuations in river stage cause the groundwater flow direction to change and occasionally reverse (Figure 2C). During baseflow conditions, when the Mississippi River stage is low, groundwater flow in the alluvial aquifer is generally to the north/northeast. During wet weather conditions, when the Mississippi River stage is high, groundwater flow direction is generally to the southwest.

Based on groundwater elevations measured between August 2021 and August 2022, the groundwater gradient in the upper aquifer unit is approximately -0.0006 to 0.0005 feet per foot (feet/foot) and is unconfined. The negative gradient signifies a higher hydraulic head at the Mississippi River relative to Pond 003 monitoring wells, resulting in groundwater flow away from the Mississippi River to the southwest. The positive gradient indicates a higher hydraulic head at Pond 003 monitoring wells relative to the Mississippi River, resulting in flow toward the river to the north/northeast.

Due to the changing groundwater flow directions, monitoring wells were sited at locations to encircle the Lined Pond, with MW-17 and MW-18 to the west, P-7 to the south, P-6 to the east, and wells MW-8 and MW-9 to the north. It is important to note that wells MW-8 and MW-9 are shared between two separate CCR units, the Lined Pond and Pond 003 to the north (Figure 1).

Hydraulic conductivity of the uppermost aquifer is based on data collected during slug testing of wells installed during development of the CCR monitoring network. The hydraulic conductivity was calculated to be 75 to 81 feet per day (Haley & Aldrich, 2019b).

The Wilcox Formation underlying the alluvial aquifer is comprised of sand deposits with interbedded clay and lignite. Because the alluvial aquifer provides a more accessible resource for groundwater production in the area, the Wilcox Formation has not been developed locally as a source of water supply. The clay and lignite present within the Wilcox Formation have lower hydraulic conductivity than the overlying alluvial aquifer. Published hydraulic conductivity values for the Wilcox Formation are available from areas where it has been investigated that indicate the hydraulic conductivity ranges from 9 to 25 feet per day (Office of Nuclear Waste Isolation [ONWI], 1982; Prudic, 1991). The Wilcox Formation in the vicinity of the Lined Pond is estimated to be approximately 400 to 500 feet thick (Gredell, 2003).

2.2.1 Lined Pond

Although leakage from the Lined Pond is unlikely, the hydrology and potential surface water/groundwater interaction beneath the Lined Pond plays an important role in determining the potential for cobalt in the groundwater if a leak from the Lined Pond were to occur. Analysis of the potential for leakage and source loading to groundwater provides a useful line of evidence to rule out the Lined Pond as a source of cobalt to groundwater.

The Lined Pond has an 80-mil high density polyethylene geomembrane liner with a base low elevation of 284 feet above mean sea level. The bottom of the liner overlies alluvium within the vadose zone approximately 8 feet above the alluvial groundwater table during normal groundwater conditions, except for seasonal periods where elevated Mississippi River water levels raise the groundwater table. The relationship of the liner with respect to the groundwater table impacts the fate and transport of any potential constituent of potential concern that may be migrating from the Lined Pond if a leak were present.

Unlike the Lined Pond, the two adjacent ponds to the east and north of the Lined Pond are unlined and in potential communication with the aquifer. Because the base liner elevation was completed within the vadose zone, potential leakage from the Lined Pond would manifest as radial flow outward from a compromised portion of the liner. Mounding from two adjacent unlined ponds (Pond 003 to the north, and the Raw Water Pond to the east) would control the fate and direction travelled for seepage from the Lined Pond. As a result, seepage from the Lined Pond would be directed towards the west and south of the pond, especially during wet weather conditions and an elevated river stage. There is no evidence that any portion of the liner has been compromised. These potential fate and transport mechanisms from the Lined Pond are thoroughly examined in subsequent sections of the current document and ruled out (see Section 3.3).

2.2.2 Aquifer Use

The aquifer is used regionally for irrigation and domestic water supply. Review of the Missouri Department of Natural Resources Well Information Management System (WIMS) Database indicates the alluvial aquifer is used for water supply wells in the vicinity of Pond 003 (database accessed 1 December 2022). The nearest private water well (well #00332117) listed in the WIMS Database is an irrigation well upgradient of the Lined Pond and is located approximately 0.35 mile south, completed in the alluvial aquifer. It is reported to be completed at a depth of 95 feet below ground surface (bgs), producing groundwater at a rate of 1,200 gallons per minute. Pumping influence (i.e., drawdown towards a pumping well or a cone of depression) from irrigation or other water wells is not evident in groundwater elevation maps. There are no reported drinking water supply wells located within a 2-mile radius of the Lined Pond.

3. Alternate Source Demonstration

Haley & Aldrich conducted an evaluation of potential alternative sources that included review of well history, sampling procedures, laboratory procedures, and statistical analyses to determine if potential errors may have been made that would result in the apparent SSL of cobalt downgradient of the Lined Pond. Haley & Aldrich also evaluated potential point and non-point sources of contamination in the vicinity of the Lined Pond. Each of these analyses and the resulting findings are described below.

3.1 REVIEW OF WELL MODIFICATION AND REDEVELOPMENT ACTIVITIES

Following the November 2021 annual assessment monitoring event, AECI initiated plans to modify the well casing at P-7 to replace the flush-mounted well vault with an above ground protective casing. This modification was requested by AECI personnel due to field observations that surface material was able to enter the well casing during sampling activities. On 11 November 2021, an attempt to remove the dedicated low-flow sampling pump was made, but the pump was reportedly stuck in the well casing. On 8 December 2021, the pump was removed by pulling on the sample tubing. On 19 January 2022, the monitoring well was jetted by a local drilling contractor in an attempt to remove any debris in the well that was the cause of the difficult pump removal. This process included flushing the well with high pressure water (jetting). Following clearing of the well, the original dedicated low-flow sampling pump was re-installed with new sampling tubing. Purging of the well was not completed following jetting of the well. A new flush-mounted well vault and concrete surface pad were installed at this time as well, which raised the surface elevation of the well vault by approximately 4 inches to reduce the risk of surface material entering the well casing.

The new well vault was installed in place of the above ground protective casing to avoid further modification to the well that may affect groundwater integrity. The monitoring well casing was not modified during this process, and the reference elevation for groundwater elevation interpretation was not updated. Therefore, an updated boring log was not required. Except for monitoring well P-6, all other compliance monitoring wells at the Lined Pond contain above ground protective casings.

On 9 February 2022, a routine semi-annual assessment monitoring sampling event was completed at the Lined Pond, including monitoring well P-7 with analytical data received and validated on 15 June 2022. A confirmation sample was collected on 18 July 2022 to confirm the P-7 cobalt result from the February 2022 sampling event. Statistical analyses completed 13 September 2022 indicated cobalt was detected at concentrations exceeding the GWPS at P-7 during the February 2022 sampling event and the subsequent July 2022 confirmation sampling. The well was redeveloped on 29 September 2022 to address elevated turbidity that had been documented during recent sampling events. Redevelopment included removing any sediment that had accumulated in the bottom of the well casing, collecting a sample of the accumulated sediment, and removing more than 10 well volumes using a high-flow Grundfos pump until field parameters stabilized and the turbidity was below 10 Nephelometric Turbidity Units. A confirmation sample was collected at the end of redevelopment activities. On 13 October 2022, an additional confirmation sample was collected using the original low-flow sampling pump and sample tubing.

Surface soil samples were also collected within 5 feet of P-7 to the west, north, and east of the well during redevelopment activities to evaluate if there was a correlation between surface soil material that may have entered the well casing and sediment collected from within the well casing.

3.2 REVIEW OF SAMPLING, ANALYSIS, AND STATISTICAL PROCEDURES

3.2.1 Field Sampling Procedures

AECI conducted the field sampling activities in accordance with a Groundwater Sampling and Analysis Plan (SAP; Haley & Aldrich, 2021) that was prepared in accordance with 40 CFR § 257.93 of the CCR Rule. The SAP prescribes the site-specific activities and methodologies for groundwater sampling and included procedures for field data collection, sample collection, sample preservation and shipment, interpretation, laboratory analytical methods, and reporting for groundwater sampling for the Lined Pond. The administrative procedures and frequency for collection of groundwater elevation measurements, determination of flow directions, and gradients were also provided in the SAP.

Haley & Aldrich reviewed the field sampling and equipment calibration logs and did not identify apparent deviations or errors in sampling procedures that would result in a potential SSL for cobalt downgradient of the Lined Pond. The field indicator parameters for the February 2022 semi-annual assessment monitoring sampling event were also reviewed and elevated turbidity was noted and described below.

3.2.1.1 P-7 Turbidity Trend

A review of turbidity measurements collected for the February 2022 semi-annual assessment monitoring sample at P-7 revealed that the turbidity documented prior to the collection of the groundwater sample was over six times higher than the average turbidity observed at P-7 from September 2018 to November 2021 (Figure 3). The elevated turbidity parameter was observed following well modification activities that were completed at the monitoring well in January 2022. Turbidity began trending downward during subsequent resampling events and redevelopment of the well.

3.2.2 Laboratory Quality Control

The groundwater samples collected downgradient of the Lined Pond were initially analyzed using standard methods. The data generated from these laboratory analyses are stored in a project database that incorporates hydrogeologic and groundwater quality data and was established to allow efficient management of chemical and physical data collected in the field and produced in the laboratory. The analytes, analytical methods, sample containers, field preservation, and maximum analytical holding times for monitoring are summarized in the SAP (Haley & Aldrich, 2021).

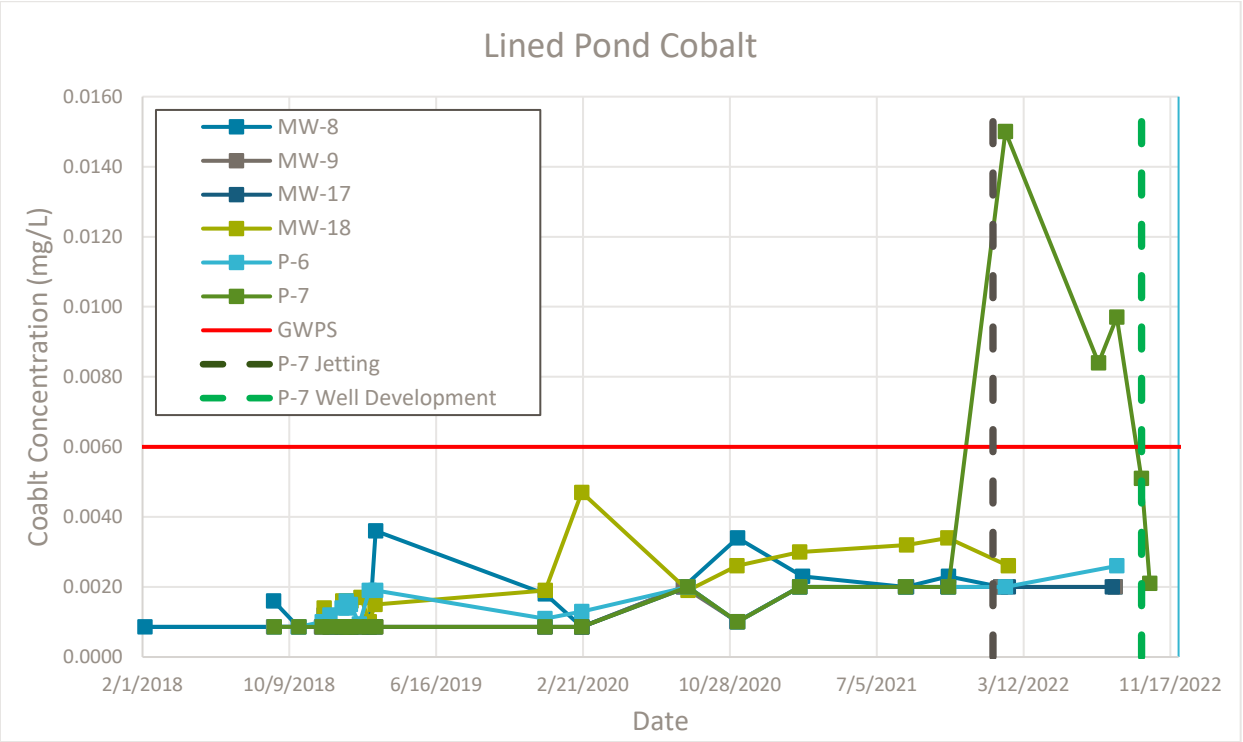
Haley & Aldrich conducted a quality assurance/quality control review of each groundwater quality dataset generated for the Lined Pond and has not identified apparent errors that would result in a potential SSL for cobalt downgradient of the Lined Pond.

3.2.3 Analytical Data

3.2.3.1 Groundwater Results

Haley & Aldrich reviewed cobalt analytical results collected between September 2018 and October 2022 at the Lined Pond monitoring network; the Lined Pond compliance wells include MW-123, MW-126, MW-16, MW-8, MW-9, MW-17, MW-18, P-6, and P-7. Cobalt results from well P-7 were the only concentrations to exceed the cobalt GWPS of 0.006 milligrams per liter (mg/L). Cobalt concentrations in

all other Lined Pond monitoring wells were below the GWPS. A graphical depiction of cobalt values over time at the Lined Pond is presented in the figure below.



Twenty-four groundwater samples, including two duplicates, have been collected at P-7 since September 2018. Cobalt concentrations at P-7 were not detected above the laboratory reporting limit prior to the February 2022 semi-annual assessment monitoring sampling event. Laboratory reporting limits for cobalt ranged from 0.00086 mg/L to 0.0020 mg/L, which are several times lower than the cobalt GWPS of 0.006 mg/L. Cobalt concentrations from the February 2022 sampling event, the February 2022 confirmation sample collected in July 2022, and the August 2022 semi-annual assessment monitoring sample exceeded the cobalt GWPS at the Lined Pond, with concentrations of 0.015 mg/L, 0.0084 mg/L, and 0.0097 mg/L, respectively. These concentrations are inconsistent with historical geochemical conditions observed at P-7 since 2018. Confirmation groundwater samples collected following redevelopment activities in September and October 2022 produced cobalt concentrations of 0.0051 mg/L and 0.0021 mg/L, respectively, which are below the GWPS for cobalt at the Lined Pond and consistent with results observed prior to February 2022.

A summary of field parameters and cobalt results are provided in Table I.

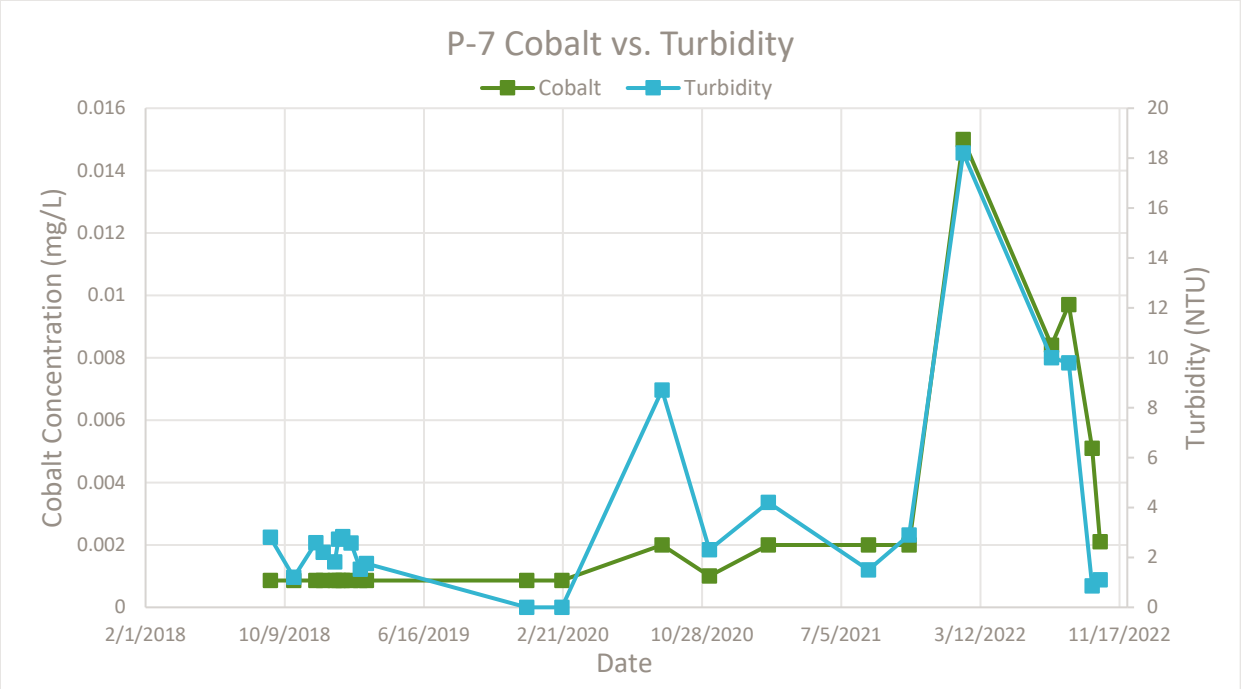
3.2.3.2 Sediment / Soil Results

Five solid-phase samples were collected during redevelopment of P-7 in September 2022. Analytical data from samples representative of surface soil (n=3) and sediment collected from within the casing of well P-7 (n=2) are summarized in Table II. Cobalt data from these samples help to determine what effect surface material entering the well casing at monitoring well P-7 may have on the cobalt concentrations observed due to well jetting and re-development activities.

Detectible concentrations of cobalt (average = 6.9 milligrams per kilogram [mg/kg]) were observed in all surface soil samples, whereas detectible concentrations of cobalt (0.92 mg/kg) were only detected in one of the two well casing sediment samples. Bivariate linear correlation for all five samples between these constituents and total iron show that strong positive correlations exist, with coefficient of correlation (R) greater than 0.95 (R>0.95), between iron and cobalt (Figure 4). The strong positive linear relationship with iron between surface soil samples and well casing sediment samples of P-7 suggests that the source of cobalt in the well sediment samples is derived from the surficial soil near well P-7. Well rehabilitation efforts, described in Section 3.1, removed the surficial soil from inside the well.

3.2.3.3 Cobalt vs. Turbidity

As discussed in Section 3.2.1.1, turbidity measurements at P-7 increased significantly following well modification activities completed in January 2022. These measurements correspond directly with the presence of increased cobalt concentrations at P-7 and are summarized in the figure below. As turbidity measurements decreased following redevelopment activities, cobalt concentrations also decreased to levels that are nearly consistent with cobalt concentrations observed prior to the February 2022 semi-annual assessment monitoring sampling event. The cobalt result collected on 13 October 2022 was 0.0021 mg/L, which is only 0.0001 mg/L above the laboratory reporting limit of 0.0020 mg/L.



3.2.4 Statistical Evaluation

AECI collected groundwater samples from each of the upgradient (MW-16, B-123, and B-126) and downgradient (MW-8, MW-9, MW-17, MW-18, P-6, and P-7) monitoring wells at the Lined Pond in February 2022 for CCR Rule compliance. Haley & Aldrich has reviewed the statistical analysis of groundwater quality data for monitoring well P-7 and has identified the cobalt concentration from P-7 as a statistical outlier. The analytical result was revised following the July 2022 confirmation sample, which also confirmed the concentrations as a statistical outlier (Appendix A). Prior to the February 2022 semi-annual assessment monitoring sampling event, cobalt at P-7 was not detected above the

laboratory reporting limit. The statistical test method used met the performance standard established in the CCR Rule and statistical evaluation complies with the requirements of the Rule.

3.3 HYDROGEOLOGIC VARIABILITY

The variability and fluctuations in groundwater flow direction, as described in Section 2.2, supports the conclusion that the Lined Pond does not leach cobalt to groundwater. Given the hydrogeologic complexity in the conceptual site model (CSM), if the Lined Pond were leaching cobalt to groundwater, the following conditions would be observed in monitoring well data:

- Consistent with groundwater flow direction, wells to the east (P-6), west (MW-17 and MW-18), and north (MW-8 and MW-9) of the Lined Pond would be expected to show concentrations of cobalt elevated above background. Cobalt concentrations at these downgradient wells have historically been, and remain, less than the background limit set for cobalt at the Lined Pond.
- Seasonal and/or temporal variation in cobalt concentrations would be expected in these wells, consistent with seasonal changes in groundwater flow direction. A comparison of cobalt concentrations and the groundwater elevation at monitoring well P-7 is provided in Figure 5.

These conditions are observed for other monitoring wells onsite with elevated, temporally variable concentrations of CCR constituents adjacent to Pond 003 in all directions of groundwater flow. The results above indicate that elevated cobalt concentrations at P-7 are isolated and separate from the uppermost aquifer of the Lined Pond.

3.4 POTENTIAL POINT AND NON-POINT SOURCES

Haley & Aldrich conducted a review of potential point and non-point sources of elevated cobalt values in the vicinity of the Lined Pond to determine if previous or adjacent site activities, land uses, or practices might have caused elevated cobalt values to occur downgradient of the Lined Pond. Potential point sources would include discharging activities or other activities occurring at a discrete location in the vicinity of the observed SSL that may potentially concentrate cobalt in that area. Non-point sources would include diffuse discharging activities or practices that may result in a low level but widespread increase in cobalt concentrations detected at the downgradient side of the Lined Pond.

3.4.1 Potential Point Sources

3.4.1.1 Historic Land Usage

Prior to construction of the Lined Pond, the site and the surrounding vicinity was agricultural land. Review of historical aerial photographs and topographic maps show undeveloped land prior to the construction of the plant site and Lined Pond. No discrete point sources have been identified associated with historic land usage. Agricultural land use is not expected to constitute a point source of cobalt at the location of the observed SSL.

3.4.1.2 Well Modification Activities

As noted in Section 3.1, AECI personnel have recorded the possibility of surface material entering the well casing at monitoring well P-7. As outlined in Section 3.2.3.2, analytical data for cobalt collected from surface soil samples near P-7 and sediment samples collected from within the well casing provides a strong positive linear relationship with iron between surface soil samples and well casing sediment

samples of P-7, which suggests that the source of cobalt in the well sediment samples is derived from the surficial soil near well P-7. Well rehabilitation efforts, described in Section 3.1, removed the surficial soil from inside the well.

3.4.2 Non-Point Sources

No mining, industrial, or other activities have been documented in the vicinity of the Lined Pond that might constitute a non-point source of cobalt at the location of the observed SSL. Agricultural land use is not expected to constitute a non-point source of cobalt at the location of the observed SSL.

3.5 HISTORICAL LAND USE REVIEW

Haley & Aldrich assessed past usage of the site and adjoining properties through a review of the following records:

- Environmental Data Resources, Inc. (EDR) – Aerial Photographs dated 1950, 1952, 1969, 1988, 1992, 1993, 1996, 2006, 2009, 2012, and 2016 (Appendix B); and
- EDR – Topographic Maps dated 1931/1934, 1939, 1951, 1954/1955, 1971, 1973, 1982, 2015, and 2017 (Appendix C).

Unless otherwise noted below, sources were reviewed dating back to 1940 or first developed use, whichever is earlier, and at 5-year intervals if the use of the property has changed within the time period. This review was completed to assess potential alternate sources based on land use.

3.5.1 Historical Aerial Photographs

Haley & Aldrich reviewed aerial photographs depicting the development of the site and vicinity as summarized in the table below. The historical aerial photograph search includes photographs from the United States Geological Survey, United States Department of Agriculture, Digital Orthophoto Quarter Quads, National Aerial Photography Program, and the National Agriculture Information Program (EDR, 2022) and are included in Appendix B.

Photographs suggest that the site was undeveloped up until at least 1969. Aerial photos from 2006 through 2016 show the history of Lined Pond activities and configuration through to its current footprint.

Historical Aerial Photograph Review Summary

Dates	Description of Site and Adjacent Properties	Sources
1950 – 1969	Agricultural use of site and adjacent properties with some road use.	USGS
1988 – 1993	The plant site is active. CCR ponds appear present at the subject site. Agricultural use of adjacent properties surrounding the subject site.	USGS, NAPP, DOQQ
1996	Extension of the Lined Pond to the west toward the road, and development of addition pond to the east of the Lined Pond.	USGS, DOQQ
2006	No apparent changes observed.	USDA, NAIP
2009 – 2016	The plant site and Pond 003 are active. No apparent changes observed.	USDA, NAIP

Historical Aerial Photograph Review Summary

Dates	Description of Site and Adjacent Properties	Sources
Notes: *CCR = coal combustion residuals* *DOQQ = Digital Orthophoto Quarter Quads* *NAIP = National Agriculture Information Program* *NAPP = National Aerial Photography Program* *USDA = United States Department of Agriculture* *USGS = United States Geological Survey*		

3.5.2 Historical Topographic Maps

Haley & Aldrich reviewed historical topographic maps depicting the development of the site and vicinity, as summarized in the table below. The topographic maps were provided for review by EDR. Copies of the topographic maps are included in Appendix C.

Historical Topographic Map Review Summary

Dates	Description of Site and Adjacent Properties	Map Name
1931 – 1955	The map shows the site as undeveloped land with several roads and a railroad within the site vicinity.	15-Minute Series, New Madrid, Missouri Quadrangle
1971	Plant site appears to be active.	7.5-Minute Series, New Madrid SE, Missouri Quadrangle
1982	Additional development of the plant and apparent Pond 003 development to the north of the Lined Pond.	7.5-Minute Series, New Madrid, Missouri Quadrangle
2015	Development of the Lined Pond prior to 2015	7.5-Minute Series, New Madrid, Missouri Quadrangle

4. Findings and Conclusions

Haley & Aldrich conducted an evaluation of groundwater quality at the NMPP Lined Pond to identify the potential source(s) of the SSL of cobalt detected in the groundwater sample collected from monitoring well P-7 to the south of the Lined Pond. The evaluation included review of sampling procedures, laboratory procedures, and statistical analyses to determine if potential errors may have been made that would result in the apparent SSL of cobalt downgradient of the Lined Pond. Haley & Aldrich also evaluated potential point and non-point sources of contamination in the vicinity of the Lined Pond.

Haley & Aldrich found no apparent errors in sampling, laboratory analysis, data management, or statistical analysis that would result in a potential SSL for cobalt downgradient of the Lined Pond. Haley & Aldrich found no apparent evidence of historical non-point or point sources of potential cobalt values in the vicinity of the Lined Pond; however, an active point source in surface soil could provide a cause for observed elevated cobalt values.

Haley & Aldrich evaluated data and information describing the well modification and redevelopment activities, reviewed the historical cobalt data, and confirmed statistical analyses of cobalt concentrations. Key findings and causes regarding cobalt in groundwater at P-7 are summarized below:

- Following well modification activities in January 2022, cobalt was detected at a concentration exceeding the GWPS during the February 2022 semi-annual assessment monitoring sampling event. A confirmation sample collected in July 2022 confirmed the exceedance.
- Turbidity measurements collected during the February 2022 semi-annual assessment monitoring sampling event was nearly six times higher than previous sampling events.
- Following redevelopment activities, the turbidity measurements and cobalt concentrations declined to levels observed prior to well modification activities.
- The strong positive linear relationship with iron between surface soil samples and well casing sediment samples of P-7 suggests that the source of cobalt in the well sediment samples was derived from the surficial soil near well P-7. Well rehabilitation efforts described in Section 3.1 removed the surficial soil from inside the well.
- The casing and surface completion has been observed to be intact and appropriate to achieve an accurate representation of the cobalt concentrations at monitoring well P-7. Future exceedance should not be expected as long as surficial soil is prevented from entering the well casing.
- Concentrations of cobalt in downgradient wells located in the primary and seasonal direction of groundwater flow directions are consistent with background.
- The hydrogeologic CSM supports the conclusion that the Lined Pond is not leaching cobalt to groundwater.

Based on these findings, it is evident that the Lined Pond is not the source of cobalt in groundwater. The alternate source of cobalt observed at monitoring well P-7 is elevated turbidity originating from well modification activities at the well. The methods and analyses employed in this ASD comply with 40 CFR § 257.95(g)(3)(ii) to ***demonstrate that a source other than the CCR unit caused the statistically significant level over background levels for a constituent***.

5. Certification

Pursuant to 40 CFR § 257.95(g)(3)(ii), AECI conducted an alternate source evaluation to demonstrate that a source other than the Lined Pond caused the SSL over background identified during assessment monitoring. This demonstration and the underlying data support the conclusion that a source other than the CCR unit is the cause of the SSL over background levels for the Appendix IV constituent (cobalt) detected during assessment monitoring of this unit.

I certify that the demonstration that a source other than the CCR unit caused the contamination, or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality is complete in accordance with 40 CFR § 257.95(g)(3)(ii). The certification submitted is, to the best of my knowledge, accurate and complete.

Signed:_____

Print Name: Steven F. Putrich, P.E.
Missouri PE License No.: 2014035813
Title: Principal Consultant
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Signed:_____

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HALEY ALDRICH

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TABLES

TABLE I

SUMMARY OF LINED POND COBALT ANALYTICAL RESULTS

ASSOCIATED ELECTRIC COOPERATIVE, INC.

NEW MADRID POWER PLANT - LINED POND (INACTIVE)

NEW MADRID, MISSOURI

Location		Measure Point (TOC)	Sample Date	Inorganics		Field Parameters					
				Cobalt (mg/L)	Depth to Water (ft btoc)	Conductivity (µS/cm)	pH (S.U.)	Temperature (Deg C)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Upgradient	B-123	292.70	9/11/2018	< 0.00086	20.65	684	7.18	16.41	30.9	0.08	-157
			10/24/2018	< 0.00086	20.74	618	6.93	17.05	28.3	0.30	-104.9
			12/4/2018	< 0.00086	19.25	526	7.09	13.84	9.94	0.47	-76.8
			12/17/2018	< 0.00086	18.51	568	7.05	16.55	5.40	1.42	-125.3
			1/9/2019	< 0.00086	20.69	602	7.05	15.84	14.8	0.82	-108.6
			1/14/2019	< 0.00086	17.93	603	5.23	14.56	21.0	0.60	-95.1
			1/21/2019	< 0.00086	17.33	581	7.11	10.45	4.35	0.68	-69.7
			2/8/2019	< 0.00086	16.71	489	7.03	11.62	5.23	0.85	-68.3
			2/22/2019	< 0.00086	15.30	565	7.03	11.61	8.07	0.89	-58.4
			3/4/2019	< 0.00086	15.30	851	7.02	14.18	39.6	3.10	-14.6
			12/18/2019	< 0.00086	13.78	640	7.53	16.46	0.0	0.07	-105
			2/21/2020	0.00098	11.20	616	9.22	16.26	90.7	0.13	-122
			8/10/2020	< 0.0020	12.89	675	7.68	17.71	10.0	0.05	-160
			11/9/2020	< 0.0010	23.44	665	6.92	16.73	2.9	0.07	-164
			2/23/2021	< 0.0020	17.73	685	8.36	14.91	9.80	7.27	-95
			8/17/2021	< 0.0020	17.47	761	6.83	16.96	24.1	0.07	-209
			11/2/2021	< 0.0020	19.45	765	7.05	16.17	23.5	0.08	-125
			1/31/2022	< 0.0020	19.37	667	8.67	16.36	14.4	0.27	-103
			10/13/2022	< 0.0020	21.20	636	7.69	15.90	3.1	0.66	-19
Upgradient	B-126	293.63	9/11/2018	0.0019	21.32	1017	6.86	17.23	90.3	0.13	-231
			10/24/2018	0.0015	21.62	330	6.49	17.88	117	0.36	-38.3
			12/4/2018	0.0017	21.05	272	6.71	13.06	70	0.46	-96.7
			12/18/2018	0.0017	20.64	219	6.68	17.30	86.4	1.01	-66.0
			1/8/2019	0.0030	20.09	320	6.58	16.79	227	0.46	-74.4
			1/14/2019	0.0018	19.78	145	5.84	14.49	140	1.78	-2.0
			1/22/2019	0.0011	18.91	130	6.43	12.10	69.2	2.77	34.3
			2/8/2019	0.0023	18.90	98	6.44	12.42	195	4.88	10.4
			3/4/2019	0.0044	16.55	134	6.17	12.76	249	3.25	16.0
			12/18/2019	0.0012	18.85	444	7.02	16.84	99.9	0.77	-103
			2/21/2020	0.00086	12.68	417	8.7	16.56	98.7	0.47	-211
			8/10/2020	< 0.0020	13.85	575	7.26	18.75	34.6	0.33	-169
			11/9/2020	0.0018	28.40	1106	6.69	17.52	70.3	0.29	-222
			2/23/2021	< 0.0020	19.85	277	8.14	15.26	61.7	9.45	48
			8/17/2021	< 0.0020	18.67	611	6.62	18.55	94.6	0.13	-272
			11/2/2021	< 0.0020	21.13	988	7.13	17.14	51.9	3.74	-145
			1/31/2022	< 0.0020	21.75	1470	8.87	16.83	38.8	3.09	-83
			10/13/2022	< 0.0020	21.20	636	7.69	15.90	3.1	3.12	10
Upgradient	MW-16	292.85	9/12/2018	< 0.00086	24.80	880	6.73	17.13	4.9	0.66	-100
			10/25/2018	< 0.00086	19.82	828	6.71	16.73	3.39	0.30	-113.3
			12/4/2018	< 0.00086	18.88	748	6.91	14.77	3.92	0.66	-121.2
			12/17/2018	< 0.00086	17.94	847	6.84	17.38	1.17	1.90	-160.2
			1/7/2019	< 0.00086	14.80	767	7.04	16.73	1.17	0.95	-115.5
			1/15/2019	< 0.00086	14.32	828	6.77	15.94	1.56	0.57	-133.5
			1/21/2019	< 0.00086	15.75	886	6.90	13.73	2.69	0.82	-112.8
			2/9/2019	< 0.00086	14.77	763	6.79	14.13	1.74	0.44	-122.4
			2/22/2019	< 0.00086	10.90	863	6.83	14.28	1.03	0.35	-118.5
			2/22/2019 (Dup)	< 0.00086	-	-	-	-	-	-	-
			3/5/2019	< 0.00086	8.52	783	6.47	15.57	3.47	2.08	-78.8
			12/19/2019	< 0.00086	17.18	869	7.14	17.25	0.0	0.05	-125
			2/21/2020	< 0.00086	19.20	804	8.91	16.95	0.0	0.26	-176
			8/10/2020	< 0.0020	18.58	872	7.87	18.46	0.0	0.05	-174
			11/9/2020	< 0.0010	24.96	889	6.76	17.73	0.0	0.07	-159
			2/23/2021	< 0.0020	23.50	899	7.82	15.78	0.9	2.31	-109
			8/17/2021	< 0.0020	23.22	1076	6.53	18.17	16.5	0.12	-193
			11/2/2021	< 0.0020	26.61	1077	6.59	17.05	0.8	0.47	-152
			2/1/2022	< 0.0020	23.40	988	8.44	17.14	9.4	0.12	-137
			10/13/2022	< 0.0020	30.06	785	7.40	16.65	4.5	0.32	-58

TABLE I

SUMMARY OF LINED POND COBALT ANALYTICAL RESULTS

ASSOCIATED ELECTRIC COOPERATIVE, INC.

NEW MADRID POWER PLANT - LINED POND (INACTIVE)

NEW MADRID, MISSOURI

Location		Measure Point (TOC)	Sample Date	Inorganics		Field Parameters					
				Cobalt (mg/L)	Depth to Water (ft btoc)	Conductivity (µS/cm)	pH (S.U.)	Temperature (Deg C)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Downgradient	MW-17	299.20	12/7/2018	0.0012	23.64	564	6.64	14.66	2.51	0.87	-53.1
			12/18/2018	< 0.00086	23.14	623	6.67	16.30	9.62	0.79	-80.5
			1/8/2019	< 0.00086	20.61	562	6.58	16.12	9.12	0.53	-69.6
			1/15/2019	< 0.00086	19.49	552	7.27	14.37	9.57	3.01	-60.6
			1/22/2019	< 0.00086	20.07	544	6.80	13.52	7.29	3.18	-35.1
			2/8/2019	< 0.00086	19.65	507	6.69	13.02	12.7	0.63	-59.5
			2/22/2019	< 0.00086	15.98	628	6.72	14.01	3.76	0.86	-89.5
			3/4/2019	< 0.00086	12.66	854	6.76	13.92	2.77	1.59	-50.8
			12/18/2019	< 0.00086	22.08	656	7.09	15.06	46.0	0.15	-47
			2/19/2020	< 0.00086	14.55	629	8.51	16.17	0.0	0.11	-168
			8/18/2020	< 0.0020	22.64	876	6.51	15.8	0.0	0.44	-30
			11/9/2020	< 0.0010	29.70	721	6.53	16.45	0.0	0.05	-83
			2/24/2021	< 0.0020	28.65	735	6.93	14.05	0	1.75	-19
			8/25/2021	< 0.0020	28.15	704	9.07	16.76	101	1.80	-60
			11/3/2021	< 0.0020	31.4	740	7.18	16.13	9.7	0.20	-42
			2/14/2022	< 0.0020	26.05	707	6.9	14.79	1.18	1.03	-41
			8/10/2022	< 0.0020	29.04	749	6.66	18.09	5.0	0.00	-92
Downgradient	MW-18	301.19	12/7/2018	0.0014	26.46	381	6.42	14.70	3.49	0.79	56.2
			12/18/2018	0.0016	25.90	451	6.58	16.38	9.26	1.20	21.8
			1/8/2019	0.0016	23.74	436	6.37	16.75	6.38	0.52	11.3
			1/15/2019	0.0016	22.57	428	7.68	14.12	10.08	0.90	4.1
			1/22/2019	0.0017	22.85	433	6.65	13.69	7.23	0.55	6.2
			2/8/2019	0.0010	22.44	411	6.56	12.68	9.09	0.42	10.3
			2/22/2019	0.0015	18.99	493	6.62	12.66	4.55	0.37	-32.7
			3/4/2019	0.0019	15.72	734	6.65	14.88	12.21	2.93	-2.7
			12/19/2019	0.0049	24.48	528	6.56	15.25	99.9	0.14	129
			2/19/2020	0.0019	17.39	491	8.11	16.34	0.0	0.09	-91
			8/18/2020	0.0026	24.54	490	6.28	16.06	0.0	0.60	99
			11/9/2020	0.0030	31.53	357	6.50	16.30	0.0	2.01	19
			11/9/2020 (Dup)	0.0029	-	-	-	-	-	-	-
			2/24/2021	0.0032	30.86	468	6.65	13.46	0	2.52	50
			2/24/2021 (Dup)	0.0032	-	-	-	-	-	-	-
			8/25/2021	0.0034	30.20	533	7.45	16.61	83.4	5.32	126
			8/25/2021 (Dup)	0.0034	-	-	-	-	-	-	-
			11/3/2021	0.0026	33.36	480	6.41	15.93	4.3	0.23	176
			2/14/2022	0.0027	30.90	490	6.79	14.48	0	4.08	145
			8/10/2022	0.0024	31.04	464	6.41	17.48	0.0	0.00	3
Downgradient	MW-8	310.63	9/12/2018	0.0016	42.30	1170	7.06	17.64	0.0	3.89	-84
			10/24/2018	0.00086	36.10	990	6.86	17.56	0.39	0.36	-98.5
			12/3/2018	< 0.00086	34.90	998	6.94	15.22	2.61	0.67	-95.2
			12/4/2018 (Dup)	< 0.00086	-	-	-	-	-	-	-
			12/17/2018	< 0.00086	33.96	1044	6.97	16.75	1.78	9.00	-119.4
			1/7/2019	< 0.00086	30.32	1015	7.06	16.9	1.85	1.87	-119.4
			1/15/2019	< 0.00086	29.21	1141	5.39	16.27	1.07	0.69	-129.0
			1/22/2019	< 0.00086	30.72	1054	6.95	14.34	1.92	0.36	-104.8
			2/5/2019	< 0.00086	29.52	1021	6.99	14.75	2.16	0.42	-110.3
			2/22/2019	< 0.00086	24.67	1249	6.95	14.46	1.78	0.42	-117.0
			3/5/2019	0.0036	21.49	1124	6.73	15.16	1.39	1.33	-53.4
			12/19/2019	0.0018	33.78	1358	7.32	16.82	0.0	0.05	-98
			2/19/2020	< 0.00086	25.60	1305	7.61	17.00	0.0	0.11	-177
			8/10/2020	< 0.0020	36.00	1400	7.69	19.11	0.0	0.08	-148
			11/10/2020	0.0034	42.70	1271	7.46	17.70	0.0	0.07	-226
			3/1/2021	0.0023	40.45	1640	7.29	15.55	0.1	N/A	-80
			8/23/2021	< 0.0020	41.20	1380	7.22	17.04	0.5	0.68	-35
			11/4/2021	0.0023	44.14	1363	7.63	17.32	12.3	0.24	-110
			2/1/2022	< 0.0020	40.32	1284	7.77	16.87	0.7	0.13	-76
			8/15/2022	< 0.0020	42.20	1360	6.65	18.79	0.0	0.00	-166

TABLE I

SUMMARY OF LINED POND COBALT ANALYTICAL RESULTS

ASSOCIATED ELECTRIC COOPERATIVE, INC.

NEW MADRID POWER PLANT - LINED POND (INACTIVE)

NEW MADRID, MISSOURI

Location		Measure Point (TOC)	Sample Date	Inorganics		Field Parameters					
				Cobalt (mg/L)	Depth to Water (ft btoc)	Conductivity (µS/cm)	pH (S.U.)	Temperature (Deg C)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Downgradient	MW-9	310.24	9/12/2018	< 0.00086	42.90	724	7.30	17.97	0.8	50.00	99
			10/25/2018	< 0.00086	34.76	693	6.80	17.70	0.62	0.31	47.5
			12/3/2018	< 0.00086	33.85	706	6.94	14.01	1.62	1.27	34.8
			12/17/2018	< 0.00086	32.82	723	6.96	17.32	1.12	1.98	15.5
			12/18/2018 (Dup)	< 0.00086	-	-	-	-	-	-	-
			1/7/2019	< 0.00086	27.65	657	16.99	6.97	0.91	0.97	33.9
			1/15/2019	< 0.00086	27.03	718	6.33	16.74	2.64	0.53	-19.4
			1/21/2019	< 0.00086	29.91	751	6.98	13.68	2.45	1.20	-8.2
			1/22/2019 (Dup)	< 0.00086	-	-	-	-	-	-	-
			2/5/2019	< 0.00086	27.88	647	6.94	0.647	1.43	0.55	22.7
			2/22/2019	< 0.00086	21.76	825	6.84	14.91	0.56	0.35	-7.2
			3/5/2019	< 0.00086	18.80	776	6.68	16.82	2.09	0.56	69.5
			3/5/2019 (Dup)	< 0.00086	-	-	-	-	-	-	-
			12/18/2019	< 0.00086	33.48	832	7.20	17.10	0.0	0.10	44
			2/19/2020	< 0.00086	22.53	883	7.71	17.39	0.0	0.13	-155
			8/10/2020	< 0.0020	37.05	997	7.50	19.38	0.0	2.33	2
			11/10/2020	< 0.0010	43.25	908	7.19	17.99	1.29	0	-68
			2/24/2021	< 0.0020	40.85	877	7.51	16.22	0	1.15	27
			8/23/2021	< 0.0020	42.50	820	7.14	17.40	0.0	0.68	53
			11/4/2021	< 0.0020	44.34	873	7.18	17.54	2.0	0.49	50
			2/1/2022	< 0.0020	40.25	875	7.63	17.28	0.8	0.35	14
			8/15/2022	< 0.0020	42.96	865	6.68	18.25	0.0	0.0	-7
Downgradient	P-6	310.88	9/13/2018	< 0.00086	41.60	924	6.84	18.79	0.4	10.06	118
			10/25/2018	< 0.00086	34.76	771	6.50	16.71	1.21	0.30	8.4
			12/4/2018	0.001	33.85	727	6.62	14.15	5.02	1.13	10.7
			12/17/2018	0.0012	32.87	823	6.58	17.18	0.95	2.40	-6.5
			1/7/2019	0.0014	26.85	676	6.83	16.21	1.86	2.13	6.0
			1/9/2019 (Dup)	< 0.00086	-	-	-	-	-	-	-
			1/14/2019	0.0014	26.43	782	5.25	15.92	1.99	0.72	32.7
			1/14/2019 (Dup)	0.0016	-	-	-	-	-	-	-
			1/21/2019	0.0015	29.82	762	6.71	12.28	2.84	1.41	11.8
			2/5/2019	0.00094	27.88	633	6.69	14.69	3.43	0.44	29.6
			2/8/2019 (Dup)	0.0011	-	-	-	-	-	-	-
			2/22/2019	0.0019	21.00	727	6.63	13.49	1.96	0.79	2.0
			3/6/2019	0.0019	18.27	702	6.49	16.14	3.13	0.31	103.7
			12/18/2019	0.0011	33.70	960	6.87	16.62	0.0	0.11	-15
			12/18/2019 (Dup)	0.0011	-	-	-	-	-	-	-
			2/19/2020	0.0013	22.12	795	8.03	16.99	0.0	0.19	-224
			2/19/2020 (Dup)	0.0014	-	-	-	-	-	-	-
			8/17/2020	< 0.0020	37.87	1080	6.62	17.41	0.0	0.46	-1
			8/17/2020 (Dup)	< 0.0020	-	-	-	-	-	-	-
			11/10/2020	< 0.0010	43.90	951	6.89	17.95	0.0	0.18	-150
			2/24/2021	< 0.0020	40.25	1010	7.22	15.77	0	1.17	-5
			8/23/2021	< 0.0020	43.00	1050	6.82	17.54	0.0	1.01	74
			11/4/2021	< 0.0020	44.74	1114	6.76	17.42	6.1	0.16	2
			11/4/2021 (Dup)	< 0.0020	-	-	-	-	-	-	-
			2/9/2022	< 0.0020	40.45	1040	6.77	15.94	1.9	1.04	15
			8/18/2022	0.0026	43.72	1020	6.78	18.29	0.0	0.00	-65

TABLE I

SUMMARY OF LINED POND COBALT ANALYTICAL RESULTS

ASSOCIATED ELECTRIC COOPERATIVE, INC.

NEW MADRID POWER PLANT - LINED POND (INACTIVE)

NEW MADRID, MISSOURI

Location		Measure Point (TOC)	Sample Date	Inorganics		Field Parameters					
				Cobalt (mg/L)	Depth to Water (ft btoc)	Conductivity (µS/cm)	pH (S.U.)	Temperature (Deg C)	Turbidity (NTU)	Dissolved Oxygen (mg/L)	ORP (mV)
Downgradient	P-7	308.60	9/13/2018	< 0.00086	38.60	980	7.22	16.61	2.8	4.38	106
			10/25/2018	< 0.00086	33.86	827	6.57	16.44	1.20	0.31	82.5
			10/25/2018 (Dup)	< 0.00086	-	-	-	-	-	-	-
			12/4/2018	< 0.00086	32.44	708	6.87	14.36	2.59	2.16	63.9
			12/17/2018	< 0.00086	31.49	754	6.74	16.47	2.20	3.08	48.4
			1/7/2019	< 0.00086	27.37	750	6.80	15.92	1.82	0.98	50.1
			1/14/2019	< 0.00086	26.45	865	6.55	15.28	2.73	0.66	-6.9
			1/21/2019	< 0.00086	28.01	758	6.80	13.52	2.83	1.58	33.8
			2/5/2019	< 0.00086	27.05	692	6.73	14.17	257	0.43	51.5
			2/21/2019	< 0.00086	20.36	774	6.70	13.58	1.53	0.53	16.5
			3/5/2019	< 0.00086	17.35	787	6.49	15.74	1.76	0.68	72.6
			12/18/2019	< 0.00086	31.24	927	6.97	15.81	0.0	0.19	44
			2/19/2020	< 0.00086	21.02	899	8.14	15.93	0.0	0.16	-141
			8/17/2020	< 0.0020	33.25	1030	6.42	16.03	8.7	1.07	64
			11/10/2020	< 0.0010	39.88	942	6.48	16.38	2.3	0.19	103
			2/24/2021	< 0.0020	38.17	970	7.15	14.83	4.2	1.68	25
			8/23/2021	< 0.0020	38.60	993	6.73	16.16	1.5	2.07	188
			11/4/2021	< 0.0020	41.81	1057	6.49	16.00	2.9	0.30	173
			2/9/2022	0.014	38.64	1044	8.44	15.84	18.2	0.07	-215
			7/18/2022	0.0084	38.27	1052	8.78	16.78	10.0	0.05	-126
			8/18/2022	0.0097	39.53	1030	6.82	16.94	9.8	0.00	-64
			9/29/2022	0.0051	44.25	940	6.79	17.1	0.86	11.1	-71.0
			10/13/2022	0.0021	45.43	1060	7.31	15.65	1.1	0.81	214

Notes and Abbreviations:

Bold value: *Detection above laboratory reporting limit or minimum detectable concentration (MDC).*

µS/cm = micro Siemens per centimeter

Deg C = degrees Celsius

ft btoc = feet below top of casing

mg/L = milligrams per liter

N/A = data is not available

NTU = Nephelometric Turbidity Unit

su = standard unit

TOC = top of casing

TABLE II

SUMMARY OF ANALYTICAL RESULTS - P-7 ALTERNATE SOURCE INVESTIGATION

ASSOCIATED ELECTRIC COOPERATIVE, INC.

NEW MADRID POWER PLANT - LINED POND (INACTIVE)

NEW MADRID, MISSOURI

Location	P-7					
Sample Name	P-7	P-7 Sediment 1	P-7 Sediment 2	P-7 Sediment 3	P-7 Sediment 4	P-7 Sediment 5
Sample Matrix	Ground Water	Soil[1]	Soil[2]	Soil[2]	Soil[2]	Soil[1]
Sample Date	9/29/2022	9/29/2022	9/29/2022	9/29/2022	9/29/2022	9/29/2022
Final Lab Report Date	10/9/2022	10/9/2022	10/9/2022	10/9/2022	10/9/2022	10/9/2022
TDS (mg/L)	**540**	-	-	-	-	-
Total Solids (%)	-	**77**	**95**	**98**	**97**	-
Cobalt, Total (mg/L)	**0.0051**	-	-	-	-	-
Cobalt, Total (mg/kg dry)	-	< 2.6	**9.7**	**2.1**	**8.9**	-
Cobalt, Total (mg/kg wet)	-	-	-	-	-	**0.92**
Cobalt, Dissolved (mg/L)	**0.0050**	-	-	-	-	-
Aluminum, Total (mg/L)	**0.049**	-	-	-	-	-
Dissolved Aluminum (mg/L)	< 0.010	-	-	-	-	-
Dissolved Iron (mg/L)	< 0.010	-	-	-	-	-
Iron, Total (mg/L)	**0.26**	-	-	-	-	-
Iron, Total (mg/kg dry)	-	**2900**	**17000**	**4400**	**16000**	-
Iron, Total (mg/kg wet)	-	-	-	-	-	**440**
Manganese, Dissolved (mg/L)	**0.38**	-	-	-	-	-
Manganese, Total (mg/kg dry)	-	**32**	**93**	**71**	**140**	-
Manganese, Total (mg/kg wet)	-	-	-	-	-	**23**
Sulfide (mg/kg dry)	-	< 13.0	< 10.5	< 10.0	< 10.0	-
Sulfide (mg/L)	< 2.0	-	-	-	-	-
Total Organic Carbon (mg/L)	**2.1**	-	-	-	-	-
Total Organic Carbon (mg/kg)	-	**380**	**20800**	**9100**	**19500**	-

Notes and Abbreviations:

[1] = Sample collected from sediment removed from the well casing during redevelopment activities.

[2] = Sample collected from soil at the surface within 5 feet of the well casing.

Radiological results are presented as activity plus or minus uncertainty with MDC.

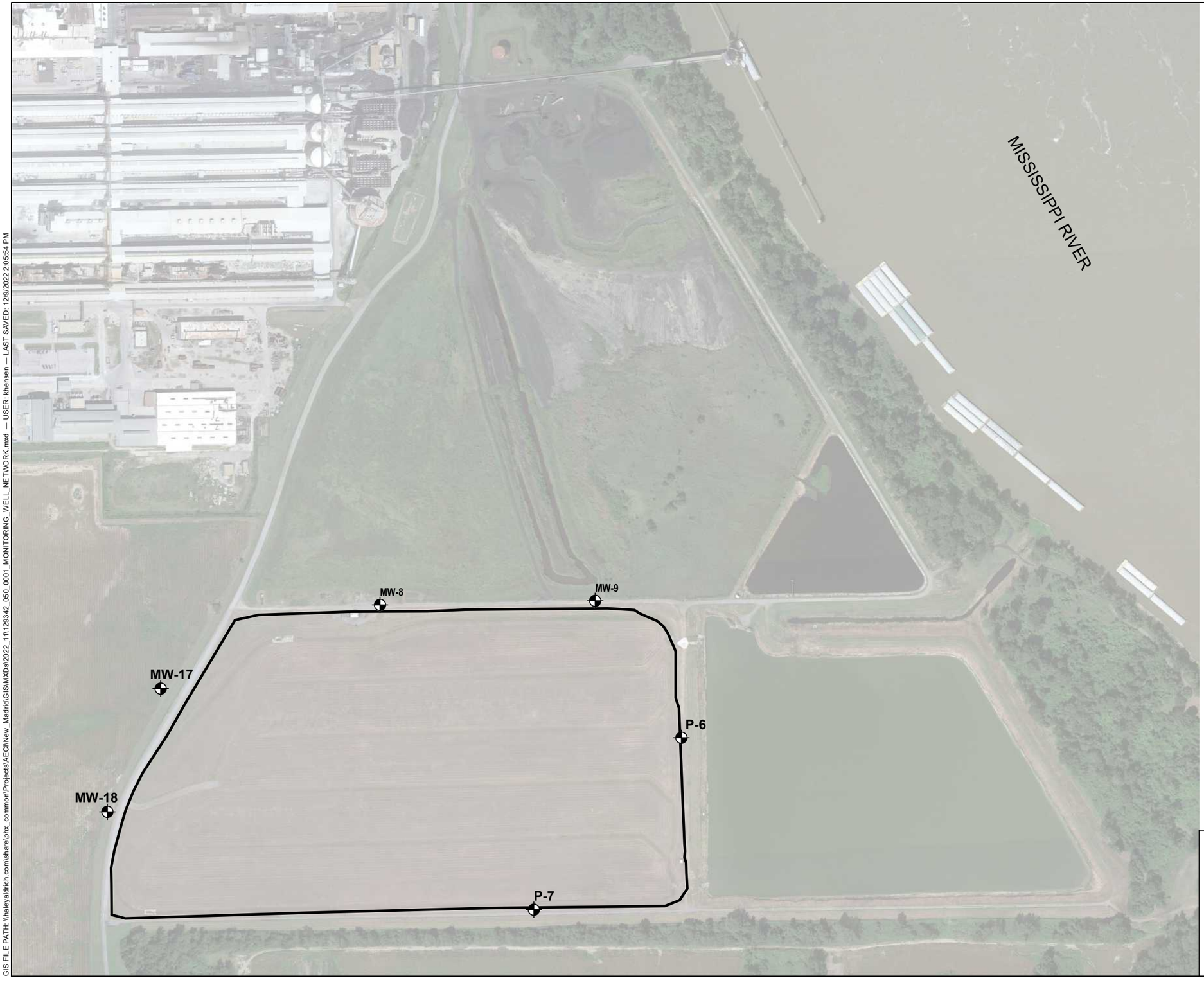
% = percent

mg/kg = milligrams per kilogram

mg/L = milligrams per liter

TDS = total dissolved solids

FIGURES



LEGEND

- MONITORING WELL
- LINED ASH POND

NOTES

1. ALL LOCATIONS ARE APPROXIMATE.
2. REFER TO TABLE I FOR GROUNDWATER ANALYTICAL RESULTS.
3. AERIAL IMAGERY SOURCE: GOOGLE EARTH, 6 SEPTEMBER 2021

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SCALE IN FEET

HALEY ALDRICH

NEW MADRID POWER PLANT
MARSTON, MISSOURI

MONITORING WELL NETWORK

aeci

DECEMBER 2022

FIGURE 1

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LEGEND

- MONITORING WELL
- 287.78 — GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL (AMSL)
- ESTIMATED GROUNDWATER POTENTIOMETRIC ELEVATION CONTOUR, IN FEET
- GROUNDWATER FLOW DIRECTION AND APPROXIMATE GROUNDWATER FLOW RATE (FEET/YEAR)
- LINED ASH POND

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. GROUNDWATER POTENTIOMETRIC ELEVATIONS WERE MEASURED 16 AUGUST 2021.
3. AERIAL IMAGERY SOURCE: GOOGLE EARTH, 6 SEPTEMBER 2021

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SCALE IN FEET

HALEY ALDRICH

NEW MADRID POWER PLANT
MARSTON, MISSOURI

LINED POND GROUNDWATER ELEVATION CONTOUR MAP AUGUST 16, 2021

aeci

DECEMBER 2022

FIGURE 2A

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LEGEND

- MONITORING WELL
- 287.78 — GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL (AMSL)
- ESTIMATED GROUNDWATER POTENTIOMETRIC ELEVATION CONTOUR, IN FEET
- GROUNDWATER FLOW DIRECTION AND APPROXIMATE GROUNDWATER FLOW RATE (FEET/YEAR)
- LINED ASH POND

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. GROUNDWATER POTENTIOMETRIC ELEVATIONS WERE MEASURED 01 NOVEMBER 2021.

3. THE GROUNDWATER FLOW RATE WAS APPROXIMATED USING THE HYDRAULIC GRADIENT CALCULATED FROM GROUNDWATER POTENTIOMETRIC ELEVATIONS MEASURED 01 NOVEMBER 2021, THE HYDRAULIC CONDUCTIVITY VALUES COLLECTED DURING SLUG TESTING DURING WELL DEVELOPMENT, AND EFFECTIVE POROSITY VALUES OBTAINED FROM PUBLISHED SOURCES.

4. AERIAL IMAGERY SOURCE: GOOGLE EARTH, 6 SEPTEMBER 2021

N

0 300 600

SCALE IN FEET

HALEY ALDRICH

NEW MADRID POWER PLANT
MARSTON, MISSOURI

LINED POND GROUNDWATER ELEVATION CONTOUR MAP NOVEMBER 1, 2021

aeci

DECEMBER 2022

FIGURE 2B

GIS FILE PATH: \\haleyaldrich.com\share\phx_common\Projects\AECI\New Madrid\GIS\MXDs\2022_11\123942_050_002B_LINED_POND_GW_CONTOUR_MAP_NOV2021.mxd — USER: khensen — LAST SAVED: 11/18/2022 2:07:46 PM

LEGEND

- MONITORING WELL
- 287.78 — GROUNDWATER ELEVATION MEASURED IN FEET ABOVE MEAN SEA LEVEL (AMSL)
- ESTIMATED GROUNDWATER POTENTIOMETRIC ELEVATION CONTOUR, IN FEET
- GROUNDWATER FLOW DIRECTION AND APPROXIMATE GROUNDWATER FLOW RATE (FEET/YEAR)
- LINED ASH POND

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.

2. GROUNDWATER POTENTIOMETRIC ELEVATIONS WERE MEASURED 28 JANUARY 2022.

3. THE GROUNDWATER FLOW RATE WAS APPROXIMATED USING THE HYDRAULIC GRADIENT CALCULATED FROM GROUNDWATER POTENTIOMETRIC ELEVATIONS MEASURED 28 JANUARY 2022, THE HYDRAULIC CONDUCTIVITY VALUES COLLECTED THROUGH SLUG TESTING DURING WELL DEVELOPMENT, AND EFFECTIVE POROSITY VALUES OBTAINED FROM PUBLISHED SOURCES.

4. AERIAL IMAGERY SOURCE: GOOGLE EARTH, 6 SEPTEMBER 2021

N

0 300 600
SCALE IN FEET

HALEY ALDRICH

NEW MADRID POWER PLANT
MARSTON, MISSOURI

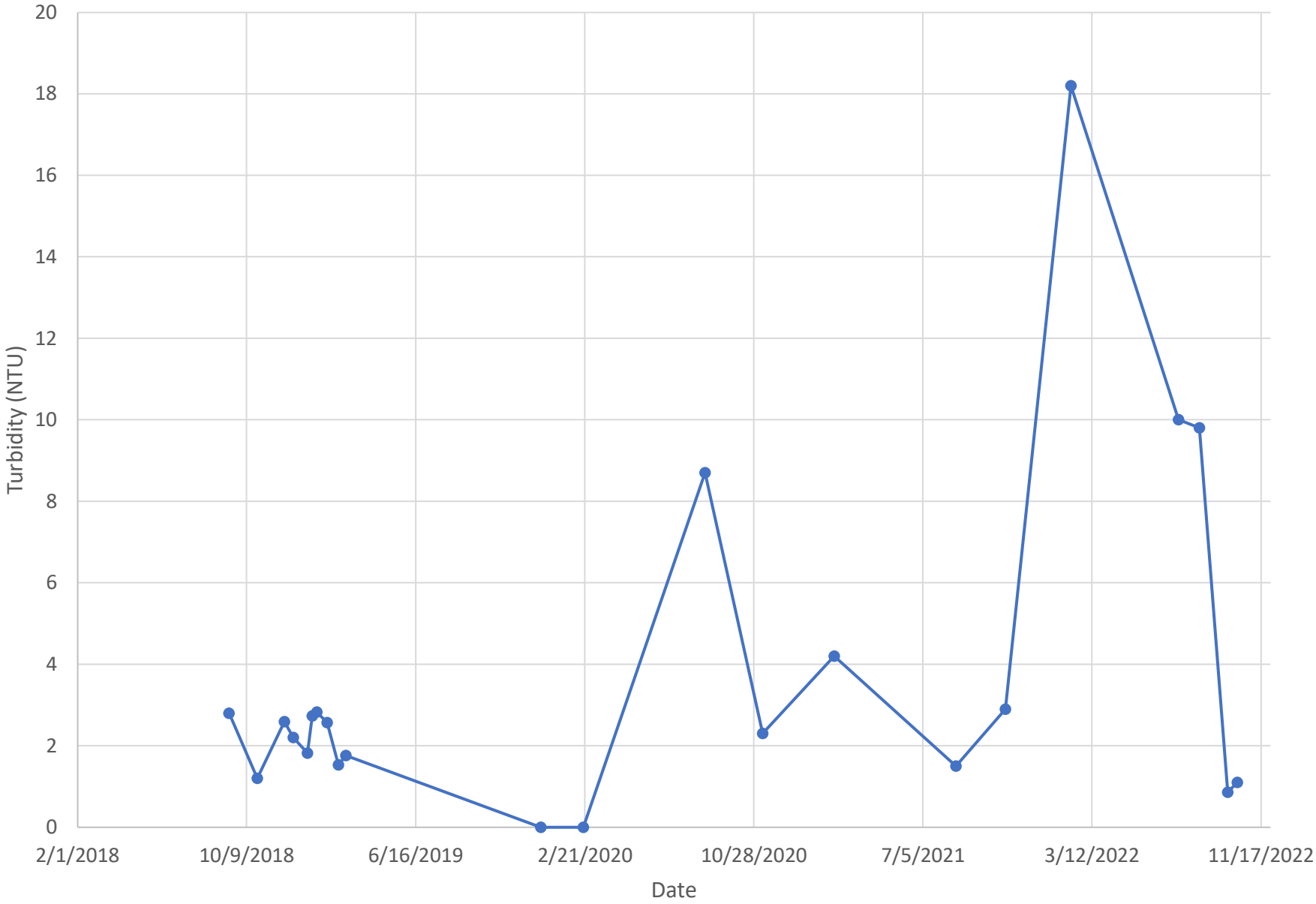
LINED POND GROUNDWATER ELEVATION CONTOUR MAP JANUARY 28, 2022

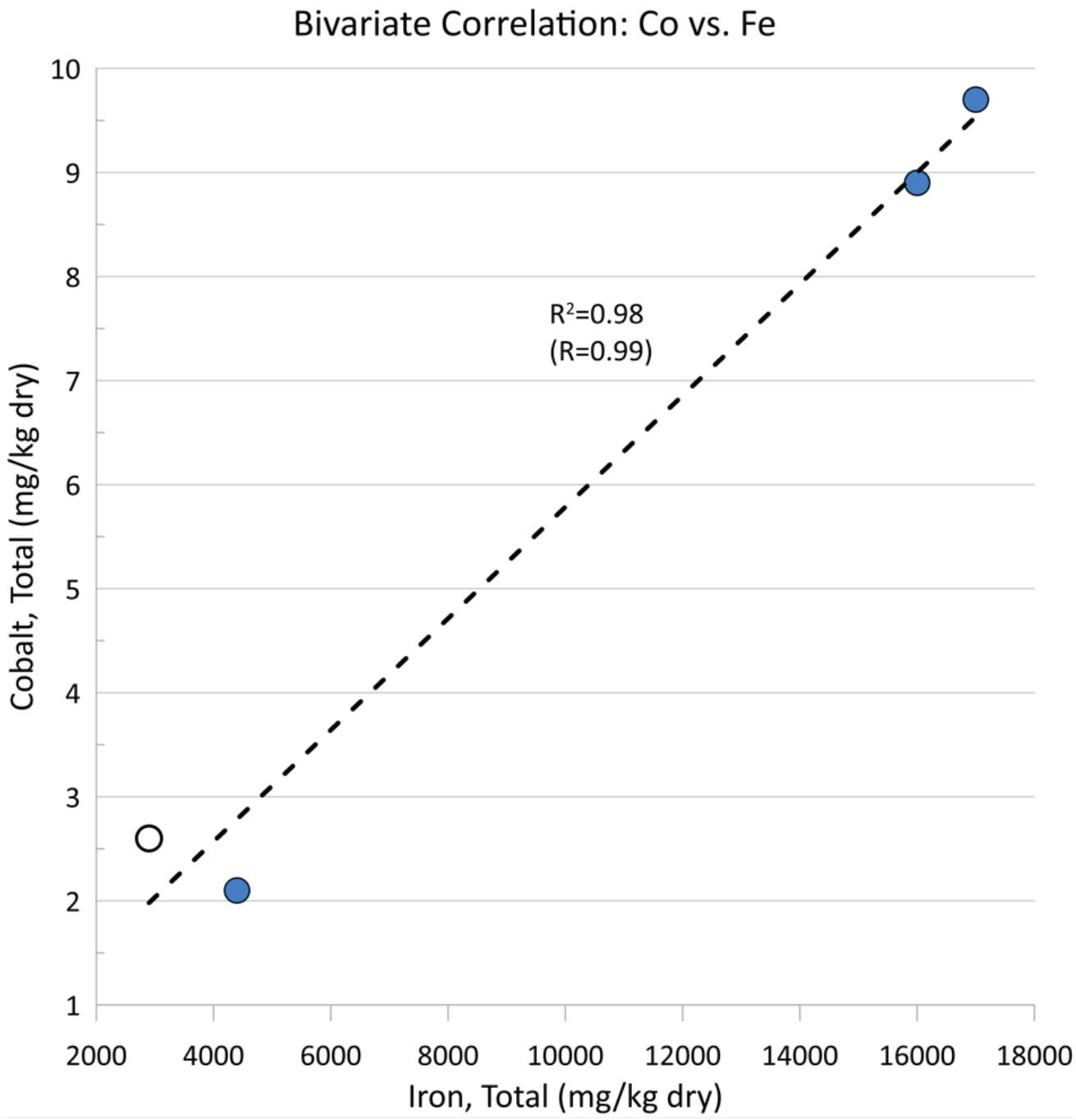
aeci

DECEMBER 2022

FIGURE 2C

Figure 3: P-7 Turbidity





HALEY ALDRICH

NEW MADRID POWER PLANT
MARSTON, MISSOURI

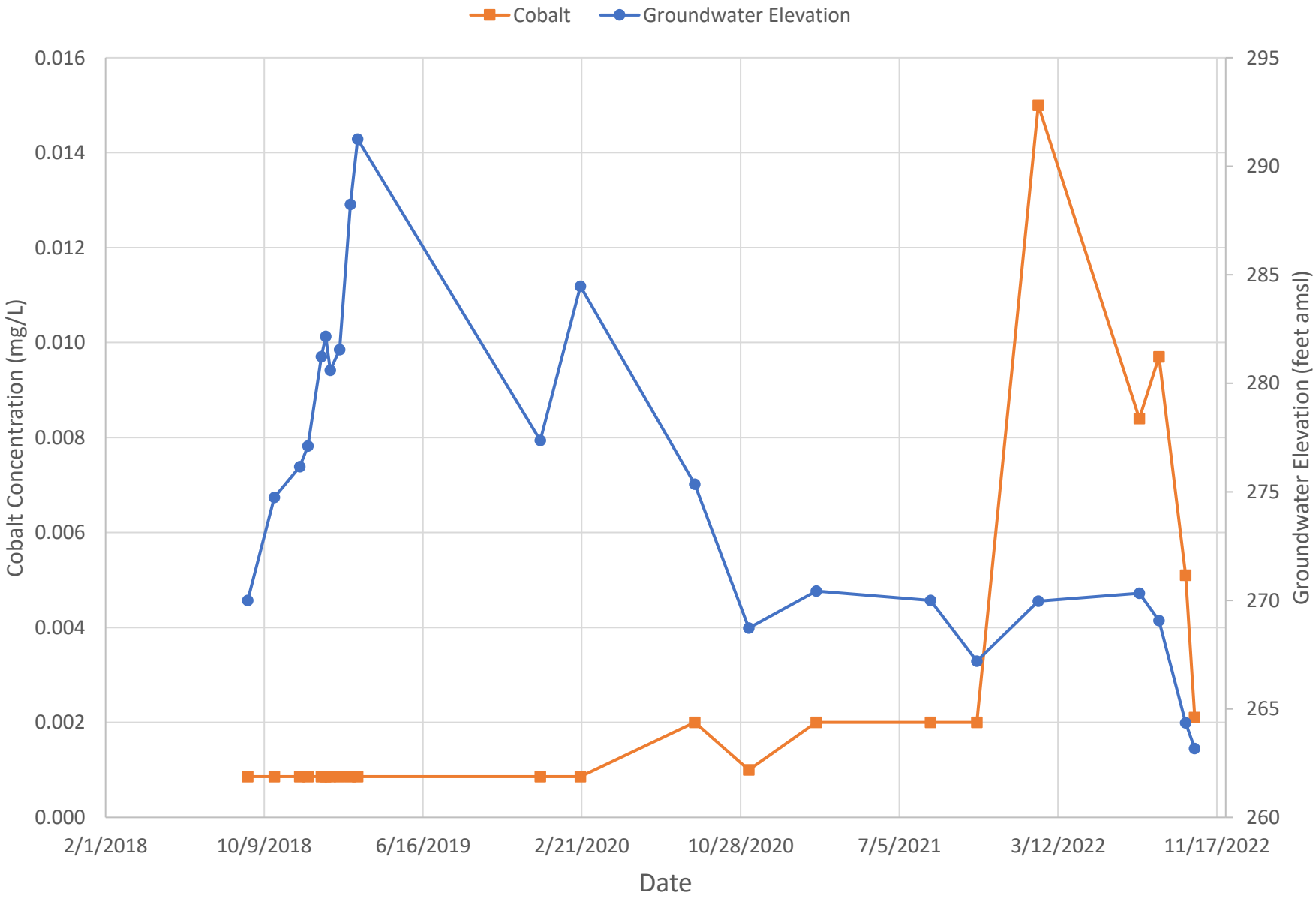
P-7 BIVARIATE LINEAR CORRELATION

aeci

DECEMBER 2022

FIGURE 4

Figure 5: P-7 Cobalt vs Groundwater Elevation



APPENDIX A
P-7 Statistical Outlier Output

Dixon's Test for Outliers

Parameter: Cobalt

Location: P-7

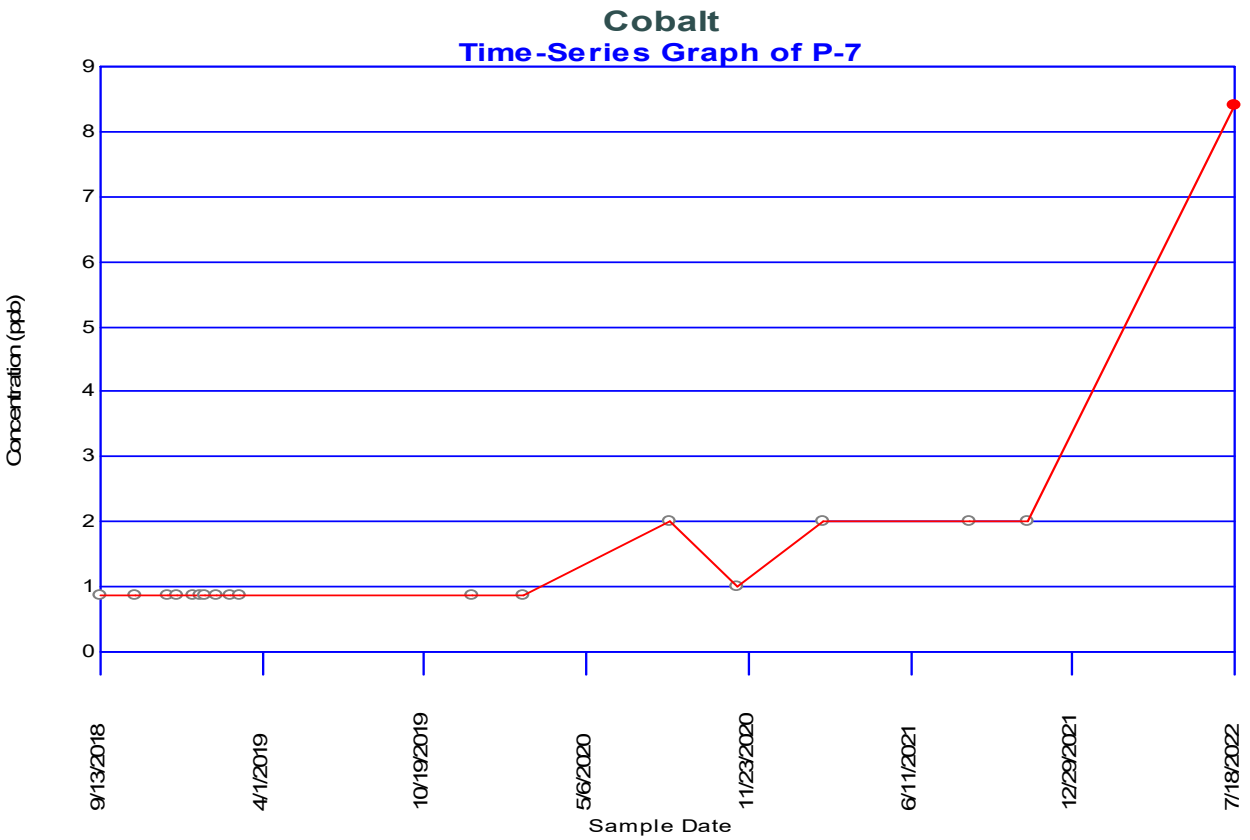
Original Data (Not Transformed)

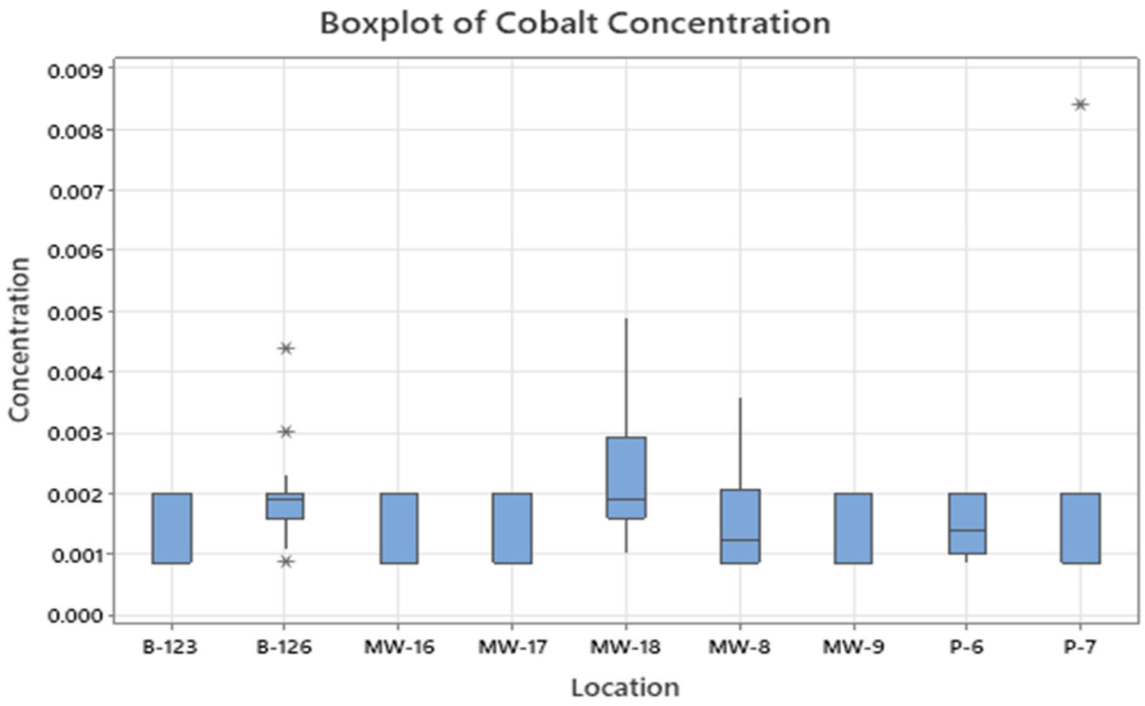
Non-Detects Replaced with Detection Limit

For 18 Measurements...
5% Level of Significance

Iteration	Highest	Lowest	Critical	Outlier
1	0.848806	0	0.475	8.4
2	0	0	0.49	None

Loc.	Date	Conc.	Outlier
P-7	9/13/2018	ND<0.86	FALSE
	10/25/2018	ND<0.86	FALSE
	12/4/2018	ND<0.86	FALSE
	12/17/2018	ND<0.86	FALSE
	1/7/2019	ND<0.86	FALSE
	1/14/2019	ND<0.86	FALSE
	1/21/2019	ND<0.86	FALSE
	2/5/2019	ND<0.86	FALSE
	2/21/2019	ND<0.86	FALSE
	3/5/2019	ND<0.86	FALSE
	12/18/2019	ND<0.86	FALSE
	2/19/2020	ND<0.86	FALSE
	8/17/2020	ND<2	FALSE
	11/10/2020	ND<1	FALSE
	2/24/2021	ND<2	FALSE
	8/23/2021	ND<2	FALSE
	11/4/2021	ND<2	FALSE
	7/18/2022	**8.4**	**TRUE**


Cobalt
Time-Series Graph of P-7
Concentration (ppb)
0
1
2
3
4
5
6
7
8
9
9/13/2018
4/1/2019
10/19/2019
5/6/2020
11/23/2020
6/11/2021
12/29/2021
7/18/2022
Sample Date


Boxplot of Cobalt Concentration
Concentration
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
B-123
B-126
MW-16
MW-17
MW-18
MW-8
MW-9
P-6
P-7
Location

APPENDIX B
EDR Historical Aerial Photograph Report

AECI New Madrid

1400-1498 St Jude Rd

Marston, MO 63866

Inquiry Number: 7162157.2

October 31, 2022

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

10/31/22

Site Name:

AECI New Madrid
1400-1498 St Jude Rd
Marston, MO 63866
EDR Inquiry # 7162157.2

Client Name:

Haley & Aldrich
600 South Meyer Ave Suite 100
Tucson, AZ 85701-0000
Contact: Samantha Kaney

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

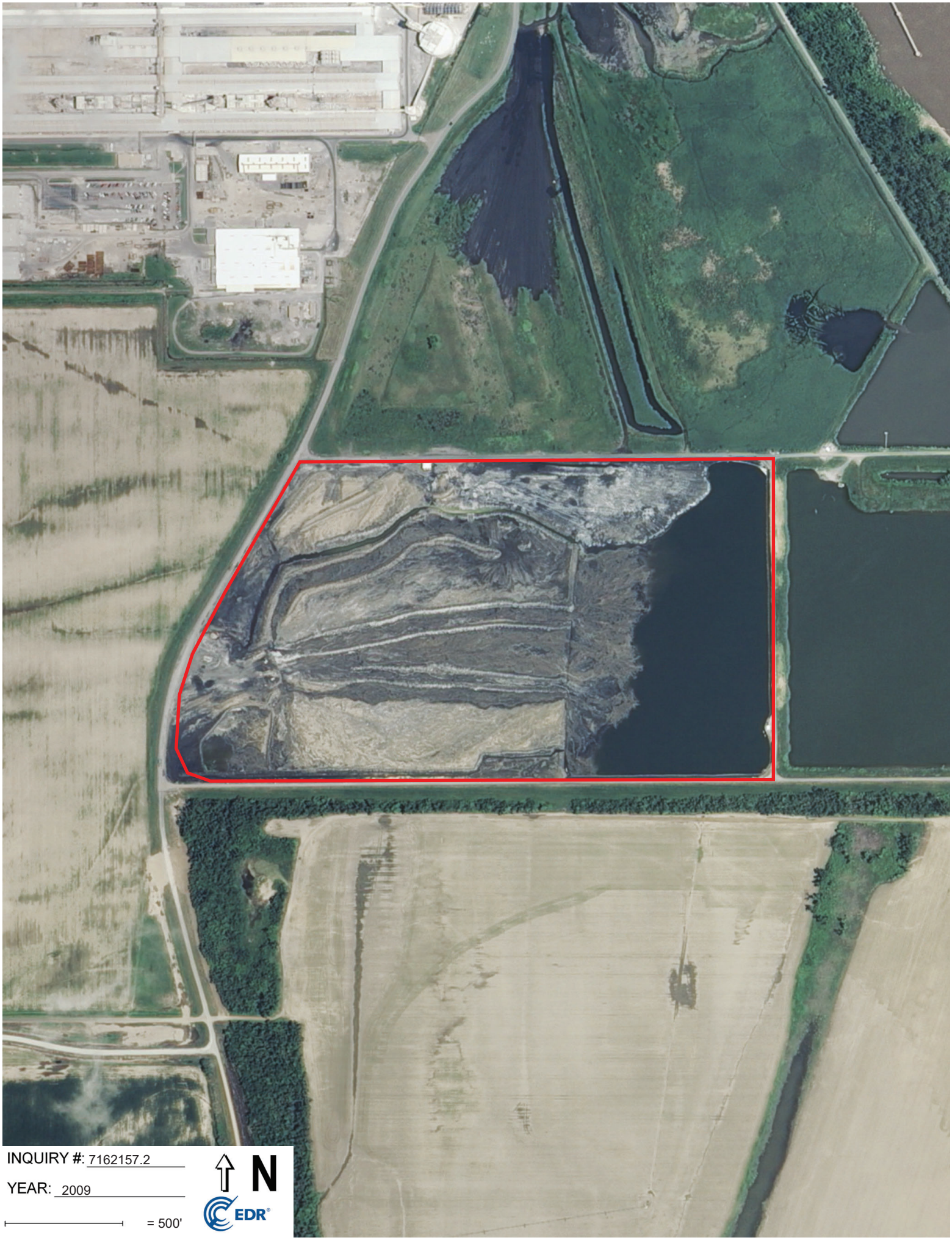
Search Results:

Year	*Scale*	*Details*	*Source*
2016	1"=500'	Flight Year: 2016	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2006	1"=500'	Flight Year: 2006	USDA/NAIP
1996	1"=500'	Acquisition Date: March 22, 1996	USGS/DOQQ
1993	1"=500'	Acquisition Date: January 01, 1993	USGS/DOQQ
1992	1"=500'	Flight Date: March 07, 1992	NAPP
1988	1"=500'	Flight Date: March 22, 1988	USGS
1969	1"=500'	Flight Date: March 17, 1969	USGS
1952	1"=500'	Flight Date: October 24, 1952	USGS
1950	1"=500'	Flight Date: April 01, 1950	USGS

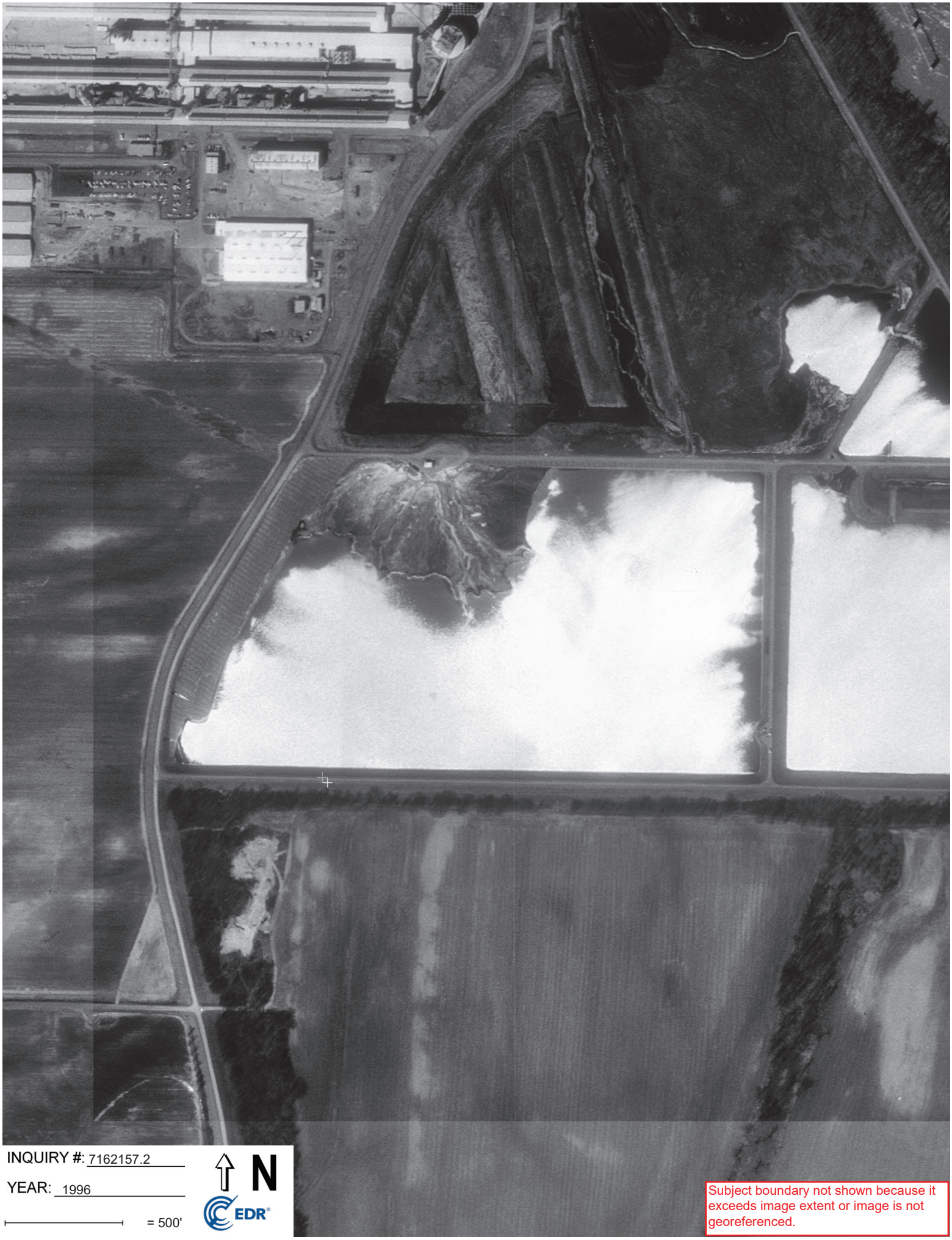
When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.


INQUIRY #: 7162157.2
YEAR: 2016
= 500'
N
EDR


INQUIRY #: 7162157.2
YEAR: 2012
= 500'
N
EDR


INQUIRY #: 7162157.2
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 7162157.2
YEAR: 2006
= 500'
N
EDR



INQUIRY #: 7162157.2

YEAR: 1996

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

INQUIRY #: 7162157.2

YEAR: 1993

= 500'

N

EDR

INQUIRY #: 7162157.2

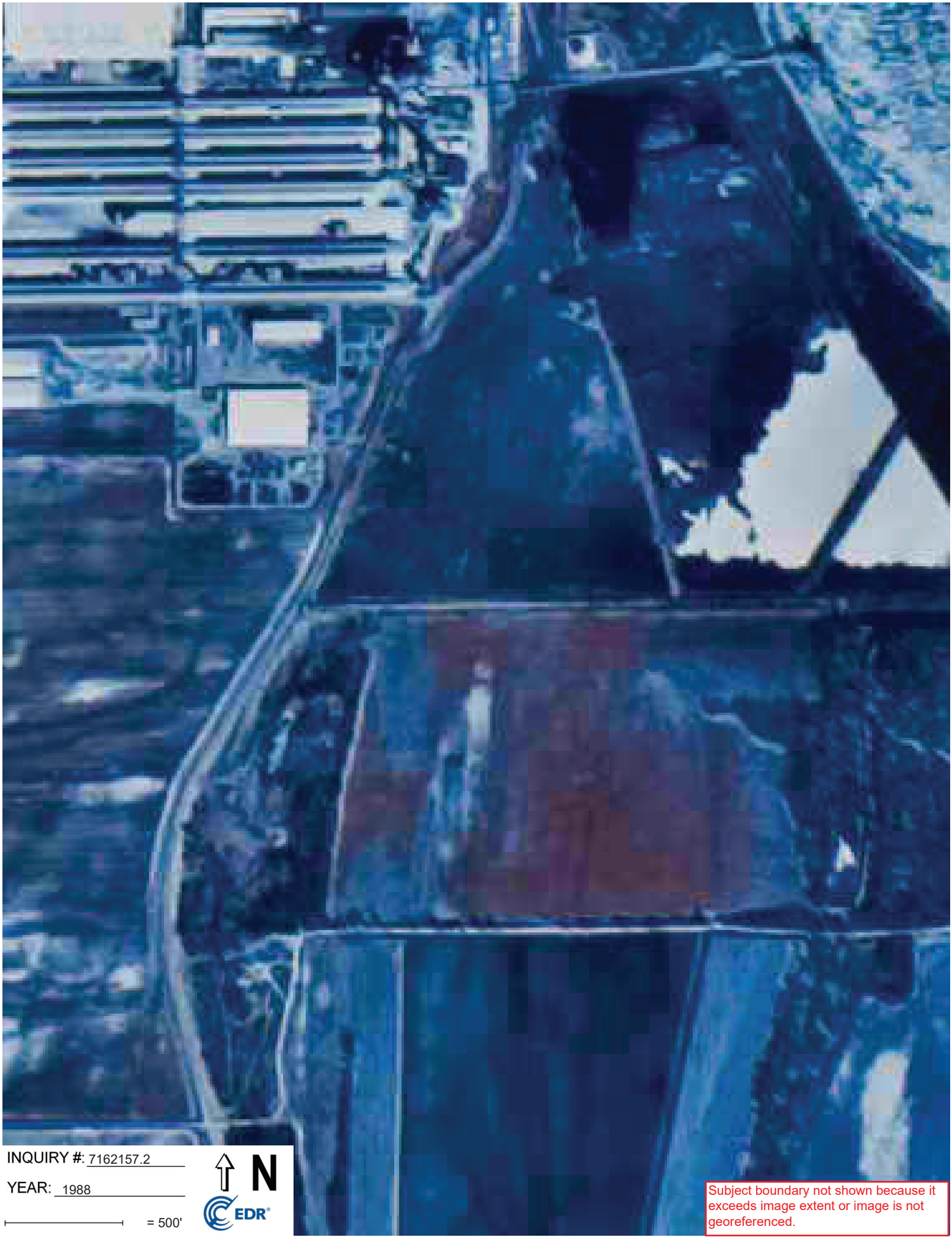
YEAR: 1992

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.



INQUIRY #: 7162157.2

YEAR: 1988

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

INQUIRY #: 7162157.2

YEAR: 1969

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

INQUIRY #: 7162157.2

YEAR: 1952

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

INQUIRY #: 7162157.2

YEAR: 1950

= 500'

N

EDR

Subject boundary not shown because it exceeds image extent or image is not georeferenced.

APPENDIX C
EDR Topographic Map Research Results

AECI New Madrid
1400-1498 St Jude Rd
Marston, MO 63866

Inquiry Number: 7162157.1
October 28, 2022

EDR Historical Topo Map Report

with QuadMatch™

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Historical Topo Map Report

10/28/22

Site Name:

AECI New Madrid
1400-1498 St Jude Rd
Marston, MO 63866
EDR Inquiry # 7162157.1

Client Name:

Haley & Aldrich
600 South Meyer Ave Suite 100
Tucson, AZ 85701-0000
Contact: Samantha Kaney

EDR Topographic Map Library has been searched by EDR and maps covering the target property location as provided by Haley & Aldrich were identified for the years listed below. EDR's Historical Topo Map Report is designed to assist professionals in evaluating potential liability on a target property resulting from past activities. EDRs Historical Topo Map Report includes a search of a collection of public and private color historical topographic maps, dating back to the late 1800s.

Search Results:

P.O.# 129342-054-001-01

Project: AECI NMPP Lined Pond ASD

Coordinates:

Latitude:	36.502163 36° 30' 8" North
Longitude:	-89.560061 -89° 33' 36" West
UTM Zone:	Zone 16 North
UTM X Meters:	270716.94
UTM Y Meters:	4042696.23
Elevation:	291.00' above sea level

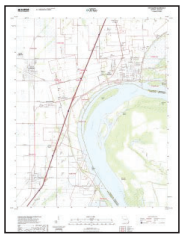
Maps Provided:

2017	1931, 1934
2015	
1982	
1973	
1971	
1954, 1955	
1951	
1939	

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

2017 Source Sheets



New Madrid
2017
7.5-minute, 24000

Point Pleasant
2017
7.5-minute, 24000

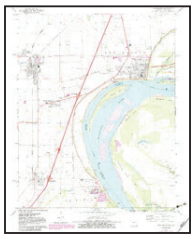
2015 Source Sheets

New Madrid
2015
7.5-minute, 24000

Point Pleasant
2015
7.5-minute, 24000

1982 Source Sheets

Point Pleasant
1982
7.5-minute, 24000
Aerial Photo Revised 1981



New Madrid
1982
7.5-minute, 24000
Aerial Photo Revised 1981

1973 Source Sheets

Portageville
1973
15-minute, 62500
Aerial Photo Revised 1969

Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

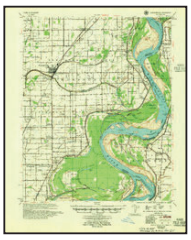
1971 Source Sheets

New Madrid
1971
7.5-minute, 24000
Aerial Photo Revised 1969

Point Pleasant
1971
7.5-minute, 24000
Aerial Photo Revised 1969

1954, 1955 Source Sheets

New Madrid
1954
15-minute, 62500
Aerial Photo Revised 1950

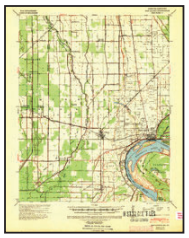


Portageville
1955
15-minute, 62500
Aerial Photo Revised 1950

1951 Source Sheets

New Madrid SE
1951
7.5-minute, 24000
Aerial Photo Revised 1950

1939 Source Sheets



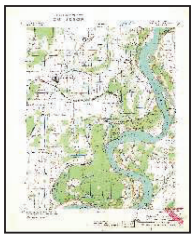
New Madrid
1939
15-minute, 62500

Portageville
1939
15-minute, 62500

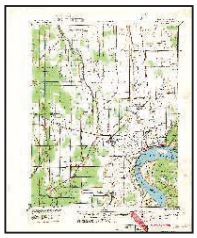
Topo Sheet Key

This EDR Topo Map Report is based upon the following USGS topographic map sheets.

1931, 1934 Source Sheets



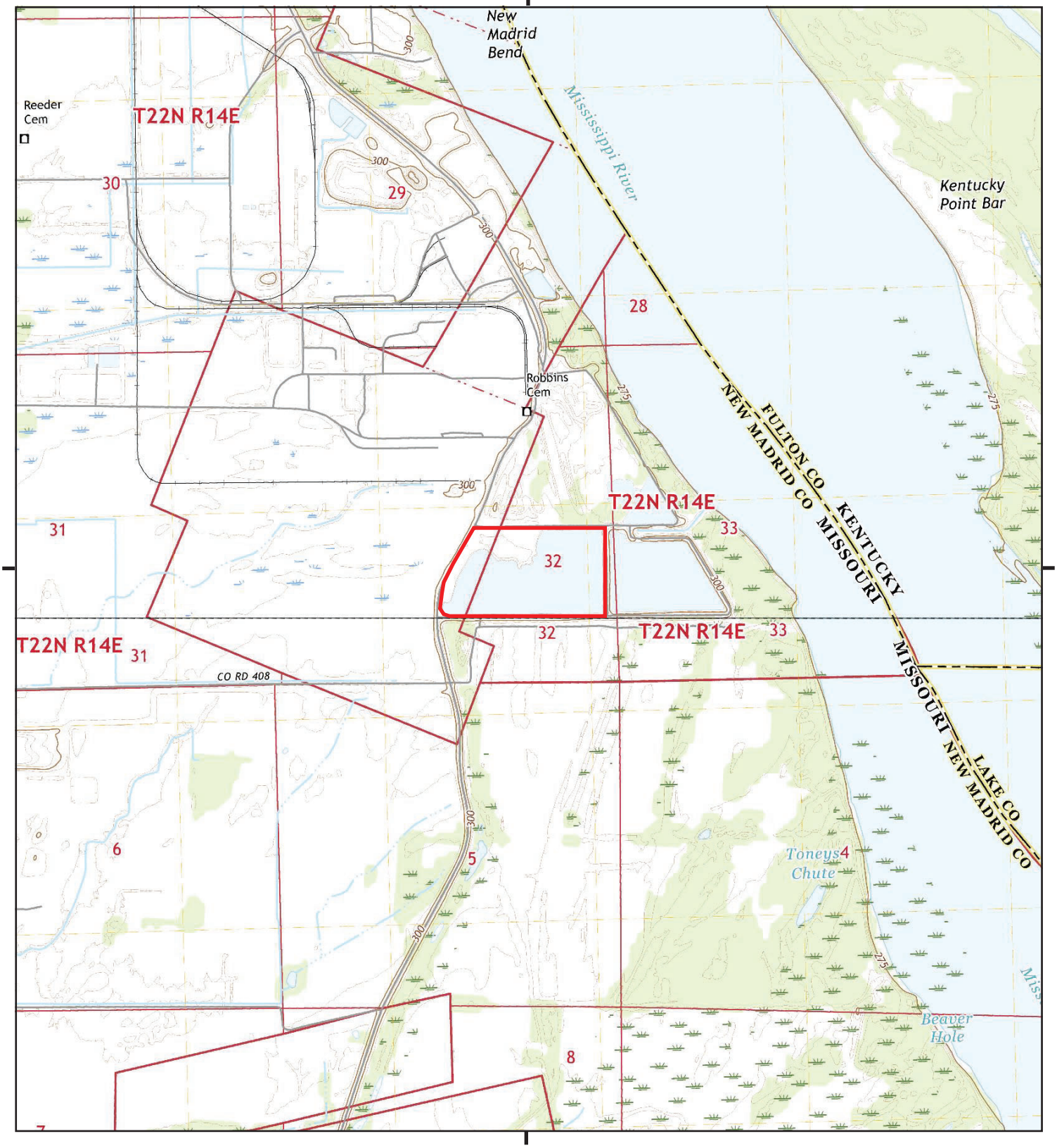
PORTAGEVILLE
1931
15-minute, 62500



NEW MADRID
1934
15-minute, 62500

Historical Topo Map

2017



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

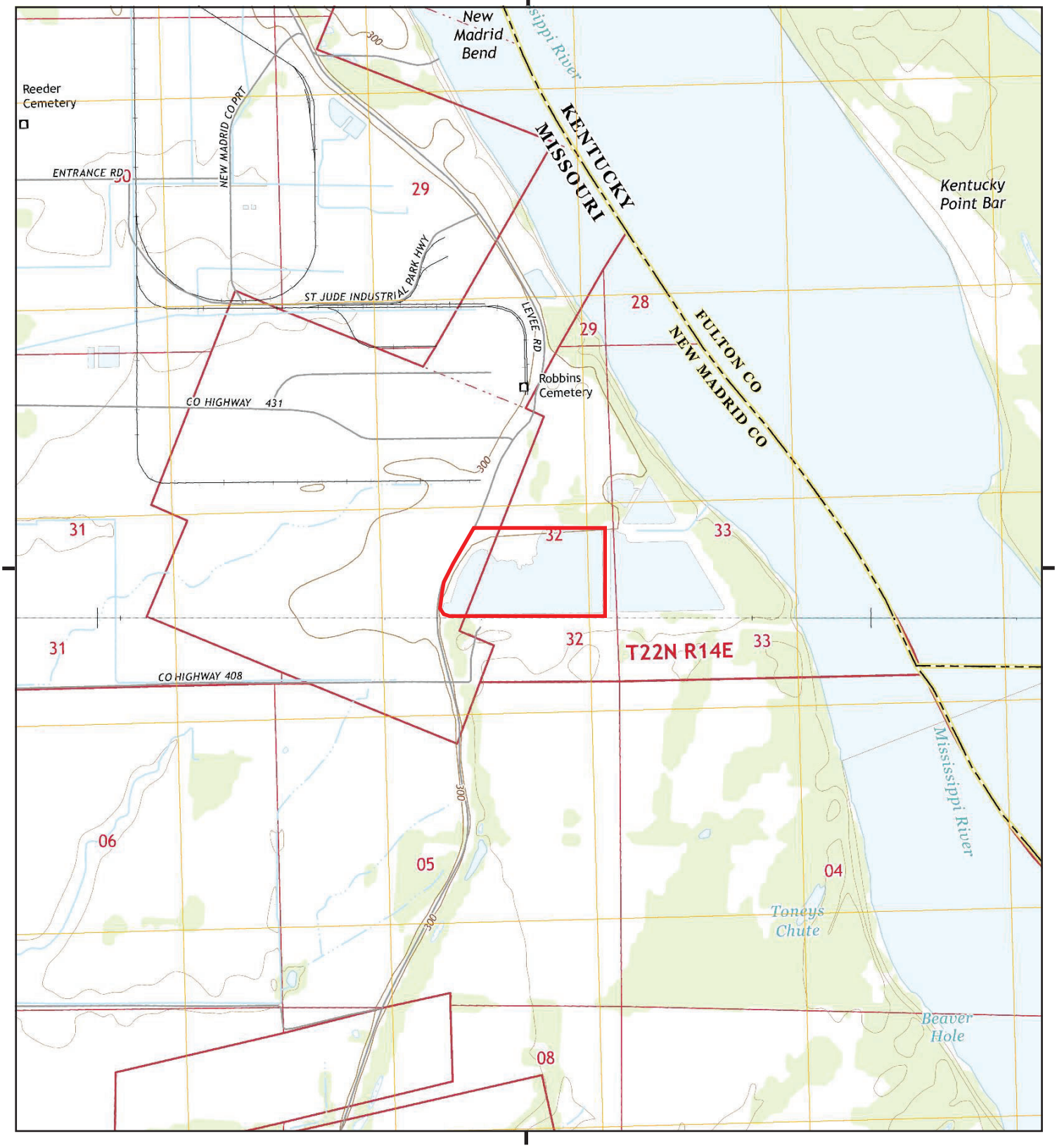
TP, New Madrid, 2017, 7.5-minute
S, Point Pleasant, 2017, 7.5-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N

Historical Topo Map

2015



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

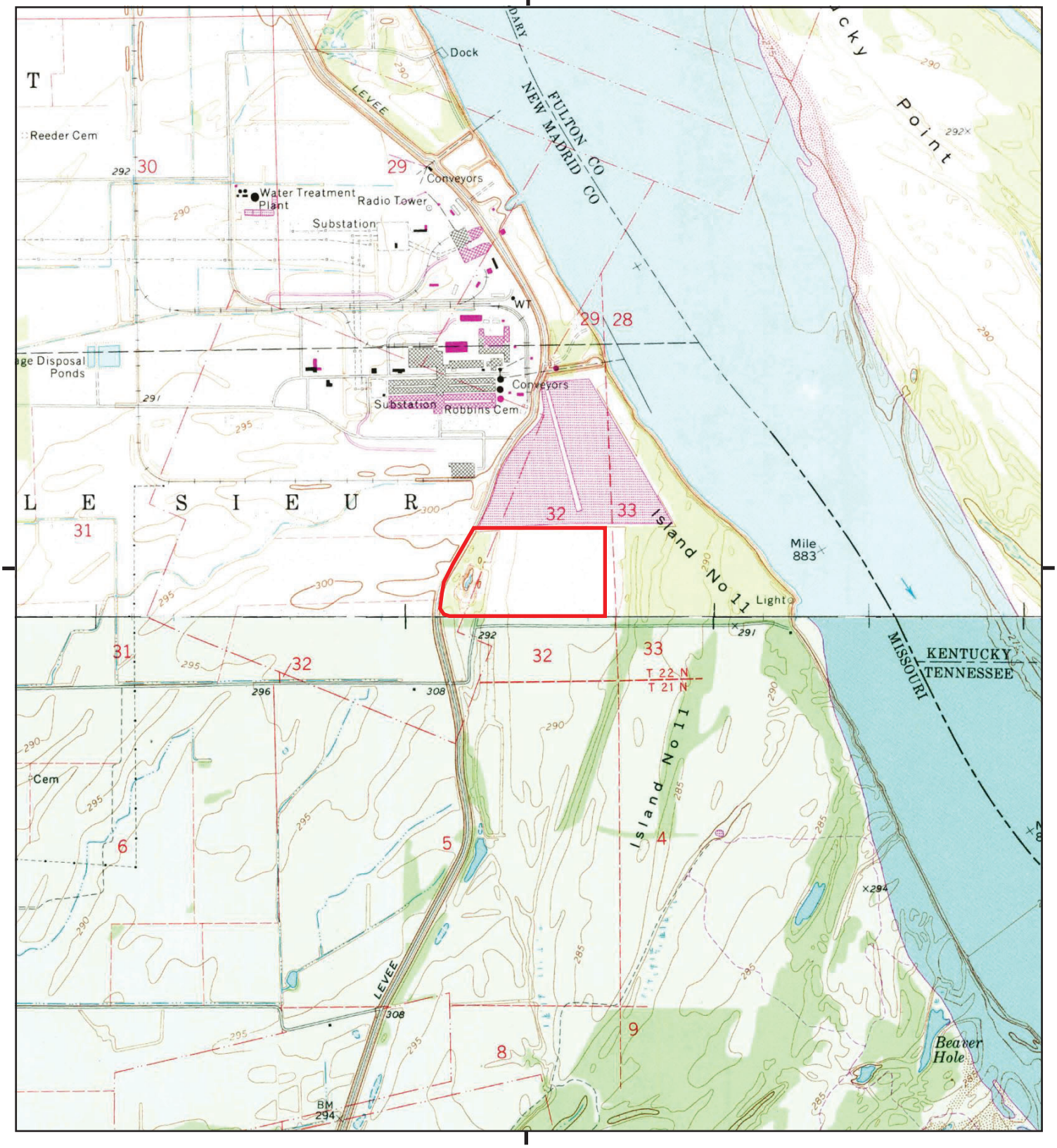
TP, New Madrid, 2015, 7.5-minute
S, Point Pleasant, 2015, 7.5-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N

Historical Topo Map

1982



This report includes information from the following map sheet(s).

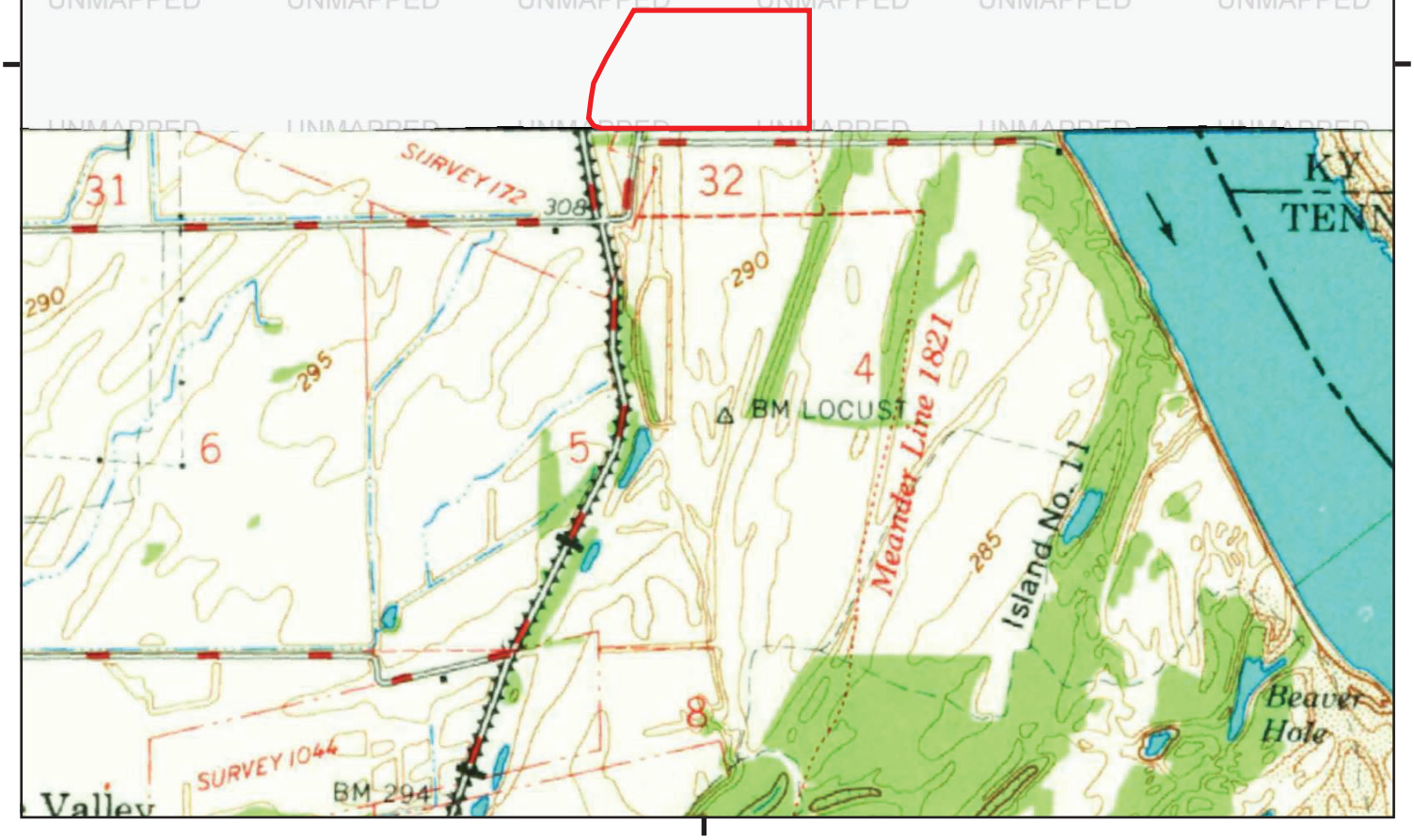
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, New Madrid, 1982, 7.5-minute
S, Point Pleasant, 1982, 7.5-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

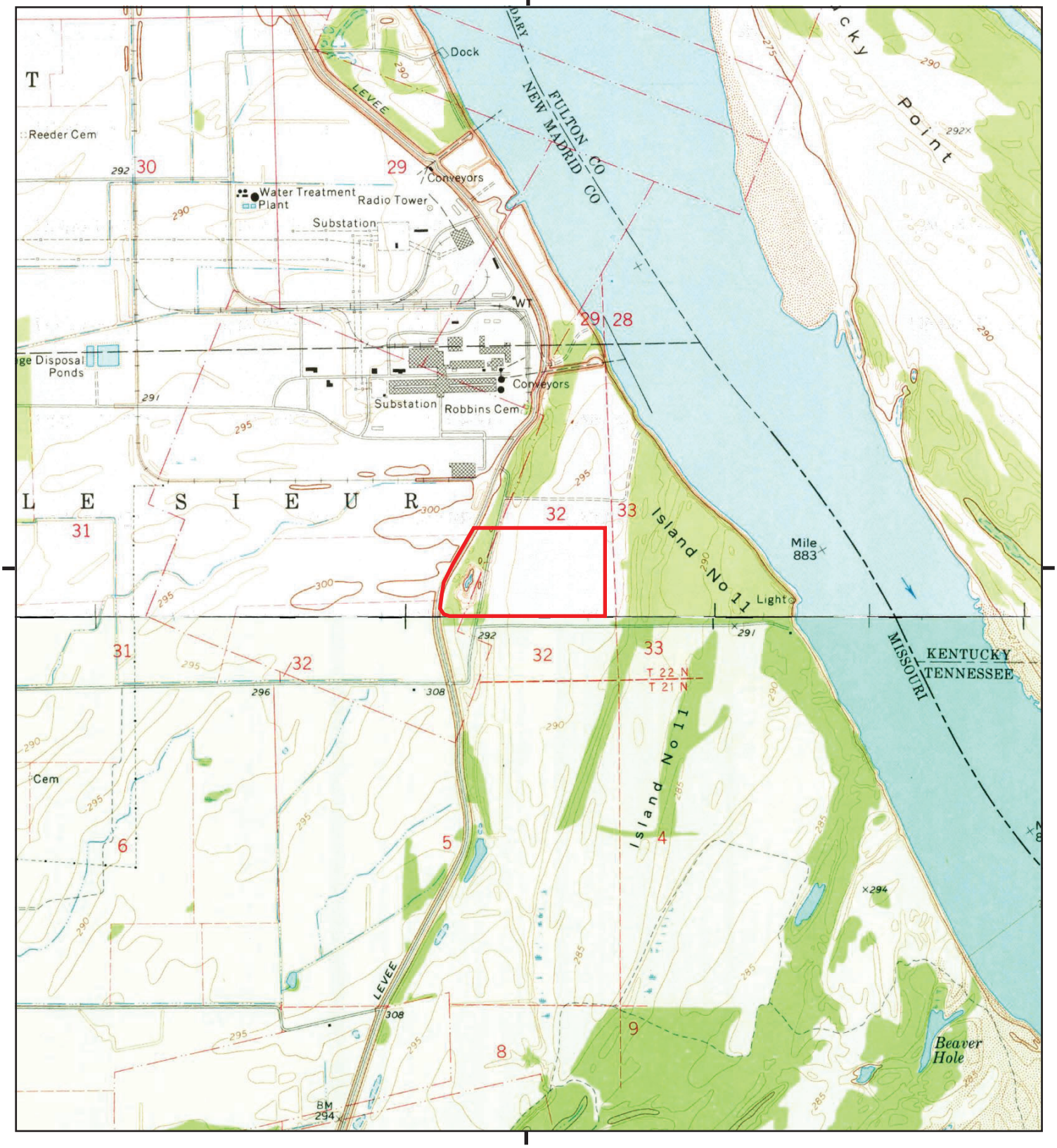
S, Portageville, 1973, 15-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N

Historical Topo Map

1971



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

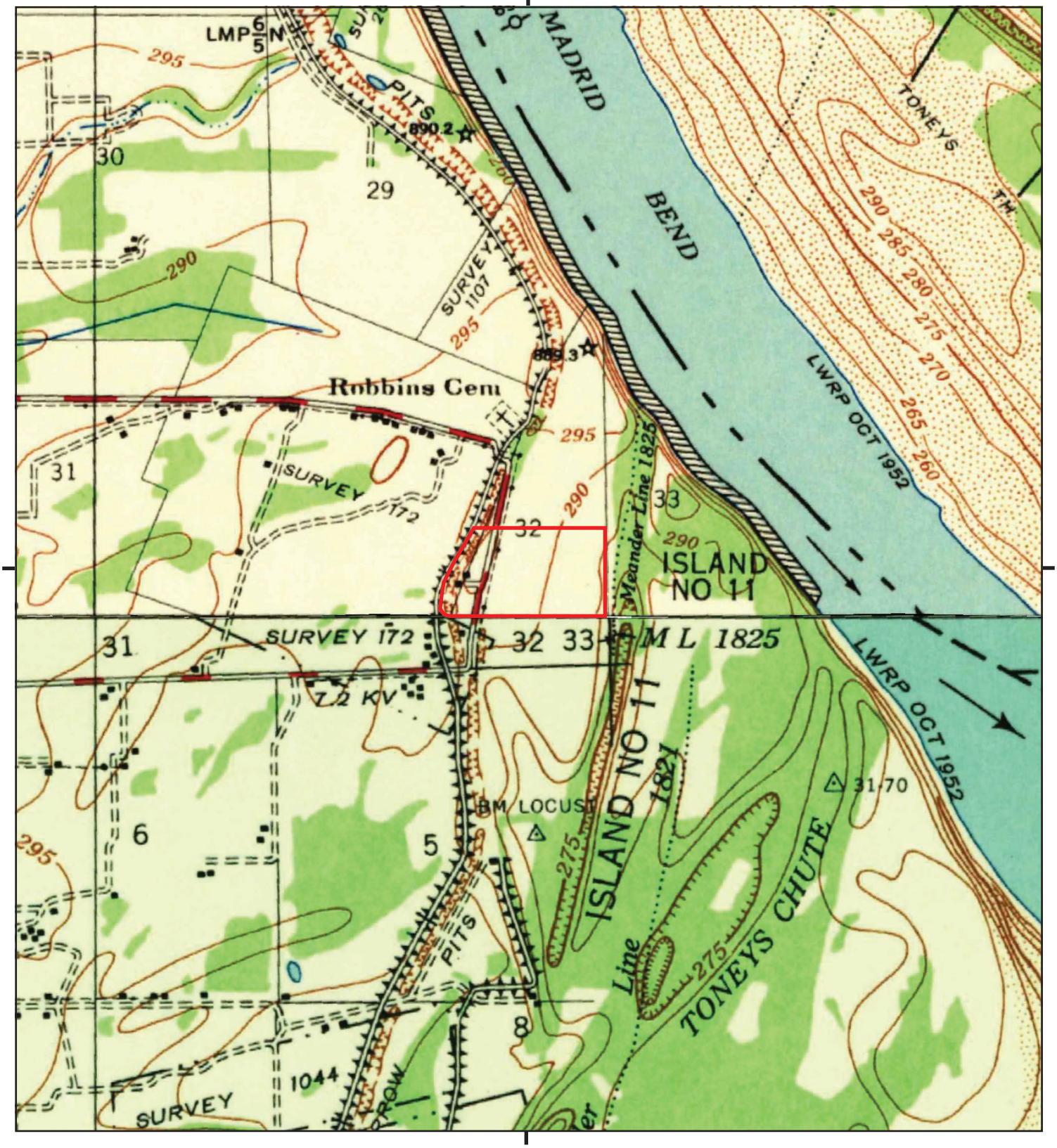
TP, New Madrid, 1971, 7.5-minute
S, Point Pleasant, 1971, 7.5-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N

Historical Topo Map

1954, 1955



This report includes information from the following map sheet(s).

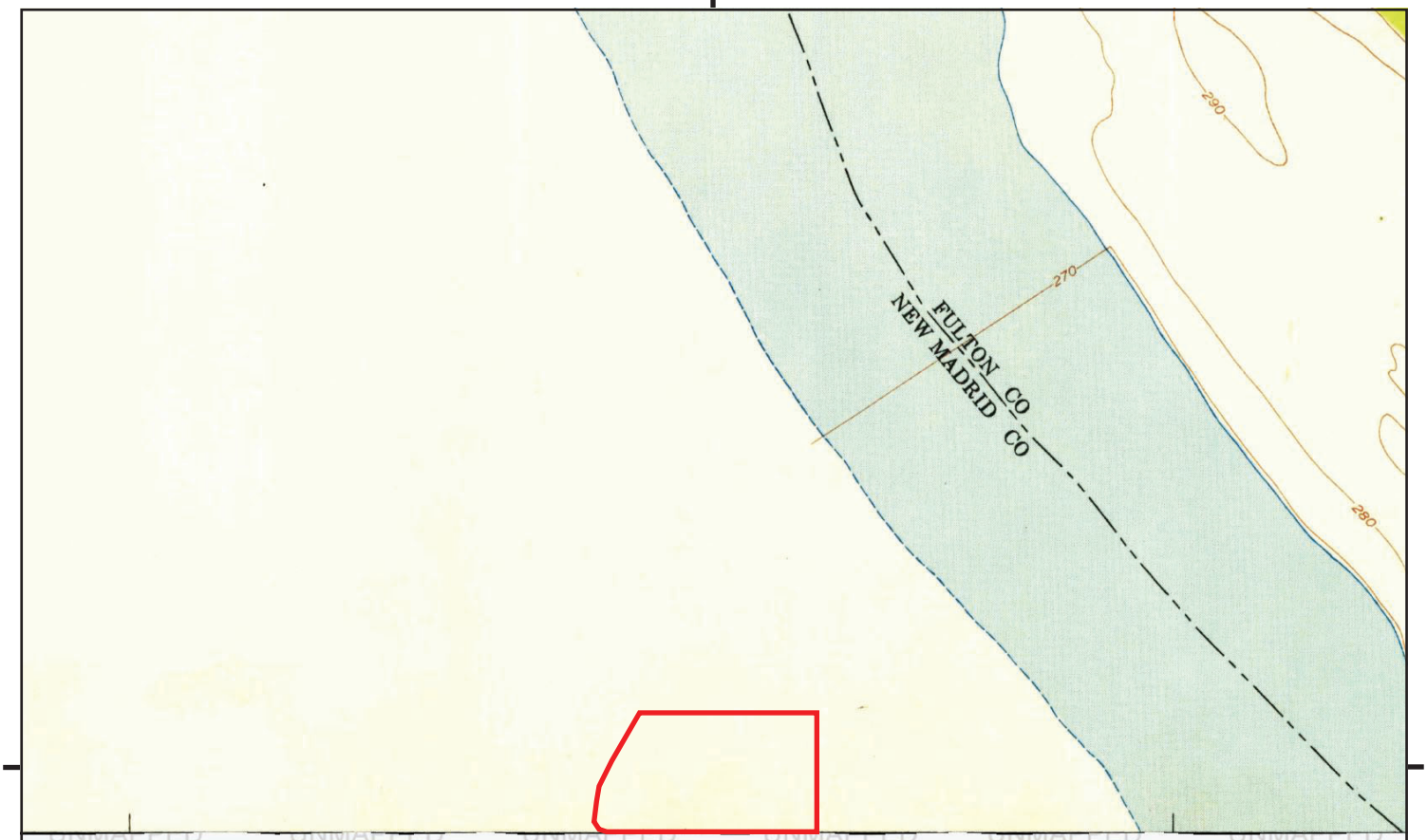
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, New Madrid, 1954, 15-minute
S, Portageville, 1955, 15-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N



This report includes information from the following map sheet(s).

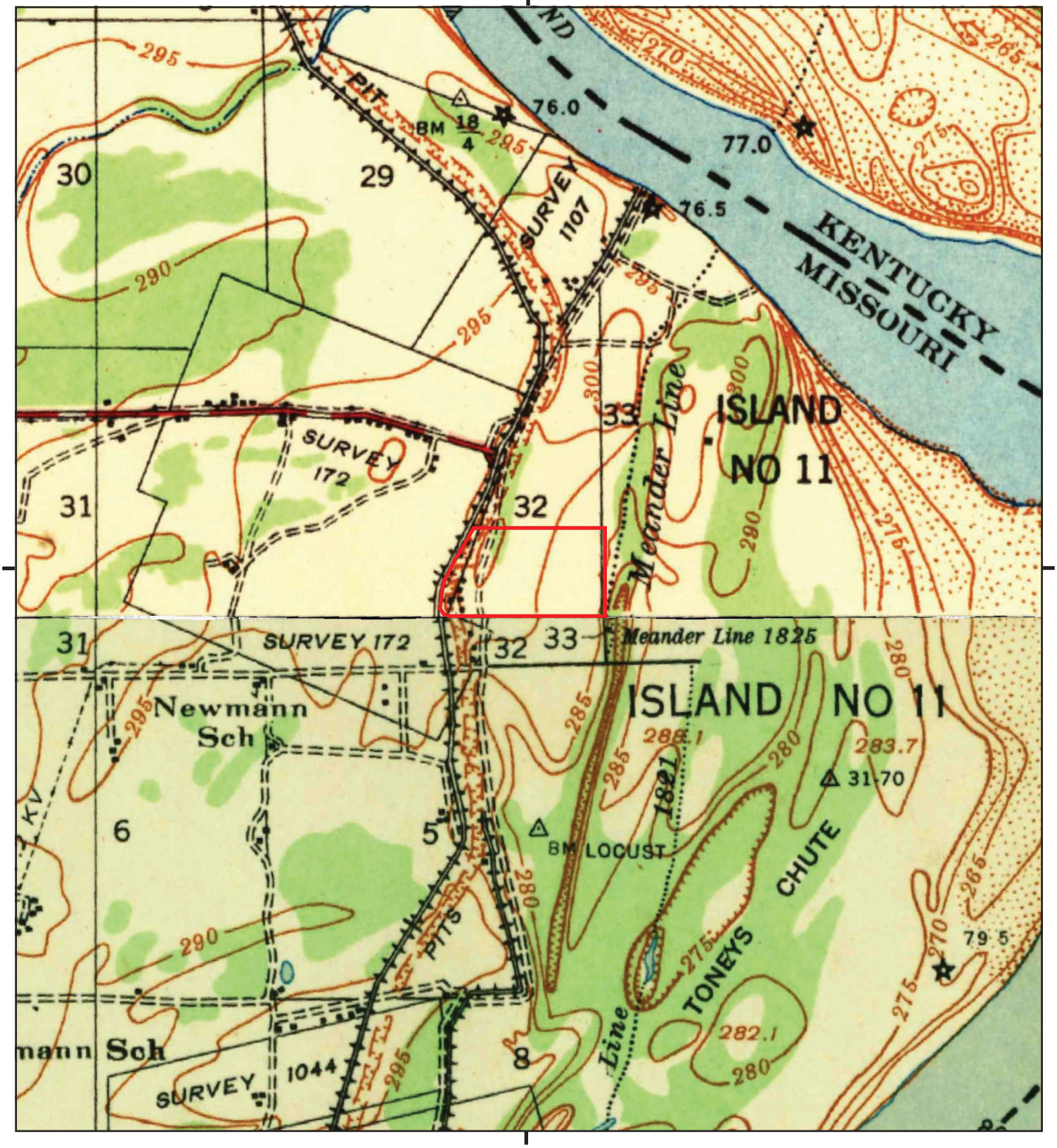
0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, New Madrid SE, 1951, 7.5-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N



This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, New Madrid, 1939, 15-minute
S, Portageville, 1939, 15-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N

This report includes information from the following map sheet(s).

0 Miles 0.25 0.5 1 1.5

NW N NE
W E
SW S SE

TP, NEW MADRID, 1934, 15-minute
S, PORTAGEVILLE, 1931, 15-minute

SITE NAME: AECI New Madrid
ADDRESS: 1400-1498 St Jude Rd
Marston, MO 63866
CLIENT: Haley & Aldrich

N