REPORT

2020 Annual Groundwater Monitoring & Corrective Action Report

RD Morrow Generating Station, Purvis, Lamar County, Mississippi, USA

Submitted to:

Cooperative Energy
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Submitted by:

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Golder Project No. 19117989

January 28, 2021

Executive Summary

This report presents the *2020 Annual Groundwater Monitoring & Corrective Action Report, R.D. Morrow, Sr. Generating Station*, Purvis, Lamar County, Mississippi. Groundwater monitoring and reporting for the Morrow facility is performed in accordance with the United States Environmental Protection Agency (US EPA) Coal Combustion Residual (CCR) Rule published in the Code of Federal Regulations Title 40 Part 257 (40 CFR Part 257, Subpart D) dated April 17, 2015, 40 CFR § 257.90 through § 257.98. As required in 40 CFR § 257.90(e), this Annual Report describes the status of the groundwater monitoring program, summarizes key actions completed, describes any problems encountered, discusses actions to resolve the problems, and presents key activities for the upcoming year.

The *R.D. Morrow, Sr. Generating Station* (Morrow or the Plant) has two CCR units:

- **Surface Impoundment** - The surface impoundment is currently following a detection monitoring program in accordance with § 257.94. It began the annual reporting period in detection monitoring and ended in detection monitoring. There have been no statistically significant increases (SSIs) over background for constituents listed in Appendix III under the detection monitoring program.
- **Landfill Unit** – The CCR landfill unit has initiated Assessment Monitoring in accordance with § 257.95, filing the Notice of Establishment of Assessment Monitoring Program on May 16, 2018. It began the annual reporting period in assessment monitoring and ended in assessment monitoring. There have been statistically significant increases (SSIs) over background for constituents listed in Appendix III and IV, as more fully described herein.

2020 Groundwater Monitoring Activities

Groundwater elevation measurements were recorded from the site monitoring wells prior to each sampling event. The elevation data were used to confirm the groundwater flow direction and to confirm that the groundwater monitoring well network for the CCR units remains sufficient to monitor groundwater downgradient of the unit. With respect to each CCR Unit, the following activities took place during the 2020 calendar year:

- **Surface Impoundment**
  - There was no change to the Surface Impoundment certified groundwater monitoring system in 2020. The network remained the same as the previous 2019 reporting year.
  - Semi-annual groundwater sampling events for the Surface Impoundment CCR unit were conducted in April 2020 and September 2020. Groundwater samples were collected and analyzed for Appendix III constituents from the detection monitoring well network.
  - Surface impoundment statistical analyses completed in 2020 include analysis of results from the October 2019, April 2020, and September 2020 monitoring events. Statistical analysis is performed in accordance with the site's certified statistical analysis method. The statistical assessment indicates no exceedances of the established prediction limits for Appendix III constituents. The impoundment network remains in detection monitoring.

- Cooperative Energy filed a Notice of Intent to Close the surface impoundment on June 16, 2020, well in advance of the deadline for unlined surface impoundments to commence closure pursuant to 40 CFR § 257.102(e). In 2020, Cooperative Energy commenced closure by removal activities pursuant to 40 CFR § 257.102(c). Those activities were ongoing at the end of the annual reporting period.

- **Landfill**
  - There is no change to the Landfill certified detection monitoring network in 2020. The assessment well network has been modified following completion of an alternate source demonstration (ASD) for lithium at monitoring wells MW-3 and MW-4. Monitoring wells MW-11 and MW-12 were monitored in the first semi-annual groundwater sampling event (April 2020) but following completion of the ASD they were removed from the network prior to the second semi-annual event. They will no longer be monitored. Supplemental monitoring points P-A and P-B, which were not part of the network, were abandoned.
  - The Assessment of Corrective Measures (ACM) began on May 15, 2019. Cooperative Energy filed its ACM Report in the operating record, documenting its initial efforts to identify the appropriate corrective measures to address groundwater impacts from the Landfill. The corrective measures assessment was ongoing in 2020. Semi-annual remedy progress reports in the spring and fall of 2020 discuss these efforts.
  - Groundwater monitoring sampling events for the CCR Landfill unit were conducted in February (Annual), and in April and September 2020 (Semi-annual). Groundwater samples were collected and analyzed for both Appendix III and Appendix IV constituents from each of the monitoring wells.
  - Alternate Source Demonstration (ASD) – An ASD has been prepared to address SSLs for lithium identified at MW-3 and MW-4. The ASD concludes that the source of the elevated concentrations of lithium at MW-3 and MW-4 are not the result of a release from the CCR Landfill Unit but are instead attributed to naturally-occurring lithium in subsurface aquifer materials.
  - Landfill unit statistical analyses completed in 2020 include analysis of results from the October 2019, April 2020, and September 2020 monitoring events. Statistical analysis is conducted in accordance with the site's certified statistical analysis method. For each of the statistical monitoring events, statistical analyses indicate statistically significant increases (SSIs) for Appendix III constituents above the prediction limit and statistically significant levels (SSLs) of Appendix IV constituents above the groundwater protection standards as summarized below. The Landfill network remains in assessment monitoring.

- Pursuant to 40 CFR § 257.90 (e)(6)(iii)-(iv), the following table presents the Appendix III and IV constituents with SSIs or SSLs, respectively, by monitoring well.

Appendix III Constituent	October 2019	April 2020	September 2020
Boron	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5
Calcium	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5
Chloride	MW-5	MW-5	MW-5
pH	MW-5	MW-3, MW-5	MW-5
Sulfate	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5
TDS	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5
Appendix IV Constituent	**October 2019**	**April 2020**	**September 2020**
Lithium	MW-3, MW-4, MW-5	MW-3, MW-4, MW-5	MW-5
Molybdenum	MW-5	MW-5	MW-5

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FIGURES & TABLES

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Certification

This *2020 Annual Groundwater Monitoring & Corrective Action Report, R.D. Morrow, Sr. Generating Station*, Purvis, Lamar County, Mississippi, USA has been prepared to comply with the United States Environmental Protection Agency (EPA) Coal Combustion Residuals (CCR) rule (40 Code of Federal Regulations [CFR] 257 Subpart D; published in 80 FR 21302-21501, April 17, 2015) under the direction of a licensed professional engineer, with Golder Associates Inc.

Golder Associates Inc.

Dawn L. Prell, CPG
Senior Hydrogeologist

I hereby certify that this *2020 Annual Groundwater Monitoring & Corrective Action Report, R.D. Morrow, Sr. Generating Station,* located at 304 Old Okahola School Road, Purvis, Lamar County, MS 39475 has been prepared to meet the requirements of 40 CFR § 257.90(e).

Jeffrey R. Piaskowski, PE
Mississippi Registered Professional Engineer No.30525

1.0 INTRODUCTION

This *2020 Annual Groundwater Monitoring and Corrective Action Report* (Annual Report) has been prepared by Golder Associates Inc. (Golder) for the RD Morrow Generating Station (Morrow or Site) operated by Cooperative Energy.

1.1 Purpose

The United States Environmental Protection Agency (US EPA) Coal Combustion Residual (CCR) Rule was published in the Code of Federal Regulations Title 40 Part 257 (40 CFR Part 257, Subpart D) on April 17, 2015. The Rule identifies an effective date of October 19, 2015. The CCR Rule regulates CCRs as non-hazardous waste under Subtitle D of the Resource Conservation and Recovery Act (RCRA) and applies to new and existing landfills and surface impoundments.

As required in 40 CFR § 257.90(e), this Annual Report describes the status of the groundwater monitoring program, summarizes key actions completed, describes any problems encountered, discusses actions to resolve the problems, and presents project key activities for the upcoming year. Groundwater monitoring and reporting for the Morrow facility are performed in accordance with the requirements of 40 CFR § 257.90 through § 257.98. This report documents the activities completed during the 2020 calendar year.

1.2 Site Description and Background

The Morrow facility is located in the community of Okahola, a rural area of Lamar County, approximately 4.5 miles north of the City of Purvis and 8 miles southwest of Hattiesburg. Old Okahola School Road bisects the property into a northern and southern parcel. The location of the Site property and surrounding area is shown on Figure 1, Site Location Map.

CCR at the Morrow facility have been managed on-site in two CCR Units, a surface impoundment and a landfill. Both are subject to compliance with the CCR Rule.

The generating plant and CCR surface impoundment unit are located on the north parcel while the landfill unit is within the south parcel, as shown in Figure 2, Well Location Map. The Morrow CCR Units include:

- **Surface Impoundment** - The surface impoundment unit is currently following a detection monitoring program in accordance with § 257.94. Cooperative Energy filed a Notice of Intent to Close the surface impoundment on June 16, 2020. In 2020, Cooperative Energy commenced closure by removal activities pursuant to 40 CFR § 257.102(c);
- **Landfill Unit** – The CCR landfill unit has initiated Assessment Monitoring in accordance with § 257.95 and Assessment of Corrective Measures in accordance with § 257.96. The remedy selection evaluation was ongoing through 2020.

1.3 Groundwater Monitoring Well Network

Two separate groundwater monitoring systems have been established for the Surface Impoundment and Landfill Unit as summarized below.

1.3.1 Surface Impoundment

The groundwater monitoring network for the surface impoundment consists of four (4) active CCR detection monitoring wells, as shown on Figure 2. CCR monitoring wells are included in the certified detection monitoring

network screened within the Miocene sequence to monitor the Miocene aquifer underlying the Surface Impoundment. This network includes:

- One upgradient detection monitoring well: MWI-1
- Three downgradient detection monitoring wells: MWI-2, MWI-3, and MWI-4

1.3.2 Landfill Unit

The groundwater monitoring network for the landfill CCR unit consists of five (5) active CCR detection monitoring wells and three (3) assessment monitoring wells, as shown on Figure 2. CCR monitoring wells are included in the monitoring network screened within reworked Citronelle sequence to monitor the Citronelle aquifer underlying the Landfill. The network for the events covered by this Annual Report included:

- One upgradient detection monitoring well: MW-2
- Four downgradient detection monitoring wells: MW-3, MW-4, MW-5, and MW-6
- Three assessment monitoring wells: MW-10, MW-11, MW-12. Note monitoring wells MW-11 and MW-12 are no longer monitored following documentation of the ASD.

2.0 GROUNDWATER MONITORING ACTIVITIES

In accordance with 40 CFR § 257.90(e), the following describes monitoring-related activities performed during the 2020 calendar year. Groundwater sampling was performed in accordance with 40 CFR § 257.93, as follows.

2.1 Monitoring Well Installation and Maintenance

There were no changes to either the surface impoundment or the landfill certified detection groundwater monitoring networks for the 2020 sampling events. After completion of the ASD that confirms that lithium is naturally-occurring and has not resulted from a release from the CCR Unit, Cooperative Energy re-evaluated the groundwater assessment monitoring network for the landfill. Since assessment monitoring wells MW-11 and MW-12 were in place solely due to lithium detections at MW-3 and MW-4, these wells were removed from the network prior to the September 2020 sampling event and will no longer be monitored as part of the assessment monitoring program. Monitoring well MW-10, downgradient from MW-5 in the path of contaminant migration from the Landfill, will continue to be monitored as an assessment monitoring well as required by 40 CFR § 257.95(g)(1)(iii). To date, MW-10 has not shown any groundwater impacts from the Landfill. In 2020, the two (2) supplemental monitor points (P-A and P-B) were abandoned because of (1) limited access to their location; (2) results from the ASD; (3) the presence of better located assessment wells; and (4) poor terrain for installation of a permanent well with conventional drilling equipment.

Additional monitoring well-related activities for both monitoring well networks included a visual inspection of well conditions prior to sampling, recording the site conditions, and performing exterior maintenance to provide safe access for sampling.

2.2 Surface Impoundment CCR Unit Detection Monitoring

Groundwater sampling events for the Surface Impoundment CCR unit were conducted in April 2020 and September 2020. During each semi-annual sampling event, groundwater samples were collected for Appendix III constituents from the detection monitoring well network.

2.3 Landfill CCR Unit Assessment Monitoring

Cooperative Energy posted a Notice of Establishment of Assessment Monitoring Program for Morrow CCR landfill unit, dated May 16, 2018. Groundwater samples were collected for both Appendix III and Appendix IV constituents from each of the monitoring wells. In February 2020, Cooperative Energy conducted the annual Appendix IV monitoring event pursuant to § 257.95(b). The results were analyzed to determine which constituents were detected and required resampling, as required by § 257.95(d)(1). The 2020 semi-annual monitoring events were then conducted in April and September.

2.4 Groundwater Elevation Measurement

Prior to each sampling event, groundwater elevations were recorded from the site monitoring wells. The April and September 2020 elevation data were used to develop potentiometric surface elevation contour maps to confirm the groundwater flow direction, and to confirm that the groundwater monitoring well network for the CCR units remains sufficient to monitor groundwater downgradient of the respective unit. The direction of groundwater flow is unchanged. Groundwater flows south across the Landfill Unit and east-southeast for the Surface Impoundment Unit, based on review of 2020 groundwater elevation contour maps. No changes to the monitoring well networks were necessary based on groundwater elevation data.

2.5 Groundwater Sampling and Laboratory Analysis

Groundwater samples were collected in accordance with 40 CFR § 257.93(a). Field sampling procedures included sample collection, field quality assurance/quality control (QA/QC), chain-of-custody controls and field documentation. The groundwater samples for the Surface Impoundment unit for 2019/2020 sampling events were analyzed for Appendix III constituents and results are summarized in Tables 1A-C. The groundwater samples for the Landfill unit for 2020 sampling events were analyzed for Appendix III and Appendix IV constituents and results are summarized in Tables 2A-E. Cooperative Energy has also included results from the October 2019 sampling event, given that the statistical results were completed in 2020. Analytical methods used for groundwater monitoring parameters are provided in laboratory reports. Laboratory analyses were performed by Micro Methods Laboratory, Inc.

3.0 COMPARATIVE STATISTICAL ANALYSES

Pursuant to 40 CFR § 257.93(f), the statistical methodology selected for the Morrow Facility meets the criteria referenced in the CCR Rule and the 2009 EPA Statistical Analysis of Groundwater Monitoring Data at Resource Conservation and Recovery Act (RCRA) Facilities Unified Guidance (EPA, 2009) and is consistent with the *Statistical Analysis Plan* (EMS, 2017).

Statistical analyses of Appendix III constituents were completed for the Surface Impoundment and the Landfill independently. Included in sections below, Cooperative Energy provides a summary of the comparative statistical analyses completed in 2020, which includes the analyses for second semi-annual event in 2019 as well as the two semi-annual monitoring events conducted in 2020 for both the Surface Impoundment and the Landfill Units.

3.1.1 Surface Impoundment Statistical Analyses

Analytical data from the October 2019, April 2020, and September 2020 monitoring events for the Surface Impoundment network have been statistically analyzed in accordance with the site's certified statistical analysis method. Review of the Sanitas™ results indicates that there were no statistically significant exceedances of the established prediction limits for Appendix III constituents. The impoundment network remains in detection

monitoring. In 2020, Cooperative Energy commenced closure by removal activities pursuant to 40 CFR § 257.102(c).

3.1.2 Landfill Unit Statistical Analyses

Analytical data from the 2020 monitoring events for the Landfill monitoring well network have been statistically analyzed in accordance with the site's certified statistical analysis method. Results are summarized below.

Groundwater Protection Standards (GWPS)

Interwell tolerance limits were used to calculate background limits from pooled upgradient well data for Appendix IV parameters with a target of 95% confidence and 95% coverage in accordance with the *Statistical Analysis Plan* (EMS, 2017).

GWPSs have been established for statistical comparison of Appendix IV constituents for the Landfill CCR Unit. The Summary of Background Levels and GWPS table presented below, summarizes the site-specific background concentration for each monitoring event and the GWPS established under Federal rules. Where the background concentration is higher than the federal MCL, the background concentration is utilized as the GWPS for that constituent.

If the comparison of the constituent's confidence interval is greater than the GWPS, a statistically significant level (SSL) is identified for that well.

Table 3.1.2 Summary of Background Levels and GWPS

Analyte[1]	Units	Site Specific Background			Federal MCL	GWPS		
		October 2019	April 2020	September 2020		October 2019	April 2020	September 2020
Barium	mg/L	0.025	0.025	0.025	2	2	2	2
Beryllium	mg/L	0.010	0.010	0.010	0.004	0.010	0.010	0.010
Cobalt	mg/L	0.169	0.166	0.167	0.006	0.169	0.166	0.167
Fluoride	mg/L	1.1	1.2	1.2	4	4	4	4
Lead	mg/L	0.0110	0.0107	0.0105	0.015	0.015	0.015	0.015
Lithium	mg/L	0.02	0.02	1.42[2]	0.04	0.04	0.04	1.42
Molybdenum	mg/L	0.0025	0.0025	0.0025	0.1	0.1	0.1	0.1
Radium (226 + 228)	pCi/L	2.4	2.3	2.3	5	5	5	5
Thallium	mg/L	0.0005	0.0005	0.0005	0.002	0.002	0.002	0.002

Notes:
mg/L - milligrams per liter
pCi/L - picocuries per liter
[1] Analytes not detected during the annual scan are not presented.
[2] The site-specific background for lithium has been recalculated due to elevated background concentrations documented in the alternate source demonstration. Lithium concentrations from monitoring wells, MW-2, MW-3 and MW-4 have been used to calculate the site specific GWPS since lithium concentrations at MW-3 and MW-4 has been deemed to be naturally occurring.

Statistical Analysis

Analytical data from the October 2019, April 2020 and September 2020 monitoring events for the landfill network have been statistically analyzed in accordance with the site's certified statistical analysis method. Review of the Sanitas™ results indicates that verified exceedances of the established prediction limits for Appendix III constituents continue to be observed. Using the GWPS established according to 40 CFR § 257.95(h), the following SSLs were identified following the 2020 monitoring events:

- MW-3 (Lithium; October 2019 and April 2020, Applicable ASD discussed in Section 3.2)
- MW-4 (Lithium; October 2019 and April 2020, Applicable ASD discussed in Section 3.2)
- MW-5 (Lithium and Molybdenum)

3.2 Landfill Alternate Source Demonstration

Pursuant to 40 CFR § 257.94(e)(2), an ASD was prepared to address the noted SSLs for lithium that have been identified at monitoring wells MW-3 and MW-4 (See Appendix A). *The Alternate Source Demonstration* (Golder, 2020) presents multiple lines of evidence that conclude that the source of the elevated concentrations of lithium at MW-3 and MW-4 are not the result of a release from the CCR Landfill Unit but can be attributed to naturally-occurring lithium in subsurface aquifer materials. The analysis includes a comparison of porewater to groundwater, geochemical fingerprinting, and analysis of soil samples at the site. Constituent concentrations of calcium, chloride, sulfate, and pH in background samples are different when compared to MW-3 and MW-4, demonstrating that the lithium detected in these wells is not the result of mixing of CCR leachate and ambient groundwater. Background site soil samples show a range of elevated lithium concentrations (2.2 to 4.6 mg/kg), demonstrating site soil spatial variability. These results are consistent with regional data showing elevated lithium in soils. Spatial variability identified at the site confirms that higher concentrations of lithium may arise in other areas of the site due to pockets of low pH groundwater across the site. These pH conditions likely have caused weathering of naturally-occurring lithium from soils and aquifer solids. The low pH conditions and associated lithium are not related to the Landfill Unit, as the CCR porewater (represented by samples LF-P-6 and LF-P-7) is alkaline. Further, no statistical exceedances of other CCR-regulated constituents have been identified at MW-3 or MW-4. For these reasons, the ASD concludes that the lithium SSLs are the result of naturally-occurring lithium in the soils.

4.0 ASSESSMENT OF CORRECTIVE MEASURES

Following the requirements of 40 CFR 257.96, RD Morrow has initiated an Assessment of Corrective Measures (ACM). Notification of this action was placed in the operating record on September 12, 2019 (Golder, 2019).

5.0 REMEDY SELECTION AND DESIGN PROGRESS REPORTS

Pursuant to 40 CFR § 257.97(a), Semi-Annual Remedy Selection and Design Progress Report (Progress Report) for Cooperative Energy's RD Morrow Generating Station's CCR Landfill unit are documented semi-annually in March and September until final remedy selection has been completed. As required by the rules, this progress report describes the progress made in selecting and designing a remedy and future planned activities. These progress reports are listed below and are provided in Appendix B. Based on the results from the ASD for lithium, Cooperative Energy has modified its remedy selection analysis to focus on the groundwater impacts of the Landfill at MW-5, which is not addressed by the ASD.

- First Semi-Annual 2020 Remedy Selection and Design Progress Report – Cooperative Energy, RD Morrow CCR Landfill, prepared by Golder Associates Inc., dated March 10, 2020.
- Second Semi-Annual 2020 Remedy Selection and Design Progress Report – Cooperative Energy, RD Morrow CCR Landfill, prepared by Golder Associates Inc., dated September 11, 2020.

Concurrent with the remedy selection process, in 2020, Cooperative Energy began preliminary activities to prepare for landfill closure and capping as part of closure and source control efforts. Additionally, ClosureTurf® installation on the landfill sideslopes began and is ongoing. Site Preparation and earthwork began to facilitate landfill closure to acquire closure grades, prepare the subgrade for geomembrane installation, and establish perimeter access around the RD Morrow Landfill.

6.0 PROGRAM TRANSITIONS

There were no program transitions within either groundwater monitoring program for the surface impoundment or the landfill unit.

7.0 PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE IN 2020

There were no specific problems encountered with the monitoring well systems in 2020.

8.0 CONCLUSIONS & FUTURE ACTIONS

This *2020 Annual Groundwater Monitoring and Corrective Action Report* has been prepared in accordance with 40 CFR § 257.90(e) and describes the status of the groundwater monitoring program during the 2020 calendar year and key actions for the upcoming calendar year 2021.

Project Key Activities for 2021

The proposed activities for the 2021 calendar year include:

- Annual and Semi-annual sampling will continue, as required by 40 CFR § 257.94 and 40 CFR § 257.95.
- Additional data collection is ongoing as part of the ACM. Further progress will occur to evaluate remedy alternatives based on these data, modeling efforts, and analysis. Future semi-annual remedy selection progress reports will document these efforts.
- Further progress to close the Landfill, including continued earthwork and installation of geosynthetics, as source control.
- Further progress and certified closure of the CCR Surface Impoundment is scheduled to be completed in 2021.

9.0 REFERENCES

EMS, 2017. Statistical Analysis Plan, RD Morrow Generating Station, Lamar County, Mississippi. Environmental Management Services, Inc. Prepared for Cooperative Energy, Inc. December 21, 2017.

Golder, 2019., Assessment of Corrective Measures RD Morrow Generating Station – Landfill CCR Unit, Hattiesburg, Mississippi. Golder Prepared for Cooperative Energy, Inc. September 12, 2019.

Golder, 2020., Alternate Source Demonstration RD Morrow Generating Station – Landfill CCR Unit, Purvis, Mississippi. Golder Prepared for Cooperative Energy, Inc. September 11, 2020.

USEPA, 2015, Federal Register. volume 80. No. 74. Friday April 17, 2015. Part II. Environmental Protection Agency. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule. [EPA HQ RCRA–2009–0640; FRL–9919–44–OSWER]. RIN–2050–AE81.

Figures

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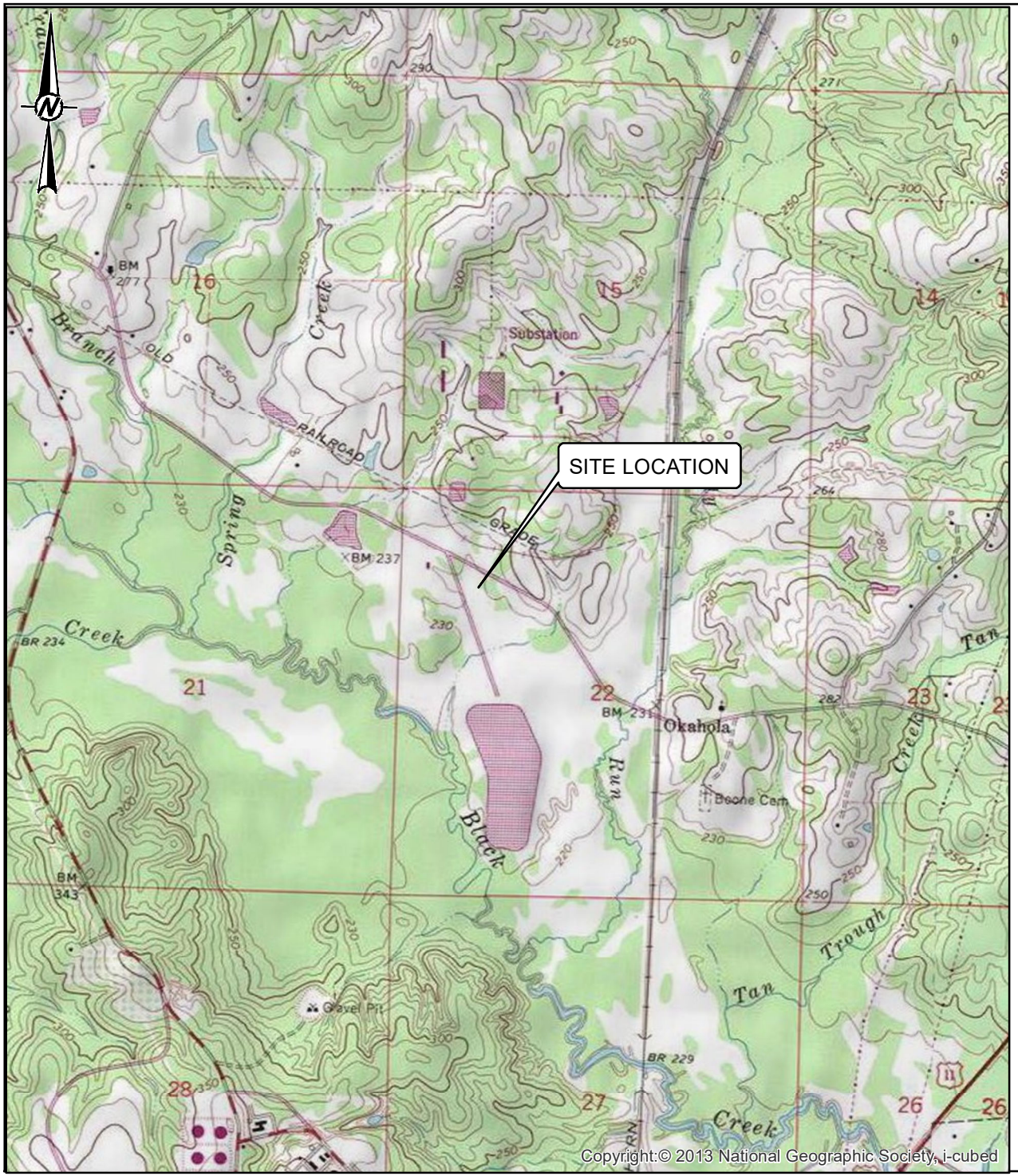

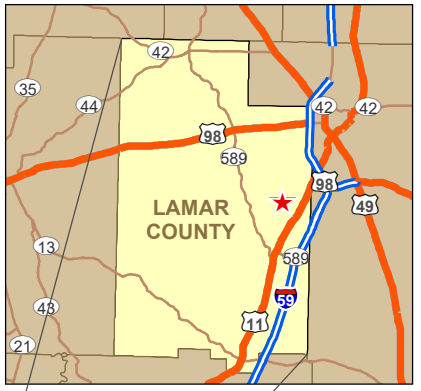

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Feet

CLIENT
COOPERATIVE ENERGY

PROJECT
RD MORROW GENERATING STATION
PURVIS, MISSISSIPPI

TITLE
SITE LOCATION MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2020-04-30
PREPARED	DJC
DESIGN	DLP
REVIEW	DLK
APPROVED	DLP

PROJECT No.	CONTROL	Rev.	FIGURE
19117989	19117989A000-GIS.mxd	0	1

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

LEGEND

MW-XX	LANDFILL UNIT MONITORING WELL LOCATION
MWI-XX	SURFACE IMPOUNDMENT UNIT WELL LOCATION
P-A	SUPPLEMENTAL MONITORING POINT LOCATION
X	FENCE

REFERENCE

BASE MAP TAKEN FROM ENVIRONMENTAL MANAGEMENT SERVICES, INC., MONITORING WELL LOCATIONS, DATED 2017-02-17 DELIVERED IN .DWG FORMAT.

CLIENT
COOPERATIVE ENERGY

CONSULTANT
GOLDER

YYYY-MM-DD	2021-01-18
DESIGNED	DLK
PREPARED	DJC
REVIEWED	DKL
APPROVED	DLP

PROJECT
RD MORROW GENERATING STATION
PURVIS, MISSISSIPPI

TITLE
WELL LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
19117989	19117989l001.dwg	0	2

Tables

TABLE 1A.
ANALYTICAL DATA SUMMARY - CCR Surface Impoundment (October 2019)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	Prediction Limit	Detection Monitoring Wells			
			MWI-1	MWI-2	MWI-3	MWI-4
		Sample Date:	10/17/2019	10/17/2019	10/17/2019	10/17/2019
Appendix III						
BORON, TOTAL	mg/L	0.142	0.110	0.074	0.073	0.086
CALCIUM, TOTAL	mg/L	365	54.3	6.76	4.28	10.0
CHLORIDE, TOTAL	mg/L	42.83	33.1	12.1	3.31	9.23
FLUORIDE, TOTAL	mg/L	2.142	<0.50	<0.50	<0.50	<0.50
pH	S.U.	varies	6.67	6.07	6.42	6.51
SULFATE, TOTAL	mg/L	943	110	7.66	<5.00	<5.00
TOTAL DISSOLVED SOLIDS	mg/L	1690	366	137	130	132

NOTES:

1. mg/L - Milligrams per Liter
2. S.U. - standard units.
3. < - Constituent was analyzed for, but was not detected above the PQL and is considered non-detect. Value is displayed as less than the PQL.
4. Intrawell prediction limts used for pH varies: MWI-1 (7.095 - 6.043), MWI-2 (6.665 - 5.475), MWI-3 (6.642 - 5.978), MWI-4 (7.28 - 5.63)

TABLE 1B.
ANALYTICAL DATA SUMMARY - CCR Surface Impoundment (April 2020)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	Prediction Limit	Detection Monitoring Wells			
			MWI-1	MWI-2	MWI-3	MWI-4
		Sample Date:	4/9/2020	4/9/2020	4/9/2020	4/9/2020
Appendix III						
BORON, TOTAL	mg/L	0.139	0.0994	0.0642	0.0631	0.0781
CALCIUM, TOTAL	mg/L	55.7	35.2	7.03	3.61	8.42
CHLORIDE, TOTAL	mg/L	39.8	35.3	12.9	3.77	9.10
FLUORIDE, TOTAL	mg/L	0.3165	<0.50	<0.50	<0.50	<0.50
pH	S.U.	varies	6.42	5.87	6.22	6.28
SULFATE, TOTAL	mg/L	98.4	50.5	6.31	<5.00	<5.00
TOTAL DISSOLVED SOLIDS	mg/L	369.4	301	154	140	139

NOTES:

1. mg/L - Milligrams per Liter
2. S.U. - standard units.
3. < - Constituent was analyzed for, but was not detected above the PQL and is considered non-detect. Value is displayed as less than the PQL.
4. Intrawell prediction limts used for pH varies: MWI-1 (6.961 - 6.143), MWI-2 (6.462 - 5.614), MWI-3 (6.662 - 5.83), MWI-4 (7.045 - 5.828)

TABLE 1C.
ANALYTICAL DATA SUMMARY - CCR Surface Impoundment (September 2020)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	Prediction Limit	Detection Monitoring Wells			
			MWI-1	MWI-2	MWI-3	MWI-4
		Sample Date:	9/9/2020	9/9/2020	9/9/2020	9/9/2020
Appendix III						
BORON, TOTAL	mg/L	0.1199	0.112	0.071	0.068	0.083
CALCIUM, TOTAL	mg/L	55.7	38.5	6.89	3.94	9.55
CHLORIDE, TOTAL	mg/L	39.83	36.6	12.0	3.29	8.42
FLUORIDE, TOTAL	mg/L	0.3146	<0.50	<0.50	<0.50	<0.50
pH	S.U.	varies	6.40	5.79	6.17	6.26
SULFATE, TOTAL	mg/L	94	36.0	7.39	<5.00	<5.00
TOTAL DISSOLVED SOLIDS	mg/L	366	305	130	136	146

NOTES:

1. mg/L - Milligrams per Liter
2. S.U. - standard units.
3. < - Constituent was analyzed for, but was not detected above the PQL and is considered non-detect. Value is displayed as less than the PQL.
4. Intrawell prediction limts used for pH varies: MWI-1 (6.961 - 6.143), MWI-2 (6.462 - 5.614), MWI-3 (6.662 - 5.828), MWI-4 (7.045 - 5.828)

TABLE 2A.
ANALYTICAL DATA SUMMARY - CCR Landfill (October 2019)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	DETECTION MONITORING WELLS					ASSESSMENT MONITORING WELLS		
		MW-02	MW-03	MW-04	MW-05	MW-06	MW-10	MW-11	MW-12
	Sample Date:	10/17/2019	10/17/2019	10/18/2019	10/17/2019	10/17/2019	10/17/2019	10/17/2019	10/17/2019
Appendix III									
BORON, TOTAL	mg/L	1.35	**7.50**	**10.8**	**25.6**	1.09	3.63	6.38	2.07
CALCIUM, TOTAL	mg/L	114	**473**	**430**	**600**	7.97	80.1	185	113
CHLORIDE, TOTAL	mg/L	160	202	142	**311**	24.2	161	179	58.9
FLUORIDE, TOTAL	mg/L	0.76	< 0.50	< 0.50	< 0.50	< 0.50	0.58	0.60	0.77
pH	S.U.	4.32	5.02	4.58	**6.70**	4.64	4.08	4.26	4.05
SULFATE, TOTAL	mg/L	574	**2200**	**2550**	**2590**	54.6	527	1380	670
TOTAL DISSOLVED SOLIDS	mg/L	1011	**3076**	**2572**	**4652**	176	991	1533	780
Appendix IV									
ANTIMONY, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
ARSENIC, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
BARIUM, TOTAL	mg/L	0.023	0.030	0.034	0.055	0.332	0.031	0.035	0.025
BERYLLIUM, TOTAL	mg/L	0.00525	< 0.00400	< 0.00400	< 0.00400	< 0.00400	0.00876	0.00419	< 0.00400
CADMIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
CHROMIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
COBALT, TOTAL	mg/L	0.128	0.0428	0.0476	0.00579	0.00591	0.0786	0.0926	0.0316
FLUORIDE, TOTAL	mg/L	0.76	< 0.50	< 0.50	< 0.50	< 0.50	0.58	0.60	0.77
LEAD, TOTAL	mg/L	0.00306	0.00690	0.00394	< 0.00100	< 0.00100	0.00379	0.00318	0.00300
LITHIUM, TOTAL	mg/L	< 0.040	**0.377**	**0.289**	**4.65**	< 0.040	0.268	0.361	0.053
MERCURY, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
MOLYBDENUM, TOTAL	mg/L	< 0.00500	< 0.00500	< 0.00500	**6.52**	< 0.00500	< 0.00500	< 0.00500	< 0.00500
RADIUM (226 + 228)	pCi/L	0.580 U	1.76 U	1.75 U	1.73 U	2.19	0.962 U	2.41 U	2.01 U
SELENIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
THALLIUM, TOTAL	mg/L	< 0.00100	< 0.00100	< 0.00100	0.00262	< 0.00100	< 0.00100	< 0.00100	< 0.00100

NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter
2. < - Constituent was analyzed for, but was not detected above the PQL and is considered a non-detect. Value is displayed as less than the PQL.
3. Radium data is a combination of radium isotopes 226 and 228. When results are reported below the MDC (Minimum Detectable Concentration), data is displayed with an accompanying U. The MDC varies depending upon the sample amount and elapsed time of the measurement.
4. Not Required - constituent analyses is not required per 40 CFR 257.96 . Annual scan of the Appendix IV constituents is conducted along with semi-annual monitoring for those constituents in Appendix III and those Appendix IV constituents detected during the annual scan event.
5. Bolded data indicates an exceedance of the PL for appendix III constituents and a statistically significant level based on 95% confidence interval above the Groundwater Protection Standard (GWPS) for appendix IV constituents.

TABLE 2B.
ANALYTICAL DATA SUMMARY - CCR Landfill (January 2020)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	SUPPLEMENTAL MONITORING WELLS	
		P-A	P-B
	Sample Date:	1/9/2020	1/9/2020
Appendix III			
BORON, TOTAL	mg/L	<0.050	5.38
CALCIUM, TOTAL	mg/L	0.351	62.4
CHLORIDE, TOTAL	mg/L	3.00	115
FLUORIDE, TOTAL	mg/L	<0.50	0.81
pH	S.U.	4.93	4.93
SULFATE, TOTAL	mg/L	<5.00	374
TOTAL DISSOLVED SOLIDS	mg/L	35	757
Appendix IV			
ANTIMONY, TOTAL	mg/L	< 0.00500	< 0.00500
ARSENIC, TOTAL	mg/L	< 0.00200	0.00310
BARIUM, TOTAL	mg/L	0.0752	0.0517
BERYLLIUM, TOTAL	mg/L	<0.00100	0.00465
CADMIUM, TOTAL	mg/L	< 0.00100	< 0.00100
CHROMIUM, TOTAL	mg/L	< 0.00100	< 0.00100
COBALT, TOTAL	mg/L	0.00494	0.00141
FLUORIDE, TOTAL	mg/L	<0.50	0.81
LEAD, TOTAL	mg/L	<0.00100	<0.00100
LITHIUM, TOTAL	mg/L	<0.040	0.721
MERCURY, TOTAL	mg/L	< 0.002	< 0.002
MOLYBDENUM, TOTAL	mg/L	< 0.00100	< 0.00100
RADIUM (226 + 228)	pCi/L	-0.054 U	0.8066 U
SELENIUM, TOTAL	mg/L	< 0.00100	< 0.00100
THALLIUM, TOTAL	mg/L	< 0.00100	< 0.00100

NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter
2. < - Constituent was analyzed for, but was not detected above the PQL and is considered a non-detect. Value is displayed as less than the PQL.
3. Radium data is a combination of radium isotopes 226 and 228. When results are reported below the MDC (Minimum Detectable Concentration), data is displayed with an accompanying U. The MDC varies depending upon the sample amount and elapsed time of the measurement.

GOLDER

TABLE 2C.
ANALYTICAL DATA SUMMARY - CCR Landfill (February 2020)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	DETECTION MONITORING WELLS					ASSESSMENT MONITORING WELLS			SUPPLEMENTAL MONITORING WELLS	
		MW-02	MW-03	MW-04	MW-05	MW-06	MW-10	MW-11	MW-12	P-A	P-B
	Sample Date:	2/27/2020	2/27/2020	2/26/2020	2/26/2020	2/26/2020	2/26/2020	2/26/2020	2/27/2020	2/26/2020	2/26/2020
Appendix IV											
ANTIMONY, TOTAL	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200
ARSENIC, TOTAL	mg/L	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200	< 0.00200
BARIUM, TOTAL	mg/L	0.0234	0.0340	0.0492	0.0632	0.104	0.0285	0.0474	0.0245	0.0559	0.0544
BERYLLIUM, TOTAL	mg/L	0.00618	<'0.00400	<'0.00400	<'0.00400	<'0.00400	0.00977	0.00467	<'0.00400	<'0.00400	0.00619
CADMIUM, TOTAL	mg/L	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500
CHROMIUM, TOTAL	mg/L	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100	< 0.0100
COBALT, TOTAL	mg/L	0.138	0.0376	0.0925	0.00584	0.00175	0.126	0.143	0.0240	0.00482	<0.00100
FLUORIDE, TOTAL	mg/L	0.91	<0.50	0.64	<0.50	<0.50	0.75	0.87	<0.50	<0.50	1.39
LEAD, TOTAL	mg/L	0.00267	0.0117	0.00452	<0.00100	<0.00100	0.00315	0.00360	0.00237	0.00127	<0.00100
LITHIUM, TOTAL	mg/L	<0.0400	0.421	0.329	5.15	<0.0400	0.556	0.415	0.0407	<0.0400	1.14
MERCURY, TOTAL	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
MOLYBDENUM, TOTAL	mg/L	< 0.00500	< 0.00500	< 0.00500	6.39	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500
RADIUM (226 + 228)	pCi/L	0.491 U	1.19	0.935 U	0.776 U	1.26 U	1.60 U	2.01 U	0.952 U	0.366 U	0.940 U
SELENIUM, TOTAL	mg/L	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500	< 0.0500
THALLIUM, TOTAL	mg/L	< 0.00100	< 0.00100	< 0.00100	0.00225	< 0.00100	< 0.00100	< 0.00100	< 0.00100	< 0.00100	< 0.00100

NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter
2. < - Constituent was analyzed for, but was not detected above the PQL and is considered a non-detect. Value is displayed as less than the PQL.
3. Radium data is a combination of radium isotopes 226 and 228. When results are reported below the MDC (Minimum Detectable Concentration), data is displayed with an accompanying U. The MDC varies depending upon the sample amount and elapsed time of the measurement.

TABLE 2D.
ANALYTICAL DATA SUMMARY - CCR Landfill (April 2020)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	DETECTION MONITORING WELLS					ASSESSMENT MONITORING WELLS			SUPPLEMENTAL MONITORING WELLS	
		MW-02	MW-03	MW-04	MW-05	MW-06	MW-10	MW-11	MW-12	P-A	P-B
	Sample Date:	4/9/2020	4/8/2020	4/8/2020	4/8/2020	4/8/2020	4/8/2020	4/9/2020	4/9/2020	4/8/2020	4/9/2020
Appendix III											
BORON, TOTAL	mg/L	1.22	**7.71**	**11.8**	**21.3**	<0.0500	4.18	6.32	1.68	<0.0500	7.38
CALCIUM, TOTAL	mg/L	97.0	**426**	**359**	**636**	2.19	82.6	203	87.6	0.320	89.0
CHLORIDE, TOTAL	mg/L	155	190	147	**318**	7.42	200	188	42.8	3.24	181
FLUORIDE, TOTAL	mg/L	0.88	<0.50	<0.50	<0.50	<0.50	0.59	0.91	<0.50	<0.50	1.42
pH	S.U.	4.46	**5.33**	4.55	**6.58**	4.71	5.23	3.71	4.22	4.37	4.97
SULFATE, TOTAL	mg/L	478	**1940**	**1860**	**2780**	14.1	548	1210	617	<5.00	602
TOTAL DISSOLVED SOLIDS	mg/L	758	**2400**	**2572**	**2964**	33	708	1562	713	31	1070
Appendix IV											
ANTIMONY, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
ARSENIC, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
BARIUM, TOTAL	mg/L	0.0234	0.0397	0.0399	0.0635	0.127	0.0267	0.0423	0.0248	0.0662	0.0561
BERYLLIUM, TOTAL	mg/L	0.00653	<0.00400	<0.00400	<0.00400	<0.00400	0.00807	0.00412	<0.00400	<0.00400	0.00592
CADMIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
CHROMIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
COBALT, TOTAL	mg/L	0.138	0.0372	0.0687	0.00474	0.00175	0.0945	0.102	0.0228	0.00549	0.00109
FLUORIDE, TOTAL	mg/L	0.88	<0.50	<0.50	<0.50	<0.50	0.59	0.91	<0.50	<0.50	1.42
LEAD, TOTAL	mg/L	0.00331	0.0100	0.00332	<0.00100	<0.00100	0.00368	0.00280	0.00235	0.00100	<0.00100
LITHIUM, TOTAL	mg/L	<0.0400	**0.334**	**0.309**	**4.85**	<0.0400	0.441	0.384	<0.0400	<0.0400	1.08
MERCURY, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
MOLYBDENUM, TOTAL	mg/L	<0.00500	<0.00500	<0.00500	**5.89**	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500
RADIUM (226 + 228)	pCi/L	0.726 U	2.60	1.61 U	0.473 U	1.04 U	2.06	2.38 U	1.68	0.746 U	0.525 U
SELENIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
THALLIUM, TOTAL	mg/L	<0.00100	<0.00100	<0.00100	0.00204	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100	<0.00100

NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter
2. < - Constituent was analyzed for, but was not detected above the PQL and is considered a non-detect. Value is displayed as less than the PQL.
3. Radium data is a combination of radium isotopes 226 and 228. When results are reported below the MDC (Minimum Detectable Concentration), data is displayed with an accompanying U. The MDC varies depending upon the sample amount and elapsed time of the measurement.
4. Not Required - constituent analyses is not required per 40 CFR 257.96 . Annual scan of the Appendix IV constituents is conducted along with semi-annual monitoring for those constituents in Appendix III and those Appendix I\ constituents detected during the annual scan event.
5. Bolded data indicates an exceedance of the PL for appendix III constituents and a statistically significant level based on 95% confidence interval above the Groundwater Protection Standard (GWPS) for appendix IV constituents.

TABLE 2E.
ANALYTICAL DATA SUMMARY - CCR Landfill (September 2020)
RD Morrow Generating Station
Purvis, Mississippi

Analyte	Units	DETECTION MONITORING WELLS					ASSESSMENT MONITORING WELLS
		MW-02	MW-03	MW-04	MW-05	MW-06	MW-10
	Sample Date:	9/9/2020	9/9/2020	9/9/2020	9/9/2020	9/9/2020	9/9/2020
Appendix III							
BORON, TOTAL	mg/L	1.42	**8.61**	**11.7**	**21.4**	0.084	5.08
CALCIUM, TOTAL	mg/L	104	**463**	**403**	**589**	2.30	104
CHLORIDE, TOTAL	mg/L	144	156	147	**278**	7.67	217
FLUORIDE, TOTAL	mg/L	0.84	<0.50	<0.50	<0.50	<0.50	0.60
pH	S.U.	4.06	5.01	4.52	**6.54**	4.31	3.47
SULFATE, TOTAL	mg/L	498	**1940**	**1980**	**2330**	15.4	602
TOTAL DISSOLVED SOLIDS	mg/L	909	**2976**	**2780**	**4472**	132	1216
Appendix IV							
ANTIMONY, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
ARSENIC, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
BARIUM, TOTAL	mg/L	0.0217	0.0344	0.0369	0.0675	0.124	0.0296
BERYLLIUM, TOTAL	mg/L	0.00449	<0.00400	<0.00400	<0.00400	<0.00400	0.00858
CADMIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
CHROMIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
COBALT, TOTAL	mg/L	0.112	0.0286	0.0501	0.0107	0.00165	0.0975
FLUORIDE, TOTAL	mg/L	0.84	<0.50	<0.50	<0.50	<0.50	0.60
LEAD, TOTAL	mg/L	0.00303	0.00285	0.00271	<0.00100	<0.00100	0.00357
LITHIUM, TOTAL	mg/L	<0.040	0.444	0.404	**2.84**	<0.040	0.353
MERCURY, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
MOLYBDENUM, TOTAL	mg/L	<0.00500	<0.00500	<0.00500	**4.14**	<0.00500	<0.00500
RADIUM (226 + 228)	pCi/L	1.08 U	2.30 U	1.95 U	1.14 U	2.22 U	1.21 U
SELENIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required	Not Required
THALLIUM, TOTAL	mg/L	<0.00100	<0.00100	<0.00100	0.00193	<0.00100	<0.00100

NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter
2. < - Constituent was analyzed for, but was not detected above the PQL and is considered a non-detect. Value is displayed as less than the PQL.
3. Radium data is a combination of radium isotopes 226 and 228. When results are reported below the MDC (Minimum Detectable Concentration), data is displayed with an accompanying U. The MDC varies depending upon the sample amount and elapsed time of the measurement.
4. Not Required - constituent analyses is not required per 40 CFR 257.96 . Annual scan of the Appendix IV constituents is conducted along with semi-annual monitoring for those constituents in Appendix III and those Appendix IV constituents detected during the annual scan event.
5. Bolded data indicates an exceedance of the PL for appendix III constituents and a statistically significant level based on 95% confidence interval above the Groundwater Protection Standard (GWPS) for appendix IV constituents.

APPENDIX A

Alternate Source Demonstration

REPORT

ALTERNATE SOURCE DEMONSTRATION

Cooperative Energy, RD Morrow CCR Landfill

Submitted to:

Cooperative Energy
304 Old Okahola School Road, Purvis Mississippi 39475

Submitted by:

Golder Associates Inc.
27200 Haggerty Road, Suite B-12, Farmington Hills, Michigan, USA 48331-5719
+1 248 295-0135

19117989

September 11, 2020

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FIGURES

Certification

This Alternate Source Demonstration for the Cooperative Energy, RD Morrow CCR Landfill in Purvis, Lamar County, Mississippi, has been prepared in compliance with 40 CFR Part 257, Subpart D; published in 80 FR 21302-21501, April 17, 2015 under the direction of a licensed professional engineer with Golder Associates Inc.

Golder Associates Inc.

PJ Nolan, PhD.
Geochemist

Dawn L. Prell
Senior Consultant

I hereby certify that this Alternate Source Demonstration for the Cooperative Energy RD Morrow CCR Landfill, located at 304 Old Okahola School Road Purvis, Mississippi, has been prepared to meet the requirements of 40 CFR § 257.95(g)(3)(ii).

Jeffery Piaskowski, PE
Mississippi Registered Professional Engineer

dlp/tir/pjn/rv/jrp

1.0 INTRODUCTION

In accordance with the United States Environmental Protection Agency (EPA) coal combustion residuals (CCR) rule 40 CFR § 257.50 *et seq.,* published in 80 FR 21302-21501, April 17, 2015 (the CCR Rule or the Rule), this *Alternate Source Demonstration* for the RD Morrow CCR Landfill has been prepared to document an alternate source has caused the Statistically Significant Levels (SSLs) of lithium at MW-03 and MW-04 that were calculated from Cooperative Energy's RD Morrow Sr. CCR Landfill Unit (RD Morrow). This document satisfies the requirements of Section 257.95(g)(3)(ii), which allows the owner or operator to demonstrate that a source other than the CCR Unit has caused an SSL and that the SSL was the result of an alternate source or resulted from an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

As documented by this report, the SSLs for lithium at monitoring wells MW-03 and MW-04 are attributed to naturally-occurring lithium in subsurface aquifer materials due to the depositional environment instead of a release from the CCR Unit.

2.0 SITE DESCRIPTION AND BACKGROUND

RD Morrow, operated by Cooperative Energy, is located in a rural area of Lamar County, approximately 4.5 miles north of the City of Purvis and 8 miles southwest of Hattiesburg, Mississippi. Old Okahola School Road bisects the property into a northern and southern parcel. The location of the Site property and surrounding area is shown on Figure 1, Site Location Map.

As shown in Figure 2, Well Location Map, the RD Morrow CCR units, subject to the CCR Rule (the CCR Units), include:

- **Surface Impoundment Unit** - The Surface Impoundment Unit is currently following a detection monitoring program in accordance with § 257.94. This ASD pertains to the CCR Landfill Unit only.
- **CCR Landfill Unit** – The CCR Landfill Unit is currently in Assessment Monitoring in accordance with § 257.95. Cooperative Energy is conducting efforts to determine the nature and extent of Appendix IV parameters since completion of the demonstration for Assessment of Corrective Measures in accordance with § 257.96(a).

2.1 CCR Landfill Unit

The facility operates an existing CCR landfill as defined in 40 CFR § 257.53 (the CCR Landfill Unit). The CCR Landfill Unit also has an existing solid waste management permit (no. SW0370020308, dated January 2015) from the Mississippi Department of Environmental Quality (MDEQ). The CCR Landfill Unit monitoring network includes:

- One upgradient detection monitoring well: MW-02
- Four downgradient detection monitoring wells: MW-03, MW-04, MW-05, and MW-06
- Three assessment monitoring wells: MW-10, MW-11, MW-12

Two supplemental monitoring points P-A and P-B are used for water level monitoring and supplemental data collection.

2.2 Geologic and Hydrogeologic Setting

Geologic and hydrogeologic units in the region from surface to depth include Terrace Deposits, the Citronelle Formation and the Miocene Sequence. The Citronelle formation represents the uppermost aquifer underlying the CCR Landfill Unit. The groundwater aquifer is replenished from rainfall directly to the outcrop areas, and from recharge through the surface soils (EMS 2018). The monitoring wells in the groundwater network for the CCR Landfill Unit extend into this aquifer.

The main drainage feature in the vicinity of the site is Black Creek, which is part of the Pascagoula River Basin. Black Creek traverse's northwest to southeast across Lamar County and forms the southern boundary of the RD Morrow site. Groundwater flow across the RD Morrow site is generally toward the south. The groundwater elevation contours across the site, based on water level measurements from October 17, 2019, were used to generate Figure 3, Groundwater Elevation Contour Map (October 2019). Review of Figure 3 confirms the groundwater flow toward the south across the CCR Landfill Unit.

3.0 SUMMARY OF STATISTICAL RESULTS

While in detection monitoring, Cooperative Energy identified statistically significant increases (SSIs) of Appendix III parameters above the upper prediction limits established based on the site-specific statistical plan. As a result, the CCR Landfill Unit has transitioned to assessment monitoring. The following sections summarize the assessment monitoring statistical analysis method for evaluation of assessment monitoring constituents (i.e., Appendix IV parameters) as they pertain to this ASD.

3.1 Statistical Analyses Methods

During assessment monitoring, concentrations of Appendix IV constituents are compared to the applicable Groundwater Protection Standard (GWPS). As described in 40 CFR § 257.95(h)(1-3) the GWPS is:

- The maximum contaminant level (MCL) established under §§141.62 and 141.66 of this title.
- Where an MCL has not been established, the regional screening level (RSL) can be applied:
  - Cobalt: 0.006 milligrams per liter (mg/L);
  - Lead: 0.015 mg/L;
  - Lithium: 0.04 mg/L; and
  - Molybdenum: 0.1 mg/L.
- Background levels for constituents where the background level is higher than the MCL or rule-specified GWPS.

The upper tolerance limits (UTLs) are used to calculate background limits from pooled upgradient well data to determine the background concentration. Table 1, Site-Specific Groundwater Protection Standards, presents the data used to identify the GWPS for statistical comparison of Appendix IV data at the CCR Landfill Unit.

Table 1: Site-Specific Groundwater Protection Standards					
Analyte	**Units**	**MCL**	**RSL**	**Site Specific Upper Tolerance Limit**	**Site-Specific Groundwater Protection Standard Used for Assessment Monitoring**
Lithium	mg/L	None	0.04	0.02	0.04

After the GWPS is established, confidence intervals are then constructed on downgradient wells for each of the Appendix IV parameters using the GWPS for comparison. Only when the entire confidence interval is above a GWPS is the constituent considered to statistically exceed the GWPS.

3.2 Assessment Monitoring

On April 16, 2018, Assessment Monitoring was initiated at the CCR Landfill Unit. Pursuant to 40 CFR § 257.95(a), detection monitoring wells and assessment monitoring wells were sampled for Appendix IV parameters. Results of subsequent Appendix IV monitoring events conducted in February, April and October 2019 were compared to the GWPS using confidence intervals.

Using the required statistical procedures, the confidence intervals indicate SSLs of lithium at monitoring wells MW-03 and MW-04 above the GWPS, and SSLs of molybdenum and lithium are identified at MW-05 above the GWPS. On February 13, 2019, Cooperative Energy provided notification of SSL exceedances as required by 40 CFR § 257.95(g).

Since the transition to assessment monitoring, Cooperative Energy has continued the investigation related to the SSL exceedances at MW-03, MW-04, and MW-05. Cooperative Energy collected groundwater samples from MW-10, MW-11, and MW-12, and Golder performed statistical analyses on the results. The results showed that reported concentrations of lithium observed at monitoring wells MW-10, MW-11 and MW-12 as well as P-A and P-B are similar to those reported in samples from MW-03 and MW-04. Unlike these downgradient wells, MW-05 results show molybdenum SSL. MW-10 serves as a delineation well because the concentration of molybdenum observed in MW-10 is below the groundwater protection standard. In summary, investigatory efforts to define the nature and extent of groundwater impacts in the vicinity of MW-05 show that groundwater from MW-10, MW-11, MW-12, P-A and P-B have not been impacted.

4.0 ALTERNATE SOURCE DEMONSTRATION

As provided by § 257.95(g)(3)(ii), this ASD evaluates whether the SSLs for lithium are the result of an alternate source, other than the CCR Landfill Unit, or are from errors in sampling, analysis, statistical evaluation, or natural variation in groundwater quality.

4.1 Supplemental Sampling Activities

In August 2019, soil samples were collected to evaluate an alternate source for the reported concentrations of lithium in groundwater at RD Morrow. Soil samples were collected from a soil boring (SB-02), upgradient of the CCR landfill unit. Soil borings were also completed downgradient of the Landfill Unit at SB-106, SB-107 during May 2019. The soil boring locations are shown on Figure 2. The soil boring locations were chosen to provide a comparison of soils upgradient from the Landfill Unit and downgradient. Soil samples were submitted for

sequential extraction analyses for lithium. This test consists of a seven-step extraction of metals from solids to provide the provenance of lithium. This, in turn, provides valuable information on metal mobility. For instance, lithium bound in the carbonate fraction or that is exchangeable is much more likely to become mobile with changes to pH and groundwater geochemistry indicating a natural source for lithium, while lithium bound within a sulfide or silicate fractions is not as likely to be released to groundwater under natural conditions.

In May 2019, groundwater samples of landfill CCR porewater (LF-P-6 and LF-P-7) at two existing piezometers were analyzed for major cations and anions and used in geochemical modeling. The porewater sample locations are shown on Figure 2. Geochemical modeling of mineral solubility, attenuation and background contributions requires analysis of major cations and anions (i.e., bicarbonate/carbonate alkalinity, calcium [Ca], chloride [Cl], Nitrate [NO_3], Phosphate [PO_4^{-3}], sodium [Na], sulfate [SO_4], magnesium [Mg], and potassium [K]), which affect and participate in sorption and mineral dissolution/precipitation reactions. Required field parameters include pH, dissolved oxygen, ORP, conductivity, and temperature, which are needed to support geochemical modeling and serve an important QA/QC function. Each of these data were used to evaluate groundwater chemistry leading to the lines of evidence in support of the ASD for lithium at MW-03 and MW-04 below.

4.2 Lines of Evidence in Support of ASD

There are multiple lines of evidence that support the conclusion that the SSLs of lithium at monitoring wells MW-03 and MW-04 are caused by an alternate source. Specifically, the lithium concentrations observed in groundwater at these two wells are due to naturally-occurring lithium in soils and rock at the site. The following lines of evidence are presented to support the conclusion that the SSLs of lithium at MW-03 and MW-04 are not the result of a release from the CCR Landfill Unit:

- Porewater and Groundwater Sample Results: Detections and concentrations of common CCR leachable parameters (Dellantonio et al. 2010) vary widely across samples from downgradient groundwater wells. Concentrations of some parameters, such as chloride, sulfate, and total dissolved solids (TDS), are higher in groundwater samples from downgradient wells MW-03 and MW-04 as compared to their upgradient CCR porewater equivalents (LF-P-6 and LF-P-7); concentrations of other CCR indicator parameters, such as calcium, are lower in downgradient samples. The pH of groundwater in downgradient wells MW-03, MW-04, MW-10, MW-11 and MW-12 (3.27 to 5.55 standard units) also shows a substantial difference from that of porewater (7.34 and 7.15 S.U.), while upgradient background groundwater pH is also acidic (4.54), indicating minimal impacts, if any, from the CCR Landfill Unit at MW-03 and MW-04. For these reasons, these parameters indicate that the groundwater at MW-03, MW-04, MW-10, MW-11 and MW-12 is not the result of a mixture of CCR leachate and ambient groundwater.
- Piper Diagram: Groundwater at MW-03, MW-04, MW-10, MW-11, MW-12, and P-B is nearly identical to that of groundwater at MW-02 (background monitoring well). The relative major ion abundances in groundwater at downgradient and upgradient wells are different than those of CCR porewater samples (LF-P-6 and LF-P-7), as can be seen from the Piper plot in Figure 4. Groundwater at MW-06 and P-A differ from both porewater and other groundwater likely due to spatial variability. The results from the CCR porewater samples LF-P-6 and LF-P-7 plot in a different location than that of the groundwater samples indicating a different ion signature and no impact from porewater.

  To further elucidate the differences between CCR porewater and the groundwater as demonstrated on the piper diagram, a ternary plot was generated using two potential CCR tracers (chloride and boron) and

lithium. The ternary figure demonstrates, based on CCR tracers, that each of the on-site monitoring wells have substantially different sources of groundwater as compared to CCR porewater (Figure 5). If lithium in groundwater was caused by a release from the CCR unit, then the ratio of these parameters, which are typically transported conservatively (i.e., without chemical attenuation), should remain constant or change in a predictive way as groundwater travels downgradient (indicated by the parameters plotting in the same location, indicating a constant abundance ratio). However, as shown and based on the data presented in Figure 5, the relative abundance of these ions in monitoring wells MW-03 and MW-04, where lithium SSLs have been identified, is virtually identical to that of background groundwater, since they plot in different regions of the triangle. This indicates that the reported concentrations of lithium at MW-03 and MW-04 are from a natural origin rather than from the CCR Landfill Unit.

Therefore, based on groundwater data plotted in the piper and ternary plots presented in both Figure 4 and 5, the lithium in groundwater at MW-03 and MW-04 cannot be from the CCR landfill based water quality signatures, relative ion abundance, and ion ratios using the water quality measured in CCR porewater.

- Soil Sampling Results: A seven-step sequential extraction method (SEP) based on Tessier et al. (1979) was used to identify the provenance of lithium in soils (i.e. the operationally-defined fraction that contains the metal) and determine their potential environmental mobility. The total concentration of a metal measured from all seven steps can be compared to the concentration determined from the total metal analysis for compositional accountability. The seven-step SEP is defined by specific extraction steps as follows (based on a modified Tessier et al. 1979 method):

SEQUENTIAL EXTRACTION PROCEDURE				
ENVIRONMENTALLY AVAILABLE (Increasing Availability)	Step 1	Increasing Extraction Strength	Exchangeable Fraction:	This extraction includes trace elements that are electrostatically adsorbed to overburden minerals
	Step 2		Carbonate Fraction:	This extraction targets trace elements that are adsorbed or otherwise bound to carbonate minerals
	Step 3		Non-Crystalline Materials Fraction:	This extraction targets trace elements that are complexed by amorphous minerals
	Step 4		Metal Hydroxide Fraction:	This extraction targets trace elements bound to hydroxides of iron, manganese, and/or aluminum
	Step 5		Organic Fraction:	This extraction targets trace elements strongly bound via chemisorption to organic material
NON-ENVIRONMENTALLY AVAILABLE	Step 6		Acid/Sulfide Fraction:	The extraction is used to identify trace elements precipitated as sulfide minerals
	Step 7		Residual Fraction:	Trace elements remaining in the overburden after the previous extractions will be distributed between silicates, phosphates, and refractory oxide

Results of sequential extraction testing indicated the presence of naturally-occurring lithium is present in soils at RD Morrow in fraction 6 and 7 at each of the three soil borings (SB-02, SB-106, and SB-107; Figure 6). Lithium is reported in soils at concentrations ranging from 2.2 to 4.6 milligrams per kilogram (from the SEP) and is predominantly (85 to 100%) present in the residual and sulfide component of the soil, i.e. the non-environmentally-available fractions. The absence of lithium in the environmentally-available fractions (specifically exchangeable and carbonate fractions) indicates a general lack of lithium transport and attenuation (e.g., through sorption and/or co-precipitation).

- Regional Data Discussion: Naturally-occurring lithium is present in groundwater across the United States (US), ranging from non-detect to approximately 1.2 mg/L. Based on available data, Mississippi is one of fifteen states in the US with the higher concentrations of lithium observed in groundwater (Ayotte 2011, Huber et al. 2014). Naturally-occurring lithium can be found in nearly all rock and soil types and is most commonly found to be associated with silicate minerals (Tomazscak 2015). Site-specific test results (i.e., SEP results) confirm this finding for the RD Morrow CCR Landfill Unit. The weathering of silicate minerals is known to cause the release of naturally-occurring lithium into groundwater (Tomazscak 2015).

4.3 Alternate Source Demonstration Summary

The evaluation presented in this document demonstrates the SSLs for lithium identified in the groundwater results at MW-03 and MW-04 are the result of naturally-occurring lithium present in soils and not due to releases from the CCR Landfill Unit.

Based on information provided regarding the regional and local geology as well as natural groundwater conditions, naturally-occurring lithium is present in soils in the vicinity of the CCR Landfill Unit. Pockets of low pH groundwater across the site likely have led to weathering of naturally-occurring lithium from soils and aquifer solids. The low pH conditions and associated lithium are not caused by the RD Morrow CCR Landfill Unit, as the CCR porewater (represented by samples LF-P-6 and LF-P-7) is alkaline. Therefore, the available geochemical data do not support that the CCR Landfill Unit is the source of lithium in groundwater at MW-03 and MW-04.

As such, the CCR Landfill Unit is not considered the source of the SSLs of lithium in MW-03 and MW-04. This summary serves as an “Alternate Source Demonstration” prepared for RD Morrow in accordance with § 257.95(g)(3)(ii).

5.0 CONCLUSIONS

This ASD has been prepared in accordance with § 257.95(g)(3) in response to SSLs identified for lithium in groundwater monitoring wells MW-03 and MW-04 at Cooperative Energy’s, RD Morrow CCR Landfill Unit.

Review of analytical results and statistical evaluations indicates that the lithium SSL exceedances at MW-03 and MW-04 are not the result of a release from the CCR Landfill Unit but can be attributed to naturally-occurring lithium in subsurface aquifer materials.

Cooperative Energy timely completed the assessment of corrective measures (ACM) demonstration for lithium and molybdenum. Cooperative Energy is currently evaluating remedy alternatives. The ACM will continue to consider remedies for the SSLs observed at monitoring well MW-05.

6.0 REFERENCES

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Dellantonio, A., Fitz, W.J., Repmann, F. and Wenzel, W.W., 2010. Disposal of coal combustion residues in terrestrial systems: contamination and risk management. Journal of environmental quality, 39(3), pp.761-775.

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Tomascak, P.B., Magna, T. and Dohmen, R., 2016. The surficial realm: Low temperature geochemistry of lithium. In Advances in Lithium Isotope Geochemistry (pp. 157-189). Springer, Cham.

USEPA. Federal Register. Volume 80. No. 74. Friday April 17, Part II. Environmental Protection Agency. 40 CFR Parts 257 and 261. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule/ [EPA-HQ-RCRA-2009-0640; FRL-9919-44-OSWER] (2015).

Figures

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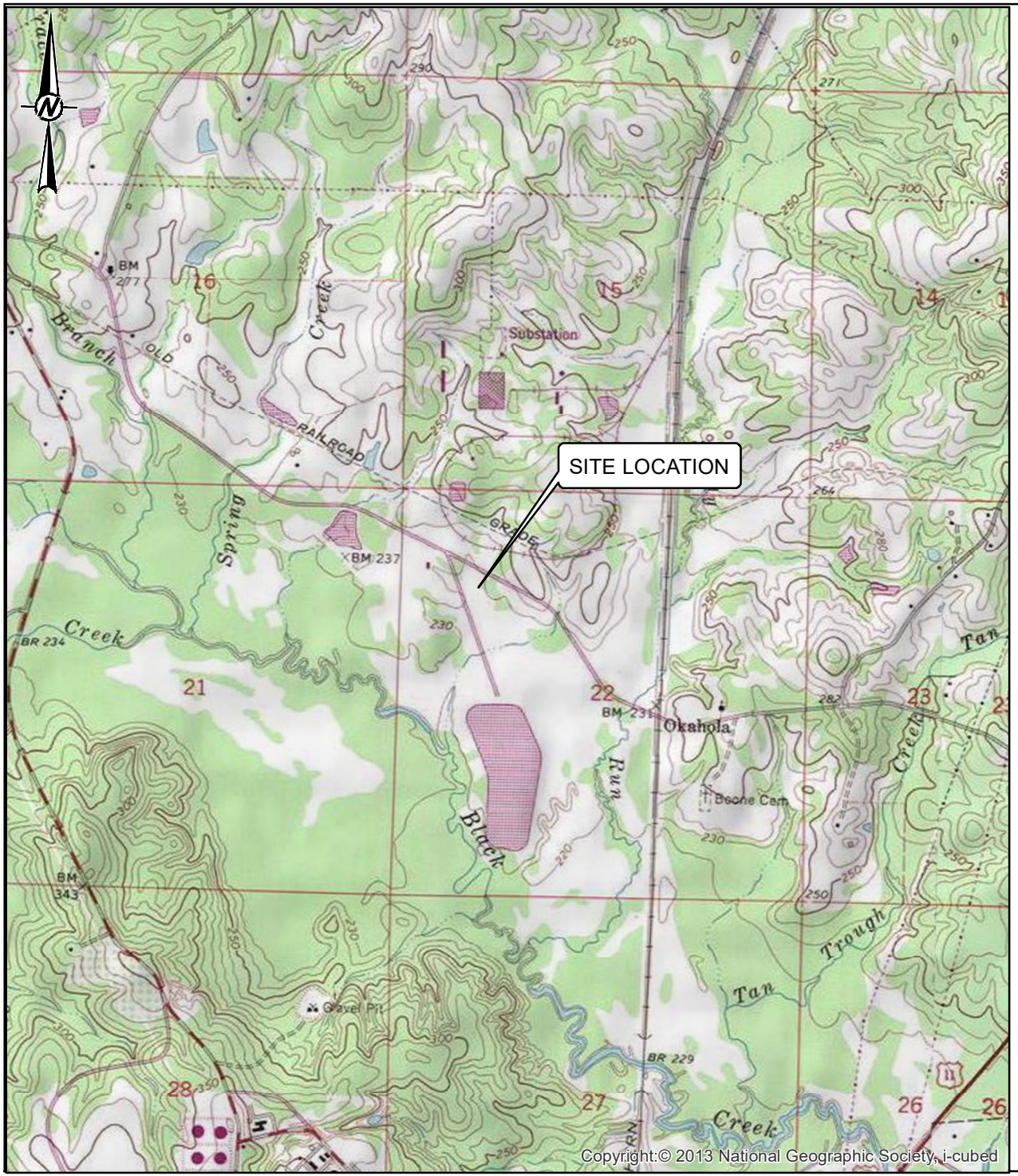
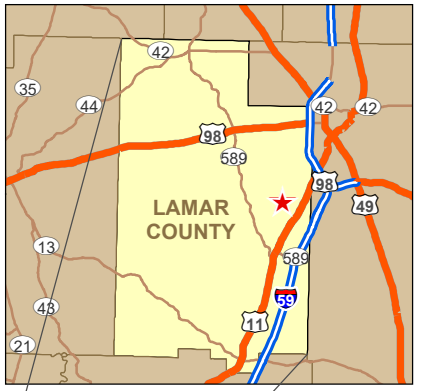




0 1000 2000

Feet

CLIENT
COOPERATIVE ENERGY

PROJECT
RD MORROW GENERATING STATION
PURVIS, MISSISSIPPI

TITLE
SITE LOCATION MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2020-04-30
PREPARED	DJC
DESIGN	DLP
REVIEW	DLK
APPROVED	DLP

PROJECT No.	CONTROL	Rev.	FIGURE
19117989	19117989A000-GIS.mxd	0	1

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

LEGEND

MW-XX	MONITORING WELL LOCATION
SB-XX	SOIL BORING LOCATION
P-A	SUPPLEMENTAL MONITORING POINTS
LF-P-X	PIEZOMETER LOCATION
—— X ——	FENCE

REFERENCE

BASE MAP TAKEN FROM ENVIRONMENTAL MANAGEMENT SERVICES, INC., MONITORING WELL LOCATIONS, DATED 2017-02-17 DELIVERED IN .DWG FORMAT.

CLIENT
COOPERATIVE ENERGY

CONSULTANT
GOLDER

YYYY-MM-DD	2020-04-30
DESIGNED	DLK
PREPARED	DJC
REVIEWED	DLK
APPROVED	DLP

PROJECT
RD MORROW GENERATING STATION
PURVIS, MISSISSIPPI

TITLE
WELL LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
19117989	19117989F001.dwg	0	2

LEGEND

- MW-XX — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION
- 220 — GROUNDWATER ELEVATION CONTOUR
- X — FENCE

REFERENCE

BASE MAP TAKEN FROM ENVIRONMENTAL MANAGEMENT SERVICES, INC., MONITORING WELL LOCATIONS, DATED 2017-02-17 DELIVERED IN .DWG FORMAT.

CLIENT
COOPERATIVE ENERGY

CONSULTANT
GOLDER

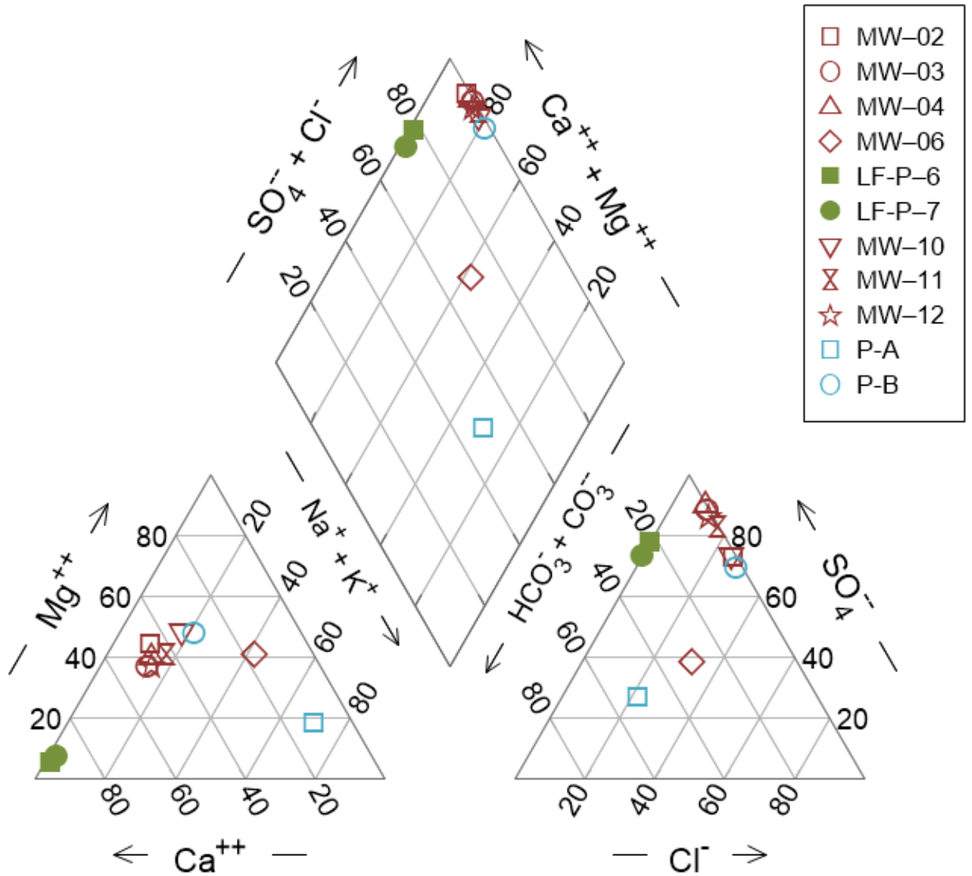
YYYY-MM-DD	2020-04-30
DESIGNED	DLK
PREPARED	DJC
REVIEWED	DLK
APPROVED	DLP

PROJECT
RD MORROW GENERATING STATION
PURVIS, MISSISSIPPI

TITLE
CCR LANDFILL UNIT POTENTIOMETRIC SURFACE ELEVATION CONTOUR MAP
OCTOBER 2019

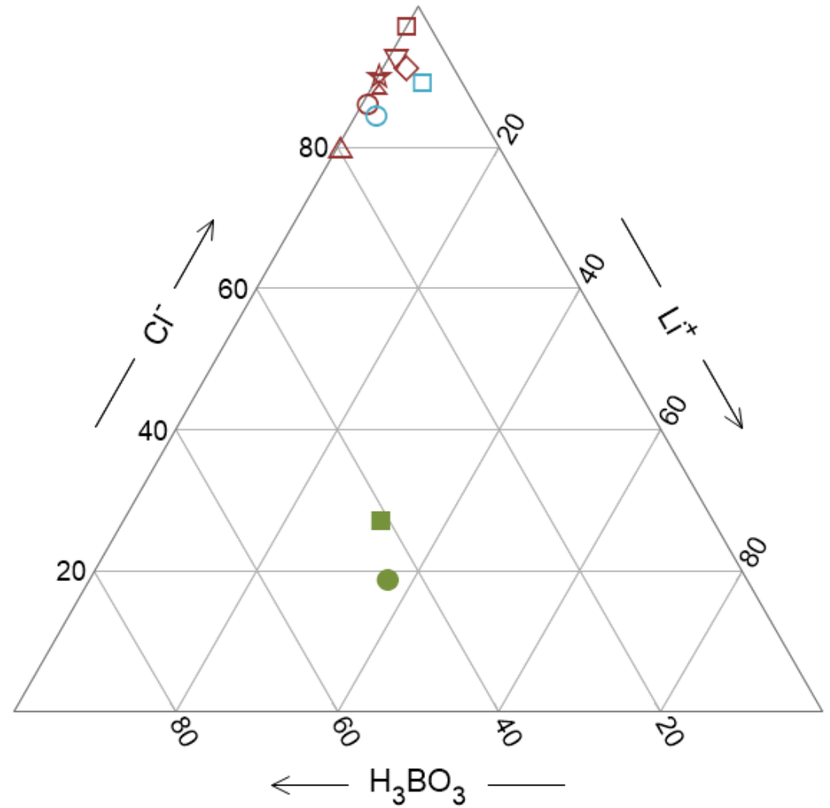
PROJECT NO.	CONTROL	REV.	FIGURE
19117989	19117989F002.dwg	0	3

Fig. 4



% meq/kg

Fig. 5



% mol

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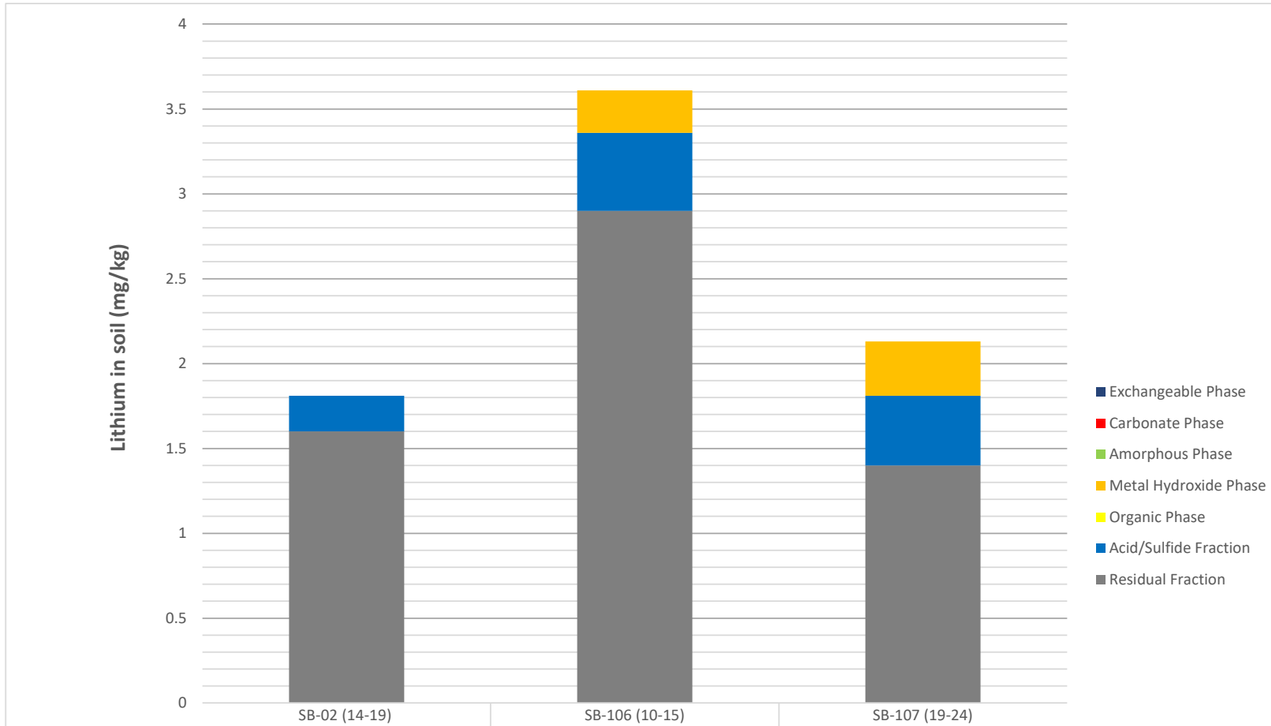
PROJECT
RD MORROW GENERATING STATION
PURVIS, MISSISSIPPI

TITLE
Geochemical Characteristics of Groundwater by Major Ion Abundance and Select Metals

PROJECT NO.	PHASE	REV.	FIGURE
19117989	001	A	4 & 5



	SB-02 (14-19)	SB-106 (10-15)	SB-107 (19-24)
Exchangeable Phase	0	0	0
Carbonate Phase	0	0	0
Amorphous Phase	0	0	0
Metal Hydroxide Phase	0	0.25	0.32
Organic Phase	0	0	0
Acid/Sulfide Fraction	0.21	0.46	0.41
Residual Fraction	1.6	2.9	1.4

Borehole and depth below ground surface (Lithium in mg/kg soil)

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PROJECT
RD MORROW GENERATING STATION
PURVIS, MISSISSIPPI

TITLE
Sequential Extraction of Lithium from Borings

PROJECT NO.	PHASE	REV.	FIGURE
19117989	001	A	6

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APPENDIX B

Semi-Annual 2020 Remedy Selection and Design Progress Report

March 10, 2020

RD MORROW GENERATING STATION - LANDFILL CCR UNIT
FIRST SEMI-ANNUAL 2020 REMEDY SELECTION AND DESIGN PROGRESS REPORT

In accordance with the United States Environmental Protection Agency (US EPA) Coal Combustion Residuals (CCR) Rule 40 Code of Federal Regulations (CFR) 257 Subpart D, Golder Associates Inc. has prepared this Semi-Annual Remedy Selection and Design Progress Report (Progress Report) for Cooperative Energy's RD Morrow Generating Station's CCR Landfill unit in accordance with § 257.97(a). The Progress Report was prepared to document activities conducted between September 1, 2019 and February 29, 2020. As required by the rules, this progress report describes the progress made in selecting and designing a remedy and future planned activities.

Summary of Work Conducted

- Field investigation to characterize the nature and extent of the release associated with the CCR Landfill Unit in the uppermost aquifer.
  - Installation and development of supplemental monitor points (P-A and P-B);
  - Evaluation of soil sample data, upgradient and downgradient from the CCR Landfill Unit, for mineralogical and chemical analyses;
  - Water-level data collection; and
  - Groundwater sampling and analysis.
- Groundwater Conceptual Site Model (CSM) – Development is ongoing to support the evaluation of potential groundwater remedies for the site.
- CCR Landfill Closure Design – As presented in the Assessment of Corrective Measures Report (Golder, 2019) (ACM Report)[1], Cooperative Energy plans to pair source control with its remedy selection.

Planned Activities and Anticipated Schedule

Cooperative Energy will continue its data collection efforts as necessary in support of efforts to refine the CSM and to further evaluate the feasibility of each corrective measure proposed in the ACM report. Once sufficient data become available to arrive at a focused number of corrective measures or a combination of corrective measures that would provide an effective groundwater remedy, necessary steps will be taken to implement a remedy for the site in accordance with 40 CFR § 257.98.

[1] Assessment of Corrective Measures, RD Morrow Generation Station – Landfill CCR Unit, Golder Associates, September 12, 2019.

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The following activities are planned for the upcoming semi-annual period:

- Evaluate alternative source for lithium pending review of geochemical and mineralogical data.
- Resample relevant monitoring and delineation wells for additional characterization. Multiple data sets will be needed to assess temporal variations in conditions.
- Continue to sample site monitoring wells for Appendix III and other Appendix IV constituents detected during assessment monitoring.
- Perform geochemical assessment of groundwater characteristics.

This Cooperative Energy, RD Morrow Generating Station Progress Report, has been prepared in compliance with applicable requirements of the CCR Final Rule. References to the appropriate 40 CFR § 257.96 rules are incorporated throughout this document.

Golder Associates Inc.

Dawn L. Prell
Senior Hydrogeologist

Jeff R. Piaskowski, PE
Senior Engineer

dlp/jrp

September 11, 2020

RD MORROW GENERATING STATION - LANDFILL CCR UNIT
SECOND SEMI-ANNUAL 2020 REMEDY SELECTION AND DESIGN PROGRESS REPORT

In accordance with the United States Environmental Protection Agency (US EPA) Coal Combustion Residuals (CCR) Rule 40 Code of Federal Regulations (CFR) 257 Subpart D, Golder Associates Inc. has prepared this Semi-Annual Remedy Selection and Design Progress Report (Progress Report) for Cooperative Energy's RD Morrow Generating Station's CCR Landfill unit in accordance with § 257.97(a). The Progress Report was prepared to document activities conducted between March 1, 2020 and August 31, 2020. As required by the rules, this progress report describes the progress made in selecting and designing a remedy and future planned activities.

Summary of Work Conducted

- Sampled monitoring and delineation wells for additional characterization.
- Sampled site monitoring wells for Appendix III and other Appendix IV constituents detected during April 2020 as part of the first semi-annual assessment monitoring.
- Prepared an alternative source demonstration for lithium with supporting geochemical and mineralogical data for monitoring wells MW-03 and MW-04. As a result, the ACM will only evaluate appropriate remedies for constituents of concern (COC)s at MW-05.
- Perform geochemical assessment of groundwater characteristics.
- Groundwater Conceptual Site Model (CSM) – Developed to support the evaluation of potential groundwater remedies for the site.
    - Groundwater modeling has been conducted to evaluate the feasibility of monitored natural attenuation along with source control for the SSLs of molybdenum and lithium at MW-05.
- Source control (Landfill Closure and Capping): Site preparation and earthwork is being conducted to commence landfill closure. Specifically, earthwork is ongoing to reroute landfill stormwater, facilitate closure grading, and establish perimeter access around the RD Morrow Landfill. The closure geosynthetics are stockpiled onsite and awaiting deployment which is planned to start in the fourth quarter of 2020.

Planned Activities and Anticipated Schedule

Cooperative Energy will continue its data collection efforts as necessary in support of efforts to refine the CSM and to further evaluate the feasibility of each corrective measure proposed in the ACM report. Once sufficient data becomes available to arrive at a focused number of corrective measures or a combination of corrective measures that would provide an effective groundwater remedy, necessary steps will be taken to implement a remedy for the site in accordance with 40 CFR § 257.98. The following activities are planned for the upcoming semi-annual period:

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- Abandonment of supplemental monitor points (P-A and P-B). Each of these temporary locations are no longer needed for assessment monitoring because a successful alternate source demonstration has been prepared.
- Resample relevant monitoring and delineation wells for additional characterization. Multiple data sets will be needed to assess temporal variations in conditions.
- Continue to sample site monitoring wells for Appendix III and other Appendix IV constituents detected during assessment monitoring.
- Perform geochemical assessment of groundwater characteristics.

This Cooperative Energy, RD Morrow Generating Station Progress Report, has been prepared in compliance with applicable requirements of the CCR Final Rule. References to the appropriate 40 CFR § 257.96 rules are incorporated throughout this document.

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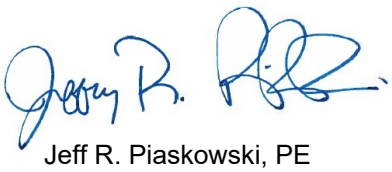

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