REPORT

2019 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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January 28, 2020

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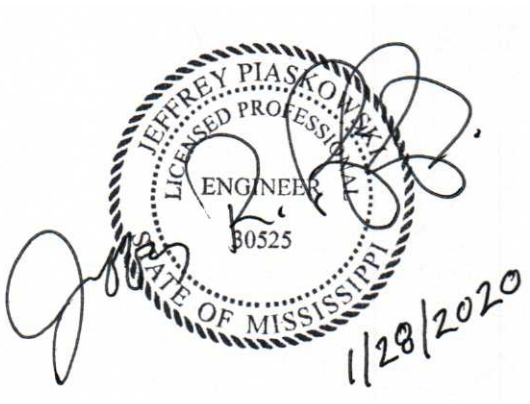
Certification

This *2019 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 *2019 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).



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https://golderassociates.sharepoint.com/sites/104953/project files/5 technical work/200 reports/annual gwmcar/2019/federal compliance report-web/final/fn 19116278_ annual report 2019_1.28.2020.docx

1.0 INTRODUCTION

This *2019 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 and revised July 2018. 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. This rule was modelled after Subtitle D of RCRA, which was initially established for Municipal Solid Waste (MSW) facilities (40 CFR § 258) in 1992.

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 is performed in accordance with the requirements of 40 CFR § 257.90 through § 257.98. This report documents the activities completed during the 2019 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.

The Combustion Waste Disposal Facility (CWDF; a.k.a. Landfill Unit) at the Morrow facility contains bottom ash, fly ash, and other coal combustion materials, that are subject to compliance with the CCR Rule. The Morrow CWDF is constructed with a natural earthen liner.

The generating plant and CCR surface impoundments are located on the north parcel while the landfill unit occupies the south parcel. As shown in Figure 2, Well Location Map, the Morrow CCR units include:

- **Surface Impoundments** - The surface impoundments are currently following a detection monitoring program in accordance with § 257.94.
- **Landfill Unit** – The CCR landfill unit is conducting efforts to determine the nature and extent of Appendix IV parameters and has initiated Assessment Monitoring in accordance with § 257.95 and Assessment of Corrective Measures in accordance with § 257.96.

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. This network includes:

- 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

2.0 GROUNDWATER MONITORING ACTIVITIES

In accordance with 40 CFR §257.90(e), the following describes monitoring-related activities performed during the 2019 calendar year. Groundwater sampling was performed in accordance with 40 CFR §257.93, as follows.

2.1 Monitoring Well Installation and Maintenance

There is no change to the surface impoundment certified groundwater monitoring system in 2019, except for, MWI-01 which was damaged during site demolition activities. The upper well casing was repaired, the inner well casing cleaned and the well resurveyed. The well was then redeveloped prior to sampling. Other than the repairs to MWI-01 the network remained the same as the previous 2018 reporting year.

Monitoring well activities for the landfill unit included the installation of three (3) assessment monitoring wells and in 2019 as part of an ongoing investigation related to the exceedances of groundwater protection standards for the landfill unit. Additionally, due to limited access with conventional drilling equipment, two (2) supplemental monitor points (P-A and P-B) were installed to assist in the investigation.

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 May 2019 and October 2019. 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. Cooperative Energy completed the assessment monitoring sampling events pursuant to the requirements of § 257.95 for the CCR Landfill unit in February, April, and October 2019. Groundwater

samples were collected for both Appendix III and Appendix IV constituents from each of the monitoring wells. As part of the ongoing investigation, additional data was collected from the new assessment monitoring wells (MW-10, MW-11, and MW-12) during August 2019 to allow for statistical evaluation of the data.

2.4 Groundwater Elevation Measurement

Prior to each sampling event, groundwater elevations were recorded from the site monitoring wells. The April/May and October 2019 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 unit remains sufficient to monitor groundwater downgradient of the unit. The direction of groundwater flow is toward the south-southwest based on review of 2019 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

The 2019 semi-annual detection monitoring events were conducted in May and October for the Surface Impoundment monitoring system. The annual Appendix IV scan event was completed in February 2019 while semi-annual assessment monitoring events were conducted in April and October for the Landfill unit monitoring system.

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 sampling events were analyzed for Appendix III constituents and results are summarized in Tables 1A-C. The groundwater samples for the Landfill unit for 2019 sampling events were analyzed for Appendix III and Appendix IV constituents and results are summarized in Tables 2A-E. 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 this report, Cooperative Energy provides a summary of the comparative statistical analyses completed in 2019, which includes the analyses for second semi-annual event in 2018 as well as the semi-annual monitoring events conducted in May 2019 and April 2019 for the Surface Impoundment and the Landfill, respectively. Statistical analyses for the October 2019 sampling event were completed after the calendar year 2019 and will be reported in next year's Annual report.

3.1.1 Surface Impoundment Statistical Analyses

October 2018 Statistical Analysis

Analytical data from the October 2018 monitoring event 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 exceedances of the established prediction limits for Appendix III constituents. The impoundment network will remain in detection monitoring.

May 2019 Statistical Analysis

Analytical data from the May 2019 monitoring event 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 exceedances of the established prediction limits for Appendix III constituents. The impoundment network will remain in detection monitoring.

3.1.2 Landfill Unit Statistical Analyses

Analytical data from the 2018-2019 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)

Parametric prediction 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).

GWPS 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 that the GWPS, a statistically significant level (SSL) is identified for that well.

Table 3.1.2 Summary of Background Levels and GWPS

Analyte	Units	Site Specific Background		Federal MCL	GWPS	
		October 2018	April 2019		October 2018	April 2019
Antimony	mg/L	0.002	0.002	0.006	0.006	0.006
Arsenic	mg/L	0.005	0.005	0.01	0.01	0.01
Barium	mg/L	0.025	0.025	2	2	2
Beryllium	mg/L	0.0092	0.0092	0.004	0.0092	0.0092
Cadmium	mg/L	0.005	0.001	0.005	0.005	0.005
Chromium	mg/L	0.02	0.02	0.1	0.1	0.1
Cobalt	mg/L	0.1687	0.1649	0.02	0.1687	0.1649
Fluoride	mg/L	0.758	1.014	4	4	4
Lead	mg/L	0.014	0.014	0.015	0.015	0.015
Lithium	mg/L	0.05	0.05	0.04	0.05	0.05
Mercury	mg/L	0.0015	0.0015	0.002	0.002	0.002
Molybdenum	mg/L	0.005	0.005	0.1	0.1	0.1
Radium (226 + 228)	pCi/L	2.074	2.218	5	5	5
Selenium	mg/L	0.05	0.05	0.05	0.05	0.05
Thallium	mg/L	0.001	0.001	0.002	0.002	0.002

Notes:
1) mg/L = milligrams per liter;
2) pCi/L = picocuries per liter.

October 2018 Statistical Analysis

Analytical data from the October 2018 monitoring event 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 October 2018 semi-annual monitoring event:

- Lithium (MW-3, MW-4 and MW-5)
- Molybdenum (MW-5)

April 2019 Statistical Analysis

Analytical data from the April 2019 monitoring event 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 using the GWPS established according to 40 CFR § 257.95(h), the following SSLs were identified following the first 2019 semi-annual monitoring event:

- Lithium (MW-3, MW-4 and MW-5)
- Molybdenum (MW-5)

4.0 PROGRAM TRANSITIONS

Surface Impoundment

There were no program transitions within the groundwater monitoring program for the surface impoundment. Detection monitoring will continue throughout 2020.

Landfill Unit

The landfill unit transitioned from Assessment Monitoring to Assessment of Corrective Measures (ACM) in 2019. The ACM (Golder, September 2019) was prepared and submitted following the requirements of 40 CFR § 257.96. Prior to submittal of the ACM, a 60-day extension demonstration documented lack of drilling contractor availability, adverse weather conditions, and issues preventing access to drilling locations. A copy of the certified ACM extension demonstration is included in Appendix A (Golder, July 2019).

5.0 PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVE IN 2019

There were no specific problems encountered with the monitoring well systems in 2019, other than the conditions giving rise to the extension needed for completion of the ACM. Cooperative Energy complied with the extension time period once those conditions abated. Cooperative Energy also notes that, at times, weather, dense foliage, and terrain have made access for personnel and equipment to areas for further site characterization challenging.

6.0 CONCLUSIONS & FUTURE ACTIONS

This *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 2019 calendar year and key actions for the upcoming calendar year 2020.

Proposed Key Activities for 2020

The proposed activities for the 2020 calendar year include:

- Semi-annual sampling will continue for Surface Impoundment's detection monitoring network in 2020
- Annual and semi-annual sampling will continue for the Landfill unit's assessment monitoring network in 2020.
- Additional data collection is ongoing as part of the ACM.
- Evaluation of the corrective measure alternatives will continue in 2020.

7.0 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.

EMS. 2018. First Annual Coal Combustion Residuals (CCR) Groundwater Monitoring and Corrective Action Report – Landfill and Surface Impoundments, RD Morrow Generating Station, Lamar County, Mississippi. Environmental Management Services, Inc. Prepared for Cooperative Energy, Inc. January 19, 2018.

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

USEPA. 2009. Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, EPA/530/R/09/007. U.S. Environmental Protection Agency (EPA), Office of Resource Conservation and Recovery (former Office of Solid Waste). 2009. March 2009.

USEPA, 2015, Federal Register. Volume 80. No. 74. Friday April 17, 2015. Part II. Environmental Protection Agency. 40 CFR Parts 257and 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.

USEPA, 2018, Federal Register. Volume 83. FR 36435; pp. 36435-36456. July 30, 2018. Phase I, Part 1. Environmental Protection Agency. 40 CFR Parts 257. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals from Electric Utilities; Amendments to National Minimum Criteria. [EPA HQ OLEM–2017–0286; FRL–9981–18–OLEM]. RIN–2050–AG88.

Tables

TABLE 1A.
ANALYTICAL DATA SUMMARY - CCR Surface Impoundment (October 2018)
RD Morrow Generating Station
Hattiesburg, Mississippi

Analyte	Units	Prediction Limit	Detection Monitoring Wells			
			MWI-1	MWI-2	MWI-3	MWI-4
		Sample Date:	10/12/2018	10/12/2018	10/12/2018	10/12/2018
Appendix III						
BORON, TOTAL	mg/L	0.1353	0.111	0.072	0.068	0.081
CALCIUM, TOTAL	mg/L	35.66	35.4	6.81	3.99	10.7
CHLORIDE, TOTAL	mg/L	40.11	35.8	13.3	2.86	10.9
FLUORIDE, TOTAL	mg/L	0.4116	0.29	<0.22	<0.22	<0.22
pH	S.U.	varies	6.57	6.01	6.25	6.41
SULFATE, TOTAL	mg/L	42.3	27.8	<5	<5	5.36
TOTAL DISSOLVED SOLIDS	mg/L	352.7	321.0	208.0	164.0	168.0

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 (7.193 - 5.955), MWI-2 (6.74 - 5.475), MWI-3 (6.869 - 5.602), MWI-4 (7.423 - 5.477)

TABLE 1B.
ANALYTICAL DATA SUMMARY - CCR Surface Impoundment (May 2019)
RD Morrow Generating Station
Hattiesburg, Mississippi

Analyte	Units	Prediction Limit	Detection Monitoring Wells			
			MWI-1	MWI-2	MWI-3	MWI-4
		Sample Date:	5/1/2019	5/1/2019	5/1/2019	5/1/2019
Appendix III						
BORON, TOTAL	mg/L	0.1435	0.104	0.065	0.065	0.076
CALCIUM, TOTAL	mg/L	37	55.7	6.74	3.33	10.8
CHLORIDE, TOTAL	mg/L	41.5	29.9	11.1	2.65	11.6
FLUORIDE, TOTAL	mg/L	0.5	<0.50	<0.50	<0.50	<0.50
pH	S.U.	varies	6.61	5.98	6.19	6.36
SULFATE, TOTAL	mg/L	46.6	64.5	< 5.0	< 5.0	< 5.0
TOTAL DISSOLVED SOLIDS	mg/L	369.1	325	163	151	176

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 (7.058 - 6.015), MWI-2 (6.596 - 5.524), MWI-3 (6.606 - 5.971), MWI-4 (7.185 - 5.695)

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

Analyte	Units	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	0.11	0.074	0.073	0.086
CALCIUM, TOTAL	mg/L	54.3	6.76	4.28	10
CHLORIDE, TOTAL	mg/L	33.1	12.1	3.31	9.23
FLUORIDE, TOTAL	mg/L	<0.5	<0.5	<0.5	<0.5
pH	S.U.	6.67	6.07	6.42	6.51
SULFATE, TOTAL	mg/L	110	7.66	<5.0	<5.0
TOTAL DISSOLVED SOLIDS	mg/L	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.

TABLE 2A.
ANALYTICAL DATA SUMMARY - CCR Landfill (October 2018)
RD Morrow Generating Station
Hattiesburg, Mississippi

Analyte	Units	Prediction Limit	GWPS	DETECTION MONITORING WELLS				
				MW-02	MW-03	MW-04	MW-05	MW-06
			Sample Date:	10/12/2018	10/12/2018	10/12/2018	10/12/2018	10/12/2018
Appendix III								
BORON, TOTAL	mg/L	2.027	N/A	1.43	**7.87**	**14.3**	**29**	0.065
CALCIUM, TOTAL	mg/L	155.2	N/A	136	**497**	**393**	**585**	2.02
CHLORIDE, TOTAL	mg/L	230.6	N/A	162	218	**321**	**320**	7.87
FLUORIDE, TOTAL	mg/L	0.7435	4	0.25	0.74	**1.03**	**1.03**	<0.22
pH	S.U.	3.491 - 5.131	N/A	3.2	4.93	**3.27**	**10.34**	**5.37**
SULFATE, TOTAL	mg/L	806.9	N/A	463	**2050**	**1710**	**1980**	8.67
TOTAL DISSOLVED SOLIDS	mg/L	1380.0	N/A	1376	**3856**	**2164**	**5560**	69
Appendix IV								
ANTIMONY, TOTAL	mg/L	N/A	0.006	<0.002	<0.002	<0.002	<0.002	<0.002
ARSENIC, TOTAL	mg/L	N/A	0.01	<0.002	<0.002	<0.002	<0.002	<0.002
BARIUM, TOTAL	mg/L	N/A	2	0.022	0.029	0.031	0.055	0.114
BERYLLIUM, TOTAL	mg/L	N/A	0.0092	0.00644	0.00174	0.00167	<0.001	<0.001
CADMIUM, TOTAL	mg/L	N/A	0.005	<0.005	<0.005	<0.005	<0.005	<0.005
CHROMIUM, TOTAL	mg/L	N/A	0.1	0.00135	0.00703	<0.001	0.0016	0.00266
COBALT, TOTAL	mg/L	N/A	0.1687	0.154	0.0468	0.0627	0.00701	0.00148
FLUORIDE, TOTAL	mg/L	0.7435	4	0.25	0.74	**1.03**	**1.03**	<0.22
LEAD, TOTAL	mg/L	N/A	0.015	0.00465	0.00814	0.00778	<0.001	<0.001
LITHIUM, TOTAL	mg/L	N/A	0.05	<0.05	0.44	0.464	5.16	<0.05
MERCURY, TOTAL	mg/L	N/A	0.002	<0.002	<0.002	<0.002	<0.002	<0.002
MOLYBDENUM, TOTAL	mg/L	N/A	0.1	<0.005	<0.005	<0.005	7.09	<0.005
RADIUM (226 + 228)	pCi/L	N/A	5.0	1.618	2.399	2.823	0.833	1.348
SELENIUM, TOTAL	mg/L	N/A	0.05	<0.05	<0.05	<0.05	<0.05	<0.05
THALLIUM, TOTAL	mg/L	N/A	0.002	<0.001	<0.001	<0.001	0.00245	<0.001

NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter; N/A - Not Applicable
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. Bolded data indicates an exceedance of the PL for appendix III constituents and a statistically significant level based on 95% confidence interval above the Goundwater Protection Standard (GWPS) for appendix IV constituents.

TABLE 2B.
ANALYTICAL DATA SUMMARY - CCR Landfill (February 2019)
RD Morrow Generating Station
Hattiesburg, Mississippi

Analyte	Units	DETECTION MONITORING WELLS				
		MW-02	MW-03	MW-04	MW-05	MW-06
	Sample Date:	2/21/2019	2/21/2019	2/21/2019	2/21/2019	2/21/2019
Appendix III						
BORON, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required
CALCIUM, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required
CHLORIDE, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required
FLUORIDE, TOTAL	mg/L	0.97	< 0.50	< 0.50	< 0.50	< 0.50
pH	S.U.	Not Required	Not Required	Not Required	Not Required	Not Required
SULFATE, TOTAL	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required
TOTAL DISSOLVED SOLIDS	mg/L	Not Required	Not Required	Not Required	Not Required	Not Required
Appendix IV						
ANTIMONY, TOTAL	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
ARSENIC, TOTAL	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
BARIUM, TOTAL	mg/L	0.023	0.035	0.035	0.055	0.133
BERYLLIUM, TOTAL	mg/L	< 0.004	< 0.004	< 0.004	< 0.004	< 0.004
CADMIUM, TOTAL	mg/L	< 0.005	< 0.005	< 0.005	< 0.005	< 0.005
CHROMIUM, TOTAL	mg/L	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010
COBALT, TOTAL	mg/L	0.129	0.0515	0.0669	0.0043	0.00154
FLUORIDE, TOTAL	mg/L	0.97	< 0.50	< 0.50	< 0.50	< 0.50
LEAD, TOTAL	mg/L	0.003	0.0058	0.00561	< 0.001	< 0.001
LITHIUM, TOTAL	mg/L	< 0.040	0.561	0.495	4.39	< 0.040
MERCURY, TOTAL	mg/L	< 0.002	< 0.002	< 0.002	< 0.002	< 0.002
MOLYBDENUM, TOTAL	mg/L	< 0.005	< 0.005	< 0.005	7.92	< 0.005
RADIUM (226 + 228)	pCi/L	1.6	2.639	2.592	1.59	0.882
SELENIUM, TOTAL	mg/L	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
THALLIUM, TOTAL	mg/L	< 0.001	< 0.001	< 0.001	0.00169	< 0.001

NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter; N/A - Not Applicable
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 consituents in Appendix III and those Appendix IV constituents detected during the annual scan event.

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TABLE 2C.
ANALYTICAL DATA SUMMARY - CCR Landfill (April 2019)
RD Morrow Generating Station
Hattiesburg, Mississippi

Analyte	Units	Prediction Limit	GWPS	DETECTION MONITORING WELLS				
				MW-02	MW-03	MW-04	MW-05	MW-06
			Sample Date:	4/30/2019	4/30/2019	4/30/2019	4/30/2019	4/30/2019
Appendix III								
BORON, TOTAL	mg/L	2.022	N/A	1.39	**9.60**	**14.6**	**28.2**	< 0.050
CALCIUM, TOTAL	mg/L	170.7	N/A	126	**474**	**351**	**530**	2.33
CHLORIDE, TOTAL	mg/L	231.5	N/A	159	209	179	**382**	7.42
FLUORIDE, TOTAL	mg/L	0.9662	4	0.92	<0.5	0.52	<0.5	<0.5
pH	S.U.	3.491 - 5.131	N/A	4.41	4.94	4.24	**6.78**	4.64
SULFATE, TOTAL	mg/L	804.2	N/A	597	**2260**	**2280**	**2740**	12.2
TOTAL DISSOLVED SOLIDS	mg/L	1379.0	N/A	1192	**3240**	**3188**	**5488**	66
Appendix IV								
ANTIMONY, TOTAL	mg/L	N/A	0.006	Not Required	Not Required	Not Required	Not Required	Not Required
ARSENIC, TOTAL	mg/L	N/A	0.01	Not Required	Not Required	Not Required	Not Required	Not Required
BARIUM, TOTAL	mg/L	N/A	2	0.021	0.037	0.037	0.069	0.126
BERYLLIUM, TOTAL	mg/L	N/A	0.0092	0.00644	< 0.004	< 0.004	< 0.004	< 0.004
CADMIUM, TOTAL	mg/L	N/A	0.005	Not Required	Not Required	Not Required	Not Required	Not Required
CHROMIUM, TOTAL	mg/L	N/A	0.1	Not Required	Not Required	Not Required	Not Required	Not Required
COBALT, TOTAL	mg/L	N/A	0.1649	0.141	0.0491	0.0882	0.0050	0.00203
FLUORIDE, TOTAL	mg/L	0.9662	4	0.92	<0.5	0.52	<0.5	<0.5
LEAD, TOTAL	mg/L	N/A	0.015	0.00364	0.00924	0.00679	0.00126	< 0.001
LITHIUM, TOTAL	mg/L	N/A	0.05	< 0.040	**0.586**	**0.501**	**4.97**	< 0.040
MERCURY, TOTAL	mg/L	N/A	0.002	Not Required	Not Required	Not Required	Not Required	Not Required
MOLYBDENUM, TOTAL	mg/L	N/A	0.1	< 0.005	< 0.005	< 0.005	**8.14**	< 0.005
RADIUM (226 + 228)	pCi/L	N/A	5.0	1.928	2.715	1.941	1.803	1.371
SELENIUM, TOTAL	mg/L	N/A	0.05	Not Required	Not Required	Not Required	Not Required	Not Required
THALLIUM, TOTAL	mg/L	N/A	0.002	< 0.001	< 0.001	< 0.001	0.00232	< 0.001

NOTES:

1. Bolded data indicates an exceedance of the PL for appendix III constituents and a statistically significant level based on 95% confidence interval above the Goundwater Protection Standard (GWPS) for appendix IV constituents.
2. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter; N/A - Not Applicable
3. < - 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.
4. 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.
5. 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 consituents in Appendix III and those Appendix IV constituents detected during the annual scan event.

TABLE 2D.
ANALYTICAL DATA SUMMARY - CCR Landfill Supplemental Background (August 2019)
RD Morrow Generating Station
Hattiesburg, Mississippi

Analyte	Units	ASSESSMENT MONITORING WELLS											
		MW-10	MW-11	MW-12	MW-10	MW-11	MW-12	MW-10	MW-11	MW-12	MW-10	MW-11	MW-12
	Sample Date:	8/8/2019	8/8/2019	8/8/2019	8/15/2019	8/15/2019	8/15/2019	8/22/2019	8/22/2019	8/22/2019	8/28/2019	8/28/2019	8/28/2019
Appendix III													
BORON, TOTAL	mg/L	3.49	6.37	1.82	3.96	6.59	1.7	3.81	6.9	2.02	3.39	6.25	1.79
CALCIUM, TOTAL	mg/L	75.5	189	94.3	80.2	179	89.2	73.5	30.2	49.3	72	168	87.5
CHLORIDE, TOTAL	mg/L	167	179	55.4	181	183	55.9	162	168	56.1	173	184	60.8
FLUORIDE, TOTAL	mg/L	0.52	0.91	<0.50	0.61	0.95	<0.50	0.58	0.91	<0.50	0.62	0.96	<0.50
pH	S.U.	4.02	3.94	4.02	3.97	3.91	3.95	4.01	3.99	3.95	3.88	3.97	3.94
SULFATE, TOTAL	mg/L	650	1200	519	542	1390	581	437	1140	566	537	1270	553
TOTAL DISSOLVED SOLIDS	mg/L	854	1645	706	1190	1990	850	952	1688	874	990	1678	796
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	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	Not Required	Not Required
BARIUM, TOTAL	mg/L	0.0313	0.0343	0.0271	0.0314	0.0393	0.0266	0.0323	0.0394	0.0265	0.0348	0.0386	0.0265
BERYLLIUM, TOTAL	mg/L	0.0089	0.00378	0.00223	0.00728	0.00336	0.00197	0.00973	0.00493	0.00269	0.00804	0.00354	0.00208
CADMIUM, TOTAL	mg/L	Not Required	Not Required	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	Not Required	Not Required
COBALT, TOTAL	mg/L	0.0909	0.0932	0.0338	0.0937	0.0969	0.0307	0.0895	0.0847	0.031	0.0853	0.0934	0.0323
FLUORIDE, TOTAL	mg/L	0.52	0.91	<0.50	0.61	0.95	<0.50	0.58	0.91	<0.50	0.62	0.96	<0.50
LEAD, TOTAL	mg/L	0.00275	0.00381	0.00244	0.00293	0.00438	0.00253	0.00272	0.00348	0.00127	0.00251	0.0035	0.00254
LITHIUM, TOTAL	mg/L	0.346	0.368	0.0424	0.402	0.418	< 0.04	0.343	0.392	0.043	0.271	0.383	0.04
MERCURY, TOTAL	mg/L	Not Required	Not Required	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	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500	< 0.00500
RADIUM (226 + 228)	pCi/L	1.439	1.399	1.782	1.794	2.954	1.551	1.888	2.72	2.005	1.16	2.59	1.601
SELENIUM, TOTAL	mg/L	Not Required	Not Required	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	< 0.00100	< 0.00100	< 0.00100	< 0.00100	< 0.00100	< 0.00100	< 0.00100	< 0.00100	< 0.00100

NOTES:
1. Data does not represent a semi-annual or annual monitoring event. Data collected per 40 CFR § 257.95
2. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter; N/A - Not Applicable
3. < - 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.
4. 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.
5. 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 consituents in Appendix III and those Appendix IV constituents detected during the annual scan event while in Assessment monitoring.

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

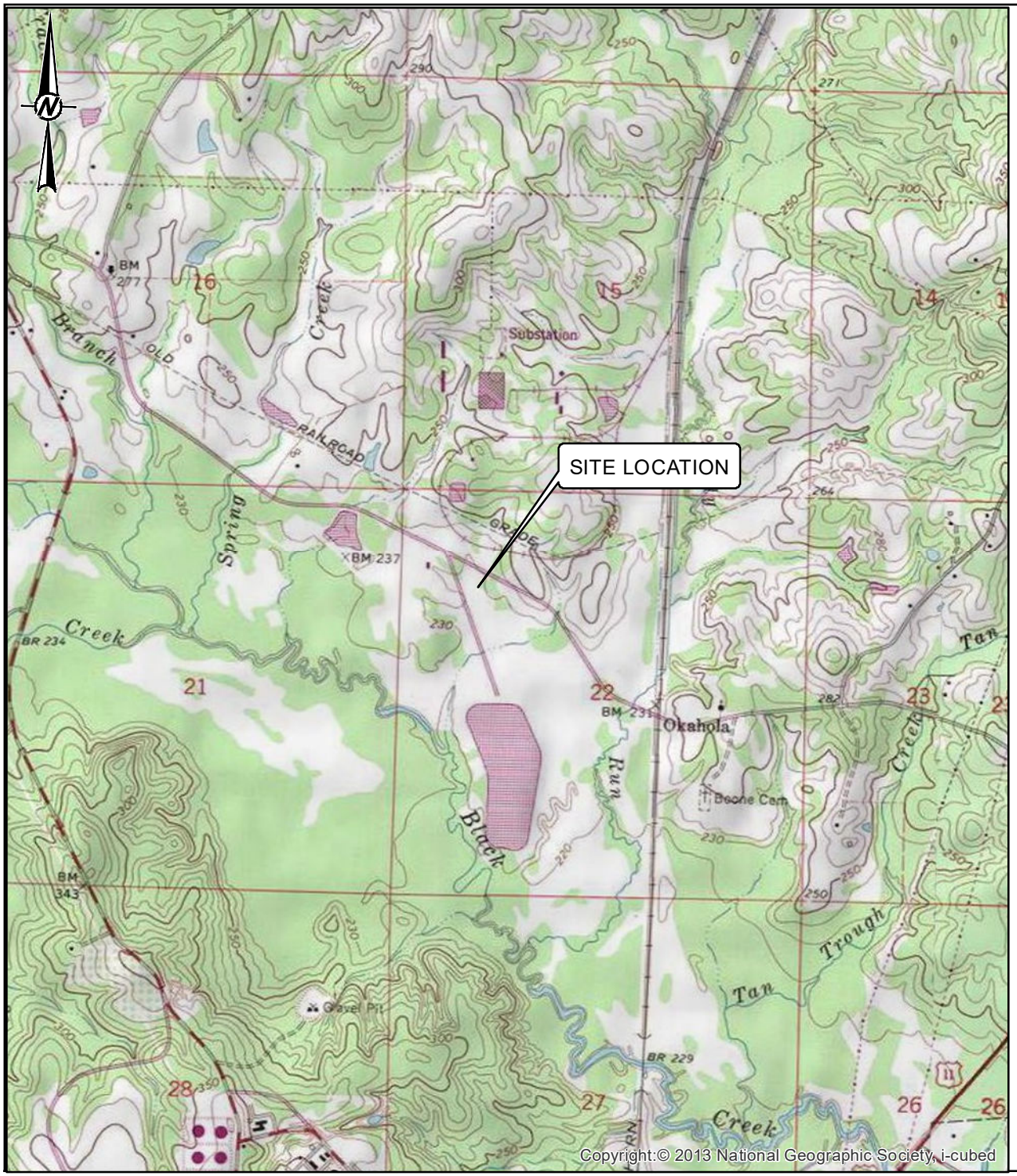
Analyte	Units	DETECTION MONITORING WELLS					ASSESSMENT MONITORING WELLS		
		MW-02	MW-03	MW-04	MW-05	MW-06	MW-10	MW-11	MW-12
	Sample Date:	10/17/2019	10/17/2019	10/17/2019	10/17/2019	10/17/2019	10/17/2019	10/17/2019	10/17/2019
Appendix III									
BORON, TOTAL	mg/L	1.35	7.5	10.8	25.6	1.09	3.63	6.38	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	0.6	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	0.03	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	0.6	0.77
LEAD, TOTAL	mg/L	0.00306	0.0069	0.00394	< 0.00100	< 0.00100	0.00379	0.00318	0.003
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	0.5798 U	1.756	1.7465	1.733 U	2.188	0.962 U	2.408	2.0138
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

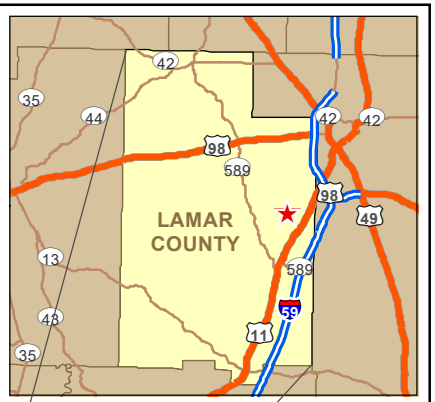
NOTES:

1. mg/L - Milligrams per Liter; pCi/L - picocuries per Liter; N/A - Not Applicable
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 consituents in Appendix III and those Appendix IV constituents detected during the annual scan event.

Figures

Path: H:\19x-Projects\19116278-Coop Energy\figures\A-\19116278A000-GIS.mxd





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Feet

CLIENT
COOPERATIVE ENERGY LLC
RD MORROW GENERATING STATION
HATTIESBURG, MISSISSIPPI

PROJECT
2019 ANNUAL GROUNDWATER MONITORING & CORRECTIVE ACTION REPORT

TITLE
SITE LOCATION MAP

CONSULTANT
GOLDER

YYYY-MM-DD	2019-12-02
PREPARED	DJC
DESIGN	DLK
REVIEW	DLK
APPROVED	DLP

PROJECT No.	CONTROL	Rev.	FIGURE
19116278	19116278A000-GIS.mxd	0	1

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

- PROPERTY BOUNDARY
- MW-XX MONITORING WELL LOCATION
- P-X SUPPLEMENTAL MONITORING POINT

REFERENCE

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

CLIENT
COOPERATIVE ENERGY LLC

CONSULTANT
GOLDER

YYYY-MM-DD	2020-01-17
DESIGNED	DLP
PREPARED	DJC
REVIEWED	DLK
APPROVED	DLP

PROJECT
RD MORROW GENERATING STATION
HATTIESBURG, MISSISSIPPI

TITLE
WELL LOCATION MAP

PROJECT NO.	CONTROL	REV.	FIGURE
19117989	19117989D001.dwg	0	2

APPENDIX A

Assessment of Corrective Measures Extension Certification

GOLDER

July 11, 2019 Project No. 19117989

Mr. Jeff Pittman
Cooperative Energy
RD Morrow, Sr. Generating Station
304 Old Okahola Schoolhouse Road
Hattiesburg, Mississippi 39404

RD MORROW GENERATING STATION: GROUNDWATER ASSESSMENT OF CORRECTIVE MEASURES EXTENSION DEMONSTRATION OF NEED CERTIFICATION

Dear Mr. Pittman.

Golder Associates Inc. (Golder) is providing Cooperative Energy with this letter certifying that, based on our knowledge of the groundwater monitoring and assessment of corrective measure activities at RD Morrow Generating Station, the demonstration of need for a 60-day extension to complete the assessment of corrective measures is justified and valid.

Golder understands that the assessment of corrective measures was initiated for the landfill groundwater monitoring system on May 15, 2019, following identification of a groundwater protection standard exceedance on February 13, 2019 (as amended March 11, 2019), in accordance with the United States Environmental Protection Agency (USEPA) *Standards for the Disposal of Coal Combustion Residuals and Surface Impoundments* 40 CFR §257.96. Activities for the assessment of corrective measures are still being completed, and due to site-specific circumstances, a 60-day extension to the 90-day completion timeframe pursuant to 40 CFR §257.96(a) is needed in order to complete the assessment. The site-specific circumstances include:

- A delay in mobilization for drilling due to limited driller availability; currently drillers are scheduling work three to four weeks out,
- A delayed and extended drilling schedule due to weather conditions and difficult site access. Multiple significant rain events were recorded during the first half of 2019. Access to drilling locations requires significant tree clearing, road construction and placement of drill mats. Road construction to gain access to drill locations was delayed due to contractor availability and drill mats were not readily available resulting in additional delays,
- A delay in laboratory turn-around time for specialized soil test analyses in excess of 10 or more days due to increase demand for needed services.

Golder Associates Inc.
5170 Peachtree Road Building 100 Suite 300, Atlanta, Georgia, USA 30341 T: +1 770 496-1893 F: +1 770 934-9476

As used herein, the word "certification" or "certifying" shall mean an expression of the Engineer's professional opinion to the best of his or her information, knowledge, and belief, and does not constitute a warranty or guarantee by the Engineer.

Should you have any questions regarding this notification or require additional information, please contact the undersigned.

Sincerely,

Golder Associates Inc.

Dawn L. Prell
Senior Consultant

Brian Thomas, P.E.
Mississippi Registered Professional Engineer

CC: RD Morrow Generating Station, Operating Record

golder.com