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ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
SEDIMENTATION POND
A.B. BROWN GENERATING STATION
POSEY COUNTY, INDIANA

by
Haley & Aldrich, Inc.
Greenville, South Carolina

for
Southern Indiana Gas and Electric Company
Evansville, Indiana

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1. 40 CFR § 257.90 Applicability

1.1 40 CFR § 257.90(a)

Except as provided for in § 257.100 for inactive CCR surface impoundments, all CCR landfills, CCR surface impoundments, and lateral expansions of CCR units are subject to the groundwater monitoring and corrective action requirements under § 257.90 through § 257.98.

The Sedimentation Pond at A.B. Brown Generating Station (ABB) is subject to the groundwater monitoring and corrective action requirements described under Code of Federal Regulations Title 40 (40 CFR) § 257.90 through § 257.98 (Rule). This document addresses the requirement for the Owner/Operator to prepare an Annual Groundwater Monitoring and Corrective Action Report per § 257.90(e).

1.2 40 CFR § 257.90(e) - SUMMARY

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

This Annual Groundwater Monitoring and Corrective Action Report documents the activities completed in 2019 for the Sedimentation Pond as required by the Rule. Groundwater sampling and analysis was conducted per the requirements described in § 257.93, and the status of the groundwater monitoring program described in § 257.95 is provided in this report.

1.2.1 Status of the Groundwater Monitoring Program

As provided in the notification on 15 January 2018 statistically significant increases (SSI) of Appendix III constituents were identified downgradient of the Sedimentation Pond. An evaluation of alternate sources was conducted; however, a successful alternate source demonstration (ASD) was not achieved at that time. As a result, an Assessment Monitoring program was initiated as required by § 257.94(e)(2). The notification was placed in the facility's operating record as required by 257.105(h)(5). Annual and semi-annual groundwater samples were collected as outlined in § 257.95(b) and 257.95(d)(1) and groundwater protection standards were established as required by § 257.95(d)(2). Statistical analysis was completed in January 2019 as described in § 257.93(h)(2) and statistically significant levels (SSL) of Appendix IV constituents were not identified downgradient of the Sedimentation Pond. As a result, the Sedimentation Pond remains in assessment monitoring.

1.2.2 Key Actions Completed

The following key actions were completed in 2019:

- Completed a statistical analysis of assessment monitoring results to evaluate potential SSLs;
- Prepared 2018 Annual Report including:
  - The Annual Report was placed in the facility's operating record pursuant to § 257.105(h)(1);
  - Pursuant to § 257.106(h)(1), the notification was sent to the relevant State Director and/or Tribal authority within 30 days of the Annual Report being placed in the facility's operating record [§ 257.106(d)];
  - Pursuant to § 257.107(h)(1), the Annual Report was posted to the CCR Website within 30 days of the Annual Report being placed in the facility's operating record [§ 257.107(d)] and 257.107(h)(1)];
- Collected and analyzed two rounds of groundwater samples in accordance with § 257.95

1.2.3 Problems Encountered

No problems such as damaged wells, issues with sample collection or lack of sampling, and problems with analytical analysis were encountered at the ABB Sedimentation Pond in 2019.

1.2.4 Actions to Resolve Problems

Actions to resolve problems were not required.

1.2.5 Project Key Activities for Upcoming Year

Key activities to be completed in 2020 include the following:

- Continue Assessment Monitoring as required by § 257.95.
- Complete statistical analysis of the semiannual groundwater sampling results as required by § 257.93(h)(2).

1.3 40 CFR § 257.90(e) - INFORMATION

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

1.3.1 40 CFR § 257.90(e)(1)

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

As required by § 257.90(e)(1), a map showing the locations of the Sedimentation Pond and associated upgradient, and downgradient wells is presented as Figure 1.

1.3.2 40 CFR § 257.90(e)(2)

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

Additional monitoring wells were not installed or decommissioned during 2019. However, location and construction details of the existing monitoring well network for the Sedimentation Pond is provided for reference as Table I.

1.3.3 40 CFR § 257.90(e)(3)

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

In accordance with § 257.95(b) and § 257.95(d)(1), two independent samples from each background and downgradient monitoring well were collected and analyzed. A summary table including the sample names, dates of sample collection, reason for sample collection (detection or assessment), and monitoring data obtained for the groundwater monitoring program for the Sedimentation Pond is presented in Table II of this report.

1.3.4 40 CFR § 257.90(e)(4)

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

As required by § 257.94(h) a statistical analysis of the Appendix IV constituents was completed by 15 January 2019. This statistical analysis determined that SSLs of Appendix IV constituents were not present downgradient of the Sedimentation Pond. As a result, this CCR Unit remains in assessment monitoring and semiannual sampling will continue in 2020.

1.3.5 40 CFR § 257.90(e)(5)

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

Other information including development of groundwater protection standards, recording groundwater monitoring results in the operating record, and an evaluation of alternate sources is discussed in preceding sections.

TABLES

TABLE I

GROUNDWATER MONITORING WELL LOCATION AND CONSTRUCTION DETAILS

A.B. BROWN GENERATING STATION - SEDIMENTATION POND

MOUNT VERNON, INDIANA

Well	CCR Unit	Date Installed	Easting	Northing	Top of Pad Elevation (ft msl)	Top of Riser Elevation (ft msl)	Surface Grout (ft bgs)	Bentonite (ft bgs)	Sand Pack (ft bgs)	Screen Zone (ft bgs)	Screen Length (ft)	Well Radius (in)	Status
CCR-SP-1	Sediment Pond	March 2016	2770030.26	970981.89	403.90	403.51	0.0 - 6.0	6.0 - 8.0	8.0 - 20.0	10.00 - 20.00	10	2	Active
CCR-SP-2	Sediment Pond	March 2016	2769939.51	970887.25	403.60	403.23	0.0 - 6.0	6.0 - 8.0	8.0 - 20.0	10.00 - 20.00	10	2	Active
CCR-SP-3	Sediment Pond	March 2016	2770027.64	970735.02	403.90	403.57	0.0 - 6.0	6.0 - 8.0	8.0 - 20.0	10.00 - 20.00	10	2	Active
CCR-BK-1R	Background	March 2016	2770919.08	974083.40	480.10	483.39	0.0 - 50.0	50.0 - 52.0	52.0 - 64.0	54.00 - 64.00	10	2	Active
CCR-BK-2	Background	March 2016	2769728.14	972854.33	427.50	430.60	0.0 - 11.5	11.5 - 13.5	13.5 - 25.5	15.50 - 25.50	10	2	Active

Notes:

bgs = below ground surface

ft = feet

in = inches

msl = mean sea level

Datum of Elevations in NAVD 88

TABLE II
SUMMARY OF GROUNDWATER QUALITY DATA
SEDIMENTATION POND - MAY THROUGH OCTOBER 2019
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

Location Group	Action Level	Background			
Location Name	Maximum Contaminant Level	CCR-BK-1R	CCR-BK-1R	CCR-BK-2	CCR-BK-2
Sample Name		CCR-BK-1R-20190521	CCR-BK-1R-20191014	CCR-BK-2-20190521	CCR-BK-2-20191014
Sample Date		05/21/2019	10/14/2019	05/21/2019	10/14/2019
Lab Sample ID		180-90467-7	180-97392-1	180-90467-8	180-97392-2
Detection Monitoring - EPA Appendix III Constituents (mg/L)					
Boron, Total	NA	0.08 U	**0.056 J**	**0.58**	**0.051 J**
Calcium, Total	NA	**37**	**34**	**71**	**35**
Chloride	NA	**2.3**	**2.4**	**4.6**	**17**
Fluoride	4	0.23 U	**0.2**	0.12 U	**0.07 J**
Sulfate	NA	**23**	**22**	**60**	**20**
Total Dissolved Solids (TDS)	NA	**230**	**210**	**440**	**230**
pH (lab) (SU)	NA	**7.4 J**	**7.2 HF**	**7.5 J**	**7 HF**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)					
Antimony, Total	0.006	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic, Total	0.01	**0.00034 J**	**0.00036 J**	**0.00041 J**	0.001 U
Barium, Total	2	**0.027 J**	**0.036**	**0.045 J-**	**0.032**
Beryllium, Total	0.004	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.005	0.001 U	0.001 U	0.001 U	0.001 U
Chromium, Total	0.1	0.002 U	0.002 U	**0.0087**	0.002 U
Cobalt, Total	0.006	**0.00012 J**	**0.00017 J**	**0.0005**	**0.00011 J**
Fluoride	4	0.23 U	**0.2**	0.12 U	**0.07 J**
Lead, Total	0.015	**0.00016 J**	**0.00023 J**	0.001 U	0.001 U
Lithium, Total	0.04	0.0065 U	0.005 U	0.0095 U	0.005 U
Mercury, Total	0.002	0.0002 U	-	0.0002 U	-
Molybdenum, Total	0.1	**0.00063 J**	**0.00075 J**	**0.0025 J**	0.005 U
Selenium, Total	0.05	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	0.002	0.001 U	0.001 U	0.001 U	0.001 U
Radiological (pCi/L)					
Radium-226	NA	**0.336 J ± 0.108**	0.0729 U ± 0.182	-0.0109 U ± 0.184	-0.0644 U ± 0.0992
Radium-228	NA	-0.0733 UJ ± 0.235	0.147 U ± 0.233	0.0733 U ± 0.246	0.323 U ± 0.292
Radium-226 & 228	5	0.336 UJ ± 0.259	0.220 U ± 0.296	0.0733 U ± 0.307	0.259 U ± 0.308
Field Parameters					
Temperature (Deg C)	NA	**15.78**	**15.72**	**14.47**	**16.04**
Dissolved Oxygen, Field (mg/L)	NA	**5.82**	**5.98**	**0.48**	**0.51**
Conductivity, Field (mS/cm)	NA	**0.34186**	**0.3542**	**0.72035**	**0.38427**
ORP, Field (mv)	NA	**43.3**	**104.9**	**47.9**	**72.1**
Turbidity, Field (NTU)	NA	**0.97**	**9.8**	**12.88**	**11.89**
pH, Field (SU)	NA	**7**	**6.34**	**7.2**	**6.54**

ABBREVIATIONS AND NOTES:

CCR: Coal Combustion Residuals.
mg/L: milligram per liter.
pCi/L: picoCurie per liter.
SU: standard units.
USEPA: United States Environmental Protection Agency.
Results in **bold** are detected.

- USEPA. 2016. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. July 26. 40 CFR Part 257.
https://www.epa.gov/coalash/coal-ash-rule

TABLE II
SUMMARY OF GROUNDWATER QUALITY DATA
SEDIMENTATION POND - MAY THROUGH OCTOBER 2019
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

Location Group	Action Level	Downgradient							
Location Name	Maximum Contaminant Level	CCR-SP-1	CCR-SP-1	CCR-SP-1	CCR-SP-2	CCR-SP-2	CCR-SP-2	CCR-SP-3	CCR-SP-3
Sample Name		CCR-SP-1-20190524	CCR-SP-1-20191015	BLIND DUPLICATE 3-20191015	CCR-SP-2-20190524	BLIND DUPLICATE 3-20190524	CCR-SP-2-20191017	CCR-SP-3-20190524	CCR-SP-3-20191015
Sample Date		05/24/2019	10/15/2019	10/15/2019	05/24/2019	05/24/2019	10/17/2019	05/24/2019	10/15/2019
Lab Sample ID		180-90606-1	180-97469-1	180-97469-4	180-90606-2	180-90606-6	180-97469-2	180-90606-3	180-97469-3
Detection Monitoring - EPA Appendix III Constituents (mg/L)									
Boron, Total	NA	**0.34 J+**	**0.46**	**0.47**	**0.15 J+**	**0.26 J+**	**0.22**	0.08 U	**0.04 J**
Calcium, Total	NA	**270**	**250**	**250**	**160**	**170**	**160**	**93**	**84**
Chloride	NA	**130**	**4.6**	**11**	**66**	**65**	**62**	**23**	**6.3**
Fluoride	4	0.2 U	0.1 U	0.25 U	**0.32 J+**	**0.29 J+**	**0.27**	0.25 U	**0.21**
Sulfate	NA	**1000**	**42**	**110**	**330**	**320**	**310**	**36**	**6.3**
Total Dissolved Solids (TDS)	NA	**2000**	**2300**	**2300**	**1100**	**1000**	**980**	**580**	**390**
pH (lab) (SU)	NA	**7 J**	**6.9 HF**	**7 HF**	**7.2 J**	**7.3 J**	**7.1 HF**	**7.5 J**	**7.4 HF**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)									
Antimony, Total	0.006	0.002 U	-	-	0.002 U	0.002 U	-	0.002 U	-
Arsenic, Total	0.01	**0.0036**	**0.0045**	**0.0047**	**0.0014**	**0.0021**	**0.0029**	**0.0017**	**0.0058**
Barium, Total	2	**0.089**	**0.053**	**0.053**	**0.12**	**0.13**	**0.1**	**0.057 J+**	**0.074**
Beryllium, Total	0.004	0.001 U	-	-	0.001 U	0.001 U	-	0.001 U	-
Cadmium, Total	0.005	0.001 U	-	-	0.001 U	0.001 U	-	0.001 U	-
Chromium, Total	0.1	0.002 U	**0.0017 JB**	**0.0017 JB**	**0.002**	**0.0025**	**0.0016 JB**	0.002 U	**0.0023 B**
Cobalt, Total	0.006	**0.0078**	**0.0067**	**0.0067**	**0.0021**	**0.0025**	**0.0011**	**0.00026 J**	**0.00075**
Fluoride	4	0.2 U	0.1 U	0.25 U	**0.32 J+**	**0.29 J+**	**0.27**	0.25 U	**0.21**
Lead, Total	0.015	**0.0002 J**	0.001 U	0.001 U	**0.00086 J**	**0.0015**	**0.00037 J**	**0.00015 J**	**0.00039 J**
Lithium, Total	0.04	**0.0059**	**0.0062**	**0.0054**	**0.007**	**0.0097**	**0.0064**	**0.004 J**	0.005 U
Mercury, Total	0.002	0.0002 U	-	-	0.0002 U	0.0002 U	-	0.0002 U	-
Molybdenum, Total	0.1	**0.0012 J**	**0.0011 J**	**0.0012 J**	**0.0014 J**	**0.0017 J**	**0.0013 J**	**0.0016 J**	**0.0028 J**
Selenium, Total	0.05	0.005 U	-	-	0.005 U	0.005 U	-	0.005 U	-
Thallium, Total	0.002	0.001 U	-	-	0.001 U	0.001 U	-	0.001 U	-
Radiological (pCi/L)									
Radium-226	NA	**0.149 ± 0.0922**	0.0158 U ± 0.0672	0.0435 U ± 0.0672	**0.258 ± 0.121**	**0.121 ± 0.0799**	0.0868 U ± 0.092	-0.0325 U ± 0.0465	0.101 U ± 0.084
Radium-228	NA	0.335 U ± 0.321	0.0447 U ± 0.218	0.398 U ± 0.266	0.320 U ± 0.273	0.188 U ± 0.324	0.419 U ± 0.302	0.174 U ± 0.345	0.215 U ± 0.256
Radium-226 & 228	5	0.483 UJ ± 0.334	0.0604 U ± 0.228	**0.441 ± 0.274**	**0.578 J ± 0.299**	0.309 UJ ± 0.334	**0.506 ± 0.316**	0.174 U ± 0.348	0.316 U ± 0.269
Field Parameters									
Temperature (Deg C)	NA	**14.64**	**18**	**18**	**15.83**	**15.83**	**16.15**	**15.32**	**17.97**
Dissolved Oxygen, Field (mg/L)	NA	**0**	**0.09**	**0.09**	**0**	**0**	**0.33**	**0.35**	**0.21**
Conductivity, Field (mS/cm)	NA	**2.4137**	**2.6609**	**2.6609**	**1.3062**	**1.3062**	**1.4095**	**0.74375**	**0.68722**
ORP, Field (mv)	NA	**1**	**51.2**	**51.2**	**-18.4**	**-18.4**	**37.7**	**10.3**	**28.4**
Turbidity, Field (NTU)	NA	**2.33**	**0.12**	**0.12**	**4.35**	**4.35**	**3.88**	**1.96**	**6.73**
pH, Field (SU)	NA	**6.92**	**6.64**	**6.64**	**6.99**	**6.99**	**6.7**	**7.24**	**6.88**

ABBREVIATIONS AND NOTES:

CCR: Coal Combustion Residuals.
mg/L: milligram per liter.
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SU: standard units.
USEPA: United States Environmental Protection Agency.
Results in **bold** are detected.

- USEPA. 2016. Final Rule: Disposal of Coal Combustion Residuals from Electric Utilities. July 26. 40 CFR Part 257.
https://www.epa.gov/coalash/coal-ash-rule

FIGURES

LEGEND

- CCR MONITORING WELL
- ASH POND UNIT BOUNDARY

NOTES

1. AERIAL IMAGERY SOURCE: ESRI
2. LOCATIONS DERIVED FROM THREE I DESIGN DATA.

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SCALE IN FEET

HALEY ALDRICH

SOUTHERN INDIANA GAS AND ELECTRIC COMPANY
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

GROUNDWATER MONITORING WELL LOCATIONS - SEDIMENTATION POND

JANAURY 2020

FIGURE 1