HALEY ALDRICH

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REPORT ON

2017 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT A.B. BROWN GENERATING STATION WEST FRANKLIN, INDIANA

by Haley & Aldrich, Inc.
Greenville, South Carolina

for Southern Indiana Gas and Electric Company (SIGECO)
Evansville, Indiana

File No. 129420-003
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Annual Groundwater Monitoring Report Summary

Haley & Aldrich, Inc. (Haley & Aldrich) has prepared this 2017 Annual Groundwater Monitoring Corrective Action Report for the A.B. Brown Generating Station (ABB). This 2017 Annual Report was developed to comply with the United States Environmental Protection Agency (USEPA) Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals (CCR) from Electric Utilities, 40 CFR Part 257, Subpart D dated 17 April 2015 (Rule), specifically subsection §257.90(e)(1) through (5). Southern Indiana Gas and Electric Company (SIGECO) operates the existing coal combustion residuals (CCR) management unit referred to as Sedimentation pond at ABB located in Posey County, Indiana near the community of West Franklin. This CCR unit is subject to the Rule since it was active as of the effective date of the Rule.

This annual report addresses the CCR management unit, referred to as Sedimentation pond, at ABB, as described in the Groundwater Monitoring Program report, which was certified and placed in the facility's operating record on October 17, 2017 as required by §257.105(h)(2) and posted on the facility's website on November 16, 2017 as required by §257.107(h)(2).

To report on the activities conducted during the prior calendar year and document compliance with the Rule, the specific requirements listed in §257.90(e)(1) through (5) are provided below in bold/italic type followed by a short narrative addressing how that specific requirement was met.

§257.90 APPLICABILITY

§257.90(e) 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).

As required, this annual report documents the status of the groundwater monitoring program for the CCR management unit at ABB and summarizes key actions completed during the prior calendar year.

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

§257.90(e)(1) AERIAL IMAGE OF GROUNDWATER MONITORING PROGRAM

§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), maps showing the location of the Sedimentation pond and associated upgradient and downgradient monitoring wells are included in this report as **Figure 1**. In addition, this information is presented in the Groundwater Monitoring Program report prepared for ABB, which was placed in the facility's operating record on October 17, 2017 as required by §257.105(h)(2).

§257.90(e)(2) ADJUSTMENTS TO GROUNDWATER MONITORING PROGRAM

§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;

To comply with the requirements of §257.91, a groundwater monitoring network of five (5) wells were installed for the Sedimentation pond at ABB. Details of the design, and construction of the monitoring wells are summarized in Table 1. Additional description of the monitoring network is presented in the Groundwater Monitoring Program report, which was placed in the facility's operating record on October 17, 2017, as required by §257.105(h)(2). None of the wells installed to monitor groundwater quality upgradient and downgradient of the Sedimentation pond were decommissioned in 2017.

§257.90(e)(3) SUMMARY OF GROUNDWATER ANALYSIS

§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 [upgradient] ***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 §257.94(b), a minimum of eight independent samples from each upgradient and downgradient monitoring well were collected prior to October 17, 2017. A summary of the groundwater monitoring program for the Sedimentation pond, including the analytical results for the Appendix III and Appendix IV list of constituents, is presented in **Table 2** of this report. All the samples obtained were required by the detection monitoring program.

§257.90(e)(4) CURRENT GROUNDWATER MONITORING PROGRAM

§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);

Consistent with §257.90(e), the 2017 annual report documents groundwater related activities conducted during the prior calendar year at the Sedimentation pond. The statistical analysis of the initial minimum eight rounds of groundwater sampling was completed by January 15, 2018 as required. This statistical analysis relied on the use of tolerance intervals as originally certified on October 17, 2017. The results of this statistical analysis identified statistically significant increases (SSI) of Appendix III constituents in one or more wells monitoring the uppermost aquifer downgradient of the Sedimentation pond. Consistent with §257.94(e)(2), SIGECO is evaluating options to demonstrate that a source other than the CCR unit caused the SSI and will provide 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), as appropriate, in subsequent annual reports.

§257.90(e)(5) OTHER REQUIRED INFORMATION

§257.90(e)(5) Other information required to be included in the annual report as specified in §257.90 through §257.98.

This initial Annual Report documents activities conducted to comply with Sections §257.90 through §257.94 of the Rule. There are no applicable requirements from Sections §257.95 through §257.98.

Attachments
Table 1. Groundwater Monitoring Well Location and Construction Details
Table 2. Summary of Analytical Results
Figure 1. Monitoring Well Network

TABLES

TABLE I

GROUNDWATER MONITORING WELL LOCATION AND CONSTRUCTUON 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)
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	10.0 - 20.0	10	2.00
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	10.0 - 20.0	10	2.00
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	10.0 - 20.0	10	2.00
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	54.0 - 64.0	10	2.00
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	15.5 - 25.5	10	2.00

Notes:

bgs = below ground surface

ft = feet

in = inches

msl = mean sea level

Datum of Elevations in NAVD 88

TABLE II
SUMMARY OF ANALYTICAL RESULTS
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

Location Group	Upgradient								
Location Name	CCR-BK-1R	CCR-BK-1R	CCR-BK-1R	CCR-BK-1R	CCR-BK-1R	CCR-BK-1R	CCR-BK-1R	CCR-BK-1R	CCR-BK-1R
Sample Name	CCR-BK-1-20160811	CCR-BK-1-20161027	CCR-BK-1R-20161107	CCR-BK-1R-20161206	CCR-BK-1R-20170207	CCR-BK-1R-20170407	CCR-BK-1R-20170606	CCR-BK-1R-20170928	CCR-BK-1R-20171116
Sample Date	08/11/2016	10/27/2016	11/07/2016	12/06/2016	02/07/2017	04/07/2017	06/06/2017	09/28/2017	11/16/2017
Lab Sample ID	180-57528-14	180-60271-6	180-60609-5	180-61491-18	180-63324-18	180-65040-1	180-67229-16	180-70809-15	180-72643-21
Water Level (ft amsl)	463.50	422.65	423.39	422.39	421.39	425.39	425.39	425.39	-
Monitoring Program	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Detection
Field Parameters									
Temperature (Deg C)	**20.68**	**15.88**	**20.42**	**11.36**	**14.52**	**14.94**	**17.06**	**24.01**	**10.95**
Turbidity, Field (FNU)	-	-	-	-	-	-	-	**0.76**	-
Dissolved Oxygen, Field (mg/L)	**5.15**	**5.85**	**5.89**	**7.03**	**5.98**	**5.43**	**6.28**	**6**	**8.82**
Conductivity, Field (mS/cm)	**0.3475**	**0.38255**	**0.36566**	**0.32748**	**0.3703**	**0.31348**	**0.35539**	**0.35718**	**0.40797**
ORP, Field (mv)	**222**	**223.99**	**116.48**	**52.8**	**131.91**	**98.13**	**266.28**	**147.09**	**47.02**
Turbidity, Field (NTU)	**17.39**	**19.19**	**10.68**	**97.13**	**6.47**	**17.2**	**24.08**	-	**131.33**
pH, Field (su)	**6.8**	**6.95**	**7.02**	**7.14**	**6.87**	**7.22**	**6.95**	**6.88**	**7.13**
Detection Monitoring - EPA Appendix III Constituents (mg/L)									
Boron, Total	0.014 U	0.02 U	0.023 U	0.02 U	0.08 U	**0.019 J**	**0.026 J**	**0.015 J+**	**0.041 J**
Calcium, Total	**36**	**41**	**38**	**36**	**34**	**35**	**34**	**35**	**39**
Chloride (mg/L)	R	**2.4**	**1.5**	**2.3**	**2.3**	**2.7**	**2.1**	**2.2**	**2.6**
Fluoride (mg/L)	R	**0.35**	**0.32**	**0.35**	**0.3**	**0.38**	**0.3**	**0.35 J+**	**0.3**
Sulfate (mg/L)	R	**26**	**21**	**26**	**27**	**28**	**25**	**25**	**26 J-**
pH (lab) (su)	**7.4 J**	**7.5 J**	**7 J**	**6.9 J**	**7.2 J**	**7.2 J**	**7.1 J**	**7.1 J**	**7.8 J**
Total Dissolved Solids (TDS) (mg/L)	**220**	**210**	**220**	**200**	**230**	**250**	**270**	**210**	**210**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)									
Antimony, Total	0.002 U	0.002 U	**0.000056 J**	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	**0.00045 J**
Arsenic, Total	**0.0011**	**0.00021 J**	0.001 U	**0.00031 J**	**0.00094 J**	**0.00095 J**	**0.00047 J**	**0.0025 J+**	**0.0015 J+**
Barium, Total	**0.048**	**0.035**	**0.037 J-**	**0.031 J-**	**0.038**	**0.04**	**0.038**	**0.032 J-**	**0.082 J-**
Beryllium, Total	**0.00012 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium, Total	**0.0025**	**0.00046 J**	**0.00087 J**	**0.00071 J**	**0.003**	**0.0026**	**0.0019 J**	R	**0.0027 J+**
Cobalt, Total	**0.0028**	**0.00076**	**0.00051**	0.0005 U	**0.0011**	**0.001**	**0.00062**	R	**0.0022**
Lead, Total	**0.00082 J**	**0.00024 J**	**0.000079 J**	**0.000096 J**	**0.00099 J**	**0.00092 J**	**0.00052 J**	0.001 U	**0.0008 J**
Lithium, Total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	**0.0086 J**
Molybdenum, Total	**0.0025 J**	0.005 U	0.005 U	**0.0015 J**	**0.0017 J**	**0.0025 J**	**0.0015 J**	R	**0.0034 J**
Selenium, Total	**0.00067 J**	0.005 U	**0.00037 J**	**0.00051 J**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	**0.000038 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Mercury, Total	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ
Fluoride (mg/L)	R	**0.35**	**0.32**	**0.35**	**0.3**	**0.38**	**0.3**	**0.35 J+**	**0.3**
Radiological (pCi/L)									
Radium-226	0.0484 U ± 0.104	0.0760 U ± 0.210	R	0.303 U ± 0.296	**0.142 ± 0.0913**	**0.280 ± 0.0981**	**0.177 J ± 0.0924**	R	**0.165 ± 0.0740**
Radium-228	0.0724 UJ ± 0.514	0.191 U ± 0.217	-0.0566 U ± 0.222	0.179 U ± 0.238	-0.0934 U ± 0.194	0.177 U ± 0.257	**0.337 ± 0.257**	0.171 U ± 0.226	0.388 U ± 0.268
Radium-226 & 228	0.121 UJ ± 0.525	0.267 U ± 0.302	R	**0.482 ± 0.380**	0.142 UJ ± 0.214	**0.457 J ± 0.275**	**0.515 J ± 0.273**	**0.426 J+ ± 0.243**	**0.553 J+ ± 0.278**

ABBREVIATIONS AND NOTES:
CCR: Coal Combustion Residuals
CFR: Code of Federal Regulations
ft amsl: feet above mean sea level
MCL: Maximum Contaminant Level
mg/L: milligram per liter
mS/cm: milliSiemen per centimeter
mv: millivolt
NA: Not Applicable
NTU: Nephelometric Turbidity Units
pCi/L: picoCurie per liter
su: standard units
USEPA: United States Environmental Protection Agency

QUALIFIERS:
J: value is estimated
J+: value is estimated with a potentially high bias
J-: value is estimated with a potentially low bias
R: value is rejected
U: Not detected value is the laboratory reporting limit

- 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 ANALYTICAL RESULTS
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

Location Group	Upgradient								
Location Name	CCR-BK-2	CCR-BK-2	CCR-BK-2	CCR-BK-2	CCR-BK-2	CCR-BK-2	CCR-BK-2	CCR-BK-2	CCR-BK-2
Sample Name	CCR-BK-2-20160608	CCR-BK-2-20160810	CCR-BK-2-20161027	CCR-BK-2-20161206	CCR-BK-2-20170210	CCR-BK-2-20170405	CCR-BK-2-20170606	CCR-BK-2-20170927	CCR-BK-2-20171116
Sample Date	06/08/2016	08/10/2016	10/27/2016	12/06/2016	02/10/2017	04/05/2017	06/06/2017	09/27/2017	11/16/2017
Lab Sample ID	180-55607-6	180-57528-15	180-60271-7	180-61491-19	180-63446-1	180-64974-1	180-67229-17	180-70809-16	180-72643-22
Water Level (ft amsl)	416.46	412.21	408.69	407.90	412.89	413.71	413.94	412.64	406.12
Monitoring Program	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Detection
Field Parameters									
Temperature (Deg C)	**17.51**	**17.4**	**15.98**	**14.25**	**13.49**	**15.79**	**15.68**	**16.85**	**14.23**
Turbidity, Field (FNU)	-	-	-	-	-	-	-	**167.49**	-
Dissolved Oxygen, Field (mg/L)	**0.42**	**0.22**	**0.38**	**0.33**	**0.35**	**1.08**	**0.14**	**0.43**	**0.47**
Conductivity, Field (mS/cm)	**0.6551**	**0.4173**	**0.40128**	**0.30961**	**0.38131**	**0.29739**	**0.41407**	**0.38594**	**0.38795**
ORP, Field (mv)	**28.72**	**144**	**234.6**	**87.3**	**120.09**	**200.74**	**212.67**	**212.04**	**108.47**
Turbidity, Field (NTU)	**17.85**	**1.751**	**858.51**	**336.44**	**11.66**	**-22.18**	**-1.12**	-	**181.78**
pH, Field (su)	**6.98**	**6.64**	**6.7**	**6.19**	**6.72**	**6.66**	**6.67**	**6.64**	**6.74**
Detection Monitoring - EPA Appendix III Constituents (mg/L)									
Boron, Total	**0.018 J+**	0.014 U	0.02 U	0.02 U	0.08 U	0.016 U	**0.021 J**	**0.018 J+**	**0.02 J**
Calcium, Total	**53**	**39**	**46**	**36**	**34**	**45**	**37**	**37**	**35**
Chloride (mg/L)	**12**	**17**	**17**	**19**	**12 J+**	**19**	**14**	**19**	**19**
Fluoride (mg/L)	R	**0.14 J+**	**0.16**	**0.2 J+**	**0.14**	**0.16**	**0.13**	R	**0.13**
Sulfate (mg/L)	**61**	**30 J-**	**28**	**26**	**25 J+**	**29**	**27**	**24**	**23 J-**
pH (lab) (su)	**7.09 J**	**7.1 J**	**6.8 J**	**6.7 J**	**8.5 J**	**7.2 J**	**7 J**	**6.8 J**	**7.3 J**
Total Dissolved Solids (TDS) (mg/L)	**360**	**260**	**350**	**260**	**230**	**240**	**270**	**320**	**250**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)									
Antimony, Total	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	**0.00048 J**
Arsenic, Total	**0.00032 J**	0.001 U	**0.0013**	**0.00051 J**	**0.00031 J**	0.001 U	0.001 U	**0.0035 J+**	**0.0028**
Barium, Total	**0.041 J-**	**0.033**	**0.15**	**0.036 J-**	**0.033 J-**	**0.034 J-**	**0.035**	**0.048 J-**	**0.046 J-**
Beryllium, Total	0.001 U	0.001 U	**0.0004 J**	0.001 U	0.001 U	0.001 U	0.001 U	**0.00018 J**	0.001 U
Cadmium, Total	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium, Total	0.002 U	0.002 U	**0.0047**	**0.00076 J**	0.002 UJ	0.002 U	0.002 U	R	**0.0043 J+**
Cobalt, Total	**0.000096 J**	**0.0001 J**	**0.0062**	0.0005 U	0.0005 U	0.0005 U	0.0005 U	**0.0015 J+**	**0.0012**
Lead, Total	**0.000028 J**	0.001 U	**0.011**	**0.00057 J**	0.001 U	0.001 U	0.001 U	**0.0028 J+**	**0.0024**
Lithium, Total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Molybdenum, Total	**0.0017 J**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	**0.00062 J**	0.005 U	**0.00068 J**
Selenium, Total	0.005 U	0.005 U	**0.00098 J**	**0.00047 J**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	**0.000059 J**
Mercury, Total	0.0002 UJ	0.0002 U	**0.0001 J**	0.0002 UJ	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ
Fluoride (mg/L)	R	**0.14 J+**	**0.16**	**0.2 J+**	**0.14**	**0.16**	**0.13**	R	**0.13**
Radiological (pCi/L)									
Radium-226	**0.102 J ± 0.0557**	0.0387 U ± 0.0693	**1.14 J ± 0.720**	0.346 U ± 0.284	0.0539 UJ ± 0.0753	0.0198 U ± 0.0619	0.00911 UJ ± 0.0490	R	**0.149 ± 0.0943**
Radium-228	0.0185 U ± 0.200	0.0797 UJ ± 0.324	0.764 U ± 0.727	R	0.163 U ± 0.253	0.102 U ± 0.198	**0.144 ± 0.284**	0.279 U ± 0.416	**2.98 ± 0.579**
Radium-226 & 228	0.120 U ± 0.207	0.118 UJ ± 0.331	**1.91 J ± 1.02**	**0.796 J ± 0.380**	0.217 UJ ± 0.264	0.122 U ± 0.208	0.153 U ± 0.288	0.525 UJ ± 0.436	**3.13 ± 0.587**

ABBREVIATIONS AND NOTES:

CCR: Coal Combustion Residuals
CFR: Code of Federal Regulations
ft amsl: feet above mean sea level
MCL: Maximum Contaminant Level
mg/L: milligram per liter
mS/cm: milliSiemen per centimeter
mv: millivolt
NA: Not Applicable
NTU: Nephelometric Turbidity Units
pCi/L: picoCurie per liter
su: standard units
USEPA: United States Environmental Protection Agency

QUALIFIERS:

J: value is estimated
J+: value is estimated with a potentially high bias
J-: value is estimated with a potentially low bias
R: value is rejected
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- 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 ANALYTICAL RESULTS
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

Location Group	Downgradient								
Location Name	CCR-SP-1	CCR-SP-1	CCR-SP-1	CCR-SP-1	CCR-SP-1	CCR-SP-1	CCR-SP-1	CCR-SP-1	CCR-SP-1
Sample Name	CCR-SP-1-20160609	CCR-SP-1-20160809	CCR-SP-1-20161027	CCR-SP-1-20170117	CCR-SP-1-20170206	CCR-SP-1-20170404	CCR-SP-1-20170605	CCR-SP-1-20170926	CCR-SP-1-20171115
Sample Date	06/09/2016	08/09/2016	10/27/2016	01/17/2017	02/06/2017	04/04/2017	06/05/2017	09/26/2017	11/15/2017
Lab Sample ID	180-55607-10	180-57528-9	180-60271-1	180-62677-1	180-63324-10	180-64974-17	180-67229-18	180-70809-17	180-72643-7
Water Level (ft amsl)	393.49	393.74	392.86	393.23	393.91	393.95	393.66	391.51	393.26
Monitoring Program	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Detection
Field Parameters									
Temperature (Deg C)	**17.3**	**18.78**	**17.41**	-	**15.35**	**15.89**	**16.82**	**18.18**	**16.81**
Turbidity, Field (FNU)	-	-	-	-	-	-	-	-	-
Dissolved Oxygen, Field (mg/L)	**0.2**	**0.17**	**0.29**	-	**0.06**	**0.04**	**0.01**	**-0.02**	**-0.01**
Conductivity, Field (mS/cm)	**1.12367**	**1.039**	**0.82285**	-	**0.97299**	**0.691**	**0.92488**	**1.17076**	**1.30724**
ORP, Field (mv)	**-69.41**	**-24**	**20**	-	**-25.92**	**-44.43**	**-87.99**	**-38.71**	**-85.51**
Turbidity, Field (NTU)	**13.23**	**33.26**	**-0.79**	-	**13.2**	**11.78**	**4.49**	**-0.14**	**0.07**
pH, Field (su)	**6.89**	**6.73**	**6.89**	-	**6.83**	**6.94**	**6.9**	**6.51**	**6.73**
Detection Monitoring - EPA Appendix III Constituents (mg/L)									
Boron, Total	**0.038 J+**	**0.041 J+**	0.031 U	0.08 U	0.08 U	**0.038 J**	**0.03 J**	**0.039 J+**	**0.033 J**
Calcium, Total	**110**	**110**	**120**	**120**	**110**	**130**	**120**	**140**	**150**
Chloride (mg/L)	**54**	**47**	**39**	**47**	**46**	**51**	**42**	**64**	**74**
Fluoride (mg/L)	R	**0.27**	**0.24**	**0.27**	**0.22**	**0.27**	**0.28**	**0.28 J+**	**0.28**
Sulfate (mg/L)	**100**	**67 J-**	**46**	**54**	**50**	**64**	**55**	**150**	**220 J-**
pH (lab) (su)	**6.98 J**	**7.2 J**	**6.9 J**	**6.6 J**	**7 J**	**7.3 J**	**7.1 J**	**7.1 J**	**7.4 J**
Total Dissolved Solids (TDS) (mg/L)	**710**	**620**	**560**	**580**	**560**	**570**	**590**	**730**	**820**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)									
Antimony, Total	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic, Total	**0.0039**	**0.0042**	**0.0042**	**0.0051**	**0.0051**	**0.0064**	**0.0058**	**0.013 J+**	**0.0054**
Barium, Total	**0.1 J-**	**0.081**	**0.083**	**0.087**	**0.085**	**0.1 J-**	**0.093**	**0.095 J-**	**0.12 J-**
Beryllium, Total	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium, Total	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	R	0.002 U
Cobalt, Total	**0.0033**	**0.0031**	**0.0028**	**0.0029**	**0.0028**	**0.0027**	**0.0028**	**0.0032**	**0.0038**
Lead, Total	R	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium, Total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Molybdenum, Total	**0.0014 J**	**0.0014 J**	**0.0021 J**	**0.0014 J**	**0.0019 J**	0.005 U	**0.0018 J**	**0.0015 J**	**0.0016 J**
Selenium, Total	0.005 U	**0.00036 J**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	**0.000026 J**	0.001 U	**0.000093 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Mercury, Total	0.0002 UJ	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ
Fluoride (mg/L)	R	**0.27**	**0.24**	**0.27**	**0.22**	**0.27**	**0.28**	**0.28 J+**	**0.28**
Radiological (pCi/L)									
Radium-226	**0.393 J ± 0.105**	**0.264 ± 0.101**	0.130 U ± 0.207	0.0940 U ± 0.0873	**0.170 ± 0.109**	**0.134 ± 0.0915**	**0.166 J ± 0.0787**	R	**0.165 ± 0.0740**
Radium-228	0.131 U ± 0.210	0.192 UJ ± 0.277	0.381 U ± 0.265	0.410 U ± 0.271	0.174 U ± 0.274	-0.0357 U ± 0.241	**0.185 ± 0.213**	**0.478 ± 0.233**	0.350 U ± 0.244
Radium-226 & 228	**0.525 ± 0.235**	0.456 UJ ± 0.295	**0.511 ± 0.336**	**0.504 ± 0.284**	0.344 UJ ± 0.294	0.134 UJ ± 0.258	**0.352 J ± 0.227**	R	**0.514 J ± 0.255**

ABBREVIATIONS AND NOTES:

CCR: Coal Combustion Residuals
CFR: Code of Federal Regulations
ft amsl: feet above mean sea level
MCL: Maximum Contaminant Level
mg/L: milligram per liter
mS/cm: milliSiemen per centimeter
mv: millivolt
NA: Not Applicable
NTU: Nephelometric Turbidity Units
pCi/L: picoCurie per liter
su: standard units
USEPA: United States Environmental Protection Agency

QUALIFIERS:

J: value is estimated
J+: value is estimated with a potentially high bias
J-: value is estimated with a potentially low bias
R: value is rejected
U: Not detected value is the laboratory reporting limit

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https://www.epa.gov/coalash/coal-ash-rule

TABLE II
SUMMARY OF ANALYTICAL RESULTS
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

Location Group	Downgradient								
Location Name	CCR-SP-2	CCR-SP-2	CCR-SP-2	CCR-SP-2	CCR-SP-2	CCR-SP-2	CCR-SP-2	CCR-SP-2	CCR-SP-2
Sample Name	CCR-SP-2-20160609	CCR-SP-2-20160809	CCR-SP-2-20161026	CCR-SP-2-20170126	CCR-SP-2-20170206	CCR-SP-2-20170404	CCR-SP-2-20170605	CCR-SP-2-20170926	CCR-SP-2-20171115
Sample Date	06/09/2016	08/09/2016	10/26/2016	01/26/2017	02/06/2017	04/04/2017	06/05/2017	09/26/2017	11/15/2017
Lab Sample ID	180-55607-11	180-57528-10	180-60193-12	180-62992-1	180-63324-11	180-64974-18	180-67229-8	180-70809-24	180-72643-8
Water Level (ft amsl)	393.61	393.92	392.23	393.53	393.73	394.02	393.55	389.56	393.41
Monitoring Program	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Detection
Field Parameters									
Temperature (Deg C)	**16.74**	**18.73**	**18.69**	-	**15.89**	**15.71**	**16.39**	**19.24**	**17.38**
Turbidity, Field (FNU)	-	-	-	-	-	-	-	-	-
Dissolved Oxygen, Field (mg/L)	**0.14**	**0.15**	**0.08**	-	**0.14**	**0.02**	**0.06**	**-0.01**	**-0.02**
Conductivity, Field (mS/cm)	**1.08**	**1.078**	**0.97799**	-	**1.43635**	**1.54536**	**1.52661**	**1.57587**	**1.59103**
ORP, Field (mv)	**29**	**93**	**0**	-	**105.02**	**28.2**	**54.35**	**85.1**	**16.7**
Turbidity, Field (NTU)	**19.14**	**33.01**	**10.16**	-	**49.45**	**1.51**	**6.38**	**3.42**	**35.67**
pH, Field (su)	**6.95**	**6.82**	**6.92**	-	**6.87**	**6.95**	**6.95**	**6.68**	**6.83**
Detection Monitoring - EPA Appendix III Constituents (mg/L)									
Boron, Total	**0.08**	**0.093 J+**	**0.11 J+**	**0.19**	**0.21**	**0.34**	**0.37**	**0.32 J+**	**0.24**
Calcium, Total	**110**	**120**	**140**	**160**	**170**	**190**	**170**	**170**	**180**
Chloride (mg/L)	**46**	**42**	**50**	**67**	**67**	**71**	**63**	**72**	**73**
Fluoride (mg/L)	**0.38 J+**	**0.32**	**0.35**	**0.33**	**0.34**	**0.38**	**0.37**	**0.34 J+**	**0.31**
Sulfate (mg/L)	**180**	**160 J-**	**190 J-**	**360**	**370**	**430**	**390**	**470**	**460 J-**
pH (lab) (su)	**7.05 J**	**7.5 J**	**7.1 J**	**7 J**	**7.2 J**	**7.4 J**	**7.2 J**	**7.1 J**	**7.4 J**
Total Dissolved Solids (TDS) (mg/L)	**750**	**710**	**780**	**970**	**1000**	**1100**	**1200**	**1200**	**1100**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)									
Antimony, Total	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic, Total	**0.00046 J**	**0.0016**	**0.00064 J**	**0.0013**	**0.0016**	**0.00031 J**	**0.00027 J**	**0.0077 J+**	**0.0014 J+**
Barium, Total	**0.082 J-**	**0.084**	**0.089 J-**	**0.12**	**0.13**	**0.13 J-**	**0.14**	**0.12 J-**	**0.14 J-**
Beryllium, Total	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.001 U	0.001 U	0.001 U	**0.000098 J**	**0.00011 J**	0.001 U	0.001 U	0.001 U	0.001 U
Chromium, Total	0.002 U	**0.0012 J**	**0.00047 J**	**0.0014 J**	**0.0012 J**	0.002 U	0.002 U	R	0.002 U
Cobalt, Total	**0.0011**	**0.0014**	**0.00081**	**0.00083**	**0.00084**	**0.00039 J**	**0.00045 J**	**0.00086**	**0.0012**
Lead, Total	R	**0.00091 J**	**0.00033 J**	**0.00078 J**	**0.00097 J**	0.001 U	0.001 U	0.001 U	**0.0008 J**
Lithium, Total	0.05 U	0.05 U	0.05 U	**0.011 J**	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Molybdenum, Total	**0.0016 J**	**0.0015 J**	0.005 U	**0.0012 J**	**0.0014 J**	0.005 U	**0.0012 J**	**0.0015 J**	**0.0012 J**
Selenium, Total	0.005 U	**0.00063 J**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	0.001 U	0.001 U	**0.000049 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Mercury, Total	0.0002 UJ	0.0002 U	0.0002 UJ	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ
Fluoride (mg/L)	**0.38 J+**	**0.32**	**0.35**	**0.33**	**0.34**	**0.38**	**0.37**	**0.34 J+**	**0.31**
Radiological (pCi/L)									
Radium-226	**0.171 J ± 0.0737**	**0.265 ± 0.129**	0.189 U ± 0.237	R	**0.256 ± 0.129**	**0.112 ± 0.0818**	**0.172 J ± 0.0817**	R	**0.242 ± 0.0951**
Radium-228	0.103 U ± 0.219	0.581 UJ ± 0.562	0.241 U ± 0.253	**0.693 ± 0.285**	0.0457 U ± 0.282	**0.798 ± 0.379**	**0.100 ± 0.199**	**0.699 ± 0.293**	0.405 U ± 0.285
Radium-226 & 228	0.275 U ± 0.231	0.846 UJ ± 0.577	**0.431 ± 0.347**	**0.887 J+ ± 0.312**	0.302 UJ ± 0.310	**0.910 ± 0.388**	0.273 UJ ± 0.215	R	**0.647 J ± 0.300**

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TABLE II
SUMMARY OF ANALYTICAL RESULTS
A.B. BROWN GENERATING STATION
MOUNT VERNON, INDIANA

Location Group	Downgradient								
Location Name	CCR-SP-3	CCR-SP-3	CCR-SP-3	CCR-SP-3	CCR-SP-3	CCR-SP-3	CCR-SP-3	CCR-SP-3	CCR-SP-3
Sample Name	CCR-SP-3-20160609	CCR-SP-3-20160809	CCR-SP-3-20161027	CCR-SP-3-20170117	CCR-SP-3-20170206	CCR-SP-3-20170404	CCR-SP-3-20170606	CCR-SP-3-20170926	CCR-SP-3-20171115
Sample Date	06/09/2016	08/09/2016	10/27/2016	01/17/2017	02/06/2017	04/04/2017	06/06/2017	09/26/2017	11/15/2017
Lab Sample ID	180-55607-12	180-57528-11	180-60193-11	180-62677-3	180-63324-12	180-64974-19	180-67229-9	180-70809-25	180-72643-9
Water Level (ft amsl)	398.81	397.25	392.77	398.41	398.92	398.61	396.10	390.91	394.01
Monitoring Program	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Detection
Field Parameters									
Temperature (Deg C)	**16.72**	**18.6**	**17.88**	-	**14.5**	**14.85**	**15.29**	**24.11**	**16.63**
Turbidity, Field (FNU)	-	-	-	-	-	-	-	-	-
Dissolved Oxygen, Field (mg/L)	**0.12**	**0.13**	**0.06**	-	**0.05**	**0.04**	**0.05**	**0.99**	**0.01**
Conductivity, Field (mS/cm)	**0.67071**	**0.711**	**605.64**	-	**0.7003**	**1.04504**	**0.6691**	**0.69142**	**0.701**
ORP, Field (mv)	**-91.32**	**-100**	**-70**	-	**-100.6**	**-39.69**	**-125.53**	**-46.17**	**-143.1**
Turbidity, Field (NTU)	**17.26**	**176.1**	**256.05**	-	**20.72**	**13.82**	**25.67**	**19.05**	**77.41**
pH, Field (su)	**7.05**	**6.95**	**7.08**	-	**7.01**	**6.93**	**7.09**	**6.8**	**6.97**
Detection Monitoring - EPA Appendix III Constituents (mg/L)									
Boron, Total	**0.023 J+**	0.027 U	0.028 U	0.08 U	0.08 U	**0.026 J**	**0.042 J**	**0.024 J+**	**0.019 J**
Calcium, Total	**76**	**84**	**92**	**86**	**85**	**96**	**88**	**83**	**86**
Chloride (mg/L)	**4.1 J+**	**3.4**	**4.7**	**4.7**	**4**	**4.3**	**2.9**	**5.1**	**4.1**
Fluoride (mg/L)	**0.38 J+**	**0.33**	**0.41**	**0.39**	**0.4**	**0.38**	**0.34**	**0.38 J+**	**0.41**
Sulfate (mg/L)	R	1 U	**0.68 J-**	1 U	**1.1**	**0.81 J**	1 U	**4.4**	**0.63 J-**
pH (lab) (su)	**7.27 J**	**7.6 J**	**7.1 J**	**6.6 J**	**7.3 J**	**7 J**	**7.2 J**	**7.1 J**	**7.6 J**
Total Dissolved Solids (TDS) (mg/L)	**400**	**390**	**390**	**370**	**380**	**380**	**400**	**400**	**370**
Assessment Monitoring - EPA Appendix IV Constituents (mg/L)									
Antimony, Total	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U
Arsenic, Total	**0.016**	**0.026**	**0.043**	**0.019**	**0.024**	**0.017**	**0.024**	**0.012 J+**	**0.035**
Barium, Total	**0.072 J-**	**0.069**	**0.11 J-**	**0.077**	**0.078**	**0.069 J-**	**0.072**	**0.064 J-**	**0.074 J-**
Beryllium, Total	0.001 U	0.001 U	**0.00029 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Cadmium, Total	0.001 U	0.001 U	**0.00015 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Chromium, Total	0.002 U	0.002 U	**0.0096**	0.002 U	0.002 U	0.002 U	0.002 U	R	0.002 U
Cobalt, Total	**0.0011**	**0.001**	**0.0054**	**0.00072**	**0.0008**	**0.00084**	**0.00067**	**0.00049 J**	**0.00066**
Lead, Total	R	**0.00013 J**	**0.0061**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Lithium, Total	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U	0.05 U
Molybdenum, Total	**0.0046 J**	**0.0051**	**0.0062**	**0.0051**	**0.0055**	0.005 U	**0.005**	**0.0031 J**	**0.0057**
Selenium, Total	0.005 U	0.005 U	**0.00042 J+**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Thallium, Total	**0.000024 J**	0.001 U	**0.00014 J**	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
Mercury, Total	0.0002 UJ	0.0002 U	0.0002 UJ	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 UJ
Fluoride (mg/L)	**0.38 J+**	**0.33**	**0.41**	**0.39**	**0.4**	**0.38**	**0.34**	**0.38 J+**	**0.41**
Radiological (pCi/L)									
Radium-226	**0.198 J ± 0.0738**	**0.194 ± 0.0788**	0.661 U ± 0.654	0.0991 U ± 0.107	**0.151 ± 0.0962**	**0.132 ± 0.0878**	R	R	**0.123 ± 0.0675**
Radium-228	0.251 U ± 0.227	-0.0623 UJ ± 0.296	0.239 U ± 0.573	0.140 U ± 0.256	-0.00781 U ± 0.215	0.206 U ± 0.278	**0.166 ± 0.212**	-0.0314 U ± 0.230	0.293 U ± 0.230
Radium-226 & 228	**0.449 ± 0.239**	0.131 UJ ± 0.307	0.900 U ± 0.870	0.239 U ± 0.277	0.151 UJ ± 0.236	0.338 UJ ± 0.292	0.335 UJ ± 0.229	0.23 UJ ± 0.247	**0.416 J ± 0.240**

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CCR: Coal Combustion Residuals
CFR: Code of Federal Regulations
ft amsl: feet above mean sea level
MCL: Maximum Contaminant Level
mg/L: milligram per liter
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FIGURES

LEGEND

- UPGRADIENT MONITORING WELL
- DOWNGRADIENT MONITORING WELL
- TOPOGRAPHIC DIVIDE

NOTES

1. LOCATIONS DERIVED FROM THREE I DESIGN DATA.
2. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
3. AERIAL IMAGERY SOURCE: ESRI

N

0 500 1,000
SCALE IN FEET

HALEY ALDRICH

VECTREN CORPORATION
A.B. BROWN GENERATING STATION
8511 WELBORN ROAD
MOUNT VERNON, IN 47620

MONITORING WELL NETWORK SEDIMENTATION POND

JANUARY 2018

FIGURE 1

GIS FILE PATH: \\haleyaldrich.com\share\boi_common\Projects\Vectren_Corporation\42796_Evansville_CCR_GWMP_Development\Global\GIS\Maps\2018_01\42796_000_002_AB_BROWN_WASTE_BOUNDARY_MONITORING.mxd — USER: ajespe — LAST SAVED: 1/30/2018 10:35:59 AM