Prepared for
Dynegy Miami Fort, LLC

Date
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Project No.
1940074922

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT

MIAMI FORT POND SYSTEM, MIAMI FORT POWER STATION

RAMBOLL Bright ideas. Sustainable change.

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
MIAMI FORT POND SYSTEM, MIAMI FORT POWER STATION

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Prepared by	**Kristen L. Theesfeld**
Checked by	**Nikki M. Pagano, PE**
Approved by	**Lauren D. Cook**
Description	**Annual Report in Support of the CCR Rule Groundwater Monitoring Program**

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA

T 414-837-3607
F 414-837-3608
https://ramboll.com

Kristen L. Theesfeld
Hydrogeologist

Nikki M. Pagano, PE
Senior Managing Engineer

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ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
CCR	Coal Combustion Residuals
CMA	Corrective Measures Assessment
GWPS	Groundwater Protection Standard
MNA	Monitored Natural Attenuation
SSI	Statistically Significant Increase
SSL	Statistically Significant Level
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This report has been prepared to provide the information required by Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.90(e) for the Miami Fort Pond System located at Miami Fort Power Station near North Bend, Ohio.

Groundwater is being monitored at Miami Fort Pond System in accordance with the Assessment Monitoring Program requirements specified in 40 C.F.R. § 257.95. Assessment Monitoring was initiated at Miami Fort Pond System on April 9, 2018.

A combined groundwater monitoring system was certified on May 22, 2020. Statitical background values were calculated for the revised monitoring system in accordance with the Statistical Analysis Plan (OBG, 2020a).

The following Statistically Significant Levels (SSLs) of 40 C.F.R. Part 257 Appendix IV parameters were determined in 2020:

- Cobalt at wells MW-4 and 4A
- Molybdenum at well MW-6
- Arsenic at wells MW-2, MW-10, and MW-13

As required by 40 C.F.R. § 257.95(g)(3)(i), a Corrective Measures Assessment (CMA) following the requirements of 40 C.F.R. § 257.96 was initiated on April 8, 2019 and completed on September 5, 2019 (OBG, 2019). The CMA was revised on November 12, 2020 (Ramboll, 2020a) to reflect the characterization of the Miami Fort Pond System as a single multi-unit, including an Alternate Source Demonstration (ASD) for SSLs of arsenic and molybdenum. The CMA was revised again on November 30, 2020 (Ramboll, 2020b) to include additional information related to site geology and hydrogeology, focus on application of evaluation factors identified in 40 C.F.R. § 257.96(c) to potential source control and groundwater corrective measures, and provide an independent evaluation of monitored natural attenuation (MNA).

A public meeting was held on December 16, 2019 at the Miami Township Community Center in North Bend, Ohio to discuss the results of the of the CMA in accordance with 40 C.F.R. § 257.96(e).

Remedy selection is in progress and the associated semiannual reports required by 40 C.F.R. § 257.97(a) are being completed.

1. INTRODUCTION

This report has been prepared by Ramboll Americas Engineering Solutions Inc. (Ramboll) on behalf of Dynegy Miami Fort, LLC, to provide the information required by 40 C.F.R. § 257.90(e) for the Miami Fort Pond System located at Miami Fort Power Station near North Bend, Ohio.

In accordance with 40 C.F.R. § 257.90(e), the owner or operator of a Coal Combustion Residuals (CCR) unit must prepare an Annual Groundwater Monitoring and Corrective Action Report for the preceding calendar year that documents the status of the Groundwater Monitoring and Corrective Action Program for the CCR unit, summarizes key actions completed, describes any problems encountered, discusses actions to resolve the problems, and projects key activities for the upcoming year. At a minimum, the annual report must contain the following information, to the extent available:

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.
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.
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.
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 [SSI] relative to background levels).
5. Other information required to be included in the annual report as specified in §§ 257.90 through 257.98.
6. A section at the beginning of the annual report that provides an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit. At a minimum, the summary must specify all of the following:
   i. At the start of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95.
   ii. At the end of the current annual reporting period, whether the CCR unit was operating under the detection monitoring program in §257.94 or the assessment monitoring program in §257.95.
   iii. If it was determined that there was a SSI over background for one or more constituents listed in Appendix III of §257 pursuant to §257.94(e):
      A. Identify those constituents listed in Appendix III of §257 and the names of the monitoring wells associated with the SSI(s).

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

iv. If it was determined that there was a SSL above the Groundwater Protection Standard (GWPS) for one or more constituents listed in Appendix IV of §257 pursuant to §257.95(g) include all of the following:

A. Identify those constituents listed in Appendix IV of §257 and the names of the monitoring wells associated with the SSL(s).

B. Provide the date when the CMA was initiated for the CCR unit.

C. Provide the date when the public meeting was held for CMA for the CCR unit.

D. Provide the date when the CMA was completed for the CCR unit.

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

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

This report provides the required information for the Miami Fort Pond System for calendar year 2020.

2. MONITORING AND CORRECTIVE ACTION PROGRAM STATUS

Groundwater is being monitored at Miami Fort Pond System in accordance with the Assessment Monitoring Program requirements specified in 40 C.F.R. § 257.95. Assessment Monitoring was initiated at Miami Fort Pond System on April 9, 2018. SSLs were determined for Miami Fort Pond System and alternate source evaluations were inconclusive for cobalt; successful ASDs were completed for arsenic and molybdenum SSLs.

As required by 40 C.F.R. § 257.95(g)(3)(i), a CMA following the requirements of 40 C.F.R. § 257.96 was initiated on April 8, 2019 and completed on September 5, 2019 (OBG, 2019). A public meeting was held on December 16, 2019 at the Miami Township Community Center in North Bend, Ohio to discuss the results of the of the CMA in accordance with 40 C.F.R. § 257.96(e). The CMA was revised on November 12, 2020 to reflect the characterization of the Miami Fort Pond System as a single multi-unit, including the ASD for arsenic and molybdenum SSLs referenced above. The CMA was revised again on November 30, 2020 to include additional information related to site geology and hydrogeology, focus on application of evaluation factors identified in 40 C.F.R. § 257.96(c) to potential source control and groundwater corrective measures, and provide an independent evaluation of MNA. Remedy selection is in progress and the associated semiannual reports required by 40 C.F.R. § 257.97(a) are being completed.

Miami Fort Pond System remains in the Assessment Monitoring Program in accordance with 40 C.F.R. § 257.96(b).

3. KEY ACTIONS COMPLETED IN 2020

The Assessment Monitoring Program is summarized in Table A. Former Miami Fort Basin A (Unit ID: 111) and Miami Fort Basin B (Unit ID: 112) were combined in 2020 to form Miami Fort Pond System (Multi-Unit ID: 115). The combined groundwater monitoring system, certified on May 22, 2020, including the CCR unit and the background and downgradient monitoring wells, is presented in Figure 1.

In general, one groundwater sample was collected from each background and downgradient well during each monitoring event[1]. All samples were collected and analyzed in accordance with the Sampling and Analysis Plan (OBG, 2020b). All monitoring data obtained under 40 C.F.R. §§ 257.90 through 257.98 (as applicable) in 2020, and analytical results for the September 2019 sampling event, are presented in Tables 1 and 2. Analytical data were evaluated in accordance with the Statistical Analysis Plan to determine any SSLs of Appendix IV parameters over GWPSs. Notifications were completed in accordance with 40 C.F.R. § 257.95(g).

Statistical background values were calculated for the revised monitoring system and are provided in Table 3 and GWPSs in Table 4.

Potential alternate sources were evaluated as outlined in the 40 C.F.R. § 257.95(g)(3)(ii). Successful Alternate Source Demonstrations (ASDs) were completed for the arsenic and molybdenum SSLs and certified by a qualified professional engineer. The dates the ASDs were completed are provided in Table A. An ASD was completed for Basin B (Unit ID 112) in April 2020 prior to creation of the multiunit. The ASDs are included in Appendix A.

Alternate source evaluations were inconclusive for the cobalt SSLs. Consequently, and in accordance with 40 C.F.R. § 257.95(g)(5), a CMA following the requirements of 40 C.F.R. § 257.96 was initiated on April 8, 2019 and the required notification completed. The CMA (OBG, 2020) was completed on September 5, 2019 and posted to the publicly accessible website, as required by 40 C.F.R. § 257.107(h)(8). It was revised on November 12, 2020 (OBG, 2020b) to reflect the characterization of the Miami Fort Pond System as a single multi-unit, including an Alternate Source Demonstration for statistically significant levels of arsenic and molybdenum for the Pond System. The CMA was revised again on November 30, 2020 (Ramboll, 2020) to include additional information related to site geology and hydrogeology, application of evaluation criteria to potential corrective measures, independent evaluation of monitored natural attenuation, application of potential source control and groundwater corrective measures.

Remedy selection is in progress and the associated semiannual reports required by 40 C.F.R. § 257.97(a) were completed in March and September of 2020.

[1] Sampling was limited to 4A and MW-13 during the June 2020 sampling event to confirm cobalt (4A) and arsenic (MW-13) concentrations initially detected at concentrations greater than the GWPS in the preceding sampling event, as allowed by the Statistical Analysis Plan.

Table A – 2019-2020 Assessment Monitoring Program Summary

Sampling Dates	Analytical Data Receipt Date	Parameters Collected	SSL(s)	SSL(s) Determination Date	ASD Completion Date	CMA Initiated
September 9 - 10, 2019	October 8, 2019	Appendix III Appendix IV Detected [1]	Arsenic (MW-2 and MW-10); Cobalt (MW-4); Molybdenum (MW-6)	January 6, 2020	April 6, 2020	NA
April 6 - 7, 2020 June 12, 2020 [2]	May 26, 2020 June 22, 2020	Appendix III Appendix IV Arsenic; Boron; Cobalt	Arsenic (MW-2, MW-10, and MW-13); Cobalt (4A and MW-4); Molybdenum (MW-6)	August 3, 2020	November 12, 2020	NA
September 14-15, 2020	October 20, 2020	Appendix III Appendix IV Detected [1]	TBD	TBD		NA

Notes:
NA: Not Applicable
TBD: To Be Determined
1. Groundwater sample analysis was limited to Appendix IV parameters detected in previous events in accordance with 40 C.F.R. § 257.95(d)(1).
2. Sampling was limited to 4A and MW-13 during the June 2020 sampling event to confirm cobalt (4A) and arsenic (MW-13) concentrations initially detected at concentrations greater than the GWPS in the preceding sampling event, as allowed by the Statistical Analysis Plan.

4. PROBLEMS ENCOUNTERED AND ACTIONS TO RESOLVED THE PROBLEMS

No problems were encountered with the Groundwater Monitoring Program during 2020. Groundwater samples were collected and analyzed in accordance with the Sampling and Analysis Plan (Ramboll, 2020a), and all data were accepted.

5. KEY ACTIVITIES PLANNED FOR 2021

The following key activities are planned for 2021:

- Continuation of the Assessment Monitoring Program with semi-annual sampling scheduled for the first and third quarters of 2021.
- Complete evaluation of analytical data from the downgradient wells, using GWPSs to determine whether an SSL of Appendix IV parameters has occurred.
- Remedy selection will continue; semiannual progress reports required by 40 C.F.R. § 257.97(a) will be completed and posted to the publicly accessible website as required by 40 C.F.R. § 257.107(h)(9).

6. REFERENCES

OBG, Part of Ramboll (OBG), 2019. Corrective Measures Assessment, Miami Fort Basin A, Miami Fort Power Station, 11021 Brower Road, North Bend, Ohio, Dynegy Miami Fort, LLC, September 5, 2019.

OBG, Part of Ramboll (OBG), 2020a, Statistical Analysis Plan, Miami Fort Power Station Pond System, Project No. 74922, Revision 1, May 22, 2020.

OBG, Part of Ramboll (OBG), 2020b, Sampling and Analysis Plan, Miami Fort Pond System, Project No. 74922, Revision 0, May 22, 2020.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2020a. Corrective Measures Assessment Revision 1, Miami Fort Pond System, Miami Fort Power Station, 11021 Brower Road, North Bend, Ohio, Dynegy Miami Fort, LLC, November 12, 2020.

Ramboll Americas Engineering Solutions, Inc. (Ramboll), 2020b. Corrective Measures Assessment Revision 2, Miami Fort Pond System, Miami Fort Power Station, 11021 Brower Road, North Bend, Ohio, Dynegy Miami Fort, LLC, November 30, 2020.

TABLES

TABLE 1.
ANALYTICAL RESULTS - GROUNDWATER ELEVATION AND APPENDIX III PARAMETERS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
MIAMI FORT POWER STATION
115 - POND SYSTEM
NORTH BEND, OH

Well ID	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft) 6020A	Groundwater Elevation (ft NAVD88) 6020A	Boron, total (mg/L) 6020A	Calcium, total (mg/L) 6020A	Chloride, total (mg/L) 9251	Fluoride, total (mg/L) 9214	pH (field) (STD) SM4500 H+B	Sulfate, total (mg/L) 9036	Total Dissolved Solids (mg/L) SM 2540C
4A Downgradient	39.112492	-84.806351	4/6/2020			5.31	155	134	<0.15	7.2	316	<20
	39.112492	-84.806351	9/15/2020			4.26	151	136	<0.15	7.3	350	952
MW-1 Downgradient	39.114429	-84.8103	9/9/2019	50.29	454.2	0.7	164	23.3	<1	6.8	407	895
	39.114429	-84.8103	4/6/2020	44.15	460.34	0.721	175	46.8	0.328	7.0	364	863
	39.114429	-84.8103	9/14/2020	50.14	454.35	0.659	158	48.6	0.383	7.1	350	780
MW-2 Downgradient	39.112099	-84.815763	9/9/2019	20.73	451.5	1.54	142	32.4	<1	6.6	62.6	668
	39.112099	-84.815763	4/7/2020	15.6	456.63	2.63	126	29.3	<0.15	6.1	30.4	592
	39.112099	-84.815763	6/12/2020			0.911						
	39.112099	-84.815763	9/14/2020	15.6	456.63	0.723	135	31.2	<0.15	6.8	35.4	624
MW-3A Downgradient	39.109824	-84.812203	9/9/2019	19.43	453.8							
	39.109824	-84.812203	9/10/2019			0.102	49.7	25.6	<1	7.2	18.3	246
	39.109824	-84.812203	4/7/2020	15.43	457.8	0.0378	70.3	21.3	<0.15	6.6	34.4	325
	39.109824	-84.812203	9/14/2020	19.18	454.05	0.0441	54.6	24.8	<0.15	7.2	10.9	262
MW-4 Downgradient	39.11035	-84.809392	9/9/2019	23.82	454.07							
	39.11035	-84.809392	9/10/2019			0.582	350	<15	<5	5.5	1450	2250
	39.11035	-84.809392	4/6/2020	19.53	458.36							
	39.11035	-84.809392	4/7/2020			0.774	439	16.1	<0.15	5.3	1610	2170
	39.11035	-84.809392	9/14/2020	24.07	453.82	0.468	312	20.3	<0.15	6.0	1030	1730
MW-5 Downgradient	39.111543	-84.807453	9/9/2019	55.74	454.22							
	39.111543	-84.807453	9/10/2019			19.5	370	510	<5	6.8	566	2670
	39.111543	-84.807453	4/6/2020	51.58	458.38							
	39.111543	-84.807453	4/7/2020			34.6	366	535	<0.15	6.5	535	1790
	39.111543	-84.807453	9/14/2020	55.49	454.47	16	276	328	<0.15	6.9	343	1540
MW-6 Downgradient	39.113214	-84.807987	9/9/2019	53.91	454.43							
	39.113214	-84.807987	9/10/2019			1.46	46.7	166	1.03	7.1	6.44	572
	39.113214	-84.807987	4/6/2020	48.65	459.69							
	39.113214	-84.807987	4/7/2020			3.71	52.9	193	0.777	6.8	22.4	590
	39.113214	-84.807987	9/14/2020	54.1	454.24	0.78	51.9	163	0.913	7.5	6.46	557
MW-7 Background	39.115209	-84.808259	9/9/2019	56.74	453.43	0.267	112	5.02	<1	6.8	46.9	470
	39.115209	-84.808259	4/6/2020	50.79	459.38	0.076	106	7.56	<0.15	6.5	38.2	458
	39.115209	-84.808259	9/14/2020	56.79	453.38	0.0717	113	4.79	<0.15	6.9	45.4	467

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NORTH BEND, OH

Well ID	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft) 6020A	Groundwater Elevation (ft NAVD88) 6020A	Boron, total (mg/L) 6020A	Calcium, total (mg/L) 6020A	Chloride, total (mg/L) 9251	Fluoride, total (mg/L) 9214	pH (field) (STD) SM4500 H+B	Sulfate, total (mg/L) 9036	Total Dissolved Solids (mg/L) SM 2540C
MW-8 Downgradient	39.113534	-84.813827	9/9/2019	40.89	452.54	1	123	40.2	<1	7.0	258	666
	39.113534	-84.813827	4/7/2020	35.38	458.05	1.54	137	40.4	0.187	6.5	288	711
	39.113534	-84.813827	9/14/2020	40.57	452.86	1.02	152	38.7	0.197	7.1	405	758
MW-9 Downgradient	39.113126	-84.815678	9/9/2019	21.53	451.52	2.88	172	65.8	<1	6.9	405	889
	39.113126	-84.815678	4/7/2020	16.6	456.45	2.57	172	65.2	0.345	6.5	410	899
	39.113126	-84.815678	9/14/2020	21.19	451.86	3.17	181	87.1	0.352	7.2	486	966
MW-10 Downgradient	39.111297	-84.8148	9/9/2019	20.76	453.04							
	39.111297	-84.8148	9/10/2019			0.102	47.5	24.4	<1	7.5	18.8	232
	39.111297	-84.8148	4/7/2020	16.31	457.49	0.0901	64.7	46.2	0.227	7.0	25.3	358
	39.111297	-84.8148	9/14/2020	20.37	453.43	0.0478	47.5	22.7	0.229	7.8	18.7	249
MW-11 Downgradient	39.110622	-84.813753	9/9/2019	21.67	453.2							
	39.110622	-84.813753	9/10/2019			0.102	47.5	21.1	<1	7.4	34.9	230
	39.110622	-84.813753	4/7/2020	17.34	457.53	0.0656	73.1	61.3	<0.15	7.0	36.1	408
	39.110622	-84.813753	9/14/2020	21.35	453.52	0.0542	49.1	26	0.174	7.8	43.1	248
MW-12 Downgradient	39.111102	-84.810338	9/9/2019	54.82	453.62							
	39.111102	-84.810338	9/10/2019			7.8	167	174	<1	5.5	<5	1110
	39.111102	-84.810338	4/6/2020	50.16	458.28							
	39.111102	-84.810338	4/7/2020			9.31	166	159	<0.15	5.2	472	894
	39.111102	-84.810338	9/14/2020	54.82	453.62							
	39.111102	-84.810338	9/15/2020			6.4	168	156	<0.15	6.7	514	979
MW-13 Downgradient	39.110808	-84.807532	9/9/2019	26.52	454.7							
	39.110808	-84.807532	9/10/2019			0.211	45.1	30.3	<1	7.1	64.5	242
	39.110808	-84.807532	4/6/2020	22.56	458.66							
	39.110808	-84.807532	4/7/2020			0.0716	41.3	28.7	<0.15	7.0	51.2	464
	39.110808	-84.807532	9/14/2020	27.24	453.98	0.0471	40.3	29.2	<0.15	7.8	54.9	<10
MW-14 Downgradient	39.110353	-84.809363	9/9/2019	25.74	454.15							
	39.110353	-84.809363	9/10/2019			0.161	40.7	29.7	<1	7.9	39.8	195
	39.110353	-84.809363	4/6/2020	21.51	458.38	0.0723	41.6	32.6	<0.15	7.2	39.8	235
	39.110353	-84.809363	9/15/2020			0.0494	42.2	29.9	<0.15	8.0	52.1	<10
MW-15 Downgradient	39.113058	-84.806674	9/9/2019	42.89	454.63							
	39.113058	-84.806674	9/10/2019			0.453	103	191	<1	7.0	13.6	688
	39.113058	-84.806674	4/6/2020	38.13	459.39	0.366	113	165	0.215	7.2	59	659
	39.113058	-84.806674	9/14/2020	43.37	454.15							
	39.113058	-84.806674	9/15/2020			0.208	130	107	0.206	7.2	106	672

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115 - POND SYSTEM
NORTH BEND, OH

Well ID	Latitude (Decimal Degrees)	Longitude (Decimal Degrees)	Date	Depth to Groundwater (ft) 6020A	Groundwater Elevation (ft NAVD88) 6020A	Boron, total (mg/L) 6020A	Calcium, total (mg/L) 6020A	Chloride, total (mg/L) 9251	Fluoride, total (mg/L) 9214	pH (field) (STD) SM4500 H+B	Sulfate, total (mg/L) 9036	Total Dissolved Solids (mg/L) SM 2540C
MW-16 Downgradient	39.11303	-84.806664	9/9/2019	42.68	454.61							
	39.11303	-84.806664	9/10/2019			0.119	170	55.8	<1	6.7	118	1010
	39.11303	-84.806664	4/6/2020	37.92	459.37	0.104	186	126	<0.15	6.8	89.2	912
	39.11303	-84.806664	9/14/2020	43.18	454.11							
	39.11303	-84.806664	9/15/2020			0.0661	190	113	<0.15	6.9	112	928

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
ft = foot/feet
mg/L = milligrams per liter
NAVD88 = North American Vertical Datum of 1988
S.U. = Standard Units
< = concentration is less than the concentration shown, which corresponds to the reporting limit for the method; estimated concentrations below the reporting limit and associated qualifiers are not provided since not utilized in statistics to determine Statistically Significant Increases (SSIs) over background.
4-digit numbers below parameter represent SW-846 analytical methods and alpha-numeric values that begin with SM represent Standard Methods for the Examination of Water and Wastewater.

TABLE 2.
ANALYTICAL RESULTS - APPENDIX IV PARAMETERS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
MIAMI FORT POWER STATION
115 - POND SYSTEM
NORTH BEND, OH

Well ID	Date	Antimony, total (mg/L) 6020A	Arsenic, total (mg/L) 6020A	Barium, total (mg/L) 6020A	Beryllium, total (mg/L) 6020A	Cadmium, total (mg/L) 6020A	Chromium, total (mg/L) 6020A	Cobalt, total (mg/L) 6020A	Fluoride, total (mg/L) 6020A	Lead, total (mg/L) 6020A	Lithium, total (mg/L) 6020A	Mercury, total (mg/L) 7470A	Molybdenum, total (mg/L) 6020A	Radium-226 + Radium 228, total (pCi/L) 6020A	Selenium, total (mg/L) 6020A	Thallium, total (mg/L) 6020A
4A Downgradient	4/6/2020	<0.004	<0.002	0.104	<0.002	<0.001	0.00225	0.00908	<0.15	<0.005	0.00802	<0.0002	0.0136	2	<0.002	<0.002
	6/12/2020							0.012								
	9/15/2020	<0.004	<0.002	0.112	<0.002	<0.001	<0.002	0.0109	<0.15	<0.005	<0.04	<0.0002	0.014	1.4	<0.002	<0.002
MW-1 Downgradient	9/9/2019		<0.001	0.0482	<0.001	<0.001	0.00289	<0.0005	<1	<0.001	0.0228	<0.0002	0.021	0.0553	<0.005	<0.001
	4/6/2020	<0.004	<0.002	0.0424	<0.002	<0.001	<0.002	<0.002	0.328	<0.005	0.0258	<0.0002	0.0273	1.87	<0.002	<0.002
	9/14/2020		<0.002	0.0421	<0.002	<0.001	<0.002	<0.002	0.383	<0.005	0.0327	<0.0002	0.0289	0.856	<0.002	<0.002
MW-2 Downgradient	9/9/2019		0.0232	0.501	<0.001	<0.001	0.00313	0.000626	<1	0.00122	<0.005	<0.0002	<0.005	0.704	<0.005	<0.001
	4/7/2020	<0.004	0.0277	0.44	<0.002	<0.001	0.00203	<0.002	<0.15	<0.005	<0.02	<0.0002	<0.005	1.66	<0.002	<0.002
	9/14/2020		0.0259	0.458	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	<0.01	<0.0002	<0.005	0.579	<0.002	<0.002
MW-3A Downgradient	9/10/2019		0.00739	0.124	<0.001	<0.001	0.00258	<0.0005	<1	<0.001	<0.005	<0.0002	<0.005	0.558	<0.005	<0.001
	4/7/2020	<0.004	0.0208	0.138	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.0033	<0.0002	<0.005	1.19	<0.002	<0.002
	9/14/2020		0.0121	0.133	<0.002	<0.001	0.0253	<0.002	<0.15	<0.005	0.00276	<0.0002	<0.005	1.76	<0.002	<0.002
MW-4 Downgradient	9/10/2019		<0.001	0.0197	<0.001	0.00102	0.00296	0.0171	<5	<0.001	0.0068	<0.0002	<0.005	0.382	<0.005	<0.001
	4/7/2020	<0.004	0.00478	0.0337	<0.002	0.00193	0.00358	0.0224	<0.15	<0.005	0.00897	<0.0002	<0.005	2.97	0.00222	<0.002
	9/14/2020		0.00473	0.0237	<0.002	0.00152	0.00284	0.0149	<0.15	<0.005	<0.01	<0.0002	<0.005	0.171	<0.002	<0.002
MW-5 Downgradient	9/10/2019		<0.001	0.12	<0.001	<0.001	0.00264	0.000522	<5	<0.001	<0.05	<0.0002	0.00543	0	<0.005	<0.001
	4/7/2020	<0.004	<0.002	0.0935	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.0118	<0.0002	0.00561	1.81	<0.002	<0.002
	9/14/2020		<0.002	0.0839	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	<0.1	<0.0002	0.00554	0.278	<0.002	<0.002
MW-6 Downgradient	9/10/2019		0.0104	0.787	<0.001	<0.001	0.00261	0.00296	1.03	<0.001	0.00936	<0.0002	0.289	0.846	<0.005	<0.001
	4/7/2020	<0.004	0.00851	0.39	<0.002	<0.001	0.00253	0.00263	0.777	<0.005	0.00884	<0.0002	0.289	0.675	<0.002	<0.002
	9/14/2020		0.0108	0.676	<0.002	<0.001	<0.002	0.00266	0.913	<0.005	<0.01	<0.0002	0.286	0.735	<0.002	<0.002
MW-7 Background	9/9/2019		<0.001	0.107	<0.001	<0.001	0.00313	<0.0005	<1	<0.001	0.00524	<0.0002	<0.005	0.464	<0.005	<0.001
	4/6/2020	<0.004	<0.002	0.088	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.00421	<0.0002	<0.005	1.07	<0.002	<0.002
	9/14/2020		<0.002	0.0958	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.00411	<0.0002	<0.005	0.86	<0.002	<0.002
MW-8 Downgradient	9/9/2019		<0.001	0.0442	<0.001	<0.001	0.00267	<0.0005	<1	<0.001	0.0108	<0.0002	0.00756	0.591	<0.005	<0.001
	4/7/2020	<0.004	<0.002	0.0345	<0.002	<0.001	<0.002	<0.002	0.187	<0.005	0.0179	<0.0002	0.00656	1.97	0.00202	<0.002
	9/14/2020		<0.002	0.0454	<0.002	<0.001	<0.002	<0.002	0.197	<0.005	<0.02	<0.0002	0.00668	0.342	<0.002	<0.002
MW-9 Downgradient	9/9/2019		<0.001	0.112	<0.001	<0.001	0.00283	<0.0005	<1	<0.001	0.00948	<0.0002	0.0494	0.252	<0.005	<0.001
	4/7/2020	<0.004	<0.002	0.0928	<0.002	<0.001	<0.002	<0.002	0.345	<0.005	<0.01	<0.0002	0.0591	2.32	<0.002	<0.002
	9/14/2020		<0.002	0.0979	<0.002	<0.001	<0.002	<0.002	0.352	<0.005	<0.02	<0.0002	0.0609	0.388	<0.002	<0.002
MW-10 Downgradient	9/10/2019		0.0221	0.163	<0.001	<0.001	0.00265	<0.0005	<1	<0.001	<0.005	<0.0002	<0.005	0.86	<0.005	<0.001
	4/7/2020	<0.004	0.0177	0.175	<0.002	<0.001	<0.002	<0.002	0.227	<0.005	0.00226	<0.0002	0.00546	0.684	<0.002	<0.002
	9/14/2020		0.0253	0.142	<0.002	<0.001	<0.002	<0.002	0.229	<0.005	<0.002	<0.0002	0.00529	0.502	<0.002	<0.002
MW-11 Downgradient	9/10/2019		0.0114	0.217	<0.001	<0.001	0.0027	0.000621	<1	<0.001	<0.005	<0.0002	<0.005	0.743	<0.005	<0.001
	4/7/2020	<0.004	0.0148	0.313	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.00366	<0.0002	<0.005	1.74	<0.002	<0.002
	9/14/2020		0.0289	0.236	<0.002	<0.001	<0.002	<0.002	0.174	<0.005	0.00304	<0.0002	<0.005	1.16	<0.002	<0.002

TABLE 2.
ANALYTICAL RESULTS - APPENDIX IV PARAMETERS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
MIAMI FORT POWER STATION
115 - POND SYSTEM
NORTH BEND, OH

Well ID	Date	Antimony, total (mg/L) 6020A	Arsenic, total (mg/L) 6020A	Barium, total (mg/L) 6020A	Beryllium, total (mg/L) 6020A	Cadmium, total (mg/L) 6020A	Chromium, total (mg/L) 6020A	Cobalt, total (mg/L) 6020A	Fluoride, total (mg/L) 6020A	Lead, total (mg/L) 6020A	Lithium, total (mg/L) 6020A	Mercury, total (mg/L) 7470A	Molybdenum, total (mg/L) 6020A	Radium-226 + Radium 228, total (pCi/L) 6020A	Selenium, total (mg/L) 6020A	Thallium, total (mg/L) 6020A
MW-12 Downgradient	9/10/2019		<0.001	0.0162	<0.001	0.00179	0.00337	0.00256	<1	<0.001	0.00706	0.001	<0.005	0.0927	<0.005	<0.001
	4/7/2020	<0.004	<0.002	<0.02	<0.002	0.00165	<0.002	0.00259	<0.15	<0.005	0.00433	0.000369	<0.005	0	<0.002	<0.002
	9/15/2020		<0.002	<0.02	<0.002	0.00206	<0.002	0.00245	<0.15	<0.005	<0.04	0.000812	<0.005	0.851	<0.002	<0.002
MW-13 Downgradient	9/10/2019		0.019	0.206	<0.001	<0.001	0.00301	<0.0005	<1	<0.001	0.00674	<0.0002	0.0126	0.373	<0.005	<0.001
	4/7/2020	<0.004	0.0223	0.205	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.00554	<0.0002	0.0106	0.854	<0.002	<0.002
	6/12/2020		0.0138													
	9/14/2020		0.0134	0.2	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.00454	<0.0002	0.0113	3.84	<0.002	<0.002
MW-14 Downgradient	9/10/2019		0.00154	0.043	<0.001	<0.001	0.00326	0.000685	<1	<0.001	0.00526	<0.0002	0.00712	0.33	<0.005	<0.001
	4/6/2020	<0.004	<0.002	0.0371	<0.002	<0.001	0.00212	<0.002	<0.15	<0.005	0.00415	<0.0002	0.00689	0.12	<0.002	<0.002
	9/15/2020	<0.004	<0.002	0.0389	<0.002	<0.001	<0.002	<0.002	<0.15	<0.005	0.00368	<0.0002	0.00604	1.43	<0.002	<0.002
MW-15 Downgradient	9/10/2019		0.00373	0.0815	<0.001	<0.001	0.00302	0.0036	<1	<0.001	0.00799	<0.0002	0.0269	0.589	<0.005	<0.001
	4/6/2020	<0.004	<0.002	0.0964	<0.002	<0.001	<0.002	0.00386	0.215	<0.005	0.0074	<0.0002	0.0291	0.607	<0.002	<0.002
	9/15/2020	<0.004	<0.002	0.091	<0.002	<0.001	0.00396	0.00379	0.206	<0.005	0.00589	<0.0002	0.0258	0.211	<0.002	<0.002
MW-16 Downgradient	9/10/2019		<0.001	0.0901	<0.001	<0.001	0.00287	0.00267	<1	<0.001	0.011	<0.0002	<0.005	0.0761	<0.005	<0.001
	4/6/2020	<0.004	<0.002	0.0997	<0.002	<0.001	0.00202	0.00217	<0.15	<0.005	0.0114	<0.0002	<0.005	0.672	<0.002	<0.002
	9/15/2020	<0.004	<0.002	0.0951	<0.002	<0.001	<0.002	0.00347	<0.15	<0.005	0.0108	<0.0002	<0.005	0.0749	<0.002	<0.002

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
mg/L = milligrams per liter
NA = Not Analyzed
pCi/L = picoCuries per liter
< = concentration is less than concentration shown, which corresponds to the reporting limit for the method; estimated concentrations below the reporting limit and associated qualifiers are not provided since not utilized in statistics to determine Statistically Significant Levels (SSLs) over Groundwater Protection Standards.
4-digit numbers below parameter represent SW-846 analytical methods and 3-digit numbers represent Clean Water Act analytical methods.

TABLE 3.
STATISTICAL BACKGROUND VALUES
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
MIAMI FORT POWER STATION
115 - POND SYSTEM
NORTH BEND, OHIO
ASSESSMENT MONITORING PROGRAM

Parameter	Statistical Background Value (UPL)
40 C.F.R. Part 257 Appendix III	
Boron (mg/L)	0.26
Calcium (mg/L)	180
Chloride (mg/L)	18.7
Fluoride (mg/L)	0.128
pH (S.U.)	5.8 / 8.2
Sulfate (mg/L)	73
Total Dissolved Solids (mg/L)	548

[O: MIK 7/1/2020, C: RAB 7/2/2020]

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
mg/L = milligrams per liter
S.U. = Standard Units
UPL = Upper Prediction Limit

TABLE 4.
GROUNDWATER PROTECTION STANDARDS
2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
MIAMI FORT POWER STATION
115 - POND SYSTEM
NORTH BEND, OHIO
ASSESSMENT MONITORING PROGRAM

Parameter	Groundwater Protection Standard[1]
40 C.F.R. Part 257 Appendix IV	
Antimony (mg/L)	0.006
Arsenic (mg/L)	0.010
Barium (mg/L)	2
Beryllium (mg/L)	0.004
Cadmium (mg/L)	0.005
Chromium (mg/L)	0.10
Cobalt (mg/L)	0.006
Fluoride (mg/L)	4
Lead (mg/L)	0.015
Lithium (mg/L)	0.040
Mercury (mg/L)	0.002
Molybdenum (mg/L)	0.10
Radium 226+228 (pCi/L)	5
Selenium (mg/L)	0.05
Thallium (mg/L)	0.002

[O: MIK 7/1/2020, C: RAB 7/2/2020]

Notes:
40 C.F.R. = Title 40 of the Code of Federal Regulations
mg/L = milligrams per liter
pCi/L = picoCuries per liter
[1]Groundwater Protection Standard is the higher of the Maximum Contaminant Level / Health-Based Level or background.

FIGURES

Y:\Mapping\Projects\22\2285\MXD\2020_AnnualGWM_CAR\Figure 1_GWS_WellLoc_MiamiFort.mxd

PROJECT: 169000XXXX | DATED: 1/26/2021 | DESIGNER: galarnmc

DOWNGRADIENT MONITORING WELL LOCATION
BACKGROUND MONITORING WELL LOCATION
CCR MONITORED MULTI-UNIT
BERM

0 150 300 Feet

MONITORING WELL LOCATION MAP
MIAMI FORT POND SYSTEM
UNIT ID:115

2020 ANNUAL GROUNDWATER MONITORING AND CORRECTIVE ACTION REPORT
VISTRA CCR RULE GROUNDWATER MONITORING
MIAMI FORT POWER STATION
NORTH BEND, OHIO

FIGURE 1

RAMBOLL AMERICAS
ENGINEERING SOLUTIONS, INC.

RAMBOLL

APPENDICES

Intended for
Dynegy Miami Fort, LLC

Date
April 6, 2020

Project No.
74922

40 C.F.R. § 257.95(g)(3)(ii): ALTERNATE SOURCE DEMONSTRATION

MIAMI FORT BASIN B

RAMBOLL Bright ideas. Sustainable change.

CERTIFICATIONS

I, Jacob J. Walczak, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Jacob J. Walczak
Senior Hydrogeologist
O'Brien & Gere Engineers, Inc., a Ramboll Company
Date: April 6, 2020

I, Nicole M. Pagano, a qualified professional engineer in good standing in the State of Ohio, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Nicole M. Pagano
Qualified Professional Engineer
85428
Ohio
O'Brien & Gere Engineers, Inc., a Ramboll Company
Date: April 6, 2020

STATE OF OHIO
NICOLE M. PAGANO
E-85428
REGISTERED
PROFESSIONAL ENGINEER

Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA
T 414-837-3607
F 414-837-3608
https://ramboll.com

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ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
bgs	below ground surface
CCR	Coal Combustion Residuals
ft	feet
gpm	gallons per minute
GWPSs	Groundwater Protection Standards
IDNR	Indiana Division of Natural Resources
LOEs	lines of evidence
MCD	Miami Conservancy District
μg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
msl	above mean sea level North American Vertical Datum of 1988
NRT/OBG	Natural Resource Technology, an OBG Company
OBG	O'Brien & Gere Engineers, Inc., part of Ramboll
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
ORP	oxidation-reduction potential
RCRA	Resource Conservation and Recovery Act
Site	Miami Fort Power Station
SI	Surface Impoundment
SSIs	Statistically Significant Increases
SSLs	Statistically Significant Levels
UPL	Upper Prediction Limit
USGS	United States Geological Survey

1. INTRODUCTION

Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.95(g)(3)(ii) allows the owner or operator of a Coal Combustion Residuals (CCR) unit 90 days from the date of determination of Statistically Significant Levels (SSLs) over Groundwater Protection Standards (GWPSs) of groundwater constituents listed in Appendix IV of 40 C.F.R. Part 257 to complete a written demonstration that a source other than the CCR unit being monitored caused the SSL(s), or that the SSL(s) resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Alternate Source Demonstration [ASD]).

This ASD has been prepared on behalf of Dynegy Miami Fort, LLC, by O'Brien & Gere Engineers, Inc., a Ramboll Company (Ramboll), to provide pertinent information pursuant to 40 C.F.R. § 257.95(g)(3)(ii) for the Miami Fort Basin B located near North Bend, Ohio.

The most recent Assessment Monitoring sampling event (A2D) was completed on September 9 through September 10, 2019 and analytical data were received on October 31, 2019. Analytical data from all sampling events, from December 2015 through A2D, were evaluated in accordance with the Statistical Analysis Plan (NRT/OBG, 2017) to determine any Statistically Significant Increases (SSIs) of Appendix III parameters over background concentrations or SSLs of Appendix IV parameters over GWPSs. That evaluation identified one SSL at downgradient monitoring wells as follows:

- Arsenic at wells MW-2 and MW-10

Pursuant to 40 C.F.R. § 257.95(g)(3)(ii), the following lines of evidence demonstrate that sources other than the Miami Fort Basin B were the cause of the arsenic SSLs listed above. This ASD was completed by April 6, 2020, within 90 days of determination of the SSLs (January 6, 2020), as required by 40 C.F.R. § 257.95(g)(3)(ii).

2. BACKGROUND

2.1 Site Location and Description

Miami Fort Power Station (Site) is located in the southwest corner of Ohio (Hamilton County) adjacent to the state boundaries of Indiana (west) and Kentucky (south), and approximately 5 miles southwest of North Bend, Ohio on the north shore of the Ohio River at the confluence with the Great Miami River. Basin B is located in the southwest corner of the Site near the confluence (Figure 1).

2.2 Description of Basin B CCR Unit

Basin B is an unlined surface impoundment (SI) approximately 20 acres in size. Basin B was constructed between 1979 and 1981 (AECOM, 2017). The unlined SI Basin A CCR Unit, approximately 30 acres, lies immediately adjacent to and east of Basin B. The basins are bounded by the Veolia North America property and Brower Road to the north, the Great Miami River to west, the Ohio River to the south, and the Site electric switch yard to the east. Veolia's production wells are located northwest of Basin B and Site production wells are located east of Basin A (AECOM, 2017). Basin B CCR monitoring well locations, production well locations, and surface water sampling locations are shown in Figure 1.

2.3 Geology and Hydrogeology

The geologic units present beneath Basin B at the Site include fill, alluvial deposits, glacial outwash (Uppermost Aquifer) and bedrock, as described below:

- Fill Unit – (CCR within Basin B). The CCR consists primarily of bottom ash, fly ash, and other non-CCR waste streams. This unit also includes man made berms constructed of a variety of locally available materials.
- Alluvial Deposits - The alluvial deposits consist of clay, silt and fine sand deposited by the Ohio River floodwaters. These alluvial deposits range in depth from approximately 20 to 60 feet below the present ground surface. A silty, sandy clay layer is the primary component of the alluvial deposits. The clay ranges in elevation from 428 feet (ft) above mean sea level North American Vertical Datum of 1988 (msl) in the southwest corner of Basin B near the confluence of the Ohio River and the Great Miami River to 495 ft msl beneath the northeast corner of Basin A. The clay is thin, or absent, near the valley wall north of the Site and thickens towards the Ohio River. The clay is thickest beneath the southern half of Basin A and Basin B, ranging in thickness from 15 ft to 48 ft. A silt layer, averaging approximately 7 ft thick, overlies the clay in several areas.
- Glacial Outwash (Uppermost Aquifer) - Deposits consisting of sands and gravels deposited during the Illinoian and Wisconsin stages of the Pleistocene. The thickness of the outwash deposits is approximately 100 feet; the outwash deposits directly overlie bedrock. A silt and fine sand layer is present locally on top of the outwash deposits and ranges in thickness from 4 ft to 30 ft; however, it is not present below the entirety of Basin A and Basin B.
- Bedrock - The bedrock consists of interbedded shales and limestones belonging to the Ordovician-aged Fairview and Kope formations (AECOM, 2017). Depth to bedrock beneath the Site varies between approximately 110 to 120 feet below ground surface (bgs) dependent on proximity to the edge of the valley wall north of the basins. Due to the

relatively impermeable nature of the shales and limestones underlying this region, water yields in the bedrock are generally insufficient for domestic use (AECOM, 2017).

The glacial outwash deposits (Uppermost Aquifer) underlying Basin B are part of the Ohio River Valley Fill Aquifer; a glacial buried-valley deposit aquifer. The valley was cut into the bedrock by pre-glacial and glacial streams and subsequently back-filled with deposits of sand, gravel and other glacial drift by glacial and alluvial processes as the glaciers advanced and receded. Buried valley aquifers such as the Uppermost Aquifer are Ohio's most productive water-bearing formations. Estimates of transmissivity are in excess of 50,000 gallons per day per foot (USGS, 1997).

Regionally, yields for high-capacity wells in the Uppermost Aquifer range from 450 gallons per minute (gpm) to 3,000 gpm with one well tested as high as 6,000 gpm. (IDNR, 2006). The majority of the water withdrawn by high capacity wells near the Site is from induced flow from the Ohio River (ODNR, undated). The Site operates four production wells east-southeast of Basin A for cooling water. Pumping rates measured at the cooling water production wells range from 1,000 gpm to 1,500 gpm. Additionally. three production wells, located northwest of Basin B, are operated by Veolia for process (non-potable) water.

The aquifer receives most of its recharge from infiltration of precipitation on the valley floor; however, secondary recharge also comes from bank storage from the Great Miami River and Ohio River during flood stages. Recharge to the aquifer from bank storage is periodic and short-lived.

Groundwater elevations across the Site ranged from approximately 451 to 460 ft msl during A2D, coincident with an approximate Ohio River pool elevation of 455 ft msl. The groundwater elevation contours shown on Figure 2 are based on groundwater measurements collected on September 9, 2019, the first day of a combined sampling event at the Site for Basin A and Basin B. Groundwater flow in the Uppermost Aquifer is generally to the west/northwest towards the Great Miami River and Veolia’s production wells, and south towards the Ohio River.

3. ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

This ASD is based on the following lines of evidence (LOEs):

1. Ionic composition of the groundwater at wells MW-2 and MW-10 is different than the ionic composition of surface water in Basin B, indicating that Basin B is not the source of the groundwater in these wells.
2. Naturally-occurring concentrations of arsenic are commonly found in soils and groundwater in southwestern Ohio. MW-2 and MW-10 are located in southwestern Ohio, along the banks of the Great Miami River, where they are susceptible to geochemical conditions that can mobilize naturally-occurring arsenic from the soils into groundwater.
3. Concentrations of CCR indicator parameters, boron and sulfate, are below the Upper Prediction Limit (UPL) at MW-2 and MW-10, and stable or decreasing, indicating that CCR is not the source of the observed detections.

These LOEs are described and supported in greater detail below. Monitoring wells and Basin B water sample locations are shown on Figure 1.

3.1 LOE #1: Ionic Composition of the Groundwater at Wells MW-2 and MW-10 is Different Than the Ionic Composition of Surface Water in Basin B, Indicating that Basin B is Not the Source of the Groundwater in These Wells.

Piper diagrams graphically represent ionic composition of aqueous solutions. A Piper diagram displays the position of water samples with respect to their major cation and anion content on the two lower triangular portions of the diagram, providing the information which, when combined on the central, diamond-shaped portion of the diagram, identify composition categories or groupings (hydrochemical facies). Figure A, below, is a Piper diagram that displays the ionic composition of groundwater samples from background monitoring wells, downgradient monitoring wells (including MW-2 and MW-10 where SSLs of arsenic were detected), and Basin B water.

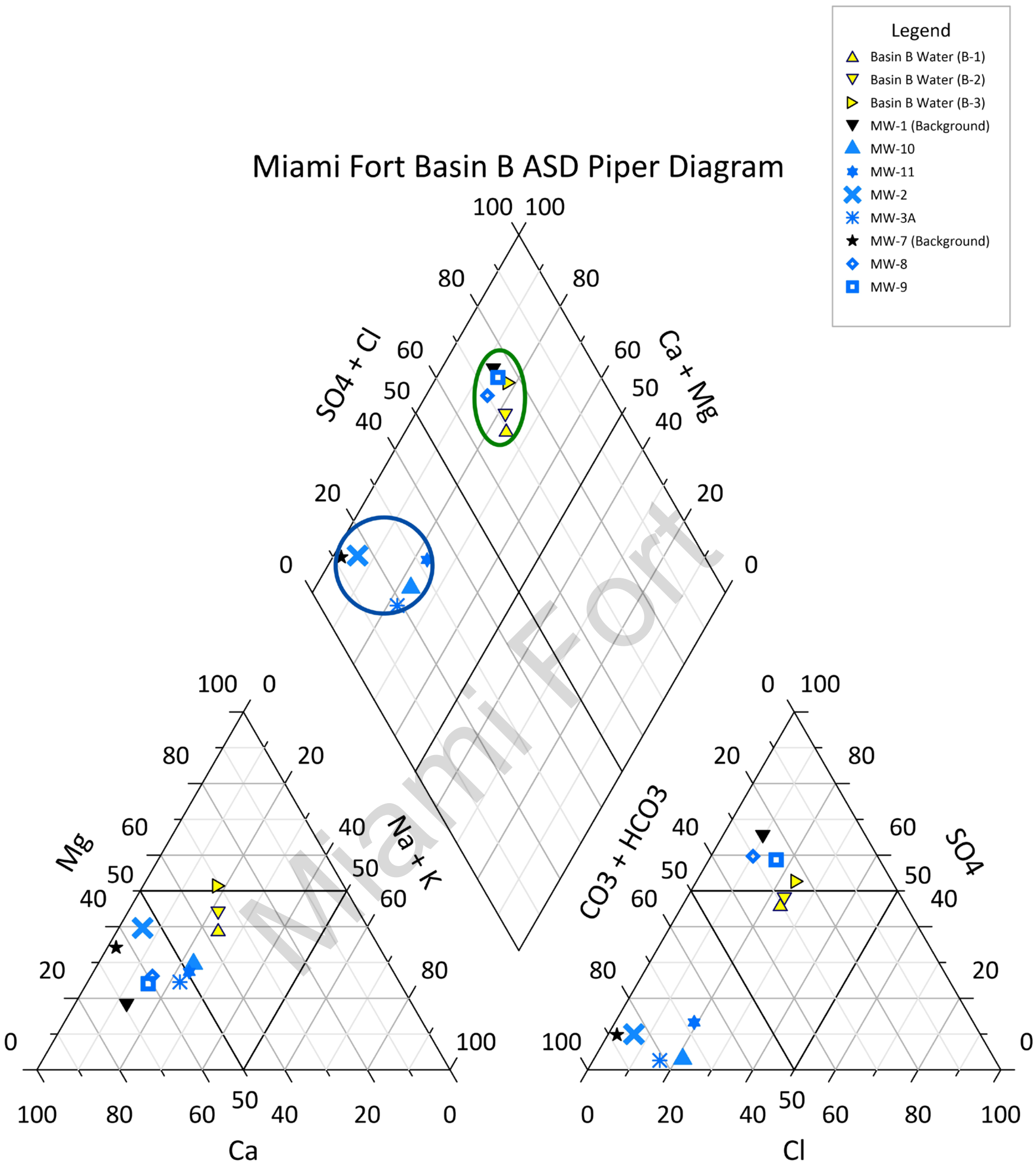

Figure A. Piper Diagram Showing Ionic Composition of Samples of Basin B Water and Groundwater

It is evident from the Piper diagram (Figure A) that Basin B water and upland monitoring wells MW-1 (background), MW-8 and MW-9 (green grouping) are in the calcium-sulfate hydrochemical facies. The remaining groundwater samples, including MW-2 and MW-10, and upgradient well MW-7 (blue grouping) are in the calcium-bicarbonate hydrochemical facies. Wells MW-2 and MW-10 share similar characteristics to both background and downgradient water composition. The dissimilarity between Basin B water and downgradient groundwater collected from monitoring wells MW-2 and MW-10 suggests that the Basin B water is not the source of groundwater impacts (elevated arsenic concentrations) at these monitoring wells.

3.2 LOE #2: Naturally-Occurring Concentrations of Arsenic are Commonly Found in Soils and Groundwater in Southwestern Ohio. MW-2 and MW-10 are Located in Southwestern Ohio, Along the Banks of the Great Miami River, Where They are Susceptible to Geochemical Conditions that can Mobilize Naturally-Occurring Arsenic from the Soils into Groundwater.

Naturally-occurring concentrations of arsenic are commonly found in nearby soils. Ten surficial soil samples (0 to 2 feet below ground surface) were collected by Ohio Environmental Protection Agency (OEPA), approximately 3,000 feet northeast of Basin B (Figure 1), near Shawnee Lookout in Hamilton County Park, and analyzed for arsenic as part of a study to evaluate background soil concentrations of Resource Conservation and Recovery Act (RCRA) metals in the Cincinnati area (OEPA, 2015). Results of the analysis indicated surficial terrace soils (clay) adjacent to Basin B have background arsenic concentrations ranging from 5.61 to 8.20 milligrams per kilogram (mg/kg).

Arsenic occurs naturally in southwestern Ohio glacial buried-valley deposit aquifers like the Uppermost Aquifer. Fifty-seven (57) groundwater samples were collected by the United States Geological Survey (USGS) in cooperation with the Miami Conservancy District (MCD) to increase understanding of arsenic occurrence in southwest Ohio (Thomas et al., 2005). The study included samples collected from carbonate bedrock, glacial buried-valley deposit and glacial till with interbedded sand and gravel aquifers within the Great Miami River drainage basin, and included samples from domestic wells in Preble, Miami, and Shelby counties. The USGS reported that 37 percent of the samples analyzed had elevated concentrations of arsenic (greater than or equal to 10 micrograms per liter [μg/L]) and elevated arsenic concentrations were found in all three aquifer types studied. Geochemical conditions were also evaluated and the USGS determined that elevated arsenic concentrations in the study area were associated with iron-reducing, sulfate-reducing, or methanic conditions, and all samples with elevated arsenic concentrations had iron concentrations that exceeded 1 milligrams per liter (mg/L), indicating the potential for the reduction of arsenic-bearing iron oxides present in soil.

Based on previous studies discussed above, naturally-occurring concentrations of arsenic are known to exist in both soils and groundwater in the same region (southwestern Ohio) and aquifer type (glacial buried-valley deposit aquifer) as Basin B. The OEPA study showed arsenic-bearing soils were found in close proximity (approximately 3,000 feet northeast) to Basin B. The USGS study showed that iron-reducing, sulfate-reducing, or methanic geochemical conditions needed to mobilize arsenic were common in southwestern Ohio aquifers. Reducing conditions indicating the potential for arsenic mobilization are likely to occur at Basin B monitoring wells MW-2 and MW-10, where arsenic SSLs were determined, as indicated by the following factors discussed below:

- Boring logs indicate organic materials are present in the soils.
- MW-2 and MW-10 are among the monitoring wells adjacent to the riverbank, where the lowest oxidation-reduction potentials (ORP) at the Site were observed.
- Dissolved iron concentrations present in groundwater at monitoring well MW-2 correlate with dissolved arsenic concentrations.

Arsenic is naturally present in groundwater and soils at variable concentrations. The arsenic is co-precipitated with iron oxyhydroxides and incorporated into the mineral structure of the soils, and can also be adsorbed to organic matter or the iron oxyhydroxides in the aquifer. Both of these sources of arsenic can be mobilized in groundwater by dissolution or desorption under reducing geochemical conditions, where organic carbon commonly acts as the reducing agent

(Thomas et al., 2005; McCarthur et al., 2001). Arsenic-bearing soils are known to be present in the areas near Basin B (OEPA, 2015); and, organic matter, a source of organic carbon and potential reducing agent, was observed in the boring logs for monitoring wells located along the banks of the Great Miami River (see boring logs for wells MW-2, MW-3A, MW-10, and MW-11 in Appendix A). The presence of organic material and arsenic-bearing soils indicates there is potential for naturally-occurring arsenic to become mobilized through reductive dissolution or desorption.

Reducing conditions sufficient to mobilize naturally-occurring arsenic have also been observed along the bank of the Great Miami River as evidenced by the low ORP measurements observed in the groundwater at monitoring wells MW-2, MW-3A, MW-10, and MW-11 (presented in Figure B below; monitoring wells adjacent to the riverbank are illustrated with solid lines, upland wells are illustrated with dashed lines).

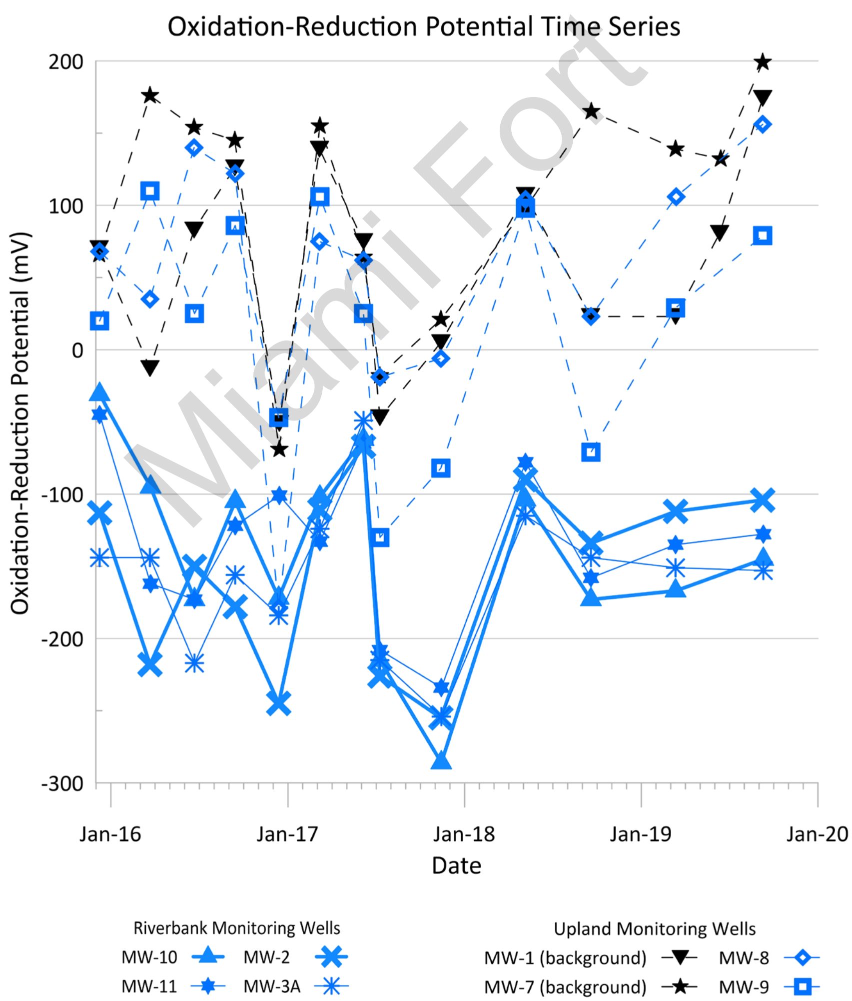

Figure B. Oxidation Reduction Potential Time-Series for Groundwater Samples (MW-1 (Background), MW-2, MW-3A, MW-7 (Background), MW-8, MW-9, MW-10, and MW-11; Monitoring Wells Adjacent to the Riverbank are Illustrated with Solid Lines, Upland Wells are Illustrated with Dashed Lines)

Available data indicated that concentrations of dissolved iron observed in groundwater at monitoring well MW 2 from 2008 to 2014 correlate with dissolved arsenic concentrations. Dissolved iron concentrations ranged from 11.8 to 52.1 mg/L, at least an order of magnitude greater than the 1 mg/L reported by the USGS as being indicative of iron-reducing geochemical conditions. Figure C below illustrates the relationship between dissolved iron concentrations and dissolved arsenic concentrations in groundwater at MW-2, where the coefficient of determination (R-squared) is 0.87.

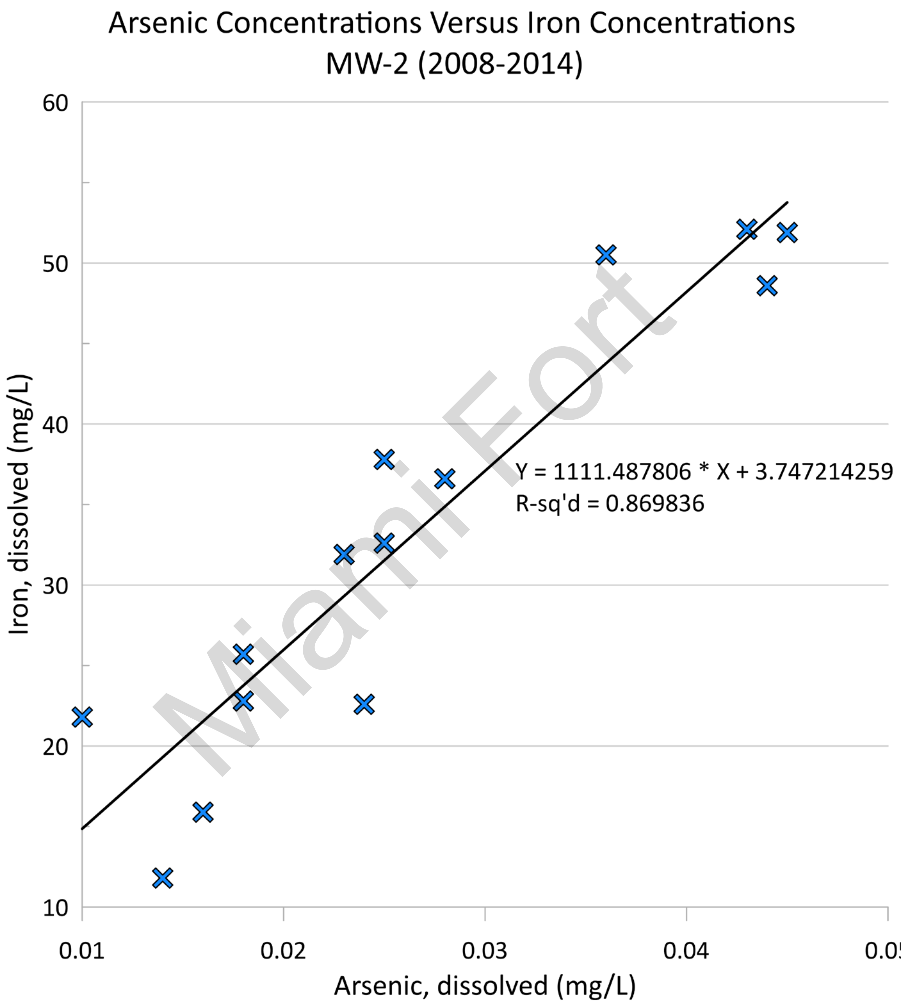

Figure C. Arsenic Concentrations Versus Iron Concentrations at Well MW-2 (2008-2014)

The presence of elevated concentrations of arsenic in background soil and groundwater in surrounding areas, as well as the presence of geochemical conditions (i.e. reducing conditions) necessary to mobilize arsenic from soil to groundwater indicate that elevated concentrations of arsenic at monitoring wells MW-2 and MW-10 are likely the result of naturally-occurring geochemical variations within the Uppermost Aquifer.

3.3 LOE #3: Concentrations of CCR Indicator Parameters, Boron and Sulfate, are Below the Upper Prediction Limit (UPL) at MW-2 and MW-10, and Stable or Decreasing, Indicating that CCR is Not the Source of the Observed Detections.

The time-series plots below (Figure D and Figure E) illustrate the concentrations of primary CCR indicator parameters boron and sulfate relative to UPLs (i.e. statistically significant increase [SSI] limits established using background monitoring wells [MW-1 and MW-7]) at downgradient monitoring wells MW-2 and MW-10.

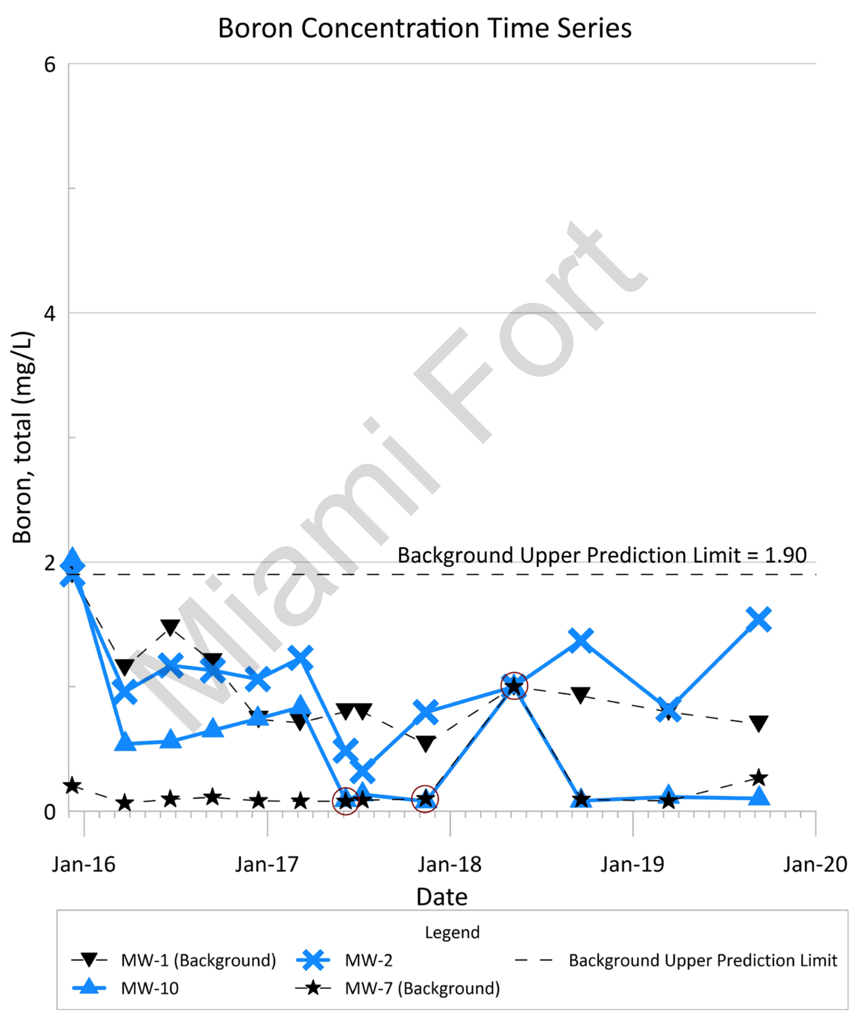

Figure D. Boron Concentration Time-Series for Groundwater Samples Collected from Monitoring Wells MW-1 (Background), MW-2, MW-7 (Background), and MW-10 (note: non-detect analysis results for all wells are shown with red circles)

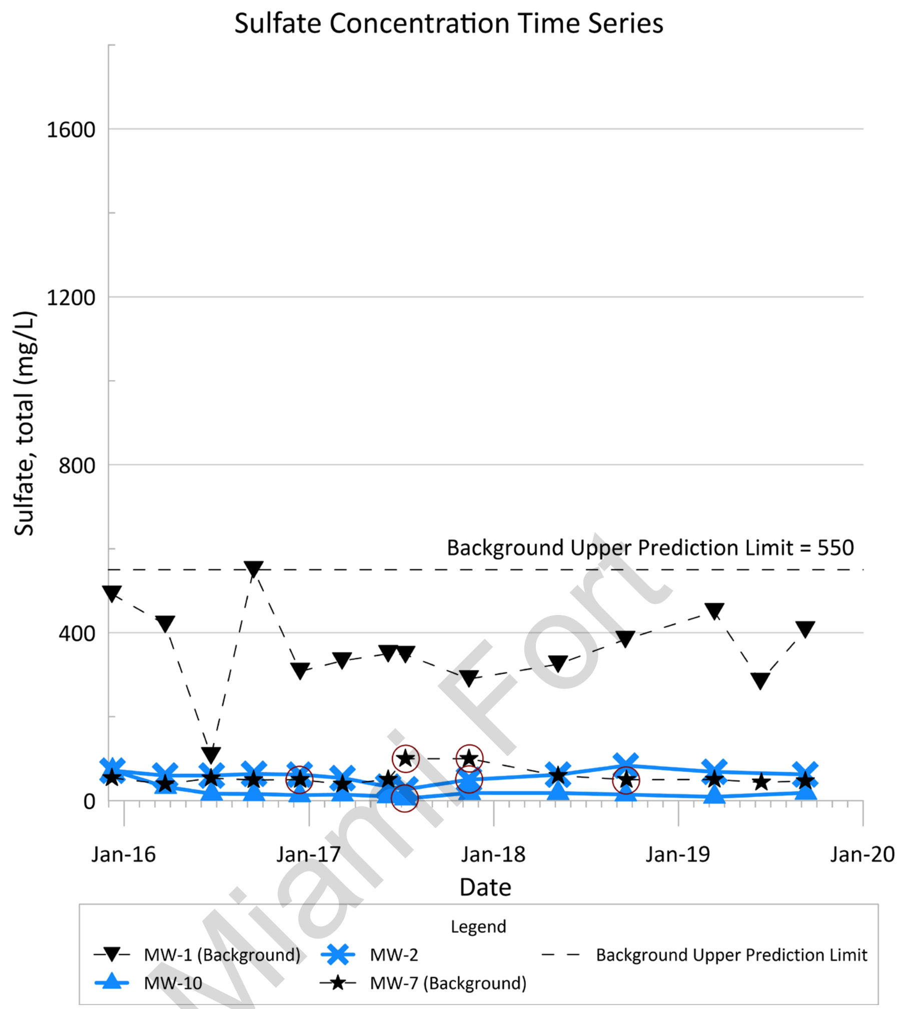

Figure E. Sulfate Concentration Time-Series for Groundwater Samples Collected from Monitoring Wells MW-1 (Background), MW-2, MW-7 (Background), and MW-10 (note: non-detect analysis results for all wells are shown with red circles)

Boron concentrations in well MW-2 ranged from 0.322 to 1.9 mg/L between December 2015 and September 2019 with a median concentration of 1.06 mg/L (Table A below), and were below the UPL for boron of 1.9 mg/L following the first sampling event in December 2015 as shown in Figure D above. Boron concentrations in well MW-10 ranged from non-detectable levels (less than 0.08 mg/L) to 2.02 mg/L with a median concentration of 0.54 mg/L (Table A below) during the same time period and were below the UPL for boron following the first sampling event in December 2015 as shown in Figure D.

Table A – Summary Statistics and Mann-Kendall Trend Analysis Results for Boron in Groundwater at MW-2 and MW-10 (December 2015 to September 2019).

Monitoring Well	Boron (mg/L)			
	Minimum	Maximum	Median	Mann-Kendall Trend Analysis Result
MW-2	0.322	1.9	1.06	None
MW-10	<0.08	2.02	0.54	Downward

Sulfate concentrations in well MW-2 ranged from 27.1 to 83.5 mg/L between December 2015 and September 2019 with a median concentration of 61.8 mg/L (Table B below), and were below the UPL for sulfate of 550 mg/L as shown in Figure E above. Sulfate concentrations in well MW-10 ranged from non-detect (less than 5.0 mg/L) to 72 mg/L with a median concentration of 15.8 mg/L (Table B below) during the same time period and were below the UPL for sulfate as shown in Figure E.

Table B – Summary Statistics and Mann-Kendall Trend Analysis Results for Sulfate in Groundwater at MW-2 and MW-10 (December 2015 to September 2019).

Monitoring Well	Sulfate (mg/L)			
	Minimum	Maximum	Median	Mann-Kendall Trend Analysis Result
MW-2	27.1	83.5	61.8	None
MW-10	<5.0	72	15.8	None

Mann-Kendall trend analyses were performed to determine whether the concentration trends for boron (Table A above) and sulfate (Table B above) at downgradient wells MW-2 and MW-10 are statistically significant at the 95% confidence level. A decreasing trend in boron at MW-10 was determined to be statistically significant; no other trends were determined to be statistically significant and are stable.

Basin B is not impacting the groundwater at monitoring wells MW-2 and MW 10 as indicated by the absence of impacts from primary CCR indicator parameters boron and sulfate, where boron and sulfate concentrations are below their respective UPLs, and trends are stable or decreasing.

4. CONCLUSIONS

Based on the following three lines of evidence, it has been demonstrated that the arsenic SSLs at MW-2 and MW-10 are not due to Miami Fort Basin B but are from a source other than the CCR unit being monitored:

1. Ionic composition of the groundwater at wells MW-2 and MW-10 is different than the ionic composition of surface water in Basin B, indicating that Basin B is not the source of the groundwater in these wells.
2. Naturally-occurring concentrations of arsenic are commonly found in soils and groundwater in southwestern Ohio. MW-2 and MW-10 are located in southwestern Ohio, along the banks of the Great Miami River, where they are susceptible to geochemical conditions that can mobilize naturally-occurring arsenic from the soils into groundwater.
3. Concentrations of CCR indicator parameters, boron and sulfate, are below the Upper Prediction Limit (UPL) at MW-2 and MW-10, and stable or decreasing, indicating that CCR is not the source of the observed detections.

This information serves as the written ASD prepared in accordance with 40 C.F.R. § 257.95(g)(3)(ii) that the SSLs observed during the A2D sampling event was not due to Basin B. Therefore, a corrective measures assessment is not required and Miami Fort Basin B will remain in assessment monitoring.

5. REFERENCES

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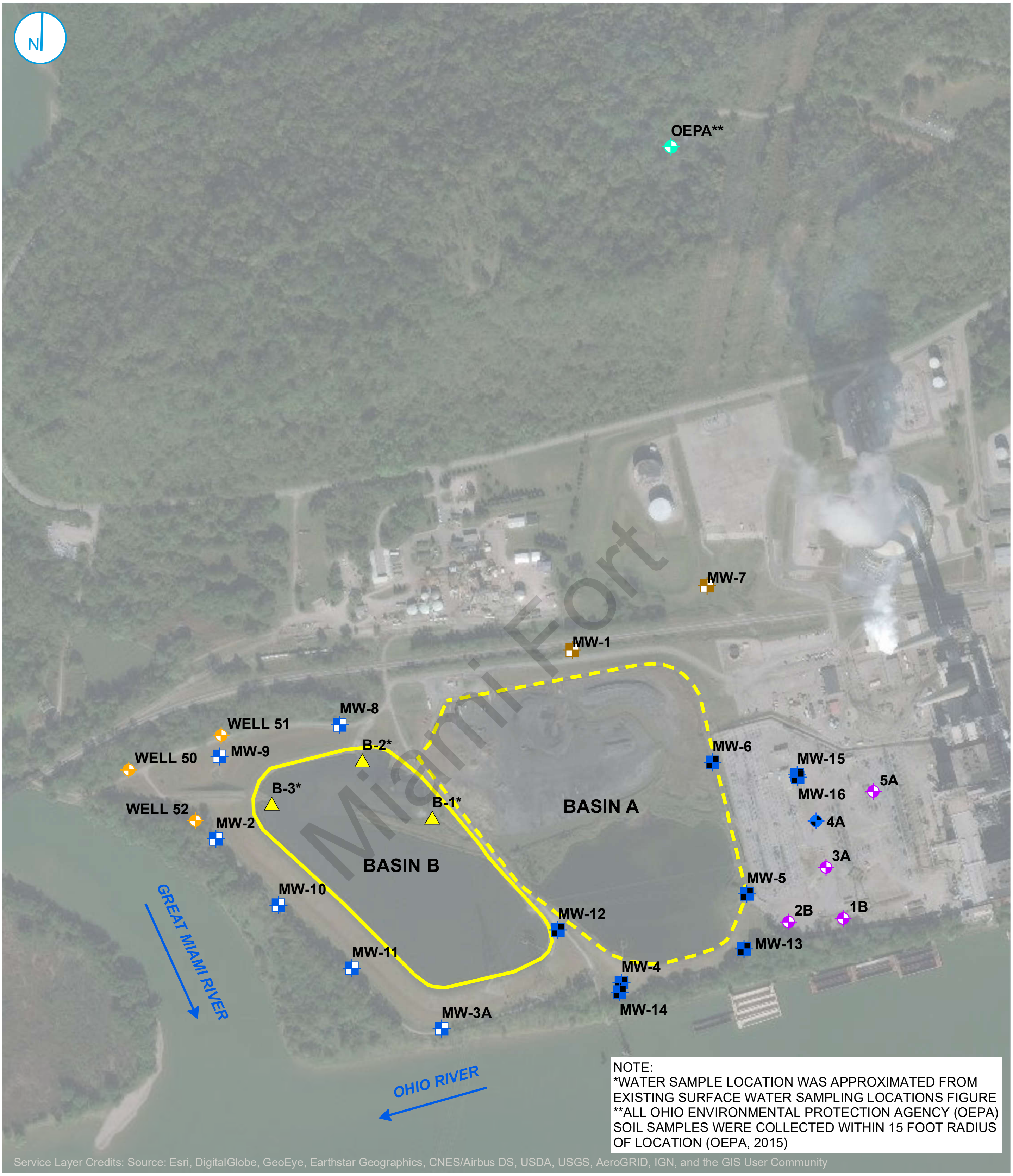
FIGURES



PROJECT: 169000XXXX | DATED: 3/25/2020 | DESIGNER: galarnmc

Y:\Mapping\Projects\22\2285\MXD\Miami_Fort\asd\Figure 1_Monitoring Well and Sampling Locations.mxd

BASIN B CCR MONITORING WELL LOCATION
BASIN A CCR MONITORING WELL LOCATION
PRODUCTION WELL AND BASIN A CCR MONITORING LOCATION
BASIN A AND BASIN B BACKGROUND CCR MONITORING WELL LOCATION
BASIN B WATER SAMPLE LOCATION
OEPA SOIL SAMPLE LOCATION
PRODUCTION WELL
VEOLIA PRODUCTION WELL
BASIN B UNIT BOUNDARY
BASIN A UNIT BOUNDARY

0 300 600 Feet

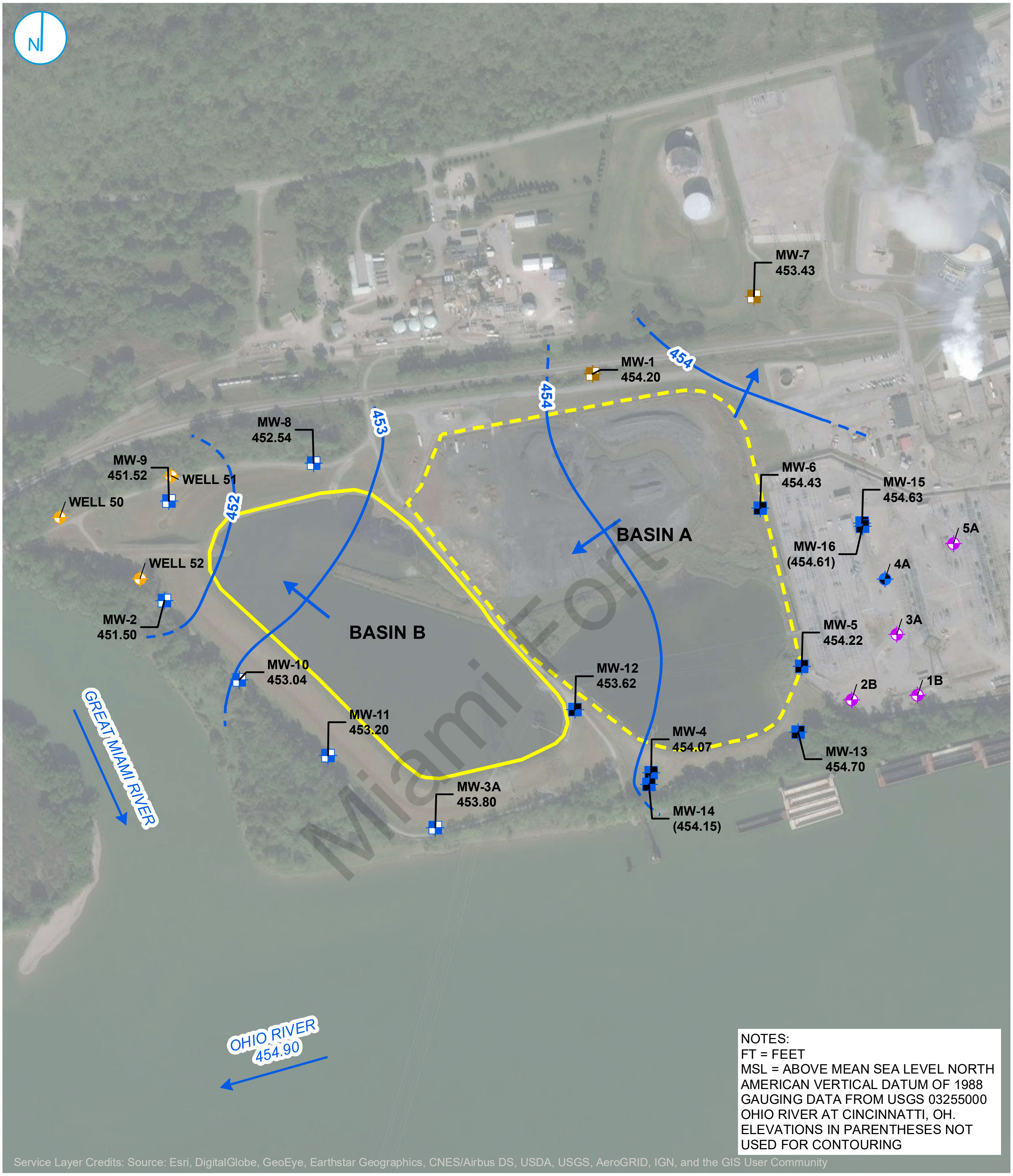
MONITORING WELL AND SAMPLING LOCATION MAP

FIGURE 1

MIAMI FORT BASIN B (UNIT ID:112)
ALTERNATE SOURCE DEMONSTRATION
VISTRA ENERGY
MIAMI FORT POWER STATION
NORTH BEND, OHIO

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

RAMBOLL



Y:\Mapping\Projects\22\2285\MXD\Miami_Fort\asd\Figure 2_GW Elev Contour Map.mxd

PROJECT: 169000XXXX | DATED: 3/25/2020 | DESIGNER: galarnmc

BASIN B CCR MONITORING WELL LOCATION
BASIN A CCR MONITORING WELL LOCATION
PRODUCTION WELL AND BASIN A CCR MONITORING LOCATION
BASIN A AND BASIN B BACKGROUND CCR MONITORING WELL LOCATION
PRODUCTION WELL
VEOLIA PRODUCTION WELL
GROUNDWATER ELEVATION CONTOUR (1-FOOT CONTOUR INTERVAL, FT MSL)
INFERRED GROUNDWATER ELEVATION CONTOUR
GROUNDWATER FLOW DIRECTION
BASIN B UNIT BOUNDARY
BASIN A UNIT BOUNDARY

0 250 500 Feet

GROUNDWATER ELEVATION CONTOUR MAP SEPTEMBER 9, 2019

FIGURE 2

MIAMI FORT BASIN B (UNIT ID:112)
ALTERNATE SOURCE DEMONSTRATION
VISTRA ENERGY
MIAMI FORT POWER STATION
NORTH BEND, OHIO

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

APPENDIX A
BORING LOGS FOR MONITORING WELLS MW-2, MW-3A, MW-10 AND MW-11

DESCRIPTION OF SUBSURFACE MATERIALS

Depth (Feet)	Sample Location	Percent Recovery	USCS Symbol
0–5	Rotosonic	76	
5–10	Rotosonic	80	
10–15	Rotosonic	60	
15–20	Rotosonic	70	
20–25	Rotosonic	100	
25–30	Rotosonic	100	
30–35	Rotosonic	100	
35–40	Rotosonic	0	

0 – Brown to dark brown sandy CLAY with silt and trace pebbles and rounded gravel, soft, plastic, moist

grades with organics

grades with less sand, pebbles, and gravel, stiff, no plasticity

grades with increasing sand and pebbles, single 3" cobble
grades soft, plastic, very moist

grades brownish yellow to brown, without organics

grades medium stiff to stiff, very slight plasticity to no plasticity

grades with increasing fine sand, plastic, soft

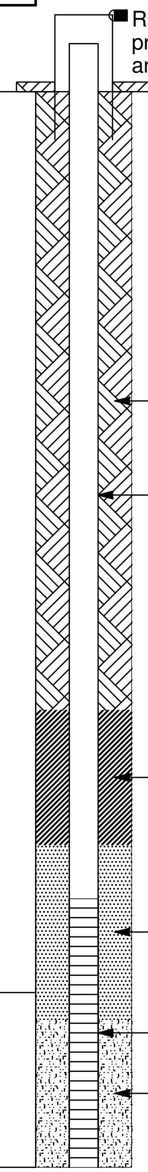
grades gray to dark gray, with increasing silt and sand

grades wet

Gray fine to coarse SAND and rounded GRAVEL, very loose, poorly sorted, wet

40 – Boring terminated 40' bgs on 12/11/2007.
2" I.D. Schedule 40 PVC monitoring well installed 40' bgs with 10' 0.010" slotted screen.

WELL CONSTRUCTION DETAIL



LEGEND:

Rotosonic

bgs Below ground surface

NR Not recorded

Duke Energy - 14947868 - North Bend, OH

DUKE ENERGY MIAMI FORT STATION MIAMI FORT STATION.GPJ 2/5/08

URS

JOB NO. 14947868

Duke Energy
Miami Fort Station
11021 Brower Road
North Bend, OH

MONITORING WELL MW-2

Project: Duke Energy Project Location: Miami Fort Station Project Number: 14948624	**Monitoring Well MW-3A** Sheet 1 of 2

Date(s) Drilled	**2/25/2009**	Logged By	**K. Pritchard**	Checked By	**M. Wagner**
Drilling Method	**4.25 in. Hollow Stem Auger**	Drilling Contractor	**Belasco Drilling Services**	Total Depth of Borehole	**52.0 feet**
Drill Rig Type	**Truck-Mounted Auger**	Sampler Type	**Split Spoon**	Surface Elevation	**471.17 feet, msl**
Groundwater Elevation(s)	**456.42 ft, msl**	Hammer Weight and Drop	**140 lb, Dropped 30-inches**	Top of PVC Elevation	**473.23 feet, msl**
Diameter of Hole (inches) **8.25**	Diameter of Well (inches) **2**	Type of Well Casing	**Schedule 40 PVC**	Screen Perforation	**0.010-Inch**
Type of Sand Pack	**Natural Collapse**	Well Completion at Ground Surface	**Riser, With Locking Cap**		
Comments	**** Split spoon sampler advanced through interval under weight of hammer and rods only**				

SAMPLES

Depth, feet	Elevation, feet	Type	Blows per 1-foot Interval	Percent Recovery
0		Split spoon	12	83
	470	Split spoon	19	100
		Split spoon	6	83
5	465	Split spoon	3	100
		Split spoon	3	83
10	460	Split spoon	3	75
		Split spoon	2	100
15	455	Split spoon	1	100
		Split spoon	1	100
		Split spoon	2	100
20	450	Split spoon	2	100
		Split spoon	2	100
25	445	Split spoon	**	100
		Split spoon	3	100
30		Split spoon	2	100

MATERIAL DESCRIPTION

Yellowish red CLAY TOPSOIL, moist

Gray to brownish gray clayey SILT with medium sand and organics, soft, moist to very moist

grades brownish yellow with increasing clay

Dark gray silty CLAY with trace fine sand and organics, plastic, very soft, moist

grades with increasing fine to medium sand, without organics, with iron staining

grades with medium to coarse grained sand lenses, without staining

grades high plasticity, very moist to wet

Yellowish brown clayey fine to coarse grained SAND, very loose, well sorted, wet

Yellowish brown fine grained sandy to silty CLAY, very soft, high plasticity, very moist to wet

grades wet with increasing fine sand

grades with fine grained sand lenses

grades brown with increasing fine sand

grades with gray to reddish gray lenses, decreasing sand, without sand lenses

grades gray, without gray to reddish gray lenses, medium plasticity

grades high plasticity

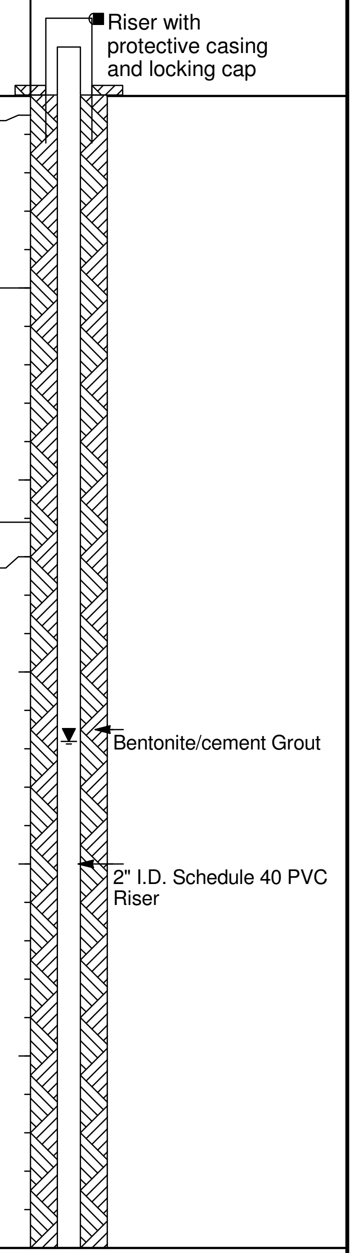
grades with increasing sand

grades with organics, sulphur odor, decreasing sand

grades without sand, without odor

grades with fine sand lenses, without organics

WELL CONSTRUCTION DETAILS



DUKE MIAMI FORT STATION MARCH 2009 MIAMI FORT STATION MW-3A.GPJ 4/28/09

URS

Project: Duke Energy	**Monitoring Well**
Project Location: Miami Fort Station	**MW-3A**
Project Number: 14948624	Sheet 2 of 2

Elevation, feet	Depth, feet	Samples: Type	Samples: Blows per 1-foot Interval	Samples: Percent Recovery
	30	X	1	100
440		X	4	100
		X	4	100
435	35	X	3	100
		X	6	100
430	40	X	4	100
		X	8	100
		X	14	42
425	45	X	7	100
		X	22	63
420	50	X	13	50
415	55			
410	60			
405	65			
	70			

MATERIAL DESCRIPTION

grades without sand, with trace organics

grades with sand, without organics

grades with trace fine sand and increasing silt, without sand lenses, medium plasticity

grades with increasing sand, without organics

grades with increasing silt, trace sand, very low plasticity, stiff

grades with sand, plastic, very soft

grades stiff, very low plasticity, very moist

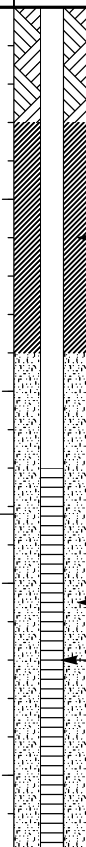
grades with trace organcis, less sand, increasing silt

Gray fine to coarse grained SAND and sub-rounded to rounded GRAVEL, pebble-sized gravel with trace 1" diameter clasts, very loose, sorted, wet

grades with increasing diameter gravel

Boring terminated 52' bgs on 2/25/2009.
2" I.D. Schedule 40 PVC monitoring well installed 52' bgs with 10' 0.010" slotted screen.

WELL CONSTRUCTION DETAILS



URS

Project: Dynegy
Project Location: Miami Fort Station
Project Number: 60442412

Monitoring Well MW-10

Date(s) Drilled	4/10/2017	Logged By	J. Alten	Checked By	M. Wagner
Drilling Method	Rotosonic	Drilling Contractor	Frontz Drilling	Total Depth of Borehole	59.0 feet
Drill Rig Type	Rotosonic	Sampler Type	Sonic Sleeve	Surface Elevation	470.90 feet, msl
Depth to Groundwater	12.34 ft bgs	Seal Material	Hydrated 3/8-inch Bentonite Chips	Top of PVC Elevation	473.35 feet, msl
Diameter of Hole (inches) 6.0	Diameter of Well (inches) 2	Type of Well Casing	Schedule 40 PVC	Screen Perforation	0.010-Inch
Type of Sand Pack	#5 Silica Sand	Well Completion at Ground Surface	Riser, With locking cap and protective casing.		
Comments					

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Percent Recovery	SAMPLES: Graphic Log	MATERIAL DESCRIPTION
	0		74		Brown SILT, with clay and fine angular to sub rounded gravel, soft, slightly moist
470					
					Grades with more clay and gravel, medium stiff
	5				
465					
					Grades without gravel and more clay, very stiff, moist
					Brown CLAY, with silt, medium stiff, moist
	10		48		
460					
	15				
455					
					Brown SILT, with some clay and very fine sand, soft, moist
			93		
	20				Grades with less silt and more fine sand
					Brown fine SAND, with silt and clay, loose, soft, moist
450					
					Grades with less silt and clay
	25				
445					
					Grades gray and brown
					Grades with trace silt and without clay, few pieces of organic matter
			88		Gray and brown fine SAND, with trace silt, loose, moist
	30				

WELL CONSTRUCTION DETAILS

- Riser with protective casing and locking cap
- 2" I.D. Schedule 40 PVC Riser
- Bentonite/cement Grout

Project: Dynegy
Project Location: Miami Fort Station
Project Number: 60442412

Monitoring Well MW-10

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Percent Recovery	MATERIAL DESCRIPTION	WELL CONSTRUCTION DETAILS
	30				
440					
				Grades with some medium sand	
435	35				
				Grades to medium sand	
			58	Grades wet	
430	40				
				Grades with silt, more dense	
					Bentonite Seal
425	45			Grades with fine and coarse sand	
				Brown and gray fine to coarse SAND wtih fine to coarse rounded gravel, loose, wet	
			88		
420	50				#5 Global Silica Sand Filter Pack
				Brown medium SAND, loose, wet	
415	55				2" I.D. Schedule 40 0.010" Slotted Screen
					End Cap
				End of boring at 59'	
410	60				
405	65				
	70				

Project: Dynegy	**Monitoring Well**
Project Location: Miami Fort Station	**MW-11**
Project Number: 60442412	Sheet 1 of 2

Date(s) Drilled	4/11/2017	Logged By	J. Alten	Checked By	M. Wagner
Drilling Method	Rotosonic	Drilling Contractor	Frontz Drilling	Total Depth of Borehole	59.0 feet
Drill Rig Type	Rotosonic	Sampler Type	Sonic Sleeve	Surface Elevation	471.81 feet, msl
Depth to Groundwater	13.25 ft bgs	Seal Material	Hydrated 3/8-inch Bentonite Chips	Top of PVC Elevation	474.45 feet, msl
Diameter of Hole (inches)	6.0 / Diameter of Well (inches): 2	Type of Well Casing	Schedule 40 PVC	Screen Perforation	0.010-Inch
Type of Sand Pack	#5 Silica Sand	Well Completion at Ground Surface	Riser, With locking cap and protective casing.		
Comments					

Elevation, feet	Depth, feet	SAMPLES: Percent Recovery	MATERIAL DESCRIPTION
	0	69	Gray coarse angluar limestone GRAVEL, with fines, medium dense, slightly moist (FILL)
470			Brown and tan with reddish mottled SILT with trace fine gravel, very stiff, moist
			Grades with fine sand
	5		Brown with red mottled fine SAND, soft, moist
465			Dark gray SILT with some clay, stiff, moist, trace organci matter
			Grades with more clay
			Gray and brown CLAY, with some silt, soft, moist
	10	42	
460			Gray and brown SILT, with fine sand and some clay, soft, moist
	15		
455			Grades with less clay
		56	
	20		Grades gray without clay
450			
			Gray very fine SAND with silt, soft, moist
	25		
445			
		53	
	30		Grades with dark gray and black wood fragments

WELL CONSTRUCTION DETAILS

Riser with protective casing and locking cap

2" I.D. Schedule 40 PVC Riser

Bentonite/cement Grout

Project:	Dynegy
Project Location:	Miami Fort Station
Project Number:	60442412

Monitoring Well MW-11

Elevation, feet	Depth, feet	SAMPLES Type	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	WELL CONSTRUCTION DETAILS
	30					
440					Grades without wood fragments	
	35					
435					Grades with less silt	
			83			
	40					
					Gray fine to coarse SAND with rounded fine gravel, loose, moist	
430						
					Grades to fine sand and without gravel	
	45					Bentonite Seal
					Grades brown and gray	
425						
					Grades fine to coarse sand with rounded fine to medium gravel	
			80			
	50				Grades wet	#5 Global Silica Sand Filter Pack
420					Alternating reddish brown CLAY lens and fine to coarse SAND with rounded fine to coarse gravel, soft, wet	
	55					2" I.D. Schedule 40 0.010" Slotted Screen
415						
					Boring terminated at 59'	End Cap
	60					
410						
	65					
405						
	70					

Intended for
Dynegy Miami Fort, LLC

Date
November 12, 2020

Project No.
1940074922

40 C.F.R. § 257.95(g)(3)(ii): ALTERNATE SOURCE DEMONSTRATION

MIAMI FORT POND SYSTEM

RAMBOLL Bright ideas. Sustainable change.

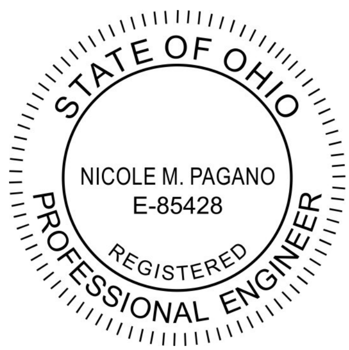
CERTIFICATIONS

I, Jacob J. Walczak, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Jacob J. Walczak
Senior Hydrogeologist
Ramboll Americas Engineering Solutions, Inc.,
f/k/a O'Brien & Gere Engineers, Inc.
Date: November 12, 2020

I, Nicole M. Pagano, a qualified professional engineer in good standing in the State of Ohio, certify that the information in this report is accurate as of the date of my signature below. The content of this report is not to be used for other than its intended purpose and meaning, or for extrapolations beyond the interpretations contained herein.

Nicole M. Pagano
Qualified Professional Engineer
85428
Ohio
Ramboll Americas Engineering Solutions, Inc.,
f/k/a O'Brien & Gere Engineers, Inc.
Date: November 12, 2020



Ramboll
234 W. Florida Street
Fifth Floor
Milwaukee, WI 53204
USA
T 414-837-3607
F 414-837-3608
https://ramboll.com

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FIGURES (IN TEXT)

FIGURES

APPENDICES

ACRONYMS AND ABBREVIATIONS

40 C.F.R.	Title 40 of the Code of Federal Regulations
ASD	Alternate Source Demonstration
bgs	below ground surface
CCR	Coal Combustion Residuals
CMP	corrugated metal pipe
FGD	Flue Gas Desulfurization
f/k/a	formerly known as
ft	feet
GWPS	Groundwater Protection Standards
HDPE	high density polyethylene
LOEs	lines of evidence
MCD	Miami Conservancy District
μg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
NAVD88	North American Vertical Datum of 1988
NRT/OBG	Natural Resource Technology, an OBG Company
OEPA	Ohio Environmental Protection Agency
ORP	oxidation-reduction potential
Ramboll	Ramboll Americas Engineering Solutions, Inc., f/k/a O'Brien & Gere Engineers, Inc.
RCRA	Resource Conservation and Recovery Act
Site	Miami Fort Power Station
SSIs	Statistically Significant Increases
SSLs	Statistically Significant Levels
USGS	United States Geological Survey

1. INTRODUCTION

Title 40 of the Code of Federal Regulations (40 C.F.R.) § 257.95(g)(3)(ii) allows the owner or operator of a Coal Combustion Residuals (CCR) unit 90 days from the date of determination of Statistically Significant Levels (SSLs) over Groundwater Protection Standards (GWPS) of groundwater constituents listed in Appendix IV of 40 C.F.R. Part 257 to complete a written demonstration that a source other than the CCR unit being monitored caused the SSL(s), or that the SSL(s) resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Alternate Source Demonstration [ASD]).

This ASD has been prepared on behalf of Dynegy Miami Fort, LLC, by Ramboll Americas Engineering Solutions, Inc., formerly known as (f/k/a) O'Brien & Gere Engineers, Inc.(Ramboll), to provide pertinent information pursuant to 40 C.F.R. § 257.95(g)(3)(ii) for the Miami Fort Pond System located near North Bend, Ohio.

The most recent Assessment Monitoring sampling event (A3) was completed on April 6 through April 7, 2020 and analytical data were received on May 4, 2020. Analytical data from all sampling events, from December 2015 through A3, were evaluated in accordance with the Statistical Analysis Plan (Natural Resource Technology, an OBG Company [NRT/OBG], 2017) to determine any Statistically Significant Increases (SSIs) of Appendix III parameters over background concentrations or SSLs of Appendix IV parameters over GWPS. That evaluation identified the following SSLs at downgradient monitoring wells:

- Arsenic at wells MW-2, MW-10 and MW-13
- Cobalt at wells MW-4 and 4A
- Molybdenum at well MW-6

In accordance with the Statistical Analysis Plan, wells MW-13 and 4A were resampled on June 12, 2020 and analyzed only for arsenic and cobalt, respectively, to confirm the SSLs. Following evaluation of analytical data from the resample event, the SSLs listed above for MW-13 and 4A were confirmed.

Pursuant to 40 C.F.R. § 257.95(g)(3)(ii), the following lines of evidence (LOEs) demonstrate that sources other than the Miami Fort Pond System were the cause of the arsenic and molybdenum SSLs listed above. This ASD was completed by November 2, 2020, within 90 days of determination of the SSLs (August 3, 2020), as required by 40 C.F.R. § 257.95(g)(3)(ii). This ASD does not address cobalt SSLs at downgradient monitoring wells MW-4 and 4A which is addressed by the Corrective Measures Assessment for the Pond System.

2. BACKGROUND

2.1 Site Location and Description

Miami Fort Power Station (Site) is located in the southwest corner of Ohio (Hamilton County) adjacent to the state boundaries of Indiana (west) and Kentucky (south), and approximately 5 miles southwest of North Bend, Ohio on the north shore of the Ohio River at the confluence with the Great Miami River (Figure 1). The Miami Fort Pond System (Pond System) is bounded by the Veolia North America property and Brower Road to the north, the Great Miami River to west, the Ohio River to the south, and the Miami Fort electric switch yard to the east. The Miami Fort production wells are located east of Basin A and Veolia's production wells are located northwest of Basin B. Pond System CCR monitoring well locations, production well locations, and source water sampling locations are shown in Figure 1.

2.2 Description of the CCR Multi-Unit

The Pond System is a CCR Multi-Unit consisting of Basins A and B (CCR Multi-Unit ID 115). The Multi-Unit covers a total area of approximately 51 acres and is located in the southwest corner of the Site property as shown in Figure 1.

Basin A (formerly Unit 111) receives effluent from the sluice lines, which primarily transport bottom ash products as well as flue gas desulfurization (FGD) effluent and some fly ash. Basin A also receives directly discharged miscellaneous yard drainage. The material is discharged into the northern portion of the basin and through a constructed internal ditch line allowing the solids to settle and the water to decant into Basin B. Solid materials collected in Basin A are generally reclaimed for beneficial reuse or landfill placement. The Basin A normal pool level is typically between elevations of 495 and 498 ft. Basin A and Basin B are hydraulically connected with a 48-inch corrugated metal pipe (CMP) culvert sliplined with a 40-inch high density polyethylene (HDPE) pipe that runs through the shared dike, allowing the basins to operate in series. The Basin A outfall is currently not in use and flow-through is controlled by the gate structure (AECOM, 2017).

Basin B (formerly Unit 112) was constructed between 1979 and 1981 (AECOM, 2017). The Basin B normal pool level is typically below the Basin A normal pool and between elevations of 495 and 498 ft. Basin A discharges into Basin B, which is used as a polishing pond prior to discharge to the Ohio River through the permitted outfall structure in Basin B. Miscellaneous yard drainage is also currently discharged directly to Basin B (AECOM, 2017).

2.3 Geology and Hydrogeology

The native geologic materials present beneath the Pond System at the Site include alluvial deposits, glacial outwash (Uppermost Aquifer), and bedrock, as described below:

- Alluvial Deposits - The alluvial deposits consist of clay, silt and fine sand deposited by the Ohio River floodwaters. These alluvial deposits are present at a depth ranging from approximately 20 to 60 ft below ground surface (bgs). A silty, sandy clay layer is the primary component of the alluvial deposits. The top of clay elevation ranges from 428 ft referenced to the North American Vertical Datum of 1988 (NAVD88) in the southwest corner of Basin B near the confluence of the Ohio River and the Great Miami River to 495 ft beneath the northeast corner of Basin A. The clay is thin, or absent, near the valley wall north of the Pond System and thickens towards the Ohio River. The clay is thickest beneath the southern half of the

Pond System, ranging in thickness from 15 ft to 48 ft. A silt layer, averaging approximately 7 ft thick, overlies the clay in several areas.

- Glacial Outwash (Uppermost Aquifer) - The Uppermost Aquifer consists of glacial outwash sands and gravels deposited during the Illinoian and Wisconsin stages of the Pleistocene. The thickness of the outwash deposits beneath the Site is approximately 100 ft; the outwash deposits directly overlie bedrock. A silt and fine sand layer is present locally overlying the outwash deposits and ranges in thickness from 4 to 30 ft; however, it is not present below the entirety of the Pond System.
- Bedrock - The bedrock consists of interbedded shales and limestones belonging to the Ordovician-aged Fairview and Kope formations (AECOM, 2017). Depth to bedrock beneath the Site varies between approximately 110 to 120 ft bgs. Due to the relatively impermeable nature of the shales and limestones underlying this region, water yields in the bedrock are generally insufficient for domestic use (AECOM, 2017).

The glacial outwash deposits (Uppermost Aquifer) underlying the Pond System are part of the Ohio River Valley Fill Aquifer; a glacial buried-valley deposit aquifer. The valley was cut into the bedrock by pre-glacial and glacial streams and subsequently backfilled with deposits of sand, gravel, and other glacial drift by glacial and alluvial processes as the glaciers advanced and receded. The thickness of the deposits ranges from approximately 60 to 100 ft and covers much of the width of the terrace between the valley wall to the Great Miami River and Ohio River confluence.

Groundwater elevations across the Site ranged from approximately 456 to 460 ft during A3, coincident with an approximate Ohio River pool elevation of 461 ft. The groundwater elevation contours shown on Figure 2 are based on groundwater measurements collected on April 6, 2020, the day prior to A3 analytical sampling. Groundwater flow in the Uppermost Aquifer is generally to the west/northwest towards the Great Miami River and Veolia's production wells, and south towards the Ohio River.

3. ALTERNATE SOURCE DEMONSTRATION: LINES OF EVIDENCE

This ASD is based on the following LOEs:

1. Median arsenic and molybdenum concentrations in the Pond System source water are lower than the median arsenic and molybdenum concentrations observed in downgradient wells with arsenic and molybdenum SSLs.
2. Arsenic and molybdenum concentrations associated with monitoring wells MW-2, MW-10 and MW-13, and MW-6, respectively, are not correlated with boron concentrations, a common indicator for CCR impacts to groundwater.
3. Naturally-occurring concentrations of arsenic are commonly found in soils and groundwater in southwestern Ohio. MW-2, MW-10 and MW-13 are located in southwestern Ohio, along the banks of the Great Miami River and Ohio River, where they are susceptible to geochemical conditions that can mobilize naturally-occurring arsenic from the soils into groundwater.

These LOEs are described and supported in greater detail below. Monitoring wells and Pond System source water sample locations are shown on Figure 1.

3.1 LOE #1: Median Arsenic and Molybdenum Concentrations in the Pond System Source Water Are Lower Than the Median Arsenic and Molybdenum Concentrations Observed in Downgradient Wells with Arsenic and Molybdenum SSLs.

Box-and-whisker plots graphically represent the range of values of a given dataset using lines to construct a box where the lower line, midline, and upper line of the box represent the values of the first quartile, median, and third quartile values, respectively. The minimum and maximum values of the dataset (excluding outliers) are illustrated by whisker lines extending beyond the first and third quartiles of (*i.e.*, below and above the box). The interquartile range (IQR) is the distance between the first and third quartiles. Outliers (values that are at least 1.5 times the IQR away from the edges of the box) are represented by single points plotted outside of the range of the whiskers. The number in parentheses below each plot is the number of observations (i.e. samples) represented in that dataset.

Figure A below provides a box-and-whisker plot of the total arsenic concentrations collected between 2015 and 2020 at Pond System monitoring wells and source water locations A-1, B-1, B-2, and B-3 (monitoring well and source water [pond] sampling locations are shown on Figure 1). Total arsenic concentrations obtained in source water samples and presented in Figure A were pooled to provide a median concentration for comparison to arsenic concentrations in monitoring wells.

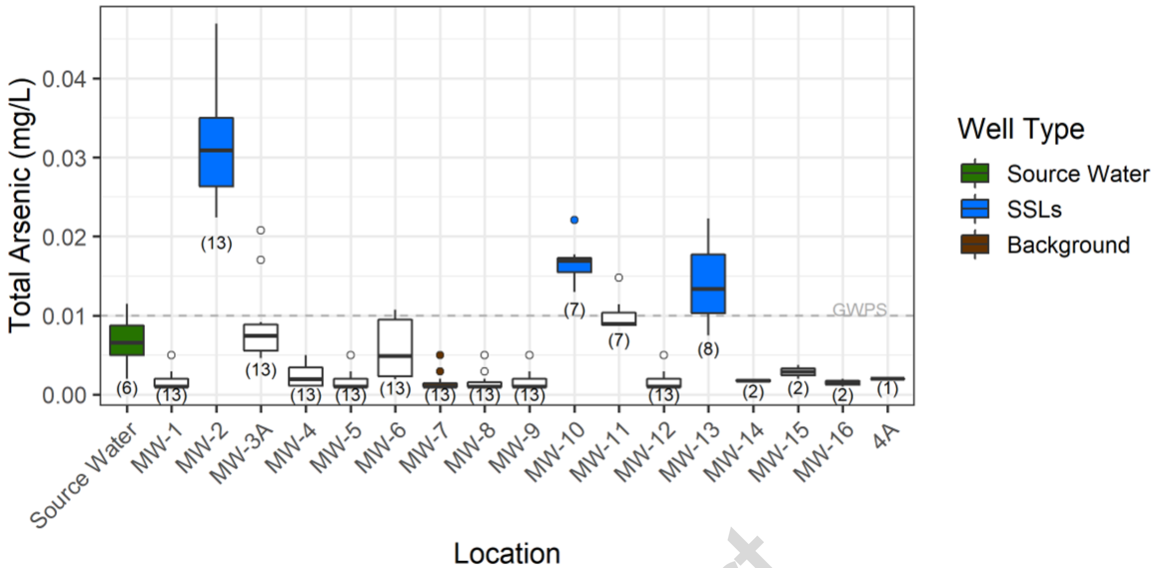

Figure A. Distribution of Arsenic Concentrations at Pond System Monitoring Wells and Source Water Locations (note: source water locations are pooled).

The box-and-whisker plot (Figure A) shows the arsenic concentrations in wells with arsenic SSLs (*i.e.*, MW-2, MW-10, and MW-13) have median arsenic concentrations greater than the median arsenic concentration observed in the source water (A-1, B-1, B-2, and B-3). If the Pond System was the source of arsenic in downgradient groundwater at wells with arsenic SSLs (*i.e.*, MW-2, MW-10, and MW-13), Pond System source water concentrations would be higher than the groundwater concentrations at those wells. Therefore, the Pond System is not the source of the arsenic in the downgradient groundwater.

Figure B below provides a box-and-whisker plot of the molybdenum concentrations collected between 2015 and 2020 at Pond System monitoring wells and source water locations A-1, B-1, B-2 and B-3 (monitoring well and source water sampling locations are shown on Figure 1).

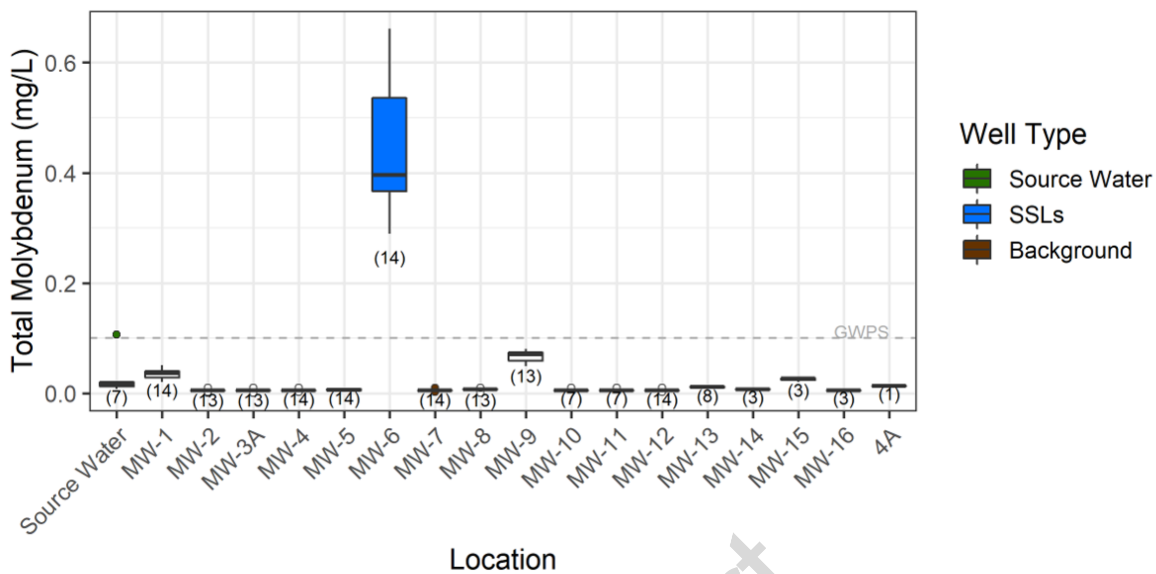

Figure B. Distribution of Molybdenum Concentrations at Pond System Monitoring Wells and Source Water Locations (note: source water locations are pooled).

The box-and-whisker plot (Figure B) shows the median molybdenum concentration in the well with a molybdenum SSL (*i.e.*, MW-6) is greater than the median molybdenum concentration observed in the source water (A-1, B-1, B-2, and B-3). If the Pond System was the source of molybdenum in downgradient groundwater at the well with a molybdenum SSL (*i.e.*, MW-6), Pond System source water concentrations would be higher than the groundwater concentrations at that well. Therefore, the Pond System is not the source of the molybdenum in the downgradient groundwater.

3.2 LOE #2: Arsenic and Molybdenum Concentrations Associated with Monitoring Wells MW-2, MW-10 and MW-13, and MW-6, respectively, are Not Correlated with Boron Concentrations, a Common Indicator for CCR Impacts to Groundwater.

Boron is a common indicator of CCR impacts to groundwater due to its leachability from CCR and mobility in groundwater. If a CCR constituent is identified as an SSL but boron is not correlated with that constituent, it is unlikely that the CCR unit is the source of the SSL.

Figure C below provides a scatter plot of arsenic versus boron concentrations (collected between 2015 and 2020) in downgradient groundwater at wells with arsenic SSLs, along with the results of a Kendall correlation test for non-parametric data. The results of the test at each well are described by the p-value and tau (Kendall's correlation coefficient) included in each plot. Typically, a p-value greater than 0.05 is considered to be a statistically insignificant relationship. The range of tau falls between -1 and 1, with a perfect correlation equal to -1 or 1. The closer tau is to 0, the less of a correlation exists in the data.

The results of the correlation analyses indicated that groundwater concentrations of arsenic observed at monitoring wells MW 2, MW-10, and MW-13 do not correlate with concentrations of boron, a common indicator of CCR impacts to groundwater. Figure C below illustrates the lack of a relationship between arsenic concentrations and boron concentrations in groundwater at MW-2, MW-10, and MW-13, where the p-values are greater than 0.05 and tau is close to 0.

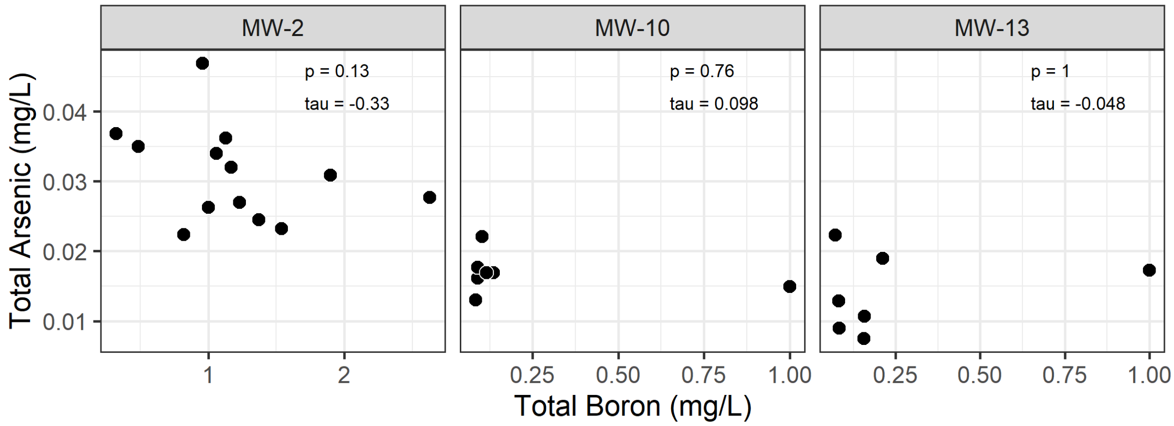

Figure C. Arsenic Concentrations Versus Boron Concentrations at Wells MW-2, MW-10, and MW-13 (2015-2020).

Figure D below provides a scatter plot of molybdenum versus boron concentrations (collected between 2015-2020) in downgradient groundwater at the only well with a molybdenum SSL, MW-6, along with the results of Kendall correlation analysis at MW-6 as described by the p-values and tau correlation coefficients included in the plot. The results of the Kendall correlation analysis indicated that groundwater molybdenum concentrations observed at monitoring well MW-6 do not correlate with concentrations of boron, a common indicator of CCR impacts to groundwater. Figure D below illustrates the lack of a relationship between molybdenum concentrations and boron concentrations in groundwater at MW-6, where the p-value is greater than 0.05 and tau is close to 0.

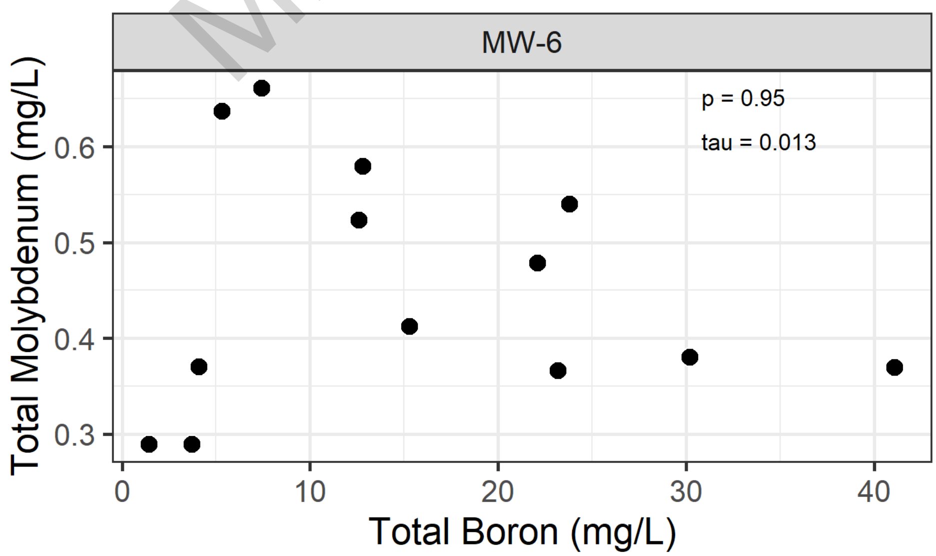

Figure D. Molybdenum Concentrations Versus Boron Concentrations at Well MW-6 (2015-2020).

Arsenic and molybdenum concentrations do not correlate with boron concentrations in downgradient monitoring wells with arsenic and molybdenum SSLs, indicating the Pond System is not the source of CCR constituents detected in the downgradient monitoring wells.

3.3 LOE #3: Naturally-Occurring Concentrations of Arsenic are Commonly Found in Soils and Groundwater in Southwestern Ohio. MW-2, MW-10, and MW-13 are Located in Southwestern Ohio, Along the Banks of the Great Miami River and Ohio River, Where They are Susceptible to Geochemical Conditions that can Mobilize Naturally-Occurring Arsenic from the Soils into Groundwater.

Naturally-occurring concentrations of arsenic are commonly found in nearby soils. Ten surficial soil samples (0 to 2 ft bgs) were collected by Ohio Environmental Protection Agency (OEPA), approximately 3,000 ft northeast of the Pond System (Figure 1), near Shawnee Lookout in Hamilton County Park, and analyzed for arsenic as part of a study to evaluate background soil concentrations of Resource Conservation and Recovery Act (RCRA) metals in the Cincinnati area (OEPA, 2015). Results of the analysis indicated surficial terrace soils (clay) adjacent to the Pond System have background arsenic concentrations ranging from 5.61 to 8.20 milligrams per kilogram (mg/kg).

Arsenic occurs naturally in southwestern Ohio glacial buried-valley deposit aquifers like the Uppermost Aquifer. Fifty-seven (57) groundwater samples were collected by the United States Geological Survey (USGS) in cooperation with the Miami Conservancy District (MCD) to increase understanding of arsenic occurrence in southwest Ohio (Thomas et al., 2005). The study included samples collected from carbonate bedrock, glacial buried-valley deposits and glacial till with interbedded sand and gravel aquifers within the Great Miami River drainage basin, and included samples from domestic wells in Preble, Miami, and Shelby counties. The USGS reported that 37 percent of the samples analyzed had elevated concentrations of arsenic (greater than or equal to 10 micrograms per liter [μg/L]) and elevated arsenic concentrations were found in all three aquifer types studied. Geochemical conditions were also evaluated and the USGS determined that elevated arsenic concentrations in the study area were associated with iron-reducing, sulfate-reducing, or methanic conditions, and all samples with elevated arsenic concentrations had iron concentrations that exceeded 1 milligrams per liter (mg/L), indicating the potential for the reduction of arsenic-bearing iron oxides present in soil.

Based on previous studies discussed above, naturally-occurring concentrations of arsenic are known to exist in both soils and groundwater in the same region (southwestern Ohio) and aquifer type (glacial buried-valley deposit aquifer) as the Pond System. The OEPA study showed arsenic-bearing soils were found in close proximity (approximately 3,000 ft northeast) to the Pond System. The USGS study showed that iron-reducing, sulfate-reducing, or methanic geochemical conditions needed to mobilize arsenic were common in southwestern Ohio aquifers. Reducing conditions indicating the potential for arsenic mobilization are likely to occur at the Pond System monitoring wells MW-2, MW-10, and MW-13, where arsenic SSLs were determined, as indicated by the following factors discussed below:

- Most riverbank boring logs indicate organic materials are present in the soils.
- MW-2, MW-10, and MW-13 are among the monitoring wells adjacent to the riverbank, where the lowest oxidation-reduction potential (ORP) at the Site were observed.

- Dissolved iron concentrations present in groundwater at monitoring well MW-2 correlate with dissolved arsenic concentrations.

Arsenic is naturally present in groundwater and soils at variable concentrations. The arsenic is co-precipitated with iron oxyhydroxides and incorporated into the mineral structure of the soils, and can also be adsorbed to organic matter or the iron oxyhydroxides in the aquifer. Both of these sources of arsenic can be mobilized in groundwater by dissolution or desorption under reducing geochemical conditions, where organic carbon commonly acts as the reducing agent (Thomas et al., 2005; McArthur et al., 2001). Arsenic-bearing soils are known to be present in the areas near the Pond System (OEPA, 2015); and, organic matter, a source of organic carbon and potential reducing agent, was observed in the most riverbank boring logs for monitoring wells located along the banks of the Great Miami River and Ohio River (see boring logs for wells MW-2, MW-3A, MW-4, MW-10, and MW-11 in Appendix A). The presence of organic material and arsenic-bearing soils indicates there is potential for naturally-occurring arsenic to become mobilized through reductive dissolution or desorption.

Reducing conditions sufficient to mobilize naturally-occurring arsenic have also been observed along the riverbanks of the Great Miami River and Ohio River as evidenced by the low ORP measurements observed in the groundwater at monitoring wells MW-2, MW-3A, MW-10, MW-11, MW-13 and MW-14 (presented in Figure E below; monitoring wells adjacent to the riverbank are illustrated with solid lines, upland wells are illustrated with dashed lines).

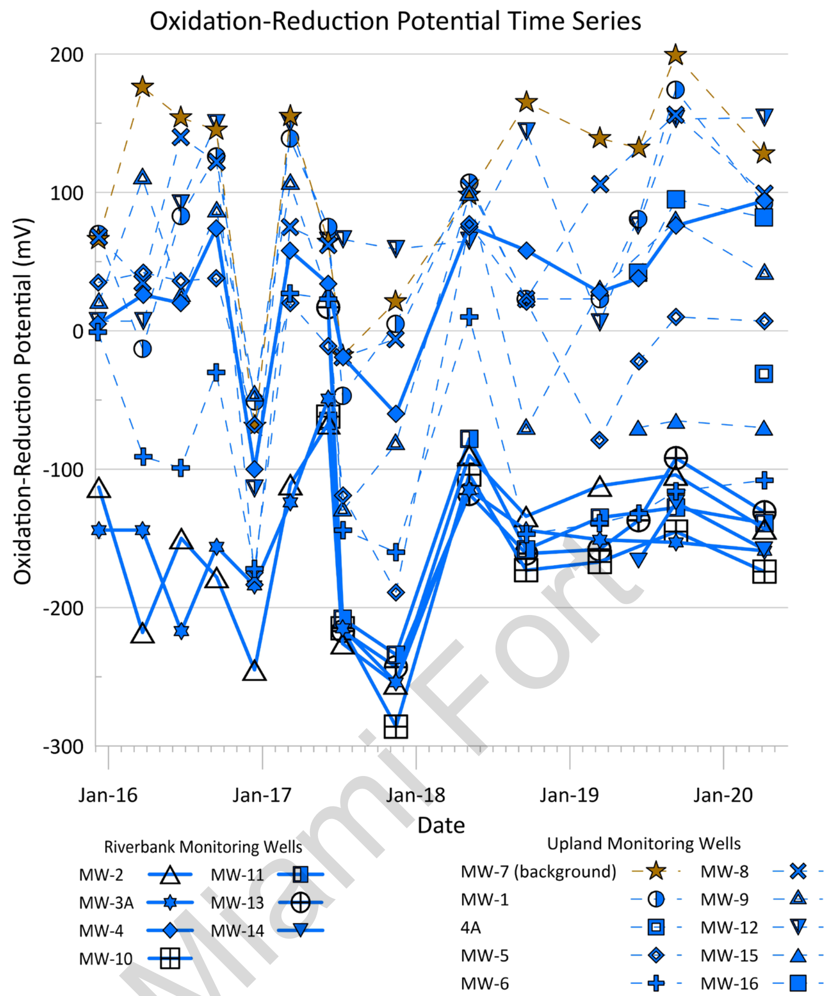

Figure E. Oxidation Reduction Potential Time-Series for Groundwater Samples (Monitoring Wells Adjacent to the Riverbank are Illustrated with Solid Lines, Upland Wells are Illustrated with Dashed Lines).

Available data indicated that concentrations of dissolved iron observed in groundwater at monitoring well MW-2 from 2008 to 2014 correlate with dissolved arsenic concentrations. Dissolved iron concentrations ranged from 11.8 to 52.1 mg/L at monitoring well MW-2 from 2008 to 2014, at least an order of magnitude greater than the 1 mg/L reported by the USGS as being indicative of iron-reducing geochemical conditions. Dissolved iron concentrations were also near or greater than 1 mg/L in A3 for MW-2, MW-10, and MW-13 at 45, 2.5 and 0.91 mg/L, respectively. Figure F below illustrates the relationship between dissolved iron concentrations and dissolved arsenic concentrations in groundwater at MW-2, where the R-squared value is 0.87, indicating a good correlation between dissolved iron and dissolved arsenic.

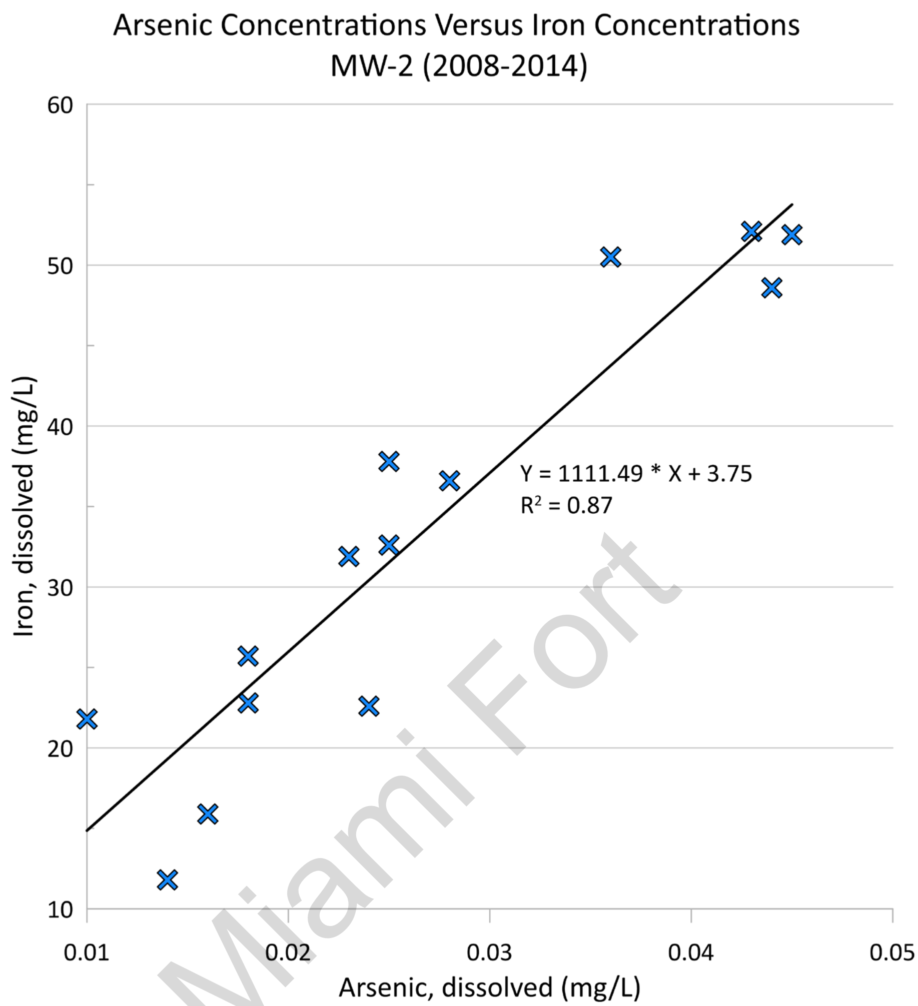

Figure F. Arsenic Concentrations Versus Iron Concentrations at Well MW-2 (2008-2014).

The presence of elevated concentrations of arsenic in background soil and groundwater in surrounding areas, as well as the presence of geochemical conditions (*i.e.*, reducing conditions) necessary to mobilize arsenic from soil to groundwater indicate that elevated concentrations of arsenic at monitoring wells MW-2, MW-10, and MW-13 are likely the result of naturally-occurring geochemical variations within the Uppermost Aquifer.

4. CONCLUSIONS

Based on the following three LOEs, it has been demonstrated that the arsenic SSLs at MW-2, MW-10, and MW-13, and the molybdenum SSL at MW-6 are not due to Miami Fort Pond System but are from a source other than the CCR unit being monitored:

1. Median arsenic and molybdenum concentrations in the Pond System source water are lower than the median arsenic and molybdenum concentrations observed in downgradient wells with arsenic and molybdenum SSLs.
2. Arsenic and molybdenum concentrations associated with monitoring wells MW-2, MW-10 and MW-13, and MW-6, respectively, are not correlated with boron concentrations, a common indicator for CCR impacts to groundwater.
3. Naturally-occurring concentrations of arsenic are commonly found in soils and groundwater in southwestern Ohio. MW-2, MW-10 and MW-13 are located in southwestern Ohio, along the banks of the Great Miami River and Ohio River, where they are susceptible to geochemical conditions that can mobilize naturally-occurring arsenic from the soils into groundwater.

This information serves as the written ASD prepared in accordance with 40 C.F.R. § 257.95(g)(3)(ii) that the SSLs for arsenic and molybdenum observed during the A3 sampling event were not due to the Pond System. Therefore, a corrective measures assessment is not required for arsenic and molybdenum at the Miami Fort Pond System.

5. REFERENCES

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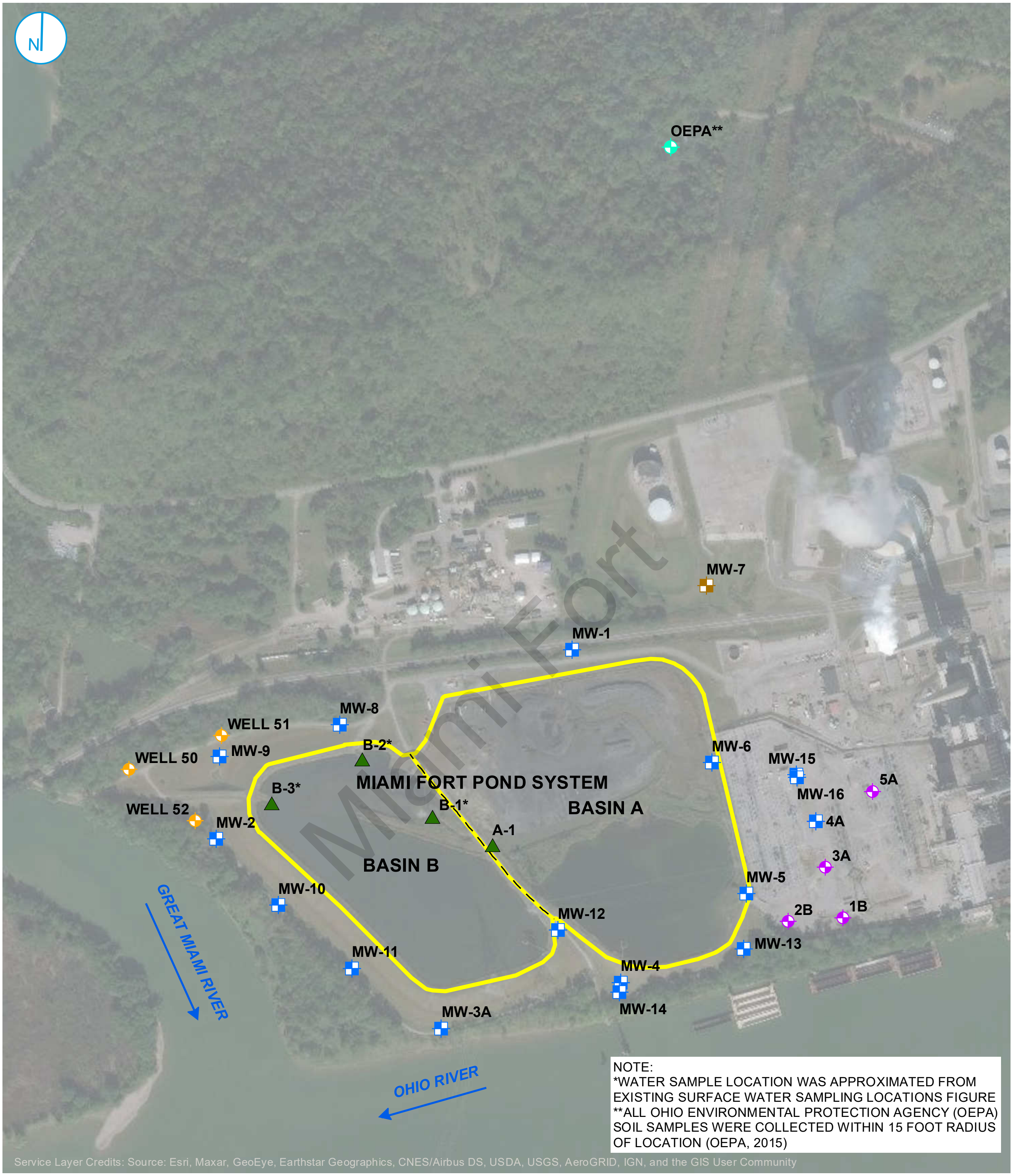
FIGURES



DOWNGRADIENT CCR MONITORING WELL LOCATION
BACKGROUND CCR MONITORING WELL LOCATION
SOURCE WATER SAMPLING LOCATION
OEPA SOIL SAMPLE LOCATION
MIAMI FORT PRODUCTION WELL
VEOLIA PRODUCTION WELL
CCR MONITORED MULTI-UNIT
BERM
RIVER FLOW DIRECTION

0 300 600 Feet

MONITORING WELL AND SAMPLING LOCATION MAP

FIGURE 1

MIAMI FORT POND SYSTEM (UNIT ID:115)
ALTERNATE SOURCE DEMONSTRATION
VISTRA ENERGY
MIAMI FORT POWER STATION
NORTH BEND, OHIO

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

Y:\Mapping\Projects\22\2285\MXD\Miami_Fort\asd\A3\Figure 2_2020_1Q_MiamiFort_GW_Contours.mxd

NOTES:
GAUGING DATA FROM USGS 03255000 OHIO RIVER AT CINCINNATI, OH.
ELEVATIONS IN PARENTHESES NOT USED FOR CONTOURING

Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PROJECT: 72799 | DATED: 10/22/2020 | DESIGNER: STOLZSD

- CCR MONITORING WELL LOCATION
- MIAMI FORT PRODUCTION WELLS
- VEOLIA PRODUCTION WELLS
- CCR MONITORED MULTI-UNIT
- BERM
- RIVER FLOW DIRECTION
- SURFACE WATER FEATURE
- GROUNDWATER ELEVATION CONTOUR (1-FOOT CONTOUR INTERVAL, NAVD 88)
- INFERRED GROUNDWATER ELEVATION CONTOUR
- GROUNDWATER FLOW DIRECTION

0 250 500 Feet

GROUNDWATER ELEVATION CONTOUR MAP
APRIL 6, 2020

MIAMI FORT POND SYSTEM (UNIT ID: 115)
ALTERNATE SOURCE DEMONSTRATION
MIAMI FORT POWER STATION
NORTH BEND, OHIO

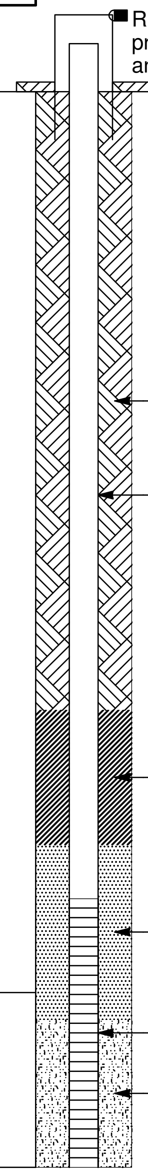
FIGURE 2

RAMBOLL US CORPORATION
A RAMBOLL COMPANY

APPENDIX A
BORING LOGS FOR MONITORING WELLS MW-2, MW-3A, MW-4, MW-10, AND MW-11

Depth (Feet)	Sample Location	Percent Recovery	USCS Symbol	DESCRIPTION OF SUBSURFACE MATERIALS
0		76		Brown to dark brown sandy CLAY with silt and trace pebbles and rounded gravel, soft, plastic, moist
5		80		grades with organics grades with less sand, pebbles, and gravel, stiff, no plasticity
10		60		grades with increasing sand and pebbles, single 3" cobble grades soft, plastic, very moist
15		70		grades brownish yellow to brown, without organics grades medium stiff to stiff, very slight plasticity to no plasticity
20		100		grades with increasing fine sand, plastic, soft
25		100		grades gray to dark gray, with increasing silt and sand
30		100		grades wet Gray fine to coarse SAND and rounded GRAVEL, very loose, poorly sorted, wet
35		0		
40				Boring terminated 40' bgs on 12/11/2007. 2" I.D. Schedule 40 PVC monitoring well installed 40' bgs with 10' 0.010" slotted screen.

WELL CONSTRUCTION DETAIL



LEGEND:

Rotosonic

bgs Below ground surface

NR Not recorded

Duke Energy - 14947868 - North Bend, OH

DUKE ENERGY MIAMI FORT STATION MIAMI FORT STATION.GPJ 2/5/08

URS

JOB NO. 14947868

Duke Energy
Miami Fort Station
11021 Brower Road
North Bend, OH

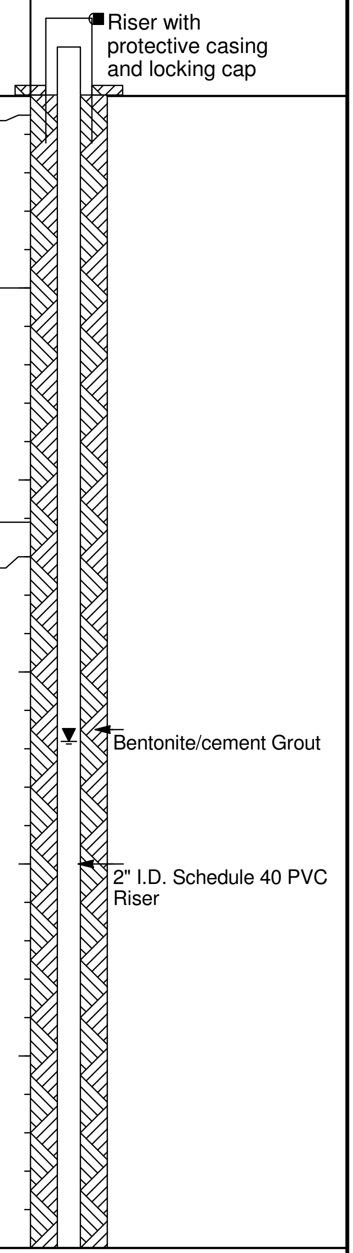
MONITORING WELL MW-2

Project: Duke Energy **Project Location: Miami Fort Station** **Project Number: 14948624**	**Monitoring Well MW-3A** Sheet 1 of 2

Date(s) Drilled	**2/25/2009**	Logged By	**K. Pritchard**	Checked By	**M. Wagner**
Drilling Method	**4.25 in. Hollow Stem Auger**	Drilling Contractor	**Belasco Drilling Services**	Total Depth of Borehole	**52.0 feet**
Drill Rig Type	**Truck-Mounted Auger**	Sampler Type	**Split Spoon**	Surface Elevation	**471.17 feet, msl**
Groundwater Elevation(s)	**456.42 ft, msl**	Hammer Weight and Drop	**140 lb, Dropped 30-inches**	Top of PVC Elevation	**473.23 feet, msl**
Diameter of Hole (inches)	**8.25** / Diameter of Well (inches) **2**	Type of Well Casing	**Schedule 40 PVC**	Screen Perforation	**0.010-Inch**
Type of Sand Pack	**Natural Collapse**	Well Completion at Ground Surface	**Riser, With Locking Cap**		
Comments	**** Split spoon sampler advanced through interval under weight of hammer and rods only**				

Elevation, feet	Depth, feet	SAMPLES: Type	Blows per 1-foot Interval	Percent Recovery	MATERIAL DESCRIPTION
470	0	X	12	83	Yellowish red CLAY TOPSOIL, moist Gray to brownish gray clayey SILT with medium sand and organics, soft, moist to very moist
		X	19	100	
		X	6	83	grades brownish yellow with increasing clay
465	5	X	3	100	Dark gray silty CLAY with trace fine sand and organics, plastic, very soft, moist
		X	3	83	grades with increasing fine to medium sand, without organics, with iron staining grades with medium to coarse grained sand lenses, without staining
460	10	X	3	75	grades high plasticity, very moist to wet
		X	2	100	Yellowish brown clayey fine to coarse grained SAND, very loose, well sorted, wet Yellowish brown fine grained sandy to silty CLAY, very soft, high plasticity, very moist to wet
		X	1	100	
455	15	X	1	100	grades wet with increasing fine sand grades with fine grained sand lenses
		X	2	100	grades brown with increasing fine sand
450	20	X	2	100	
		X	2	100	grades with gray to reddish gray lenses, decreasing sand, without sand lenses grades gray, without gray to reddish gray lenses, medium plasticity
	25	X	**	100	grades high plasticity grades with increasing sand
445		X	3	100	grades with organics, sulphur odor, decreasing sand
	30	X	2	100	grades without sand, without odor grades with fine sand lenses, without organics

WELL CONSTRUCTION DETAILS



URS

Project: Duke Energy
Project Location: Miami Fort Station
Project Number: 14948624

Monitoring Well MW-3A

Depth, feet	Sample Type	Blows per 1-foot Interval	Percent Recovery	MATERIAL DESCRIPTION
30	X	1	100	
				grades without sand, with trace organics
				grades with sand, without organics
	X	4	100	
	X	4	100	grades with trace fine sand and increasing silt, without sand lenses, medium plasticity
35				grades with increasing sand, without organics
	X	3	100	
				grades with increasing silt, trace sand, very low plasticity, stiff
	X	6	100	grades with sand, plastic, very soft
				grades stiff, very low plasticity, very moist
40	X	4	100	
				grades with trace organcis, less sand, increasing silt
	X	8	100	
				Gray fine to coarse grained SAND and sub-rounded to rounded GRAVEL, pebble-sized gravel with trace 1" diameter clasts, very loose, sorted, wet
	X	14	42	
45				
	X	7	100	
	X	22	63	
				grades with increasing diameter gravel
50	X	13	50	
				Boring terminated 52' bgs on 2/25/2009. 2" I.D. Schedule 40 PVC monitoring well installed 52' bgs with 10' 0.010" slotted screen.

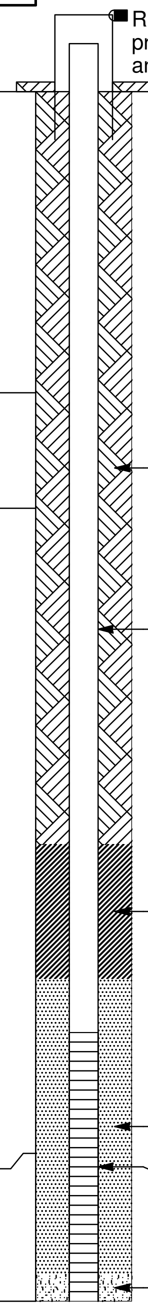
Elevation scale (feet): 440, 435, 430, 425, 420, 415, 410, 405
Depth scale (feet): 30, 35, 40, 45, 50, 55, 60, 65, 70

WELL CONSTRUCTION DETAILS

- Bentonite Seal
- Natural Collapse of Formation
- 2" I.D. Schedule 40 0.010" Slotted Screen

Depth (Feet)	Sample Location	Percent Recovery	USCS Symbol	DESCRIPTION OF SUBSURFACE MATERIALS
0				Dark gray fine to coarse SAND and GRAVEL FILL with clay, soft, moist
		100		
5				grades very hard to brittle (FILL) with glass piece
				grades dry, very loose with angular clasts (FILL)
		50		
10				
		62		Yellowish red silty CLAY with trace fine sand, medium stiff, very slightly moist to moist
				grades soft
15				Brownish yellow to yellowish red sandy CLAY, soft, moist (sand is very fine grained to fine grained)
		80		grades loose, with increasing sand
				grades soft
20				
		80		grades sandy clay/clayey sand (increasing sand), very moist to wet
25				grades very moist
		80		grades with less sand, with red staining and organics, medium stiff
30				grades with increasing sand
				grades with less sand
		40		
35				
				grades gray
		100		grades with increasing sand (clayey sand), very moist
				large wood piece through core sample
40				Gray medium to coarse grained SAND and rounded GRAVEL, poorly sorted, wet
		0		NO RECOVERY 40-45 feet bgs
45				Boring terminated 45' bgs on 12/12/2007. 2" I.D. Schedule 40 PVC monitoring well installed 45' bgs with 10' 0.010" slotted screen.

WELL CONSTRUCTION DETAIL



Miami Fort

LEGEND:

- Rotosonic
- bgs Below ground surface
- NR Not recorded

Duke Energy - 14947868 - North Bend, OH

DUKE ENERGY MIAMI FORT STATION MIAMI FORT STATION.GPJ 2/5/08

URS

JOB NO. 14947868

Duke Energy
Miami Fort Station
11021 Brower Road
North Bend, OH

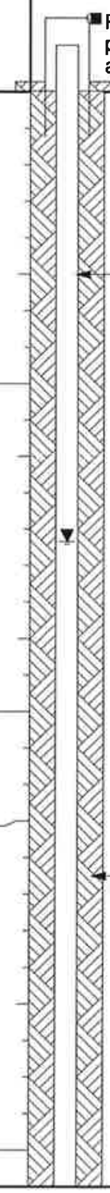
MONITORING WELL MW-4

Project: Dynegy	# Monitoring Well MW-10
Project Location: Miami Fort Station	Sheet 1 of 2
Project Number: 60442412	

Date(s) Drilled	4/10/2017	Logged By	J. Alten	Checked By	M. Wagner
Drilling Method	Rotosonic	Drilling Contractor	Frontz Drilling	Total Depth of Borehole	59.0 feet
Drill Rig Type	Rotosonic	Sampler Type	Sonic Sleeve	Surface Elevation	470.90 feet, msl
Depth to Groundwater	12.34 ft bgs	Seal Material	Hydrated 3/8-inch Bentonite Chips	Top of PVC Elevation	473.35 feet, msl
Diameter of Hole (inches) 6.0	Diameter of Well (inches) 2	Type of Well Casing	Schedule 40 PVC	Screen Perforation	0.010-Inch
Type of Sand Pack	#5 Silica Sand	Well Completion at Ground Surface	Riser, With locking cap and protective casing.		
Comments					

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Percent Recovery	MATERIAL DESCRIPTION
470	0		74	Brown SILT, with clay and fine angular to sub rounded gravel, soft, slightly moist
				Grades with more clay and gravel, medium stiff
465	5			Grades without gravel and more clay, very stiff, moist
	8			Brown CLAY, with silt, medium stiff, moist
460	10		48	
455	15			
	17			Brown SILT, with some clay and very fine sand, soft, moist
	19		93	Grades with less silt and more fine sand
450	20			Brown fine SAND, with silt and clay, loose, soft, moist
445	25			Grades with less silt and clay
				Grades gray and brown
				Grades with trace silt and without clay, few pieces of organic matter
	29		88	Gray and brown fine SAND, with trace silt, loose, moist
	30			

WELL CONSTRUCTION DETAILS



Project: Dynegy	Monitoring Well
Project Location: Miami Fort Station	MW-10
Project Number: 60442412	Sheet 2 of 2

Elevation, feet	Depth, feet	Type	Percent Recovery	Graphic Log	MATERIAL DESCRIPTION	WELL CONSTRUCTION DETAILS
440	30					
					Grades with some medium sand	
435	35					
					Grades to medium sand	
			58		Grades wet	
430	40					
					Grades with silt, more dense	
						Bentonite Seal
	45				Grades with fine and coarse sand	
425					Brown and gray fine to coarse SAND wtih fine to coarse rounded gravel, loose, wet	
			88			
420	50					#5 Global Silica Sand Filter Pack
					Brown medium SAND, loose, wet	
415	55					2" I.D. Schedule 40 0.010" Slotted Screen
						End Cap
					End of boring at 59'	
410	60					
405	65					
	70					

Miami Fort

DYNEGY CCR GENERAL MIAMI FORT STATION CCR WELLS.GPJ 5/18/17

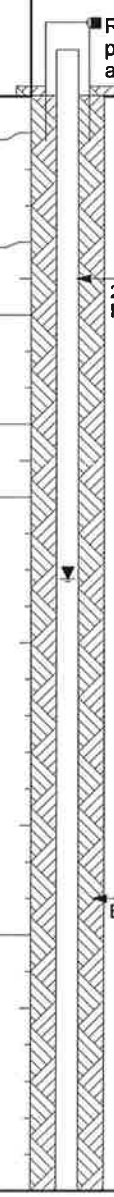
AECOM

Project: Dynegy	**Monitoring Well**
Project Location: Miami Fort Station	**MW-11**
Project Number: 60442412	Sheet 1 of 2

Date(s) Drilled	**4/11/2017**	Logged By	**J. Alten**	Checked By	**M. Wagner**
Drilling Method	**Rotosonic**	Drilling Contractor	**Frontz Drilling**	Total Depth of Borehole	**59.0 feet**
Drill Rig Type	**Rotosonic**	Sampler Type	**Sonic Sleeve**	Surface Elevation	**471.81 feet, msl**
Depth to Groundwater	**13.25 ft bgs**	Seal Material	**Hydrated 3/8-inch Bentonite Chips**	Top of PVC Elevation	**474.45 feet, msl**
Diameter of Hole (inches) **6.0**	Diameter of Well (inches) **2**	Type of Well Casing	**Schedule 40 PVC**	Screen Perforation	**0.010-Inch**
Type of Sand Pack	**#5 Silica Sand**	Well Completion at Ground Surface	**Riser, With locking cap and protective casing.**		
Comments					

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Percent Recovery	MATERIAL DESCRIPTION
	0		69	Gray coarse angluar limestone GRAVEL, with fines, medium dense, slightly moist (FILL)
470				Brown and tan with reddish mottled SILT with trace fine gravel, very stiff, moist
				Grades with fine sand
	5			Brown with red mottled fine SAND, soft, moist
465				Dark gray SILT with some clay, stiff, moist, trace organci matter
				Grades with more clay
				Gray and brown CLAY, with some silt, soft, moist
	10		42	
460				Gray and brown SILT, with fine sand and some clay, soft, moist
	15			
455				Grades with less clay
			56	
	20			Grades gray without clay
450				
				Gray very fine SAND with silt, soft, moist
	25			
445				
			53	
	30			Grades with dark gray and black wood fragments

WELL CONSTRUCTION DETAILS



Project: Dynegy	Monitoring Well
Project Location: Miami Fort Station	MW-11
Project Number: 60442412	Sheet 2 of 2

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Percent Recovery	MATERIAL DESCRIPTION
	30			
440				Grades without wood fragments
	35			
435				Grades with less silt
			83	
	40			
				Gray fine to coarse SAND with rounded fine gravel, loose, moist
430				
				Grades to fine sand and without gravel
	45			
				Grades brown and gray
425				
				Grades fine to coarse sand with rounded fine to medium gravel
			80	
	50			Grades wet
420				Alternating reddish brown CLAY lens and fine to coarse SAND with rounded fine to coarse gravel, soft, wet
	55			
415				
				Boring terminated at 59'
	60			
410				
	65			
405				
	70			

WELL CONSTRUCTION DETAILS