

Annual Groundwater Monitoring Report

Cardinal Operating Company

Cardinal Plant

Fly Ash Reservoir II

Brilliant, OH

January 2018

Prepared by:

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I. Overview

This *Annual Groundwater Monitoring Report* (Report) has been prepared to report the status of activities for the preceding year for the Fly Ash Reservoir II (FAR II) at Cardinal Operating Company's, Cardinal Power Plant. The Cardinal Plant is a three-unit coal-fired generating station with Unit 1 owned by AEP Generation Resources, Inc., a wholly-owned subsidiary of American Electric Power Company (AEP), and Units 2 and 3 owned by Buckeye Power, Inc. (Buckeye). The Cardinal Operating Company collectively manages and operates the Cardinal Plant. The USEPA's CCR rules require that the Annual Groundwater Monitoring Report be posted to the operating record for the preceding year no later than January 31, 2018.

In general, the following activities were completed:

- Monitoring wells were installed and developed to establish a certified groundwater monitoring system around each CCR unit, in accordance with the requirements of 40 CFR 257.91 pursuant AEP's *Groundwater Monitoring Network Evaluation (2016)*;
- Groundwater samples were collected and analyzed for Appendix III and Appendix IV constituents, as specified in 40 CFR 257.94 *et seq.* and AEP's *Groundwater Sampling and Analysis Plan (2016)*;
- Groundwater data underwent various validation tests, including tests for completeness, valid values, transcription errors, and consistent units;
- Background groundwater values for each Appendix III and Appendix IV constituent were collected;
- Detection Monitoring sampling was initiated;
- A statistical process in accordance with 40 CFR 257.93 to evaluate groundwater data was prepared, certified, and posted to AEP's CCR website in April 2017 [AEP's *Statistical Analysis Plan (AEP 2017)*]. The statistical process was guided by USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* ("Unified Guidance", USEPA, 2009). Data evaluation is underway.

The major components of this annual report, to the extent applicable at this time, are presented in sections that follow:

- A map, aerial photograph or a drawing showing the CCR management unit(s), all groundwater monitoring wells and monitoring well identification numbers;
- Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a statement as to why that happened;
- All of the monitoring data collected, including the rate and direction of groundwater flow, plus a summary showing the number of samples collected per monitoring well, the

dates the samples were collected and whether the sample was collected as part of detection monitoring or assessment monitoring programs (Attached as **Appendix I**);

- A summary of any transition between monitoring programs or an alternate monitoring frequency, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring, in addition to identifying the constituents detected at a statistically significant increase over background concentrations (Attached as **Appendix II**, where applicable); and
- Other information required to be included in the annual report such as alternate source demonstration or assessment of corrective measures, if applicable.

In addition, this report summarizes key actions completed, and where applicable, describes any problems encountered and actions taken to resolve those problems. The report includes a projection of key activities for the upcoming year.

II. Groundwater Monitoring Well Locations and Identification Numbers

The figure that follows depicts the PE-certified groundwater monitoring network, the monitoring well locations and their corresponding identification.

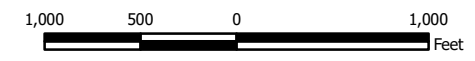


Monitoring Well Network

- ◆ Downgradient Sampling Location
- ◆ Background Sampling Location
- Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir I - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.



Site Layout
Fly Ash Reservoir II
 AEP Cardinal Generating Plant
 Brilliant, Ohio

Geosyntec
 consultants

Columbus, Ohio 2018/01/25

Figure
1

III. Monitoring Wells Installed or Decommissioned

There were no monitoring wells installed or decommissioned in 2017. The network design, as summarized in the *Groundwater Monitoring Network Design Report* (2016) and as posted at the CCR web site for Cardinal Plant, did not change. That design report, viewable on the AEP CCR web site, discusses the facility location, the hydrogeological setting, the hydrostratigraphic units, the uppermost aquifer, downgradient monitoring well locations and the upgradient monitoring well locations.

IV. Groundwater Quality Data and Static Water Elevation Data, With Flow Rate and Direction and Discussion

Appendix I contains tables showing the groundwater quality data collected during the establishment of background quality. Static water elevation data from each monitoring event also are shown in Appendix I, along with the groundwater velocity calculations, groundwater flow direction and potentiometric maps developed after each sampling event.

V. Discussion About Transition Between Monitoring Requirements or Alternate Monitoring Frequency

As of this first annual groundwater report date there has been no transition between detection monitoring and assessment monitoring. Detection monitoring will continue in 2018. The sampling frequency of twice per year will be maintained for the Appendix III parameters (boron, calcium, chloride, fluoride, pH, sulfate and total dissolved solids).

Regarding defining an alternate monitoring frequency, the groundwater velocity and monitoring well production is high enough at this facility that no modification of the twice-per-year detection monitoring effort is needed.

VI. Other Information Required

At the appropriate time the geochemical analyses, coupled with the statistical analyses of the groundwater quality data, will determine whether an alternate source or alternate sources are affecting groundwater chemistry. In those cases where an alternative source(s) demonstration is made, those analyses and supporting information will be presented as well.

VII. Description of Any Problems Encountered in 2017 and Actions Taken

No significant problems were encountered. The low flow sampling effort went smoothly and the schedule was met to support this first annual groundwater report preparation. However, two wells (M-6 and M-10) were missed during 1 sampling event and therefore only have 7 background values for certain constituents. This does not affect the monitoring well network though.

VIII. A Projection of Key Activities for the Upcoming Year

Key activities for 2018 include:

- Detection monitoring on a twice per year schedule
- Evaluation of the first detection monitoring results from a statistical analysis viewpoint, looking for any statistically significant increases, or decreases when pH is considered.
- Responding to any new data received in light of what the CCR rule requires
- Preparation of the second annual groundwater report

APPENDIX I

Tables follow, showing the groundwater monitoring data collected and the rate and direction of groundwater flow. The dates that the samples were collected also is shown.

Groundwater Data Tables

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	CA-0622A								
		10/25/2016	11/15/2016	12/14/2016	1/10/2017	4/18/2017	5/25/2017	6/20/2017	7/27/2017	9/27/2017
		Background								
Antimony	µg/L	0.370	<0.2 U	0.0700	0.140	0.0900 J	0.0300 J	0.100 J	0.200 J	-
Arsenic	µg/L	4.32	6.40	16.0	19.1	36.9	31.8	24.9	25.4	-
Barium	µg/L	99.8	87.2	140	209	253	325	420	860	-
Beryllium	µg/L	0.142	0.200 J	0.127	0.399	0.148	0.572	0.0800 J	0.0800 J	-
Boron	mg/L	0.385	0.366	0.293	0.306	0.314	0.447	0.305	0.276	0.331
Cadmium	µg/L	0.0300	<0.08 U	0.0200 J	0.0800	0.0300 J	0.0600	0.0200 J	0.0300 J	-
Calcium	mg/L	32.3	22.3	22.8	35.8	37.9	64.0	48.4	67.7	85.4
Chloride	mg/L	119	135	743	1360	1330	1230	2380	3500	4190
Chromium	µg/L	3.52	5.06	3.96	9.48	5.21	11.6	3.02	3.10	-
Cobalt	µg/L	2.29	2.28	1.90	3.95	2.42	5.76	1.61	1.40	-
Combined Radium	pCi/L	2.06	0.601	1.58	1.95	1.42	2.37	3.78	4.93	-
Fluoride	mg/L	0.950	0.790	0.790	0.850	0.920	0.880	0.700 J	0.500 J	0.550
Lead	µg/L	3.04	1.86	2.33	5.22	2.71	10.5	1.74	1.59	-
Lithium	mg/L	0.0310	0.0350	0.0360	0.0540	0.0390	0.0590	0.0540	0.0680	-
Mercury	µg/L	0.00600	0.00300 J	<0.002 U	<0.002 U	0.00200 J	<0.002 U	0.0100	0.00200 J	-
Molybdenum	µg/L	24.2	45.8	60.1	54.5	48.4	22.2	46.0	32.5	-
Selenium	µg/L	0.600	1.00 J	0.400	0.900	0.400	2.00	0.200 J	0.200 J	-
Total Dissolved Solids	mg/L	1180	28500	2240	3300	3100	2940	4590	5860	7140
Sulfate	mg/L	383	340	320	246	246	244	163	56.3	46.9
Thallium	µg/L	0.0400 J	<0.2 U	0.0300 J	0.209	0.0500 J	0.0600 J	<0.04 U	0.0900 J	-
pH	SU	7.85	7.81	7.76	7.85	7.69	7.69	7.52	8.86	7.91

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	FA-8								
		10/27/2016	11/15/2016	12/13/2016	1/10/2017	5/2/2017	6/1/2017	6/27/2017	7/27/2017	9/26/2017
		Background								
Antimony	µg/L	0.610	0.530	0.500	0.490	0.540	0.530	0.500	0.450	-
Arsenic	µg/L	7.85	5.11	4.04	3.91	6.07	5.99	6.47	6.41	-
Barium	µg/L	44.8	33.7	30.0	28.4	25.1	28.1	25.9	25.1	-
Beryllium	µg/L	0.0580	0.0200 J	0.00900 J	0.00900 J	<0.008 U	0.00800 J	<0.008 U	<0.008 U	-
Boron	mg/L	5.46	5.05	4.49	4.84	4.64	4.44	5.05	4.34	4.86
Cadmium	µg/L	0.0400	0.0300	0.0400	0.0400	0.0200 J	0.0200	<0.01 U	0.0600	-
Calcium	mg/L	233	208	192	207	192	192	174	191	211
Chloride	mg/L	59.2	58.6	62.7	60.2	57.3	54.4	52.8	52.2	53.1
Chromium	µg/L	1.30	0.360	0.161	0.182	0.0700 J	0.143	0.131	0.324	-
Cobalt	µg/L	5.89	1.91	0.867	0.737	0.560	0.704	0.627	0.720	-
Combined Radium	pCi/L	1.87	1.20	0.943	0.321	0.547	0.160	1.12	1.25	-
Fluoride	mg/L	0.550	0.510	0.430	0.470	0.500	0.490	0.490	0.450	0.520
Lead	µg/L	2.10	0.523	0.279	0.374	0.0610	0.156	0.0620	0.0800	-
Lithium	mg/L	0.229	0.228	0.206	0.218	0.207	0.198	0.184	0.199	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	312	361	345	297	302	337	326	308	-
Selenium	µg/L	2.20	2.10	2.10	2.40	2.20	1.40	0.700	0.300	-
Total Dissolved Solids	mg/L	1500	1530	1540	1550	1540	1530	1510	1490	1560
Sulfate	mg/L	899	907	933	907	875	909	906	886	958
Thallium	µg/L	0.220	0.190	0.153	0.168	0.152	0.187	0.174	0.174	-
pH	SU	6.49	-	7.22	7.22	6.79	7.15	7.21	6.97	7.82

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-6										
		10/11/2016	4/20/2017	4/26/2017	7/26/2017	8/1/2017	8/21/2017	8/29/2017	9/6/2017	9/27/2017	10/4/2017	10/11/2017
Background												Detection
Antimony	µg/L	-	-	-	0.250	0.250	0.210	0.120	0.230	0.230	0.110	-
Arsenic	µg/L	-	-	-	1.85	3.20	3.31	2.83	3.37	5.36	4.36	-
Barium	µg/L	-	-	-	247	292	288	429	306	556	689	-
Beryllium	µg/L	-	-	-	0.399	0.705	0.721	1.29	0.915	1.63	2.02	-
Boron	mg/L	-	-	-	0.212	0.201	0.246	0.198	0.287	0.216	0.234	0.248
Cadmium	µg/L	-	-	-	0.0800	0.120	0.110	0.200	0.140	0.300	0.270	-
Calcium	mg/L	-	-	-	8.69	10.2	10.4	14.8	13.2	18.9	21.1	23.8
Chloride	mg/L	-	-	38.0	37.6	37.6	37.2	37.2	37.5	37.2	37.2	38.3
Chromium	µg/L	-	-	-	3.16	5.13	5.09	2.99	4.22	4.89	3.28	-
Cobalt	µg/L	-	-	-	1.41	2.40	2.55	1.96	2.38	2.83	2.45	-
Combined Radium	pCi/L	-	-	-	3.41	4.68	4.33	9.81	4.43	8.11	7.15	-
Fluoride	mg/L	-	-	1.26	1.20	1.32	1.23	1.24	1.27	1.18	1.19	1.24
Lead	µg/L	-	-	-	7.25	11.4	11.3	16.4	13.0	26.8	22.7	-
Lithium	mg/L	-	-	-	0.0150	0.0120	0.0180	0.0110	0.0180	0.0140	0.0160	-
Mercury	µg/L	-	-	-	<0.002 U	0.00200 J	<0.002 U	0.00200 J	<0.002 U	<0.09 U	<0.002 U	-
Molybdenum	µg/L	-	-	-	0.660	5.65	0.740	3.31	0.790	0.770	1.18	-
Selenium	µg/L	-	-	-	0.500	1.80	1.40	1.10	1.40	2.90	1.30	-
Total Dissolved Solids	mg/L	-	-	588	594	580	564	594	612	562	134	288
Sulfate	mg/L	-	-	<0.04 U	0.200	0.200	0.200	0.100 J	0.100	<0.04 U	0.100	1.30
Thallium	µg/L	-	-	-	0.0860	0.0830	0.106	0.0920	0.0990	0.127	0.114	-
pH	SU	8.37	8.40	8.24	7.66	7.18	7.73	8.51	8.25	8.31	8.71	8.40

Notes:

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pCi/L: picocuries per liter

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J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-8										
		12/13/2016	1/16/2017	2/9/2017	3/9/2017	4/12/2017	4/18/2017	5/1/2017	5/31/2017	6/21/2017	8/1/2017	10/3/2017
		Background										
Antimony	µg/L	0.230	0.0800	0.0200 J	0.0200 J	<0.01 U	-	-	0.0200 J	<0.01 U	<0.01 U	-
Arsenic	µg/L	1.31	0.870	1.22	1.31	1.32	-	-	1.03	1.14	1.18	-
Barium	µg/L	148	142	119	133	129	-	-	136	125	128	-
Beryllium	µg/L	0.0200 J	0.00800 J	0.0100 J	0.0100 J	0.00800 J	-	-	0.00900 J	0.00800 J	0.0100 J	-
Boron	mg/L	0.0270	0.0100	0.0380	0.0240	0.0290	-	-	0.0330	0.0350	0.0100	0.0170
Cadmium	µg/L	0.0800	0.0200 J	0.00800 J	<0.004 U	<0.005 U	-	-	0.00600 J	0.360	0.0500	-
Calcium	mg/L	94.3	88.6	105	98.2	93.6	-	-	92.4	97.5	99.2	93.7
Chloride	mg/L	5.92	5.76	5.79	5.75	-	-	5.86	5.89	5.87	5.80	5.68
Chromium	µg/L	0.380	0.211	0.116	0.0600	0.0770	-	-	0.0960	0.0760	0.161	-
Cobalt	µg/L	0.438	0.378	0.680	0.454	0.385	-	-	0.309	0.272	0.327	-
Combined Radium	pCi/L	0.906	1.07	3.78	0.512	1.58	-	-	1.26	1.47	1.16	-
Fluoride	mg/L	0.0900	0.110	0.110	0.110	-	-	0.110	0.100	0.0900	0.120	0.0900 J
Lead	µg/L	0.634	0.106	0.297	0.0920	0.142	-	-	0.0960	0.0730	0.0720	-
Lithium	mg/L	0.00800	0.00600	0.0100	<0.0002 U	0.00800	-	-	0.0110	0.00700	0.00800	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-	-	<0.002 U	<0.002 U	0.00400 J	-
Molybdenum	µg/L	1.56	0.820	0.740	0.630	0.500	-	-	0.550	0.630	0.470	-
Selenium	µg/L	0.100	<0.03 U	<0.03 U	<0.03 U	<0.03 U	-	-	0.0400 J	<0.03 U	<0.03 U	-
Total Dissolved Solids	mg/L	418	417	374	450	-	-	424	420	430	440	435
Sulfate	mg/L	94.5	90.5	95.4	93.0	-	-	94.4	97.4	98.5	97.7	94.2
Thallium	µg/L	0.153	0.0200 J	0.0100 J	<0.01 U	<0.01 U	-	-	0.0100 J	<0.01 U	<0.01 U	-
pH	SU	7.19	6.79	6.93	-	8.31	8.64	7.22	7.21	6.82	8.44	8.34

Notes:

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J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

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**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-10									
		10/27/2016	4/26/2017	7/26/2017	8/1/2017	8/21/2017	8/29/2017	9/6/2017	9/27/2017	10/4/2017	10/11/2017
		Background									
Antimony	µg/L	-	-	0.110	0.0200 J	0.100	0.0800	0.0500 J	0.0300 J	0.0200 J	-
Arsenic	µg/L	-	-	0.580	0.170	0.840	0.450	0.310	0.360	0.220	-
Barium	µg/L	-	-	106	97.6	163	109	96.0	77.5	73.5	-
Beryllium	µg/L	-	-	0.0810	0.0200 J	0.315	0.0780	0.0740	0.0250	0.0100 J	-
Boron	mg/L	-	-	0.510	0.566	0.553	0.501	0.609	0.560	0.661	0.577
Cadmium	µg/L	-	-	0.890	0.0400	0.450	0.460	0.170	0.210	0.0700	-
Calcium	mg/L	-	-	10.7	13.8	13.7	13.6	14.5	13.3	14.1	13.5
Chloride	mg/L	-	-	12.3	12.7	12.2	13.1	12.9	12.5	12.9	13.5
Chromium	µg/L	-	-	0.777	0.175	1.18	0.547	0.322	0.255	0.0400 J	-
Cobalt	µg/L	-	-	0.173	0.0380	0.374	0.146	0.117	0.0580	0.0320	-
Combined Radium	pCi/L	-	-	1.70	1.31	7.38	1.72	1.96	8.70	1.13	-
Fluoride	mg/L	-	-	0.620	0.760	0.690	0.660	0.740	0.680	0.670	0.660
Lead	µg/L	-	-	9.23	0.859	19.6	7.27	4.22	1.23	0.492	-
Lithium	mg/L	-	-	0.0200	0.0250	0.0240	0.0140	0.0230	0.0190	0.0200	-
Mercury	µg/L	-	-	0.0140	0.00400 J	0.00500 J	0.00200 J	<0.002 U	<0.09 U	<0.004 U	-
Molybdenum	µg/L	-	-	2.53	2.37	2.11	3.91	2.23	2.30	2.50	-
Selenium	µg/L	-	-	0.0500 J	<0.03 U	0.300	0.100	0.0300 J	0.0500 J	<0.03 U	-
Total Dissolved Solids	mg/L	-	761	745	706	752	740	800	754	734	732
Sulfate	mg/L	-	-	127	135	127	135	139	137	128	133
Thallium	µg/L	-	-	0.0200 J	<0.01 U	0.0300 J	0.0100 J	0.0200 J	<0.01 U	<0.01 U	-
pH	SU	8.44	7.92	7.66	8.17	8.06	8.42	8.24	8.22	8.47	8.58

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-11									
		6/30/2016	8/10/2016	10/19/2016	10/26/2016	1/18/2017	4/26/2017	5/24/2017	6/21/2017	8/1/2017	10/4/2017
		Background									
Antimony	µg/L	0.950	1.10	0.970	-	0.960	0.830	0.630	0.840	0.710	-
Arsenic	µg/L	4.35	3.45	4.28	-	4.04	4.13	4.25	5.05	5.10	-
Barium	µg/L	26.0	26.6	27.9	-	29.4	29.4	26.6	25.7	26.0	-
Beryllium	µg/L	0.00500 J	<0.005 U	0.00600 J	-	<0.005 U	0.00600 J	<0.004 U	<0.008 U	<0.004 U	-
Boron	mg/L	4.88	4.91	4.43	-	4.64	4.93	4.87	4.92	5.08	4.69
Cadmium	µg/L	0.0100 J	0.0300	0.0100 J	-	0.0400	0.0300	<0.005 U	<0.01 U	<0.005 U	-
Calcium	mg/L	230	207	215	-	201	211	209	203	212	191
Chloride	mg/L	57.2	55.4	58.5	-	57.7	56.9	55.0	54.6	52.3	52.6
Chromium	µg/L	0.300	0.100	0.100	-	0.168	0.0880	0.0300 J	0.175	0.0840	-
Cobalt	µg/L	0.974	0.749	0.641	-	0.982	0.917	0.546	0.735	0.744	-
Combined Radium	pCi/L	1.17	0.140	0.460	1.31	0.649	0.333	0.384	2.21	1.01	-
Fluoride	mg/L	0.580	0.540	0.580	-	0.580	0.530	0.500	0.470	0.610	0.490
Lead	µg/L	0.171	0.270	0.620	-	6.89	0.757	0.149	0.155	0.127	-
Lithium	mg/L	0.251	0.208	0.203	-	0.214	0.217	0.223	0.220	0.222	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	-	<0.002 U	<0.09 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	316	375	378	-	373	431	362	339	330	-
Selenium	µg/L	0.300	0.600	2.10	-	3.50	2.70	2.00	0.800	0.300	-
Total Dissolved Solids	mg/L	1480	1510	1570	-	1620	1570	1560	1550	1530	1570
Sulfate	mg/L	881	850	900	-	922	892	835	1000	936	886
Thallium	µg/L	0.0300 J	0.351	0.141	-	0.282	0.375	0.211	0.116	0.0740	-
pH	SU	7.90	7.62	7.59	-	7.30	7.65	7.67	7.66	7.89	8.44

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-12								
		7/1/2016	8/5/2016	10/26/2016	11/16/2016	1/18/2017	4/20/2017	6/21/2017	8/1/2017	9/28/2017
		Background								
Antimony	µg/L	0.0400 J	0.0500 J	0.0500 J	0.0400 J	0.0200 J	0.0800 J	0.0300 J	0.0400 J	-
Arsenic	µg/L	6.44	7.81	6.24	5.67	4.77	9.68	8.86	6.91	-
Barium	µg/L	36.0	58.8	35.0	61.2	45.5	51.6	33.9	41.8	-
Beryllium	µg/L	0.0860	0.0600	0.0300 J	0.0380	0.0200 J	0.0540	0.0470	0.0480	-
Boron	mg/L	0.391	0.273	0.295	0.283	0.264	0.266	0.377	0.324	0.276
Cadmium	µg/L	0.150	0.0900	0.0400 J	0.0400	0.0400	0.0700	0.0400 J	0.0500	-
Calcium	mg/L	341	273	196	112	91.0	303	307	207	102
Chloride	mg/L	284	288	476	402	658	205	257	391	448
Chromium	µg/L	0.300	0.300	0.304	0.283	0.386	0.231	0.202	0.555	-
Cobalt	µg/L	26.9	17.5	4.54	4.04	1.30	12.8	13.2	7.39	-
Combined Radium	pCi/L	0.579	1.02	1.41	1.18	2.04	1.30	2.00	6.71	-
Fluoride	mg/L	1.38	1.36	1.72	1.64	2.29	1.08	1.20	1.64	2.22
Lead	µg/L	1.44	0.515	0.446	0.494	0.597	1.07	0.366	0.503	-
Lithium	mg/L	0.140	0.107	0.0950	0.0800	0.0600	0.123	0.122	0.0980	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	0.0100	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	1.22	1.11	1.23	1.95	2.48	0.980	0.870	1.22	-
Selenium	µg/L	0.300	0.0900 J	0.200 J	0.0900 J	0.0700 J	0.100 J	<0.06 U	<0.06 U	-
Total Dissolved Solids	mg/L	2560	2710	2440	1910	2280	2750	2690	2390	1850
Sulfate	mg/L	1400	1380	898	488	419	1360	1370	1040	416
Thallium	µg/L	0.110	0.0600 J	0.0600 J	0.0200 J	0.0100 J	0.0400 J	0.0200 J	0.0300 J	-
pH	SU	6.93	6.91	7.09	7.24	7.22	7.60	7.63	7.53	7.90

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-13									
		6/30/2016	8/11/2016	10/19/2016	1/18/2017	4/13/2017	4/26/2017	6/1/2017	6/22/2017	7/31/2017	9/28/2017
		Background									
Antimony	µg/L	0.0500 J	0.0200 J	0.0500 J	0.0300 J	0.0600	-	0.0500	0.0400 J	0.0400 J	-
Arsenic	µg/L	1.07	1.36	1.39	1.11	1.23	-	1.30	1.19	1.03	-
Barium	µg/L	79.5	138	99.7	130	122	-	141	128	90.8	-
Beryllium	µg/L	0.121	0.0270	0.139	0.255	0.184	-	0.132	0.114	0.116	-
Boron	mg/L	0.157	0.254	0.176	0.164	0.198	-	0.243	0.233	0.257	0.287
Cadmium	µg/L	0.170	<0.004 U	0.0200	0.0100 J	0.0100 J	-	0.0300	0.00800 J	0.00900 J	-
Calcium	mg/L	6.77	13.1	8.65	9.01	8.86	-	10.5	11.5	7.71	7.80
Chloride	mg/L	2.76	2.03	2.74	2.62	-	2.65	2.42	2.23	2.53	2.43
Chromium	µg/L	0.900	0.300	0.900	0.285	0.846	-	0.657	0.544	0.606	-
Cobalt	µg/L	0.301	0.0960	0.358	0.383	0.389	-	0.290	0.241	0.266	-
Combined Radium	pCi/L	2.69	0.976	1.24	4.10	2.36	-	1.85	2.58	2.28	-
Fluoride	mg/L	1.26	1.66	1.01	0.990	-	1.14	1.28	1.43	1.19	1.19
Lead	µg/L	0.859	0.221	1.06	1.33	1.47	-	1.11	0.933	0.853	-
Lithium	mg/L	0.0210	0.0130	0.00800	0.0100	0.00700	-	0.00900	0.0150	0.0120	-
Mercury	µg/L	<0.002 U	<0.002 U	0.00200 J	<0.002 U	<0.002 U	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	0.590	0.790	0.670	0.700	0.370	-	1.10	0.600	0.580	-
Selenium	µg/L	0.100	0.0700 J	0.200	0.0600 J	0.300	-	0.200	0.200	0.200	-
Total Dissolved Solids	mg/L	478	485	459	482	-	482	498	487	492	485
Sulfate	mg/L	11.7	22.1	8.60	5.60	-	8.90	14.0	18.0	10.2	12.4
Thallium	µg/L	0.0100 J	<0.01 U	0.114	0.0600	0.0200 J	-	0.0200 J	0.0100 J	0.0200 J	-
pH	SU	8.55	8.26	8.83	8.61	8.70	8.45	8.23	8.07	8.36	8.63

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-14									
		7/5/2016	8/11/2016	10/18/2016	1/11/2017	4/13/2017	4/27/2017	6/1/2017	6/21/2017	7/31/2017	10/10/2017
		Background									
Antimony	µg/L	0.0200 J	0.0100 J	0.0200 J	0.0200 J	<0.01 U	-	<0.01 U	0.0100 J	<0.01 U	-
Arsenic	µg/L	0.360	0.290	0.320	0.240	0.170	-	0.160	0.140	0.150	-
Barium	µg/L	25.0	19.3	22.9	20.9	14.9	-	15.9	14.9	14.8	-
Beryllium	µg/L	0.0620	0.0260	0.0440	0.0350	0.00600 J	-	0.0100 J	0.00800 J	0.00700 J	-
Boron	mg/L	0.208	0.226	0.188	0.188	0.199	-	0.214	0.218	0.189	0.261
Cadmium	µg/L	0.0900	<0.004 U	0.00600 J	0.00500 J	<0.005 U	-	<0.005 U	<0.005 U	0.00800 J	-
Calcium	mg/L	1.17	0.736	1.05	0.739	0.526	-	0.534	0.595	0.531	0.485
Chloride	mg/L	1.36	1.29	1.33	1.38	-	1.39	1.31	1.38	1.49	1.40
Chromium	µg/L	0.400	0.200	0.800	0.332	0.0920	-	0.117	0.0840	0.127	-
Cobalt	µg/L	0.118	0.0470	0.107	0.0780	0.0100	-	0.0220	0.0200 J	0.0100 J	-
Combined Radium	pCi/L	1.00	1.09	1.23	1.54	0.353	-	0.389	1.47	1.35	-
Fluoride	mg/L	0.790	0.740	0.750	0.700	-	0.760	0.700	0.740	0.840	0.740
Lead	µg/L	0.763	0.285	0.680	0.512	0.0370	-	0.0820	0.0530	0.0310	-
Lithium	mg/L	0.00900	0.00800	0.00300	0.00500	0.00700	-	0.00600	0.000300 J	0.00800	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	0.300	0.740	0.440	0.550	1.11	-	0.260	0.330	0.390	-
Selenium	µg/L	0.200	0.0700 J	0.100	0.0700 J	<0.03 U	-	<0.03 U	<0.03 U	<0.03 U	-
Total Dissolved Solids	mg/L	383	380	381	364	-	379	373	1010	395	381
Sulfate	mg/L	3.00	0.900	0.300	0.600	-	0.200	0.500	0.500	0.300	0.500
Thallium	µg/L	0.0200 J	<0.01 U	0.172	0.0680	<0.01 U	-	<0.01 U	0.0100 J	<0.01 U	-
pH	SU	8.94	9.11	9.39	7.99	9.09	8.97	9.26	9.09	8.62	9.24

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-15									
		7/6/2016	8/11/2016	10/18/2016	1/17/2017	4/13/2017	4/27/2017	6/1/2017	6/26/2017	7/31/2017	9/27/2017
		Background									
Antimony	µg/L	0.0200 J	0.0100 J	0.0200 J	0.0300 J	0.0100 J	-	0.0200 J	0.0200 J	0.0100 J	-
Arsenic	µg/L	2.54	2.48	2.49	2.09	2.36	-	2.58	2.61	2.34	-
Barium	µg/L	46.3	49.3	51.0	47.3	46.7	-	55.1	49.0	44.6	-
Beryllium	µg/L	<0.005 U	<0.005 U	0.0100 J	<0.005 U	<0.004 U	-	0.0450	0.0100 J	<0.004 U	-
Boron	mg/L	0.244	0.266	0.225	0.231	0.227	-	0.243	0.115	0.225	0.272
Cadmium	µg/L	<0.004 U	0.0900	0.00500 J	0.00800 J	<0.005 U	-	0.00800 J	0.0800	0.00900 J	-
Calcium	mg/L	1.94	1.90	2.10	1.79	1.60	-	1.67	0.369	1.73	1.85
Chloride	mg/L	29.6	27.5	28.1	31.0	-	29.0	28.7	28.1	28.1	28.5
Chromium	µg/L	0.500	0.100	0.200	0.178	0.0100 J	-	0.332	0.159	0.180	-
Cobalt	µg/L	0.0270	0.0200	0.0590	0.0330	0.00900 J	-	0.145	0.0640	0.0240	-
Combined Radium	pCi/L	0.551	1.20	2.22	1.81	0.598	-	0.791	1.24	1.65	-
Fluoride	mg/L	1.32	1.25	1.29	1.18	-	1.21	1.15	1.14	1.34	1.29
Lead	µg/L	0.0620	0.0550	0.180	0.0760	<0.004 U	-	0.414	0.190	0.0780	-
Lithium	mg/L	0.00900	0.00900	0.00400	0.00800	0.00700	-	0.00200	0.00400	0.00900	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	0.700	0.740	0.740	1.06	0.920	-	0.720	1.18	0.760	-
Selenium	µg/L	0.100 J	0.0300 J	0.0400 J	0.0400 J	<0.03 U	-	0.0700 J	0.0500 J	<0.03 U	-
Total Dissolved Solids	mg/L	588	578	612	565	-	567	578	574	588	572
Sulfate	mg/L	7.90	4.70	9.40	0.200 J	-	3.20	2.10	2.40	2.60	3.10
Thallium	µg/L	0.0810	<0.01 U	0.0300 J	0.0200 J	<0.01 U	-	0.0200 J	0.0200 J	<0.01 U	-
pH	SU	8.79	9.01	8.98	7.64	9.03	8.84	8.74	8.69	9.39	8.34

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-16									
		7/6/2016	8/10/2016	10/14/2016	1/11/2017	4/13/2017	4/27/2017	5/25/2017	6/26/2017	8/1/2017	10/2/2017
		Background									
Antimony	µg/L	<0.01 U	<0.01 U	<0.01 U	<0.01 U	<0.01 U	-	<0.01 U	<0.01 U	<0.01 U	-
Arsenic	µg/L	0.340	0.310	0.330	0.280	0.290	-	0.230	0.510	0.280	-
Barium	µg/L	44.0	44.2	42.5	42.5	40.9	-	42.7	40.3	41.8	-
Beryllium	µg/L	<0.005 U	<0.005 U	<0.005 U	<0.005 U	<0.004 U	-	<0.004 U	<0.004 U	<0.004 U	-
Boron	mg/L	0.174	0.177	0.171	0.171	0.164	-	0.196	0.235	0.185	0.191
Cadmium	µg/L	<0.004 U	<0.004 U	<0.004 U	<0.004 U	<0.005 U	-	<0.005 U	<0.005 U	<0.005 U	-
Calcium	mg/L	2.26	2.22	2.09	2.19	2.06	-	2.23	2.24	2.37	2.11
Chloride	mg/L	9.20	8.98	9.37	8.92	-	9.21	9.04	9.06	8.93	9.26
Chromium	µg/L	0.500	0.100	0.300	0.0930	0.0100 J	-	0.0500 J	0.0630	0.167	-
Cobalt	µg/L	0.0470	0.0140	0.0310	0.0200	0.00700 J	-	0.0100 J	0.0100 J	0.0100 J	-
Combined Radium	pCi/L	0.209	0.381	0.646	0.860	0.312	-	1.18	11.7	0.806	-
Fluoride	mg/L	0.410	0.370	0.390	0.380	-	0.370	0.350	0.310	0.400	0.330
Lead	µg/L	0.0650	0.0200 J	0.0450	0.0200 J	0.00600 J	-	0.0200 J	0.0200 J	0.00500 J	-
Lithium	mg/L	0.0100	0.0120	0.0120	0.0150	0.0120	-	0.0150	0.00800	0.0130	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	0.190	0.390	0.150	0.590	0.280	-	0.270	11.4	0.240	-
Selenium	µg/L	0.100 J	<0.03 U	0.0300 J	<0.03 U	<0.03 U	-	<0.03 U	<0.03 U	<0.03 U	-
Total Dissolved Solids	mg/L	776	764	758	764	-	776	775	778	795	737
Sulfate	mg/L	252	251	253	242	-	250	240	252	273	247
Thallium	µg/L	<0.01 U	<0.01 U	0.0100 J	0.0100 J	<0.01 U	-	<0.01 U	<0.01 U	<0.01 U	-
pH	SU	8.67	9.08	9.01	8.29	8.98	9.27	8.93	8.60	8.66	8.40

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-21										
		7/5/2016	8/9/2016	10/19/2016	1/18/2017	4/12/2017	4/20/2017	4/26/2017	5/30/2017	6/22/2017	8/1/2017	10/2/2017
		Background										
Antimony	µg/L	0.270	0.0900	0.170	0.0700	0.300	-	-	0.0700 J	0.0600 J	0.0400 J	-
Arsenic	µg/L	5.49	2.66	4.24	2.92	5.70	-	-	1.89	2.59	4.62	-
Barium	µg/L	12.8	12.2	12.5	12.3	17.4	-	-	10.1	11.3	13.7	-
Beryllium	µg/L	0.915	0.379	0.739	0.247	0.512	-	-	0.244	0.191	0.0910	-
Boron	mg/L	3.08	3.33	2.68	2.88	2.78	-	-	3.15	3.15	3.21	3.08
Cadmium	µg/L	0.0300	0.0100 J	0.00900 J	0.00600 J	0.0200 J	-	-	<0.01 U	<0.01 U	0.0100 J	-
Calcium	mg/L	298	282	262	229	214	-	-	254	241	203	247
Chloride	mg/L	100	79.6	68.6	64.5	-	65.2	-	59.2	64.1	65.8	62.5
Chromium	µg/L	0.300	0.100	0.200	0.262	0.124	-	-	0.119	0.407	0.492	-
Cobalt	µg/L	2.95	2.07	2.41	2.02	1.89	-	-	2.66	2.99	1.89	-
Combined Radium	pCi/L	1.01	0.445	0.393	0.838	0.811	-	-	1.19	1.31	1.85	-
Fluoride	mg/L	0.100 J	0.100 J	0.100 J	0.100 J	-	0.100 J	-	0.0700 J	0.0800 J	0.100 J	0.0800 J
Lead	µg/L	1.52	0.446	0.983	0.544	1.67	-	-	0.392	0.349	0.328	-
Lithium	mg/L	0.0820	0.0900	0.0740	0.0820	0.0740	-	-	0.0800	0.0820	0.0810	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	20.9	14.9	17.2	18.9	16.6	-	-	16.9	18.8	16.9	-
Selenium	µg/L	0.400	0.200	0.300	0.100	0.500	-	-	0.100 J	0.0700 J	<0.06 U	-
Total Dissolved Solids	mg/L	1940	1840	1810	1850	-	1850	891	1770	1830	1840	1830
Sulfate	mg/L	1070	995	990	986	-	990	-	1020	1030	1080	998
Thallium	µg/L	0.0200 J	0.0200 J	0.0550	0.0200 J	<0.01 U	-	-	0.0500 J	<0.02 U	<0.02 U	-
pH	SU	6.94	7.07	7.53	6.42	7.03	8.02	-	6.98	7.43	8.11	7.14

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-22										
		6/30/2016	8/9/2016	10/18/2016	1/17/2017	4/13/2017	4/18/2017	4/27/2017	6/1/2017	6/26/2017	8/1/2017	9/27/2017
		Background										
Antimony	µg/L	0.0100 J	<0.01 U	0.0100 J	0.0200 J	<0.01 U	-	-	<0.01 U	<0.01 U	<0.01 U	-
Arsenic	µg/L	0.490	0.470	0.530	0.620	0.550	-	-	0.560	0.520	0.510	-
Barium	µg/L	24.6	23.4	25.3	25.1	24.1	-	-	26.1	25.4	24.4	-
Beryllium	µg/L	0.0410	0.0320	0.0380	0.0410	0.0330	-	-	0.0400	0.0370	0.0370	-
Boron	mg/L	3.56	3.81	3.39	3.79	3.50	-	-	3.96	4.14	4.08	4.14
Cadmium	µg/L	0.00600 J	0.0100 J	<0.004 U	0.00400 J	<0.005 U	-	-	<0.005 U	<0.005 U	<0.005 U	-
Calcium	mg/L	194	182	189	176	161	-	-	175	185	182	195
Chloride	mg/L	46.1	46.3	46.7	47.8	-	-	49.4	49.4	49.6	50.2	51.8
Chromium	µg/L	0.100	0.100	0.200	0.258	0.0400 J	-	-	0.0400 J	0.0520	0.118	-
Cobalt	µg/L	0.922	1.17	1.13	1.16	1.17	-	-	1.15	1.00	1.06	-
Combined Radium	pCi/L	1.95	1.20	3.24	2.08	1.26	-	-	1.49	5.16	0.769	-
Fluoride	mg/L	0.460	0.400	0.440	0.410	-	-	0.420	0.400	0.370	0.430	0.350
Lead	µg/L	0.00700 J	0.0200 J	0.0390	0.0290	0.0270	-	-	0.0100 J	0.0200 J	<0.004 U	-
Lithium	mg/L	0.0680	0.0540	0.0460	0.0570	0.0520	-	-	0.0620	0.0640	0.0680	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	90.8	92.5	97.8	92.7	89.0	-	-	94.3	93.6	86.8	-
Selenium	µg/L	0.100	<0.03 U	0.0400 J	0.0500 J	0.0400 J	-	-	0.0500 J	0.0400 J	<0.03 U	-
Total Dissolved Solids	mg/L	883	913	916	929	-	-	938	946	961	963	985
Sulfate	mg/L	378	386	383	390	-	-	399	403	409	415	435
Thallium	µg/L	0.0400 J	0.0100 J	0.0640	0.0820	<0.01 U	-	-	<0.01 U	0.0100 J	<0.01 U	-
pH	SU	6.79	6.88	6.99	6.63	6.93	7.92	6.92	6.84	7.21	8.08	7.14

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-23										
		6/30/2016	8/9/2016	10/19/2016	1/16/2017	4/12/2017	4/18/2017	5/1/2017	6/1/2017	6/26/2017	8/1/2017	10/3/2017
		Background										
Antimony	µg/L	0.0300 J	0.0300 J	0.0200 J	0.0300 J	0.0300 J	-	-	<0.03 U	<0.03 U	<0.03 U	-
Arsenic	µg/L	1.31	1.22	1.08	1.18	0.970	-	-	1.11	1.21	1.15	-
Barium	µg/L	9.59	9.26	8.85	9.33	9.04	-	-	9.75	8.67	8.76	-
Beryllium	µg/L	0.0200 J	0.0200 J	0.0200 J	0.0230	0.0200 J	-	-	0.0200 J	0.0200 J	0.0200 J	-
Boron	mg/L	0.620	0.667	0.578	0.589	0.615	-	-	0.637	0.717	0.630	0.601
Cadmium	µg/L	<0.008 U	<0.008 U	0.0200 J	0.00900 J	<0.01 U	-	-	<0.02 U	<0.02 U	<0.02 U	-
Calcium	mg/L	121	106	112	92.1	89.0	-	-	106	100	110	104
Chloride	mg/L	13.0	13.2	12.6	13.3	-	-	13.7	12.3	13.8	12.5	12.8
Chromium	µg/L	0.300	0.200	0.100	0.353	0.0800 J	-	-	0.291	0.208	0.575	-
Cobalt	µg/L	0.455	0.438	0.376	0.377	0.290	-	-	0.570	0.598	0.486	-
Combined Radium	pCi/L	3.12	2.11	2.03	6.71	2.88	-	-	2.77	3.92	3.08	-
Fluoride	mg/L	0.590	0.570	0.550	0.570	-	-	0.540	0.500	0.520	0.600 J	0.480
Lead	µg/L	0.112	0.156	0.0680	0.188	0.0610	-	-	0.188	0.207	0.0690	-
Lithium	mg/L	0.0550	0.0490	0.0480	0.0540	0.0480	-	-	0.0500	0.0500	0.0590	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.004 U	-	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	4.99	0.340	3.80	0.590	0.700	-	-	1.03	1.98	0.460	-
Selenium	µg/L	0.200	<0.06 U	<0.06 U	0.0600 J	<0.06 U	-	-	<0.09 U	<0.09 U	<0.09 U	-
Total Dissolved Solids	mg/L	3300	3280	3300	3240	-	-	3140	3220	3210	2980	3210
Sulfate	mg/L	1730	1690	1660	1560	-	-	1610	1650	1690	1830	1620
Thallium	µg/L	0.0300 J	0.0400 J	0.0600 J	0.0780	0.0200 J	-	-	<0.03 U	<0.03 U	<0.03 U	-
pH	SU	7.00	6.99	6.95	6.63	7.69	8.19	7.26	7.51	7.07	8.11	7.96

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-1003								
		6/29/2016	8/4/2016	10/25/2016	1/12/2017	5/2/2017	5/31/2017	6/22/2017	8/1/2017	9/28/2017
		Background								
Antimony	µg/L	0.0200 J	0.0500 J	0.0400 J	0.0300 J	0.0100 J	0.0100 J	0.0100 J	0.0200 J	-
Arsenic	µg/L	0.350	1.92	1.05	0.730	0.320	0.360	0.210	0.680	-
Barium	µg/L	76.4	102	90.5	81.7	73.6	82.0	71.7	78.2	-
Beryllium	µg/L	0.0100 J	0.0550	0.0390	0.0270	0.00900 J	0.0200 J	0.00700 J	0.0350	-
Boron	mg/L	0.0850	0.138	0.139	0.106	0.178	0.138	0.189	0.124	0.124
Cadmium	µg/L	<0.004 U	0.0100 J	0.00600 J	<0.004 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	-
Calcium	mg/L	67.7	56.8	65.1	59.2	60.8	63.0	68.8	62.8	61.6
Chloride	mg/L	4.51	4.56	4.61	4.58	4.66	4.76	4.72	4.92	4.90
Chromium	µg/L	0.400	0.700	0.488	0.494	0.113	0.160	0.107	0.562	-
Cobalt	µg/L	0.195	0.828	0.304	0.300	0.249	0.267	0.289	0.346	-
Combined Radium	pCi/L	2.10	4.06	4.18	5.06	2.57	2.80	3.13	3.97	-
Fluoride	mg/L	0.220	0.210	0.210	0.190	0.190	0.180	0.170	0.230	0.190
Lead	µg/L	0.130	0.679	0.415	0.323	0.125	0.190	0.135	0.361	-
Lithium	mg/L	0.0260	0.0110	0.0120	0.0130	0.0120	0.00800	0.0150	0.0130	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	2.63	2.06	0.300	0.310	2.90	0.170	0.180	0.430	-
Selenium	µg/L	0.100 J	0.0600 J	0.100 J	0.0400 J	0.0300 J	0.0400 J	<0.03 U	0.0500 J	-
Total Dissolved Solids	mg/L	461	443	429	448	470	475	487	470	488
Sulfate	mg/L	88.7	79.9	91.9	89.8	105	106	113	91.9	105
Thallium	µg/L	<0.01 U	0.0200 J	0.0300 J	0.0100 J	<0.01 U	0.0200 J	<0.01 U	0.0200 J	-
pH	SU	7.67	7.55	7.68	7.37	7.42	7.21	7.77	6.90	7.47

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-1004										
		6/30/2016	8/9/2016	10/18/2016	1/17/2017	4/12/2017	4/18/2017	4/27/2017	6/1/2017	6/22/2017	7/31/2017	9/27/2017
		Background										
Antimony	µg/L	0.0300 J	0.0500	0.0700	0.0100 J	0.0600	-	-	0.0300 J	0.0200 J	0.0300 J	-
Arsenic	µg/L	2.48	4.01	7.55	2.41	5.26	-	-	3.53	2.94	3.19	-
Barium	µg/L	73.1	94.3	102	84.1	90.4	-	-	76.9	67.3	82.3	-
Beryllium	µg/L	0.0900	0.145	0.247	0.0930	0.133	-	-	0.110	0.0850	0.127	-
Boron	mg/L	1.63	2.05	1.72	1.78	1.54	-	-	1.90	2.02	1.97	2.25
Cadmium	µg/L	0.00600 J	0.00900 J	0.0200 J	<0.004 U	0.00800 J	-	-	0.0200 J	<0.005 U	0.00700 J	-
Calcium	mg/L	99.9	96.1	95.6	85.6	80.8	-	-	82.5	89.6	85.4	100
Chloride	mg/L	26.1	27.8	29.6	28.5	-	-	29.3	30.3	32.5	30.1	32.1
Chromium	µg/L	1.90	3.60	7.40	1.83	4.02	-	-	2.60	2.08	3.30	-
Cobalt	µg/L	0.588	1.13	2.57	0.369	1.48	-	-	0.902	0.756	0.988	-
Combined Radium	pCi/L	1.97	1.78	2.21	2.92	1.26	-	-	5.50	2.42	1.95	-
Fluoride	mg/L	1.46	1.54	1.53	1.65	-	-	1.86	1.48	1.37	1.69	1.38
Lead	µg/L	0.527	1.11	2.69	0.544	1.34	-	-	1.03	0.743	0.943	-
Lithium	mg/L	0.0350	0.0230	0.0200	0.0220	0.0250	-	-	0.0230	0.0260	0.0240	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	9.44	11.4	11.8	9.87	8.92	-	-	9.92	10.8	9.73	-
Selenium	µg/L	0.200	0.100	0.400	0.0900 J	0.200	-	-	0.100	0.100	0.200	-
Total Dissolved Solids	mg/L	1010	914	841	877	-	-	855	900	874	874	848
Sulfate	mg/L	363	272	265	249	-	-	207	269	276	249	267
Thallium	µg/L	0.0100 J	0.0300 J	0.0530	0.0200 J	0.0300 J	-	-	0.0200 J	0.0100 J	0.0200 J	-
pH	SU	7.41	7.52	7.38	7.31	7.28	7.16	7.36	6.87	7.70	7.23	7.35

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-1302											
		7/1/2016	8/10/2016	10/13/2016	11/15/2016	1/11/2017	1/12/2017	4/13/2017	4/27/2017	5/25/2017	6/21/2017	8/1/2017	10/2/2017
		Background											Detection
Antimony	µg/L	<0.01 U	<0.01 U	<0.01 U	<0.01 U	0.0100 J	-	<0.01 U	-	<0.01 U	<0.01 U	<0.01 U	-
Arsenic	µg/L	0.0900	0.0700	0.0800	0.0600	0.120	-	0.0500 J	-	0.0500 J	0.0500 J	0.0500 J	-
Barium	µg/L	83.6	84.8	94.5	81.9	88.5	-	95.5	-	69.4	83.9	85.8	-
Beryllium	µg/L	<0.005 U	<0.005 U	<0.005 U	0.00600 J	<0.005 U	-	<0.004 U	-	<0.004 U	<0.004 U	<0.004 U	-
Boron	mg/L	0.237	0.243	0.260	0.245	0.248	-	0.297	-	0.255	0.264	0.303	0.302
Cadmium	µg/L	0.00500 J	0.00700 J	<0.004 U	<0.004 U	0.00700 J	-	<0.005 U	-	<0.005 U	<0.005 U	<0.005 U	-
Calcium	mg/L	4.29	3.87	3.81	3.93	3.93	-	3.60	-	3.66	3.91	3.88	3.49
Chloride	mg/L	26.3	25.0	25.8	25.8	24.5	-	-	25.7	25.5	26.2	25.8	26.5
Chromium	µg/L	0.400	0.200	0.200	0.181	0.138	-	0.0640	-	0.0400 J	0.0560	0.163	-
Cobalt	µg/L	0.0190	0.0150	0.0200	0.0120	0.0380	-	0.0100	-	0.00700 J	0.00800 J	0.00900 J	-
Combined Radium	pCi/L	0.246	0.404	0.878	0.795	1.08	-	0.186	-	0.760	1.10	1.81	-
Fluoride	mg/L	1.31	1.14	1.43	1.11	1.26	-	-	1.16	1.03	1.23	1.38	1.37
Lead	µg/L	0.0350	0.0390	0.0250	0.0100 J	0.0220	-	0.0100 J	-	0.0200 J	0.00800 J	0.00400 J	-
Lithium	mg/L	0.0150	0.0130	0.0140	0.0140	0.0180	-	0.0130	-	0.0130	0.0130	0.0160	-
Mercury	µg/L	<0.002 U	<0.004 U	<0.002 U	<0.002 U	<0.002 U	-	<0.002 U	-	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	0.360	0.270	0.110	0.120	0.580	-	0.0700 J	-	0.300	0.100	0.190	-
Selenium	µg/L	0.0800 J	<0.03 U	<0.03 U	0.0400 J	<0.03 U	-	<0.03 U	-	<0.03 U	<0.03 U	<0.03 U	-
Total Dissolved Solids	mg/L	746	765	730	788	754	-	-	775	789	791	762	712
Sulfate	mg/L	115	118	93.7	114	95.0	-	-	123	126	108	111	82.7
Thallium	µg/L	0.0100 J	<0.01 U	0.0200 J	0.0200 J	0.0400 J	-	<0.01 U	-	<0.01 U	<0.01 U	<0.01 U	-
pH	SU	8.66	8.66	8.13	8.53	-	8.59	8.89	8.57	8.79	8.73	8.42	8.44

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	M-1309								
		7/6/2016	8/10/2016	10/26/2016	1/17/2017	5/1/2017	6/1/2017	6/26/2017	7/31/2017	9/28/2017
		Background								
Antimony	µg/L	0.0500	0.0500 J	0.0400 J	0.0200 J	0.0300 J	0.0200 J	0.0100 J	0.0100 J	-
Arsenic	µg/L	3.53	2.68	2.56	2.51	2.43	2.33	2.85	2.45	-
Barium	µg/L	35.6	39.3	38.4	37.9	35.8	38.8	33.6	33.6	-
Beryllium	µg/L	0.100	0.0730	0.0560	0.0230	0.0220	0.0240	0.0200 J	0.0100 J	-
Boron	mg/L	0.282	0.264	0.276	0.252	0.256	0.284	0.345	0.268	0.278
Cadmium	µg/L	0.0200	0.0300	0.0200 J	0.00700 J	0.0100 J	0.00600 J	<0.005 U	<0.005 U	-
Calcium	mg/L	17.4	16.8	14.1	12.3	11.3	11.1	9.20	8.85	9.55
Chloride	mg/L	46.0	40.0	39.6	38.6	39.9	38.6	38.0	39.0	39.2
Chromium	µg/L	1.50	1.00	0.828	0.319	0.398	0.224	0.187	0.154	-
Cobalt	µg/L	2.34	1.16	0.904	0.506	0.510	0.406	0.336	0.271	-
Combined Radium	pCi/L	0.527	0.825	2.84	0.562	0.642	0.695	4.64	3.54	-
Fluoride	mg/L	1.34	1.11	1.13	1.20	1.21	1.04	1.03	1.26	1.10
Lead	µg/L	1.17	0.924	0.718	0.231	0.261	0.232	0.181	0.122	-
Lithium	mg/L	0.0400	0.0290	0.0260	0.0290	0.0260	0.0210	0.0250	0.0270	-
Mercury	µg/L	<0.002 U	0.00200 J	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	8.94	7.48	5.54	4.00	3.04	3.46	22.1	2.80	-
Selenium	µg/L	0.300	0.200	0.200	0.100 J	0.0800 J	0.0500 J	0.0600 J	<0.03 U	-
Total Dissolved Solids	mg/L	1070	866	815	804	789	778	790	760	769
Sulfate	mg/L	323	222	193	172	151	149	161	154	149
Thallium	µg/L	0.0200 J	0.0100 J	0.0200 J	<0.01 U	<0.01 U	0.0200 J	<0.01 U	<0.01 U	-
pH	SU	7.77	7.79	8.21	7.90	7.99	7.67	8.00	9.14	8.20

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	MGS-1								
		11/16/2016	12/13/2016	1/11/2017	2/9/2017	5/1/2017	6/1/2017	6/21/2017	7/31/2017	10/5/2017
		Background								
Antimony	µg/L	0.0700	0.0300 J	0.0200 J	0.0100 J	0.0100 J	<0.01 U	<0.01 U	0.0100 J	-
Arsenic	µg/L	1.03	0.360	0.260	0.240	0.150	0.130	0.110	0.100	-
Barium	µg/L	113	114	108	101	102	107	96.8	98.2	-
Beryllium	µg/L	0.0450	0.0100 J	0.0100 J	0.00900 J	0.0100 J	0.0100 J	0.00900 J	0.0100 J	-
Boron	mg/L	0.312	0.260	0.280	0.342	0.304	0.313	0.286	0.250	0.268
Cadmium	µg/L	<0.004 U	0.00400 J	<0.004 U	<0.004 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	-
Calcium	mg/L	4.39	4.31	4.91	5.71	6.48	6.27	6.64	6.75	7.22
Chloride	mg/L	19.8	35.9	34.5	34.6	36.0	35.7	36.5	36.5	36.7
Chromium	µg/L	0.504	0.140	0.175	0.0400 J	0.218	0.0780	0.0790	0.127	-
Cobalt	µg/L	0.226	0.0660	0.0250	0.214	0.0200 J	0.0100 J	0.0100 J	0.0200 J	-
Combined Radium	pCi/L	2.67	1.75	1.50	0.932	0.526	0.770	1.16	0.959	-
Fluoride	mg/L	0.620	0.450	0.520	0.540	0.560	0.510	0.500	0.640	0.500
Lead	µg/L	0.665	0.0850	0.0430	0.0250	0.0200 J	0.0100 J	0.00900 J	0.00500 J	-
Lithium	mg/L	0.0250	0.0210	0.0190	0.0240	0.0190	0.0140	0.0180	0.0160	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	0.670	1.71	1.82	0.960	0.730	0.310	0.440	0.560	-
Selenium	µg/L	0.100	<0.03 U	<0.03 U	<0.03 U	0.0300 J	<0.03 U	<0.03 U	<0.03 U	-
Total Dissolved Solids	mg/L	496	642	628	642	624	640	640	644	632
Sulfate	mg/L	41.3	84.3	86.5	80.6	83.8	85.6	87.3	87.6	82.4
Thallium	µg/L	0.0200 J	0.0400 J	<0.01 U	0.0100 J	<0.01 U	<0.01 U	<0.01 U	<0.01 U	-
pH	SU	6.86	7.57	7.58	7.18	7.75	8.27	7.95	7.27	8.58

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	MGS-2								
		7/5/2016	8/11/2016	12/13/2016	1/17/2017	5/1/2017	6/1/2017	6/21/2017	7/31/2017	10/5/2017
		Background								
Antimony	µg/L	1.88	1.05	0.640	0.420	0.240	0.220	0.220	0.190	-
Arsenic	µg/L	16.4	16.3	18.2	16.4	12.1	14.4	13.5	12.3	-
Barium	µg/L	42.8	36.3	36.4	32.3	29.2	34.6	32.3	31.1	-
Beryllium	µg/L	0.0200 J	0.00600 J	0.00900 J	<0.005 U	<0.004 U	<0.004 U	<0.004 U	<0.004 U	-
Boron	mg/L	0.207	0.222	0.202	0.226	0.208	0.245	0.249	0.205	0.203
Cadmium	µg/L	0.0100 J	0.00600 J	0.00700 J	<0.004 U	<0.005 U	<0.005 U	<0.005 U	<0.005 U	-
Calcium	mg/L	15.6	14.4	6.77	6.15	6.28	7.65	5.11	6.02	3.97
Chloride	mg/L	18.5	20.9	25.8	24.6	25.8	25.8	26.8	26.0	26.5
Chromium	µg/L	0.600	0.200	0.218	0.150	0.221	0.0730	0.0580	0.155	-
Cobalt	µg/L	0.596	0.517	0.603	0.731	0.627	0.449	0.473	0.521	-
Combined Radium	pCi/L	0.537	0.0543	0.568	1.14	0.283	0.333	0.853	1.17	-
Fluoride	mg/L	0.430	0.410	0.360	0.420	0.430	0.390	0.400	0.480	0.400
Lead	µg/L	0.428	0.126	0.154	0.0640	0.0550	0.0310	0.0230	0.0100 J	-
Lithium	mg/L	0.0130	0.0160	0.00900	0.0150	0.0160	0.0160	0.0100	0.0170	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	7.11	5.11	1.65	2.60	1.39	0.930	0.950	1.19	-
Selenium	µg/L	0.200	0.100	0.0700 J	<0.03 U	<0.03 U	0.0500 J	0.0400 J	0.0500 J	-
Total Dissolved Solids	mg/L	644	626	592	572	586	613	597	602	600
Sulfate	mg/L	152	131	91.2	82.9	93.1	95.0	85.3	101	79.6
Thallium	µg/L	0.0100 J	<0.01 U	0.0100 J	0.0300 J	<0.01 U	<0.01 U	<0.01 U	<0.01 U	-
pH	SU	7.46	7.77	7.59	7.59	7.77	7.21	7.95	7.29	8.45

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	MGS-3								
		6/30/2016	8/9/2016	11/16/2016	1/11/2017	5/1/2017	6/1/2017	6/21/2017	7/27/2017	10/5/2017
		Background								
Antimony	µg/L	2.27	0.650	0.640	0.600	0.300	0.260	0.280	0.220	-
Arsenic	µg/L	79.1	83.5	101	76.5	11.9	12.7	19.9	20.3	-
Barium	µg/L	26.2	20.2	19.4	17.0	13.6	13.9	14.5	12.0	-
Beryllium	µg/L	0.0100 J	0.0100 J	0.0300 J	0.0200 J	0.00900 J	0.0100 J	0.0100 J	0.0100 J	-
Boron	mg/L	0.381	0.614	0.756	0.759	0.423	0.507	0.637	0.734	0.870
Cadmium	µg/L	0.0200 J	0.0500	0.0200 J	0.0200 J	0.0200 J	0.0100 J	0.0200 J	0.0100 J	-
Calcium	mg/L	192	109	102	100	222	216	194	156	94.4
Chloride	mg/L	15.9	20.7	26.3	25.5	16.3	14.4	20.6	21.8	28.7
Chromium	µg/L	0.300	0.300	0.498	0.311	0.296	0.103	0.129	0.356	-
Cobalt	µg/L	5.47	7.16	6.80	4.54	2.15	1.55	2.08	2.20	-
Combined Radium	pCi/L	1.31	1.72	1.25	1.94	1.18	1.89	1.94	1.52	-
Fluoride	mg/L	0.340	0.340	0.340	0.290	0.230	0.200	0.210	0.200	0.240
Lead	µg/L	0.461	0.289	0.457	0.479	0.150	0.0880	0.263	0.173	-
Lithium	mg/L	0.0600	0.0500	0.0670	0.0620	0.0410	0.0400	0.0500	0.0550	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	9.26	4.64	3.14	3.29	1.90	6.93	2.95	1.77	-
Selenium	µg/L	0.400	0.0600 J	0.0700 J	<0.06 U	<0.06 U	<0.06 U	<0.06 U	<0.06 U	-
Total Dissolved Solids	mg/L	2130	2250	2480	2430	2110	2070	2280	2320	2320
Sulfate	mg/L	1270	1310	1470	1470	1240	1260	1460	1370	1360
Thallium	µg/L	0.241	0.353	0.370	0.390	0.212	0.234	0.292	0.368	-
pH	SU	6.85	6.72	6.14	6.57	6.86	6.98	7.38	8.77	7.84

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	MGS-4								
		11/16/2016	12/13/2016	1/11/2017	2/9/2017	5/1/2017	6/1/2017	6/21/2017	7/31/2017	10/2/2017
		Background								
Antimony	µg/L	0.370	0.0800	0.130	0.0500	0.0600	0.0500	0.0500 J	0.0400 J	-
Arsenic	µg/L	3.57	5.09	9.43	11.1	15.0	15.6	15.8	14.9	-
Barium	µg/L	42.0	33.5	29.5	23.0	20.1	19.9	18.0	16.4	-
Beryllium	µg/L	0.0660	0.0200 J	0.0100 J	0.00500 J	0.00400 J	<0.004 U	<0.004 U	<0.004 U	-
Boron	mg/L	0.178	0.151	0.161	0.267	0.209	0.175	0.191	0.142	0.183
Cadmium	µg/L	0.0300	0.0200 J	0.0200 J	0.00700 J	<0.005 U	<0.005 U	<0.005 U	<0.005 U	-
Calcium	mg/L	96.4	131	97.3	74.0	30.1	27.2	20.2	16.5	11.1
Chloride	mg/L	14.3	16.3	15.3	14.5	13.2	12.8	12.1	11.9	11.5
Chromium	µg/L	0.983	0.344	0.841	0.257	0.0810	0.118	0.0760	0.120	-
Cobalt	µg/L	3.93	3.21	2.61	1.40	0.484	0.507	0.280	0.243	-
Combined Radium	pCi/L	0.334	1.11	1.75	0.635	0.571	0.184	0.317	0.771	-
Fluoride	mg/L	0.310	0.240	0.320	0.340	0.460	0.430	0.450	0.620	0.530
Lead	µg/L	1.62	0.304	0.409	0.133	0.0620	0.0470	0.0270	0.0100 J	-
Lithium	mg/L	0.0370	0.0300	0.0310	0.0350	0.0190	0.0180	0.0180	0.0150	-
Mercury	µg/L	0.00200 J	<0.002 U	0.00200 J	<0.002 U	<0.002 U	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	7.97	5.20	5.87	4.57	2.87	3.47	2.58	2.66	-
Selenium	µg/L	0.300	0.100	0.0800 J	0.0500 J	0.0600 J	0.0400 J	<0.03 U	<0.03 U	-
Total Dissolved Solids	mg/L	1540	1630	1410	1200	850	848	717	672	586
Sulfate	mg/L	848	914	741	556	283	298	189	152	98.3
Thallium	µg/L	0.0400 J	0.0200 J	0.125	0.0200 J	<0.01 U	<0.01 U	<0.01 U	<0.01 U	-
pH	SU	6.64	7.21	7.36	7.10	7.84	7.87	8.03	8.97	8.34

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

**Table 1 - Groundwater Data Summary
Cardinal Plant - Fly Ash Reservoir II**

Paramter	Unit	MGS-5								
		11/17/2016	12/14/2016	1/10/2017	2/9/2017	4/17/2017	5/30/2017	6/21/2017	7/27/2017	10/3/2017
		Background								
Antimony	µg/L	2.90	0.360	0.190	0.120	0.100	0.0700	0.0600	0.0500 J	-
Arsenic	µg/L	5.47	22.7	20.8	20.7	25.0	24.1	23.1	22.6	-
Barium	µg/L	71.6	66.9	64.0	59.1	75.1	77.5	75.4	78.7	-
Beryllium	µg/L	0.0200 J	0.0730	0.0290	0.0100 J	0.00900 J	0.00600 J	<0.004 U	<0.004 U	-
Boron	mg/L	0.168	0.251	0.297	0.360	0.287	0.300	0.302	0.300	0.287
Cadmium	µg/L	0.0100 J	0.0200	0.00700 J	0.00900 J	<0.005 U	<0.005 U	<0.005 U	0.0100 J	-
Calcium	mg/L	25.5	7.05	5.92	5.36	4.40	4.20	4.09	3.73	3.62
Chloride	mg/L	78.1	163	155	159	159	162	166	161	174
Chromium	µg/L	0.231	0.517	0.594	0.348	0.173	0.117	0.106	0.217	-
Cobalt	µg/L	1.46	0.656	0.165	0.0650	0.0520	0.0270	0.0240	0.0320	-
Combined Radium	pCi/L	0.833	1.57	0.900	2.57	0.342	1.23	1.87	2.01	-
Fluoride	mg/L	1.61	4.41	4.66	4.73	4.74	4.97	5.27	5.09	5.09
Lead	µg/L	0.206	2.22	1.16	0.323	0.190	0.0990	0.0590	0.127	-
Lithium	mg/L	0.0210	0.0190	0.0230	0.0230	0.0120	0.0180	0.0170	0.0170	-
Mercury	µg/L	<0.002 U	<0.002 U	<0.002 U	<0.002 U	0.00200 J	<0.002 U	<0.002 U	<0.002 U	-
Molybdenum	µg/L	42.0	19.0	16.0	12.6	10.6	8.95	8.05	9.78	-
Selenium	µg/L	0.200	0.200	0.0600 J	0.0800 J	<0.03 U	0.0300 J	<0.03 U	0.0300 J	-
Total Dissolved Solids	mg/L	798	542	1140	1110	-	1080	1100	1060	1090
Sulfate	mg/L	211	94.3	74.3	45.8	29.9	24.8	20.4	14.6	2.70
Thallium	µg/L	0.0200 J	0.0200 J	0.0650	0.0400 J	<0.01 U	<0.01 U	<0.01 U	<0.01 U	-
pH	SU	6.98	8.29	8.53	7.96	8.72	8.79	8.47	8.11	8.27

Notes:

µg/L: micrograms per liter

mg/L: milligrams per liter

pCi/L: picocuries per liter

SU: standard unit

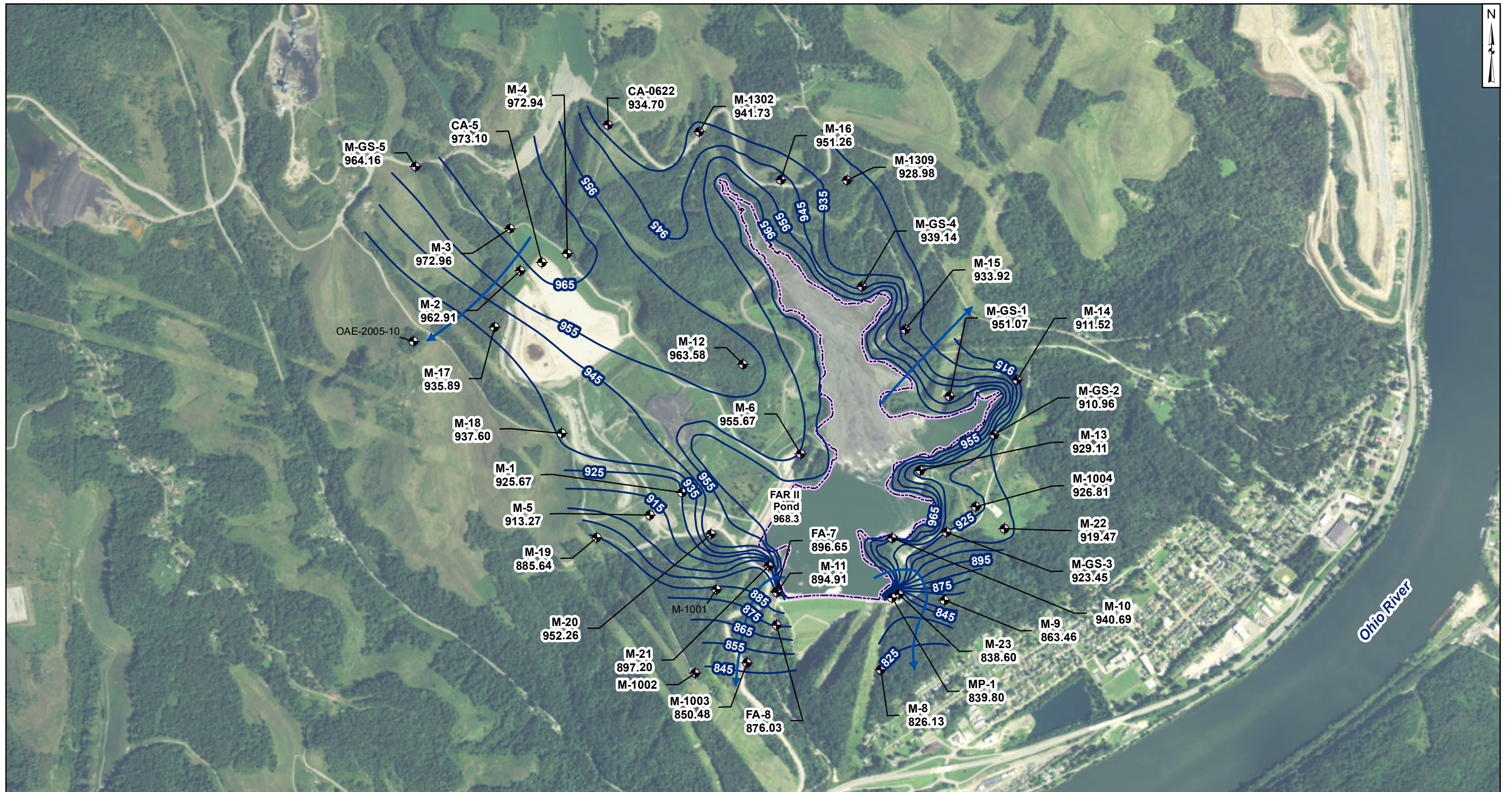
U: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL).

J: Estimated value. Parameter was detected in concentrations below the reporting limit

-: Not sampled

For statistical analysis, parameters which were not detected were replaced with the reporting limit.

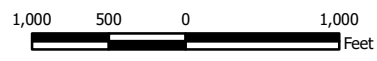
Groundwater Flow Direction Maps



- Legend**
- Inactive FAR II Network Monitoring Well
 - FAR II Network Monitoring Well
 - State/Other Program Monitoring Well
 - Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected between June 21 and June 22, 2016) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
June 2016**

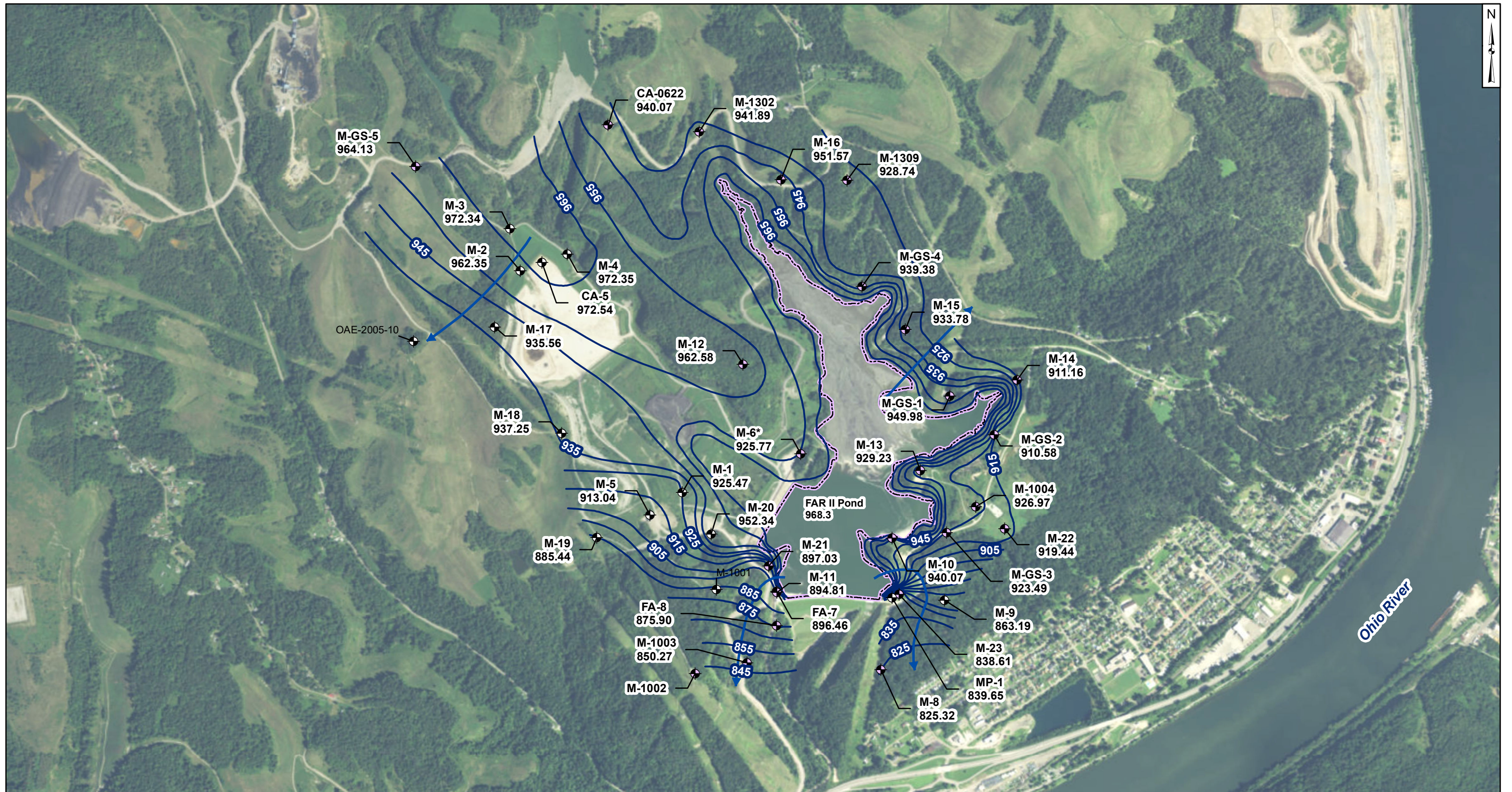
AEP Cardinal Generating Plant
Brilliant, Ohio

Geosyntec
consultants

Columbus, Ohio

2017/10/24

Figure
1

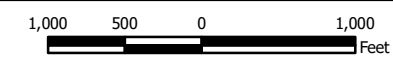


Legend

- Inactive FAR II Network Monitoring Well
- FAR II Network Monitoring Well
- State/Other Program Monitoring Well
- Approximate Groundwater Flow Direction
- Groundwater Elevation Contour
- Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected between August 1 and August 2, 2016) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.



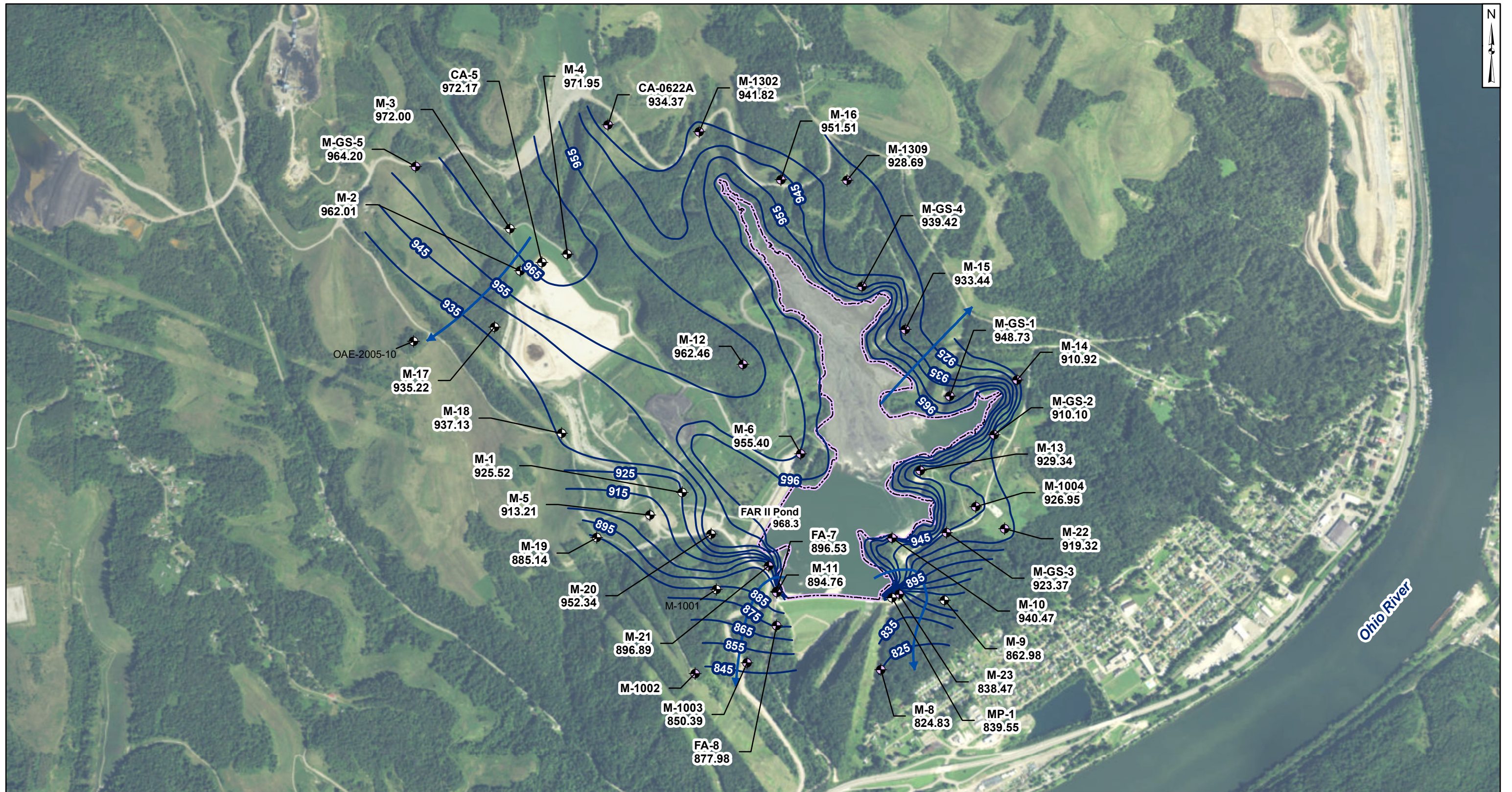
**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
August 2016**

AEP Cardinal Generating Plant
Brilliant, Ohio

Geosyntec
consultants

Columbus, Ohio 2017/12/19

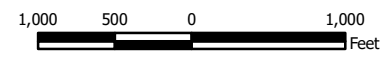
Figure 2



- Legend**
- ⊕ Inactive FAR II Network Monitoring Well
 - ⊙ FAR II Network Monitoring Well
 - ⊕ State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ▭ Fly Ash Reservoir (FAR II)

Notes

- Monitoring well coordinates and water level data (collected between October 3 and October 4, 2016) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
October 2016**

AEP Cardinal Generating Plant
Brilliant, Ohio

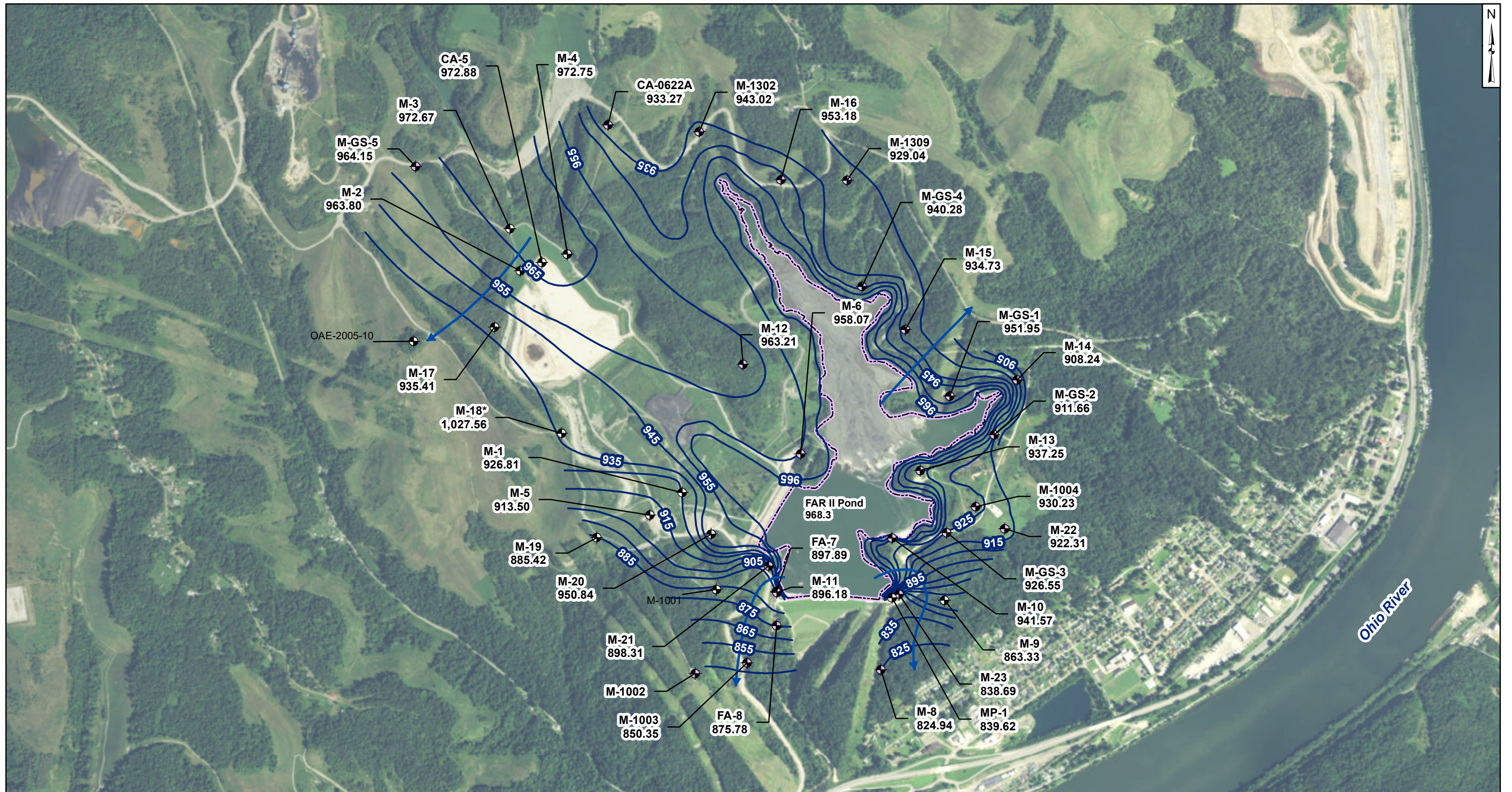
Geosyntec
consultants

Figure

3

Columbus, Ohio

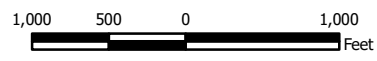
2017/12/19



- Legend**
- ⊕ Inactive FAR II Network Monitoring Well
 - ⊙ FAR II Network Monitoring Well
 - ⊕ State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ▭ Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected on November 14, 2016) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Data not used for groundwater contouring due to inconsistent/anomalous reading.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
November 2016**

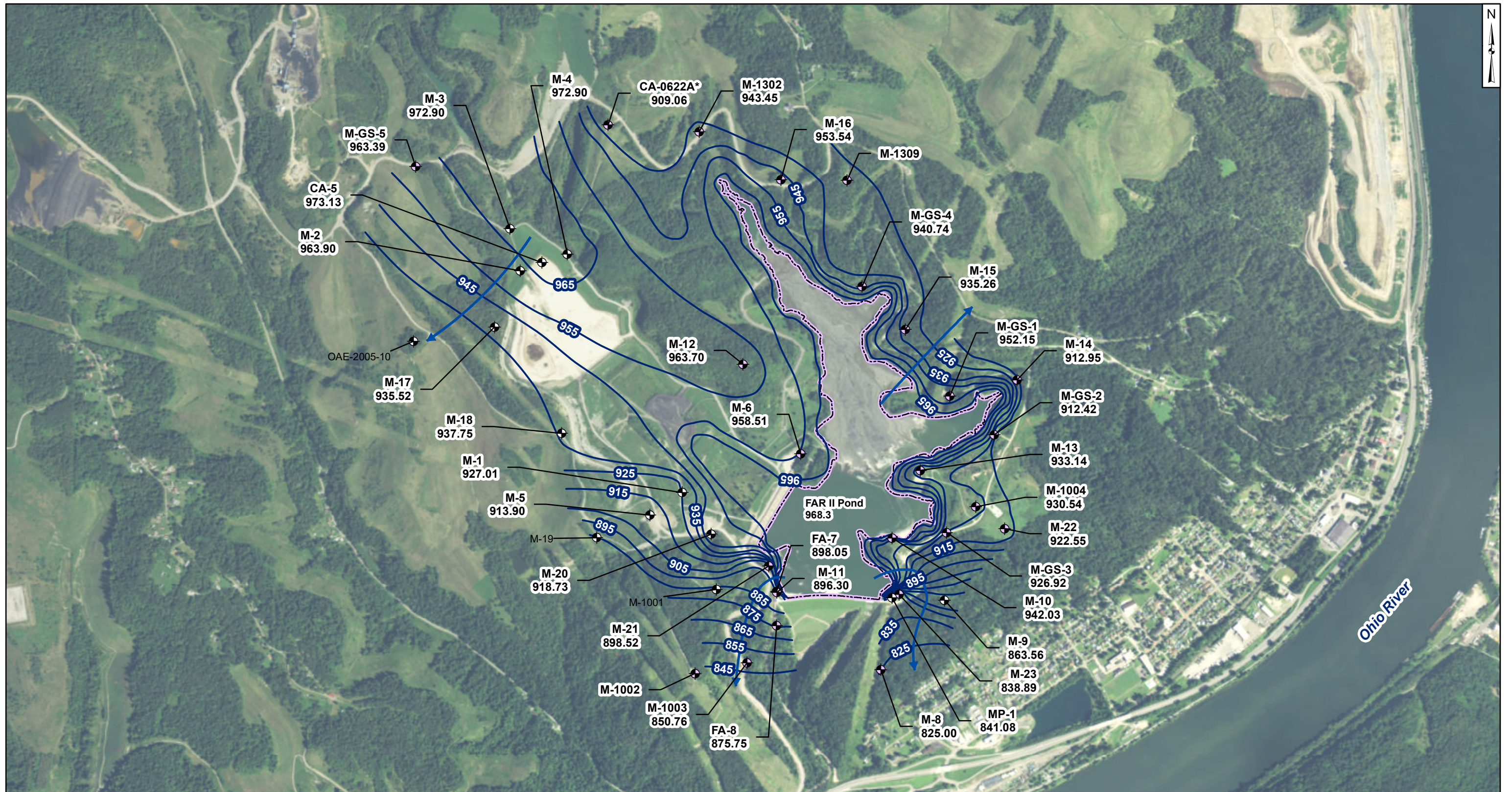
AEP Cardinal Generating Plant
Brilliant, Ohio

Geosyntec
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Columbus, Ohio

2017/12/20

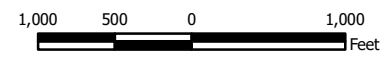
Figure
4



- Legend**
- ⊕ Inactive FAR II Network Monitoring Well
 - ⊙ FAR II Network Monitoring Well
 - ⊕ State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ▭ Fly Ash Reservoir (FAR II)

Notes

- Monitoring well coordinates and water level data (collected on December 12, 2016) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Data not used for contouring due to inconsistent/anomalous reading.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
December 2016**

AEP Cardinal Generating Plant
Brilliant, Ohio

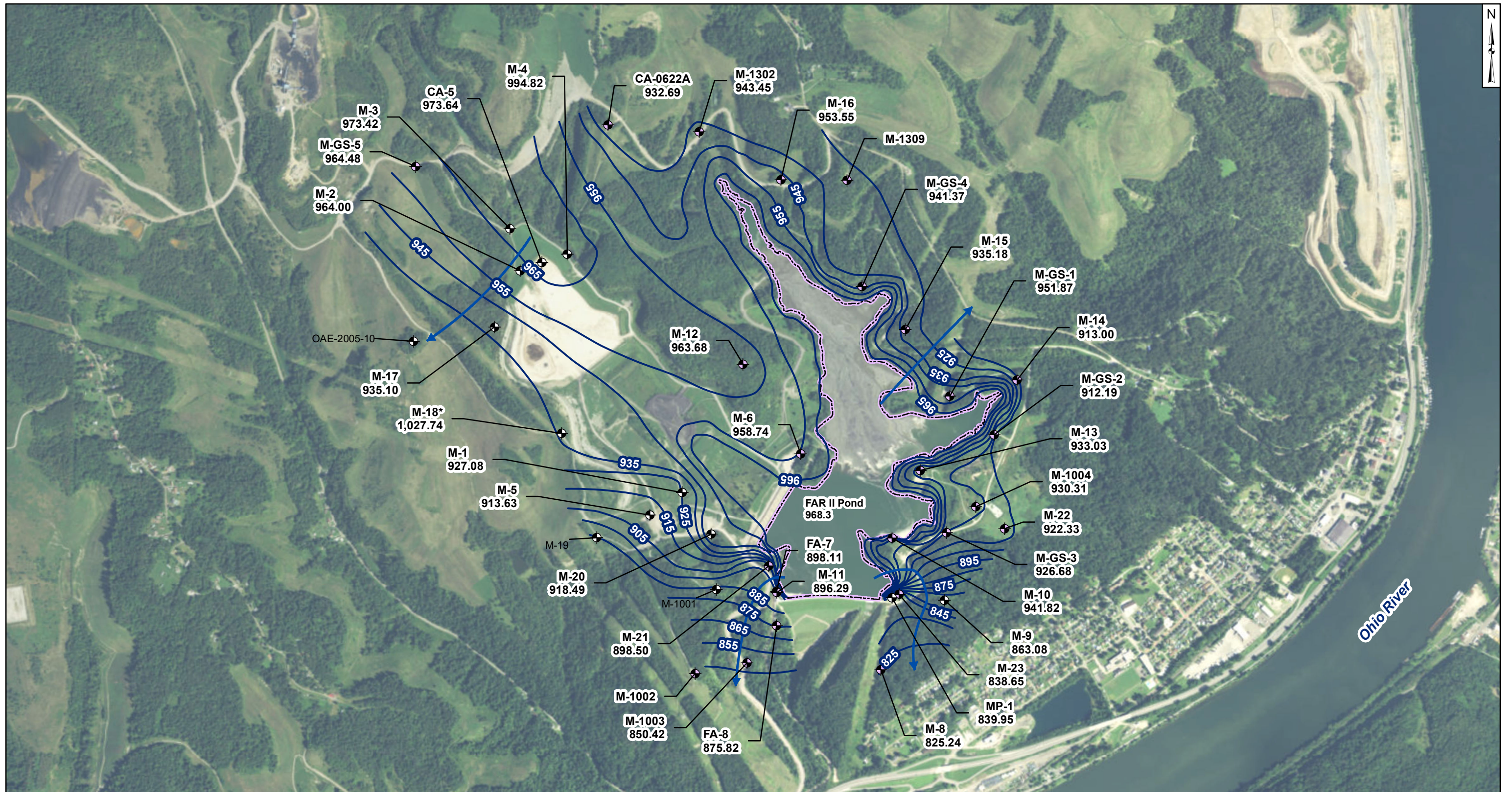
Geosyntec
consultants

Columbus, Ohio

2017/12/20

Figure

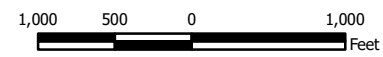
5



- Legend**
- ⊕ Inactive FAR II Network Monitoring Well
 - ⊙ FAR II Network Monitoring Well
 - ⊕ State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ⬡ Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected on January 9, 2017) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Data not used for contouring due to inconsistent/anomalous reading.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
January 2017**

AEP Cardinal Generating Plant
Brilliant, Ohio

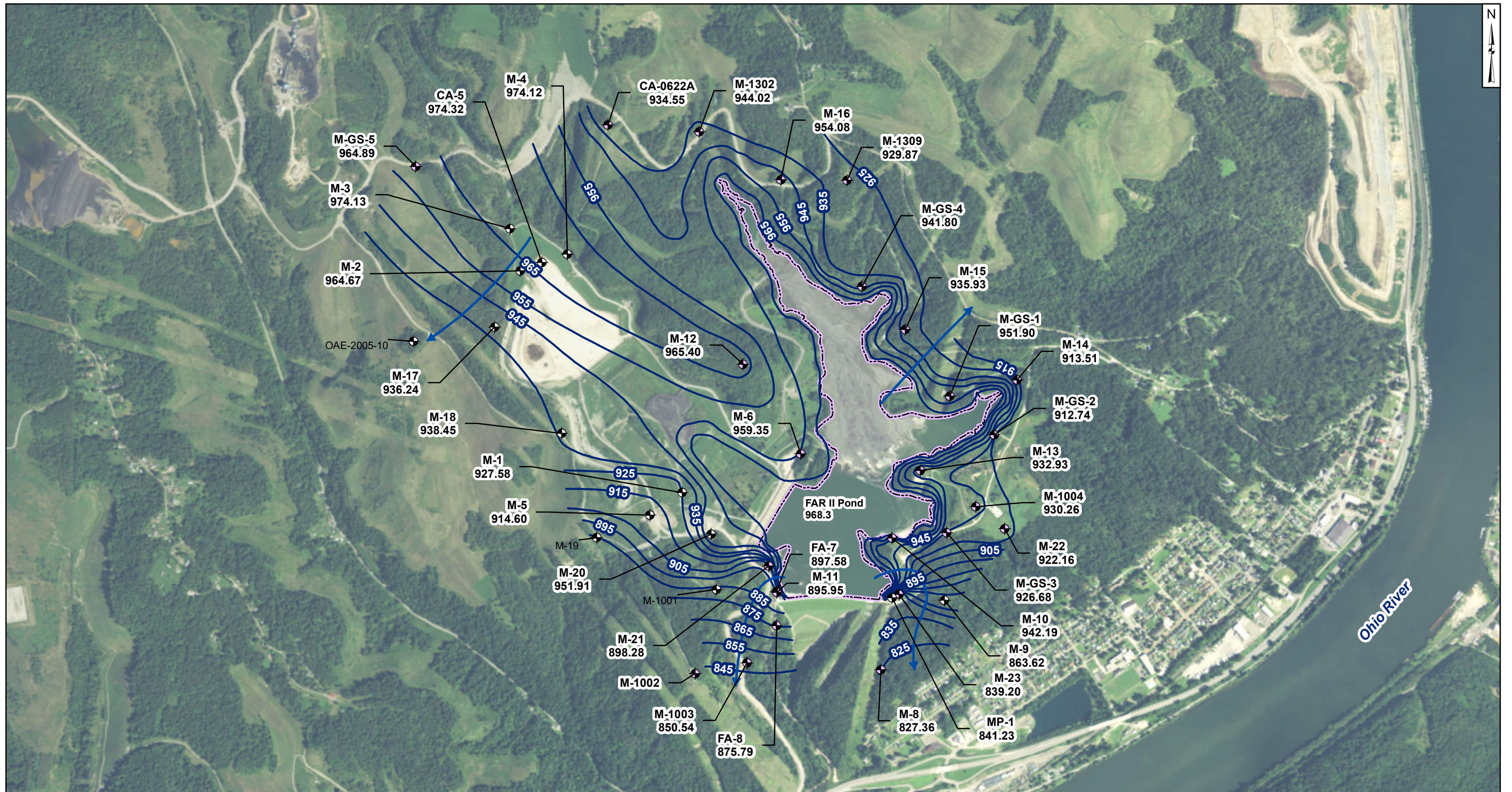
Geosyntec
consultants

Columbus, Ohio

2017/12/20

Figure

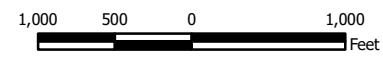
6



- Legend**
- ⊕ Inactive FAR II Network Monitoring Well
 - ⊙ FAR II Network Monitoring Well
 - ⊕ State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ▭ Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected on April 10, 2017) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Data not used for contouring due to inconsistent/anomalous reading.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
April 2017**

AEP Cardinal Generating Plant
Brilliant, Ohio

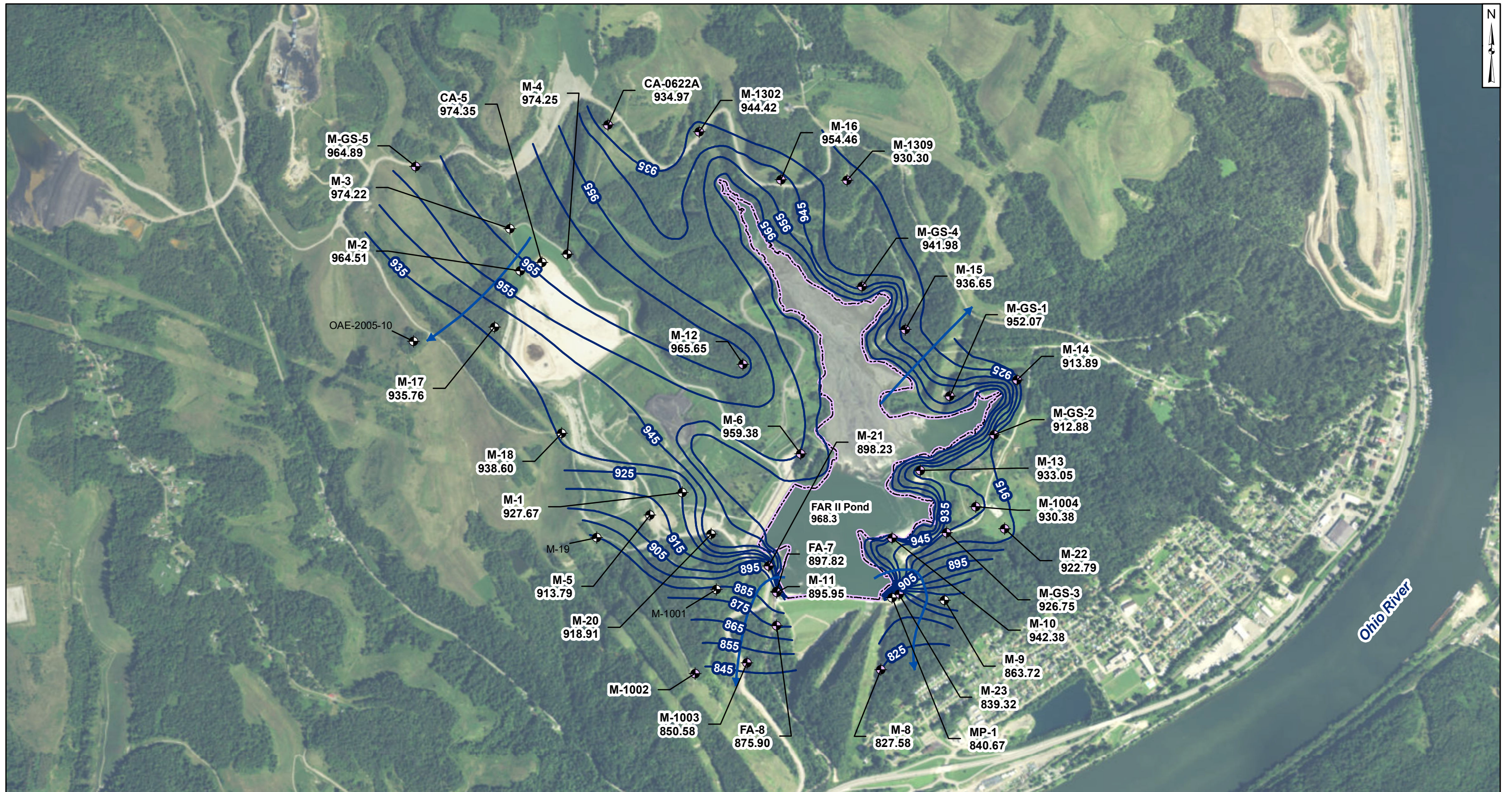


Columbus, Ohio

2017/12/20

Figure

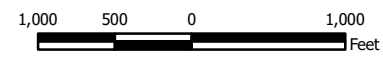
7



- Legend**
- Inactive FAR II Network Monitoring Well
 - FAR II Network Monitoring Well
 - State/Other Program Monitoring Well
 - Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - Fly Ash Reservoir (FAR II)

Notes

- Monitoring well coordinates and water level data (collected on May 23, 2017) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Data not used for contouring due to inconsistent/anomalous reading.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
May 2017**

AEP Cardinal Generating Plant
Brilliant, Ohio

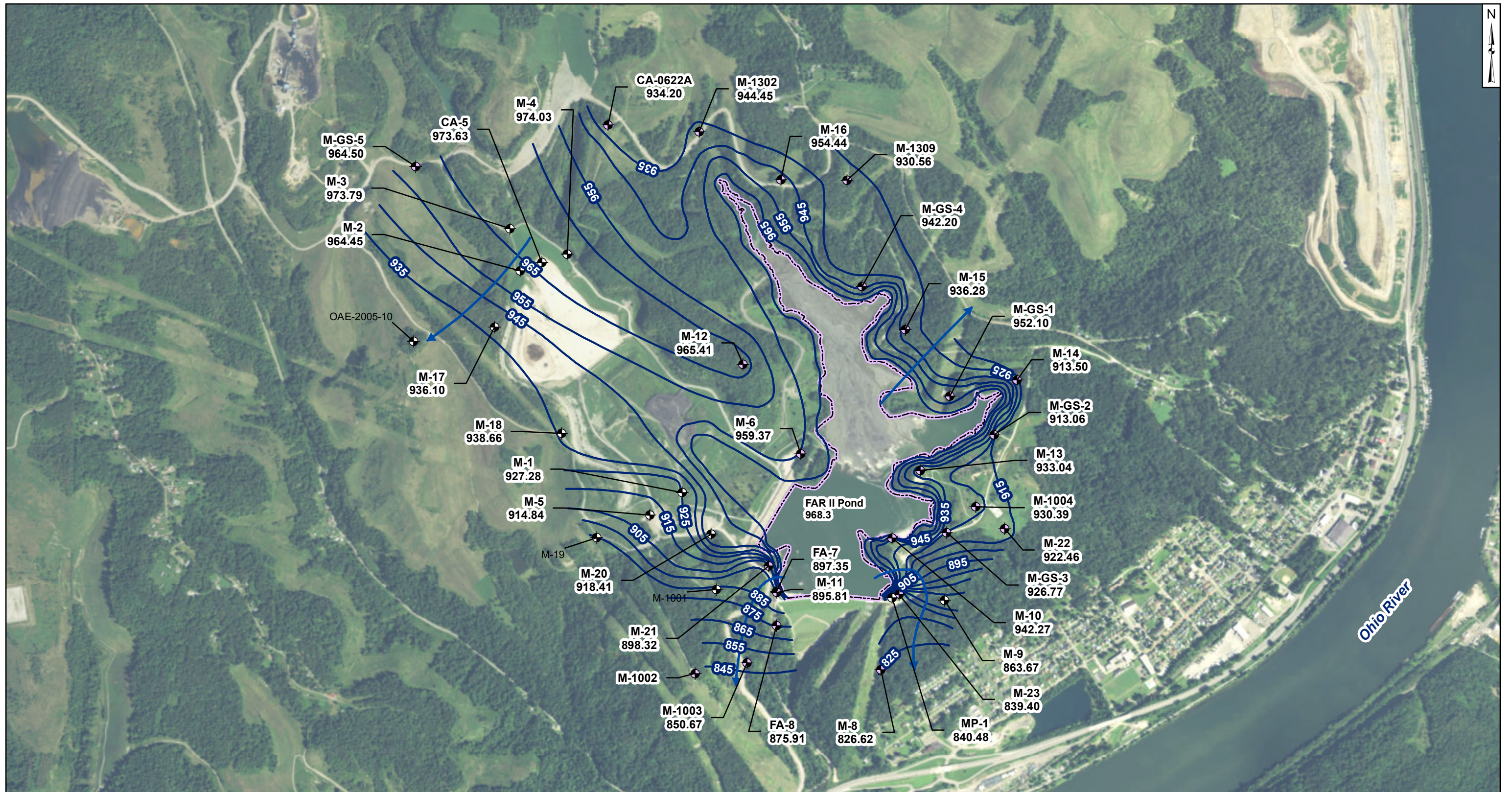
Geosyntec
consultants

Columbus, Ohio

2017/12/20

Figure

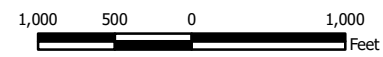
8



- Legend**
- ⊕ Inactive FAR II Network Monitoring Well
 - ⊙ FAR II Network Monitoring Well
 - ⊕ State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ⬡ Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected between June 21 and June 22, 2017) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Data not used for contouring due to inconsistent/anomalous reading.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
June 2017**

AEP Cardinal Generating Plant
Brilliant, Ohio

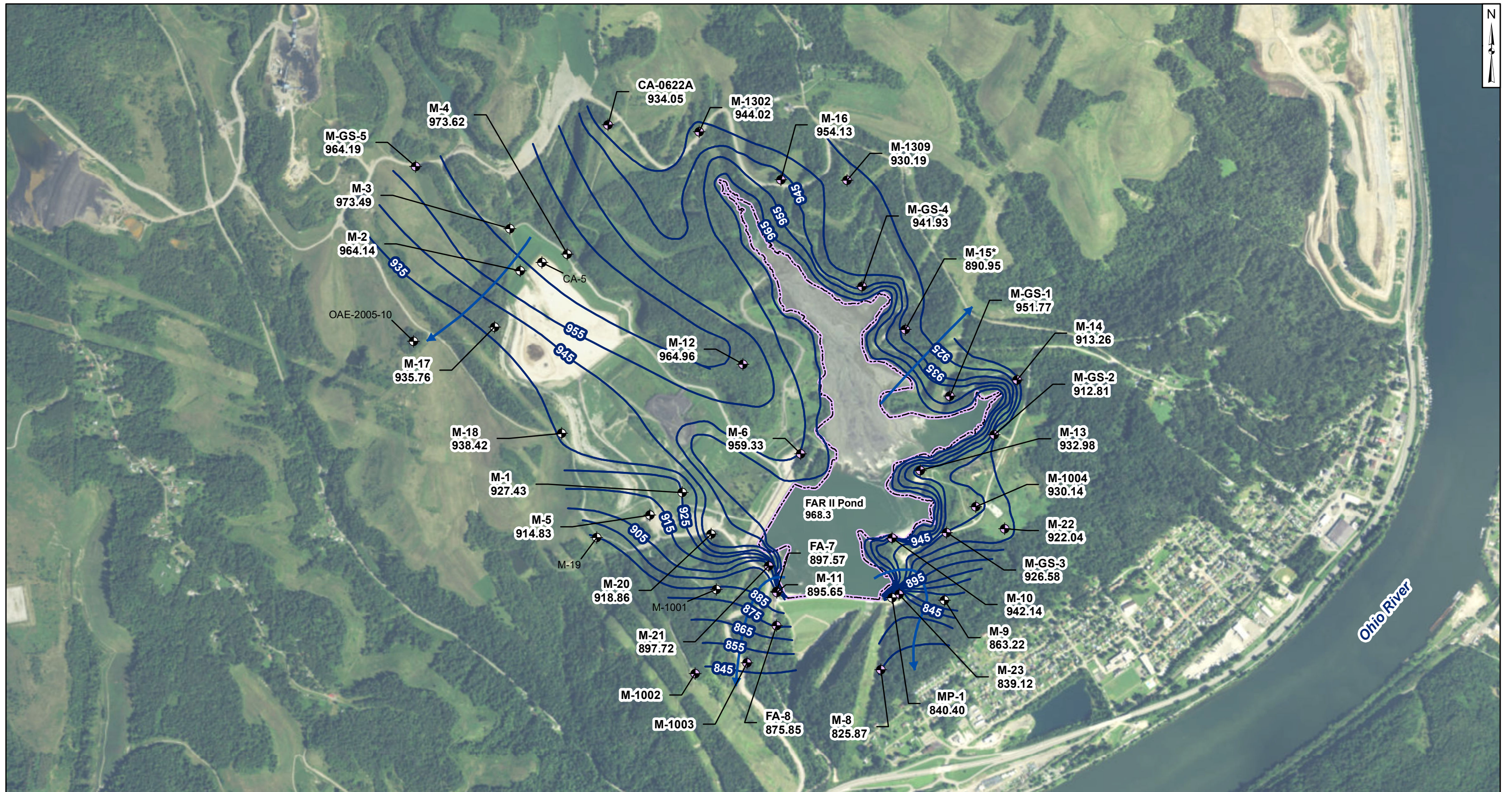
Geosyntec
consultants

Columbus, Ohio

2017/12/20

Figure

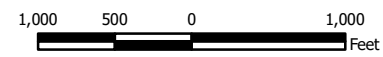
9



- Legend**
- ⊕ Inactive FAR II Network Monitoring Well
 - ⊙ FAR II Network Monitoring Well
 - ⊙ State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ⬡ Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected on July 25, 2017) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Data not used for contouring due to inconsistent/anomalous reading.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
July 2017**

AEP Cardinal Generating Plant
Brilliant, Ohio

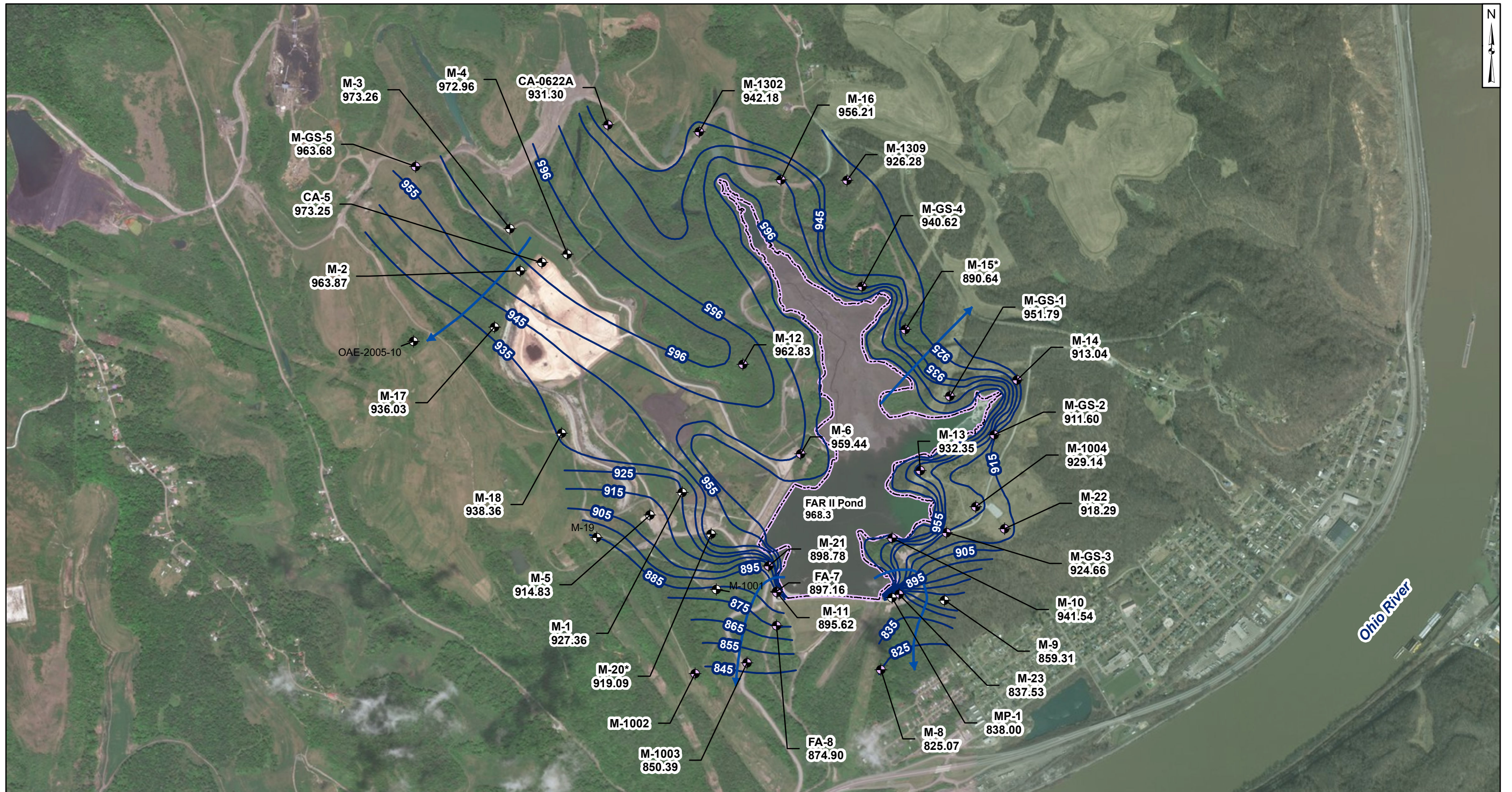
Geosyntec
consultants

Columbus, Ohio

2017/12/20

Figure

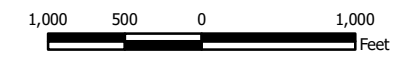
10



- Legend**
- FAR II Network Monitoring Well
 - State/Other Program Monitoring Well
 - ➔ Approximate Groundwater Flow Direction
 - Groundwater Elevation Contour
 - ▭ Fly Ash Reservoir (FAR) II

Notes

- Monitoring well coordinates and water level data (collected on October 1, 2017) provided by AEP.
- Site features based on information available in Groundwater Monitoring Network Evaluation - Cardinal Site - Former Fly Ash Reservoir II - Residual Solid Waste Landfill (Geosyntec, 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- * Well not used for contouring due to inconsistent/anomalous data.



**Potentiometric Surface Map - Morgantown Aquifer
Fly Ash Reservoir (FAR) II
October 2017**

AEP Cardinal Generating Plant
Brilliant, Ohio



Columbus, Ohio

2018/01/29

Figure
11

Groundwater Flow Velocity Calculations

**Table 1: Residence Time Calculation Summary
Cardinal Plant - Fly Ash Reservoir II**

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2016-06		2016-08		2016-10		2016-11		2016-12	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Fly Ash Reservoir II	CA-0622/A ^[1]	2.0	13.9	4.4	7.2	8.4	14.4	4.2	15.9	3.8	48.6	1.3
	FA-8 ^[2]	2.0	18.4	3.3	18.2	3.3	21.6	2.8	18.0	3.4	17.9	3.4
	M-10 ^[2]	0.75	16.2	1.4	15.6	1.5	16.0	1.4	17.1	1.3	17.6	1.3
	M-1003 ^[2]	2.0	8.7	7.0	9.1	6.7	8.9	6.9	8.9	6.8	8.1	7.5
	M-1004 ^[2]	2.0	3.5	17.4	3.6	17.0	3.6	17.1	5.3	11.6	5.4	11.2
	M-11 ^[2]	1.0	18.1	1.7	17.9	1.7	17.8	1.7	20.4	1.5	20.6	1.5
	M-12 ^[1]	2.0	8.6	7.1	7.6	8.0	7.5	8.1	8.2	7.4	8.7	7.0
	M-13 ^[2]	2.0	3.3	18.3	3.4	17.7	3.5	17.3	9.9	6.1	6.6	9.2
	M-1302 ^[1]	2.0	17.3	3.5	17.7	3.4	17.5	3.5	20.6	3.0	21.7	2.8
	M-1309 ^[2]	2.0	5.7	10.6	6.0	10.2	6.0	10.1	5.7	10.7	NC	NC
	M-14 ^[2]	2.0	65.1	0.9	65.5	0.9	65.8	0.9	69.0	0.9	63.3	1.0
	M-15 ^[2]	2.0	12.8	4.8	12.6	4.8	12.1	5.0	14.0	4.4	14.7	4.1
	M-16 ^[2]	2.0	18.4	3.3	18.8	3.2	18.7	3.3	20.6	3.0	21.0	2.9
	M-21 ^[2]	2.0	9.6	6.3	9.5	6.4	9.4	6.5	10.5	5.8	10.7	5.7
	M-22 ^[2]	2.0	5.0	12.2	5.0	12.2	5.1	11.9	2.4	25.1	2.2	27.6
	M-23 ^[2]	2.0	3.5	17.5	3.5	17.5	3.3	18.2	3.6	17.1	3.7	16.2
	M-6 ^[1]	1.0	7.6	4.0	32.1	0.9	7.8	3.9	5.7	5.4	5.3	5.7
	M-8 ^[2]	2.0	11.4	5.3	12.4	4.9	13.0	4.7	12.9	4.7	12.8	4.7
	M-GS-1 ^[2]	2.0	20.5	3.0	19.1	3.2	17.5	3.5	21.6	2.8	21.8	2.8
	M-GS-2 ^[2]	2.0	92.0	0.7	92.6	0.7	93.4	0.7	90.8	0.7	89.5	0.7
M-GS-3 ^[2]	2.0	16.6	3.7	16.7	3.6	16.5	3.7	22.7	2.7	23.4	2.6	
M-GS-4 ^[2]	2.0	9.1	6.7	9.6	6.3	9.7	6.3	11.6	5.3	12.6	4.8	
M-GS-5 ^[1]	2.0	11.4	5.4	11.3	5.4	11.4	5.3	11.3	5.4	10.4	5.8	

**Table 1: Residence Time Calculation Summary
Cardinal Plant - Fly Ash Reservoir II**

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2017-01		2017-04		2017-05		2017-06		2017-07		2017-10	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Fly Ash Reservoir II	CA-0622/A ^[1]	2.0	16.6	3.7	14.1	4.3	13.6	4.5	14.6	4.2	14.8	4.1	12.3	5.0
	FA-8 ^[2]	2.0	18.0	3.4	18.0	3.4	18.2	3.3	18.2	3.3	18.1	3.4	22.0	2.8
	M-10 ^[2]	0.75	17.4	1.3	17.8	1.3	18.0	1.3	17.8	1.3	17.7	1.3	105	0.2
	M-1003 ^[2]	2.0	8.8	6.9	8.6	7.1	8.5	7.2	8.3	7.3	NC	NC	16.1	3.3
	M-1004 ^[2]	2.0	5.3	11.5	5.3	11.6	5.3	11.4	5.3	11.4	5.2	11.7	16.0	3.8
	M-11 ^[2]	1.0	20.6	1.5	20.0	1.5	20.0	1.5	19.7	1.5	19.4	1.6	17.5	1.7
	M-12 ^[1]	2.0	8.7	7.0	10.4	5.8	10.7	5.7	10.4	5.8	10.0	6.1	3.7	16.6
	M-13 ^[2]	2.0	6.5	9.3	6.4	9.5	6.5	9.3	6.5	9.3	6.5	9.4	6.3	9.6
	M-1302 ^[1]	2.0	21.7	2.8	23.1	2.6	24.2	2.5	24.2	2.5	23.1	2.6	3.8	16.0
	M-1309 ^[2]	2.0	NC	NC	4.9	12.5	4.5	13.6	4.2	14.4	4.6	13.3	2.2	27.8
	M-14 ^[2]	2.0	63.3	1.0	62.6	1.0	62.2	1.0	62.7	1.0	62.9	1.0	79.3	0.8
	M-15 ^[2]	2.0	14.6	4.2	15.7	3.9	16.7	3.6	16.2	3.8	48.8	1.2	56.4	1.1
	M-16 ^[2]	2.0	21.0	2.9	21.6	2.8	22.0	2.8	22.0	2.8	21.7	2.8	12.4	4.9
	M-21 ^[2]	2.0	10.7	5.7	10.5	5.8	10.4	5.8	10.5	5.8	10.0	6.1	12.8	4.8
	M-22 ^[2]	2.0	2.4	25.3	2.6	23.8	2.0	30.6	2.3	26.6	2.7	22.8	8.6	7.1
	M-23 ^[2]	2.0	3.5	17.3	4.0	15.0	4.2	14.6	4.2	14.4	4.0	15.3	2.7	22.7
	M-6 ^[1]	1.0	5.1	5.9	4.6	6.6	4.6	6.6	4.6	6.6	4.6	6.6	5.3	5.7
	M-8 ^[2]	2.0	12.5	4.9	9.8	6.2	9.5	6.4	10.8	5.7	11.7	5.2	3.3	18.5
	M-GS-1 ^[2]	2.0	21.5	2.8	21.5	2.8	21.7	2.8	21.8	2.8	21.3	2.8	13.2	4.6
	M-GS-2 ^[2]	2.0	89.9	0.7	88.9	0.7	88.7	0.7	88.4	0.7	88.8	0.7	174	0.3
M-GS-3 ^[2]	2.0	23.0	2.6	23.0	2.6	23.1	2.6	23.1	2.6	22.8	2.7	18.3	3.3	
M-GS-4 ^[2]	2.0	13.9	4.4	14.9	4.1	15.3	4.0	15.8	3.9	15.2	4.0	12.6	4.8	
M-GS-5 ^[1]	2.0	11.8	5.2	12.3	5.0	12.3	5.0	11.8	5.2	11.4	5.3	11.4	5.4	

Notes:
 [1] - Background Well
 [2] - Downgradient Well

APPENDIX II

Not applicable at this time.