

# Annual Groundwater Monitoring Report

Southwestern Electric Power Company

John W. Turk Power Plant

Landfill CCR Management Unit

Fulton, Arkansas

January 2020

Prepared by:

American Electric Power Service Corporation

1 Riverside Plaza

Columbus, Ohio 43215



An **AEP** Company

BOUNDLESS ENERGY™

**Table of Contents**

I. Overview ..... 2

II. Groundwater Monitoring Well Locations and Identification Numbers ..... 4

III. Monitoring Wells Installed or Decommissioned ..... 4

IV. Groundwater Quality Data and Static Water Elevation Data, With Flow Rate and Direction and Discussion ..... 4

V. Statistical Evaluation of 2018 and 2019 Events..... 5

VI. Alternate Source Demonstration..... 5

VII. Discussion About Transition Between Monitoring Requirements or Alternate Monitoring Frequency..... 5

VIII. Other Information Required..... 5

IX. Description of Any Problems Encountered in 2019 and Actions Taken ..... 5

X. A Projection of Key Activities for the Upcoming Year..... 5

**Appendix I**

**Appendix II**

## I. Overview

This *Annual Groundwater Monitoring Report* (Report) has been prepared to report the status of activities for the preceding year for an existing CCR unit at Southwestern Electric Power Company's, a wholly-owned subsidiary of American Electric Power Company (AEP), Turk Power 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, 2020.

At the beginning of 2019 the landfill was in detection monitoring. At the end of 2019 the landfill was still in detection monitoring.

In general, the following activities were completed:

- Groundwater samples were collected and analyzed for Appendix III 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;
- There were no statistically significant increases (SSIs) determined for the 2<sup>nd</sup> half 2018 groundwater sampling and analysis event;
- There were no statistically significant increases (SSIs) determined for the 1<sup>st</sup> half 2019 groundwater sampling and analysis event;
- There were no statistically significant increases (SSIs) determined for the 2<sup>nd</sup> half 2019 groundwater sampling and analysis event;
- Groundwater Monitoring Statistical Evaluation Reports to evaluate groundwater data were prepared and certified in accordance with 40 CFR 257.93. The statistical process was guided by USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* ("Unified Guidance", USEPA, 2009).

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 is included in Appendix I;

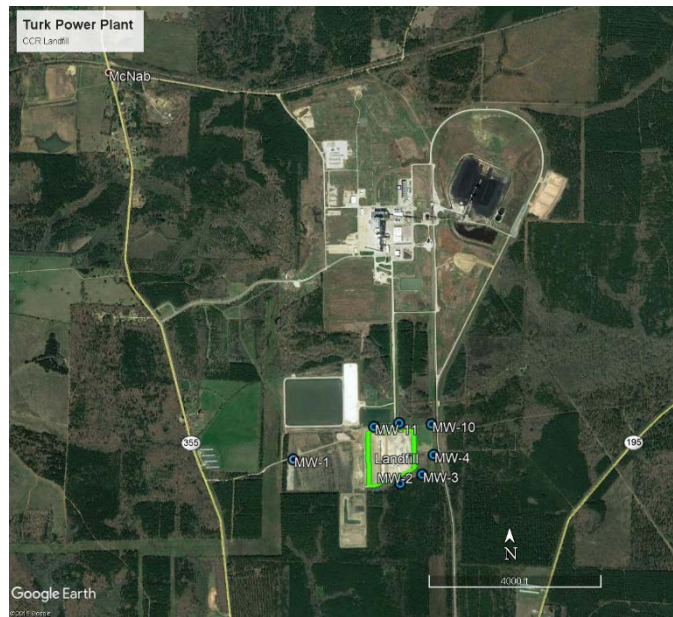
- A summary of any transition between monitoring programs or an alternate monitoring frequency, for example the date and circumstances for transitioning from detection monitoring to assessment monitoring, in addition to identifying the constituents detected at a statistically significant increase over background concentrations.
- 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 numbers.

Landfill Monitoring Wells	
Up Gradient	Down Gradient
MW-1	MW-2
	MW-3
	MW-4
	MW-5
	MW-6



**III. Monitoring Wells Installed or Decommissioned**

There were no monitoring wells installed or decommissioned this year.

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

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

**V. Statistical Evaluation of 2018 and 2019 Events**

The 2<sup>nd</sup> half 2018 statistical analysis report is included in Appendix II. There were no statistically significant increases (SSIs) determined for the 2<sup>nd</sup> half 2018 groundwater sampling and analysis event.

The 1<sup>st</sup> half 2019 statistical analysis report is included in Appendix II. There were no SSIs determined for the 1<sup>st</sup> half 2019 groundwater sampling and analysis event.

The 2<sup>nd</sup> half 2019 statistical analysis report is included in Appendix II. There were no SSIs determined for the 2<sup>nd</sup> half 2019 groundwater sampling and analysis event.

**VI. Alternate Source Demonstration**

No alternate source demonstration were prepared in 2019.

**VII. Discussion About Transition Between Monitoring Requirements or Alternate Monitoring Frequency**

There were no groundwater program transitions this year. The detection monitoring program remains in effect.

Regarding defining an alternate monitoring frequency, no modification of the twice-per-year detection monitoring effort is needed.

**VIII. Other Information Required**

No other information applies at this time.

**IX. Description of Any Problems Encountered in 2019 and Actions Taken**

No problems were encountered this year.

**X. A Projection of Key Activities for the Upcoming Year**

Key activities for 2020 include:

- Detection monitoring on a twice per year schedule;
- Evaluation of the detection monitoring results from a statistical analysis viewpoint, looking for any SSIs above background;
- Responding to any new data received in light of CCR rule requirements;
- Preparation of the next annual groundwater report.

**Table 1 - Groundwater Data Summary: MW-1  
Turk - LF  
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
6/1/2016	Background	0.247	218	284	1.1734	7.0	1752	478
7/25/2016	Background	0.274	247	294	0.7506 J	6.5	2245	767
9/1/2016	Background	0.258	251	271	1.0888	6.5	1742	469
11/2/2016	Background	0.321	275	360	0.5629 J	6.6	3008	1479
12/15/2016	Background	0.333	310	350	2	6.7	2328	830
2/1/2017	Background	0.212	230	331	2	7.0	1812	461
2/21/2017	Background	0.184	215	281	1.1213	7.0	1660	407
5/2/2017	Background	0.137	176	230	1.23	7.4	1020	334
6/29/2017	Background	0.135	177	202	1.1529	7.4	1374	301
7/19/2017	Background	0.17	183	226	1.1435	6.7	1504	407
8/10/2017	Detection	0.181	207	243	0.9589 J	7.0	1600	417
4/26/2018	Detection	0.126	153	166	1.657	7.3	1220	294
9/5/2018	Detection	0.098	198	216	<0.083 U	7.1	1216	280
4/17/2019	Detection	0.120	160	197	1.51	7.5	1188	317
9/19/2019	Detection	0.242	244	239	1.03	7.4	1462	463

Notes:

mg/L: milligrams per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

**Table 1 - Groundwater Data Summary: MW-1**

**Turk - LF**

**Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
6/1/2016	Background	<0.93 U	<1.05 U	38	0.0809225 J	<0.07 U	1	1.08847 J	--	1.1734	1.15566 J	0.099	0.01991 J	2.54209 J	2.09098 J	1.23972 J
7/25/2016	Background	<0.93 U	<1.05 U	49	0.159579 J	<0.07 U	1	1.25472 J	--	0.7506 J	<0.68 U	0.118	0.01078 J	3.09725 J	3.00699 J	<0.86 U
9/1/2016	Background	1.45614 J	<1.05 U	41	0.16559 J	0.810967 J	0.406151 J	0.950716 J	1.844	1.0888	<0.68 U	0.087	0.01003 J	4.13353 J	3.88471 J	<0.86 U
11/2/2016	Background	3.5 J	<1.05 U	42.76	<0.02 U	<0.07 U	0.9 J	1.1 J	1.287	0.5629 J	<0.68 U	0.105	<0.005 U	1.57 J	3.33 J	<0.86 U
12/15/2016	Background	0.950637 J	<1.05 U	39	<0.02 U	<0.07 U	<0.23 U	0.605475 J	2.076	2	<0.68 U	0.102	<0.005 U	1.57771 J	<0.99 U	<0.86 U
2/1/2017	Background	<0.93 U	<1.05 U	32	<0.02 U	<0.07 U	<0.23 U	0.688421 J	1.203	2	<0.68 U	0.081	0.01216 J	1.43338 J	<0.99 U	<0.86 U
2/21/2017	Background	<0.93 U	<1.05 U	31	<0.02 U	<0.07 U	<0.23 U	0.564016 J	0.899	1.1213	<0.68 U	0.078	0.00711 J	1.7175 J	2.52261 J	<0.86 U
5/2/2017	Background	<0.93 U	<1.05 U	29.84	<0.02 U	<0.07 U	<0.23 U	0.57 J	1.114	1.23	0.74 J	0.06633	<0.005 U	2.15 J	3.43 J	<0.86 U
6/29/2017	Background	<0.93 U	<1.05 U	27.71	<0.02 U	<0.07 U	<0.23 U	0.33 J	4.687	1.1529	<0.68 U	0.05943	<0.005 U	1.68 J	<0.99 U	<0.86 U
7/19/2017	Background	<0.93 U	<1.05 U	30.71	<0.02 U	<0.07 U	0.24 J	0.78 J	0.842	1.1435	0.71 J	0.06479	<0.005 U	1.82 J	<0.99 U	<0.86 U

Notes:  
 µg/L: micrograms per liter  
 SU: standard unit  
 <: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.  
 J: Estimated value. Parameter was detected at concentration below the reporting limit  
 --: Not analyzed  
 pCi/L: picocuries per liter



**Table 1 - Groundwater Data Summary: MW-2  
Turk - LF  
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
6/1/2016	Background	0.07	57.4	12	0.5064 J	7.9	343	42
7/25/2016	Background	0.152	120	10	0.4781 J	6.9	486	121
9/1/2016	Background	0.128	109	15	0.4811 J	6.9	514	108
11/2/2016	Background	0.369	398	25	0.493 J	6.9	960	346
12/15/2016	Background	0.109	95.2	47	0.5233 J	7.0	562	79
2/1/2017	Background	0.05	38.9	9	0.5086 J	7.5	248	28
2/21/2017	Background	0.05	40.8	10	<0.083 U	7.9	252	33
5/2/2017	Background	0.04823	51.2	5	0.52 J	7.9	208	19
6/29/2017	Background	0.05514	59.6	7	0.4428 J	7.9	336	48
7/19/2017	Background	0.08324	65.5	8	0.4694 J	7.5	332	44
8/10/2017	Detection	0.07471	62.9	10	0.451 J	7.5	304	25
4/26/2018	Detection	0.04343	51.8	6	<0.083 U	7.6	264	22
9/5/2018	Detection	0.098	111	13	<0.083 U	7.4	348	66
4/17/2019	Detection	0.037	76.8	5.86	0.34	7.9	310	18.6
9/19/2019	Detection	0.098	113	10.1	0.30	8.0	416	76.8

Notes:

mg/L: milligrams per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

**Table 1 - Groundwater Data Summary: MW-2**

**Turk - LF**

**Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
6/1/2016	Background	<0.93 U	1.75982 J	120	0.122549 J	<0.07 U	2	0.904166 J	--	0.5064 J	2.01553 J	0.015	0.01145 J	2.82795 J	1.14538 J	<0.86 U
7/25/2016	Background	<0.93 U	1.39254 J	152	0.131235 J	<0.07 U	0.862157 J	1.21412 J	--	0.4781 J	<0.68 U	0.048	0.00701 J	4.69255 J	<0.99 U	<0.86 U
9/1/2016	Background	5	<1.05 U	162	0.141798 J	<0.07 U	3	1.1267 J	3.045	0.4811 J	1.22736 J	0.031	0.01382 J	6	3.91967 J	<0.86 U
11/2/2016	Background	1.91737 J	<1.05 U	107	0.0819 J	<0.07 U	3	1.53886 J	1.939	0.493 J	1.26945 J	0.088	0.00947 J	5	1.45298 J	<0.86 U
12/15/2016	Background	1.7294 J	<1.05 U	158	<0.02 U	<0.07 U	<0.23 U	0.355698 J	1.919	0.5233 J	<0.68 U	0.028	<0.005 U	2.15202 J	1.67636 J	<0.86 U
2/1/2017	Background	<0.93 U	<1.05 U	80	<0.02 U	<0.07 U	<0.23 U	0.217505 J	0.933	0.5086 J	<0.68 U	0.011	<0.005 U	2.91607 J	<0.99 U	<0.86 U
2/21/2017	Background	<0.93 U	<1.05 U	83	<0.02 U	<0.07 U	<0.23 U	0.233088 J	1.335	<0.083 U	<0.68 U	0.012	<0.005 U	2.62555 J	<0.99 U	<0.86 U
5/2/2017	Background	1.46 J	1.37 J	93	<0.02 U	<0.07 U	<0.23 U	0.32 J	1.935	0.52 J	<0.68 U	0.00925	<0.005 U	1.08 J	1.32 J	<0.86 U
6/29/2017	Background	<0.93 U	<1.05 U	101	<0.02 U	<0.07 U	<0.23 U	0.58 J	3.373	0.4428 J	<0.68 U	0.01089	<0.005 U	0.87 J	<0.99 U	<0.86 U
7/19/2017	Background	<0.93 U	<1.05 U	97.5	0.02 J	<0.07 U	0.76 J	0.71 J	2.712	0.4694 J	1.14 J	0.01387	0.005 J	1.18 J	<0.99 U	<0.86 U

Notes:  
 µg/L: micrograms per liter  
 SU: standard unit  
 <: Non-detect value. Parameters which were not detected are shown as less than the method detection limit (MDL) followed by a 'U' flag.  
 J: Estimated value. Parameter was detected at concentration below the reporting limit  
 --: Not analyzed  
 pCi/L: picocuries per liter

**Table 1 - Groundwater Data Summary: MW-3  
Turk - LF  
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
6/1/2016	Background	0.04	93.9	3	0.3926 J	7.6	357	17
7/25/2016	Background	0.168	393	37	0.4403 J	7.4	1612	699
9/1/2016	Background	0.09	149	14	0.4288 J	7.3	564	119
11/2/2016	Background	0.151	264	48	0.5852 J	7.4	1188	424
12/15/2016	Background	0.06	67.8	15	0.6047 J	7.4	408	43
2/1/2017	Background	0.03	53	7	<0.083 U	7.4	220	19
2/21/2017	Background	0.05	81.5	12	<0.083 U	7.6	340	76
5/2/2017	Background	0.04375	77.3	6	0.37 J	7.6	328	27
6/29/2017	Background	0.05282	95.6	6	0.3475 J	7.6	332	32
7/19/2017	Background	0.09178	122	15	<0.083 U	7.2	510	95
8/10/2017	Detection	0.09788	160	23	0.438 J	7.5	716	190
4/26/2018	Detection	0.03713	61.3	4	<0.083 U	7.4	278	28
9/5/2018	Detection	0.073	160	58	<0.083 U	7.3	1234	554
1/22/2019	Detection	--	--	7.3	--	--	--	--
4/17/2019	Detection	0.035	81.1	3.70	0.21	7.5	364	13.7
9/19/2019	Detection	0.074	143	27.3	0.22	7.9	612	148

Notes:

mg/L: milligrams per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-3

Turk - LF

Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
6/1/2016	Background	<0.93 U	<1.05 U	73	0.194411 J	<0.07 U	1	0.664792 J	--	0.3926 J	0.940276 J	0.01	0.01506 J	0.949404 J	<0.99 U	<0.86 U
7/25/2016	Background	<0.93 U	<1.05 U	238	0.137503 J	<0.07 U	0.493284 J	0.785774 J	--	0.4403 J	<0.68 U	0.075	<0.005 U	1.16782 J	<0.99 U	<0.86 U
9/1/2016	Background	1.90159 J	<1.05 U	81	0.185901 J	<0.07 U	0.955367 J	0.803817 J	3.55	0.4288 J	<0.68 U	0.014	<0.005 U	1.14299 J	1.25976 J	<0.86 U
11/2/2016	Background	1.9135 J	2.32209 J	160	0.0958 J	<0.07 U	0.571016 J	1.33502 J	2.83	0.5852 J	1.51713 J	0.03	<0.005 U	1.68622 J	<0.99 U	<0.86 U
12/15/2016	Background	1.36647 J	1.8418 J	55	0.261831 J	<0.07 U	0.471105 J	0.395502 J	1.92	0.6047 J	<0.68 U	0.009	<0.005 U	0.30882 J	<0.99 U	<0.86 U
2/1/2017	Background	1.38687 J	<1.05 U	55	0.157528 J	<0.07 U	0.906786 J	0.761635 J	0.942	<0.083 U	<0.68 U	0.003	0.00701 J	1.02923 J	<0.99 U	<0.86 U
2/21/2017	Background	1.75888 J	<1.05 U	66	0.239409 J	<0.07 U	4	1.21066 J	1.156	<0.083 U	2.18988 J	0.008	0.00692 J	0.551231 J	<0.99 U	0.918887 J
5/2/2017	Background	<0.93 U	2.37 J	47.28	0.1 J	<0.07 U	0.31 J	0.35 J	2.8	0.37 J	<0.68 U	0.00679	<0.005 U	<0.29 U	<0.99 U	<0.86 U
6/29/2017	Background	<0.93 U	<1.05 U	63.01	0.13 J	<0.07 U	1.64	0.89 J	1.894	0.3475 J	1.12 J	0.00836	<0.005 U	<0.29 U	<0.99 U	<0.86 U
7/19/2017	Background	<0.93 U	<1.05 U	79.28	0.15 J	<0.07 U	0.58 J	0.72 J	3.43	<0.083 U	<0.68 U	0.01353	<0.005 U	<0.29 U	<0.99 U	<0.86 U

Notes:

µg/L: micrograms per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

**Table 1 - Groundwater Data Summary: MW-4  
Turk - LF  
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
6/1/2016	Background	0.36	391	653	0.6203 J	7.2	2352	190
7/25/2016	Background	0.455	729	1055	<0.083 U	7.4	4084	694
9/1/2016	Background	0.402	569	1065	0.5614 J	7.1	3500	671
11/2/2016	Background	0.393	513	993	0.374 J	7.4	3450	538
12/15/2016	Background	0.305	280	930	0.3995 J	7.3	2980	434
2/1/2017	Background	0.445	669	1159	<0.083 U	6.8	3720	747
2/21/2017	Background	0.365	439	730	<0.083 U	7.2	2404	186
5/2/2017	Background	0.376	496	1024	0.44 J	6.9	3370	572
6/29/2017	Background	0.264	264	659	0.4605 J	7.0	2276	157
7/19/2017	Background	0.296	306	1052	<0.083 U	6.9	3120	557
8/10/2017	Detection	0.429	648	1105	0.512 J	7.0	3788	692
4/26/2018	Detection	0.347	383	1140	<0.083 U	7.0	3654	557
9/5/2018	Detection	0.255	516	1241	<0.083 U	6.8	5442	748
12/20/2018	Detection	--	--	110	--	--	2792	--
4/17/2019	Detection	0.261	452	1000	0.38	7.0	2798	164
9/19/2019	Detection	0.330	573	895	0.34	7.0	2780	157

Notes:

mg/L: milligrams per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

**Table 1 - Groundwater Data Summary: MW-4**

**Turk - LF**

**Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
6/1/2016	Background	<0.93 U	1.83781 J	69	0.23746 J	<0.07 U	7	3.34813 J	--	0.6203 J	1.47143 J	0.131	0.01634 J	2.98754 J	6	<0.86 U
7/25/2016	Background	<0.93 U	<1.05 U	110	0.454281 J	<0.07 U	19	8	--	<0.083 U	4.81995 J	0.162	0.01917 J	1.38966 J	3.81662 J	<0.86 U
9/1/2016	Background	1.44388 J	1.75655 J	144	0.506995 J	<0.07 U	23	9	1.909	0.5614 J	6	0.098	0.028	3.08827 J	13	<0.86 U
11/2/2016	Background	2.65159 J	1.40633 J	56	0.0976 J	<0.07 U	4	2.56138 J	1.195	0.374 J	2.26641 J	0.105	<0.005 U	1.80188 J	13	<0.86 U
12/15/2016	Background	<0.93 U	2.20107 J	63	0.0334569 J	<0.07 U	0.630135 J	0.943538 J	2.64	0.3995 J	<0.68 U	0.125	<0.005 U	3.76575 J	<0.99 U	<0.86 U
2/1/2017	Background	1.15118 J	<1.05 U	29	<0.02 U	<0.07 U	0.266332 J	0.771837 J	0.913	<0.083 U	<0.68 U	0.072	0.00591 J	0.342891 J	11	<0.86 U
2/21/2017	Background	0.987123 J	<1.05 U	78	0.170596 J	<0.07 U	9	4.18392 J	4.46	<0.083 U	2.76588 J	0.104	0.01482 J	2.52827 J	7	<0.86 U
5/2/2017	Background	2.26 J	<1.05 U	41.07	0.03 J	<0.07 U	0.33 J	1.02 J	4.274	0.44 J	<0.68 U	0.09813	0.006 J	1.41 J	4.09 J	<0.86 U
6/29/2017	Background	<0.93 U	<1.05 U	65.4	0.05 J	<0.07 U	1.05	1.64 J	13.21	0.4605 J	<0.68 U	0.116	<0.005 U	2.65 J	<0.99 U	<0.86 U
7/19/2017	Background	<0.93 U	2.44 J	64.91	0.07 J	<0.07 U	1.4	1.64 J	3.521	<0.083 U	1.34 J	0.133	0.013 J	3.06 J	1.18 J	<0.86 U

Notes:

µg/L: micrograms per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter

**Table 1 - Groundwater Data Summary: MW-5  
Turk - LF  
Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
6/1/2016	Background	0.06	284	100	0.4866 J	7.7	1272	329
7/25/2016	Background	0.04	491	188	0.4938 J	7.7	1694	465
9/1/2016	Background	0.05	251	96	0.408 J	7.5	1250	319
11/2/2016	Background	0.06	234	80	0.5023 J	7.6	1034	281
12/15/2016	Background	0.03	217	55	0.2941 J	7.7	1036	220
2/1/2017	Background	0.05	272	78	0.7224 J	6.8	1092	265
2/21/2017	Background	0.06	270	80	<0.083 U	7.7	1156	273
5/2/2017	Background	0.06152	275	91	0.54 J	7.1	1192	287
6/29/2017	Background	0.04842	248	73	<0.083 U	7.0	1104	228
7/19/2017	Background	0.04983	208	66	<0.083 U	6.6	932	216
8/10/2017	Detection	0.06474	267	70	<0.083 U	6.8	1052	233
4/26/2018	Detection	0.08795	310	105	<0.083 U	7.0	1408	303
9/5/2018	Detection	0.086	380	134	<0.083 U	6.4	1502	273
4/17/2019	Detection	0.082	290	138	0.30	7.2	1292	343
9/19/2019	Detection	0.075	306	110	0.27	6.8	1326	275

Notes:

mg/L: milligrams per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

**Table 1 - Groundwater Data Summary: MW-5**

**Turk - LF**

**Appendix IV Constituents**

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
6/1/2016	Background	<0.93 U	<1.05 U	40	0.0620377 J	<0.07 U	0.662999 J	0.611001 J	--	0.4866 J	<0.68 U	0.049	0.02124 J	1.45446 J	2.29756 J	<0.86 U
7/25/2016	Background	4.2029 J	<1.05 U	42	0.165141 J	<0.07 U	2	1.38215 J	--	0.4938 J	1.36311 J	0.164	0.01234 J	4.13266 J	8	<0.86 U
9/1/2016	Background	0.948881 J	<1.05 U	41	0.141298 J	<0.07 U	0.560473 J	0.970337 J	1.411	0.408 J	<0.68 U	0.024	0.01038 J	3.3054 J	1.06126 J	<0.86 U
11/2/2016	Background	<0.93 U	<1.05 U	38	<0.02 U	<0.07 U	0.37232 J	0.68278 J	3.11	0.5023 J	<0.68 U	0.024	<0.005 U	0.760667 J	1.57137 J	<0.86 U
12/15/2016	Background	<0.93 U	<1.05 U	35	<0.02 U	<0.07 U	0.558695 J	0.494922 J	1.159	0.2941 J	<0.68 U	0.015	<0.005 U	<0.29 U	<0.99 U	<0.86 U
2/1/2017	Background	<0.93 U	<1.05 U	43	<0.02 U	<0.07 U	0.86197 J	0.547445 J	0.632	0.7224 J	<0.68 U	0.018	0.01495 J	0.862299 J	<0.99 U	<0.86 U
2/21/2017	Background	<0.93 U	<1.05 U	43	<0.02 U	<0.07 U	1	0.733647 J	0.747	<0.083 U	<0.68 U	0.021	0.00912 J	0.957474 J	<0.99 U	<0.86 U
5/2/2017	Background	1.2 J	<1.05 U	38.42	<0.02 U	<0.07 U	0.42 J	0.6 J	4.45	0.54 J	<0.68 U	0.02349	0.016 J	1.11 J	<0.99 U	<0.86 U
6/29/2017	Background	<0.93 U	<1.05 U	35.21	<0.02 U	<0.07 U	<0.23 U	0.68 J	5.057	<0.083 U	<0.68 U	0.01696	0.011 J	2.2 J	<0.99 U	<0.86 U
7/19/2017	Background	<0.93 U	<1.05 U	35.22	<0.02 U	<0.07 U	0.46 J	0.81 J	1.381	<0.083 U	0.95 J	0.01583	0.026	0.97 J	<0.99 U	<0.86 U

Notes:

µg/L: micrograms per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter



**Table 1 - Groundwater Data Summary: MW-10**

*Geosyntec Consultants, Inc.*

**Turk - LF**

**Appendix III Constituents**

Collection Date	Monitoring Program	Boron	Calcium	Chloride	Fluoride	pH	Total Dissolved Solids	Sulfate
		mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
6/1/2016	Background	0.07	245	509	0.5264 J	7.8	2252	582
7/25/2016	Background	0.07	348	680	0.4623 J	6.7	2936	960
9/1/2016	Background	0.08	349	400	0.5157 J	6.6	1896	444
11/2/2016	Background	0.09	407	378	0.373 J	6.8	1916	499
12/15/2016	Background	0.05	363	514	0.3419 J	6.3	2298	559
2/1/2017	Background	0.05	369	53	1.2456	6.0	2280	62
2/21/2017	Background	0.177	673	762	<0.083 U	7.8	3814	1452
5/2/2017	Background	0.08024	213	305	0.52 J	5.8	1618	371
6/29/2017	Background	0.08018	256	277	1.1688	5.8	1666	389
7/19/2017	Background	0.0858	454	470	3.17	6.3	2146	560
8/10/2017	Detection	0.07623	392	544	0.37 J	6.2	2252	619
4/26/2018	Detection	0.06224	298	326	0.9038 J	7.3	1826	452
9/5/2018	Detection	0.074	410	405	<0.083 U	7.5	1872	484
4/17/2019	Detection	0.046	313	431	0.21	7.4	2002	554
9/19/2019	Detection	0.05 J	339	365	0.21	6.6	1900	481

Notes:

mg/L: milligrams per liter

SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

Table 1 - Groundwater Data Summary: MW-10

Turk - LF

Appendix IV Constituents

Collection Date	Monitoring Program	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Combined Radium	Fluoride	Lead	Lithium	Mercury	Molybdenum	Selenium	Thallium
		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	pCi/L	mg/L	µg/L	mg/L	µg/L	µg/L	µg/L
6/1/2016	Background	<0.93 U	<1.05 U	68	0.0420664 J	<0.07 U	2	0.608593 J	--	0.5264 J	<0.68 U	0.039	0.01929 J	0.808299 J	1.28039 J	<0.86 U
7/25/2016	Background	<0.93 U	<1.05 U	57	0.0790461 J	<0.07 U	0.841449 J	0.890358 J	--	0.4623 J	<0.68 U	0.073	0.00766 J	1.38895 J	1.70224 J	0.912736 J
9/1/2016	Background	<0.93 U	<1.05 U	55	0.0599978 J	<0.07 U	1	0.876633 J	0.525	0.5157 J	<0.68 U	0.029	0.00756 J	1.18242 J	<0.99 U	<0.86 U
11/2/2016	Background	1.07709 J	<1.05 U	51	<0.02 U	<0.07 U	0.843928 J	0.995858 J	0.658	0.373 J	0.773158 J	0.042	<0.005 U	1.02999 J	<0.99 U	<0.86 U
12/15/2016	Background	<0.93 U	<1.05 U	51	<0.02 U	<0.07 U	1	0.642068 J	0.951	0.3419 J	<0.68 U	0.017	<0.005 U	0.729956 J	<0.99 U	<0.86 U
2/1/2017	Background	<0.93 U	<1.05 U	60	<0.02 U	<0.07 U	1	0.67122 J	0.344	1.2456	<0.68 U	0.02	0.00911 J	0.7751 J	<0.99 U	<0.86 U
2/21/2017	Background	<0.93 U	<1.05 U	47	<0.02 U	<0.07 U	2	0.951093 J	0.63	<0.083 U	0.870989 J	0.095	0.01349 J	2.06399 J	<0.99 U	<0.86 U
5/2/2017	Background	<0.93 U	<1.05 U	58.09	<0.02 U	<0.07 U	1.43	0.74 J	1.4731	0.52 J	<0.68 U	0.01559	<0.005 U	0.59 J	<0.99 U	<0.86 U
6/29/2017	Background	<0.93 U	<1.05 U	52.23	<0.02 U	<0.07 U	1.24	0.61 J	2.112	1.1688	0.83 J	0.01916	<0.005 U	0.59 J	<0.99 U	<0.86 U
7/19/2017	Background	<0.93 U	<1.05 U	48.43	<0.02 U	<0.07 U	1.9	0.77 J	3.154	3.17	1.1 J	0.0401	0.007 J	0.87 J	<0.99 U	<0.86 U

Notes:

µg/L: micrograms per liter

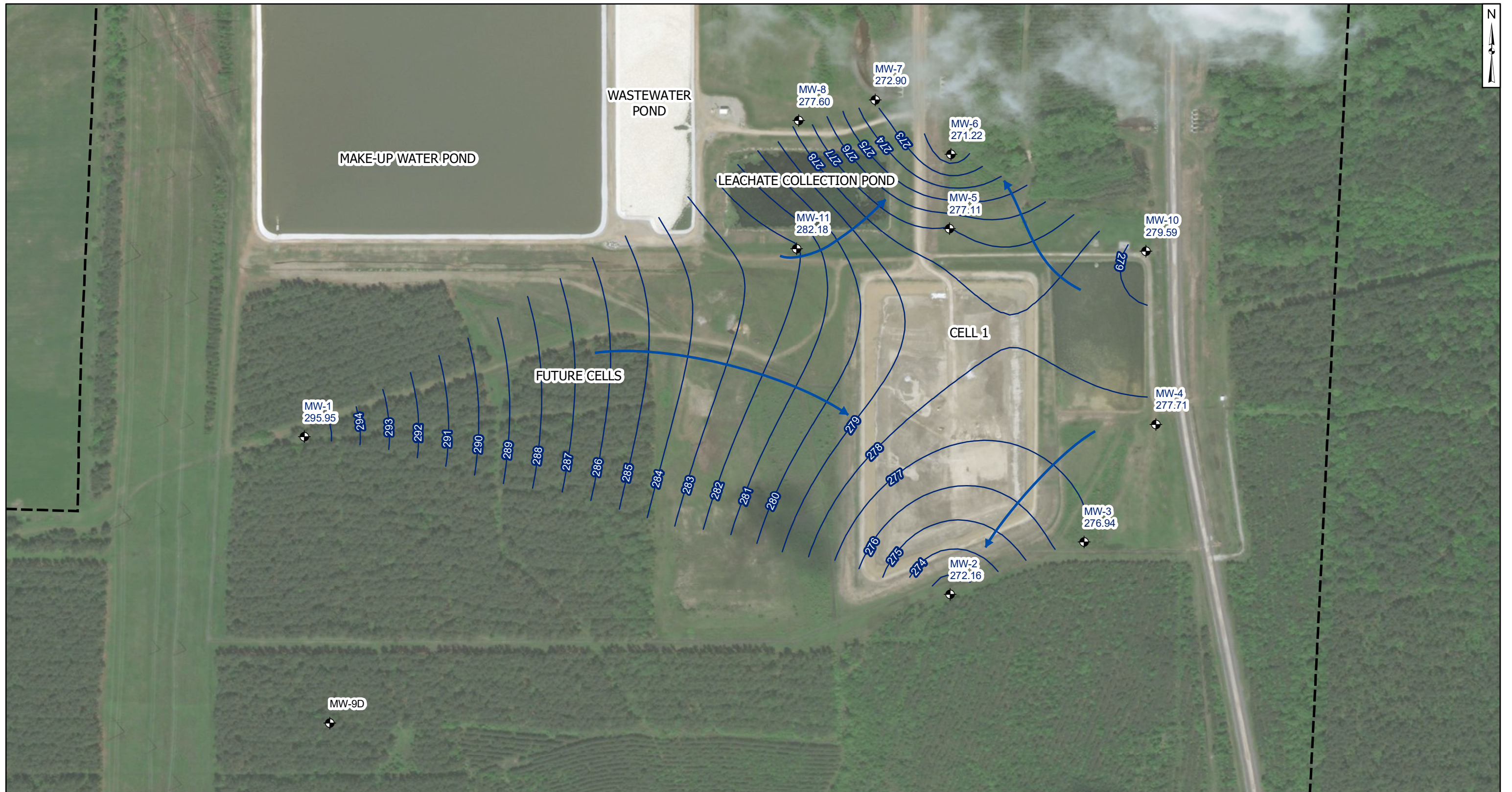
SU: standard unit

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

J: Estimated value. Parameter was detected at concentration below the reporting limit

--: Not analyzed

pCi/L: picocuries per liter



- Legend**
- ⊕ Groundwater Monitoring Well
  - ▲ Piezometer
  - ➔ Groundwater Flow Direction
  - Groundwater Elevation Contour
  - ⌚ Property Boundary

**Notes**

- Monitoring well coordinates and water level data (collected on September 5, 2018) provided by AEP.
- Site features based on information available in Report 1 - Groundwater Monitoring Network for CCR Compliance - John W. Turk, Jr. Power Plant Class 3N Landfill (Terracon, October 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- MW-9D is screened within the lower aquifer and excluded from the potentiometric surface calculations.



**Groundwater Elevation Contour Map  
September 2018**

AEP Turk Power Plant - Landfill  
Fulton, Arkansas

**Geosyntec**  
consultants

Columbus, Ohio

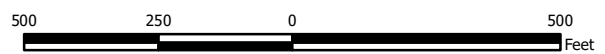
2019/01/21



- Legend**
- Groundwater Monitoring Well
  - Groundwater Flow Direction
  - Groundwater Elevation Contour
  - Property Boundary





**Notes**

- Monitoring well coordinates and water level data (collected on April 17, 2019) provided by AEP.
- Site features based on information available in Report 1 - Groundwater Monitoring Network for CCR Compliance - John W. Turk, Jr. Power Plant Class 3N Landfill (Terracon, October 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- MW-9D is screened within the lower aquifer and excluded from the potentiometric surface calculations.



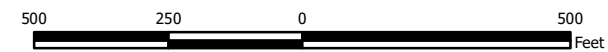
<b>Groundwater Elevation Contour Map</b> <b>April 2019</b>	
AEP Turk Power Plant - Landfill Fulton, Arkansas	
Columbus, Ohio	2020/01/17



- Legend**
-  Groundwater Monitoring Well
  -  Groundwater Flow Direction
  -  Groundwater Elevation Contour
  -  Property Boundary

**Notes**

- Monitoring well coordinates and water level data (collected on September 19, 2019) provided by AEP.
- Site features based on information available in Report 1 - Groundwater Monitoring Network for CCR Compliance - John W. Turk, Jr. Power Plant Class 3N Landfill (Terracon, October 2016) provided by AEP.
- Groundwater elevation units are feet above mean sea level.
- MW-9D is screened within the lower aquifer and excluded from the potentiometric surface calculations.



**Groundwater Elevation Contour Map  
September 2019**

AEP Turk Power Plant - Landfill  
Fulton, Arkansas

**Geosyntec**  
consultants

Columbus, Ohio

2020/01/17

**Table 1: Residence Time Calculation Summary  
Turk Landfill**

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2018-04		2018-09	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Landfill	MW-1 <sup>[1]</sup>	2.0	19.7	3.1	21.4	2.8
	MW-2 <sup>[2]</sup>	2.0	20.8	2.9	27.6	2.2
	MW-3 <sup>[2]</sup>	2.0	9.8	6.2	22.5	2.7
	MW-4 <sup>[2]</sup>	2.0	4.4	13.8	4.1	14.7
	MW-5 <sup>[2]</sup>	2.0	4.3	14.1	32.2	1.9
	MW-10 <sup>[2]</sup>	2.0	4.0	15.2	18.8	3.2

Notes:

[1] - Background Well

[2] - Downgradient Well

**Table 1: Residence Time Calculation Summary  
Turk Landfill**

CCR Management Unit	Monitoring Well	Well Diameter (inches)	2019-04		2019-09	
			Groundwater Velocity (ft/year)	Groundwater Residence Time (days)	Groundwater Velocity (ft/year)	Groundwater Residence Time (days)
Landfill	MW-1 <sup>[1]</sup>	2.0	10.5	5.8	27.7	2.2
	MW-2 <sup>[2]</sup>	2.0	35.4	1.7	38.5	1.6
	MW-3 <sup>[2]</sup>	2.0	32.0	1.9	12.4	4.9
	MW-4 <sup>[2]</sup>	2.0	12.8	4.7	6.2	9.8
	MW-5 <sup>[2]</sup>	2.0	17.1	3.6	26.0	2.3
	MW-10 <sup>[2]</sup>	2.0	25.7	2.4	22.2	2.7

Notes:

[1] - Background Well

[2] - Downgradient Well

## Memorandum

Date: February 11, 2019

To: David Miller (AEP)

Copies to: Terence Wehling (AEP)

From: Allison Kreinberg and Bruce Sass, Ph.D. (Geosyntec)

Subject: Evaluation of Detection Monitoring Data at  
Turk Plant's Landfill (LF)

---

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257 Subpart D, "CCR rule"), a detection monitoring event was completed on September 5, 2018, December 20, 2018, and January 22, 2019 at the Landfill (LF), an existing CCR unit at the Turk Power Plant located in Fulton, Arkansas.

Ten background monitoring events were conducted at the Turk LF prior to these detection monitoring events, and upper prediction limits (UPLs) were calculated for each Appendix III parameter to represent background values. Lower prediction limits (LPLs) were also calculated for pH. Details on the calculation of these background values are described in Geosyntec's *Statistical Analysis Summary* report, dated January 15, 2018.

To achieve an acceptably high statistical power while maintaining a site-wide false-positive rate (SWFPR) of 10% per year or less, prediction limits were calculated based on a one-of-two retesting procedure. With this procedure, a statistically significant increase (SSI) is only concluded if both samples in a series of two exceeds the UPL.

Detection monitoring results and the relevant background values are summarized in Table 1. No SSIs were observed at the Turk LF CCR unit, and as a result the Turk LF will remain in detection monitoring. The statistical analysis was conducted within 90 days of completion of sampling and analysis in accordance with 40 CFR 257.93(h)(2). A certification of these statistics by a qualified professional engineer is provided in Attachment A.



**Table 1: Detection Monitoring Data Evaluation  
Turk Plant - Landfill**

*Geosyntec Consultants, Inc.*

Parameter	Unit	Description	MW-2	MW-3		MW-4		MW-5	MW-10
			9/5/2018	9/5/2018	1/22/2019	9/5/2018	12/20/2018	9/5/2018	9/5/2018
Boron	mg/L	Intrawell Background Value (UPL)	1.40	1.30		0.608		0.426	0.407
	mg/L	Detection Monitoring Result	0.098	0.073	-	0.255	-	0.086	0.074
Calcium	mg/L	Intrawell Background Value (UPL)	433	440		863		481	692
	mg/L	Detection Monitoring Result	111	160	-	516	-	380	410
Chloride	mg/L	Intrawell Background Value (UPL)	39.1	41.2		1200		674	1235
	mg/L	Detection Monitoring Result	13	<b>58</b>	7.3	<b>1241</b>	110	134	405
Fluoride	mg/L	Intrawell Background Value (UPL)	1.11	1.34		1		1	1.25
	mg/L	Detection Monitoring Result	<0.083	<0.083	-	<0.083	-	<0.083	<0.083
pH	SU	Intrawell Background Value (UPL)	8.03	7.82		7.53		7.91	7.60
	SU	Intrawell Background Vlaue (LPL)	6.24	6.33		6.33		6.02	5.67
	SU	Detection Monitoring Result	7.38	7.31	-	6.79	-	6.40	7.47
Sulfate	mg/L	Intrawell Background Value (UPL)	467	618		983		1257	1800
	mg/L	Detection Monitoring Result	66	554	-	748	-	273	484
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	3800	1313		4750		3372	5245
	mg/L	Detection Monitoring Result	348	1234	-	<b>5442</b>	2792	1502	1872

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

-: Not Sampled

**Bold values exceed the background value.**

Background values are shaded gray.

Based on a 1-of-2 resampling, a statistically significant increase (SSI) is only identified when both samples in the detection monitoring period are above the

# ATTACHMENT A

Certification by Qualified Professional Engineer

**CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER**

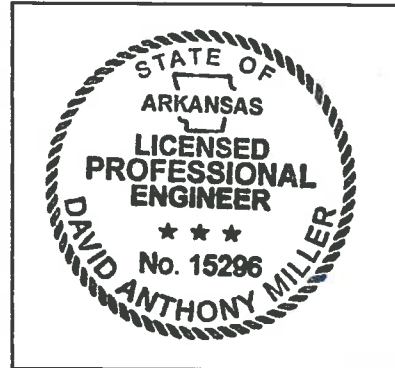
I certify that the selected statistical method, described above and in the January 15, 2018 *Statistical Analysis Summary* report, is appropriate for evaluating the groundwater monitoring data for the Turk LF CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer

David Anthony Miller

Signature



15296

License Number

ARKANSAS

Licensing State

02.18.19

Date

## Memorandum

Date: January 15, 2020  
To: David Miller (AEP)  
Copies to: Terence Wehling (AEP)  
From: Allison Kreinberg and Bruce Sass, Ph.D. (Geosyntec)  
Subject: Evaluation of Detection Monitoring Data at  
Turk Plant's Landfill (LF)

---

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257 Subpart D, "CCR rule"), a detection monitoring event was completed on April 17, 2019 at the Landfill (LF), an existing CCR unit at the Turk Power Plant located in Fulton, Arkansas.

Ten background monitoring events were conducted at the Turk LF prior to this detection monitoring event, and upper prediction limits (UPLs) were calculated for each Appendix III parameter to represent background values. Lower prediction limits (LPLs) were also calculated for pH. Details on the calculation of these background values are described in Geosyntec's *Statistical Analysis Summary* report, dated January 15, 2018.

To achieve an acceptably high statistical power while maintaining a site-wide false-positive rate (SWFPR) of 10% per year or less, prediction limits were calculated based on a one-of-two retesting procedure. With this procedure, a statistically significant increase (SSI) is only concluded if both samples in a series of two exceeds the UPL (or are below the LPL for pH).

Detection monitoring results and the relevant background values are summarized in Table 1. No SSIs were observed at the Turk LF CCR unit, and as a result the Turk LF will remain in detection monitoring. The statistical analysis was conducted within 90 days of completion of sampling and analysis in accordance with 40 CFR 257.93(h)(2). A certification of these statistics by a qualified professional engineer is provided in Attachment A.

**Table 1: Detection Monitoring Data Evaluation  
Turk Plant - Landfill**

Parameter	Units	Description	MW-2	MW-3	MW-4	MW-5	MW-10
			4/17/2019	4/17/2019	4/17/2019	4/17/2019	4/17/2019
Boron	mg/L	Intrawell Background Value (UPL)	1.40	1.30	0.608	0.426	0.407
		Detection Monitoring Data	0.037	0.035	0.261	0.082	0.046
Calcium	mg/L	Intrawell Background Value (UPL)	433	440	863	481	692
		Detection Monitoring Data	76.8	81.1	452	290	313
Chloride	mg/L	Intrawell Background Value (UPL)	39.1	41.2	1200	674	1235
		Detection Monitoring Data	5.86	3.70	1000	138	431
Fluoride	mg/L	Intrawell Background Value (UPL)	1.11	1.34	1.00	1.00	1.25
		Detection Monitoring Data	0.34	0.21	0.38	0.30	0.21
pH	SU	Intrawell Background Value (UPL)	8.0	7.8	7.5	7.9	7.6
		Intrawell Background Value (LPL)	6.2	6.3	6.3	6.0	5.7
		Detection Monitoring Data	7.9	7.5	7.0	7.2	7.4
Sulfate	mg/L	Intrawell Background Value (UPL)	467	618	983	1257	1800
		Detection Monitoring Data	18.6	13.7	164	343	554
TDS	mg/L	Intrawell Background Value (UPL)	3800	1313	4750	3372	5245
		Detection Monitoring Data	310	364	2798	1292	2002

Notes

UPL: Upper prediction limit

LPL: Lower prediction limit

TDS: Total dissolved solids

Background values are shaded gray.

## ATTACHMENT A

Certification by Qualified Professional Engineer

**CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER**

I certify that the selected statistical method, described above and in the January 15, 2018 *Statistical Analysis Summary* report, is appropriate for evaluating the groundwater monitoring data for the Turk LF CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer



David Anthony Miller

Signature

15296

License Number

ARKANSAS

Licensing State

01.15.2020

Date

## Memorandum

Date: January 16, 2020

To: David Miller (AEP)

Copies to: Terence Wehling (AEP)

From: Allison Kreinberg and Bruce Sass, Ph.D. (Geosyntec)

Subject: Evaluation of Detection Monitoring Data at  
Turk Plant's Landfill (LF)

---

In accordance with the United States Environmental Protection Agency's (USEPA's) regulations regarding the disposal of coal combustion residuals (CCR) in landfills and surface impoundments (40 CFR 257 Subpart D, "CCR rule"), a detection monitoring event was completed on September 19, 2019 at the Landfill (LF), an existing CCR unit at the Turk Power Plant located in Fulton, Arkansas.

Background values for the Turk LF were previously calculated in December 2017. After a minimum of four detection monitoring events, the results of those events were compared to the existing background and the dataset was updated as appropriate. Revised upper prediction limits (UPLs) were calculated for each Appendix III parameter to represent background values. Lower prediction limits (LPLs) were also calculated for pH. Details on the calculation of these revised background values are described in Geosyntec's *Statistical Analysis Summary* report, dated January 8, 2020.

To achieve an acceptably high statistical power while maintaining a site-wide false-positive rate (SWFPR) of 10% per year or less, prediction limits were calculated based on a one-of-two retesting procedure. With this procedure, a statistically significant increase (SSI) is only concluded if both samples in a series of two exceeds the UPL (or are below the LPL for pH).

Detection monitoring results and the relevant background values are summarized in Table 1. No SSIs were observed at the Turk LF CCR unit, and as a result the Turk LF will remain in detection monitoring. The statistical analysis was conducted within 90 days of completion of sampling and analysis in accordance with 40 CFR 257.93(h)(2). A certification of these statistics by a qualified professional engineer is provided in Attachment A.



**Table 1: Detection Monitoring Data Evaluation  
Turk Plant - Landfill**

Parameter	Unit	Description	MW-2	MW-3	MW-4	MW-5	MW-10
			9/19/2019	9/19/2019	9/19/2019	9/19/2019	9/19/2019
Boron	mg/L	Intrawell Background Value (UPL)	1.40	1.30	0.609	0.504	0.430
		Detection Monitoring Result	0.098	0.074	0.330	0.075	0.050
Calcium	mg/L	Intrawell Background Value (UPL)	135	246	799	451	615
		Detection Monitoring Result	113	143	573	306	339
Chloride	mg/L	Intrawell Background Value (UPL)	140	660	1240	708	1180
		Detection Monitoring Result	10.1	27.3	895	110	365
Fluoride	mg/L	Intrawell Background Value (UPL)	1.40	1.03	0.620	0.584	0.908
		Detection Monitoring Result	0.30	0.22	0.34	0.27	0.21
pH	SU	Intrawell Background Value (UPL)	8.1	7.9	7.5	7.8	7.7
		Intrawell Background Value (LPL)	6.3	6.4	6.4	6.1	5.7
		Detection Monitoring Result	8.0	7.9	7.0	6.8	6.6
Sulfate	mg/L	Intrawell Background Value (UPL)	1900	2300	971	1180	1800
		Detection Monitoring Result	76.8	148	157	275	481
Total Dissolved Solids	mg/L	Intrawell Background Value (UPL)	3800	4800	4880	3360	5240
		Detection Monitoring Result	416	612	2780	1330	1900

Notes:

UPL: Upper prediction limit

LPL: Lower prediction limit

**Bold values exceed the background value.**

Background values are shaded gray.

# ATTACHMENT A

Certification by Qualified Professional Engineer

**CERTIFICATION BY QUALIFIED PROFESSIONAL ENGINEER**

I certify that the selected statistical method, described above and in the January 8, 2020 *Statistical Analysis Summary* report, is appropriate for evaluating the groundwater monitoring data for the Turk LF CCR management area and that the requirements of 40 CFR 257.93(f) have been met.

DAVID ANTHONY MILLER

Printed Name of Licensed Professional Engineer



David Anthony Miller

Signature

15296  
License Number

ARKANSAS  
Licensing State

01.16.2020  
Date