

**2017 Annual Groundwater
Monitoring and Corrective
Action Report**



Tennessee Valley Authority
Cumberland Fossil Plant Stilling
Pond (Including Retention Pond)
CCR Unit



Prepared for:
Tennessee Valley Authority
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January 31, 2018

January 31, 2018

Reference: 2017 Annual Groundwater Monitoring and Corrective Action Report
TVA Cumberland Fossil Plant Stilling Pond (Including Retention Pond) CCR Unit

This report documents 2017 groundwater monitoring activities as required under the Federal coal combustion residuals (CCR) rule (the CCR Rule; 40 CFR 257.90(e)) at the Tennessee Valley Authority (TVA) Cumberland Fossil Plant (CUF) Stilling Pond (including retention pond) CCR unit. TVA established a groundwater monitoring network and program at the CUF Stilling Pond (including retention pond) CCR unit in accordance with 40 CFR 257.90. During 2017, TVA performed the following groundwater monitoring activities:

- The required groundwater quality monitoring network was established and certified by a qualified Professional Engineer as required by 40 CFR 257.91.
- Monitoring wells were video-logged and resurveyed to confirm accuracy in the documented well construction records.
- A groundwater quality sampling and analysis program was developed and implemented as required by 40 CFR 257.90.
- The required baseline monitoring of network wells was initiated and independent baseline samples, as required by 40 CFR 257.94(b), were collected.
- The sampling and analysis for the first detection monitoring event was completed in October 2017 in accordance with the CCR Rule [40 CFR 257.93 and 257.94(a)].
- Statistical analysis of baseline data was performed in accordance with the CCR Rule.
- No problems were encountered during the first-year phase of the TVA Groundwater Quality Monitoring Program and therefore, no further action has been recommended, except for the planned key activities for 2018 that are outlined below.

The projected key activities for 2018 are:

- Statistical procedures of the detection monitoring event were performed in accordance with the CCR Rule 40 CFR 257.93(h). Although not required to be included in the 2017 Annual Groundwater Monitoring and Corrective Action Report, TVA has provided the January 15, 2018 determination of any statistically significant increases (SSIs) over background for the first detection monitoring event as shown on Table 1.
- Perform confirmation of SSIs via retesting procedures and error checking. Investigate whether the SSI over background resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality as specified in 40 CFR 257.94(e)(2).
- Perform an alternate source demonstration in accordance with 40 CFR 257.94(e)(2).
- Establish an assessment monitoring program in accordance with 40 CFR 257.94(e)(1) where applicable, if unable to establish that SSIs were the result of another source or the result of an error.
- Perform further field and desktop Site Characterization Investigations to improve the CUF Conceptual Site Model (CSM).
- Continue semi-annual detection monitoring at the certified groundwater monitoring network consistent with 40 CFR 257.94 for the 2018 Annual Groundwater Monitoring and Corrective Action Report.
- Continue and improve TVA's third party Quality Assurance Program to evaluate groundwater analytical data using best practices concerning field methods and validation techniques, as well as the application of the most appropriate statistical methods.
- Review new data as it becomes available and implement changes to the groundwater monitoring program as necessary to maintain compliance with 40 CFR 257.90 through 257.98.

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- Comply with recordkeeping requirements specified in 40 CFR 257.105(h), notification requirements specified in 40 CFR 257.106(h), and internet requirements specified in 40 CFR 257.107(h).

GROUNDWATER MONITORING WELL NETWORK

The monitoring well network for the CUF Stilling Pond (including retention pond) CCR unit consists of two background wells (CUF-201 and CUF-202) and four downgradient wells (CUF-205, CUF-206, CUF-207, and CUF-208). The downgradient wells are installed at the waste boundary. Figure 1 is an aerial photograph that shows the groundwater monitoring well locations. The monitoring well network was designed for a single CCR unit (CUF Stilling Pond [including retention pond]).

No monitoring wells in the CCR network were installed or decommissioned during the 2017 reporting period. The certification of the groundwater monitoring system required under 40 CFR 257.91(f) is included in the facility operating record and on the CCR Compliance Data and Information website: <https://www.tva.gov/Environment/Environmental-Stewardship/Coal-Combustion-Residuals>.

GROUNDWATER SAMPLING AND LABORATORY ANALYTICAL TESTING

A groundwater sampling and analysis program was developed and includes procedures and techniques for: sample collection; sample preservation and shipment; analytical procedures; chain-of-custody control; and, quality assurance and quality control (QA/QC) required by 40 CFR 257.93(a). The groundwater monitoring program includes sampling and analysis procedures designed to provide monitoring results that are an accurate representation of groundwater quality at background and downgradient wells.

The first round of detection monitoring was completed in compliance with 40 CFR 257.94 and results are summarized in Table 1. Baseline groundwater samples were obtained between November 2016 and August 2017. Baseline groundwater sampling results are summarized in Table 2. A summary of sampling dates, and monitoring program status is provided in Table 3.

Baseline data for both Appendix III and IV constituents were required to be collected prior to the establishment of upper prediction limits (UPLs) or Groundwater Protection Standards (GWPS). Under a CCR-required assessment monitoring program, GWPS will be established in accordance with 40 CFR 257.95(h), at which time maximum contaminant levels (MCLs) may or may not be considered the appropriate GWPS depending on background well concentrations for each Appendix IV constituent. The appropriate GWPS will establish the assessment groundwater monitoring program and any assessment of corrective measures.

Groundwater elevations were measured in each monitoring well immediately prior to purging during each sampling event as required by 40 CFR 257.93(c). Groundwater elevations and Cumberland River surface water elevations are summarized in Table 4. Groundwater flow directions were determined for each sampling event, and a generalized depiction of groundwater flow direction is illustrated on Figure 2.

Hydraulic conductivity testing was performed in the uppermost aquifer, and the results are summarized in Table 5. The uppermost aquifer consists of alluvial sand and gravel formations. Available data indicates the uppermost aquifer has a geometric mean hydraulic conductivity of 1.82×10^{-3} centimeters per second (cm/sec) (AECOM, 2017). Linear groundwater flow velocity was calculated for the uppermost aquifer using the geometric mean hydraulic conductivity, horizontal hydraulic gradients ranging from 0.0047 to 0.0056 feet per foot (ft/ft) calculated from groundwater elevation data (Table 4), and an effective porosity ranging between 24% and 28%

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(Law Engineering, Inc. [Law], 1992). The average linear flow velocity in the uppermost aquifer ranges from approximately 32 to 44 feet per year.

The groundwater monitoring data was evaluated using statistical procedures as required by 40 CFR 257.93(f) through 257.93(h). The statistical method certification is included in the facility operating record and the CCR Compliance Data and Information website. Background groundwater quality was established for the background monitoring wells.

NARRATIVE DISCUSSION OF ANY TRANSITION BETWEEN MONITORING PROGRAMS

In January 2018, TVA evaluated the groundwater monitoring data for SSIs over background levels for the constituents listed in Appendix III¹ as required by 40 CFR 257.93(h). Although not required to be included in this 2017 Annual Groundwater Monitoring and Corrective Action Report concerning the preceding calendar year, TVA has provided the January 15, 2018 determination (based on the current dataset) of any SSIs over background for the first detection monitoring event. The groundwater analytical results from the initial round of detection monitoring indicated SSIs of Appendix III CCR constituents at the downgradient monitoring wells. TVA plans to perform confirmation of the SSIs via retesting procedures and error checking and investigate whether the SSI over background resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality as specified in 40 CFR 257.94(e)(2). TVA also plans to perform investigations to determine whether a source other than the CCR materials contained in the CUF Stilling Pond are the cause of any verified SSI over background as specified in 40 CFR 257.94(e)(2). If TVA is unable to demonstrate that the SSI was a result of error or another source, then an Assessment Monitoring Program will be established and implemented as specified in 40 CFR 257.95.

¹ Appendix III CCR Constituents: boron, calcium, chloride, fluoride, pH, sulfate, and total dissolved solids (TDS)

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LIMITATIONS

This document entitled 2017 Annual Groundwater Monitoring and Corrective Action Report was prepared by Stantec Consulting Services Inc. ("Stantec") for the Tennessee Valley Authority (the "Client"). The material in it reflects Stantec's professional judgment in light of the scope, schedule and other limitations stated in the document. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec relied upon data and information supplied to it by the client.



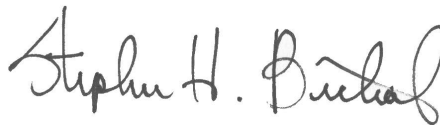
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John Griggs, PhD, PG
Senior Principal



Reviewed by _____
(signature)

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Vice President

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References:

AECOM, 2017. *Draft Hydrogeological Characterization Report (Rev A)*, Cumberland Fossil Plant, April.

Law Engineering, 1992. *Report of Hydrogeologic Evaluation, Proposed Dry Fly Ash and Gypsum Disposal Facility*, TVA Cumberland Fossil Plant, Cumberland City, Tennessee, Law Project No. 574-01442.04. Prepared for Tennessee Valley Authority. July 3.

Attachments:

Figure 1 – Map with CCR Unit Background and Downgradient Wells

Figure 2 – Generalized Groundwater Flow Direction Map

Table 1 – Detection Monitoring Groundwater Sampling Results

Table 2 – Baseline Groundwater Sampling Results

Table 3 – Groundwater Sampling Summary

Table 4 – Groundwater and Surface Water Elevation Summary

Table 5 – Hydraulic Conductivity Data Summary

FIGURES



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- Background Well
- Downgradient Well
- CCR Unit Subject to CCR Rule
- TVA Property Boundary

0 1,000 2,000 Feet
 1:24,000 (At original document size of 8.5x11)

Notes
 1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
 2. Imagery Source: Tucker Mapping Solutions, INC (Flown April 8, 2017)

Project Location 182603174
 Cumberland City Prepared by WSW on 2018-01-30
 Stewart County, Tennessee Technical Review by MD on 2018-01-30
 Independent Review by JK on 2018-01-30

Client/Project
 Tennessee Valley Authority
 Cumberland Fossil Plant
 CCR Rule

Figure No. 1

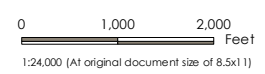
Title
Map with CCR Unit Background and Downgradient Wells



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- ▲ Staff Gauge
- Background Well
- Downgradient Well
- ➔ Groundwater Flow Direction
- CCR Unit Subject to CCR Rule
- TVA Property Boundary



Notes
 1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
 2. Imagery Source: Tucker Mapping Solutions, INC (Flown April 8, 2017)

Project Location
 Cumberland County, Tennessee
 Prepared by WSW on 2018-01-30
 Technical Review by MD on 2018-01-30
 Independent Review by JK on 2018-01-30

Client/Project
 Tennessee Valley Authority
 Cumberland Fossil Plant
 CCR Rule

Figure No.
 2

Title
 Generalized Groundwater Flow Direction Map



Groundwater flow directions are based on Cumberland River elevations and groundwater elevations from CCR and Non-CCR monitoring wells.

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TABLES

TABLE 1
Detection Monitoring Groundwater Sampling Results

Cumberland Fossil Plant
Cumberland City, Tennessee

Constituent	Boron	Calcium	Chloride	Fluoride	pH	Sulfate	TDS
Unit	mg/L	mg/L	mg/L	mg/L	SU	mg/L	mg/L
BTV (UPL)	0.0318	75.5	2.01	0.338	6.24 – 8.13*	17.6	230
Well ID	First Detection Monitoring Round Results (for samples taken on October 2-4, 2017)						
CUF-205	<u>0.152</u>	<u>130</u>	<u>6.33</u>	0.0857	6.99	<u>156</u>	<u>485</u>
CUF-206	<u>20.4</u>	<u>566</u>	<u>697</u>	0.132**	6.65	<u>887</u>	<u>2,870</u>
CUF-207	<u>26.6</u>	<u>475</u>	<u>659</u>	0.134	6.79	<u>955</u>	<u>2,830</u>
CUF-208	<u>15.3</u>	<u>731</u>	<u>734</u>	0.179	6.78	<u>1,310</u>	<u>3,440</u>
CUF-201	0.00950	24.7	1.56	0.130	7.25	1.11	91.0
CUF-202	0.0191	60.7	1.74	0.184	7.52	14.6	209

Notes:

Bold and underlined concentration indicates an SSI over background

SSI - Statistically Significant Increase

BTV - Background Threshold Values

UPL - Upper Prediction Limit

TDS - Total Dissolved Solids

mg/L - milligrams per liter

SU - Standard Unit

Wells CUF-201 and CUF-202 are background monitoring wells. Sampling data included to document detection monitoring groundwater sampling results.

* indicates the lower bound of the range is the lower prediction limit (LPL). The upper bound is the UPL.

** analyte was not detected and the Method Detection Limit (MDL) is presented

TABLE 2
Baseline Groundwater Sampling Results

Cumberland Fossil Plant
Cumberland City, Tennessee

Monitoring Well		CUF-201																					
Sample Date		09-Nov-16		23-Jan-17		07-Feb-17		07-Mar-17		04-Apr-17		02-May-17		30-May-17		11-Jul-17		26-Jul-17		16-Aug-17		29-Aug-17	
Sample Type		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline	
Location/Well ID		CUF-201		CUF-201		CUF-201		CUF-201		CUF-201		CUF-201		CUF-201		CUF-201		CUF-201		CUF-201		CUF-201	
Sample ID		CUF-GW-011-11092016		CUF-GW-011-01232017		CUF-GW-011-02072017		CUF-GW-011-03072017		CUF-GW-011-04042017		CUF-GW-011-05022017		CUF-GW-011-05302017		CUF-GW-011-07112017		CUF-GW-011-07262017		CUF-GW-011-08162017		CUF-GW-011-08292017	
Well Designation		Background		Background		Background		Background		Background		Background		Background		Background		Background		Background		Background	
Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals																							
Antimony	mg/L	< 0.000352	U*	< 0.000443	U	< 0.000656	U*	< 0.000443	U*	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000632	U*	< 0.000443	U	< 0.00127	U*
Arsenic	mg/L	0.00460		< 0.000343	U*	0.00231		0.00121		0.00106		0.00105		0.00404		0.00464		0.00458		0.00503		0.00514	
Barium	mg/L	0.0331		0.0257		0.0258		0.0246		0.0237		0.0255		0.0254		0.0298		0.0265		0.0318		0.0285	
Beryllium	mg/L	< 0.000102	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U
Boron	mg/L	0.00859	J	< 0.0317	U*	0.0104	J	< 0.0141	U*	< 0.0161	U*	< 0.00781	U	< 0.00781	U	< 0.00894	U*	0.00933	J	< 0.0288	U*	0.0105	J
Cadmium	mg/L	< 0.000152	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U
Calcium	mg/L	27.0		25.0		25.0		24.4		28.8		24.3		24.1		25.9		24.6		26.0		25.8	
Chromium	mg/L	< 0.000339	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U
Cobalt	mg/L	0.00115		0.000491	J	0.00101		0.000473	J	0.000172		< 0.000413	U*	0.000808		0.000757		0.000801		0.000720		0.000700	
Lead	mg/L	< 0.0000675	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U
Lithium	mg/L	< 0.00193	U*	< 0.00267	U*	< 0.00212	U	< 0.00212	U	< 0.00212	U	0.00223	J	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00349	U*
Mercury	mg/L	< 0.0000521	U	< 0.0000521	U	< 0.0000521	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U
Molybdenum	mg/L	0.00329	J	0.00232	J	0.00243	J	0.00225	J	0.00174		0.00167	J	0.00233	J	0.00245	J	0.00258	J	0.00257	J	0.00271	J
Selenium	mg/L	< 0.000348	U	< 0.00127	U	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U
Thallium	mg/L	< 0.0000360	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	0.0000730	J	< 0.0000531	U	< 0.0000531	U
Radium 226 + radium 228	pCi/L	0.0875	U	0.497	UJ	1.11	J	0.00000	U	0.00000	U	0.647	U	0.623	U	0.255	U	0.715	U	0.762	U	0.636	U*
Anions																							
Chloride	mg/L	1.33		1.65		1.44		< 1.13	U*	1.67		1.65		1.52		1.46		1.44		1.44		1.54	
Fluoride	mg/L	0.150		< 0.141	U*	0.150		< 0.137	U*	0.149		0.156		0.147		0.185		0.150		0.147		0.155	
Sulfate	mg/L	1.12		< 1.93	U*	1.52		1.08	J	1.97		1.90		1.37		1.58		1.34		1.06		1.26	
General Chemistry																							
Total Dissolved Solids	mg/L	119		103		110		91.0		75.0		87.0		105		104		104		104		91.0	
Field pH																							
pH (field)	SU	7.12		6.83		6.94		6.93		6.93		6.69		6.82		7.06		7.32		7.36		7.10	

Notes:
Q - Data Qualifier
U* - Result should be considered "not-detected" because it was detected in a rinsate blank or laboratory blank at a similar level
J - Quantitation is approximate due to limitations identified during data validation
UJ - Analyte not detected, but the reporting limit may or may not be higher due to a bias identified during data validation
U - Analyte not detected
UR - Unreliable reporting limit; analyte may or may not be present in the sample
mg/L - milligrams per liter
pCi/L - picoCurie per liter
SU - Standard Unit

**TABLE 2
Baseline Groundwater Sampling Results**

Cumberland Fossil Plant
Cumberland City, Tennessee

Monitoring Well		CUF-202																					
Sample Date		09-Nov-16		24-Jan-17		06-Feb-17		07-Mar-17		04-Apr-17		02-May-17		30-May-17		11-Jul-17		26-Jul-17		17-Aug-17		29-Aug-17	
Sample Type		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline	
Location/Well ID		CUF-202		CUF-202		CUF-202		CUF-202		CUF-202		CUF-202		CUF-202		CUF-202		CUF-202		CUF-202		CUF-202	
Sample ID		CUF-GW-012-11092016		CUF-GW-012-01242017		CUF-GW-012-02062017		CUF-GW-012-03072017		CUF-GW-012-04042017		CUF-GW-012-05022017		CUF-GW-012-05302017		CUF-GW-012-07112017		CUF-GW-012-07262017		CUF-GW-012-08172017		CUF-GW-012-08292017	
Well Designation		Background		Background		Background		Background		Background		Background		Background		Background		Background		Background		Background	
Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals																							
Antimony	mg/L	< 0.000840	U*	< 0.000443	U	< 0.000607	U*	< 0.000704	U*	< 0.000443	U	< 0.000443	U	< 0.000508	U*	< 0.000443	U	< 0.000609	U*	< 0.000618	U*	< 0.00170	U*
Arsenic	mg/L	0.000443	J	< 0.000220	UJ	< 0.000220	U	< 0.000220	U	< 0.000220	U	0.000358	J	0.000459	J	< 0.000220	U	0.000242	J	< 0.000392	U*	< 0.000488	U*
Barium	mg/L	0.0378		0.0257		0.0247		0.0245		0.0245		0.0245		0.0257		0.0309		0.0302		0.0364		0.0333	
Beryllium	mg/L	< 0.000102	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U
Boron	mg/L	0.0202		< 0.0255	U*	0.0254	J	< 0.0229	U*	< 0.0318	U*	0.0188	J	0.0174	J	< 0.0179	U*	0.0258	J	< 0.0337	U*	0.0386	J
Cadmium	mg/L	< 0.000152	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	0.000645	J	0.000250	J	0.000305	J	0.000190	J	0.000230	J
Calcium	mg/L	61.1		61.9		62.2		63.7		75.5		67.8		60.8		60.2		62.5		62.5		63.5	
Chromium	mg/L	< 0.000339	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000440	U*
Cobalt	mg/L	0.00359		0.000114	J	0.0000960	J	< 0.0000947	U	0.000111		< 0.0000947	U	0.000185	J	0.000231	J	0.000369	J	0.000426	J	0.000500	
Lead	mg/L	< 0.0000675	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U
Lithium	mg/L	< 0.00306	U*	< 0.00407	U*	< 0.00306	U*	< 0.00334	U*	< 0.00236	U*	0.00348	J	0.00241	J	0.00225	J	0.00247	J	0.00312	J	< 0.00708	U*
Mercury	mg/L	< 0.0000521	U	< 0.0000521	U	< 0.0000521	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U
Molybdenum	mg/L	0.00728		0.00454	J	0.00449	J	0.00441	J	0.00483		0.00568		0.00871		0.00766		0.00795		0.00796		0.00863	
Selenium	mg/L	< 0.000348	U	< 0.00127	U	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U
Thallium	mg/L	0.000910	J	0.000152	J	< 0.000200	U*	< 0.000169	U*	< 0.0000531	U	< 0.000203	U*	0.00125		0.000858	J	0.00109		0.000942	J	0.00109	
Radium 226 + radium 228	pCi/L	0.277	U	0.811	UJ	0.589	U	0.263	U	0.119	U	0.0958	U	0.539	UR	0.565	U	0.324	U	0.35	U	1.03	U*
Anions																							
Chloride	mg/L	1.45		1.55		1.33		< 1.22	U*	1.43		1.36		1.29		1.43		1.44		1.52		1.54	
Fluoride	mg/L	0.196		< 0.191	U*	0.212		< 0.218	U*	0.203		0.215		0.195		0.265		0.215		0.216		0.216	
Sulfate	mg/L	15.6		17.0		17.6		14.7		16.6		16.1		15.1		16.6		15.8		16.2		17.1	
General Chemistry																							
Total Dissolved Solids	mg/L	230		221		214		212		189		203		221		217		222		220		202	
Field pH																							
pH (field)	SU	7.36		7.33		7.14		7.31		7.42		7.25		7.18		7.41		7.54		7.41		7.32	

Notes:
Q - Data Qualifier
U* - Result should be considered "not-detected" because it was detected in a rinsate blank or laboratory blank at a similar level
J - Quantitation is approximate due to limitations identified during data validation
UJ - Analyte not detected, but the reporting limit may or may not be higher due to a bias identified during data validation
U - Analyte not detected
UR - Unreliable reporting limit; analyte may or may not be present in the sample
mg/L - milligrams per liter
pCi/L - picoCurie per liter
SU - Standard Unit

**TABLE 2
Baseline Groundwater Sampling Results**

Cumberland Fossil Plant
Cumberland City, Tennessee

Monitoring Well		CUF-205																							
Sample Date	09-Nov-16		26-Jan-17		08-Feb-17		08-Mar-17		04-Apr-17		03-May-17		31-May-17		11-Jul-17		26-Jul-17		17-Aug-17		30-Aug-17				
Sample Type	Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline				
Location/Well ID	CUF-205		CUF-205		CUF-205		CUF-205		CUF-205		CUF-205		CUF-205		CUF-205		CUF-205		CUF-205		CUF-205				
Sample ID	CUF-GW-014-11092016		CUF-GW-014-01262017		CUF-GW-014-02082017		CUF-GW-014-03082017		CUF-GW-014-04042017		CUF-GW-014-05032017		CUF-GW-014-05312017		CUF-GW-014-07112017		CUF-GW-014-07262017		CUF-GW-014-08172017		CUF-GW-014-08302017				
Well Designation	Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient				
Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q		
Total Metals																									
Antimony	mg/L	< 0.000509	U*	< 0.000443	U	< 0.000514	U*	< 0.000868	U*	< 0.000443	U	0.000452	J	0.000450	J	< 0.000443	U	< 0.000443	U	< 0.000443	U*	< 0.00129	U*		
Arsenic	mg/L	0.000398	J	0.000659	J	0.000248	J	0.000468	J	0.000305	J	0.000558	J	< 0.000738	U*	0.000350	J	0.000290	J	< 0.000514	U*	< 0.000670	U*		
Barium	mg/L	0.0800		0.0765		0.0667		0.0767		0.0790		0.0763		0.0745		0.0852		0.0708		0.0855		0.0787			
Beryllium	mg/L	< 0.000102	U	< 0.000131	UJ	< 0.000131	UJ	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U		
Boron	mg/L	0.142		< 0.178	U*	0.213	J	0.158		0.213		0.153		0.135		0.139	J	0.124		< 0.149	U*	0.151			
Cadmium	mg/L	0.000183	J	0.000168	J	0.000183	J	0.000181	J	< 0.0000781	U	< 0.0000850	U*	0.000354	J	0.000215	J	0.000226	J	0.000223	J	0.000211	J		
Calcium	mg/L	138		125	J	122	J	132		155		140		127		134		140		135		137			
Chromium	mg/L	< 0.000339	U	< 0.000378	UJ	< 0.000378	UJ	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000426	U*		
Cobalt	mg/L	0.000968		< 0.000373	U*	< 0.000524	U*	0.000458	J	0.000337	J	< 0.000246	U*	0.000468	J	0.000573		0.000561		0.000633		0.000568			
Lead	mg/L	< 0.0000675	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	0.000379	J	< 0.000318	U
Lithium	mg/L	< 0.00200	U*	< 0.00278	U*	< 0.00212	UJ	< 0.00301	U*	< 0.00212	U	< 0.00247	U*	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00341	U*		
Mercury	mg/L	< 0.0000521	U	< 0.0000521	U	< 0.0000521	UJ	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U		
Molybdenum	mg/L	0.00108	J	0.000953	J	< 0.000844	U*	0.000862	J	0.000795		0.000735	J	0.000828	J	0.000938	J	0.00104	J	0.000882	J	0.000999	J		
Selenium	mg/L	< 0.000348	U	< 0.00127	U	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U		
Thallium	mg/L	< 0.0000360	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U		
Radium 226 + Radium 228	pCi/L	0.618	J	0.579	U	0.551	J	0.389	U	0.272	U	0.232	U	0.00000	UR	0.724	U	0.905	U*	0.690	J	0.757	U		
Anions																									
Chloride	mg/L	3.69		5.87		5.72		4.25		6.36		6.16		5.80		6.25		6.18		6.33		6.43			
Fluoride	mg/L	0.100		< 0.105	U*	0.131		< 0.106	U*	0.117		0.122		0.102		0.134		0.113		0.0983		0.116			
Sulfate	mg/L	154		132		128		149		149		145		148		153		148		155		160			
General Chemistry																									
Total Dissolved Solids	mg/L	513		435		465		475		466		477		496		455		479		464		448			
Field pH																									
pH (field)	SU	6.96		6.86		6.96		7.03		6.90		6.95		6.88		6.90		6.99		6.97		6.98			

Notes:
Q - Data Qualifier
U* - Result should be considered "not-detected" because it was detected in a rinsate blank or laboratory blank at a similar level
J - Quantitation is approximate due to limitations identified during data validation
UJ - Analyte not detected, but the reporting limit may or may not be higher due to a bias identified during data validation
U - Analyte not detected
UR - Unreliable reporting limit; analyte may or may not be present in the sample
mg/L - milligrams per liter
pCi/L - picoCurie per liter
SU - Standard Unit

**TABLE 2
Baseline Groundwater Sampling Results**

Cumberland Fossil Plant
Cumberland City, Tennessee

Monitoring Well		CUF-206																					
Sample Date		09-Nov-16		26-Jan-17		08-Feb-17		09-Mar-17		05-Apr-17		04-May-17		01-Jun-17		13-Jul-17		28-Jul-17		18-Aug-17		31-Aug-17	
Sample Type		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline	
Location/Well ID		CUF-206		CUF-206		CUF-206		CUF-206		CUF-206		CUF-206		CUF-206		CUF-206		CUF-206		CUF-206		CUF-206	
Sample ID		CUF-GW-015-11092016		CUF-GW-015-01262017		CUF-GW-015-02082017		CUF-GW-015-03092017		CUF-GW-015-04052017		CUF-GW-015-05042017		CUF-GW-015-06012017		CUF-GW-015-07132017		CUF-GW-015-07282017		CUF-GW-015-08182017		CUF-GW-015-08312017	
Well Designation		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient	
Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals																							
Antimony	mg/L	< 0.000249	U*	< 0.000443	U	< 0.000525	U*	< 0.00297	U*	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000562	U*
Arsenic	mg/L	0.0102		0.0102		0.0104	J	0.0100		0.0103		0.0100		0.00962		0.00996		0.0105		0.00994		0.0104	
Barium	mg/L	0.0916		0.0984		0.0821		0.0908		0.0918		0.0954		0.0891		0.0934		0.0837		0.0976		0.0874	
Beryllium	mg/L	< 0.000102	U	< 0.000131	UJ	< 0.000131	UJ	< 0.000131	U	0.000524		< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U
Boron	mg/L	21.0		24.7	J	21.1		21.0		24.2		19.0		19.4		19.5		18.5		21.6		21.2	
Cadmium	mg/L	< 0.000152	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U
Calcium	mg/L	581		579	J	579	J	593		699		622		564		578		591		538		576	
Chromium	mg/L	< 0.000339	U	0.000580	J	< 0.000378	UJ	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000381	U*	< 0.000527	U*
Cobalt	mg/L	0.000464	J	0.000560	J	< 0.000457	U*	0.000471	J	0.000453		< 0.000469	U*	0.000546		0.000508		0.000594		0.000550		0.000560	
Lead	mg/L	< 0.0000675	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U
Lithium	mg/L	< 0.00199	U*	< 0.00255	U*	< 0.00212	UJ	< 0.00212	U	< 0.00242	U*	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00224	U*
Mercury	mg/L	< 0.0000521	U	< 0.0000521	U	< 0.0000521	UJ	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U
Molybdenum	mg/L	< 0.000873	U	0.000907	J	< 0.000633	U*	0.000669	J	0.00129		0.00143	J	0.000856	J	0.000802	J	0.000742	J	0.000805	J	0.000812	J
Selenium	mg/L	< 0.000961	U*	< 0.00127	U	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U
Thallium	mg/L	< 0.0000360	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000570	U*	0.000164	J	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U
Radium 226 + Radium 228	pCi/L	1.81		1.83		1.78	J	1.59	J	1.49	J	1.50	J	1.08	U*	1.51	J	1.42	J	1.21	J	1.14	J
Anions																							
Chloride	mg/L	647		623		645		578		677		643		641		668		669		635		703	
Fluoride	mg/L	< 0.121	U	< 0.0789	U*	< 0.0733	U	< 0.147	U	< 0.0733	U	< 0.0733	U	< 0.0733	U	0.104	J	0.0734	J	0.0662	J	0.0699	J
Sulfate	mg/L	942		993		1030		977		1090		1020		1060		1070		1040		978		1080	
General Chemistry																							
Total Dissolved Solids	mg/L	3190		2640		2840		2750		2900		2840		3210		2940		2840		2820		2980	
Field pH																							
pH (field)	SU	6.58		6.52		6.63		6.65		6.64		6.71		6.65		6.57		6.53		6.61		6.61	

Notes:

Q - Data Qualifier

U* - Result should be considered "not-detected" because it was detected in a rinsate blank or laboratory blank at a similar level

J - Quantitation is approximate due to limitations identified during data validation

UJ - Analyte not detected, but the reporting limit may or may not be higher due to a bias identified during data validation

U - Analyte not detected

UR - Unreliable reporting limit; analyte may or may not be present in the sample

mg/L - milligrams per liter

pCi/L - picoCurie per liter

SU - Standard Unit

**TABLE 2
Baseline Groundwater Sampling Results**

Cumberland Fossil Plant
Cumberland City, Tennessee

Monitoring Well		CUF-207																					
Sample Date		08-Nov-16		26-Jan-17		08-Feb-17		09-Mar-17		05-Apr-17		04-May-17		01-Jun-17		13-Jul-17		28-Jul-17		22-Aug-17		31-Aug-17	
Sample Type		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline	
Location/Well ID		CUF-207		CUF-207		CUF-207		CUF-207		CUF-207		CUF-207		CUF-207		CUF-207		CUF-207		CUF-207		CUF-207	
Sample ID		CUF-GW-016-11082016		CUF-GW-016-01262017		CUF-GW-016-02082017		CUF-GW-016-03092017		CUF-GW-016-04052017		CUF-GW-016-05042017		CUF-GW-016-06012017		CUF-GW-016-07132017		CUF-GW-016-07282017		CUF-GW-016-08222017		CUF-GW-016-08312017	
Well Designation		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient	
Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals																							
Antimony	mg/L	< 0.000185	U*	< 0.000460	U*	< 0.000671	U*	< 0.00239	U*	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000696	U*	< 0.000651	U*
Arsenic	mg/L	0.000783		0.00151		0.000877	J	< 0.00103	U*	0.000849		0.00144		0.00145		0.000736	J	0.000799	J	< 0.00101	U*	< 0.00114	U*
Barium	mg/L	0.0506		0.0556		0.0444		0.0498		0.0522		0.0529		0.0536		0.0552		0.0519		0.0556		0.0514	
Beryllium	mg/L	< 0.000102	U	< 0.000131	UJ	< 0.000131	UJ	< 0.000131	U	0.000698		< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U
Boron	mg/L	27.4		32.4	J	26.7	J	27.7		32.6		23.8		25.9		25.2		24.9		26.6		27.6	
Cadmium	mg/L	< 0.000152	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U
Calcium	mg/L	488		493	J	472	J	476		588		469		488		504		501		452		494	
Chromium	mg/L	< 0.000339	U	< 0.000378	UJ	< 0.000378	UJ	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000544	U*	< 0.000547	U*
Cobalt	mg/L	0.000311		0.000308	J	< 0.000242	U*	0.000346	J	0.000261		< 0.000247	U*	0.000284	J	0.000291	J	0.000377	J	0.00182		0.000297	J
Lead	mg/L	< 0.0000675	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	0.000403	J	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U
Lithium	mg/L	< 0.00153	U*	< 0.00260	U*	< 0.00212	UJ	< 0.00212	U	< 0.00736	U*	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00212	U	0.00245	J	< 0.00223	U*
Mercury	mg/L	< 0.0000521	U	< 0.0000521	U	< 0.0000521	UJ	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U
Molybdenum	mg/L	0.0224		0.0216		0.0203	J	0.0201		0.0218		0.0208		0.0210		0.0210		0.0212		0.0197		0.0211	
Selenium	mg/L	< 0.000531	U*	0.00198	J	< 0.00127	UJ	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U
Thallium	mg/L	< 0.0000360	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U
Radium 226 + Radium 228	pCi/L	0.834	U	0.789	J	1.27	J	1.46	J	0.669	U	1.79	J	0.893	U*	1.22	U	1.45	J	1.56	U	1.34	J
Anions																							
Chloride	mg/L	684		600		594		628		619		571		594		616		616		646		652	
Fluoride	mg/L	< 0.121	U	< 0.168	U*	0.157	J	< 0.110	U*	0.197		0.160	J	0.151	J	0.210	J	0.145	J	< 0.0658	U	0.149	
Sulfate	mg/L	1040		1090		1060		1170		1120		1010		1110		1100		1050		1160		1100	
General Chemistry																							
Total Dissolved Solids	mg/L	2840		2860		2450		2750		2880		2880		3030		2850		2560		2890		3060	
Field pH																							
pH (field)	SU	6.75		6.69		6.79		6.82		6.81		6.88		6.87		6.70		6.72		6.83		6.77	

Notes:
Q - Data Qualifier
U* - Result should be considered "not-detected" because it was detected in a rinsate blank or laboratory blank at a similar level
J - Quantitation is approximate due to limitations identified during data validation
UJ - Analyte not detected, but the reporting limit may or may not be higher due to a bias identified during data validation
U - Analyte not detected
UR - Unreliable reporting limit; analyte may or may not be present in the sample
mg/L - milligrams per liter
pCi/L - picoCurie per liter
SU - Standard Unit

**TABLE 2
Baseline Groundwater Sampling Results**

Cumberland Fossil Plant
Cumberland City, Tennessee

Monitoring Well		CUF-208																					
Sample Date		08-Nov-16		26-Jan-17		08-Feb-17		09-Mar-17		05-Apr-17		04-May-17		01-Jun-17		13-Jul-17		28-Jul-17		22-Aug-17		31-Aug-17	
Sample Type		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline		Baseline	
Location/Well ID		CUF-208		CUF-208		CUF-208		CUF-208		CUF-208		CUF-208		CUF-208		CUF-208		CUF-208		CUF-208		CUF-208	
Sample ID		CUF-GW-017-11082016		CUF-GW-017-01262017		CUF-GW-017-02082017		CUF-GW-017-03092017		CUF-GW-017-04052017		CUF-GW-017-05042017		CUF-GW-017-06012017		CUF-GW-017-07132017		CUF-GW-017-07282017		CUF-GW-017-08222017		CUF-GW-017-08312017	
Well Designation		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient		Downgradient	
Analyte	Units	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Total Metals																							
Antimony	mg/L	< 0.000138	U*	< 0.000443	U	< 0.000697	U*	< 0.00304	U*	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000443	U	< 0.000639	U*	< 0.000614	U*
Arsenic	mg/L	0.00245		0.00216		0.00290		< 0.00349	U*	0.00280		0.00345		0.00323		0.00275		0.00302		0.00335		0.00342	
Barium	mg/L	0.0390		0.0379		0.0309		0.0338		0.0354		0.0348		0.0329		0.0318		0.0299		0.0384		0.0333	
Beryllium	mg/L	< 0.000102	U	< 0.000131	UJ	< 0.000131	U	< 0.000131	U	0.000450		< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U	< 0.000131	U
Boron	mg/L	16.9		19.0	J	16.5		16.9		18.8		15.0		15.3		13.5		15.5		12.4		15.6	
Cadmium	mg/L	< 0.000152	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U	< 0.0000781	U
Calcium	mg/L	777		743		735		760		903		816		750		712		792		797		789	
Chromium	mg/L	< 0.000339	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000378	U	< 0.000556	U*	< 0.000482	U*
Cobalt	mg/L	0.00827		0.00699		0.00672		0.00587		0.00556		0.00491		0.00541		0.00553		0.00680		0.00624		0.00659	
Lead	mg/L	< 0.0000675	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U	< 0.000318	U
Lithium	mg/L	< 0.00188	U*	< 0.00284	U*	< 0.00212	U	< 0.00212	U	< 0.00388	U*	< 0.00212	U	< 0.00212	U	< 0.00212	U	< 0.00212	U	0.00258	J	< 0.00227	U*
Mercury	mg/L	< 0.0000521	U	< 0.0000521	U	< 0.0000521	UJ	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U	< 0.0000653	U
Molybdenum	mg/L	0.00685		0.00447	J	0.00494	J	0.00383	J	0.00608		0.00493	J	0.00529		0.00354	J	0.00438	J	0.00378	J	0.00478	J
Selenium	mg/L	< 0.000348	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U	< 0.00127	U
Thallium	mg/L	< 0.0000360	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U	< 0.0000531	U
Radium 226 + Radium 228	pCi/L	0.36	U	0.164	U	0.529	U	0.247	UJ	0.532	U	0.662	U	0.726	U*	0.368	U	0.439	U	0.806	J	0.982	J
Anions																							
Chloride	mg/L	1080		668		687		701		681		709		675		694		697		710		725	
Fluoride	mg/L	< 0.121	U	< 0.0796	U*	< 0.0733	U	< 0.0733	U	< 0.0733	U	0.0764	J	< 0.0733	U	0.0865	J	0.0786	J	< 0.0658	U	0.0673	
Sulfate	mg/L	1100		1220		1210		1290		1220		1280		1250		1240		1200		1240		1230	
General Chemistry																							
Total Dissolved Solids	mg/L	3380		3100		3310		3310		2910		3260		3840		3470		3260		3430		3460	
Field pH																							
pH (field)	SU	6.73		6.66		6.78		6.81		6.81		6.85		6.81		6.65		6.67		6.74		6.77	

Notes:
Q - Data Qualifier
U* - Result should be considered "not-detected" because it was detected in a rinsate blank or laboratory blank at a similar level
J - Quantitation is approximate due to limitations identified during data validation
UJ - Analyte not detected, but the reporting limit may or may not be higher due to a bias identified during data validation
U - Analyte not detected
UR - Unreliable reporting limit; analyte may or may not be present in the sample
mg/L - milligrams per liter
pCi/L - picoCurie per liter
SU - Standard Unit

TABLE 3
Groundwater Sampling Summary

Cumberland Fossil Plant
Cumberland City, Tennessee

Well ID	Well Designation	Number of Baseline Samples Collected	Baseline / Background Sample Dates											Number of Detection Samples Collected	Detection Monitoring: October 2-4, 2017	Detection Monitoring Program	
			November 8-9, 2016	January 23-26, 2017	February 6-8, 2017	March 7-9, 2017	April 4-5, 2017	May 2-4, 2017	May 30-June 1, 2017	July 11-13, 2017	July 26-28, 2017	August 16-22, 2017	August 29-31, 2017				
CUF-201	Background	11	X	X	X	X	X	X	X	X	X	X	X	X	1	X	Detection Monitoring - 257.94(a) - Appendix III Constituents
CUF-202	Background	11	X	X	X	X	X	X	X	X	X	X	X	X	1	X	Detection Monitoring - 257.94(a) - Appendix III Constituents
CUF-205	Downgradient	11	X	X	X	X	X	X	X	X	X	X	X	X	1	X	Detection Monitoring - 257.94(a) - Appendix III Constituents
CUF-206	Downgradient	11	X	X	X	X	X	X	X	X	X	X	X	X	1	X	Detection Monitoring - 257.94(a) - Appendix III Constituents
CUF-207	Downgradient	11	X	X	X	X	X	X	X	X	X	X	X	X	1	X	Detection Monitoring - 257.94(a) - Appendix III Constituents
CUF-208	Downgradient	11	X	X	X	X	X	X	X	X	X	X	X	X	1	X	Detection Monitoring - 257.94(a) - Appendix III Constituents

Notes:

Baseline groundwater samples analyzed for Appendix III and Appendix IV constituents

Appendix III Constituents - boron, calcium, chloride, fluoride, pH, sulfate, total dissolved solids (TDS)

Appendix IV Constituents - antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, selenium, thallium, radium 226 and 228 combined

TABLE 4
Groundwater and Surface Water Elevation Summary

Cumberland Fossil Plant
Cumberland City, Tennessee

Groundwater Elevation Collection Date		04-Nov-16	23-Jan-17	06-Feb-17	07-Mar-17	04-Apr-17	02-May-17	30-May-17	11-Jul-17	25-Jul-17	15-Aug-17	29-Aug-17	02-Oct-17
Monitoring Well	Units	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Detection
CUF-201	ft-MSL	387.87	388.53	388.10	388.06	388.58	388.49	388.36	388.07	387.72	388.06	387.79	387.71
CUF-202	ft-MSL	376.73	378.88	378.17	378.38	378.72	378.54	378.30	377.46	376.16	377.87	377.21	376.80
CUF-205	ft-MSL	361.93	368.83	365.22	363.79	376.68	367.54	368.67	368.23	365.38	367.54	365.19	364.43
CUF-206	ft-MSL	362.16	364.48	363.24	362.75	362.55	363.90	364.77	364.88	363.78	363.96	362.97	361.59
CUF-207	ft-MSL	363.28	365.48	364.22	363.80	363.19	364.53	365.39	365.44	364.47	364.28	363.65	362.43
CUF-208	ft-MSL	358.88	361.96	360.06	359.51	360.25	361.22	362.20	362.19	360.93	361.15	359.82	358.21

Surface Water Elevation Collection Date		04-Nov-16	23-Jan-17	06-Feb-17	07-Mar-17	04-Apr-17	02-May-17	30-May-17	11-Jul-17	25-Jul-17	16-Aug-17	29-Aug-17	02-Oct-17
Cumberland River	Units	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Baseline	Detection
Staff Gauge - Morning	ft-MSL	354.29	357.81	355.74	354.67	356.68	356.84	359.27	359.15	357.86	358.05	356.24	354.51
Staff Gauge - Afternoon	ft-MSL	354.18	357.38	355.79	355.08	356.42	356.81	359.27	359.09	358.02	358.19	356.41	354.48
Average Staff Gauge	ft-MSL	354.24	357.60	355.77	354.88	356.55	356.83	359.27	359.12	357.94	358.12	356.33	354.50

Notes:

ft-MSL: feet above mean sea level

TABLE 5
Hydraulic Conductivity Data Summary

Cumberland Fossil Plant
 Cumberland City, Tennessee

Well ID	Well Designation	Pumping Test Hydraulic Conductivity (cm/sec)
CUF-205	Downgradient	1.80E-03
CUF-206	Downgradient	6.68E-03
CUF-207	Downgradient	3.80E-03
CUF-208	Downgradient	2.40E-04
Geometric Mean of Hydraulic Conductivity (cm/sec)		1.82E-03

Notes:
 cm/sec - centimeters per second

AECOM, Draft Hydrogeological Characterization Report
 (Rev A), Cumberland Fossil Plant, April 2017