APPENDIX J –
SURFACE STREAM, SEDIMENT AND BENTHIC, AND FISH TISSUE INVESTIGATIONS

APPENDIX J.1

TECHNICAL EVALUATION OF SURFACE STREAM DATA

TENNESSEE VALLEY AUTHORITY

Appendix J.1 - Technical Evaluation of Surface Streams Data

Cumberland Fossil Plant

Cumberland City, Tennessee

Tennessee Valley Authority

TVA

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Acronyms and Abbreviations

CARA	Corrective Action and Risk Assessment
CC	Center Channel
CCR	Coal Combustion Residuals
CCR Parameters	CCR Constituents in 40 CFR 257, Appendices III and IV and the five inorganic constituents listed Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations, Part 257
CFR	Code of Federal Regulations
CUF Plant	Cumberland Fossil Plant
CuR#	Cumberland River Sampling Transect ID (#=transect number)
CuRM	Cumberland River Mile
EAR	Environmental Assessment Report
EI	Environmental Investigation
EIP	Environmental Investigation Plan
ESV	Ecological Screening Value
LB	Left Bank
NPDES	National Pollution Discharge Elimination System
%	Percent
RB	Right Bank
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
TN	Tennessee
TVA	Tennessee Valley Authority
µg/L	micrograms per Liter
USACE	United States Army Corps of Engineers
UT#	Unnamed Tributary Sampling Transect ID (#=transect number)

Chapter 1 Introduction

The Tennessee Valley Authority (TVA) has prepared this technical evaluation appendix to summarize historical and recent surface stream sampling data at TVA's Cumberland Fossil Plant (CUF Plant) in Cumberland City, Tennessee. This technical appendix provides a detailed evaluation of these data to support information provided in the Environmental Assessment Report (EAR) to fulfill the requirements for the Tennessee Department of Environment and Conservation-issued Commissioner's Order No. OGC15-0177 (TDEC Order) Program (TDEC 2015).

Chapter 2 Surface Stream Investigation

The purpose of the surface stream investigation was to characterize surface stream water quality conditions in the vicinity of the Coal Combustion Residuals (CCR) management units at the CUF Plant. For this investigation, TVA reviewed historical and current/ongoing surface stream studies conducted in streams and rivers adjacent to the CUF Plant and performed a surface stream investigation as part of the TDEC Order Environmental Investigation (EI).

The following Chapters summarize the previous studies and present overall surface stream investigation and evaluation findings based on data obtained during previous studies and the EI for the CUF Plant.

2.1 Historical Studies

From 1994 through 2015, the United States Army Corps of Engineers (USACE) collected surface stream water quality samples (surface stream samples) from the Cumberland River near the CUF Plant (USACE 2018) at Cumberland River Mile (CuRM) 100.1; the CUF Plant is located at CuRM 102.8. Surface water data included results from grab samples collected from the surface, mid-depth and epi-benthic zones of the water column. These samples were analyzed for total and dissolved concentrations of select inorganic constituents listed in Appendices III and IV of 40 Code of Federal Regulation (CFR) 257 (CCR Rule) and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters).

Historically, TVA has not routinely conducted surface stream monitoring for chemical parameters in the Cumberland River because the CUF Plant is not physically located within the Tennessee River Valley (TVA 2016). However, in 2016, TVA collected surface stream samples from the Cumberland River to supplement the USACE data in support of the TVA request to TDEC and the United States Environmental Protection Agency for approval of alternative technology-based effluent limitations for selenium and other non-CCR-related parameters. Those samples were collected at locations upstream (CuRM 106.8), proximate to (CuRM 102.6), and downstream (CuRM 99.0) of the CUF Plant for analyses of total and dissolved selenium (TVA 2016).

2.2 Current and Ongoing Monitoring

TVA is conducting ongoing monitoring of surface stream water quality, including the following:

- From 2009 to the date of this EAR, TVA has conducted quarterly groundwater assessment monitoring at the Dry Fly Ash Stack and Gypsum Storage Area under the Solid Waste Disposal Permit (refer to Chapter 5.0 in the EAR). As part of this monitoring, TVA is collecting surface stream samples from Wells Creek quarterly at state compliance sampling points upstream and downstream of the CUF Plant, beyond the property boundary (TVA 2020).

- Regular sampling of CUF Plant's outfall discharge and whole effluent toxicity analyses are conducted in accordance with National Pollution Discharge Elimination System (NPDES) permit requirements (TDEC 2018).

2.3 TDEC Order Environmental Investigation Activities

The objectives of the TDEC Order surface stream investigation were to collect surface stream data for characterization of surface stream water quality on or adjacent to the CUF Plant CCR management units and to evaluate if CCR material and/or dissolved CCR constituents have moved from those units into surface streams, potentially impacting aquatic life. TVA performed EI sample collection activities in accordance with the *Environmental Investigation Plan* (EIP) (TVA 2018), *Surface Stream Sampling and Analysis Plan* (SAP) (Stantec 2018), *Benthic and Surface Stream Sampling and Analysis Plans - Addendum 1* (Stantec 2021a), and *Quality Assurance Project Plan* (Environmental Standards 2018), including TVA- and TDEC-approved programmatic and project-specific changes that were made after approval of the EIP. Sample location selection, collection methodology, analyses, and quality assurance/quality control completed for the investigation are provided in the *Surface Stream Sampling and Analysis Report* (SAR) included in Appendix J.2 and the *Benthic and Sediment SAR Addendum* included in Appendix J.5.

The scope of work for the surface stream investigation included collection of surface water samples and measurement of field parameters along sample transects or at individual sample locations from four waterbodies proximal to the CUF Plant: Cumberland River, Wells Creek, Unnamed Tributary and Discharge Channel. Each transect was made up of three sampling points, including the descending right bank (RB), center channel or thalweg (CC), and left bank (LB) positions within the channel. Depending on water depth at a station/sampling point, surface, mid-column, and/or epi-benthic (within 0.5 meters of the streambed) samples were collected. The sampling events were conducted in November 2018, August, September and December 2019, and May 2020, as shown on Exhibits J.1-1 through J.1-5.

As described in Appendix J.3, Polarized Light Microscopy (PLM) results above the 20% ash value in sediment samples collected from the Unnamed Tributary in August 2019 triggered Phase 2 of the Benthic SAP. The Phase 2 supplemental sampling consisted of additional sediment and surface stream water sample collection in June and July 2021 for further evaluation of whether CCR constituents have migrated into the Unnamed Tributary. The surface stream water samples were collected along two transects in the Unnamed Tributary, at seven individual (single-point) locations in the Unnamed Tributary, and at one transect in Wells Creek. Refer to Exhibit J.1-6 for the sample locations. Samples collected from the Discharge Channel are not included in the evaluation presented in this technical appendix, nor in the statistical analysis of the EI data presented in Appendix E.5, since conditions in the Discharge Channel are not representative of natural surface stream conditions and are permitted and monitored under TVA's NPDES permit.

2.4 Results and Discussion

2.4.1 Field Parameters

Concurrent with surface water sample collection for laboratory analysis and pursuant to the *Surface Stream SAP*, corresponding *in situ* water quality parameters were measured within the Cumberland River, Wells Creek, and the Unnamed Tributary using a Hydrolab® multi-parameter sonde. Parameters included temperature, dissolved oxygen, specific conductance, oxidation reduction potential, pH and turbidity, and measurements were performed on a depth gradient. These data were collected to document general existing water quality conditions within adjacent surface streams and are not used to indicate the presence or direct effects of CCR materials or potential associated impacts and are therefore not discussed in this EAR.

2.4.2 Analytical Results

Water sampling in surface streams near the CUF Plant CCR management units was performed during four monitoring events conducted between November 2018 and May 2020, as described in the SAR (Appendix J.2). Samples were collected at representative locations upstream, adjacent, and downstream of the CUF Plant CCR management units, with upstream locations representing unimpacted control conditions. As shown on Exhibits J.1-1 through J.1-5, surface stream samples were collected along seven transects in the Cumberland River, 11 transects in Wells Creek, and five transects in the Unnamed Tributary. The table below summarizes the number of samples collected within representative zones upstream of, adjacent to, and downstream of the CUF Plant CCR management units.

Waterbody	Total Number of Samples Collected (2018, 2019, and 2020)		
	Upstream (Control)	Adjacent	Downstream
Cumberland River	55	32	43
Wells Creek	19	50	4
Unnamed Tributary	NA	31	NA

Note: The Unnamed Tributary reaches its confluence with the Wells Creek in the vicinity of the CUF Plant CCR management units; therefore, reaches representative of downstream conditions were not present and are captured through Wells Creek sampling locations. NA – not applicable

During the investigation, 234 primary samples were collected and analyzed from the three stream channels: 130 from the Cumberland River, 73 from Wells Creek, and 31 from the Unnamed Tributary. 15 additional samples were collected and laboratory analyzed from the Discharge Channel; these data are presented and discussed below for completeness, however it should be noted that they are not evaluated further in this EAR, as conditions in the Discharge Channel are not representative of natural surface stream conditions and are permitted and monitored under TVA's NPDES permit. Including duplicates, a total of 263 samples were collected within the study area; duplicate results were not evaluated in the statistical analysis (Appendix E.5).

Based on the phased approach proposed in the *Surface Stream SAP*, additional Phase 2 surface stream sampling would have been required if over 20 percent (%) ash was observed in corresponding sediment samples. As described in Appendix J.3, none of the polarized light microscopy results for the sediment samples were above this threshold in the Cumberland River or Wells Creek, and therefore, Phase 2 surface stream sampling was not required.

Phase 2 water sampling was performed in the Unnamed Tributary in June/July 2021 as described in the SAR Addendum (Appendix J.5) due to localized ash above 20% detected in limited in Phase 1 sediment samples from one area (Ponds 3A and 3B) of that waterbody (See Appendix J.3, Section 3.1.1). The Phase 2 surface stream water samples were collected along two transects in the Unnamed Tributary, at seven individual (single-point) locations in the Unnamed Tributary, and at one transect in Wells Creek downstream of the confluence with the Unnamed Tributary. Refer to Exhibit J.1-6 for the sample locations. During the Phase 2 investigation, 14 samples were collected from the Unnamed Tributary (including one duplicate) and three samples were collected from Wells Creek. Duplicate results were not evaluated in the statistical analysis (Appendix E.5).

Water samples were analyzed as total and dissolved fractions by an accredited laboratory for the following CCR-related constituents, hereafter referred to collectively as "CCR Parameters" for the Surface Stream Investigation.

- 40 CFR Part 257 Appendix III constituents including: boron, calcium, chloride, fluoride, sulfate, and total dissolved solids

- 40 CFR Part 257 Appendix IV constituents including: antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226/228
- Tennessee Rule 0400-11-01-.04, Appendix 1 inorganic constituents including: copper, nickel, silver, vanadium, and zinc
- Total Suspended Solids and additional cations including magnesium, manganese, and iron.

TDEC-approved acute and chronic ecological screening values (ESVs) for the EAR (Table 1-2 and Appendix A.2) to evaluate whether identified CCR Parameter concentrations in surface stream samples may be indicative of potential impacts to aquatic life. Acute ESVs are concentrations of CCR Parameters that are protective of aquatic organisms for short-term exposure (typically a period of days), and chronic ESVs are protective of aquatic organisms for long-term exposure (typically the duration of an entire life cycle, although that can vary by species). ESVs for hardness-dependent parameters (cadmium, chromium, lead, copper, nickel, silver, and zinc) were expressed as dissolved concentrations and adjusted based on stream-specific water chemistry.

TDEC also approved EAR screening levels for human health, which are based on human exposure through use of surface water for drinking water supply (Table 1-2 and Appendix A.2). The human health screening levels were only applied to surface stream sampling results for the Cumberland River, as it is the only surface stream used as a potable water source near the CUF Plant.

The EAR screening levels are generic (not specific to an individual person or ecological receptor) and are protective of human and ecological health. Most screening levels are not regulatory standards and are conservatively based on published health studies. Concentrations above the screening level do not necessarily mean that an adverse health effect is occurring, but rather, that further evaluation is required in the Corrective Action and Risk Assessment Plan (CARA) to determine if an unacceptable risk exists and corrective action is required.

Statistical evaluation of the EI surface stream data for the CUF Plant is presented in Appendix E.5. This technical appendix summarizes the results of those evaluations relative to the objective of the surface stream investigation.

Exploratory Data Analysis

The 2018-2020 exploratory data analysis showed that CCR Parameter concentrations in the Cumberland River were below the EAR screening levels based on protection of human health. With only a few exceptions, CCR Parameter concentrations also were generally below chronic and acute ESVs in water samples collected from the Cumberland River, Wells Creek and the Unnamed Tributary. Limited samples from the Unnamed Tributary had boron and calcium higher than an ESV. Boron concentrations, ranging from 7,230 to 10,400 µg/L in eight of the 31 total samples, were slightly above the 7,200 micrograms per liter (µg/L) ESV. Calcium concentrations were above the chronic ESV of 116,000 µg/L in the 31 Unnamed Tributary samples, ranging from 132,000 to 436,000 µg/L. No CCR Parameter concentrations in the Cumberland River or Wells Creek were above ESVs.

The 2021 exploratory data analysis showed that samples from the Unnamed Tributary had boron and calcium higher than an ESV. Boron concentrations of 8,530 µg/L in the UT02 sample and 8,000 µg/L in the UT03 sample were slightly above the 7,200 µg/L chronic ESV. Calcium concentrations were above the chronic ESV of 116,000 µg/L in each of the 14

Unnamed Tributary samples, ranging from 273,000 to 405,000 µg/L. No CCR Parameter concentrations in the Wells Creek samples were above ESVs.

A summary of the surface stream analytical results for the 2018-2021 sampling events are presented in Tables J.1-1, J.1-2 and J.1-3; those concentrations found to be above ESVs are highlighted on the tables based on the exploratory data analysis. As noted above, human health screening levels based on consumption of surface water as potable water were only applied to the Cumberland River samples.

The 2019 boron concentrations in the Unnamed Tributary above the ESV occurred only in the three most upstream transect locations (Ponds 3A and 3B), and there appears to be no relationship between the concentrations above the ESV and position within the transect. The 2021 Phase 2 boron concentrations in the Unnamed Tributary above the chronic ESV only occurred in the two sample locations in Pond 3A (UT02 and UT03). While the Unnamed Tributary does not extend upstream of the plant, and therefore there is no feasible upstream control location, concentrations farther downstream were lower than the upstream concentrations. Additionally, boron concentrations in both 2019 and 2021 samples from the receiving waters in Wells Creek below the confluence with the Unnamed Tributary were below the ESV.

The 2018-2019 samples from the Unnamed Tributary contained calcium concentrations between the chronic and acute ESVs, as shown in Table J.1-3 and on Exhibit J.1-7. Similar to boron, calcium concentrations at downstream transects UT04 and UT05 were lower than upstream locations (UT01, UT02 and UT03), regardless of position on the transect. Similarly, all Phase 2 samples collected from the Unnamed Tributary in 2021 contained calcium concentrations between the chronic and acute ESVs, as shown in Table J.1-3 and on Exhibit J.1-8. Calcium concentrations remained below the chronic ESV in the sampled transects of Wells Creek downstream of the confluence with the Unnamed Tributary. Therefore, potential impacts of calcium to the Unnamed Tributary appear to be localized within the heavily impounded tributary. These results above ESVs, including potential sources, processes and pathways will be further evaluated in the CARA Plan.

2.5 Summary

The exploratory data analysis found that CCR Parameter concentrations were below EAR human health screening levels in the Cumberland River, and consistently below acute and chronic ESVs at the sampling locations in both the Cumberland River and Wells Creek. The predominance of surface stream sampling results below the EAR screening levels in these water bodies demonstrate that potential impacts from CCR materials associated with CUF Plant CCR management units are unlikely and do not appear to be affecting water quality or associated biological communities within these systems (see Appendices J.3 and J.5).

Potential impacts appear to be limited to boron and calcium concentrations localized within the Unnamed Tributary and decrease in a downstream direction. These parameters were more consistently above the chronic ESVs, and at higher concentrations at the upstream locations within Ponds 3A and/or 3B of the Unnamed Tributary. These findings demonstrate that potential impacts are predominantly localized in this area. Consistently lower constituent concentrations of boron and calcium occurred in the downstream portions of the Unnamed Tributary and were below ESVs in Wells Creek and the Cumberland River.

These surface stream water quality results are further evaluated in the context of other environmental data in the EAR and will be included in risk assessments as part of the CARA Plan.

Chapter 3 References

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TABLES

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CuR01							
Sample Date					5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18
Sample ID					CUF-STR-CuR01-CC-SUR-20181105	CUF-STR-CuR01-CC-MID-20181105	CUF-STR-CuR01-CC-BOT-20181105	CUF-STR-CuR01-LB-SUR-20181105	CUF-STR-CuR01-LB-MID-20181105	CUF-STR-CuR01-LB-BOT-20181105	CUF-STR-CuR01-RB-SUR-20181105	CUF-STR-DUP04-20181105
Parent Sample ID												CUF-STR-CUR01-CC-SUR-20181105
Sample Depth					0.5 m	5 m	10 m	0.5 m	1.5 m	3 m	0.5 m	0.5 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute								
Total Metals												
Antimony	ug/L	6[A]	190[B]	900[C]	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12
Arsenic	ug/L	10[A]	150[B]	340[C]	0.423 J	0.702 J	0.461 J	0.363 J	--[2]	0.366 J	0.596 J	0.692 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.3	25.4	25.6	24.8	27.9	26.2	26	27
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	0.076 J	<0.057
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	37,300	37,100	37,200	37,800	37,900	37,500	35,800	37,300
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	<0.631	0.899 U*	<0.631	0.795 U*	1.04 U*	<0.631	<0.631	1.57 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.279 J	0.221 J	0.32 J	0.387 J	0.545	0.329 J	0.386 J	0.254 J
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	<1.3	<1.3	<1.3	<1.3	2.53	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	381 J	495	538	402	914	507	480	423
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.375 J	0.441 J	0.49 J	0.424 J	1.52	0.496 J	0.469 J	0.338 J
Lithium	ug/L	40[A]	440[B]	910[C]	4.68 J	4.71 J	4.78 J	4.41 J	5.22	4.84 J	4.39 J	<2.56
Magnesium	ug/L	n/v	n/v	n/v	6,040	6,020	6,040	6,030	6,040	5,980	5,770	6,140
Manganese	ug/L	n/v	n/v	n/v	48.7	58.2	65.9	52.8	62.7	58.9	56.5	50.4
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	0.48 U*	<0.474	<0.474	2.02 U*	1.05 U*	0.551 U*	0.496 U*	<0.474
Nickel	ug/L	100[A]	52.2[B]	469[C]	0.931 J	1.4	1.19	1.21	1.96	1.51	1.25	0.72 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813
Silver	ug/L	100[A]	n/v	3.78[C]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	6[B]	54[C]	<0.063	<0.063	<0.063	0.088 J	0.102 J	<0.063	0.081 J	<0.063
Vanadium	ug/L	86[A]	27[B]	79[C]	1.91 U*	2.13 U*	1.98 U*	1.85 U*	2.59 U*	2.37 U*	2.11 U*	2.31 U*
Zinc	ug/L	2,000[A]	120[B]	120[C]	2.98 U*	4.37 U*	3.69 U*	4.29 U*	9.14 U*	4.02 U*	3.17 U*	2.8 U*
Dissolved Metals												
Antimony	ug/L	6[A]	n/v	n/v	<1.12	<1.12	<1.12	<1.12	1.15 J	<1.12	<1.12	<1.12
Arsenic	ug/L	10[A]	150[D]	340[E]	1.16	0.598 J	0.437 J	0.542 J	<0.323	<0.323	0.331 J	0.587 J
Barium	ug/L	2,000[A]	n/v	n/v	21	20.4	20.3	22.9	20.5	19.4	20.8	22.6
Beryllium	ug/L	4[A]	n/v	n/v	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	35,900	36,500	36,400	38,900	35,800	36,700	36,200	37,500
Chromium	ug/L	100[A]	74.1[D]	570[E]	<0.631	<0.631	<0.631	1.1 U*	<0.631	<0.631	<0.631	1.19 U*
Cobalt	ug/L	6[A]	n/v	n/v	0.26 J	<0.075	0.108 J	<0.075	0.086 J	0.105 J	0.1 J	<0.075
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	538 J	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	21.2 J
Lead	ug/L	5[A]	2.52[D]	64.6[E]	0.451 J	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094
Lithium	ug/L	40[A]	n/v	n/v	3.11 J	<2.56	<2.56	<2.56	2.76 J	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	5,900	5,950	5,930	5,840	5,710	5,890	5,920	6,100
Manganese	ug/L	n/v	n/v	n/v	7.66	3.78 J	4.28 J	6.21	7.15	6.13	11.9	3.63 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100[A]	n/v	n/v	0.521 U*	<0.474	<0.474	<0.474	0.814 U*	0.618 U*	<0.474	<0.474
Nickel	ug/L	100[A]	52.0[D]	468[E]	1.51 J	0.86 J	1.32	0.481 J	1.05	0.655 J	0.983 J	0.312 UJ
Selenium	ug/L	50[A]	n/v	n/v	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813
Silver	ug/L	100[A]	n/v	3.22[E]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	n/v	n/v	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063
Vanadium	ug/L	86[A]	n/v	n/v	1.77 U*	1.37 U*	1.51 U*	1.95 U*	1.45 U*	1.35 U*	1.3 U*	1.91 U*
Zinc	ug/L	2,000[A]	118[D]	117[E]	3.81 U*	3.06 U*	2.94 U*	4.13 U*	2.84 U*	2.58 U*	14 U*	2.73 U*
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	0.0736 +/-(0.0730)U	0.0751 +/-(0.0811)U	0.0422 +/-(0.0711)U	0.0893 +/-(0.0839)U	0.0705 +/-(0.0730)U	0.0477 +/-(0.0718)U	0.0693 +/-(0.0741)U	0.0615 +/-(0.0643)U
Radium-228	pCi/L	n/v	n/v	n/v	0.386 +/-(0.332)U	0.167 +/-(0.405)U	0.142 +/-(0.304)U	-0.123 +/-(0.274)U	0.183 +/-(0.259)U	0.0960 +/-(0.274)U	-0.00876 +/-(0.331)U	-0.0102 +/-(0.320)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.460 +/-(0.340)U	0.242 +/-(0.413)U	0.184 +/-(0.312)U	0.0893 +/-(0.287)U	0.254 +/-(0.269)U	0.144 +/-(0.283)U	0.0693 +/-(0.339)U	0.0615 +/-(0.326)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	5.67	5.59	5.49	5.60	5.52	5.65	4.02	5.41
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0901 J	0.0909 J	0.0893 J	0.0907 J	0.0894 J	0.0902 J	0.0788 J	0.0861 J
Sulfate	mg/L	250[A]	n/v	n/v	20.6	20.3	20.0	20.5	20.1	20.2	16.7	19.7
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	118	117	118	119	120	118	113	118
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	121	129	127	124	136	133	146	122
Total Suspended Solids	mg/L	n/v	n/v	n/v	14.0	18.5	20.6	13.8	16.9	16.7	14.5	14.3

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CuR01								
Sample Date					5-Nov-18	5-Nov-18	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CuR01-RB-MID-20181105	CUF-STR-CuR01-RB-BOT-20181105	CUF-STR-CuR01-CC-SUR-20190904	CUF-STR-DUP04-20190904	CUF-STR-CuR01-CC-MID-20190904	CUF-STR-CuR01-CC-BOT-20190904	CUF-STR-CuR01-LB-SUR-20190904	CUF-STR-CuR01-LB-MID-20190904	CUF-STR-CuR01-LB-BOT-20190904
Parent Sample ID								CUF-STR-CUR01-CC-SUR-20190904					
Sample Depth					2.7 m	5 m	0.5 m	0.5 m	5.5 m	10.5 m	0.5 m	4.5 m	8.4 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review			Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	1.12 UJ	<1.12	0.447 J	0.586 J	0.424 J	1.73 J	0.514 J	0.614 J	0.433 J
Arsenic	ug/L	10[A]	150[B]	340[C]	<0.323	0.748 J	0.922 J	0.873 J	1.02	1.36	0.873 J	0.970 J	0.956 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	25.1	25.6	22.1	24.3	25.3	27.1	22.9	24.0	25.2
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.057	<0.057	<0.182	<0.182	<0.182	0.463 U*	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	<30.3	<38.6	<38.6	<38.6	46.2 J	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	<0.125	<0.125	0.230 J	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	36,700	37,200	26,100	27,300	27,200	27,400	26,200	26,000	26,200
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	<0.631	<0.631	2.57	2.97	2.84	3.82	2.56	3.17	3.19
Cobalt	ug/L	6[A]	19[B]	120[C]	0.269 J	0.325 J	0.213 U*	0.224 U*	0.413 U*	0.662	0.317 U*	0.376 U*	0.482 J
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	<1.3	<1.3	0.763 J	0.841 J	1.12 J	1.44 J	0.910 J	0.969 J	1.04 J
Iron	ug/L	n/v	n/v	n/v	354	455	248	271	646	785	423	608	738
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.391 J	0.435 J	0.298 U*	0.282 U*	0.630 U*	0.941 J	0.454 U*	0.595 U*	0.693 U*
Lithium	ug/L	40[A]	440[B]	910[C]	4.6 J	4.98 J	<3.39	3.68 J	<3.39	4.44 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,940	6,030	5,480	5,710	5,820	6,010	5,460	5,370	5,610
Manganese	ug/L	n/v	n/v	n/v	54.1	59.7	39.8	42.3	75.2	87.1	55.7	70.5	80.6
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.474	<0.474	<0.610	<0.610	<0.610	0.673 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.22	1.1	0.546 J	0.529 J	0.887 J	1.21	0.742 J	0.904 J	1.07
Selenium	ug/L	50[A]	3.1[B]	20[C]	<0.813	<0.813	<1.51	<1.51	<1.51	2.13 J	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.063	<0.063	<0.148	<0.148	<0.148	0.408 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.86 U*	2.18 U*	2.75	2.76	3.40	4.12	2.81	3.34	3.43
Zinc	ug/L	2,000[A]	120[B]	120[C]	4.27 U*	4.17 U*	5.22 U*	6.38 U*	7.05 U*	7.10 U*	--[2]	6.49 U*	6.55 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	3.64 J	1.16 J	0.429 J	0.564 J	0.445 J	1.03 J	0.584 J	0.512 J	0.491 J
Arsenic	ug/L	10[A]	150[D]	340[E]	0.395 J	<0.323	0.766 J	0.766 J	0.818 J	0.902 J	0.790 J	0.751 J	0.803 J
Barium	ug/L	2,000[A]	n/v	n/v	20.7	19.1	20.4	21.8	20.2	20.3	19.4	18.3	20.5
Beryllium	ug/L	4[A]	n/v	n/v	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	36,800	37,100	26,700	27,200	27,400	26,500	24,900	24,100	26,300
Chromium	ug/L	100[A]	74.1[D]	570[E]	<0.631	<0.631	2.34	2.60	2.65	2.87	2.63	2.36	2.35
Cobalt	ug/L	6[A]	n/v	n/v	0.157 J	0.089 J	<0.0750	<0.0750	0.0880 U*	0.0990 J	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	<1.3	<1.3	0.654 J	0.638 J	1.07 J	1.13 J	0.742 J	<0.627	<0.627
Iron	ug/L	n/v	n/v	n/v	16.1 J	<14.1	<19.5	<19.5	513	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<2.56	<2.56	<3.39	3.48 J	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	6,000	6,100	5,580	5,670	5,730	5,620	5,180	5,000	5,420
Manganese	ug/L	n/v	n/v	n/v	12.3	12.6	<1.35	<1.35	2.10 J	2.02 J	1.57 J	2.14 J	3.22 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	2.3 U*	1.01 U*	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	52.0[D]	468[E]	1.15	0.881 J	<0.336	<0.336	0.430 J	0.417 J	<0.336	<0.336	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<0.813	<0.813	<1.51	<1.51	<1.51	1.71 J	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	0.066 J	<0.063	<0.148	<0.148	<0.148	0.148 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.64 U*	1.35 U*	2.41	2.43	2.40	2.84	2.48	2.30	2.34
Zinc	ug/L	2,000[A]	118[D]	117[E]	2.69 U*	<2.42	4.02 J	5.39	4.41 J	3.83 J	3.43 J	3.82 J	3.74 J
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.121 +/-(0.0831)	0.121 +/-(0.0861)	0.0102 +/-(0.0689)U	-0.0265 +/-(0.0724)U	0.0742 +/-(0.0720)U	-0.00689 +/-(0.0653)U	0.0984 +/-(0.0914)U	0.0659 +/-(0.0788)U	0.0475 +/-(0.0868)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.0729 +/-(0.284)U	0.229 +/-(0.316)U	0.0737 +/-(0.245)U	0.517 +/-(0.441)UJ	0.138 +/-(0.268)U	0.208 +/-(0.278)U	0.113 +/-(0.265)U	0.360 +/-(0.233)U*	0.327 +/-(0.269)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.121 +/-(0.296)J	0.350 +/-(0.328)J	0.0839 +/-(0.255)U	0.517 +/-(0.447)UJ	0.213 +/-(0.278)U	0.208 +/-(0.286)U	0.212 +/-(0.280)U	0.426 +/-(0.246)U*	0.374 +/-(0.283)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	5.51	5.43	3.47	3.52	3.43	3.56	3.37	3.34	3.38
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0888 J	0.0856 J	0.0775 J	0.0755 J	0.0707 J	0.0763 J	0.0688 J	0.0689 J	0.0736 J
Sulfate	mg/L	250[A]	n/v	n/v	20.0	19.6	23.0	23.3	23.0	23.8	22.6	22.5	23.0
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	116	118	87.7	91.7	91.9	93.2	87.9	87.0	88.5
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	126	134	122	123	110	111	128	120	117
Total Suspended Solids	mg/L	n/v	n/v	n/v	14.7	16.6	8.71	10.1	22.4	26.9	14.9	21.6	27.9

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR01		CuR02						
Sample Date					4-Sep-19	4-Sep-19	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18
Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CUF-STR-CuR01-RB-SUR-20190904	CUF-STR-CuR01-RB-BOT-20190904	CUF-STR-CuR02-CC-SUR-20181105	CUF-STR-CuR02-CC-MID-20181105	CUF-STR-CuR02-CC-BOT-20181105	CUF-STR-CuR02-LB-SUR-20181105	CUF-STR-CuR02-LB-MID-20181105	CUF-STR-CuR02-LB-BOT-20181105	CUF-STR-CuR02-RB-SUR-20181105
Parent Sample ID													
Sample Depth					0.5 m	2.5 m	0.5 m	5.25 m	10 m	0.5 m	3.5 m	7 m	0.5 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	0.784 J	0.648 J	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12
Arsenic	ug/L	10[A]	150[B]	340[C]	0.903 J	1.11	0.691 J	0.722 J	0.729 J	0.638 J	0.72 J	0.721 J	0.697 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	21.4	25.5	27.1	26.5	26.2	25.7	27.6	26.6	26.4
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	55.2 J	<38.6	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	25,600	26,200	35,600	35,700	36,100	34,400	36,300	35,500	36,500
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	2.77	3.28	1.8 U*	1.54 U*	1.62 U*	1.51 U*	1.76 U*	1.72 U*	1.55 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.242 U*	0.538	0.282 J	0.285 J	0.299 J	0.244 J	0.322 J	0.293 J	0.254 J
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	0.870 J	1.17 J	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	288	807	505	459	533	445	530	510	413
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.369 U*	0.817 U*	0.382 J	0.407 J	0.45 J	0.382 J	0.438 J	0.398 J	0.357 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	5,450	5,720	6,040	6,010	5,980	5,890	6,170	6,030	6,170
Manganese	ug/L	n/v	n/v	n/v	48.3	96.9	54.5	54.8	59.6	51.1	58.7	56.2	51.3
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474
Nickel	ug/L	100[A]	52.2[B]	469[C]	0.439 J	1.09	1.03	0.859 J	0.925 J	0.871 J	1.14	1.11	0.771 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813
Silver	ug/L	100[A]	n/v	3.78[C]	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063
Vanadium	ug/L	86[A]	27[B]	79[C]	2.97	3.65	2.83 U*	2.42 U*	2.64 U*	2.35 U*	3.04 U*	2.9 U*	2.53 U*
Zinc	ug/L	2,000[A]	120[B]	120[C]	4.74 U*	6.17 U*	3.54 U*	3.26 U*	3.71 U*	3.11 U*	4.41 U*	3.93 U*	3.65 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	0.785 J	0.594 J	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12
Arsenic	ug/L	10[A]	150[D]	340[E]	0.920 J	0.861 J	0.514 J	0.516 J	0.517 J	0.489 J	0.536 J	0.534 J	0.398 J
Barium	ug/L	2,000[A]	n/v	n/v	20.7	19.8	22.4	22.3	23	23.1	23.2	22.6	22.7
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	27,000	25,400	36,700	37,000	37,100	36,500	36,700	36,300	37,300
Chromium	ug/L	100[A]	74.1[D]	570[E]	2.75	2.76	1.06 U*	1.06 U*	1 U*	0.958 U*	1.05 U*	1.06 U*	<0.631
Cobalt	ug/L	6[A]	n/v	n/v	0.0940 J	0.0840 J	<0.075	<0.075	<0.075	<0.075	0.104 J	<0.075	<0.075
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	0.674 J	<0.627	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<14.1	<14.1	<14.1	15.2 J	<14.1	16.8 J	<14.1
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.128	<0.128	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094
Lithium	ug/L	40[A]	n/v	n/v	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	5,840	5,510	5,810	5,770	5,840	5,870	5,810	5,720	5,970
Manganese	ug/L	n/v	n/v	n/v	2.37 J	8.11	3.05 J	3.6 J	3.47 J	5.17	5.98	5.78	4.71 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.474	<0.474	<0.474	<0.474	0.509 J	0.494 J	<0.474
Nickel	ug/L	100[A]	52.0[D]	468[E]	<0.336	<0.336	0.457 J	0.427 J	0.5 J	0.427 J	0.525 J	0.458 J	0.493 J
Selenium	ug/L	50[A]	n/v	n/v	1.57 J	<1.51	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813
Silver	ug/L	100[A]	n/v	3.22[E]	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063
Vanadium	ug/L	86[A]	n/v	n/v	2.65	2.69	1.67 U*	1.89 U*	1.85 U*	1.92 U*	2.39 U*	2.27 U*	<0.899
Zinc	ug/L	2,000[A]	118[D]	117[E]	3.75 J	3.24 J	<2.42	2.59 U*	2.43 U*	<2.42	3.07 U*	4.34 U*	3.19 U*
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	-0.0505 +/-(0.0540)U	0.0173 +/-(0.0618)U	0.0444 +/-(0.0565)U	0.100 +/-(0.0755)U	0.00745 +/-(0.0624)U	0.138 +/-(0.118)U	0.125 +/-(0.0910)	0.116 +/-(0.0850)	0.0591 +/-(0.0654)U
Radium-228	pCi/L	n/v	n/v	n/v	0.0531 +/-(0.321)U	-0.302 +/-(0.235)U	0.125 +/-(0.230)U	0.0549 +/-(0.240)U	-0.155 +/-(0.230)U	-0.256 +/-(0.330)U	0.000 +/-(0.263)U	-0.109 +/-(0.238)U	0.104 +/-(0.226)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.0531 +/-(0.326)U	0.0173 +/-(0.243)U	0.169 +/-(0.237)U	0.155 +/-(0.252)U	0.00745 +/-(0.238)U	0.138 +/-(0.350)U	0.125 +/-(0.278)J	0.116 +/-(0.253)J	0.163 +/-(0.235)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	3.38	3.32	5.15	5.15	5.14	5.06	5.14	5.16	5.20
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0705 J	0.0671 J	0.0835 J	0.0851 J	0.0842 J	0.0848 J	0.0834 J	0.0863 J	0.0848 J
Sulfate	mg/L	250[A]	n/v	n/v	22.8	22.7	20.4	20.4	20.5	20.6	20.4	20.9	20.6
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	86.4	89.0	117	119	116	112	111	115	117
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	115	97.0	124	133	115	142	133	130	133
Total Suspended Solids	mg/L	n/v	n/v	n/v	10.9	29.1	12.5	15.6	17.3	13.9	13.9	14.9	12.0

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CuR02								
Sample Date					5-Nov-18	5-Nov-18	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CUR02-RB-MID-20181105	CUF-STR-CuR02-RB-BOT-20181105	CUF-STR-CuR02-CC-SUR-20190904	CUF-STR-CuR02-CC-MID-20190904	CUF-STR-CuR02-CC-BOT-20190904	CUF-STR-CuR02-LB-SUR-20190904	CUF-STR-CuR02-LB-BOT-20190904	CUF-STR-CuR02-RB-SUR-20190904	CUF-STR-CuR02-RB-BOT-20190904
Parent Sample ID													
Sample Depth					1.75 m	3.1 m	0.5 m	6.1 m	11.8 m	0.5 m	2 m	0.5 m	2.1 m
Sample Type			Cumberland River (Hardness = 100 mg/L)		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Chronic	Acute	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals													
Antimony	ug/L	6^{A}	190^{B}	900^{C}	<1.12	<1.12	1.81 J	1.74 J	0.920 J	<0.378	<0.378	0.756 J	0.672 J
Arsenic	ug/L	10^{A}	150^{B}	340^{C}	0.714 J	0.674 J	0.976 J	0.986 J	0.992 J	1.08	0.907 J	0.852 J	1.13
Barium	ug/L	$2,000^{A}$	220^{B}	$2,000^{C}$	26.6	26.1	20.7	23.4	25.1	28.1	31.1 J	22.1	23.9
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	<0.057	<0.057	0.253 U*	0.252 U*	<0.182	0.437 U*	<0.182	<0.182	<0.182
Boron	ug/L	$4,000^{A}$	$7,200^{B}$	$34,000^{C}$	<30.3	<30.3	<38.6	39.1 J	<38.6	41.8 J	<38.6	<38.6	<38.6
Cadmium	ug/L	5^{A}	0.790^{B}	1.91^{C}	<0.125	<0.125	<0.125	<0.125	<0.125	0.135 J	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	$116,000^{B}$	n/v	36,400	35,700	24,500	24,500	25,200	26,200	24,800	25,200	24,600
Chromium	ug/L	100^{A}	86.2^{B}	$1,803^{C}$	1.75 U*	1.81 U*	2.57	3.40	3.06	3.58	4.62	2.73	3.13
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.288 J	0.29 J	0.284 U*	0.467 U*	0.468 U*	0.384 U*	0.392 U*	0.328 U*	0.433 U*
Copper	ug/L	$1,300^{A}$	9.33^{B}	14.0^{C}	2.15	<1.3	1.00 J	1.09 J	1.11 J	1.06 J	0.963 J	1.12 J	1.05 J
Iron	ug/L	n/v	n/v	n/v	528	501	256	657	708	464	542	391	698
Lead	ug/L	5^{A}	3.18^{B}	81.6^{C}	0.435 J	0.408 J	0.386 U*	0.641 U*	0.761 U*	0.521 U*	0.558 U*	0.544 U*	0.772 U*
Lithium	ug/L	40^{A}	440^{B}	910^{C}	<2.56	<2.56	4.21 J	4.28 J	3.93 J	4.56 J	3.97 J	3.42 J	3.64 J
Magnesium	ug/L	n/v	n/v	n/v	6,070	5,890	5,180	5,280	5,560	6,080	5,750	5,320	5,300
Manganese	ug/L	n/v	n/v	n/v	59	58.3	42.6	76.1	88.1	70.1	74.8	55.7	75.9
Mercury	ug/L	2^{A}	0.77^{B}	1.4^{C}	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100^{A}	800^{B}	$7,200^{C}$	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100^{A}	52.2^{B}	469^{C}	0.988 J	0.937 J	0.529 J	1.03	0.875 J	1.07	1.56	0.672 J	0.888 J
Selenium	ug/L	50^{A}	3.1^{B}	20^{C}	<0.813	<0.813	<1.51	1.70 J	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	3.78^{C}	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2^{A}	6^{B}	54^{C}	<0.063	<0.063	0.214 U*	<0.148	<0.148	0.233 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	2.61 U*	2.53 U*	2.95	3.60	3.45	3.84	3.61	2.99	3.42
Zinc	ug/L	$2,000^{A}$	120^{B}	120^{C}	4.04 U*	4.54 U*	4.17 U*	6.01 U*	6.25 U*	5.68 U*	5.76 U*	4.90 U*	5.74 U*
Dissolved Metals													
Antimony	ug/L	6^{A}	n/v	n/v	<1.12	<1.12	2.36	1.11 J	1.03 J	<0.378	0.605 J	0.699 J	0.497 J
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	0.406 J	0.581 J	1.08	0.837 J	0.842 J	0.843 J	1.02	0.863 J	0.736 J
Barium	ug/L	$2,000^{A}$	n/v	n/v	23.3	23	19.8	19.9	19.6	24.3	66.6 J	19.6	19.9
Beryllium	ug/L	4^{A}	n/v	n/v	<0.057	<0.057	0.476 U*	<0.182	<0.182	<0.182	0.608 U*	<0.182	<0.182
Boron	ug/L	$4,000^{A}$	n/v	n/v	<30.3	<30.3	51.0 J	<38.6	<38.6	<38.6	58.5 J	<38.6	<38.6
Cadmium	ug/L	5^{A}	0.718^{D}	1.80^{E}	<0.125	<0.125	0.156 J	<0.125	<0.125	<0.125	0.196 J	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	37,800	37,600	25,100	25,500	25,400	26,200	26,200	25,800	23,800
Chromium	ug/L	100^{A}	74.1^{D}	570^{E}	<0.631	1.04 U*	2.92	2.55	2.54	2.96	3.31	2.63	2.26
Cobalt	ug/L	6^{A}	n/v	n/v	<0.075	<0.075	0.187 U*	0.0770 U*	0.0940 U*	0.116 J	0.220 J	0.0990 U*	0.0770 U*
Copper	ug/L	$1,300^{A}$	8.96^{D}	13.4^{E}	<1.3	<1.3	1.02 J	0.712 J	0.663 J	0.682 J	0.751 J	0.708 J	0.670 J
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5^{A}	2.52^{D}	64.6^{E}	<0.094	<0.094	0.210 J	<0.128	<0.128	<0.128	0.216 J	0.181 J	<0.128
Lithium	ug/L	40^{A}	n/v	n/v	<2.56	<2.56	4.64 J	<3.39	4.18 J	3.96 J	5.23	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	6,110	5,950	5,390	5,420	5,410	6,000	6,000	5,450	5,120
Manganese	ug/L	n/v	n/v	n/v	5.93	6.01	<1.35	2.85 J	4.87 J	4.34 J	4.54 J	3.71 J	3.95 J
Mercury	ug/L	2^{A}	0.77^{D}	1.4^{E}	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100^{A}	n/v	n/v	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	0.636 J	<0.610	<0.610
Nickel	ug/L	100^{A}	52.0^{D}	468^{E}	0.45 J	0.466 J	0.409 J	<0.336	<0.336	0.626 J	0.676 J	0.342 J	<0.336
Selenium	ug/L	50^{A}	n/v	n/v	<0.813	<0.813	1.98 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	3.22^{E}	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2^{A}	n/v	n/v	<0.063	<0.063	0.273 U*	<0.148	<0.148	<0.148	0.317 U*	<0.148	<0.148
Vanadium	ug/L	86^{A}	n/v	n/v	<0.899	1.96 U*	2.94	2.39	2.54	2.81	3.08	2.58	2.09
Zinc	ug/L	$2,000^{A}$	118^{D}	117^{E}	3.82 U*	18.9 J	3.30 J	3.56 J	4.13 J	3.89 J	6.25	5.16	3.59 J
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.0532 +/-(0.0746)U	0.00811 +/-(0.0532)U	-0.0526 +/-(0.0557)U	0.0911 +/-(0.0859)U	0.0667 +/-(0.0741)U	0.0181 +/-(0.0755)U	0.0513 +/-(0.0910)U	-0.0139 +/-(0.0710)U	-0.0385 +/-(0.0704)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.0967 +/-(0.288)U	0.268 +/-(0.277)U	0.587 +/-(0.319)U*	0.327 +/-(0.298)U	0.0778 +/-(0.236)U	0.136 +/-(0.303)UJ	0.272 +/-(0.408)UJ	-0.0504 +/-(0.232)U	-0.0364 +/-(0.263)U
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	0.0532 +/-(0.298)U	0.276 +/-(0.282)U	0.587 +/-(0.324)U*	0.419 +/-(0.310)U	0.144 +/-(0.247)U	0.154 +/-(0.312)UJ	0.323 +/-(0.418)UJ	0.000 +/-(0.243)U	0.000 +/-(0.272)U
Anions													
Chloride	mg/L	250^{A}	230^{B}	860^{C}	5.24	5.30	3.34	3.31	3.33	3.38	3.24	3.49	3.30
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.0857 J	0.0877 J	0.0688 J	0.0737 J	0.0681 J	0.0681 J	0.0678 J	0.0723 J	0.0729 J
Sulfate	mg/L	250^{A}	n/v	n/v	20.7	21.3	23.0	23.0	23.3	23.1	22.5	23.2	23.0
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	116	113	82.5	82.9	85.8	90.5	85.6	84.8	83.3
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	134	129	122	126	125	105	130	122	113
Total Suspended Solids	mg/L	n/v	n/v	n/v	16.8	17.1	9.43	22.3	22.9	16.1	22.4	16.1	23.6

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CuR02						CuR03		
Sample Date					27-May-20	27-May-20	27-May-20	27-May-20	27-May-20	27-May-20	5-Nov-18	5-Nov-18	5-Nov-18
Sample ID					CUF-STR-CUR02-CC-SUR-20200527	CUF-STR-CUR02-CC-MID-20200527	CUF-STR-CUR02-CC-BOT-20200527	CUF-STR-CUR02-LB-MID-20200527	CUF-STR-DUP02-20200527	CUF-STR-CUR02-RB-MID-20200527	CUF-STR-CuR03-CC-SUR-20181105	CUF-STR-CuR03-CC-MID-20181105	CUF-STR-CuR03-CC-BOT-20181105
Parent Sample ID									CUF-STR-CUR02-LB-MID-20200527				
Sample Depth					0.5 m	6 m	11.5 m	0.8 m	0.8 m	0.8 m	0.5 m	5.5 m	10.7 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L) Chronic	Cumberland River (Hardness = 100 mg/L) Acute	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals													
Antimony	ug/L	6^{A}	190^{B}	900^{C}	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12
Arsenic	ug/L	10^{A}	150^{B}	340^{C}	0.357 J	0.365 J	0.438 J	<0.313	0.462 J	<0.313	0.682 J	0.696 J	0.681 J
Barium	ug/L	$2,000^{A}$	220^{B}	$2,000^{C}$	22.7	24.6	29.2	24.7	21.4	23.4	26.6	28.1	29
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057
Boron	ug/L	$4,000^{A}$	$7,200^{B}$	$34,000^{C}$	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5^{A}	0.790^{B}	1.91^{C}	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	$116,000^{B}$	n/v	25,200	24,800	25,100	24,700	24,500	24,300	35,000	35,400	35,000
Chromium	ug/L	100^{A}	86.2^{B}	$1,803^{C}$	<1.53	1.66 J	<1.53	<1.53	<1.53	2.05	1.64 U*	1.8 U*	1.94 U*
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.221 J	0.271 J	0.298 J	0.227 J	0.285 J	0.287 J	0.293 J	0.333 J	0.389 J
Copper	ug/L	$1,300^{A}$	9.33^{B}	14.0^{C}	<0.627	<0.627	<0.627	<0.627	0.766 J	0.740 J	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	370	504	583	386	408	542	483	592	752
Lead	ug/L	5^{A}	3.18^{B}	81.6^{C}	0.319 J	0.425 J	0.567 J	0.356 J	0.396 J	0.371 J	0.365 J	0.462 J	0.59 J
Lithium	ug/L	40^{A}	440^{B}	910^{C}	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	5,350	5,310	5,140	5,060	4,890	5,160	6,150	6,250	6,040
Manganese	ug/L	n/v	n/v	n/v	48.9	64.1	70.4	53.7	47.7	52.6	56.1	65.8	75
Mercury	ug/L	2^{A}	0.77^{B}	1.4^{C}	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100^{A}	800^{B}	$7,200^{C}$	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.474
Nickel	ug/L	100^{A}	52.2^{B}	469^{C}	0.636 J	0.859 J	0.917 J	0.749 J	0.750 J	2.23	1.01	1.3	1.29
Selenium	ug/L	50^{A}	3.1^{B}	20^{C}	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813
Silver	ug/L	100^{A}	n/v	3.78^{C}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	ug/L	2^{A}	6^{B}	54^{C}	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	<0.991	<0.991	<0.991	<0.991	<0.991	1.09	2.56 U*	2.72 U*	3.11 U*
Zinc	ug/L	$2,000^{A}$	120^{B}	120^{C}	<3.22	3.45 J	4.30 J	<3.22	<3.22	<3.22	3.62 U*	3.77 U*	5.44 U*
Dissolved Metals													
Antimony	ug/L	6^{A}	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	0.368 J	<0.313	<0.313	<0.313	<0.313	<0.313	0.52 J	0.544 J	0.491 J
Barium	ug/L	$2,000^{A}$	n/v	n/v	19.5	20.6	19.1	20.2	17.7	19.7	22.2	22.7	23.4
Beryllium	ug/L	4^{A}	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057
Boron	ug/L	$4,000^{A}$	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5^{A}	0.718^{D}	1.80^{E}	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	24,800	25,300	23,600	25,300	24,000	24,200	35,100	35,700	36,600
Chromium	ug/L	100^{A}	74.1^{D}	570^{E}	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	1.05 U*	1.06 U*	1.03 U*
Cobalt	ug/L	6^{A}	n/v	n/v	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.075	<0.075	<0.075
Copper	ug/L	$1,300^{A}$	8.96^{D}	13.4^{E}	1.37 U*	1.20 U*	<0.627	<0.627	<0.627	<0.627	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	<19.5	19.9 J	<19.5	<19.5	<19.5	<19.5	<14.1	<14.1	<14.1
Lead	ug/L	5^{A}	2.52^{D}	64.6^{E}	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094
Lithium	ug/L	40^{A}	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	5,200	5,380	4,910	5,240	4,740	5,020	5,650	5,730	5,860
Manganese	ug/L	n/v	n/v	n/v	1.28 J	1.62 J	1.11 J	8.02	7.16	5.92	4.88 J	5.07	5.74
Mercury	ug/L	2^{A}	0.77^{D}	1.4^{E}	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100^{A}	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.474
Nickel	ug/L	100^{A}	52.0^{D}	468^{E}	1.20	0.649 J	0.355 J	<0.336	<0.336	0.377 J	0.411 J	0.489 J	0.471 J
Selenium	ug/L	50^{A}	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813
Silver	ug/L	100^{A}	n/v	3.22^{E}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	ug/L	2^{A}	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063
Vanadium	ug/L	86^{A}	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	2.06 U*	2.09 U*	2.11 U*
Zinc	ug/L	$2,000^{A}$	118^{D}	117^{E}	3.60 J	<3.22	<3.22	<3.22	3.96 J	<3.22	3.22 U*	2.74 U*	<2.42
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.181 +/-(0.163)U	0.217 +/-(0.174)U	0.130 +/-(0.161)U	0.332 +/-(0.215)J	-0.0836 +/-(0.141)UJ	0.0971 +/-(0.148)U	0.0557 +/-(0.0689)U	0.0869 +/-(0.0787)U	0.0838 +/-(0.104)U
Radium-228	pCi/L	n/v	n/v	n/v	1.07 +/-(2.26)UJ	0.120 +/-(0.375)U	0.319 +/-(0.360)U	-0.0452 +/-(0.345)U	0.728 +/-(0.399)U*	0.231 +/-(0.432)U	0.338 +/-(0.321)U	-0.0565 +/-(0.236)U	0.0335 +/-(0.359)U
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	1.25 +/-(2.27)UJ	0.337 +/-(0.413)U	0.449 +/-(0.394)U	0.332 +/-(0.407)J	0.728 +/-(0.423)U*	0.328 +/-(0.457)U	0.394 +/-(0.328)U	0.0869 +/-(0.249)U	0.117 +/-(0.374)U
Anions													
Chloride	mg/L	250^{A}	230^{B}	860^{C}	3.60	3.01	3.00	2.92 J	4.56 J	7.25	5.06	5.03	4.93
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.0692 J	0.0718 J	0.0752 J	0.0749 J	0.0744 J	0.0746 J	0.0851 J	0.0837 J	0.0808 J
Sulfate	mg/L	250^{A}	n/v	n/v	18.9	18.8	19.2	19.0	19.1	19.0	21.9	21.5	20.9
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	84.9	83.7	83.9	82.4	81.3	81.8	109	111	114
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	114	107	121	115	120	113	137	131	130
Total Suspended Solids	mg/L	n/v	n/v	n/v	13.7	17.2	22.7	16.8	14.1	15.6	15.0	18.5	23.2

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR03								
Sample Date					5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CuR03-LB-SUR-20181105	CUF-STR-CuR03-LB-MID-20181105	CUF-STR-DUP02-20181105	CUF-STR-CuR03-LB-BOT-20181105	CUF-STR-CuR03-RB-SUR-20181105	CUF-STR-CuR03-RB-MID-20181105	CUF-STR-CuR03-RB-BOT-20181105	CUF-STR-CuR03-CC-SUR-20190904	CUF-STR-CuR03-CC-MID-20190904
Parent Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels				CUF-STR-CuR03-LB-MID-20181105						
Sample Depth					0.5 m	2.5 m	2.5 m	4.9 m	0.5 m	2 m	4.2 m	0.5 m	5.9 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<1.12	1.12 UJ	3.54 J	<1.12	<1.12	<1.12	<1.12	<0.378	0.503 J
Arsenic	ug/L	10[A]	150[B]	340[C]	0.702 J	0.659 J	0.435 J	0.749 J	0.714 J	0.676 J	0.722 J	0.979 J	0.949 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	26.4	26.2	24.2	27.6	27.3	26.7	27.8	24.7	25.0
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	45.8 J	<38.6
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	33,600	34,600	32,000	34,900	35,500	35,200	35,800	28,500	26,400
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	1.62 U*	1.68 U*	<0.631	1.66 U*	1.62 U*	1.65 U*	1.77 U*	3.07	3.04
Cobalt	ug/L	6[A]	19[B]	120[C]	0.28 J	0.282 J	0.381 J	0.284 J	0.312 J	0.264 J	0.29 J	0.289 U*	0.389 U*
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.75 J	1.13 J
Iron	ug/L	n/v	n/v	n/v	466	470	386	507	536	454	533	359	646
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.378 J	0.388 J	0.384 J	0.411 J	0.421 J	0.359 J	0.461 J	0.344 U*	0.558 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<2.56	<2.56	2.89 J	<2.56	<2.56	<2.56	<2.56	4.95 J	3.72 J
Magnesium	ug/L	n/v	n/v	n/v	6,120	6,250	5,750	6,340	6,060	6,190	6,240	6,340	5,690
Manganese	ug/L	n/v	n/v	n/v	54.4	56.9	50.1	58.4	59.8	54.3	60.1	53.5	74.9
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.474	<0.474	2.3 U*	<0.474	<0.474	<0.474	<0.474	<0.610	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.03	1.06	1.3	1.19	1.19	0.954 J	0.996 J	1.11	0.895 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.063	<0.063	0.067 J	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.41 U*	2.4 U*	1.86 U*	2.56 U*	2.56 U*	2.27 U*	2.55 U*	3.38	3.20
Zinc	ug/L	2,000[A]	120[B]	120[C]	3.17 U*	4.04 U*	3.41 U*	3.7 U*	3.57 U*	3.25 U*	4.14 U*	5.22 U*	6.94 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	0.442 J	0.641 J
Arsenic	ug/L	10[A]	150[D]	340[E]	0.554 J	0.532 J	<0.323	0.587 J	0.521 J	0.52 J	0.565 J	0.721 J	0.833 J
Barium	ug/L	2,000[A]	n/v	n/v	22.8	23.3	19.2	22.4	23.1	22.4	23.5	21.6	21.2
Beryllium	ug/L	4[A]	n/v	n/v	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	35,400	35,800	32,900	34,900	37,100	36,000	36,300	27,300	27,400
Chromium	ug/L	100[A]	74.1[D]	570[E]	1.07 U*	1.1 U*	<0.631	1.06 U*	1.05 U*	1.05 U*	1.03 U*	2.10	2.94
Cobalt	ug/L	6[A]	n/v	n/v	<0.075	<0.075	0.076 J	<0.075	<0.075	<0.075	<0.075	<0.0750	<0.0750
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.16 J	0.712 J
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	30.4 J	<19.5
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	4.45 J
Magnesium	ug/L	n/v	n/v	n/v	5,870	5,960	6,050	5,720	5,970	5,780	5,850	5,570	5,840
Manganese	ug/L	n/v	n/v	n/v	6.38	7.42	6.73	7.83	4.28 J	3.75 J	4.02 J	<1.35	1.93 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.474	<0.474	0.679 U*	<0.474	<0.474	<0.474	<0.474	<0.610	<0.610
Nickel	ug/L	100[A]	52.0[D]	468[E]	0.544 J	0.571 J	1.16	0.467 J	0.44 J	0.457 J	0.564 J	<0.336	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	2.05 U*	2.14 U*	1.23 U*	2.24 U*	1.69 U*	1.83 U*	1.89 U*	2.10	2.84
Zinc	ug/L	2,000[A]	118[D]	117[E]	3.63 U*	<2.42	2.58 U*	<2.42	3.14 U*	3.03 U*	4.34 U*	<3.22	4.69 J
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.106 +/-(0.0824)U	0.0334 +/-(0.0705)U	0.0571 +/-(0.0712)U	0.0105 +/-(0.0662)U	0.0721 +/-(0.0965)U	0.0795 +/-(0.116)U	0.00420 +/-(0.0775)U	0.00466 +/-(0.0730)U	0.0260 +/-(0.0577)U
Radium-228	pCi/L	n/v	n/v	n/v	0.0131 +/-(0.219)U	0.393 +/-(0.321)U	-0.0959 +/-(0.280)U	0.314 +/-(0.275)U	-0.133 +/-(0.342)U	0.167 +/-(0.414)U	0.273 +/-(0.388)U	0.532 +/-(0.346)U*	0.00269 +/-(0.238)UJ
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.119 +/-(0.234)U	0.426 +/-(0.329)U	0.0571 +/-(0.289)U	0.325 +/-(0.283)U	0.0721 +/-(0.355)U	0.246 +/-(0.430)U	0.277 +/-(0.396)U	0.536 +/-(0.354)U*	0.0287 +/-(0.245)UJ
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	4.77	4.82	5.05	4.80	5.06	5.01	5.10	3.89	3.30
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0786 J	0.0803 J	0.0842 J	0.0805 J	0.0850 J	0.0827 J	0.0840 J	0.0758 J	0.0675 J
Sulfate	mg/L	250[A]	n/v	n/v	20.6	20.6	22.1	20.7	21.1	20.8	21.3	23.3	22.8
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	114	110	104	110	111	108	114	97.3	89.4
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	132	133	124	125	141	131	132	124	110
Total Suspended Solids	mg/L	n/v	n/v	n/v	13.5	14.9	14.3	14.0	15.2	13.3	18.6	10.6	16.6

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR03						CuR04		
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CuR03-CC-BOT-20190904	CUF-STR-CuR03-LB-SUR-20190904	CUF-STR-CuR03-LB-MID-20190904	CUF-STR-CuR03-LB-BOT-20190904	CUF-STR-CuR03-RB-SUR-20190904	CUF-STR-CuR03-RB-BOT-20190904	CUF-STR-CUR04-CC-SUR-20190904	CUF-STR-CUR04-CC-MID-20190904	CUF-STR-CUR04-CC-BOT-20190904
Parent Sample ID													
Sample Depth					11.3 m	0.5 m	2.6 m	4.8 m	0.5 m	2.3 m	0.5 m	6.5 m	12.5 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	1.22	1.06	1.10	1.16	0.991 J	0.870 J	1.21	1.07	1.19
Barium	ug/L	2,000[A]	220[B]	2,000[C]	29.8	24.1	26.9	27.9	25.9	31.1	26.2	27.8	30.0
Beryllium	ug/L	4[A]	11[B]	93[C]	0.501 U*	0.196 U*	0.185 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	65.3 J	<38.6	<38.6	<38.6	<38.6	160	44.5 J	38.7 J
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	0.212 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	25,800	28,000	26,600	27,600	25,400	25,700	30,800	28,500	29,400
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	3.84	3.22	3.39	3.44	3.35	3.39	3.23	3.32	3.91
Cobalt	ug/L	6[A]	19[B]	120[C]	0.550	0.249 U*	0.501	0.583	0.278 U*	0.296 U*	0.431 U*	0.411 U*	0.613
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	1.23 J	1.99 J	1.23 J	1.30 J	1.14 J	1.86 J	2.77	1.64 J	1.63 J
Iron	ug/L	n/v	n/v	n/v	682	288	746	968	305	366	601	504	859
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.807 U*	0.318 U*	0.749 U*	0.949 J	0.374 U*	0.406 U*	0.652 J	0.590 J	0.998 J
Lithium	ug/L	40[A]	440[B]	910[C]	5.36	5.33	5.18	5.33	4.06 J	3.79 J	4.82 J	4.71 J	4.68 J
Magnesium	ug/L	n/v	n/v	n/v	6,060	6,200	5,990	6,240	5,790	5,960	8,030	6,280	6,390
Manganese	ug/L	n/v	n/v	n/v	89.6	47.6	89.3	108	54.0	56.3	88.0	73.8	121
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	1.10 J	<0.610	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.32	0.987 J	1.35	1.58	0.868 J	0.973 J	1.45	1.06	1.39
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	1.67 J	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	0.316 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	4.05	3.38	3.96	4.06	3.39	3.42	4.65	3.48	4.27
Zinc	ug/L	2,000[A]	120[B]	120[C]	8.49 U*	4.50 U*	6.57 U*	7.36 U*	4.71 U*	6.11 U*	11.4 U*	8.46 U*	6.74 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<0.378	0.949 J	0.713 J	0.649 J	<0.378	<0.378	0.403 U*	0.456 U*	0.422 U*
Arsenic	ug/L	10[A]	150[D]	340[E]	0.845 J	0.869 J	0.753 J	0.859 J	0.832 J	0.909 J	1.25 U*	1.13 U*	1.09 U*
Barium	ug/L	2,000[A]	n/v	n/v	24.1	22.6	22.7	21.8	22.5	25.5	23.0	23.3	24.0
Beryllium	ug/L	4[A]	n/v	n/v	0.186 U*	<0.182	<0.182	<0.182	<0.182	<0.182	0.275 J	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	48.7 J	<38.6	<38.6	<38.6	<38.6	163 U*	<38.6	<38.6
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	25,200	28,200	26,200	26,600	25,400	25,900	29,300	27,400	27,900
Chromium	ug/L	100[A]	74.1[D]	570[E]	2.76	2.74	2.45	2.81	3.40	3.68	2.79 U*	3.03 U*	2.90 U*
Cobalt	ug/L	6[A]	n/v	n/v	0.117 J	<0.0750	<0.0750	<0.0750	0.0870 J	0.0780 J	0.240 U*	0.138 U*	0.151 U*
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	0.654 J	1.42 J	1.58 J	0.688 J	0.788 J	<0.627	2.08	1.07 J	0.932 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	73.6	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.139 J	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	3.81 J	4.61 J	3.85 J	3.86 J	3.69 J	3.99 J	4.54 J	3.51 J	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,860	5,900	5,570	5,550	5,740	5,980	7,500	5,960	5,900
Manganese	ug/L	n/v	n/v	n/v	3.02 J	1.95 J	5.47	12.3	<1.35	<1.35	7.79	1.55 J	7.99
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	1.18 J	<0.610	<0.610
Nickel	ug/L	100[A]	52.0[D]	468[E]	0.537 J	0.338 J	0.365 J	<0.336	0.559 J	0.659 J	0.920 J	0.704 J	0.547 J
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	1.99 J	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	0.170 U*	<0.148	<0.148	<0.148	<0.148	<0.148	0.289 J	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	2.65	2.52	2.58	2.48	3.16	3.37	3.02 U*	3.13 U*	3.08 U*
Zinc	ug/L	2,000[A]	118[D]	117[E]	5.36	4.04 J	4.33 J	3.29 J	3.94 J	3.46 J	6.72	6.10	5.05
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.0475 +/-(0.0827)U	0.0265 +/-(0.0791)U	0.000 +/-(0.0688)U	0.0117 +/-(0.0750)U	-0.0261 +/-(0.0657)U	0.0532 +/-(0.0743)U	0.0219 +/-(0.0829)U	0.157 +/-(0.107)U*	0.106 +/-(0.114)U
Radium-228	pCi/L	n/v	n/v	n/v	0.342 +/-(0.468)UJ	0.152 +/-(0.249)UJ	-0.212 +/-(0.238)UJ	0.443 +/-(0.389)UJ	0.00280 +/-(0.351)UJ	-0.0141 +/-(0.265)UJ	0.337 +/-(0.249)UJ	-0.0435 +/-(0.220)UJ	0.564 +/-(0.313)U*
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.390 +/-(0.475)UJ	0.179 +/-(0.261)UJ	0.000 +/-(0.248)UJ	0.455 +/-(0.396)UJ	0.00280 +/-(0.357)UJ	0.0532 +/-(0.275)UJ	0.359 +/-(0.262)UJ	0.157 +/-(0.245)U*	0.670 +/-(0.333)U*
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	3.29	4.15	3.33	3.33	3.38	3.39	7.54	3.65	3.61
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0692 J	0.0788 J	0.0672 J	0.0665 J	0.0691 J	0.0723 J	0.122	0.0832 J	0.0809 J
Sulfate	mg/L	250[A]	n/v	n/v	23.0	24.1	22.5	22.7	22.7	22.9	32.0	23.7	22.8
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	89.4	95.4	91.1	94.6	87.3	88.7	110	97.0	99.7
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	129	132	122	104	119	128	111	112	127
Total Suspended Solids	mg/L	n/v	n/v	n/v	24.4	8.50	23.1	31.4	11.0	11.0	16.7	25.2	31.3

See last page for notes.

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Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location									CuR04				
Sample Date					4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	27-May-20	27-May-20	27-May-20	27-May-20
Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CUF-STR-CUR04-LB-SUR-20190904	CUF-STR-CUR04-LB-BOT-20190904	CUF-STR-CUR04-RB-SUR-20190904	CUF-STR-CUR04-RB-MID-20190904	CUF-STR-CUR04-RB-BOT-20190904	CUF-STR-CUR04-CC-SUR-20200527	CUF-STR-CUR04-CC-ME-20200527	CUF-STR-CUR04-CC-MID-20200527	CUF-STR-CUR04-CC-BOT-20200527
Parent Sample ID													
Sample Depth					0.5 m	1.4 m	0.5 m	2.3 m	4.2 m	0.5 m	3.5 m	7 m	14 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	0.387 J	0.388 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	1.26	1.28	0.854 J	0.847 J	0.919 J	0.395 J	0.473 J	0.387 J	0.445 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	26.6	29.7	26.4	25.1	31.5	23.6	23.7	23.5	24.4
Beryllium	ug/L	4[A]	11[B]	93[C]	0.250 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	163	140	94.9	55.5 J	46.7 J	237	95.4	44.8 J	<38.6
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	116,000[B]	n/v	29,600	31,100	29,100	28,100	29,400	27,800	25,700	24,900	24,200
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	2.99	3.18	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.474 J	0.509	0.423 U*	0.404 U*	0.450 U*	0.284 J	0.267 J	0.271 J	0.321 J
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	2.69	2.71	2.55	2.25	1.94 J	2.27	1.50 J	0.798 J	<0.627
Iron	ug/L	n/v	n/v	n/v	459	605	562	588	639	575	528	430	592
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.536 J	0.584 J	0.619 J	0.621 J	0.691 J	0.479 J	0.483 J	1.23	0.497 J
Lithium	ug/L	40[A]	440[B]	910[C]	4.34 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	7,280	7,660	6,290	5,990	6,110	6,290	5,590	5,380	5,130
Manganese	ug/L	n/v	n/v	n/v	77.5	94.5	83.3	83.2	89.3	65.2	60.4	48.4	71.1
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	0.928 J	0.944 J	0.707 J	0.658 J	0.616 J	1.42 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.40	1.38	1.33	1.16	1.23	1.21	1.08	0.975 J	0.973 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	1.78 J	1.53 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	0.217 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	3.39	3.73	2.20	2.04	2.25	1.22	1.17	1.03	1.46
Zinc	ug/L	2,000[A]	120[B]	120[C]	5.53 U*	6.24 U*	<3.22	3.32 U*	4.21 U*	3.97 J	<3.22	3.79 J	3.84 J
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	0.415 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	1.09 U*	1.03 U*	0.673 U*	0.647 U*	0.682 U*	<0.313	<0.313	<0.313	<0.313
Barium	ug/L	2,000[A]	n/v	n/v	24.3	25.1	21.4	21.7	22.0	21.1	19.7	19.8	19.8
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	153 U*	137 U*	66.8 U*	63.5 U*	40.7 U*	227	76.9 J	41.7 J	<38.6
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	n/v	n/v	31,000	31,500	27,900	28,700	27,900	27,700	25,200	25,200	24,500
Chromium	ug/L	100[A]	74.1[D]	570[E]	3.00 U*	2.69 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	0.134 U*	0.128 U*	0.0750 U*	<0.0750	0.0850 U*	<0.134	<0.134	<0.134	<0.134
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	1.92 J	1.80 J	1.59 J	1.64 J	1.16 J	1.09 U*	0.906 U*	<0.627	<0.627
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	126	<19.5	<19.5	<19.5	66.9
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	3.54 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	7,580	7,700	6,040	6,150	5,840	6,440	5,440	5,290	5,090
Manganese	ug/L	n/v	n/v	n/v	2.79 J	7.38	5.23	4.05 J	4.16 J	9.92	5.58	2.77 J	1.74 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	100[A]	n/v	n/v	1.01 J	1.04 J	0.735 J	0.703 J	<0.610	1.36 J	0.645 J	<0.610	<0.610
Nickel	ug/L	100[A]	52.0[D]	468[E]	0.832 J	0.843 J	0.711 J	0.741 J	0.519 J	0.700 J	0.466 J	0.403 J	0.440 J
Selenium	ug/L	50[A]	n/v	n/v	1.83 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	3.28 U*	2.85 U*	1.44 U*	1.59 U*	1.72 U*	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	2,000[A]	118[D]	117[E]	3.59 J	3.56 J	<3.22	11.8 J	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.0441 +/-(0.0913)U	-0.0273 +/-(0.0798)U	-0.0176 +/-(0.0897)U	-0.0641 +/-(0.0829)U	0.0746 +/-(0.0943)U	-	0.260 +/-(0.233)U	-	0.0527 +/-(0.240)U
Radium-228	pCi/L	n/v	n/v	n/v	0.462 +/-(0.269)U*	1.08 +/-(0.421)U*	0.484 +/-(0.278)U*	1.08 +/-(0.349)U*	0.616 +/-(0.308)U*	-	0.290 +/-(0.313)U	-	0.466 +/-(0.427)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.506 +/-(0.284)U*	1.08 +/-(0.428)U*	0.484 +/-(0.292)U*	1.08 +/-(0.359)U*	0.690 +/-(0.322)U*	-	0.550 +/-(0.390)U	-	0.519 +/-(0.490)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	7.02	6.87	5.31	4.75	4.51	6.41 J	2.88	3.31	3.76
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.119	0.114	0.0969 J	0.0893 J	0.0896 J	0.0698 J	0.0729 J	0.0861 J	0.0845 J
Sulfate	mg/L	250[A]	n/v	n/v	30.6	30.7	27.4	26.0	25.2	28.5	18.6	20.6	19.8
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	104	109	98.6	94.8	98.6	95.2	87.3	84.4	81.6
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	172	147	146	135	102	126	120	120	106
Total Suspended Solids	mg/L	n/v	n/v	n/v	18.0	20.4	22.8	31.1	25.1	18.2	19.0	14.0	25.3

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR04						CuR05		
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		27-May-20	27-May-20	27-May-20	27-May-20	27-May-20	27-May-20	4-Sep-19	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CUR04-LB-SUR-20200527	CUF-STR-CUR04-LB-BOT-20200527	CUF-STR-CUR04-RB-SUR-20200527	CUF-STR-DUP01-20200527	CUF-STR-CUR04-RB-MID-20200527	CUF-STR-CUR04-RB-BOT-20200527	CUF-STR-CUR05-CC-SUR-20190904	CUF-STR-CUR05-CC-MID-20190904	CUF-STR-CUR05-CC-BOT-20190904
Parent Sample ID								CUF-STR-CUR04-RB-SUR-20200527					
Sample Depth					0.5 m	2 m	0.5 m	0.5 m	2 m	3.2 m	0.5 m	6.5 m	12.7 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6^{A}	190^{B}	900^{C}	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.394 J	0.487 J
Arsenic	ug/L	10^{A}	150^{B}	340^{C}	0.407 J	0.392 J	0.422 J	0.508 J	0.373 J	0.428 J	0.837 J	0.913 J	1.06
Barium	ug/L	2,000^{A}	220^{B}	2,000^{C}	25.6	25.3	25.2	22.4	25.7	23.7	31.5	25.9	27.6
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.254 U*	0.314 U*
Boron	ug/L	4,000^{A}	7,200^{B}	34,000^{C}	139	73.3 J	111	105	117	111	120	55.9 J	<38.6
Cadmium	ug/L	5^{A}	0.790^{B}	1.91^{C}	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000^{B}	n/v	29,100	28,800	26,600	25,200	26,500	26,200	30,400	28,900	29,000
Chromium	ug/L	100^{A}	86.2^{B}	1,803^{C}	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	1.61 J	1.92 J
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.314 J	0.309 J	0.340 J	0.335 J	0.337 J	0.280 J	0.411 U*	0.360 U*	0.577
Copper	ug/L	1,300^{A}	9.33^{B}	14.0^{C}	1.53 J	0.989 J	1.99 J	2.14	2.99	1.99 J	2.94	1.53 J	1.51 J
Iron	ug/L	n/v	n/v	n/v	461	534	602	538	654	614	543	509	791
Lead	ug/L	5^{A}	3.18^{B}	81.6^{C}	0.458 J	0.442 J	0.510 J	0.479 J	1.34	0.520 J	0.597 J	0.482 J	0.854 J
Lithium	ug/L	40^{A}	440^{B}	910^{C}	<3.39	<3.39	<3.39	<3.39	4.89 J	<3.39	<3.39	4.41 J	3.92 J
Magnesium	ug/L	n/v	n/v	n/v	5,590	5,440	5,980	5,300	5,900	5,600	6,790	5,750	5,710
Manganese	ug/L	n/v	n/v	n/v	81.2	89.1	68.9	59.1	71.7	68.6	86.3	67.8	104
Mercury	ug/L	2^{A}	0.77^{B}	1.4^{C}	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101
Molybdenum	ug/L	100^{A}	800^{B}	7,200^{C}	0.922 J	<0.610	0.837 J	0.812 J	0.820 J	0.684 J	1.01 J	<0.610	<0.610
Nickel	ug/L	100^{A}	52.2^{B}	469^{C}	1.04	1.16	1.04	0.962 J	1.53	1.06	1.30	0.945 J	1.25
Selenium	ug/L	50^{A}	3.1^{B}	20^{C}	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	3.78^{C}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2^{A}	6^{B}	54^{C}	0.436 U*	0.167 U*	<0.148	<0.148	<0.148	0.162 U*	<0.148	<0.148	0.166 U*
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	<0.991	1.15	1.48	1.11	1.33	1.19	2.01	2.20	2.71
Zinc	ug/L	2,000^{A}	120^{B}	120^{C}	<3.22	<3.22	<3.22	<3.22	8.97	3.29 J	4.07 U*	<3.22	4.29 U*
Dissolved Metals													
Antimony	ug/L	6^{A}	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.451 U*
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	<0.313	<0.313	<0.313	0.330 J	<0.313	<0.313	0.712 U*	0.912 U*	0.818 U*
Barium	ug/L	2,000^{A}	n/v	n/v	21.3	22.6	20.4	19.5	21.2	19.3	23.1	23.9	22.8
Beryllium	ug/L	4^{A}	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.407 J	0.196 J
Boron	ug/L	4,000^{A}	n/v	n/v	138	64.1 J	96.7	92.1	155	101	129 U*	41.0 U*	<38.6
Cadmium	ug/L	5^{A}	0.718^{D}	1.80^{E}	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	0.170 J	<0.125
Calcium	ug/L	n/v	n/v	n/v	28,700	28,200	25,600	26,400	26,300	25,300	31,300	28,700	29,200
Chromium	ug/L	100^{A}	74.1^{D}	570^{E}	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6^{A}	n/v	n/v	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	0.0900 U*	0.188 U*	0.128 U*
Copper	ug/L	1,300^{A}	8.96^{D}	13.4^{E}	0.797 U*	<0.627	1.35 U*	1.54 U*	1.27 U*	1.06 U*	1.90 J	1.22 J	0.905 J
Iron	ug/L	n/v	n/v	n/v	20.0 J	28.1 J	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5^{A}	2.52^{D}	64.6^{E}	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.173 J	<0.128
Lithium	ug/L	40^{A}	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	3.39 J	3.60 J
Magnesium	ug/L	n/v	n/v	n/v	5,620	5,260	5,760	5,450	5,810	5,420	7,160	5,840	5,690
Manganese	ug/L	n/v	n/v	n/v	20.5	24.3	8.97	8.16	9.06	8.70	7.08	<1.35	7.05
Mercury	ug/L	2^{A}	0.77^{D}	1.4^{E}	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101
Molybdenum	ug/L	100^{A}	n/v	n/v	0.932 J	<0.610	0.722 J	0.773 J	0.794 J	0.631 J	1.22 J	0.685 J	<0.610
Nickel	ug/L	100^{A}	52.0^{D}	468^{E}	0.551 J	0.572 J	0.626 J	0.463 J	0.672 J	0.426 J	0.906 J	0.818 J	0.517 J
Selenium	ug/L	50^{A}	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	3.22^{E}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2^{A}	n/v	n/v	0.223 J	<0.148	<0.148	<0.148	0.439 J	<0.148	<0.148	0.345 J	0.169 J
Vanadium	ug/L	86^{A}	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	1.70 U*	1.40 U*	1.90 U*
Zinc	ug/L	2,000^{A}	118^{D}	117^{E}	<3.22	<3.22	8.21	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.141 +/-(0.236)U	0.293 +/-(0.255)U	0.457 +/-(0.324)U	0.225 +/-(0.195)U	-	-	-0.0422 +/-(0.0750)U	0.0262 +/-(0.0916)U	0.143 +/-(0.110)U
Radium-228	pCi/L	n/v	n/v	n/v	0.645 +/-(0.421)U*	0.325 +/-(0.373)U	-0.0407 +/-(0.376)U	-0.188 +/-(0.334)U	-	-	1.07 +/-(0.308)U*	0.350 +/-(0.257)UJ	0.272 +/-(0.209)UJ
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	0.786 +/-(0.483)U*	0.619 +/-(0.452)U	0.457 +/-(0.496)U	0.225 +/-(0.387)U	-	-	1.07 +/-(0.317)U*	0.376 +/-(0.273)UJ	0.415 +/-(0.236)UJ
Anions													
Chloride	mg/L	250^{A}	230^{B}	860^{C}	5.07	4.15	4.04 J	4.48	4.41	4.23 J	6.01	3.75	3.62
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.0935 J	0.0866 J	0.0539 J	0.0903 J	0.0893 J	0.0595 J	0.107	0.0788 J	0.0768 J
Sulfate	mg/L	250^{A}	n/v	n/v	20.3	19.8	24.9	20.9	20.9	25.3	28.6	23.3	23.0
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	95.8	94.4	91.1	84.8	90.4	88.5	104	95.8	95.9
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	113	123	121	117	134	113	123	120	110
Total Suspended Solids	mg/L	n/v	n/v	n/v	14.6	19.0	21.6	21.2	22.7	22.2	21.7	17.9	27.2

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location		**Human Health Surface Water Screening Levels**	**Ecological Surface Water Screening Levels**		**CuR05**						
Sample Date					**4-Sep-19**	**4-Sep-19**	**4-Sep-19**	**4-Sep-19**	**27-May-20**	**27-May-20**	**27-May-20**
Sample ID					**CUF-STR-CUR05-LB-SUR-20190904**	**CUF-STR-CUR05-LB-BOT-20190904**	**CUF-STR-CUR05-RB-SUR-20190904**	**CUF-STR-CUR05-RB-BOT-20190904**	**CUF-STR-CUR05-CC-SUR-20200527**	**CUF-STR-CUR05-CC-MID-20200527**	**CUF-STR-CUR05-CC-BOT-20200527**
Parent Sample ID											
Sample Depth					**0.5 m**	**2 m**	**0.5 m**	**1.8 m**	**0.5 m**	**7.4 m**	**14.4 m**
Sample Type					**Normal Environmental Sample**	**Normal Environmental Sample**	**Normal Environmental Sample**	**Normal Environmental Sample**	**Normal Environmental Sample**	**Normal Environmental Sample**	**Normal Environmental Sample**
Level of Review	**Units**		**Cumberland River (Hardness = 100 mg/L)**		**Final-Verified**	**Final-Verified**	**Final-Verified**	**Final-Verified**	**Final-Verified**	**Final-Verified**	**Final-Verified**
			Chronic	**Acute**							
Total Metals											
Antimony	ug/L	6[A]	190[B]	900[C]	0.816 J	0.509 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	1.08	1.03	0.895 J	0.837 J	0.402 J	0.347 J	0.454 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	27.4	26.7	25.9	27.4	22.7	25.7	22.9
Beryllium	ug/L	4[A]	11[B]	93[C]	0.223 U*	0.269 U*	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	194	147	52.3 J	63.1 J	<38.6	<38.6	75.8 J
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	0.135 J	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	116,000[B]	n/v	31,300	31,900	28,900	29,600	25,400	26,100	26,100
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	1.89 J	1.73 J	1.60 J	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.433 U*	0.445 U*	0.430 U*	0.414 U*	0.239 J	0.501	0.347 J
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	2.91	2.65	2.36	2.28	0.735 J	0.682 J	1.83 J
Iron	ug/L	n/v	n/v	n/v	404	547	540	525	504	820	579
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.500 J	0.647 J	0.619 J	0.601 J	0.417 J	0.666 J	0.543 J
Lithium	ug/L	40[A]	440[B]	910[C]	3.41 J	5.37	3.47 J	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	8,090	7,360	6,020	6,250	5,420	5,520	5,520
Manganese	ug/L	n/v	n/v	n/v	76.3	80.3	81.4	83.9	53.5	84.3	65.9
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	1.08 J	1.29 J	0.661 J	0.679 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.40	1.38	1.38	1.34	0.850 J	1.19	1.17
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	0.191 U*	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.20	2.56	2.27	1.97	1.04	1.37	<0.991
Zinc	ug/L	2,000[A]	120[B]	120[C]	3.32 U*	3.39 U*	<3.22	<3.22	<3.22	4.51 J	3.39 J
Dissolved Metals											
Antimony	ug/L	6[A]	n/v	n/v	0.656 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.893 U*	0.681 U*	0.752 U*	0.713 U*	<0.313	<0.313	<0.313
Barium	ug/L	2,000[A]	n/v	n/v	23.5 J	22.9	22.8	22.3	18.6	19.9	20.5
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	171 U*	144 U*	54.9 U*	55.0 U*	<38.6	<38.6	77.9 J
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	n/v	n/v	31,000	31,800	29,600	29,000	24,900	25,400	27,000
Chromium	ug/L	100[A]	74.1[D]	570[E]	1.73 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	0.151 U*	0.0840 U*	0.0990 U*	0.0980 U*	<0.134	<0.134	<0.134
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	1.92 J	1.69 J	1.62 J	1.44 J	<0.627	<0.627	1.23 U*
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	23.2 J	<19.5	<19.5
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	3.95 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	7,800	7,230	6,120	5,940	5,210	5,300	5,810
Manganese	ug/L	n/v	n/v	n/v	3.34 J	3.87 J	3.62 J	2.63 J	3.47 J	2.17 J	9.99
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	ug/L	100[A]	n/v	n/v	1.06 J	1.19 J	0.703 J	0.699 J	<0.610	<0.610	0.686 J
Nickel	ug/L	100[A]	52.0[D]	468[E]	0.846 J	0.698 J	0.848 J	0.573 J	0.487 J	<0.336	0.539 J
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	0.172 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.82 U*	1.31 U*	1.48 U*	1.33 U*	<0.991	<0.991	<0.991
Zinc	ug/L	2,000[A]	118[D]	117[E]	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	n/v	-0.0506 +/-(0.0681)U	0.0554 +/-(0.0833)U	-0.0744 +/-(0.0770)U	0.0307 +/-(0.0916)U	0.0848 +/-(0.0942)U	0.0766 +/-(0.0884)U	0.161 +/-(0.147)U
Radium-228	pCi/L	n/v	n/v	n/v	0.478 +/-(0.264)U*	1.68 +/-(0.351)U*	3.34 +/-(0.530)J	1.13 +/-(0.325)U*	0.228 +/-(0.260)U	0.227 +/-(0.278)U	0.557 +/-(0.426)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.478 +/-(0.273)U*	1.74 +/-(0.361)U*	--[2]	1.16 +/-(0.338)U*	0.313 +/-(0.277)U	0.303 +/-(0.292)U	0.718 +/-(0.451)U
Anions											
Chloride	mg/L	250[A]	230[B]	860[C]	8.04	7.62	4.33	4.77	3.10	2.89	3.71 J
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.130	0.129	0.0866 J	0.0929 J	0.0684 J	0.0754 J	0.0537 J
Sulfate	mg/L	250[A]	n/v	n/v	33.1	32.5	24.9	26.4	19.3	18.7	24.1
General Chemistry											
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	111	110	97.0	99.6	85.8	87.9	87.8
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	146	125	80.0	146	128	105	133
Total Suspended Solids	mg/L	n/v	n/v	n/v	16.3	17.6	21.5	23.0	16.2	24.2	21.6

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR05					CuR06		
Sample Date					27-May-20	27-May-20	27-May-20	27-May-20	27-May-20	5-Nov-18	5-Nov-18	5-Nov-18
Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CUF-STR-CUR05-LB-SUR-20200527	CUF-STR-CUR05-LB-MID-20200527	CUF-STR-CUR05-LB-BOT-20200527	CUF-STR-CUR05-RB-SUR-20200527	CUF-STR-CUR05-RB-BOT-20200527	CUF-STR-CuR06-CC-SUR-20181105	CUF-STR-CuR06-CC-MID-20181105	CUF-STR-CuR06-CC-BOT-20181105
Parent Sample ID												
Sample Depth					0.5 m	1.6 m	2.7 m	0.5 m	1.7 m	0.5 m	4.5 m	8.4 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated
			Chronic	Acute								
Total Metals												
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378	<0.378	<0.378	3.02	<1.12	<1.12
Arsenic	ug/L	10[A]	150[B]	340[C]	0.603 J	0.528 J	0.485 J	0.565 J	0.476 J	0.43 J	0.583 J	0.653 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.3	24.3	25.0	23.9	24.9	23.2	25.6	25
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	136	118	162	107	<38.6	38 J	<30.3	<30.3
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	27,300	27,100	27,600	27,100	25,800	35,200	35,800	36,500
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	<1.53	<1.53	<1.53	<1.53	<1.53	0.634 J	<0.631	0.66 J
Cobalt	ug/L	6[A]	19[B]	120[C]	0.259 J	0.284 J	0.298 J	0.262 J	0.352 J	0.404 U*	0.416 U*	0.374 U*
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	1.66 J	1.67 J	1.86 J	1.60 J	2.82	1.52 J	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	435	456	529	489	611	296	329	494
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.372 J	0.579 J	0.476 J	0.419 J	0.585 J	0.34 J	0.405 J	0.564 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	6,070	5,800	6,200	5,860	5,560	6,630	6,650	6,780
Manganese	ug/L	n/v	n/v	n/v	60.8	60.9	63.0	63.0	67.5	49.9	56.8	64.1
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	0.842 J	0.755 J	1.02 J	0.778 J	<0.610	2.14 U*	0.771 U*	0.592 U*
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.20	0.971 J	1.19	0.913 J	--[2]	1.51 U*	1.63 U*	1.53 U*
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813
Silver	ug/L	100[A]	n/v	3.78[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	<0.148	<0.148	<0.148	<0.148	0.08 U*	<0.063	<0.063
Vanadium	ug/L	86[A]	27[B]	79[C]	1.04	<0.991	1.10	1.04	1.15	1.6	1.63	2.17
Zinc	ug/L	2,000[A]	120[B]	120[C]	<3.22	<3.22	3.49 J	4.28 J	4.44 J	4.43 U*	7.01 U*	9.41 U*
Dissolved Metals												
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12
Arsenic	ug/L	10[A]	150[D]	340[E]	<0.313	<0.313	0.371 J	<0.313	0.477 J	0.526 J	0.418 J	0.409 J
Barium	ug/L	2,000[A]	n/v	n/v	20.9	21.8	19.4	19.3	20.3	19.7	20.4	19.8
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057
Boron	ug/L	4,000[A]	n/v	n/v	128	116	152	111	<38.6	32.8 J	<30.3	<30.3
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	27,700	27,800	26,700	25,700	25,700	33,900 J	33,500 J	34,300 J
Chromium	ug/L	100[A]	74.1[D]	570[E]	<1.53	2.05	<1.53	<1.53	<1.53	<0.631	<0.631	<0.631
Cobalt	ug/L	6[A]	n/v	n/v	<0.134	<0.134	<0.134	<0.134	<0.134	0.133 U*	0.101 U*	0.091 U*
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	1.08 U*	1.04 U*	1.32 U*	0.916 U*	<0.627	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	30.4 J	43.2 J	<19.5	<19.5	<19.5	<14.1	<14.1	<14.1
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094
Lithium	ug/L	40[A]	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	6,110	5,900	6,030	5,540	5,450	6,310	6,190	6,350
Manganese	ug/L	n/v	n/v	n/v	11.2	8.58	8.11	7.91	5.03	5.55	6.12	6.47
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100[A]	n/v	n/v	0.897 J	0.853 J	0.968 J	0.655 J	<0.610	1.21 U*	0.495 U*	0.487 U*
Nickel	ug/L	100[A]	52.0[D]	468[E]	0.593 J	0.545 J	0.761 J	0.669 J	0.469 J	1.13 U*	0.797 U*	1.51 U*
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813
Silver	ug/L	100[A]	n/v	3.22[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063
Vanadium	ug/L	86[A]	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	<0.899	0.901 J	<0.899
Zinc	ug/L	2,000[A]	118[D]	117[E]	<3.22	<3.22	<3.22	<3.22	<3.22	2.6 U*	3.47 U*	2.68 U*
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	0.0193 +/-(0.0758)U	0.00625 +/-(0.0583)U	0.179 +/-(0.117)	0.0777 +/-(0.111)U	-0.0940 +/-(0.257)U	0.0802 +/-(0.119)U	0.0715 +/-(0.112)U	-0.00421 +/-(0.0835)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.188 +/-(0.236)U	0.146 +/-(0.265)U	0.466 +/-(0.285)	0.0323 +/-(0.256)U	0.352 +/-(0.383)U	0.437 +/-(0.270)	0.0356 +/-(0.232)U	-0.156 +/-(0.210)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.0193 +/-(0.248)U	0.152 +/-(0.271)U	0.645 +/-(0.308)	0.110 +/-(0.279)U	0.352 +/-(0.461)U	0.517 +/-(0.295)J	0.107 +/-(0.258)U	0.000 +/-(0.226)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	5.33	4.60	4.87	4.34 J	2.98 J	4.03	3.74	3.46
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0938 J	0.0849 J	0.0800 J	0.0573 J	0.0475 J	0.0738 J	0.0704 J	0.0654 J
Sulfate	mg/L	250[A]	n/v	n/v	22.5	21.1	21.5	24.3	22.5	21.3	18.6	17.6
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	93.1	91.4	94.4	91.9	87.3	115	117	119
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	149	138	141	139	113	136	130	139
Total Suspended Solids	mg/L	n/v	n/v	n/v	15.7	17.5	19.0	29.3	21.6	11.9	14.4	17.2

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR06								
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	4-Sep-19	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CuR06-LB-SUR-20181105	CUF-STR-CuR06-LB-MID-20181105	CUF-STR-CuR06-LB-BOT-20181105	CUF-STR-CuR06-RB-SUR-20181105	CUF-STR-CuR06-RB-MID-20181105	CUF-STR-CuR06-RB-BOT-20181105	CUF-STR-CuR06-CC-SUR-20190904	CUF-STR-CuR06-CC-MID-20190904	CUF-STR-CuR06-CC-BOT-20190904
Parent Sample ID													
Sample Depth					0.5 m	4 m	7.5 m	0.5 m	4 m	7.5 m	0.5 m	4.8 m	9 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Validated	Validated	Validated	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<1.12	2.58	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.706 J	0.562 J	0.577 J	0.703 J	0.566 J	0.735 J	0.996 J	1.12	1.08
Barium	ug/L	2,000[A]	220[B]	2,000[C]	22.7	25.3	22.9	24.9	24.2	28.4	26.4	27.5	26.5
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.057	0.057 J	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	100	59.8 J	<38.6
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	34,700	34,400	33,800	35,400	34,800	36,200	29,800	29,000	28,800
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	<0.631	<0.631	0.667 J	0.638 J	0.678 J	2.23	2.53	3.10	3.21
Cobalt	ug/L	6[A]	19[B]	120[C]	0.311 U*	0.362 U*	0.437 U*	0.364 U*	0.373 U*	0.367 J	0.382 U*	0.436 U*	0.406 U*
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	1.56 J	<1.3	<1.3	<1.3	<1.3	<1.3	2.42	1.73 J	2.04
Iron	ug/L	n/v	n/v	n/v	356	394	475	465	453	637	510	660	606
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.379 J	0.392 J	0.496 J	0.464 J	0.493 J	0.552 J	0.533 U*	0.610 U*	0.589 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<2.56	<2.56	<2.56	<2.56	<2.56	3.65 U*	4.37 J	4.37 J	4.61 J
Magnesium	ug/L	n/v	n/v	n/v	6,550	6,460	6,380	6,700	6,430	6,140	6,920	6,470	6,140
Manganese	ug/L	n/v	n/v	n/v	49.2	55.2	61.5	63.5	60.8	73.7	75.1	76.2	74.5
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	0.715 U*	1.78 U*	0.764 U*	<0.474	<0.474	0.554 J	0.843 J	0.639 J	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.5 U*	1.38 U*	1.48 U*	1.61 U*	2.43 U*	0.997 U*	1.43	1.23	1.14
Selenium	ug/L	50[A]	3.1[B]	20[C]	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.063	0.071 U*	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.62	1.78	1.93	1.98	2	2.95	3.13	3.64	3.58
Zinc	ug/L	2,000[A]	120[B]	120[C]	5.24 U*	5.19 U*	29.7	5.16 U*	6.66 U*	6.56 U*	6.33 U*	5.61 U*	6.36 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	0.688 J	0.578 J	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.328 J	0.443 J	0.392 J	0.492 J	0.366 J	0.528 J	0.844 J	0.832 J	0.817 J
Barium	ug/L	2,000[A]	n/v	n/v	18.5	20.3	19.5	21.9	20.1	24.8	22.8	22.0	21.4
Beryllium	ug/L	4[A]	n/v	n/v	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	77.3 J	43.7 J	<38.6
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	35,000 J	34,100 J	32,600 J	35,500 J	35,100 J	37,700	29,100	27,900	27,700
Chromium	ug/L	100[A]	74.1[D]	570[E]	<0.631	<0.631	<0.631	<0.631	<0.631	1.79 J	2.69	2.44	1.86 U*
Cobalt	ug/L	6[A]	n/v	n/v	0.085 U*	0.152 U*	<0.075	0.091 U*	0.097 U*	0.089 J	<0.0750	<0.0750	0.0980 U*
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.56 J	1.06 J	1.15 J
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<2.56	<2.56	<2.56	<2.56	<2.56	2.73 U*	4.17 J	3.80 J	3.66 J
Magnesium	ug/L	n/v	n/v	n/v	6,510	6,410	6,000	6,630	6,400	6,200	6,460	5,830	6,130
Manganese	ug/L	n/v	n/v	n/v	5.28	6.3	6.06	11.3	7.05	8.45	<1.35	<1.35	1.55 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	0.706 U*	0.87 U*	0.588 U*	<0.474	<0.474	0.48 J	0.788 J	<0.610	<0.610
Nickel	ug/L	100[A]	52.0[D]	468[E]	1.09 U*	0.968 U*	1.29 U*	1.19 U*	1.17 U*	0.543 U*	0.630 J	0.555 J	0.681 J
Selenium	ug/L	50[A]	n/v	n/v	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	1.57 J	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	<0.899	<0.899	0.901 J	0.931 J	<0.899	2	2.90	2.73	1.42
Zinc	ug/L	2,000[A]	118[D]	117[E]	2.56 U*	<2.42	4.34 U*	2.98 U*	5.44 U*	2.79 U*	3.82 J	<3.22	4.06 U*
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	-0.00141 +/-(0.0936)U	0.0320 +/-(0.108)U	0.00273 +/-(0.0859)U	0.151 +/-(0.137)U	0.0200 +/-(0.0965)U	-0.00834 +/-(0.0828)U	0.173 +/-(0.100)	0.0206 +/-(0.0779)U	-0.00321 +/-(0.0674)U
Radium-228	pCi/L	n/v	n/v	n/v	0.0556 +/-(0.220)U	0.0642 +/-(0.203)U	-0.0271 +/-(0.219)U	0.0358 +/-(0.248)U	0.149 +/-(0.234)U	-0.0811 +/-(0.214)U	0.00909 +/-(0.315)UJ	-0.113 +/-(0.286)UJ	0.273 +/-(0.292)UJ
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.0556 +/-(0.239)U	0.0962 +/-(0.230)U	0.00273 +/-(0.235)U	0.186 +/-(0.283)U	0.169 +/-(0.253)U	0.000 +/-(0.229)U	0.182 +/-(0.330)J	0.0206 +/-(0.296)UJ	0.273 +/-(0.300)UJ
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	4.42	3.70	3.66	3.30	3.93	3.78	5.52	4.30	3.72
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.107	0.0718 J	0.0684 J	0.0631 J	0.0757 J	0.0712 J	0.105	0.0902 J	0.0786 J
Sulfate	mg/L	250[A]	n/v	n/v	23.0	19.2	18.7	16.4	19.0	18.8	27.0	24.7	22.9
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	114	112	111	116	113	116	103	99.1	97.2
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	132	139	141	146	133	148	202	116	126
Total Suspended Solids	mg/L	n/v	n/v	n/v	11.6	16.0	17.6	16.2	17.6	20.2	18.1	19.1	19.8

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location									CuR06				
Sample Date					4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	27-May-20	27-May-20	27-May-20
Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CUF-STR-CuR06-LB-SUR-20190904	CUF-STR-CuR06-LB-BOT-20190904	CUF-STR-CuR06-RB-SUR-20190904	CUF-STR-CuR06-RB-MID-20190904	CUF-STR-CuR06-RB-BOT-20190904	CUF-STR-DUP02-20190904	CUF-STR-CUR06-CC-SUR-20200527	CUF-STR-CUR06-CC-MID-20200527	CUF-STR-CUR06-CC-BOT-20200527
Parent Sample ID										CUF-STR-CUR06-RB-BOT-20190904			
Sample Depth					0.5 m	2.5 m	0.5 m	2 m	3.5 m	3.5 m	0.5 m	5.5 m	10.5 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378	0.432 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.968 J	1.01	0.984 J	1.40	1.10	1.02	0.323 J	0.481 J	0.486 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	25.2	25.8	26.3	25.6	27.3	27.3	22.5	22.7	26.3
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	0.619 U*	0.320 U*	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	99.2	99.9	71.0 J	105	80.3	71.8 J	40.1 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	0.153 J	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	116,000[B]	n/v	29,200	29,300	28,900	28,800	29,100	29,300	26,200	26,300	26,600
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	2.61	3.09	5.29	3.35	3.31	2.91	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.328 U*	0.331 U*	0.364 U*	0.499 J	0.481 J	0.426 U*	0.209 J	0.290 J	0.368 J
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	2.39	2.41	2.44	2.53	1.82 J	2.58	1.03 J	0.791 J	0.880 J
Iron	ug/L	n/v	n/v	n/v	411	415	507	494	687	626	333	553	627
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.486 U*	0.473 U*	0.546 U*	0.697 U*	0.698 U*	0.631 U*	0.329 J	0.509 J	0.619 J
Lithium	ug/L	40[A]	440[B]	910[C]	4.68 J	4.67 J	4.64 J	5.97	5.03	6.31	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	6,850	6,910	6,640	6,630	6,500	6,490	5,620	5,550	5,580
Manganese	ug/L	n/v	n/v	n/v	66.9	65.5	74.1	73.6	83.8	82.0	42.3	64.6	75.7
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	0.776 J	0.833 J	0.693 J	0.832 J	0.640 J	0.657 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.19	1.16	1.27	1.36	1.44	1.34	0.704 J	0.875 J	1.14
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	1.75 J	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	<0.148	<0.148	0.295 U*	<0.148	<0.148	<0.148	0.177 U*	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	3.04	3.46	3.48	3.71	3.78	3.29	<0.991	<0.991	1.48
Zinc	ug/L	2,000[A]	120[B]	120[C]	5.40 U*	5.57 U*	6.37 U*	6.11 U*	6.34 U*	6.57 U*	<3.22	<3.22	4.84 J
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	0.617 J	0.592 J	0.569 J	<0.378	1.29 J	0.835 J	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.762 J	0.846 J	0.855 J	0.843 J	0.815 J	0.904 J	<0.313	<0.313	0.421 J
Barium	ug/L	2,000[A]	n/v	n/v	22.8	22.4	22.8	22.1	21.5	22.7	19.1	19.2	21.6
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	76.1 J	77.3 J	63.2 J	63.4 J	60.4 J	49.0 J	47.4 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	n/v	n/v	29,600	29,000	29,300	29,400	27,200	28,900	25,500	26,100	25,800
Chromium	ug/L	100[A]	74.1[D]	570[E]	2.36	2.85	2.75	2.29 U*	2.49	2.65	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	0.0750 J	<0.0750	<0.0750	0.0940 U*	0.0960 J	0.0770 J	<0.134	<0.134	<0.134
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	1.45 J	1.48 J	1.58 J	1.73 J	1.00 J	1.32 J	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	19.5 UJ	160 J	<19.5	21.6 J	<19.5
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	4.05 J	4.12 J	4.44 J	4.16 J	4.18 J	4.39 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	6,360	6,370	6,350	6,930	5,570	6,060	5,280	5,630	5,450
Manganese	ug/L	n/v	n/v	n/v	1.82 J	2.08 J	3.10 J	3.39 J	1.99 J	2.66 J	2.95 J	1.76 J	1.52 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	ug/L	100[A]	n/v	n/v	0.826 J	0.830 J	0.737 J	0.680 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	52.0[D]	468[E]	0.636 J	0.633 J	0.524 J	0.870 J	0.436 J	0.625 J	0.455 J	0.463 J	0.483 J
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	1.57 J	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.250 J	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	2.55	2.80	2.75	1.55	2.70	2.92	<0.991	<0.991	<0.991
Zinc	ug/L	2,000[A]	118[D]	117[E]	3.69 J	3.70 J	3.50 J	3.72 U*	3.49 J	3.89 J	<3.22	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.0984 +/-(0.0883)U	0.0558 +/-(0.0834)U	0.0532 +/-(0.0744)U	0.0268 +/-(0.0795)U	-0.0371 +/-(0.0878)UJ	0.187 +/-(0.124)J	0.0231 +/-(0.0797)U	0.00401 +/-(0.119)U	0.0707 +/-(0.0993)U
Radium-228	pCi/L	n/v	n/v	n/v	0.337 +/-(0.318)UJ	0.0387 +/-(0.280)UJ	0.235 +/-(0.284)UJ	0.124 +/-(0.271)UJ	0.106 +/-(0.394)UJ	0.150 +/-(0.311)UJ	-0.226 +/-(0.258)U	-0.128 +/-(0.258)U	0.0709 +/-(0.259)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.435 +/-(0.330)UJ	0.0945 +/-(0.292)UJ	0.288 +/-(0.294)UJ	0.151 +/-(0.282)UJ	0.106 +/-(0.404)U	0.337 +/-(0.335)J	0.0231 +/-(0.270)U	0.00401 +/-(0.284)U	0.142 +/-(0.277)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	5.47	5.55	4.81	4.84	4.39	4.40	3.40	3.00	2.94
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.105	0.105	0.100	0.0927 J	0.0834 J	0.0900 J	0.0756 J	0.0778 J	0.0757 J
Sulfate	mg/L	250[A]	n/v	n/v	27.2	27.1	25.7	25.8	24.7	24.7	19.7	19.5	19.1
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	101	102	99.5	99.2	99.4	99.9	88.7	88.6	89.3
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	122	122	132	136	129	129	131	110	108
Total Suspended Solids	mg/L	n/v	n/v	n/v	14.3	13.5	15.4	18.8	22.4	20.6	11.7	16.9	22.9

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR06					CuR07			
Sample Date					27-May-20	27-May-20	27-May-20	27-May-20	27-May-20	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18
Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		CUF-STR-CUR06-LB-SUR-20200527	CUF-STR-CUR06-LB-BOT-20200527	CUF-STR-CUR06-RB-SUR-20200527	CUF-STR-CUR06-RB-MID-20200527	CUF-STR-CUR06-RB-BOT-20200527	CUF-STR-CuR07-CC-SUR-20181105	CUF-STR-CuR07-CC-MID-20181105	CUF-STR-DUP01-20181105	CUF-STR-CuR07-CC-BOT-20181105
Parent Sample ID												CUF-STR-CUR07-CC-MID-20181105	
Sample Depth					0.5 m	2 m	0.5 m	2.7 m	5 m	0.5 m	5 m	5 m	10 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated	Validated
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6^{A}	190^{B}	900^{C}	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<1.12
Arsenic	ug/L	10^{A}	150^{B}	340^{C}	0.554 J	0.357 J	0.338 J	0.367 J	0.528 J	0.634 J	0.57 J	0.667 J	0.692 J
Barium	ug/L	$2,000^{A}$	220^{B}	$2,000^{C}$	23.9	23.7	24.9	23.2	25.8	21.7	25.9	27.3	24.9
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057
Boron	ug/L	$4,000^{A}$	$7,200^{B}$	$34,000^{C}$	55.2 J	46.8 J	66.4 J	51.1 J	<38.6	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	5^{A}	0.790^{B}	1.91^{C}	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	$116,000^{B}$	n/v	27,100	26,200	27,400	26,700	26,700	33,300	33,800	34,900	34,800
Chromium	ug/L	100^{A}	86.2^{B}	$1,803^{C}$	<1.53	<1.53	<1.53	<1.53	<1.53	<0.631	0.631 J	2.11	0.715 J
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.269 J	0.291 J	0.238 J	0.312 J	0.340 J	0.395 U*	0.246 U*	0.305 J	0.358 U*
Copper	ug/L	$1,300^{A}$	9.33^{B}	14.0^{C}	1.16 J	0.863 J	1.42 J	1.45 J	1.34 J	<1.3	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	406	462	473	534	717	400	440	505	578
Lead	ug/L	5^{A}	3.18^{B}	81.6^{C}	0.379 J	0.444 J	0.446 J	0.473 J	0.608 J	0.386 J	0.446 J	0.413 J	0.633 J
Lithium	ug/L	40^{A}	440^{B}	910^{C}	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	3.01 U*	<2.56
Magnesium	ug/L	n/v	n/v	n/v	5,910	5,690	6,060	5,590	5,700	6,250	6,370	6,140	6,650
Manganese	ug/L	n/v	n/v	n/v	48.7	53.8	55.6	59.6	72.9	50.3	58.1	61	72.2
Mercury	ug/L	2^{A}	0.77^{B}	1.4^{C}	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100^{A}	800^{B}	$7,200^{C}$	<0.610	<0.610	<0.610	<0.610	<0.610	0.559 U*	<0.474	0.518 J	0.505 U*
Nickel	ug/L	100^{A}	52.2^{B}	469^{C}	0.844 J	0.940 J	0.980 J	0.965 J	1.16	1.91 U*	1.41 U*	0.935 U*	2.59 U*
Selenium	ug/L	50^{A}	3.1^{B}	20^{C}	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813
Silver	ug/L	100^{A}	n/v	3.78^{C}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2^{A}	6^{B}	54^{C}	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	1.03	1.01	0.991 J	1.09	1.33	1.67	1.7 J	2.75 J	1.98
Zinc	ug/L	$2,000^{A}$	120^{B}	120^{C}	<3.22	<3.22	<3.22	4.16 J	4.82 J	5.08 U*	8.65 U*	4.23 U*	6.31 U*
Dissolved Metals													
Antimony	ug/L	6^{A}	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<1.12
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	<0.313	0.337 J	0.573 J	0.421 J	0.315 J	0.397 J	0.449 J	0.574 J	0.369 J
Barium	ug/L	$2,000^{A}$	n/v	n/v	21.6	19.6	19.9	20.2	20.9	20.6	19.6	24.1	21.3
Beryllium	ug/L	4^{A}	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057
Boron	ug/L	$4,000^{A}$	n/v	n/v	55.0 J	49.8 J	71.9 J	41.6 J	<38.6	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	5^{A}	0.718^{D}	1.80^{E}	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	26,700	26,700	25,600	26,700	24,700	34,500	34,100	35,800	34,700
Chromium	ug/L	100^{A}	74.1^{D}	570^{E}	<1.53	<1.53	<1.53	<1.53	<1.53	<0.631	<0.631	1.58 J	<0.631
Cobalt	ug/L	6^{A}	n/v	n/v	<0.134	<0.134	<0.134	<0.134	<0.134	<0.075	0.079 U*	<0.075	0.08 U*
Copper	ug/L	$1,300^{A}$	8.96^{D}	13.4^{E}	<0.627	0.738 U*	1.02 U*	0.690 U*	<0.627	<1.3	<1.3	<1.3	<1.3
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	19.6 J	<14.1	<14.1	<14.1	<14.1
Lead	ug/L	5^{A}	2.52^{D}	64.6^{E}	<0.128	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094	<0.094
Lithium	ug/L	40^{A}	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56
Magnesium	ug/L	n/v	n/v	n/v	5,730	5,630	5,500	5,660	5,230	6,470	6,430	6,230	6,580
Manganese	ug/L	n/v	n/v	n/v	4.19 J	3.97 J	5.36	7.02	3.26 J	4.62 J	4.32 J	4.4 J	5.27
Mercury	ug/L	2^{A}	0.77^{D}	1.4^{E}	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	ug/L	100^{A}	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	0.572 U*	0.491 U*	0.523 J	0.505 U*
Nickel	ug/L	100^{A}	52.0^{D}	468^{E}	0.436 J	0.448 J	0.494 J	0.484 J	0.338 J	1.23 U*	1.4 U*	0.659 U*	1.29 U*
Selenium	ug/L	50^{A}	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813
Silver	ug/L	100^{A}	n/v	3.22^{E}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2^{A}	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063
Vanadium	ug/L	86^{A}	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	1.06	1.03	1.91	1.17
Zinc	ug/L	$2,000^{A}$	118^{D}	117^{E}	<3.22	<3.22	<3.22	<3.22	<3.22	2.79 U*	3.31 U*	3.52 U*	2.94 U*
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.0273 +/-(0.107)U	-0.0106 +/-(0.0563)U	-0.0342 +/-(0.0684)U	0.131 +/-(0.128)U	0.0119 +/-(0.0727)U	0.0125 +/-(0.0651)U	0.0989 +/-(0.0863)U	0.0625 +/-(0.0856)U	0.0379 +/-(0.0588)U
Radium-228	pCi/L	n/v	n/v	n/v	0.189 +/-(0.363)U	-0.0625 +/-(0.255)U	0.0844 +/-(0.308)U	0.0953 +/-(0.278)U	-0.177 +/-(0.219)U	-0.0496 +/-(0.201)U	-0.219 +/-(0.220)U	0.197 +/-(0.364)U	0.0193 +/-(0.248)U
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	0.216 +/-(0.378)U	0.000 +/-(0.261)U	0.0844 +/-(0.316)U	0.226 +/-(0.306)U	0.0119 +/-(0.231)U	0.0125 +/-(0.211)U	0.0989 +/-(0.236)U	0.260 +/-(0.374)U	0.0572 +/-(0.255)U
Anions													
Chloride	mg/L	250^{A}	230^{B}	860^{C}	3.57	3.51	4.49	3.30	3.18	3.82	3.76	3.67	3.68
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.0726 J	0.0805 J	0.0852 J	0.0772 J	0.0710 J	0.0711 J	0.0705 J	0.0708 J	0.0689 J
Sulfate	mg/L	250^{A}	n/v	n/v	19.5	19.9	21.2	19.4	19.0	20.3	19.7	19.6	19.3
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	91.9	88.9	93.4	89.7	90.1	109	111	112	114
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	102	103	110	134	101	125	116	129	141
Total Suspended Solids	mg/L	n/v	n/v	n/v	13.8	16.3	15.4	19.9	22.4	13.2	18.1	17.5	20.2

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR07								
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	5-Nov-18	4-Sep-19	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CuR07-LB-SUR-20181105	CUF-STR-CuR07-LB-MID-20181105	CUF-STR-CuR07-LB-BOT-20181105	CUF-STR-CuR07-RB-SUR-20181105	CUF-STR-CuR07-RB-MID-20181105	CUF-STR-CuR07-RB-BOT-20181105	CUF-STR-CuR07-CC-SUR-20190904	CUF-STR-CuR07-CC-MID-20190904	CUF-STR-CuR07-CC-BOT-20190904
Parent Sample ID													
Sample Depth					0.5 m	5.5 m	10.5 m	0.5 m	4.5 m	9.2 m	0.5 m	5.1 m	10.8 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L) Chronic	Acute	Validated	Validated	Validated	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.607 J	0.651 J	0.548 J	0.52 J	0.678 J	0.582 J	0.816 J	0.837 J	0.726 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	23.2	24	25.7	23.9	23.1	25.2	26.2	24.7	26.2
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	0.216 U*	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	76.7 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.790[B]	1.91[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	34,900	33,800	33,700	33,900	33,100	35,800	31,600	29,100	29,500
Chromium	ug/L	100[A]	86.2[B]	1,803[C]	0.653 J	0.73 J	0.78 J	<0.631	<0.631	0.716 J	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.409 U*	0.393 U*	0.45 U*	0.262 U*	0.342 U*	0.471 J	0.280 U*	0.322 U*	0.368 U*
Copper	ug/L	1,300[A]	9.33[B]	14.0[C]	1.34 J	<1.3	1.33 J	<1.3	<1.3	<1.3	1.66 J	1.37 J	1.05 J
Iron	ug/L	n/v	n/v	n/v	436	496	514	407	349	619	354	351	474
Lead	ug/L	5[A]	3.18[B]	81.6[C]	0.443 J	0.542 J	0.584 J	0.441 J	0.381 J	0.617 J	0.359 U*	0.425 U*	0.513 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	6,420	6,160	6,280	6,330	6,250	6,830	7,490	6,740	6,740
Manganese	ug/L	n/v	n/v	n/v	60.3	62.5	67.6	53.2	45.8	74.7	61.3	68.8	82.6
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	0.478 U*	0.659 U*	<0.474	0.71 U*	1.71 U*	0.632 U*	0.729 J	<0.610	<0.610
Nickel	ug/L	100[A]	52.2[B]	469[C]	1.13 U*	1.42 U*	1.39 U*	1.36 U*	1.29 U*	1.73 U*	0.870 J	0.615 J	0.864 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.78[C]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.063	<0.063	<0.063	<0.063	0.118 U*	<0.063	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.44	1.78	1.9	1.54	1.32	1.88	1.92	1.65	1.85
Zinc	ug/L	2,000[A]	120[B]	120[C]	5.26 U*	4.85 U*	5.58 U*	4.4 U*	5.7 U*	9.22 U*	4.66 U*	6.35 U*	17.9 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<1.12	<1.12	<1.12	2.36	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.347 J	0.502 J	<0.323	0.416 J	0.422 J	0.375 J	0.706 J	0.743 J	0.733 J
Barium	ug/L	2,000[A]	n/v	n/v	19.7	20.2	18.3	19.7	20.2	20.4	23.2	22.0	23.5
Beryllium	ug/L	4[A]	n/v	n/v	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	74.0 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.718[D]	1.80[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	31,200	32,800	32,800	34,900	33,300 J	34,000 J	30,600	29,400	29,200
Chromium	ug/L	100[A]	74.1[D]	570[E]	<0.631	<0.631	<0.631	<0.631	<0.631	<0.631	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.075	0.075 U*	<0.075	0.147 U*	0.084 U*	0.094 U*	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	8.96[D]	13.4[E]	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.06 J	0.825 J	<0.627
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<19.5	41.5 J	<19.5
Lead	ug/L	5[A]	2.52[D]	64.6[E]	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,720	5,970	6,120	6,580	6,260	6,420	7,180	6,730	6,600
Manganese	ug/L	n/v	n/v	n/v	4.78 J	5.78	5.62	5.22	5.39	10.6	<1.35	8.91	<1.35
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	0.516 U*	0.513 U*	<0.474	1.68 U*	0.893 U*	0.484 U*	0.764 J	<0.610	<0.610
Nickel	ug/L	100[A]	52.0[D]	468[E]	1.1 U*	0.943 U*	0.824 U*	0.758 U*	1.13 U*	0.902 U*	0.556 J	0.526 J	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	3.22[E]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.063	<0.063	<0.063	0.08 U*	<0.063	<0.063	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	<0.899	<0.899	<0.899	0.931 J	0.927 J	<0.899	1.55	1.47	1.23
Zinc	ug/L	2,000[A]	118[D]	117[E]	5.17 U*	3.6 U*	3.58 U*	2.44 U*	3.87 U*	4.42 U*	3.34 U*	5.73 U*	9.12 U*
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.00313 +/-(0.0655)U	-0.00534 +/-(0.0594)U	0.00858 +/-(0.0777)U	-0.00108 +/-(0.0601)U	0.0391 +/-(0.0672)U	0.105 +/-(0.122)U	0.0619 +/-(0.0982)U	0.0132 +/-(0.0711)U	-0.0238 +/-(0.0599)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.239 +/-(0.220)U	-0.0732 +/-(0.224)U	0.136 +/-(0.251)U	0.0473 +/-(0.264)U	0.0600 +/-(0.269)U	0.244 +/-(0.220)U	-0.117 +/-(0.365)U	0.837 +/-(0.365)U*	0.343 +/-(0.308)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.00313 +/-(0.230)U	0.000 +/-(0.232)U	0.144 +/-(0.263)U	0.0473 +/-(0.271)U	0.0992 +/-(0.277)U	0.349 +/-(0.252)U	0.0619 +/-(0.378)U	0.850 +/-(0.372)U*	0.343 +/-(0.314)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	3.73	3.80	3.70	3.68	3.62	3.68	4.89	3.65	3.55
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0715 J	0.0725 J	0.0706 J	0.0697 J	0.0692 J	0.0704 J	0.0965 J	0.0794 J	0.0851 J
Sulfate	mg/L	250[A]	n/v	n/v	19.2	19.1	19.3	19.3	18.7	19.2	25.7	23.4	23.2
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	114	110	110	111	108	118	110	100	101
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	132	134	124	124	132	138	127	120	118
Total Suspended Solids	mg/L	n/v	n/v	n/v	15.2	19.0	22.1	14.8	17.1	24.6	10.2	13.4	16.5

See last page for notes.

Table J.1-1: Surface Stream Analytical Results - Cumberland River
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019 and May 2020

Sample Location					CuR07					
Sample Date					4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19	4-Sep-19
Sample ID					CUF-STR-CuR07-LB-SUR-20190904	CUF-STR-CuR07-LB-MID-20190904	CUF-STR-CuR07-LB-BOT-20190904	CUF-STR-CuR07-RB-SUR-20190904	CUF-STR-CuR07-RB-MID-20190904	CUF-STR-CuR07-RB-BOT-20190904
Parent Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels							
Sample Depth					0.5 m	3.2 m	5.8 m	0.5 m	3.1 m	5.9 m
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Cumberland River (Hardness = 100 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute						
Total Metals										
Antimony	ug/L	6^{A}	190^{B}	900^{C}	<0.378	<0.378	<0.378	<0.378	2.03	<0.378
Arsenic	ug/L	10^{A}	150^{B}	340^{C}	0.946 J	0.941 J	0.963 J	0.916 J	1.12	1.19
Barium	ug/L	$2,000^{A}$	220^{B}	$2,000^{C}$	26.4	26.4	28.1	25.0	25.9	25.3
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	0.275 U*	0.192 U*	<0.182	<0.182	0.273 U*	<0.182
Boron	ug/L	$4,000^{A}$	$7,200^{B}$	$34,000^{C}$	66.3 J	<38.6	45.2 J	74.7 J	52.8 J	90.1
Cadmium	ug/L	5^{A}	0.790^{B}	1.91^{C}	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	$116,000^{B}$	n/v	31,300	29,400	28,900	30,900	28,100	28,200
Chromium	ug/L	100^{A}	86.2^{B}	$1,803^{C}$	<1.53	<1.53	<1.53	<1.53	3.21	3.00
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.294 U*	0.421 U*	0.460 J	0.319 U*	0.371 U*	0.279 U*
Copper	ug/L	$1,300^{A}$	9.33^{B}	14.0^{C}	1.73 J	2.11	1.51 J	1.35 J	1.61 J	2.83
Iron	ug/L	n/v	n/v	n/v	281	423	699	283	386	341
Lead	ug/L	5^{A}	3.18^{B}	81.6^{C}	0.322 U*	0.537 U*	0.787 U*	0.318 U*	0.518 U*	0.396 U*
Lithium	ug/L	40^{A}	440^{B}	910^{C}	<3.39	<3.39	<3.39	<3.39	6.31	5.26
Magnesium	ug/L	n/v	n/v	n/v	7,440	6,900	6,690	7,300	5,950	6,340
Manganese	ug/L	n/v	n/v	n/v	58.7	79.1	106	59.4	57.6	58.3
Mercury	ug/L	2^{A}	0.77^{B}	1.4^{C}	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100^{A}	800^{B}	$7,200^{C}$	0.863 J	0.694 J	0.615 J	0.668 J	0.657 J	<0.610
Nickel	ug/L	100^{A}	52.2^{B}	469^{C}	1.09	0.885 J	1.22	0.915 J	1.02	0.920 J
Selenium	ug/L	50^{A}	3.1^{B}	20^{C}	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	3.78^{C}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2^{A}	6^{B}	54^{C}	0.207 U*	<0.148	<0.148	<0.148	0.224 U*	<0.148
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	1.88	2.64	2.26	1.81	3.53	5.44
Zinc	ug/L	$2,000^{A}$	120^{B}	120^{C}	4.50 U*	5.80 U*	6.17 U*	7.23 U*	5.64 U*	5.04 U*
Dissolved Metals										
Antimony	ug/L	6^{A}	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	0.909 J
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	0.810 J	0.727 J	0.685 J	0.641 J	0.911 J	0.888 J
Barium	ug/L	$2,000^{A}$	n/v	n/v	23.4	21.6	23.9	22.2	22.1	22.5
Beryllium	ug/L	4^{A}	n/v	n/v	0.221 U*	<0.182	<0.182	<0.182	0.194 U*	<0.182
Boron	ug/L	$4,000^{A}$	n/v	n/v	65.0 J	71.1 J	42.8 J	70.6 J	<38.6	39.5 J
Cadmium	ug/L	5^{A}	0.718^{D}	1.80^{E}	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	30,500	29,100	29,100	30,700	27,700	28,100
Chromium	ug/L	100^{A}	74.1^{D}	570^{E}	<1.53	<1.53	<1.53	<1.53	1.86 U*	2.29
Cobalt	ug/L	6^{A}	n/v	n/v	0.0920 J	0.0810 J	0.0750 J	<0.0750	0.130 U*	0.0970 J
Copper	ug/L	$1,300^{A}$	8.96^{D}	13.4^{E}	1.07 J	1.87 J	0.822 J	1.06 J	1.17 J	1.06 J
Iron	ug/L	n/v	n/v	n/v	54.9	<19.5	150	<19.5	<19.5	49.4 J
Lead	ug/L	5^{A}	2.52^{D}	64.6^{E}	<0.128	1.95 J	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40^{A}	n/v	n/v	<3.39	<3.39	<3.39	<3.39	4.23 J	4.01 J
Magnesium	ug/L	n/v	n/v	n/v	7,130	6,720	6,790	7,420	6,360	5,850
Manganese	ug/L	n/v	n/v	n/v	16.6	2.74 J	8.02	<1.35	<1.35	10.7
Mercury	ug/L	2^{A}	0.77^{D}	1.4^{E}	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100^{A}	n/v	n/v	0.818 J	0.620 J	0.633 J	0.827 J	<0.610	<0.610
Nickel	ug/L	100^{A}	52.0^{D}	468^{E}	0.518 J	<0.336	0.485 J	0.419 J	0.569 J	0.511 J
Selenium	ug/L	50^{A}	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	3.22^{E}	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2^{A}	n/v	n/v	<0.148	<0.148	<0.148	<0.148	0.223 U*	<0.148
Vanadium	ug/L	86^{A}	n/v	n/v	1.43	1.52	1.28	1.32	1.47	2.62
Zinc	ug/L	$2,000^{A}$	118^{D}	117^{E}	3.55 U*	4.53 U*	3.76 U*	4.95 U*	3.74 U*	3.55 J
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	n/v	-0.0172 +/-(0.0807)U	0.0892 +/-(0.0922)U	-0.0460 +/-(0.0607)U	0.0135 +/-(0.0650)U	0.00202 +/-(0.0793)U	-0.0186 +/-(0.0614)U
Radium-228	pCi/L	n/v	n/v	n/v	0.795 +/-(0.440)U*	0.364 +/-(0.319)U	0.605 +/-(0.423)U	0.688 +/-(0.395)U*	0.405 +/-(0.354)U	0.364 +/-(0.291)U
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	0.795 +/-(0.447)U*	0.453 +/-(0.332)U	0.605 +/-(0.427)U	0.701 +/-(0.400)U*	0.407 +/-(0.363)U	0.364 +/-(0.297)U
Anions										
Chloride	mg/L	250^{A}	230^{B}	860^{C}	4.83	4.01	3.79	5.12	4.09	3.97
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.100	0.0864 J	0.0925 J	0.104	0.0908 J	0.0826 J
Sulfate	mg/L	250^{A}	n/v	n/v	25.6	24.4	23.9	26.1	24.6	24.2
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	109	102	99.7	107	94.7	96.5
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	122	107	110	112	110	110
Total Suspended Solids	mg/L	n/v	n/v	n/v	9.80	17.7	21.2	10.3	11.5	11.6

See last page for notes.

Notes:
Please note that units have been converted automatically in this table, and significant figures may not have been maintained.

A	Human Health Surface Water Screening Levels
B	Ecological Surface Water Screening Levels - Cumberland River (Hardness = 100 mg/L) Total Chronic
C	Ecological Surface Water Screening Levels - Cumberland River (Hardness = 100 mg/L) Total Acute
D	Ecological Surface Water Screening Levels - Cumberland River (Hardness = 100 mg/L) Dissolved Chronic
E	Ecological Surface Water Screening Levels - Cumberland River (Hardness = 100 mg/L) Dissolved Acute
6.5^{A}	Concentration is greater than or equal to the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
m	meters
ID	identification
mg/L	milligrams per Liter
n/v	No standard/guideline value.
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picocuries per Liter
R	Unreliable positive result; compound may or may not be present in sample.
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
ug/L	micrograms per Liter

1. Level of review is defined in the Quality Assurance Project Plan.
2. Value determined to be a statistical outlier and not presented in this data set (see Appendix E.5).

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Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC01					
Sample Date				29-Nov-18	29-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC01-LB-SUR-20181129	CUF-STR-WC01-RB-SUR-20181129	CUF-STR-WC01-CC-MID-20190813	CUF-STR-WC01-LB-MID-20190813	CUF-STR-WC01-RB-MID-20190813	CUF-STR-WC01-CC-SUR-20191205
Parent Sample ID									
Sample Depth				0.5 m	0.3 m	0.6 m	0.6 m	0.6 m	0.5 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.442 J	0.438 J	0.571 U*	0.709 U*	0.666 U*	<0.323
Barium	ug/L	220[A]	2,000[B]	29.5	30.6	36.9 U*	39.3 U*	42.5 U*	31.5
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.182	0.256 U*	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<30.3	42.6 U*	<38.6	41.9 J	<38.6	41.6 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	56,400	57,200	55,100	57,600	58,500	52,900
Chromium	ug/L	114[A]	2,375[B]	2.33 U*	2.48 U*	<1.53	1.82 U*	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.146 U*	0.263 U*	0.351 J	0.358 J	0.506	0.123 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	<0.627	1.12 U*	0.683 U*	<0.627
Iron	ug/L	n/v	n/v	149	146	338	332	602	119
Lead	ug/L	4.88[A]	125[B]	<0.094	<0.094	0.383 J	0.430 J	0.616 J	<0.128
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,910	4,590	4,820	4,970	5,090	4,400
Manganese	ug/L	n/v	n/v	55.1	51.4	107	110	136	36.5
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	0.109 U*	0.107 U*	0.107 U*	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	0.347 U*	0.367 U*	0.520 U*	<0.336
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.148	0.229 U*	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.57 U*	2.07 U*	1.73 U*	1.99 U*	2.09 U*	<0.991
Zinc	ug/L	159[A]	159[B]	<2.42	<2.42	3.68 U*	5.23 U*	5.22 U*	3.73 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.381 J	0.399 J	0.533 J	0.493 J	0.529 J	0.379 J
Barium	ug/L	n/v	n/v	27.8	28.6	36.2	34.8	36.2	29.2
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	0.269 J	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<30.3	<30.3	43.3 J	<38.6	<38.6	<38.6
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	53,700	54,800	55,200	53,200	55,700	52,000
Chromium	ug/L	97.6[C]	751[D]	1.91 U*	2.22 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.119 J	0.099 J	0.200 J	0.163 J	0.195 J	0.129 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	43.5 J	47.9 J	<19.5	<19.5	30.1 J	20.0 U*
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,710	4,360	4,800	4,680	4,810	4,380 J
Manganese	ug/L	n/v	n/v	48.6	47.9	84.1	68.4	92.5	33.3
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.312	<0.312	0.424 J	<0.336	<0.336	<0.336
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	0.193 J	<0.148	<0.148	0.154 J
Vanadium	ug/L	n/v	n/v	1.31	1.8	1.36	1.31	1.47	1.37
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	3.35 U*	<3.22	3.40 U*	4.12 U*
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	0.00447 +/-(0.0463)U	0.0182 +/-(0.0487)U	0.0901 +/-(0.0916)U	0.0598 +/-(0.0902)U	0.0935 +/-(0.0948)U	-0.0268 +/-(0.0722)U
Radium-228	pCi/L	n/v	n/v	0.0348 +/-(0.173)U	0.213 +/-(0.197)U	0.200 +/-(0.268)U	-0.00241 +/-(0.237)U	0.0430 +/-(0.259)U	0.197 +/-(0.219)U
Radium-226+228	pCi/L	3[A]	3[B]	0.0392 +/-(0.179)U	0.231 +/-(0.203)U	0.290 +/-(0.283)U	0.0598 +/-(0.254)U	0.137 +/-(0.276)U	0.197 +/-(0.231)U
Anions									
Chloride	mg/L	230[A]	860[B]	4.61	4.61	4.56	3.68	4.59	4.36
Fluoride	mg/L	2.7[A]	9.8[B]	0.0693 J	0.0688 J	0.343	0.0448 J	0.433	0.0472 J
Sulfate	mg/L	n/v	n/v	6.34	6.46	6.24	4.92	6.17	6.88
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	161	162	157	164	167	150
Total Dissolved Solids	mg/L	n/v	n/v	176	176	169	176	170	145
Total Suspended Solids	mg/L	n/v	n/v	1.00	1.00	11.6 J	12.1 J	21.0 J	1.90

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC02					
Sample Date				28-Nov-18	28-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC02-LB-SUR-20181128	CUF-STR-WC02-RB-SUR-20181128	CUF-STR-WC02-CC-MID-20190813	CUF-STR-WC02-LB-SUR-20190813	CUF-STR-WC02-RB-SUR-20190813	CUF-STR-WC02-RB-SUR-20191205
Parent Sample ID									
Sample Depth				0.5 m	0.6 m	0.85 m	0.2 m	0.5 m	0.5 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.516 U*	0.49 U*	0.765 U*	0.676 U*	0.807 U*	<0.323
Barium	ug/L	220[A]	2,000[B]	28.8	28	46.3	40.5 U*	38.8 U*	34.6
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.182	<0.182	0.325 U*	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<30.3	<30.3	<38.6	<38.6	49.6 J	49.2 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	56,000	56,200	55,900	53,300	53,400	54,400
Chromium	ug/L	114[A]	2,375[B]	1.78 U*	2.12 U*	1.81 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.115 U*	0.105 U*	0.778	0.490 J	0.495 J	0.150 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	0.923 U*	0.627 U*	0.752 U*	<0.627
Iron	ug/L	n/v	n/v	154 J	135 J	1,100	596	546	132
Lead	ug/L	4.88[A]	125[B]	<0.094	<0.094	1.04	0.643 J	0.697 J	<0.128
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,850	4,820	4,860	4,690	4,880	4,560
Manganese	ug/L	n/v	n/v	62.2	56.8	254	153	130	42.6
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	0.121 U*	0.124 U*	0.110 U*	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	0.948 U*	0.509 U*	0.615 U*	<0.336
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.148	<0.148	0.199 U*	<0.148
Vanadium	ug/L	27[A]	79[B]	1.13 U*	1.27 U*	2.68 U*	2.13 U*	2.00 U*	<0.991
Zinc	ug/L	159[A]	159[B]	<2.42	<2.42	6.95 U*	5.13 U*	5.31 U*	4.58 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.416 U*	0.447 U*	0.530 J	0.506 J	0.612 J	0.326 J
Barium	ug/L	n/v	n/v	27.5	27.3	36.0	35.6	33.9	30.7
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<30.3	<30.3	<38.6	<38.6	<38.6	50.9 U*
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	55,100	54,100	52,900	52,700	51,200	54,100
Chromium	ug/L	97.6[C]	751[D]	1.59 U*	2.06 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.113 J	0.104 J	0.209 J	0.155 J	0.163 J	0.137 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	34.8 J	58 J	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,730	4,650	4,540	4,640	4,610	4,630 J
Manganese	ug/L	n/v	n/v	59.4	53.9	176	93.7	78.6	38.3
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.312	<0.312	<0.336	<0.336	<0.336	<0.336
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	0.997 J	1.24	1.44	1.31	1.43	0.991 J
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	<3.22	<3.22	<3.22	3.45 U*
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	0.0700 +/-(0.0651)U	0.0880 +/-(0.0658)U	0.157 +/-(0.106)	0.0225 +/-(0.0853)U	0.00225 +/-(0.0883)U	-0.0520 +/-(0.0548)U
Radium-228	pCi/L	n/v	n/v	0.0367 +/-(0.229)U	0.176 +/-(0.242)U	0.182 +/-(0.303)U	0.246 +/-(0.279)U	-0.229 +/-(0.286)U	0.665 +/-(0.278)
Radium-226+228	pCi/L	3[A]	3[B]	0.107 +/-(0.238)U	0.264 +/-(0.251)U	0.339 +/-(0.321)J	0.269 +/-(0.292)U	0.00225 +/-(0.299)U	0.665 +/-(0.283)J
Anions									
Chloride	mg/L	230[A]	860[B]	4.75	4.85	3.49	3.57	3.68	5.18
Fluoride	mg/L	2.7[A]	9.8[B]	0.0716 J	0.0738 J	0.0758 J	0.0777 J	0.0725 J	0.0626 J
Sulfate	mg/L	n/v	n/v	8.44	7.49	4.96	5.59	6.02	10.6
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	160	160	160	152	153	155
Total Dissolved Solids	mg/L	n/v	n/v	167	175	117	128	171	149
Total Suspended Solids	mg/L	n/v	n/v	<0.500	<0.500	43.5	22.9 J	16.1 J	4.00

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC03						
Sample Date				29-Nov-18	29-Nov-18	29-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC03-CC-SUR-20181129	CUF-STR-WC03-LB-SUR-20181129	CUF-STR-WC03-RB-SUR-20181129	CUF-STR-WC03-CC-MID-20190813	CUF-STR-WC03-LB-MID-20190813	CUF-STR-WC03-RB-MID-20190813	CUF-STR-WC03-RB-SUR-20191205
Parent Sample ID										
Sample Depth				0.5 m	0.3 m	0.3 m	0.6 m	0.6 m	0.6 m	0.25 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<1.12	<0.378	0.512 U*	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.581 J	0.456 J	0.573 J	0.618 U*	1.13 U*	0.776 U*	0.404 J
Barium	ug/L	220[A]	2,000[B]	28.6	28.8	30.1	40.9 U*	48.3	45.2 U*	35.3
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.057	<0.182	0.471 U*	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<30.3	<30.3	42.1 J	<38.6	62.1 J	<38.6	55.7 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	0.191 J	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	55,600	57,200	56,300	53,600	53,500	54,200	54,500
Chromium	ug/L	114[A]	2,375[B]	2.17 U*	1.76 U*	2.38 U*	<1.53	2.54 U*	<1.53	1.86 U*
Cobalt	ug/L	19[A]	120[B]	0.144 U*	0.137 U*	0.306 U*	0.364 J	0.809	0.525	0.170 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	<1.3	0.777 U*	1.44 U*	0.905 U*	<0.627
Iron	ug/L	n/v	n/v	192	178	165	380	1,080	623	138
Lead	ug/L	4.88[A]	125[B]	<0.094	0.128 J	<0.094	0.420 J	1.02	0.594 J	0.145 U*
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	3.54 U*
Magnesium	ug/L	n/v	n/v	4,820	4,960	4,910	4,820	4,920	4,970	4,660
Manganese	ug/L	n/v	n/v	73.5	75.4	69.1	114	229	200	46.0
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	<0.0653	0.134 U*	0.140 U*	0.134 U*	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	0.514 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	0.336 J	0.474 U*	1.11 U*	0.638 U*	<0.336
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.063	<0.148	0.277 U*	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.25 U*	1.09 U*	2.19 U*	1.78 U*	3.08 U*	2.19 U*	1.31 U*
Zinc	ug/L	159[A]	159[B]	<2.42	4.13 J	88.1	4.35 U*	8.48 U*	5.20 U*	4.18 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.454 J	0.432 J	0.472 J	0.472 J	0.643 J	0.596 J	0.391 J
Barium	ug/L	n/v	n/v	28.8	28	29.1	38.4	39.7	39.6	32.6
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	39.4 J	<30.3	<30.3	<38.6	41.7 J	<38.6	57.5 U*
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	56,300	56,100	56,500	53,400	52,800	53,000	54,200
Chromium	ug/L	97.6[C]	751[D]	1.99 U*	2.07 U*	2.05 U*	<1.53	<1.53	<1.53	1.75 J
Cobalt	ug/L	n/v	n/v	0.235 J	0.122 J	0.15 J	0.162 J	0.220 J	0.198 J	0.137 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<1.3	<1.3	0.635 U*	0.764 U*	0.654 U*	<0.627
Iron	ug/L	n/v	n/v	35.4 J	24.7 J	31.9 J	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	3.71 U*
Magnesium	ug/L	n/v	n/v	4,900	4,860	4,940	4,840	4,820	4,930	4,630 J
Manganese	ug/L	n/v	n/v	71.5	71.2	66.3	75.0	154	118	41.1
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.312	<0.312	<0.312	<0.336	<0.336	<0.336	<0.336
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.85	1.2	1.63	1.33	1.47	1.39	1.21
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	2.73 J	3.36 U*	3.93 U*	<3.22	3.22 UJ
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	0.0551 +/-(0.0521)U	0.0101 +/-(0.0417)U	0.0130 +/-(0.0474)U	-0.0193 +/-(0.0733)U	0.148 +/-(0.122)U	0.0325 +/-(0.0870)U	0.0758 +/-(0.0844)U
Radium-228	pCi/L	n/v	n/v	-0.0666 +/-(0.199)U	-0.0442 +/-(0.200)U	-0.0448 +/-(0.228)U	0.0828 +/-(0.263)U	0.0299 +/-(0.329)U	-0.0754 +/-(0.288)U	0.370 +/-(0.280)U
Radium-226+228	pCi/L	3[A]	3[B]	0.0551 +/-(0.206)U	0.0101 +/-(0.204)U	0.0130 +/-(0.233)U	0.0828 +/-(0.273)U	0.178 +/-(0.351)U	0.0325 +/-(0.301)U	0.445 +/-(0.292)U
Anions										
Chloride	mg/L	230[A]	860[B]	5.40	4.76	4.75	3.62	3.70	3.82	4.62
Fluoride	mg/L	2.7[A]	9.8[B]	0.0918 J	0.0726 J	0.0701 J	0.0549 J	0.0760 J	0.0435 J	0.0488 J
Sulfate	mg/L	n/v	n/v	8.36	7.85	7.35	4.86	5.59	5.77	9.21
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	159	163	161	154	154	156	155
Total Dissolved Solids	mg/L	n/v	n/v	184	200	176	176	179	176	146
Total Suspended Solids	mg/L	n/v	n/v	2.80	1.40	2.80	11.4 J	36.4	21.1 J	4.60

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC03.5			
Sample Date				24-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21
Sample ID				CUF-STR-WC03.5-CC-MID-20210624	CUF-STR-WC03.5-LB-SUR-20210624	CUF-STR-DUP01-20210624	CUF-STR-WC03.5-RB-MID-20210624
Parent Sample ID						CUF-STR-WC03.5-LB-SUR-20210624	
Sample Depth				0.7 m	0.3 m	0.3 m	0.8 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Validated	Validated	Validated	Validated
		Chronic	Acute				
Total Metals							
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.637 J	0.810 J	0.996 J	0.497 J
Barium	ug/L	220[A]	2,000[B]	37.2	37.1	39.8	36.4
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	45.5 U*	48.7 U*	123 U*	82.3 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	116,000[A]	n/v	55,200	54,900	54,200	55,000
Chromium	ug/L	114[A]	2,375[B]	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.324 J	0.448 J	0.592	0.337 J
Copper	ug/L	12.4[A]	19.2[B]	0.739 J	0.634 J	<0.627	0.657 J
Iron	ug/L	n/v	n/v	171	405	435	269
Lead	ug/L	4.88[A]	125[B]	0.295 U*	0.449 U*	0.564 U*	0.248 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,210	4,060	4,410	4,380
Manganese	ug/L	n/v	n/v	96.9	101	112	92.2
Mercury	ug/L	0.77[A]	1.4[B]	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.336	0.365 J	0.473 J	<0.336
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	0.556 U*	<0.148
Vanadium	ug/L	27[A]	79[B]	1.21	1.71	1.83	1.12
Zinc	ug/L	159[A]	159[B]	<3.22	<3.22	<3.22	<3.22
Dissolved Metals							
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.552 J	0.673 J	0.609 J	0.663 J
Barium	ug/L	n/v	n/v	34.3	35.6	34.8	35.7
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	46.3 J	91.6 U*	87.5 U*	50.8 J
Cadmium	ug/L	0.925[C]	2.47[D]	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	n/v	56,600	54,200	54,600	55,900
Chromium	ug/L	97.6[C]	751[D]	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.170 J	0.172 J	0.163 J	0.260 J
Copper	ug/L	11.9[C]	18.5[D]	<0.627	<0.627	<0.627	0.658 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	123
Lead	ug/L	3.62[C]	93.0[D]	<0.128	<0.128	<0.128	0.158 J
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,400	4,300	4,410	4,490
Manganese	ug/L	n/v	n/v	20.3	19.8	19.8	53.0
Mercury	ug/L	0.77[C]	1.4[D]	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	n/v	n/v	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.336	<0.336	<0.336	<0.336
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	0.454 U*	0.198 U*	<0.148
Vanadium	ug/L	n/v	n/v	1.01	1.06	1.07	1.14
Zinc	ug/L	157[C]	156[D]	<3.22	<3.22	<3.22	<3.22
Radiological Parameters							
Radium-226	pCi/L	n/v	n/v	0.0779 +/-(0.104)U	0.125 +/-(0.107)U	0.0519 +/-(0.0957)U	0.0963 +/-(0.105)U
Radium-228	pCi/L	n/v	n/v	0.678 +/-(0.392)U*	-0.0552 +/-(0.341)U	0.499 +/-(0.387)U	0.656 +/-(0.390)U*
Radium-226+228	pCi/L	3[A]	3[B]	0.756 +/-(0.406)U*	0.125 +/-(0.357)U	0.551 +/-(0.399)U	0.752 +/-(0.404)U*
Anions							
Chloride	mg/L	230[A]	860[B]	5.30 J	5.24	5.27	5.39
Fluoride	mg/L	2.7[A]	9.8[B]	0.0497 J	0.0546 J	0.0493 J	0.0509 J
Sulfate	mg/L	n/v	n/v	7.88 J	7.35	7.45	8.04
General Chemistry							
Hardness (as CaCO3)	mg/L	n/v	n/v	155	154	154	155
Total Dissolved Solids	mg/L	n/v	n/v	181 J	162	170	178
Total Suspended Solids	mg/L	n/v	n/v	13.7 J	32.4 J	63.6 J	11.2

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC04						
Sample Date				29-Nov-18	29-Nov-18	29-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC04-CC-SUR-20181129	CUF-STR-WC04-RB-SUR-20181129	CUF-STR-DUP02-20181129	CUF-STR-WC04-CC-MID-20190813	CUF-STR-WC04-LB-SUR-20190813	CUF-STR-WC04-RB-SUR-20190813	CUF-STR-WC04-RB-SUR-20191205
Parent Sample ID						CUF-STR-WC04-RB-SUR-20181129				
Sample Depth				0.2 m	0.6 m	0.6 m	0.6 m	0.2 m	0.3 m	0.3 m
Sample Type		Wells Creek (Hardness = 140 mg/L)		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Chronic	Acute	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
Total Metals										
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.453 J	0.427 J	0.39 J	0.876 U*	1.33 U*	1.04 U*	0.396 J
Barium	ug/L	220[A]	2,000[B]	30.7	28.3	28.9	46.1 U*	62.6	46.6	32.0
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	82.4	68.9 J	64.7 U*	92.4	148	188	61.3 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	58,700	58,300	55,100	53,700	52,300	57,500	56,700
Chromium	ug/L	114[A]	2,375[B]	2 U*	1.71 U*	2.07 U*	<1.53	3.16 U*	<1.53	1.91 U*
Cobalt	ug/L	19[A]	120[B]	0.142 U*	0.152 U*	0.135 U*	0.410 J	0.756	0.407 J	0.206 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	<1.3	0.776 U*	0.879 U*	0.974 U*	<0.627
Iron	ug/L	n/v	n/v	185	174 J	240 J	484	973	503	168
Lead	ug/L	4.88[A]	125[B]	0.135 J	<0.094	0.098 J	0.442 J	0.889 J	0.418 J	0.156 U*
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,010	5,000	4,490	5,180	5,010	6,170	4,940
Manganese	ug/L	n/v	n/v	101	104	100	217	440	250	60.4
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	<0.0653	0.154 U*	0.159 U*	0.148 U*	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	<0.474	<0.610	<0.610	0.820 J	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	<0.312	0.552 U*	0.915 U*	0.672 U*	<0.336
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.21 U*	1.05 U*	1.55 U*	2.02 U*	2.71 U*	2.22 U*	1.38 U*
Zinc	ug/L	159[A]	159[B]	<2.42	<2.42	2.89 J	5.84 U*	6.51 U*	5.31 U*	3.91 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.371 J	0.377 J	0.338 J	0.708 J	1.02	0.894 J	0.377 J
Barium	ug/L	n/v	n/v	29.1	28.4	30.7	35.5	31.2	34.4	30.6
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.057	<0.182	<0.182	0.305 J	<0.182
Boron	ug/L	n/v	n/v	76.6 J	71.2 J	69.5 U*	99.6	159	222	62.1 U*
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	60,000	59,200	60,200	54,100	53,300	57,000	56,500
Chromium	ug/L	97.6[C]	751[D]	1.59 U*	1.59 U*	1.65 U*	<1.53	1.76 U*	<1.53	1.55 J
Cobalt	ug/L	n/v	n/v	0.125 J	0.124 J	0.123 J	0.118 J	0.129 J	0.189 J	0.163 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<1.3	<1.3	<0.627	0.632 U*	0.694 U*	<0.627
Iron	ug/L	n/v	n/v	25.8 J	29.1 J	38.7 J	<19.5	30.5 U*	<19.5	19.8 U*
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,130	5,070	4,910	5,240	5,090	6,130	4,950 J
Manganese	ug/L	n/v	n/v	101	102	108	6.40	51.7	31.1	55.7
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	<0.474	<0.610	<0.610	0.872 J	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.312	<0.312	<0.312	<0.336	<0.336	<0.336	<0.336
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.063	<0.148	<0.148	0.191 J	<0.148
Vanadium	ug/L	n/v	n/v	0.985 J	1.03	1.4	1.37	1.87	1.51	1.13
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	2.58 J	3.75 U*	<3.22	3.38 U*	3.40 U*
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	0.0540 +/-(0.0552)U	0.0151 +/-(0.0511)U	-0.00939 +/-(0.0375)U	-0.0681 +/-(0.0788)U	0.0709 +/-(0.101)U	0.0116 +/-(0.0971)U	0.130 +/-(0.120)U
Radium-228	pCi/L	n/v	n/v	0.276 +/-(0.233)U	0.0480 +/-(0.166)U	0.330 +/-(0.251)U	0.00977 +/-(0.258)U	0.0656 +/-(0.266)U	0.388 +/-(0.355)U	0.0308 +/-(0.328)U
Radium-226+228	pCi/L	3[A]	3[B]	0.330 +/-(0.239)U	0.0631 +/-(0.174)U	0.330 +/-(0.254)U	0.00977 +/-(0.270)U	0.136 +/-(0.285)U	0.400 +/-(0.368)U	0.161 +/-(0.349)U
Anions										
Chloride	mg/L	230[A]	860[B]	7.25	6.89	6.79	6.29	9.10	10.1	6.20
Fluoride	mg/L	2.7[A]	9.8[B]	0.0700 J	0.0696 J	0.0723 J	0.0439 J	0.0407 J	0.105	0.0539 J
Sulfate	mg/L	n/v	n/v	12.3	12.1	11.9	9.42	12.1	33.8	16.2
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	167	166	156	155	151	169	162
Total Dissolved Solids	mg/L	n/v	n/v	193	195	186	185	204	229	154
Total Suspended Solids	mg/L	n/v	n/v	2.60	1.10	1.40	14.2 J	50.7	15.3 J	6.00

See last page for notes.

Sample Location				WC05						
Sample Date		Ecological Surface Water Screening Levels		29-Nov-18	29-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC05-CC-SUR-20181129	CUF-STR-WC05-RB-SUR-20181129	CUF-STR-WC05-CC-MID-20190813	CUF-STR-DUP02-20190813	CUF-STR-WC05-LB-SUR-20190813	CUF-STR-WC05-RB-SUR-20190813	CUF-STR-WC05-RB-SUR-20191205
Parent Sample ID							CUF-STR-WC05-CC-MID-20190813			
Sample Depth				0.1 m	0.6 m	0.6 m	0.6 m	0.2 m	0.2 m	0.3 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.381 J	0.47 J	0.886 U*	0.872 U*	1.94 U*	1.03 U*	0.361 J
Barium	ug/L	220[A]	2,000[B]	28.9	28.6	40.9 U*	42.6 U*	55.7	42.5 U*	31.1
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	155	67 J	136	131	158	127	54.6 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	63,200	59,200	55,500	56,200	55,500	54,300	55,000
Chromium	ug/L	114[A]	2,375[B]	1.44 U*	1.9 U*	<1.53	<1.53	2.31 U*	<1.53	1.60 U*
Cobalt	ug/L	19[A]	120[B]	0.159 U*	0.169 U*	0.481 J	0.450 J	1.10	0.481 J	0.182 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	0.648 U*	0.651 U*	1.30 U*	0.697 U*	<0.627
Iron	ug/L	n/v	n/v	197	181	589	562	1,590	618	125
Lead	ug/L	4.88[A]	125[B]	0.12 J	<0.094	0.560 J	0.553 J	1.39	0.649 J	0.149 U*
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,320	5,050	5,210	5,300	5,410	5,190	4,740
Manganese	ug/L	n/v	n/v	139	101	327	329	656	308	57.0
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	0.197 U*	0.130 U*	0.179 U*	0.426 U*	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	0.496 U*	0.420 U*	1.46 U*	0.634 U*	<0.336
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	0.98 U*	1.18 U*	2.05 U*	1.91 U*	3.84 U*	2.17 U*	1.23 U*
Zinc	ug/L	159[A]	159[B]	<2.42	<2.42	4.65 U*	4.10 U*	8.37 U*	4.82 U*	3.68 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.351 J	0.405 J	1.10	0.652 J	1.33	0.784 J	0.453 J
Barium	ug/L	n/v	n/v	28.2	28.5	34.8	32.1	27.7	30.3	34.1
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	147	68.6 J	130	127	158	123	58.3 U*
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	0.243 J	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	61,600	59,700	56,900	53,400	54,100	51,500	55,000
Chromium	ug/L	97.6[C]	751[D]	1.45 U*	1.47 U*	1.53 U*	<1.53	<1.53	<1.53	2.08
Cobalt	ug/L	n/v	n/v	0.14 J	0.135 J	0.341 J	0.134 J	0.178 J	0.122 J	0.167 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	1.30 U*
Iron	ug/L	n/v	n/v	45.2 J	33.6 J	22.4 U*	<19.5	36.3 U*	<19.5	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	0.266 J	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,160	5,140	5,300	5,050	5,260	4,930	4,850 J
Manganese	ug/L	n/v	n/v	129	101	133	123	149	47.7	51.9
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	0.612 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.312	<0.312	0.397 J	<0.336	<0.336	<0.336	0.358 J
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	0.483 J	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	0.937 J	0.952 J	1.64	1.29	1.84	1.35	1.35
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	5.15 U*	3.39 U*	<3.22	8.35 U*	3.86 U*
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	0.0877 +/-(0.0636)	0.00470 +/-(0.0444)U	0.101 +/-(0.0948)U	0.0536 +/-(0.0881)U	0.0665 +/-(0.110)U	0.0471 +/-(0.0793)U	0.129 +/-(0.0851)
Radium-228	pCi/L	n/v	n/v	0.209 +/-(0.210)U	0.328 +/-(0.235)U	0.239 +/-(0.321)U	0.269 +/-(0.278)U	-0.0717 +/-(0.325)U	0.103 +/-(0.274)U	0.363 +/-(0.250)U
Radium-226+228	pCi/L	3[A]	3[B]	0.297 +/-(0.219)J	0.333 +/-(0.239)U	0.340 +/-(0.335)U	0.323 +/-(0.292)U	0.0665 +/-(0.343)U	0.150 +/-(0.285)U	0.492 +/-(0.264)J
Anions										
Chloride	mg/L	230[A]	860[B]	10.9	7.42	7.25	7.11	8.78	7.03	6.27
Fluoride	mg/L	2.7[A]	9.8[B]	0.0698 J	0.0801 J	0.0415 J	0.0478 J	0.0445 J	0.0393 J	0.0551 J
Sulfate	mg/L	n/v	n/v	17.9	12.6	11.2	11.0	10.5	9.98	16.0
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	180	169	160	162	161	157	157
Total Dissolved Solids	mg/L	n/v	n/v	220	185	191	189	198	179	161
Total Suspended Solids	mg/L	n/v	n/v	2.20	1.10	22.6 J	23.1 J	53.4	24.3 J	4.60

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC06				
Sample Date				28-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC06-RB-SUR-20181128	CUF-STR-WC06-CC-SUR-20190813	CUF-STR-WC06-LB-SUR-20190813	CUF-STR-WC06-RB-SUR-20190813	CUF-STR-WC06-RB-SUR-20191205
Parent Sample ID								
Sample Depth				0.6 m	0.1 m	0.1 m	0.5 m	0.5 m
Sample Type		Wells Creek (Hardness = 140 mg/L)		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Chronic	Acute	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
Total Metals								
Antimony	ug/L	190[A]	900[B]	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.353 U*	1.36 U*	1.73 U*	1.28 U*	0.417 J
Barium	ug/L	220[A]	2,000[B]	29.4	49.4	63.5	45.1	31.7
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	93.2	137	132	148	61.3 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	59,200	57,000	55,500	56,200	56,200
Chromium	ug/L	114[A]	2,375[B]	1.13 U*	1.61 U*	1.76 U*	<1.53	1.91 U*
Cobalt	ug/L	19[A]	120[B]	0.139 U*	0.577	1.10	0.508	0.165 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	1.14 U*	2.06 U*	0.909 U*	<0.627
Iron	ug/L	n/v	n/v	169 J	615	1,530	512	167
Lead	ug/L	4.88[A]	125[B]	<0.094	0.697 J	1.31	0.574 J	0.156 U*
Lithium	ug/L	440[A]	910[B]	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,100	5,760	5,590	5,620	4,760
Manganese	ug/L	n/v	n/v	117	301	400	270	58.2
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.610	0.646 J	0.622 J	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	0.832 J	1.46	0.759 J	0.403 J
Selenium	ug/L	3.1[A]	20[B]	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	<0.899	2.77 U*	3.63 U*	2.44 U*	1.31 U*
Zinc	ug/L	159[A]	159[B]	2.76 J	5.76 U*	21.7 U*	8.46 U*	3.93 U*
Dissolved Metals								
Antimony	ug/L	n/v	n/v	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.363 U*	1.07	1.24	1.03	0.402 J
Barium	ug/L	n/v	n/v	28.9	35.4	36.7	35.1	32.5
Beryllium	ug/L	n/v	n/v	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	91.7	134	130	140	62.9 U*
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	59,300	55,700	53,900	55,300	56,800
Chromium	ug/L	97.6[C]	751[D]	1.26 U*	<1.53	<1.53	<1.53	1.97 J
Cobalt	ug/L	n/v	n/v	0.121 J	0.142 J	0.140 J	0.146 J	0.146 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<0.627	1.04 U*	<0.627	<0.627
Iron	ug/L	n/v	n/v	23.3 J	<19.5	36.6 J	19.8 J	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,130	5,620	5,430	5,520	4,890 J
Manganese	ug/L	n/v	n/v	111	10.0	30.1	8.99	51.9
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	0.115 J	0.108 J	0.139 J	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.610	<0.610	0.641 J	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.312	0.367 J	0.349 J	0.358 J	<0.336
Selenium	ug/L	n/v	n/v	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.148	<0.148	<0.148	0.159 J
Vanadium	ug/L	n/v	n/v	0.923 J	1.80	2.12	1.62	1.20
Zinc	ug/L	157[C]	156[D]	<2.42	4.59 J	3.63 J	3.54 J	3.46 U*
Radiological Parameters								
Radium-226	pCi/L	n/v	n/v	0.0162 +/-(0.0419)U	0.0463 +/-(0.108)U	0.137 +/-(0.159)U	0.0445 +/-(0.0871)U	-0.0466 +/-(0.0622)U
Radium-228	pCi/L	n/v	n/v	-0.139 +/-(0.185)U	0.237 +/-(0.261)U	-0.0566 +/-(0.377)U	0.197 +/-(0.229)U	0.0133 +/-(0.239)U
Radium-226+228	pCi/L	3[A]	3[B]	0.0162 +/-(0.190)U	0.283 +/-(0.282)U	0.137 +/-(0.409)U	0.241 +/-(0.245)U	0.0133 +/-(0.247)U
Anions								
Chloride	mg/L	230[A]	860[B]	8.33	8.26	7.17	8.77	6.63
Fluoride	mg/L	2.7[A]	9.8[B]	0.0810 J	0.0753 J	0.0746 J	0.0812 J	0.0571 J
Sulfate	mg/L	n/v	n/v	14.4	10.4	9.95	11.3	15.7
General Chemistry								
Hardness (as CaCO3)	mg/L	n/v	n/v	169	166	162	163	160
Total Dissolved Solids	mg/L	n/v	n/v	178	197	196	193	169
Total Suspended Solids	mg/L	n/v	n/v	1.00	31.2	59.8	20.4	4.40

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC07								
Sample Date				28-Nov-18	28-Nov-18	28-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC07-LB-SUR-20181128	CUF-STR-WC07-RB-SUR-20181128	CUF-STR-WC07-RB-BOT-20181128	CUF-STR-WC07-CC-SUR-20190813	CUF-STR-WC07-CC-BOT-20190813	CUF-STR-WC07-LB-SUR-20190813	CUF-STR-WC07-RB-SUR-20190813	CUF-STR-DUP01-20190813	CUF-STR-WC07-RB-SUR-20191205
Parent Sample ID											CUF-STR-WC07-RB-SUR-20190813	
Sample Depth				0.6 m	0.5 m	1.5 m	0.5 m	1.8 m	0.3 m	0.5 m	0.5 m	0.5 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute									
Total Metals												
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.365 U*	0.459 U*	0.509 U*	1.01 U*	2.01 U*	1.26 U*	1.07 U*	1.26 U*	0.433 J
Barium	ug/L	220[A]	2,000[B]	28	28.7	32.2	35.4	48.3	38.3	41.8	50.7	30.7
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.057	0.225 U*	0.863 U*	0.266 U*	0.219 U*	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	77.8 J	79.9 J	78 J	122	135	126	135	134	59.1 U*
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	0.538 J	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	55,500	56,600	57,100	50,200	52,400	51,000	53,600	54,900	55,400
Chromium	ug/L	114[A]	2,375[B]	1.26 U*	1.91 U*	1.83 U*	<1.53	<1.53	<1.53	<1.53	2.28 U*	<1.53
Cobalt	ug/L	19[A]	120[B]	0.164 U*	0.145 U*	0.155 U*	0.362 J	1.03	0.427 J	0.470 J	0.548	0.195 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	<1.3	<0.627	1.25 U*	**12.5[A]**	0.929 U*	1.32 U*	<0.627
Iron	ug/L	n/v	n/v	160 J	169 J	161 J	304	770	482	535 J	708 J	142
Lead	ug/L	4.88[A]	125[B]	0.189 J	<0.094	<0.094	0.436 J	1.45	0.488 J	0.595 J	0.617 J	0.176 U*
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,940	5,030	5,130	5,120	5,280	5,210	5,490	5,540	4,810
Manganese	ug/L	n/v	n/v	107	107	107	245	411	252	291	297	44.0
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	<0.474	<0.610	1.02 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	<0.312	0.778 J	1.89	1.02	1.49	0.930 J	0.545 J
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<0.813	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.121	<0.177	0.274 J	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.063	<0.148	1.17 U*	<0.148	<0.148	<0.148	0.261 U*
Vanadium	ug/L	27[A]	79[B]	0.948 U*	1.22 U*	1.27 U*	1.42 U*	2.59 U*	1.94 U*	2.03 U*	3.02 U*	1.13 U*
Zinc	ug/L	159[A]	159[B]	<2.42	3.5 J	<2.42	3.78 U*	5.19 U*	11.9 U*	6.74 U*	5.34 U*	4.09 U*
Dissolved Metals												
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<1.12	1.53 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	<0.323	0.393 U*	0.42 U*	1.04	0.953 J	0.933 J	0.835 J	0.970 J	0.476 J
Barium	ug/L	n/v	n/v	33.7	27.8	29.2	27.7	41.5	34.7	28.8	36.1	29.9
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.057	0.375 U*	0.197 U*	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	76.7 J	78.4 J	78.6 J	133	130	128	130	132	56.7 U*
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.150 J
Calcium	ug/L	n/v	n/v	58,100	57,100	58,400	52,100	52,900	50,200	53,600	54,600	53,400
Chromium	ug/L	97.6[C]	751[D]	1.62 U*	1.54 U*	1.89 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.15 J	0.124 J	0.137 J	0.139 J	0.424 J	0.268 J	<0.0750	0.129 J	0.162 J
Copper	ug/L	11.9[C]	18.5[D]	1.59 J	<1.3	<1.3	<0.627	0.724 U*	<0.627	<0.627	0.706 U*	<0.627
Iron	ug/L	n/v	n/v	25.3 J	22.9 J	30.2 J	<19.5	485	259	<19.5	20.0 J	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	<0.094	<0.128	0.531 J	0.278 J	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	3 J	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,050	5,030	5,210	5,300	5,340	5,210	5,490	5,440	4,720 J
Manganese	ug/L	n/v	n/v	110	104	105	2.88 J	285	154	11.0	10.9	36.2
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.0653	<0.101	0.196 J	<0.101	0.168 J	0.104 J	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	<0.474	1.53 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	69.1[C]	622[D]	<0.312	<0.312	0.407 J	0.452 J	1.16	0.977 J	0.510 J	<0.336	0.438 J
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<0.813	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.063	1.07	<0.148	<0.148	<0.148	<0.148	0.341 J
Vanadium	ug/L	n/v	n/v	1.03	1	1.1	1.11	1.85	1.91	1.08	1.80	1.22
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	<2.42	<3.22	4.38 J	3.71 J	<3.22	<3.22	3.28 U*
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	0.0161 +/-(0.0545)U	0.0486 +/-(0.0548)U	0.0396 +/-(0.0546)U	0.0410 +/-(0.0910)U	0.0253 +/-(0.0959)U	-0.00896 +/-(0.0850)U	0.0570 +/-(0.0991)U	0.117 +/-(0.133)U	0.0713 +/-(0.0643)U
Radium-228	pCi/L	n/v	n/v	0.138 +/-(0.242)U	-0.0268 +/-(0.206)U	0.125 +/-(0.234)U	0.289 +/-(0.277)U	0.331 +/-(0.261)U	0.267 +/-(0.248)U	0.360 +/-(0.258)U	-0.304 +/-(0.367)U	0.186 +/-(0.249)U
Radium-226+228	pCi/L	3[A]	3[B]	0.154 +/-(0.248)U	0.0486 +/-(0.213)U	0.164 +/-(0.240)U	0.330 +/-(0.292)U	0.356 +/-(0.278)U	0.267 +/-(0.262)U	0.416 +/-(0.276)U	0.117 +/-(0.390)U	0.258 +/-(0.257)U
Anions												
Chloride	mg/L	230[A]	860[B]	7.58	7.52	7.44	8.29	8.43	8.26	8.82	7.42	6.18
Fluoride	mg/L	2.7[A]	9.8[B]	0.0715 J	0.0750 J	0.0709 J	0.0753 J	0.0769 J	0.0770 J	0.0803 J	0.0741 J	0.0490 J
Sulfate	mg/L	n/v	n/v	14.1	13.9	14.0	10.7	11.1	10.6	11.5	10.5	15.5
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	159	162	164	146	153	149	156	160	158
Total Dissolved Solids	mg/L	n/v	n/v	175	191	187	194	196	195	195	199	155
Total Suspended Solids	mg/L	n/v	n/v	0.700	<0.500	1.20	21.4	41.6	20.2	22.2	21.6	2.90

See last page for notes.

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Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location				WC08								
Sample Date		Ecological Surface Water Screening Levels		28-Nov-18	28-Nov-18	28-Nov-18	28-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC08-LB-SUR-20181128	CUF-STR-WC08-LB-BOT-20181128	CUF-STR-DUP01-20181128	CUF-STR-WC08-RB-SUR-20181128	CUF-STR-WC08-CC-SUR-20190813	CUF-STR-WC08-CC-BOT-20190813	CUF-STR-WC08-LB-MID-20190813	CUF-STR-WC08-RB-SUR-20190813	CUF-STR-WC08-RB-SUR-20191205
Parent Sample ID						CUF-STR-WC08-LB-SUR-20181128						
Sample Depth				0.5 m	1.2 m	0.5 m	0.75 m	0.5 m	1.9 m	0.6 m	0.5 m	0.5 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute									
Total Metals												
Antimony	ug/L	190^{A}	900^{B}	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150^{A}	340^{B}	0.591 U*	0.442 U*	0.49 U*	0.524 U*	1.04 U*	1.11 U*	1.15 U*	1.09 U*	0.413 J
Barium	ug/L	220^{A}	2,000^{B}	28.7	29.5	29.1	27.5	35.7	48.3	37.5	37.8	31.0
Beryllium	ug/L	11^{A}	93^{B}	<0.057	<0.057	<0.057	<0.057	0.197 U*	0.252 U*	0.233 U*	0.221 U*	<0.182
Boron	ug/L	7,200^{A}	34,000^{B}	76.4 J	83.8	72.9 J	77.6 J	122	125	131	134	61.9 J
Cadmium	ug/L	1.03^{A}	2.65^{B}	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000^{A}	n/v	52,600 J	58,000	57,900	53,800	48,900	55,000	51,600	52,400	55,000
Chromium	ug/L	114^{A}	2,375^{B}	1.99 U*	1.54 U*	2.02 U*	1.84 U*	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	19^{A}	120^{B}	0.236 U*	0.234 U*	0.151 U*	0.184 U*	0.288 J	0.605	0.330 J	0.326 J	0.165 U*
Copper	ug/L	12.4^{A}	19.2^{B}	<1.3	<1.3	<1.3	<1.3	<0.627	0.666 U*	<0.627	0.670 U*	0.637 J
Iron	ug/L	n/v	n/v	138 J	154 J	148 J	147 J	236	596	310	332	106
Lead	ug/L	4.88^{A}	125^{B}	<0.094	<0.094	<0.094	<0.094	0.393 J	0.718 J	0.423 J	0.387 J	0.132 U*
Lithium	ug/L	440^{A}	910^{B}	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,740	5,240	5,220	4,790	4,970	5,450	5,240	5,370	4,750
Manganese	ug/L	n/v	n/v	91.5 J	101	101	96.4	231	360	239	240	48.1
Mercury	ug/L	0.77^{A}	1.4^{B}	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800^{A}	7,200^{B}	0.49 J	<0.474	<0.474	<0.474	<0.610	0.645 J	<0.610	<0.610	<0.610
Nickel	ug/L	69.3^{A}	624^{B}	0.312 UJ	<0.312	<0.312	<0.312	0.601 J	0.950 J	0.712 J	1.02	<0.336
Selenium	ug/L	3.1^{A}	20^{B}	<0.813	<0.813	<0.813	<0.813	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51
Silver	ug/L	n/v	6.75^{B}	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6^{A}	54^{B}	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27^{A}	79^{B}	1.59 U*	1.09 U*	1.28 U*	1.19 U*	1.31 U*	2.12 U*	1.56 U*	1.90 U*	1.12 U*
Zinc	ug/L	159^{A}	159^{B}	<2.42	<2.42	<2.42	<2.42	<3.22	5.61 U*	3.45 U*	3.80 U*	3.44 U*
Dissolved Metals												
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150^{C}	340^{D}	0.344 J	0.431 U*	0.34 U*	0.392 U*	0.855 J	0.937 J	0.772 J	0.793 J	0.373 J
Barium	ug/L	n/v	n/v	33.6	28.6	27.6	28.7	29.7	28.4	27.3	30.2	30.9
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.057	<0.057	0.302 U*	0.190 U*	0.242 U*	0.190 U*	<0.182
Boron	ug/L	n/v	n/v	82.3	81.5	71.9 J	74.7 J	131	119	123	141	61.2 J
Cadmium	ug/L	0.925^{C}	2.47^{D}	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	59,300 J	58,300	57,600	53,500	52,500	50,300	47,400	50,700	55,200
Chromium	ug/L	97.6^{C}	751^{D}	2.09 U*	1.56 U*	1.38 U*	1.11 U*	<1.53	<1.53	<1.53	<1.53	1.98 J
Cobalt	ug/L	n/v	n/v	0.366 J	0.163 J	0.118 J	0.133 J	0.0970 J	0.104 J	0.104 J	0.0930 J	0.132 J
Copper	ug/L	11.9^{C}	18.5^{D}	1.46 J	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	54.6	28.7 J	20.7 J	37.7 J	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	3.62^{C}	93.0^{D}	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	3.76 J	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	5,110	5,270	5,150	4,820	5,320	5,030	4,830	5,130	4,850
Manganese	ug/L	n/v	n/v	103 J	94.8	97.7	91.7	2.37 J	48.1	4.25 J	26.5	42.2
Mercury	ug/L	0.77^{C}	1.4^{D}	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	0.89 J	<0.474	<0.474	<0.474	<0.610	<0.610	<0.610	0.791 J	<0.610
Nickel	ug/L	69.1^{C}	622^{D}	2.44 J	<0.312	0.312 UJ	<0.312	0.398 J	0.584 J	0.379 J	0.355 J	<0.336
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<0.813	<0.813	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51
Silver	ug/L	n/v	5.74^{D}	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.47	1.14	0.956 J	<0.899	1.22	1.23	1.10	1.14	1.36
Zinc	ug/L	157^{C}	156^{D}	3.14 J	<2.42	<2.42	<2.42	<3.22	<3.22	<3.22	<3.22	3.79 U*
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	0.0157 +/-(0.0416)U	0.0415 +/-(0.0511)U	0.0114 +/-(0.0503)U	0.0704 +/-(0.0658)U	0.155 +/-(0.136)U	-0.103 +/-(0.0916)U	0.120 +/-(0.112)U	0.0277 +/-(0.0924)U	-0.0522 +/-(0.0696)U
Radium-228	pCi/L	n/v	n/v	0.224 +/-(0.225)U	0.126 +/-(0.219)U	0.108 +/-(0.225)U	0.0408 +/-(0.249)U	0.207 +/-(0.252)U	0.214 +/-(0.257)U	0.192 +/-(0.229)U	0.201 +/-(0.230)U	-0.0332 +/-(0.281)U
Radium-226+228	pCi/L	3^{A}	3^{B}	0.240 +/-(0.229)U	0.168 +/-(0.225)U	0.119 +/-(0.231)U	0.111 +/-(0.258)U	0.362 +/-(0.286)U	0.214 +/-(0.273)U	0.312 +/-(0.255)U	0.229 +/-(0.248)U	0.000 +/-(0.289)U
Anions												
Chloride	mg/L	230^{A}	860^{B}	7.52	7.33	7.45	7.34	8.86	8.59	8.91	8.85	6.38
Fluoride	mg/L	2.7^{A}	9.8^{B}	0.0889 J	0.0717 J	0.0801 J	0.0710 J	0.0830 J	0.0817 J	0.0825 J	0.0831 J	0.0469 J
Sulfate	mg/L	n/v	n/v	14.5	14.0	13.7	14.0	11.7	11.3	11.9	11.7	15.6
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	151	166	166	154	143	160	150	153	157
Total Dissolved Solids	mg/L	n/v	n/v	191	182	190	184	191	181	200	190	157
Total Suspended Solids	mg/L	n/v	n/v	0.900	<1.00	0.800	0.500	19.6	32.0	20.2	17.8	3.00

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC09									
Sample Date				28-Nov-18	28-Nov-18	28-Nov-18	28-Nov-18	28-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	13-Aug-19	5-Dec-19
Sample ID				CUF-STR-WC09-CC-SUR-20181128	CUF-STR-WC09-CC-BOT-20181128	CUF-STR-WC09-LB-SUR-20181128	CUF-STR-WC09-LB-BOT-20181128	CUF-STR-WC09-RB-SUR-20181128	CUF-STR-WC09-CC-SUR-20190813	CUF-STR-WC09-CC-BOT-20190813	CUF-STR-WC09-LB-MID-20190813	CUF-STR-WC09-RB-SUR-20190813	CUF-STR-WC09-RB-SUR-20191205
Parent Sample ID													
Sample Depth				0.5 m	2 m	0.5 m	1.9 m	0.5 m	0.5 m	2.4 m	0.6 m	0.5 m	0.5 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute										
Total Metals													
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	<0.323	<0.323	0.325 J	<0.323	<0.323	1.17 U*	1.45 U*	1.37 U*	0.988 U*	0.389 J
Barium	ug/L	220[A]	2,000[B]	32.4	32.1	31.4	30.5	30.9	34.5	51.8	37.2	36.9	30.5
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	0.316 U*	<0.182	0.233 U*	<0.182
Boron	ug/L	7,200[A]	34,000[B]	48.6 J	74 J	52.6 J	60.2 J	62.4 J	147	151	155	141	53.7 J
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	56,400	55,300	56,000	55,700	55,400	49,000	51,700	51,500	48,800	54,200
Chromium	ug/L	114[A]	2,375[B]	0.957 U*	0.962 U*	1.08 U*	1.05 U*	0.835 U*	2.18 U*	<1.53	2.01 U*	<1.53	1.95 U*
Cobalt	ug/L	19[A]	120[B]	0.097 U*	0.165 U*	0.101 U*	0.115 U*	0.158 U*	0.312 J	0.573	0.469 J	0.380 J	0.190 U*
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	<1.3	<1.3	<1.3	1.12 U*	<0.627	1.41 U*	<0.627	<0.627
Iron	ug/L	n/v	n/v	171	147	154	154	149	375	498	602	324	133
Lead	ug/L	4.88[A]	125[B]	<0.094	<0.094	<0.094	0.124 J	<0.094	0.327 J	0.586 J	0.523 J	0.408 J	0.139 U*
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,190	4,410	4,410	4,400	4,330	5,330	5,540	5,690	5,580	4,660
Manganese	ug/L	n/v	n/v	91.8	92.1	88.4	87	98.8	204	312	226	222	43.1
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	<0.474	<0.474	<0.474	0.671 J	1.26 J	0.834 J	0.796 J	<0.610
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	<0.312	<0.312	<0.312	0.596 J	0.760 J	0.921 J	0.737 J	<0.336
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	1.51 UJ	<1.51	1.51 UJ	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	1.42	<0.148	0.263 U*	<0.148
Vanadium	ug/L	27[A]	79[B]	0.953 U*	1.43 U*	0.938 U*	1.05 U*	1.02 U*	2.62 U*	1.54 U*	3.05 U*	1.39 U*	1.36 U*
Zinc	ug/L	159[A]	159[B]	<2.42	<2.42	<2.42	<2.42	<2.42	4.03 U*	3.91 U*	4.28 U*	3.39 U*	3.33 U*
Dissolved Metals													
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	<0.323	<0.323	<0.323	<0.323	<0.323	1.04	1.08	1.07	0.841 J	0.363 J
Barium	ug/L	n/v	n/v	30.1	30.4	31.2	30.7	30.5	26.8	44.2	27.8	26.3	29.4
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	0.242 U*	<0.182	0.223 U*	<0.182
Boron	ug/L	n/v	n/v	69.3 J	61.5 J	49.3 J	54.9 J	59 J	151	152	155	144	52.3 J
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	55,500	53,700	56,300	57,200	56,700	50,500	52,000	51,100	47,600	54,000
Chromium	ug/L	97.6[C]	751[D]	0.943 U*	0.8 U*	0.993 U*	0.976 U*	0.989 U*	1.85 U*	<1.53	2.12 U*	<1.53	1.65 J
Cobalt	ug/L	n/v	n/v	0.127 J	0.121 J	<0.075	0.091 J	0.115 J	0.0860 J	0.305 J	0.0950 J	0.0900 J	0.114 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<1.3	<1.3	<1.3	<1.3	0.726 U*	1.33 U*	0.982 U*	2.51 U*	<0.627
Iron	ug/L	n/v	n/v	40.5 J	23.9 J	48.2 J	35.1 J	24 J	<19.5	254	<19.5	<19.5	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	0.325 J	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,550	4,210	4,300	4,500	4,390	5,540	5,570	5,610	5,430	4,710
Manganese	ug/L	n/v	n/v	80.4	79.6	82.9	84	98.9	<1.35	208	6.35	12.5	37.8
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	<0.474	<0.474	<0.474	0.697 J	0.769 J	0.802 J	0.689 J	<0.610
Nickel	ug/L	69.1[C]	622[D]	0.32 J	<0.312	<0.312	<0.312	<0.312	<0.336	1.06	0.369 J	0.617 J	<0.336
Selenium	ug/L	n/v	n/v	0.813 UJ	0.813 UJ	0.813 UJ	0.813 UJ	0.813 UJ	<1.51	1.51 UJ	<1.51	1.51 UJ	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	0.394 J	<0.148	0.172 J	<0.148
Vanadium	ug/L	n/v	n/v	0.96 J	1.08	<0.899	0.91 J	1.01	2.05	1.21	2.18	1.04	1.20
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	<2.42	<2.42	<2.42	<3.22	<3.22	3.31 J	<3.22	3.81 U*
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	0.0663 +/-(0.0545)U	-0.00378 +/-(0.0397)U	0.0447 +/-(0.0551)U	0.0451 +/-(0.0512)U	0.0466 +/-(0.0514)U	0.0473 +/-(0.0843)U	-0.0208 +/-(0.0845)U	0.0241 +/-(0.0913)U	0.0596 +/-(0.104)U	0.0223 +/-(0.0598)U
Radium-228	pCi/L	n/v	n/v	0.111 +/-(0.214)U	0.222 +/-(0.244)U	0.272 +/-(0.236)U	0.0648 +/-(0.209)U	0.229 +/-(0.253)U	0.290 +/-(0.263)U	-0.271 +/-(0.223)U	0.0876 +/-(0.263)U	-0.0491 +/-(0.233)U	0.00444 +/-(0.220)U
Radium-226+228	pCi/L	3[A]	3[B]	0.177 +/-(0.221)U	0.222 +/-(0.247)U	0.316 +/-(0.242)U	0.110 +/-(0.215)U	0.276 +/-(0.258)U	0.338 +/-(0.276)U	0.000 +/-(0.238)U	0.112 +/-(0.278)U	0.0596 +/-(0.255)U	0.0268 +/-(0.228)U
Anions													
Chloride	mg/L	230[A]	860[B]	7.24	7.41	7.51	7.38	7.44	8.30	8.61	8.76	8.36	5.51
Fluoride	mg/L	2.7[A]	9.8[B]	0.0936 J	0.0620 J	0.0586 J	0.0940 J	0.0999 J	0.0814 J	0.0790 J	0.0898 J	0.0810 J	0.0493 J
Sulfate	mg/L	n/v	n/v	14.3	14.6	14.1	14.0	14.2	12.8	12.9	14.4	13.1	13.0
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	158	156	158	157	156	144	152	152	145	155
Total Dissolved Solids	mg/L	n/v	n/v	191	192	181	175	190	180	189	181	180	158
Total Suspended Solids	mg/L	n/v	n/v	1.30	1.10	1.30	1.30	1.30	17.4	24.2	27.8	26.0	3.20

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location	Units	Ecological Surface Water Screening Levels		WC10						
Sample Date				28-Nov-18	28-Nov-18	28-Nov-18	13-Aug-19	13-Aug-19	13-Aug-19	13-Aug-19
Sample ID				CUF-STR-WC10-CC-SUR-20181128	CUF-STR-WC10-LB-SUR-20181128	CUF-STR-WC10-RB-SUR-20181128	CUF-STR-WC10-CC-SUR-20190813	CUF-STR-WC10-LB-SUR-20190813	CUF-STR-WC10-LB-BOT-20190813	CUF-STR-WC10-RB-SUR-20190813
Parent Sample ID										
Sample Depth				0.2 m	0.8 m	0.3 m	0.3 m	0.5 m	1.7 m	0.3 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review		Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	<0.323	<0.323	<0.323	1.16 U*	1.08 U*	1.31 U*	1.14 U*
Barium	ug/L	220[A]	2,000[B]	29.9	29.6	30.6	32.9	27.6	38.1	33.3
Beryllium	ug/L	11[A]	93[B]	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	54.4 J	58.9 J	56.2 J	150	166	157	149
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	54,000	53,400	54,600	49,000	40,500	50,900	49,400
Chromium	ug/L	114[A]	2,375[B]	1.03 U*	0.943 U*	1.03 U*	2.06 U*	2.34 U*	2.28 U*	1.85 U*
Cobalt	ug/L	19[A]	120[B]	0.107 U*	0.098 U*	0.101 U*	0.272 J	0.249 J	0.395 J	0.349 J
Copper	ug/L	12.4[A]	19.2[B]	<1.3	<1.3	<1.3	1.18 U*	1.86 U*	1.51 U*	0.935 U*
Iron	ug/L	n/v	n/v	146	146	156	240	306	575	431
Lead	ug/L	4.88[A]	125[B]	<0.094	<0.094	0.118 J	0.307 J	0.286 J	0.496 J	0.410 J
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,190	4,220	4,190	5,420	5,970	5,690	5,550
Manganese	ug/L	n/v	n/v	76	70.5	78.2	197	139	246	215
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.474	<0.474	<0.474	<0.610	0.786 J	0.701 J	0.675 J
Nickel	ug/L	69.3[A]	624[B]	<0.312	<0.312	<0.312	0.519 J	0.679 J	0.794 J	0.673 J
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.02 U*	0.911 U*	1.04 U*	2.45 U*	2.34 U*	2.86 U*	2.53 U*
Zinc	ug/L	159[A]	159[B]	3 J	<2.42	<2.42	3.64 U*	3.99 U*	5.39 U*	4.39 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	<0.323	<0.323	<0.323	1.08	0.984 J	1.12	0.917 J
Barium	ug/L	n/v	n/v	29	28.3	29.1	30.9	23.8	27.0	27.2
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	52.7 J	56.4 J	72.1 J	164	172	162	147
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	54,000	53,200	55,200	53,600	44,600	51,400	48,900
Chromium	ug/L	97.6[C]	751[D]	0.999 U*	1.02 U*	1.04 U*	1.87 U*	2.07 U*	2.44 U*	<1.53
Cobalt	ug/L	n/v	n/v	0.083 J	0.076 J	0.09 J	0.139 J	0.0830 J	0.100 J	0.0840 J
Copper	ug/L	11.9[C]	18.5[D]	<1.3	<1.3	<1.3	1.00 U*	1.32 U*	2.78 U*	<0.627
Iron	ug/L	n/v	n/v	19.5 J	16.6 J	19.4 J	63.9	<19.5	22.4 J	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,210	4,140	4,570	5,940	6,140	5,800	5,500
Manganese	ug/L	n/v	n/v	68.4	63.6	65.7	40.4	<1.35	9.81	22.3
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.474	<0.474	<0.474	0.722 J	0.818 J	0.782 J	0.693 J
Nickel	ug/L	69.1[C]	622[D]	<0.312	<0.312	<0.312	0.435 J	0.391 J	0.469 J	<0.336
Selenium	ug/L	n/v	n/v	0.813 UJ	0.813 UJ	0.813 UJ	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	0.978 J	0.987 J	0.989 J	2.14	2.00	2.42	1.66
Zinc	ug/L	157[C]	156[D]	<2.42	<2.42	<2.42	3.30 J	<3.22	3.99 J	<3.22
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	0.0462 +/-(0.0521)U	0.0367 +/-(0.0409)U	0.0775 +/-(0.0587)U	0.0568 +/-(0.118)U	-0.0654 +/-(0.0854)U	0.00937 +/-(0.118)U	0.0282 +/-(0.0938)U
Radium-228	pCi/L	n/v	n/v	0.101 +/-(0.202)U	-0.0248 +/-(0.192)U	0.349 +/-(0.242)U	0.314 +/-(0.276)U	0.0445 +/-(0.285)U	0.0402 +/-(0.262)U	0.199 +/-(0.322)U
Radium-226+228	pCi/L	3[A]	3[B]	0.147 +/-(0.209)U	0.0367 +/-(0.196)U	0.426 +/-(0.249)U	0.371 +/-(0.300)U	0.0445 +/-(0.298)U	0.0496 +/-(0.287)U	0.227 +/-(0.335)U
Anions										
Chloride	mg/L	230[A]	860[B]	6.83	6.92	7.43	8.25	8.53	8.20	8.73
Fluoride	mg/L	2.7[A]	9.8[B]	0.0649 J	0.0819 J	0.101	0.0820 J	0.0989 J	0.0803 J	0.0910 J
Sulfate	mg/L	n/v	n/v	13.3	13.7	14.5	13.1	18.4	13.3	14.6
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	152	151	154	145	126	151	146
Total Dissolved Solids	mg/L	n/v	n/v	178	187	176	184	172	179	187
Total Suspended Solids	mg/L	n/v	n/v	2.20	0.700	2.00	20.0	12.0	21.6	17.4

See last page for notes.

Table J.1-2 - Surface Stream Analytical Results - Wells Creek
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		WC11				
Sample Date				4-Sep-19	4-Sep-19	4-Sep-19	27-May-20	27-May-20
Sample ID				CUF-STR-WC11-CC-SUR-20190904	CUF-STR-WC11-CC-BOT-20190904	CUF-STR-DUP01-20190904	CUF-STR-WC11-CC-SUR-20200527	CUF-STR-WC11-CC-BOT-20200527
Parent Sample ID						CUF-STR-WC11-CC-SUR-20190904		
Sample Depth				0.5 m	1.3 m	0.5 m	0.5 m	2.5 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Wells Creek (Hardness = 140 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute					
Total Metals								
Antimony	ug/L	190[A]	900[B]	<0.378	0.625 J	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.08	1.36	1.04	<0.313	0.717 J
Barium	ug/L	220[A]	2,000[B]	36.1	41.8	34.4	23.7	22.9
Beryllium	ug/L	11[A]	93[B]	<0.182	0.425 J	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	150	206	134	91.7	41.7 J
Cadmium	ug/L	1.03[A]	2.65[B]	<0.125	0.127 J	<0.125	<0.217	<0.217
Calcium	ug/L	116,000[A]	n/v	39,200	45,700	39,700	25,900	24,700
Chromium	ug/L	114[A]	2,375[B]	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.526	0.639	0.459 J	0.252 J	0.481 J
Copper	ug/L	12.4[A]	19.2[B]	1.76 J	1.47 J	1.86 J	0.744 J	1.15 J
Iron	ug/L	n/v	n/v	568	725	549	358	562
Lead	ug/L	4.88[A]	125[B]	0.584 J	0.721 J	0.606 J	0.325 J	0.614 J
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	6,770	6,530	6,450	5,350	5,010
Manganese	ug/L	n/v	n/v	187	252	179	56.6	64.0
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.130	<0.130
Molybdenum	ug/L	800[A]	7,200[B]	0.756 J	0.821 J	0.913 J	<0.610	<0.610
Nickel	ug/L	69.3[A]	624[B]	1.09	1.08	1.27	0.867 J	0.976 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	6.75[B]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	0.218 U*	<0.148	<0.148	0.361 U*
Vanadium	ug/L	27[A]	79[B]	2.18	2.60	2.40	<0.991	1.20
Zinc	ug/L	159[A]	159[B]	3.63 U*	4.26 U*	3.79 U*	4.76 J	<3.22
Dissolved Metals								
Antimony	ug/L	n/v	n/v	0.538 U*	1.13 U*	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.06 U*	1.15 U*	0.806 U*	<0.313	0.417 J
Barium	ug/L	n/v	n/v	28.8 J	28.2 J	27.5	21.0	19.1
Beryllium	ug/L	n/v	n/v	0.338 J	0.228 J	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	196 U*	193 U*	136 U*	93.7	40.4 J
Cadmium	ug/L	0.925[C]	2.47[D]	<0.125	<0.125	<0.125	<0.217	<0.217
Calcium	ug/L	n/v	n/v	41,600	39,700	40,500	26,800	25,600
Chromium	ug/L	97.6[C]	751[D]	<1.53	1.77 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.184 U*	0.157 U*	0.0940 U*	<0.134	<0.134
Copper	ug/L	11.9[C]	18.5[D]	0.917 J	1.20 J	0.857 J	<0.627	<0.627
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	3.62[C]	93.0[D]	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	3.44 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	6,680	6,980	6,070	5,480	5,050
Manganese	ug/L	n/v	n/v	29.2	10.4	28.1	14.0	11.1
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.130	<0.130
Molybdenum	ug/L	n/v	n/v	0.853 J	0.917 J	0.840 J	<0.610	<0.610
Nickel	ug/L	69.1[C]	622[D]	0.447 J	0.608 J	0.547 J	0.458 J	0.390 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	5.74[D]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	0.213 J	0.179 J	<0.148	<0.148	0.275 J
Vanadium	ug/L	n/v	n/v	1.43 U*	2.03 U*	1.62 U*	<0.991	<0.991
Zinc	ug/L	157[C]	156[D]	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters								
Radium-226	pCi/L	n/v	n/v	0.0984 +/-(0.0997)U	0.00518 +/-(0.0812)U	0.111 +/-(0.106)U	0.0179 +/-(0.155)U	0.0899 +/-(0.180)U
Radium-228	pCi/L	n/v	n/v	0.804 +/-(0.285)U*	0.255 +/-(0.241)UJ	0.469 +/-(0.298)U*	0.602 +/-(0.452)U	-0.0661 +/-(0.348)U
Radium-226+228	pCi/L	3[A]	3[B]	0.903 +/-(0.302)U*	0.260 +/-(0.254)UJ	0.580 +/-(0.316)U*	0.620 +/-(0.478)U	0.0899 +/-(0.392)U
Anions								
Chloride	mg/L	230[A]	860[B]	7.53	8.16	7.74	4.48	3.32
Fluoride	mg/L	2.7[A]	9.8[B]	0.113	0.0930 J	0.110	0.0865 J	0.0828 J
Sulfate	mg/L	n/v	n/v	28.4	21.0	26.6	20.7	19.8
General Chemistry								
Hardness (as CaCO3)	mg/L	n/v	n/v	126	141	126	86.8	82.4
Total Dissolved Solids	mg/L	n/v	n/v	145	162	154	135	119
Total Suspended Solids	mg/L	n/v	n/v	22.4	30.6	22.6	10.7	21.7

Notes:
Please note that units have been converted automatically in this table, and significant figures may not have been maintained.

A	Ecological Surface Water Screening Levels - Wells Creek (Hardness = 140 mg/l) Total Chronic
B	Ecological Surface Water Screening Levels - Wells Creek (Hardness = 140 mg/l) Total Acute
C	Ecological Surface Water Screening Levels - Wells Creek (Hardness = 140 mg/l) Dissolved Chronic
D	Ecological Surface Water Screening Levels - Wells Creek (Hardness = 140 mg/l) Dissolved Acute
6.5[A]	Concentration is greater than or equal to the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
n/v	No standard/guideline value.
m	meters
ID	identification
mg/L	milligrams per Liter
n/v	No standard/guideline value.
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picocuries per Liter
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
ug/L	micrograms per Liter

1. Level of review is defined in the Quality Assurance Project Plan.
2. Value determined to be a statistical outlier and not presented in this data set (see Appendix E.5).

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Table J.1-3 - Surface Stream Analytical Results - Unnamed Tributary
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		UT01									
Sample Date				21-Aug-19	21-Aug-19	21-Aug-19	4-Dec-19	4-Dec-19	4-Dec-19	23-Jun-21	23-Jun-21	23-Jun-21	23-Jun-21
Sample ID				CUF-STR-UT01-CC-SUR-20190821	CUF-STR-UT01-LB-SUR-20190821	CUF-STR-UT01-RB-SUR-20190821	CUF-STR-UT01-CC-SUR-20191204	CUF-STR-UT01-LB-SUR-20191204	CUF-STR-UT01-RB-SUR-20191204	CUF-STR-UT01-CC-SUR-20210623	CUF-STR-UT01-LB-SUR-20210623	CUF-STR-UT01-RB-SUR-20210623	CUF-STR-DUP01-20210623
Parent Sample ID													CUF-STR-UT01-RB-SUR-20210623
Sample Depth				0.1 m	0.1 m	0.1 m	0.3 m	0.3 m	0.5 m	0.1 m	0.1 m	0.1 m	0.1 m
Sample Type		Unnamed Tributary (Hardness = 750 mg/L)		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units	Chronic	Acute	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Total Metals													
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.38	1.54	1.44	0.678 J	0.650 J	0.792 J	0.623 J	0.788 J	0.861 J	0.695 J
Barium	ug/L	220[A]	2,000[B]	89.1	89.7	88.9	31.8	32.3	32.0	96.1	96.2	99.1	99.9
Beryllium	ug/L	11[A]	11[A] 93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	**7,680[A]**	**7,530[A]**	**7,620[A]**	3,750	3,730	3,700	4,480	4,280	4,600	4,550
Cadmium	ug/L	2.39[A]	7.42[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	116,000[A]	n/v	**354,000[A]**	**366,000[A]**	**358,000[A]**	**304,000[A]**	**301,000[A]**	**302,000[A]**	**352,000[A]**	**350,000[A]**	**355,000[A]**	**360,000[A]**
Chromium	ug/L	268[A]	5,612[B]	<1.53	2.15 U*	<1.53	1.75 U*	1.58 U*	1.97 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.371 J	0.419 J	0.357 J	1.40	1.32	1.35	0.332 J	0.360 J	0.248 J	0.268 J
Copper	ug/L	30.5[A]	51.7[B]	<0.627	0.662 J	0.668 J	<0.627	<0.627	0.726 J	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	165	170	150	1,240	1,140	1,320	782	808	829	810
Lead	ug/L	18.6[A]	477[B]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	4.54 U*	3.54 U*	5.14 U*	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	33,500	34,300	33,500	26,800	26,400	26,800	31,700	31,300	32,500	31,700
Manganese	ug/L	n/v	n/v	4,230	4,280	4,240	2,700	2,620	2,700	6,380	5,830	6,550	6,440
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	800[A]	7,200[B]	22.8	23.5	22.7	59.6	58.6	57.4	114	120	122	121
Nickel	ug/L	169[A]	1,516[B]	0.589 J	0.513 J	0.617 J	0.991 J	0.960 J	1.01	0.552 J	0.645 J	0.628 J	0.494 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	n/v	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.81	2.23	1.92	1.20	1.09	1.27	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	388[A]	388[B]	4.57 U*	4.68 U*	4.37 U*	4.74 U*	3.75 U*	4.45 U*	<3.22	<3.22	<3.22	<3.22
Dissolved Metals													
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.21	1.28	1.36	0.465 J	0.550 J	0.554 J	0.702 J	0.666 J	0.592 J	0.627 J
Barium	ug/L	n/v	n/v	87.4	87.3	88.3	28.2	28.0	29.8	90.3	91.3	95.3	93.8
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	7,720	7,550	7,650	3,390	3,570	3,480	4,450	4,400	4,420	4,540
Cadmium	ug/L	2.03[C]	6.58[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	n/v	355,000	353,000	355,000	298,000	303,000	302,000	346,000	350,000	351,000	346,000
Chromium	ug/L	231[C]	1,773[D]	<1.53	1.54 J	2.09	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.271 J	0.263 J	0.288 J	1.20	1.26	1.27	0.252 J	0.273 J	0.253 J	0.251 J
Copper	ug/L	29.3[C]	49.6[D]	0.733 J	<0.627	1.53 J	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	59.3	49.4 J	51.2	72.3 U*	61.7 U*	155 U*	265	40.4 J	32.8 J	31.1 J
Lead	ug/L	10.9[C]	281[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	33,100	33,500	33,100	26,200	27,000	27,000	31,000	31,100	31,300	31,000
Manganese	ug/L	n/v	n/v	4,140	4,170	4,210	2,530	2,570	2,760	6,220	5,670	6,000	5,880
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	n/v	n/v	22.6	23.0	22.3	57.7	59.5	57.5	113	119	119	119
Nickel	ug/L	168[C]	1,513[D]	0.462 J	0.337 J	0.402 J	0.890 J	0.917 J	0.918 J	0.537 J	0.375 J	0.423 J	0.464 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	34.9[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.69	1.79	2.31	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	382[C]	379[D]	<3.22	<3.22	<3.22	3.58 U*	3.40 U*	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	0.130 +/-(0.171)U	0.0847 +/-(0.166)U	0.110 +/-(0.166)U	0.133 +/-(0.104)U	-0.0209 +/-(0.101)U	0.0341 +/-(0.104)U	0.146 +/-(0.144)U	0.233 +/-(0.205)U	0.215 +/-(0.155)U	0.363 +/-(0.219)
Radium-228	pCi/L	n/v	n/v	0.121 +/-(0.366)U	0.238 +/-(0.361)U	0.260 +/-(0.452)U	0.288 +/-(0.320)U	0.109 +/-(0.299)U	0.0940 +/-(0.339)U	0.662 +/-(0.438)UJ	0.634 +/-(0.552)U	-0.0101 +/-(0.511)U	0.882 +/-(0.642)U
Radium-226+228	pCi/L	3[A]	3[B]	0.251 +/-(0.404)U	0.323 +/-(0.397)U	0.370 +/-(0.482)U	0.421 +/-(0.336)U	0.109 +/-(0.316)U	0.128 +/-(0.355)U	0.809 +/-(0.461)UJ	0.868 +/-(0.589)U	0.215 +/-(0.534)U	1.25 +/-(0.678)J
Anions													
Chloride	mg/L	230[A]	860[B]	122	123	122	73.8	70.3	71.2	81.2	79.3 J	83.4 J	79.7 J
Fluoride	mg/L	2.7[A]	9.8[B]	0.124 J	0.126 J	0.128 J	0.127	0.200	0.120	0.152	0.149 J	0.147 J	0.139 J
Sulfate	mg/L	n/v	n/v	835	841	829	635	689	677	696	693 J	726 J	709 J
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	1,020	1,060	1,030	870	861	864	1,010	1,000	1,020	1,030
Total Dissolved Solids	mg/L	n/v	n/v	1,750	1,770	1,770	1,190	1,250	1,200	1,440	1,430 J	1,370 J	1,450 J
Total Suspended Solids	mg/L	n/v	n/v	16.3	18.0	15.0	19.7	18.3	19.7	22.4	23.3 J	36.3 J	38.8 J

See last page for notes.

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Table J.1-3 - Surface Stream Analytical Results - Unnamed Tributary
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		UT01.5			UT02					
Sample Date				23-Jun-21	23-Jun-21	23-Jun-21	21-Aug-19	21-Aug-19	4-Dec-19	4-Dec-19	4-Dec-19	23-Jun-21
Sample ID				CUF-STR-UT01.5-CC-SUR-20210623	CUF-STR-UT01.5-LB-SUR-20210623	CUF-STR-UT01.5-RB-SUR-20210623	CUF-STR-UT02-CC-SUR-20190821	CUF-STR-UT02-RB-SUR-20190821	CUF-STR-UT02-CC-SUR-20191204	CUF-STR-UT02-LB-SUR-20191204	CUF-STR-UT02-RB-SUR-20191204	CUF-STR-UT02-CC-SUR-20210623
Parent Sample ID												
Sample Depth				0.2 m	0.1 m	0.2 m	0.3 m	0.3 m	0.5 m	0.3 m	0.5 m	0.1 m
Sample Type		Unnamed Tributary (Hardness = 750 mg/L)		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Chronic	Acute	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Total Metals												
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	0.388 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.782 J	0.713 J	0.736 J	1.38	1.43	0.646 J	0.676 J	0.674 J	1.29
Barium	ug/L	220[A]	2,000[B]	98.4	101	97.5	95.3	90.1	27.3	26.5	26.2	95.8
Beryllium	ug/L	11[A]	11[A] 93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	4,390	4,310	4,820	**7,880[A]**	**7,550[A]**	4,120	4,250	4,360	**8,530[A]**
Cadmium	ug/L	2.39[A]	7.42[B]	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	0.137 J	<0.125	<0.217
Calcium	ug/L	116,000[A]	n/v	**344,000[A]**	**355,000[A]**	**341,000[A]**	**358,000[A]**	**352,000[A]**	**301,000[A]**	**314,000[A]**	**314,000[A]**	**405,000[A]**
Chromium	ug/L	268[A]	5,612[B]	<1.53	<1.53	<1.53	<1.53	1.65 U*	<1.53	<1.53	1.76 U*	<1.53
Cobalt	ug/L	19[A]	120[B]	0.259 J	0.412 J	0.257 J	0.297 J	0.292 J	1.07	0.963	0.970	0.568
Copper	ug/L	30.5[A]	51.7[B]	<0.627	<0.627	<0.627	<0.627	0.707 J	0.645 J	0.630 J	0.699 J	<0.627
Iron	ug/L	n/v	n/v	946	965	837	90.1	84.3	623	496	471	944
Lead	ug/L	18.6[A]	477[B]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.132 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	3.41 U*	4.99 U*	<3.39
Magnesium	ug/L	n/v	n/v	31,300	31,600	30,200	33,200	32,000	25,600	26,200	26,100	23,900
Manganese	ug/L	n/v	n/v	6,860	6,880	6,940	4,660	4,470	1,940	1,710	1,660	5,430
Mercury	ug/L	0.77[A]	1.4[B]	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130
Molybdenum	ug/L	800[A]	7,200[B]	125	121	111	19.8	23.3	59.4	62.1	62.1	443
Nickel	ug/L	169[A]	1,516[B]	0.665 J	0.605 J	0.513 J	0.571 J	0.556 J	0.987 J	0.969 J	1.24	0.834 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	n/v	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	0.298 U*	<0.148	<0.148	<0.148	<0.148	<0.148	0.248 U*	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	<0.991	<0.991	<0.991	1.85	2.59	<0.991	1.01	1.18	6.71
Zinc	ug/L	388[A]	388[B]	<3.22	<3.22	<3.22	9.30 U*	3.24 U*	3.73 U*	4.12 U*	4.56 U*	<3.22
Dissolved Metals												
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.714 J	0.850 J	0.598 J	1.32	1.49	0.512 J	0.559 J	0.621 J	1.05
Barium	ug/L	n/v	n/v	93.1	93.9	89.6	93.4	88.1	26.3	22.9	23.1	89.6
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	4,300	4,340	4,450	7,510	7,520	4,030	3,960	4,160	8,640
Cadmium	ug/L	2.03[C]	6.58[D]	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217
Calcium	ug/L	n/v	n/v	349,000	355,000	326,000	358,000	351,000	314,000	307,000	310,000	377,000
Chromium	ug/L	231[C]	1,773[D]	<1.53	<1.53	<1.53	<1.53	2.48	<1.53	1.71 J	2.19	<1.53
Cobalt	ug/L	n/v	n/v	0.331 J	0.257 J	0.185 J	0.228 J	0.209 J	0.964	0.827	0.861	0.470 J
Copper	ug/L	29.3[C]	49.6[D]	<0.627	<0.627	<0.627	0.640 J	0.786 J	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	617	536	68.7 U*	55.0	59.5	28.4 U*	<19.5	26.7 U*	354
Lead	ug/L	10.9[C]	281[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	4.03 J	5.48	<3.39
Magnesium	ug/L	n/v	n/v	30,800	31,200	29,000	32,600	32,000	26,800	26,000	26,200	23,100
Manganese	ug/L	n/v	n/v	6,760	6,720	6,430	4,540	4,420	1,740	1,260	1,280	5,150
Mercury	ug/L	0.77[C]	1.4[D]	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130
Molybdenum	ug/L	n/v	n/v	117	117	106	16.3	20.3	62.2	61.7	61.4	427
Nickel	ug/L	168[C]	1,513[D]	0.382 J	0.544 J	0.483 J	0.403 J	0.427 J	0.907 J	0.998 J	0.874 J	0.603 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	34.9[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	<0.991	<0.991	<0.991	2.00	2.85	<0.991	1.11	1.26	5.09
Zinc	ug/L	382[C]	379[D]	<3.22	<3.22	<3.22	<3.22	3.42 J	<3.22	3.81 U*	4.20 U*	<3.22
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	0.204 +/-(0.186)U	0.162 +/-(0.199)U	0.246 +/-(0.234)U	0.0606 +/-(0.181)U	-0.0564 +/-(0.138)U	0.103 +/-(0.123)U	0.147 +/-(0.143)U	-0.0235 +/-(0.0707)U	0.221 +/-(0.128)
Radium-228	pCi/L	n/v	n/v	0.210 +/-(0.593)U	0.719 +/-(0.515)U	0.832 +/-(0.575)U	0.582 +/-(0.456)U	0.411 +/-(0.473)U	0.308 +/-(0.405)U	0.0285 +/-(0.387)U	0.396 +/-(0.424)U	0.782 +/-(0.448)U*
Radium-226+228	pCi/L	3[A]	3[B]	0.414 +/-(0.621)U	0.881 +/-(0.552)U	1.08 +/-(0.621)U	0.643 +/-(0.491)U	0.411 +/-(0.493)U	0.411 +/-(0.423)U	0.175 +/-(0.413)U	0.396 +/-(0.430)U	1.00 +/-(0.466)J
Anions												
Chloride	mg/L	230[A]	860[B]	80.4 J	82.3 J	83.6	126	126	75.1	72.1	79.4	138
Fluoride	mg/L	2.7[A]	9.8[B]	0.145 J	0.164 J	0.136	0.121 J	0.122 J	0.151	0.136	0.139	0.149
Sulfate	mg/L	n/v	n/v	682 J	699 J	689	855	839	643	661	814	780
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	987	1,020	976	1,030	1,010	858	892	891	1,110
Total Dissolved Solids	mg/L	n/v	n/v	1,430 J	1,430 J	1,450	1,770	1,770	1,230	1,250	1,260	1,750
Total Suspended Solids	mg/L	n/v	n/v	19.5 J	34.7 J	19.0	12.2	13.2	16.3	17.8	11.3	7.20

See last page for notes.

Table J.1-3 - Surface Stream Analytical Results - Unnamed Tributary
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		UT03							UT03.25	UT03.5
Sample Date				21-Aug-19	21-Aug-19	21-Aug-19	4-Dec-19	4-Dec-19	4-Dec-19	23-Jun-21	22-Jun-21	22-Jun-21
Sample ID				CUF-STR-UT03-LB-SUR-20190821	CUF-STR-UT03-LB-BOT-20190821	CUF-STR-UT03-RB-MID-20190821	CUF-STR-UT03-CC-SUR-20191204	CUF-STR-UT03-LB-SUR-20191204	CUF-STR-UT03-RB-MID-20191204	CUF-STR-UT03-CC-SUR-20210623	CUF-STR-UT03.25-CC-SUR-20210622	CUF-STR-UT03.5-CC-SUR-20210622
Parent Sample ID												
Sample Depth				0.3 m	1.3 m	0.7 m	0.5 m	0.5 m	0.7 m	0.1 m	0.25 m	0.3 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Unnamed Tributary (Hardness = 750 mg/L)		Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
		Chronic	Acute									
Total Metals												
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.45	2.02	1.31	0.684 J	0.604 J	0.653 J	1.28 J	1.39	1.23
Barium	ug/L	220[A]	2,000[B]	88.0	135	84.3	28.9	27.6	26.8	90.4	67.2	70.5
Beryllium	ug/L	11[A]	11[A] 93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	**7,840[A]**	**10,400[A]**	**7,230[A]**	4,550	4,490	4,370	**8,000[A]**	3,930	4,050
Cadmium	ug/L	2.39[A]	7.42[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	ug/L	116,000[A]	n/v	**351,000[A]**	**436,000[A]**	**350,000[A]**	**317,000[A]**	**312,000[A]**	**309,000[A]**	**398,000[A]**	**282,000[A]**	**283,000[A]**
Chromium	ug/L	268[A]	5,612[B]	<1.53	<1.53	<1.53	1.78 U*	<1.53	1.99 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.300 J	0.525	0.277 J	0.997	0.933	0.949	0.429 J	0.192 J	0.183 J
Copper	ug/L	30.5[A]	51.7[B]	<0.627	0.642 J	0.761 J	0.967 J	0.958 J	0.898 J	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	77.3	104	68.9	552	544	473	767	187	167
Lead	ug/L	18.6[A]	477[B]	<0.128	<0.128	<0.128	0.156 J	0.145 J	0.131 J	<0.128	<0.128	<0.128
Lithium	ug/L	440[A]	910[B]	<3.39	4.90 J	<3.39	4.70 U*	3.51 U*	4.94 U*	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	31,500	29,200	32,300	26,400	26,200	25,800	25,100	23,400	23,200
Manganese	ug/L	n/v	n/v	4,400	5,680	4,300	1,810	1,740	1,560	5,910	4,240	4,730
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	ug/L	800[A]	7,200[B]	20.1	38.5	19.7	62.9	62.3	60.3	358	94.3	98.2
Nickel	ug/L	169[A]	1,516[B]	0.517 J	0.907 J	0.539 J	1.17	1.02	1.10	0.653 J	0.517 J	0.587 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	n/v	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.92	3.92	1.86	1.43	1.22	1.43	5.32	1.14	1.14
Zinc	ug/L	388[A]	388[B]	3.26 U*	6.40 U*	3.55 U*	7.07 U*	7.08 U*	7.24 U*	<3.22	<3.22	<3.22
Dissolved Metals												
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.30	1.79	1.30	0.575 J	0.559 J	0.507 J	1.03	1.05	0.853 J
Barium	ug/L	n/v	n/v	91.9	132	86.7	24.4	23.7	23.2	86.6	65.3	68.5
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	7,670	10,300	7,710	4,350	4,460	4,390	8,330	3,870	4,080
Cadmium	ug/L	2.03[C]	6.58[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	ug/L	n/v	n/v	370,000	423,000	363,000	311,000	310,000	311,000	395,000	283,000	275,000
Chromium	ug/L	231[C]	1,773[D]	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.242 J	0.423 J	0.228 J	0.832	0.772	0.789	0.351 J	<0.134	<0.134
Copper	ug/L	29.3[C]	49.6[D]	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	43.0 J	<19.5	44.1 J	19.6 U*	<19.5	<19.5	33.2 U*	57.1 U*	70.7
Lead	ug/L	10.9[C]	281[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	4.62 J	<3.39	3.89 J	4.89 J	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	33,600	28,200	32,800	25,700	25,800	25,700	24,900	23,000	22,600
Manganese	ug/L	n/v	n/v	4,590	5,510	4,400	1,400	1,310	1,180	5,950	4,240	4,630
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	ug/L	n/v	n/v	18.3	15.8	19.4	62.0	61.4	61.1	351	93.5	96.8
Nickel	ug/L	168[C]	1,513[D]	0.473 J	0.557 J	0.420 J	0.854 J	0.831 J	0.805 J	0.670 J	0.444 J	0.464 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	34.9[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.78	3.01	1.65	1.04	1.31	<0.991	3.08	1.06	1.17
Zinc	ug/L	382[C]	379[D]	<3.22	<3.22	<3.22	3.54 U*	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	0.109 +/-(0.177)U	0.202 +/-(0.202)U	-0.191 +/-(0.129)U	0.0105 +/-(0.0796)U	-0.0703 +/-(0.0922)U	-0.0884 +/-(0.110)U	0.143 +/-(0.112)U	0.135 +/-(0.116)U	0.130 +/-(0.110)U
Radium-228	pCi/L	n/v	n/v	0.505 +/-(0.421)U	0.283 +/-(0.340)U	-0.0705 +/-(0.342)U	0.125 +/-(0.414)U	-0.317 +/-(0.346)U	0.639 +/-(0.498)U	0.232 +/-(0.391)U	0.204 +/-(0.384)U	0.561 +/-(0.441)U
Radium-226+228	pCi/L	3[A]	3[B]	0.614 +/-(0.457)U	0.484 +/-(0.395)U	0.000 +/-(0.366)U	0.135 +/-(0.422)U	0.000 +/-(0.358)U	0.639 +/-(0.510)U	0.374 +/-(0.407)U	0.339 +/-(0.401)U	0.691 +/-(0.455)U
Anions												
Chloride	mg/L	230[A]	860[B]	126	172	125	77.6	79.3	74.9	128	69.7	65.9
Fluoride	mg/L	2.7[A]	9.8[B]	0.126 J	0.115 J	0.118 J	0.147	0.151	0.144	0.121	0.134	0.118
Sulfate	mg/L	n/v	n/v	860	696	849	656	612	631	797	590	578
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	1,010	1,210	1,010	899	887	878	1,100	799	801
Total Dissolved Solids	mg/L	n/v	n/v	1,730	1,970	1,740	1,260	1,270	1,290	1,660	1,340	1,150
Total Suspended Solids	mg/L	n/v	n/v	27.8	19.2	29.0	18.7	17.0	16.8	6.43	50.0	49.5

See last page for notes.

Table J.1-3 - Surface Stream Analytical Results - Unnamed Tributary
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		UT03.75	UT04									
Sample Date				22-Jun-21	27-Nov-18	27-Nov-18	27-Nov-18	20-Aug-19	20-Aug-19	20-Aug-19	4-Dec-19	4-Dec-19	22-Jun-21
Sample ID				CUF-STR-UT03.75-CC-SUR-20210622	CUF-STR-UT04-CC-SUR-20181127	CUF-STR-UT04-LB-SUR-20181127	CUF-STR-UT04-RB-SUR-20181127	CUF-STR-UT04-CC-SUR-20190820	CUF-STR-UT04-LB-SUR-20190820	CUF-STR-UT04-RB-SUR-20190820	CUF-STR-UT04-RB-SUR-20191204	CUF-STR-DUP01-20191204	CUF-STR-UT04-CC-SUR-20210622
Parent Sample ID												CUF-STR-UT04-RB-SUR-20191204	
Sample Depth				0.35 m	0.5 m	0.1 m	0.1 m	0.2 m	0.1 m	0.2 m	0.1 m	0.1 m	0.15 m
Sample Type		Unnamed Tributary (Hardness = 750 mg/L)		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	Chronic	Acute	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated
Total Metals													
Antimony	ug/L	190[A]	900[B]	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.13	0.583 J	0.736 J	0.639 J	1.43	1.47	1.63	0.529 J	0.835 J	1.83
Barium	ug/L	220[A]	2,000[B]	65.8	29.4	27.5	28.1	35.3	33.9	40.0	25.0	28.7	57.6
Beryllium	ug/L	11[A]	11[A] 93[B]	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	0.233 J	<0.182
Boron	ug/L	7,200[A]	34,000[B]	4,080	2,910	3,050	3,070	2,600	2,480	2,580	3,320	3,200	3,650
Cadmium	ug/L	2.39[A]	7.42[B]	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217
Calcium	ug/L	116,000[A]	n/v	**288,000[A]**	**230,000[A]**	**242,000[A]**	**241,000[A]**	**138,000[A]**	**132,000[A]**	**139,000[A]**	**250,000[A]**	**252,000[A]**	**273,000[A]**
Chromium	ug/L	268[A]	5,612[B]	<1.53	1.37 U*	1.7 U*	1.32 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.225 J	0.155 U*	0.172 U*	0.16 U*	0.106 J	0.0950 J	0.107 J	0.389 J	0.332 J	0.168 J
Copper	ug/L	30.5[A]	51.7[B]	2.91	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	143	42.2 J	36.1 J	40.3 J	76.3	63.8	88.5	89.1	81.6 U*	186
Lead	ug/L	18.6[A]	477[B]	0.152 U*	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	440[A]	910[B]	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	3.42 U*	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	23,800	22,800	23,500	23,700	19,200	18,700	18,700	23,400	24,100	22,300
Manganese	ug/L	n/v	n/v	4,110	216	170	222	967	893	1,210	329	305	2,820
Mercury	ug/L	0.77[A]	1.4[B]	<0.130	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130
Molybdenum	ug/L	800[A]	7,200[B]	87.5	13.6	14.2	14	25.0	24.1	25.3	31.5	31.9	60.7
Nickel	ug/L	169[A]	1,516[B]	0.717 J	0.645 J	0.634 J	0.605 J	0.607 J	0.491 J	0.599 J	0.753 J	0.336 UJ	0.683 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	n/v	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.08	1.31 U*	1.5 U*	1.51 U*	1.21	1.31	1.21	<0.991	1.48	1.15
Zinc	ug/L	388[A]	388[B]	<3.22	<2.42	<2.42	<2.42	<3.22	<3.22	<3.22	3.45 U*	3.85 U*	<3.22
Dissolved Metals													
Antimony	ug/L	n/v	n/v	<0.378	<1.12	<1.12	<1.12	<0.378	0.458 J	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.01	0.608 J	0.55 J	0.65 J	1.52	1.50	1.65	0.493 J	1.21	1.40 J
Barium	ug/L	n/v	n/v	63.4	27.4	27.7	29.3	31.2	33.2	34.3	24.6	24.9	54.6
Beryllium	ug/L	n/v	n/v	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	0.299 J	<0.182
Boron	ug/L	n/v	n/v	3,970	2,870	3,140	3,030	2,590	2,520	2,540	3,130	3,230	3,750
Cadmium	ug/L	2.03[C]	6.58[D]	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217
Calcium	ug/L	n/v	n/v	282,000	235,000	244,000	246,000	138,000	132,000	139,000	254,000	252,000	274,000
Chromium	ug/L	231[C]	1,773[D]	<1.53	1.27 U*	1.08 U*	1.39 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	<0.134	0.148 J	0.161 J	0.173 J	0.101 J	0.111 J	<0.0750	0.398 J	0.331 J	<0.134
Copper	ug/L	29.3[C]	49.6[D]	<0.627	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	1.07 U*	<0.627
Iron	ug/L	n/v	n/v	60.0	29 J	<14.1	14.3 J	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	10.9[C]	281[D]	3.21 J	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	23,100	23,000	24,100	24,100	18,900	18,500	19,000	23,500	24,200 J	22,400
Manganese	ug/L	n/v	n/v	4,040	203	155	225	749	773	879	242	226	2,670
Mercury	ug/L	0.77[C]	1.4[D]	<0.130	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130
Molybdenum	ug/L	n/v	n/v	83.6	13.6	14.2	14.4	25.0	24.9	25.1	31.9	31.2	61.8
Nickel	ug/L	168[C]	1,513[D]	0.495 J	0.632 J	0.672 J	0.64 J	0.495 J	0.448 J	0.482 J	0.799 J	1.86 J	0.503 J
Selenium	ug/L	n/v	n/v	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	34.9[D]	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.063	<0.063	<0.063	<0.148	0.204 J	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	<0.991	1.25 U*	1.12 U*	1.44 U*	1.12	1.02	1.16	0.991 UJ	2.00 J	<0.991
Zinc	ug/L	382[C]	379[D]	3.42 J	<2.42	<2.42	<2.42	<3.22	<3.22	3.59 J	3.26 U*	3.22 UJ	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	0.288 +/-(0.261)U	0.0197 +/-(0.0406)U	0.00316 +/-(0.0323)U	0.0786 +/-(0.0567)	-0.0351 +/-(0.134)U	-0.0555 +/-(0.107)U	0.0208 +/-(0.158)U	-0.0888 +/-(0.0963)U	-0.0161 +/-(0.101)U	0.0608 +/-(0.119)U
Radium-228	pCi/L	n/v	n/v	1.28 +/-(0.608)U*	0.412 +/-(0.229)	0.0166 +/-(0.217)U	0.0208 +/-(0.194)U	0.0301 +/-(0.355)U	-0.0366 +/-(0.387)U	0.390 +/-(0.383)U	0.0529 +/-(0.401)U	0.308 +/-(0.390)U	0.841 +/-(0.471)U*
Radium-226+228	pCi/L	3[A]	3[B]	1.57 +/-(0.662)U*	0.432 +/-(0.233)J	0.0197 +/-(0.219)U	0.0994 +/-(0.202)J	0.0301 +/-(0.379)U	0.000 +/-(0.402)U	0.411 +/-(0.414)U	0.0529 +/-(0.412)U	0.308 +/-(0.403)U	0.902 +/-(0.486)U*
Anions													
Chloride	mg/L	230[A]	860[B]	66.3	76.1	80.8	80.9	81.5	80.4	81.5	62.1	62.3	67.7 J
Fluoride	mg/L	2.7[A]	9.8[B]	0.123	0.217	0.208	0.222	0.152	0.156	0.154	0.123	0.115	0.124 J
Sulfate	mg/L	n/v	n/v	539	439	487	491	206	204	205	563 J	488	543 J
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	818	668	701	699	424	407	424	721	721	773
Total Dissolved Solids	mg/L	n/v	n/v	1,120	1,010	1,060	1,010	678	687	701	990	1,000	1,170 J
Total Suspended Solids	mg/L	n/v	n/v	66.5	0.800	0.700	1.30	6.90	5.30	7.80	7.40	7.10	53.5 J

See last page for notes.

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Table J.1-3 - Surface Stream Analytical Results - Unnamed Tributary
Cumberland Fossil Plant

Sample Location		Ecological Surface Water Screening Levels		UT05						
Sample Date				27-Nov-18	27-Nov-18	27-Nov-18	20-Aug-19	20-Aug-19	20-Aug-19	20-Aug-19
Sample ID				CUF-STR-UT05-CC-SUR-20181127	CUF-STR-UT05-LB-SUR-20181127	CUF-STR-UT05-RB-SUR-20181127	CUF-STR-UT05-CC-SUR-20190820	CUF-STR-DUP01-20190820	CUF-STR-UT05-LB-SUR-20190820	CUF-STR-UT05-RB-SUR-20190820
Parent Sample ID								CUF-STR-UT05-CC-SUR-20190820		
Sample Depth				0.1 m	0.1 m	0.1 m	0.1 m	0.1 m	0.1 m	0.1 m
Sample Type		Unnamed Tributary (Hardness = 750 mg/L)		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Chronic	Acute	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals										
Antimony	ug/L	190[A]	900[B]	<1.12	<1.12	<1.12	<0.378	1.12 J	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.617 J	0.577 J	0.6 J	1.58	1.49	1.53	1.38
Barium	ug/L	220[A]	2,000[B]	26.8	26.6	28.6	49.2	46.5	49.4	38.9
Beryllium	ug/L	11[A]	11[A] 93[B]	<0.057	<0.057	<0.057	<0.182	0.324 J	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	2,790	2,730	2,940	2,550	2,390	2,520	2,530
Cadmium	ug/L	2.39[A]	7.42[B]	<0.125	<0.125	<0.125	<0.125	<0.125	0.315 J	<0.125
Calcium	ug/L	116,000[A]	n/v	**231,000[A]**	**225,000[A]**	**241,000[A]**	**134,000[A]**	**126,000[A]**	**135,000[A]**	**141,000[A]**
Chromium	ug/L	268[A]	5,612[B]	1.5 U*	1.67 U*	1.69 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	19[A]	120[B]	0.168 U*	0.145 U*	0.195 U*	0.214 J	0.263 J	0.216 J	0.157 J
Copper	ug/L	30.5[A]	51.7[B]	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	33.8 J	35.5 J	39.9 J	250	254	228	101
Lead	ug/L	18.6[A]	477[B]	<0.094	<0.094	<0.094	0.376 J	0.416 J	0.421 J	<0.128
Lithium	ug/L	440[A]	910[B]	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	22,000	21,700	23,400	18,900	18,300	19,100	18,500
Manganese	ug/L	n/v	n/v	159	162	223	1,700	1,630	1,720	1,050
Mercury	ug/L	0.77[A]	1.4[B]	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	13.6	13.6	14.3	21.7	21.9	21.2	24.4
Nickel	ug/L	169[A]	1,516[B]	0.587 J	0.592 J	0.712 J	0.719 J	0.854 J	0.855 J	0.656 J
Selenium	ug/L	3.1[A]	20[B]	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	n/v	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.063	<0.063	<0.063	<0.148	0.952 U*	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.48 U*	1.47 U*	1.45 U*	1.28	1.21	1.40	1.21
Zinc	ug/L	388[A]	388[B]	<2.42	<2.42	<2.42	3.24 U*	3.66 U*	7.35 U*	3.70 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<1.12	<1.12	<1.12	<0.378	0.454 J	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.609 J	0.595 J	0.542 J	1.53	1.48	1.50	1.40
Barium	ug/L	n/v	n/v	26.4	26.9	27.5	46.8	43.1	45.1	32.7
Beryllium	ug/L	n/v	n/v	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	2,650	2,780	2,860	2,540	2,480	2,490	2,550
Cadmium	ug/L	2.03[C]	6.58[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	230,000	232,000	245,000	134,000	129,000	136,000	139,000
Chromium	ug/L	231[C]	1,773[D]	2.02 U*	1.46 U*	1.41 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.16 J	0.154 J	0.167 J	0.0980 J	0.131 J	0.0770 J	0.0980 J
Copper	ug/L	29.3[C]	49.6[D]	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	n/v	n/v	<14.1	17.3 J	<14.1	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	10.9[C]	281[D]	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	21,700	22,300	23,300	19,000	18,700	18,600	18,800
Manganese	ug/L	n/v	n/v	154	163	216	1,670	1,650	1,520	793
Mercury	ug/L	0.77[C]	1.4[D]	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	13.6	14.1	14.3	22.2	21.5	22.2	24.9
Nickel	ug/L	168[C]	1,513[D]	0.619 J	0.603 J	0.593 J	0.634 J	0.554 J	0.564 J	0.436 J
Selenium	ug/L	n/v	n/v	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	34.9[D]	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.063	<0.063	<0.063	<0.148	0.376 J	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.6 U*	1.39 U*	1.44 U*	<0.991	<0.991	<0.991	1.05
Zinc	ug/L	382[C]	379[D]	<2.42	<2.42	<2.42	<3.22	<3.22	4.70 J	<3.22
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	0.0147 +/-(0.0437)U	0.0327 +/-(0.0487)U	0.0746 +/-(0.0574)U	0.164 +/-(0.174)U	-0.0493 +/-(0.124)U	-0.0555 +/-(0.160)U	-0.173 +/-(0.154)U
Radium-228	pCi/L	n/v	n/v	0.0504 +/-(0.225)U	0.193 +/-(0.223)U	0.410 +/-(0.246)	0.184 +/-(0.366)U	0.552 +/-(0.446)U	0.151 +/-(0.402)U	0.194 +/-(0.492)U
Radium-226+228	pCi/L	3[A]	3[B]	0.0651 +/-(0.229)U	0.226 +/-(0.228)U	0.485 +/-(0.253)J	0.348 +/-(0.405)U	0.552 +/-(0.463)U	0.151 +/-(0.433)U	0.194 +/-(0.516)U
Anions										
Chloride	mg/L	230[A]	860[B]	76.3	81.2	77.4	82.3	79.5	81.1	80.4
Fluoride	mg/L	2.7[A]	9.8[B]	0.201	0.205	0.202	0.158	0.159	0.152	0.156
Sulfate	mg/L	n/v	n/v	477	480	487	212	205	207	203
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	667	651	698	412	390	416	428
Total Dissolved Solids	mg/L	n/v	n/v	1,070	1,030	1,040	669	678	652	703
Total Suspended Solids	mg/L	n/v	n/v	1.22	0.800	0.900	11.0	9.50	11.2	10.7

Table J.1-3 - Surface Stream Analytical Results - Unnamed Tributary
Cumberland Fossil Plant

Sample Location	Units	Ecological Surface Water Screening Levels		UT05	
Sample Date				4-Dec-19	22-Jun-21
Sample ID				CUF-STR-UT05-RB-SUR-20191204	CUF-STR-UT05-CC-SUR-20210622
Parent Sample ID					
Sample Depth				0.05 m	0.1 m
Sample Type				Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Unnamed Tributary (Hardness = 750 mg/L)		Validated	Validated
		Chronic	Acute		
Total Metals					
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.508 J	1.77
Barium	ug/L	220[A]	2,000[B]	23.9	55.1
Beryllium	ug/L	11[A]	11[A] 93[B]	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	3,050 J	3,570
Cadmium	ug/L	2.39[A]	7.42[B]	<0.125	<0.217
Calcium	ug/L	116,000[A]	n/v	**250,000[A]**	**278,000[A]**
Chromium	ug/L	268[A]	5,612[B]	1.74 U*	<1.53
Cobalt	ug/L	19[A]	120[B]	0.383 J	0.156 J
Copper	ug/L	30.5[A]	51.7[B]	<0.627	<0.627
Iron	ug/L	n/v	n/v	54.9	129
Lead	ug/L	18.6[A]	477[B]	<0.128	<0.128
Lithium	ug/L	440[A]	910[B]	4.14 U*	<3.39
Magnesium	ug/L	n/v	n/v	22,900	22,400
Manganese	ug/L	n/v	n/v	281	2,800
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.130
Molybdenum	ug/L	800[A]	7,200[B]	31.6	59.1
Nickel	ug/L	169[A]	1,516[B]	0.682 J	0.463 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51
Silver	ug/L	n/v	n/v	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.12	1.14
Zinc	ug/L	388[A]	388[B]	4.36 U*	<3.22
Dissolved Metals					
Antimony	ug/L	n/v	n/v	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.523 J	1.35
Barium	ug/L	n/v	n/v	25.5	53.5
Beryllium	ug/L	n/v	n/v	<0.182	<0.182
Boron	ug/L	n/v	n/v	3,430 J	3,630
Cadmium	ug/L	2.03[C]	6.58[D]	<0.125	<0.217
Calcium	ug/L	n/v	n/v	264,000	268,000
Chromium	ug/L	231[C]	1,773[D]	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.374 J	<0.134
Copper	ug/L	29.3[C]	49.6[D]	<0.627	<0.627
Iron	ug/L	n/v	n/v	<19.5	<19.5
Lead	ug/L	10.9[C]	281[D]	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	24,100 J	21,900
Manganese	ug/L	n/v	n/v	207	2,600
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.130
Molybdenum	ug/L	n/v	n/v	33.5	59.3
Nickel	ug/L	168[C]	1,513[D]	0.742 J	0.391 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51
Silver	ug/L	n/v	34.9[D]	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	<0.991	<0.991
Zinc	ug/L	382[C]	379[D]	3.57 U*	<3.22
Radiological Parameters					
Radium-226	pCi/L	n/v	n/v	-0.0700 +/-(0.114)U	0.132 +/-(0.144)U
Radium-228	pCi/L	n/v	n/v	0.324 +/-(0.427)U	0.966 +/-(0.434)U*
Radium-226+228	pCi/L	3[A]	3[B]	0.324 +/-(0.442)U	1.10 +/-(0.457)U*
Anions					
Chloride	mg/L	230[A]	860[B]	73.2	67.2 J
Fluoride	mg/L	2.7[A]	9.8[B]	0.157	0.130 J
Sulfate	mg/L	n/v	n/v	575 J	524 J
General Chemistry					
Hardness (as CaCO3)	mg/L	n/v	n/v	718	787
Total Dissolved Solids	mg/L	n/v	n/v	1,070	1,170 J
Total Suspended Solids	mg/L	n/v	n/v	8.00	8.80 J

Notes:
Please note that units have been converted automatically in this table, and significant figures may not have been maintained.

A	Ecological Surface Water Screening Levels - Unnamed Tributary (Hardness = 750 mg/L) Total Chronic
B	Ecological Surface Water Screening Levels - Unnamed Tributary (Hardness = 750 mg/L) Total Acute
C	Ecological Surface Water Screening Levels - Unnamed Tributary (Hardness = 750 mg/L) Dissolved Chronic
D	Ecological Surface Water Screening Levels - Unnamed Tributary (Hardness = 750 mg/L) Dissolved Acute
6.5[A]	Concentration is greater than or equal to the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
m	meters
ID	identification
mg/L	milligrams per Liter
n/v	No standard/guideline value.
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picocuries per Liter
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
ug/L	micrograms per Liter

1. Level of review is defined in the Quality Assurance Project Plan.

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EXHIBITS

Exhibit No.

J.1-1

Title

Surface Stream Sampling Locations - November 2018

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

0 1,250 2,500 3,750 5,000 Feet

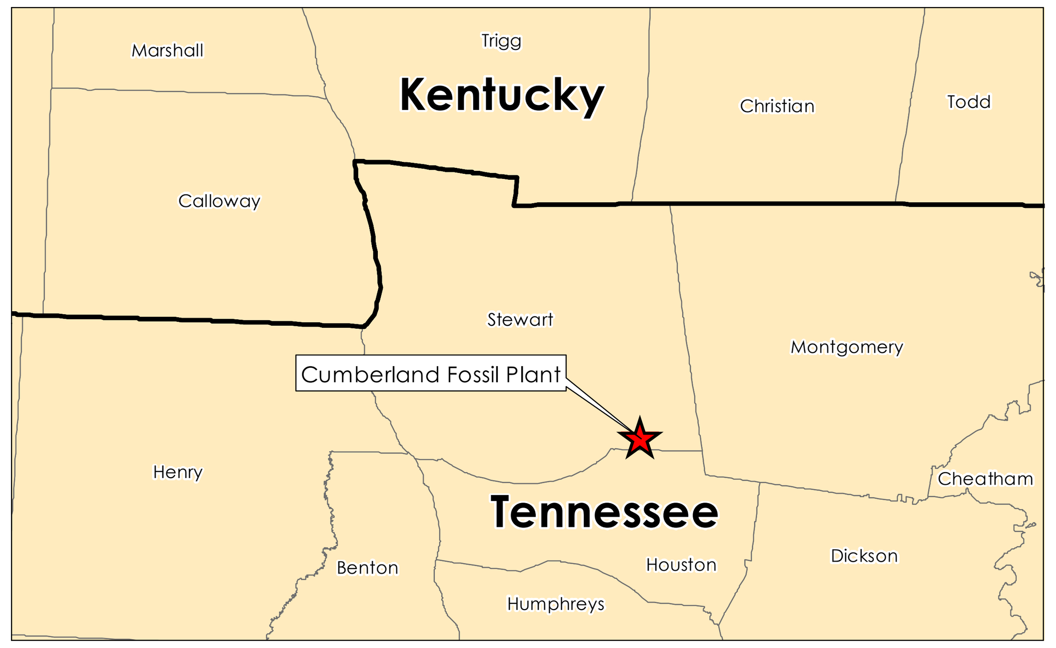
1:15,000 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022); Esri World Imagery



Stantec TVA

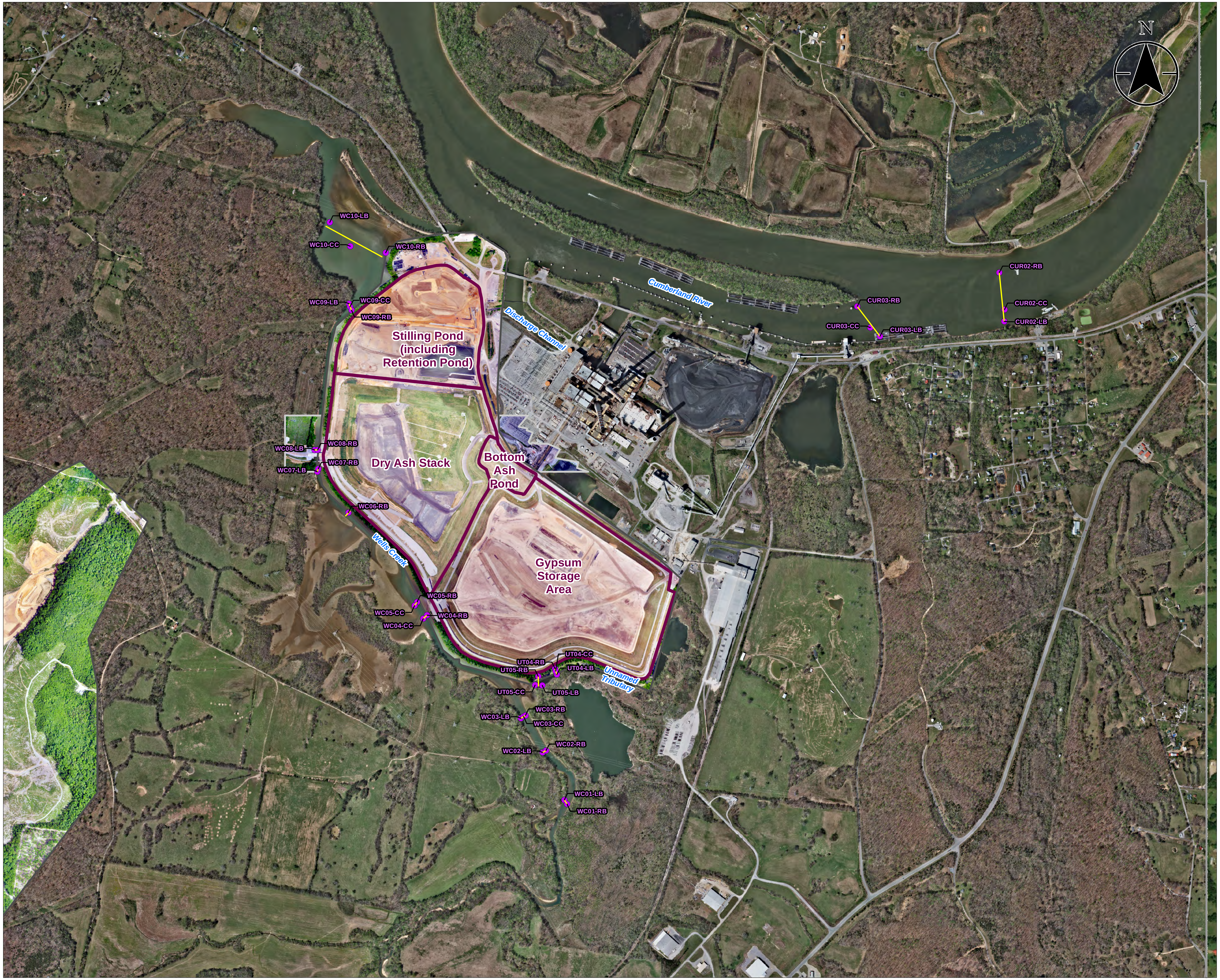


Exhibit No.
J.1-1a

Title
Surface Stream Sampling Locations - November 2018

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

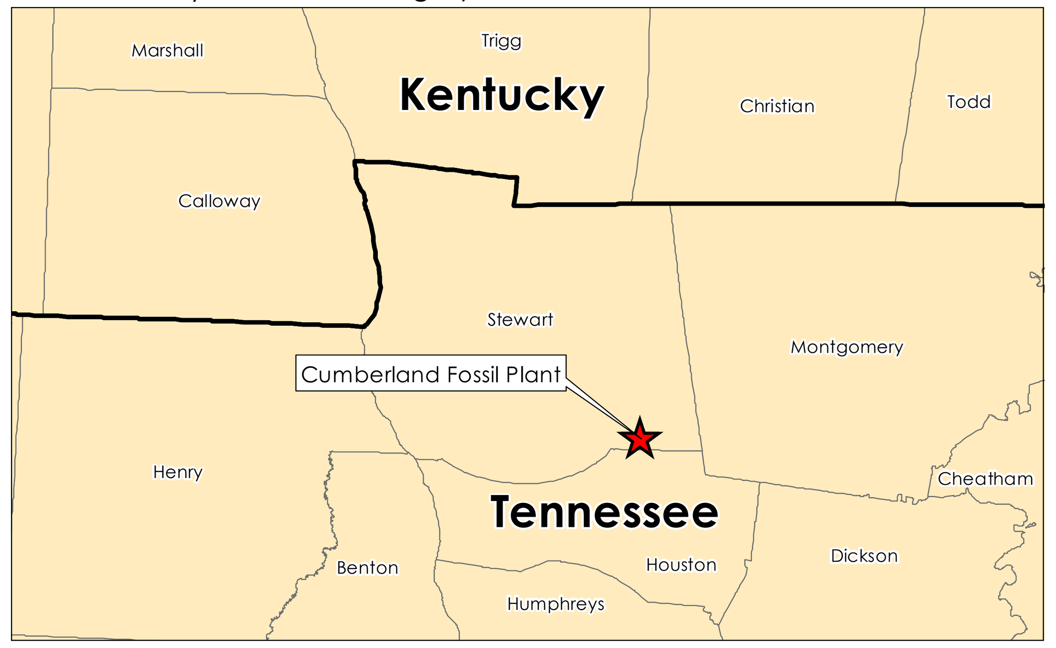
0 | 650 | 1,300 | 1,950 | 2,600 Feet
1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- 2017 Imagery Boundary
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022); Esri World Imagery



Stantec TVA

Exhibit No.

J.1-2

Title

Surface Stream Sampling Locations - August 2019

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

0 1,250 2,500 3,750 5,000 Feet

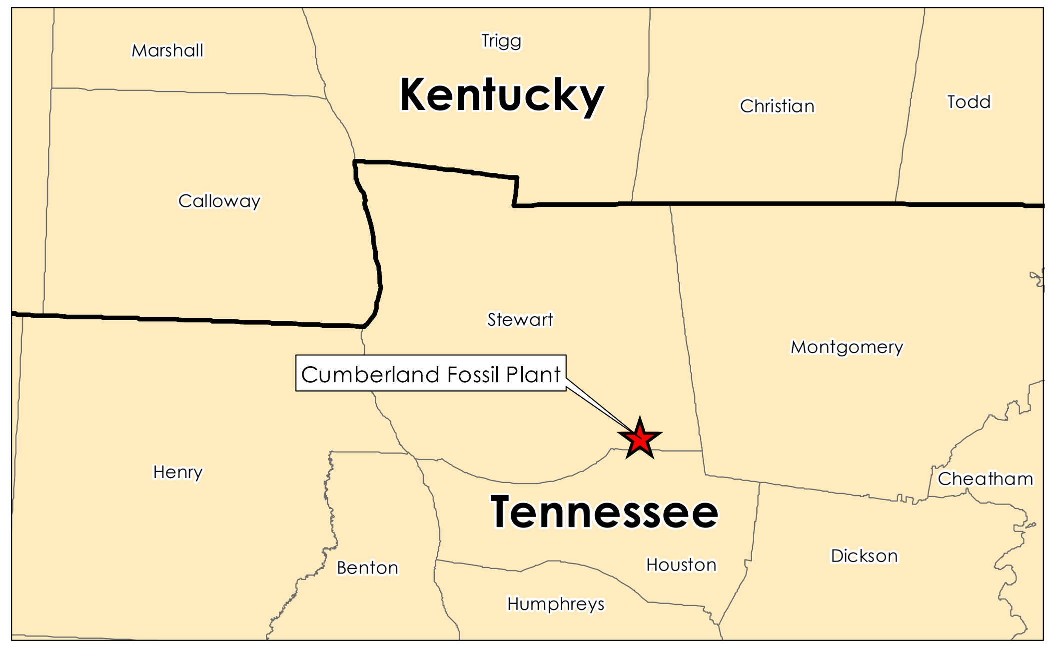
1:15,000 (At original document size of 22x34)

Legend

- Surface Streams Sampling Locations
- Surface Streams Sampling Locations – Transect
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022); Esri World Imagery
3. Note: Due to the dredging operations, surface water sampling in the Cumberland River was delayed until September. This sampling event is presented on Exhibits J.1-3 and J.1-3a.



Stantec TVA

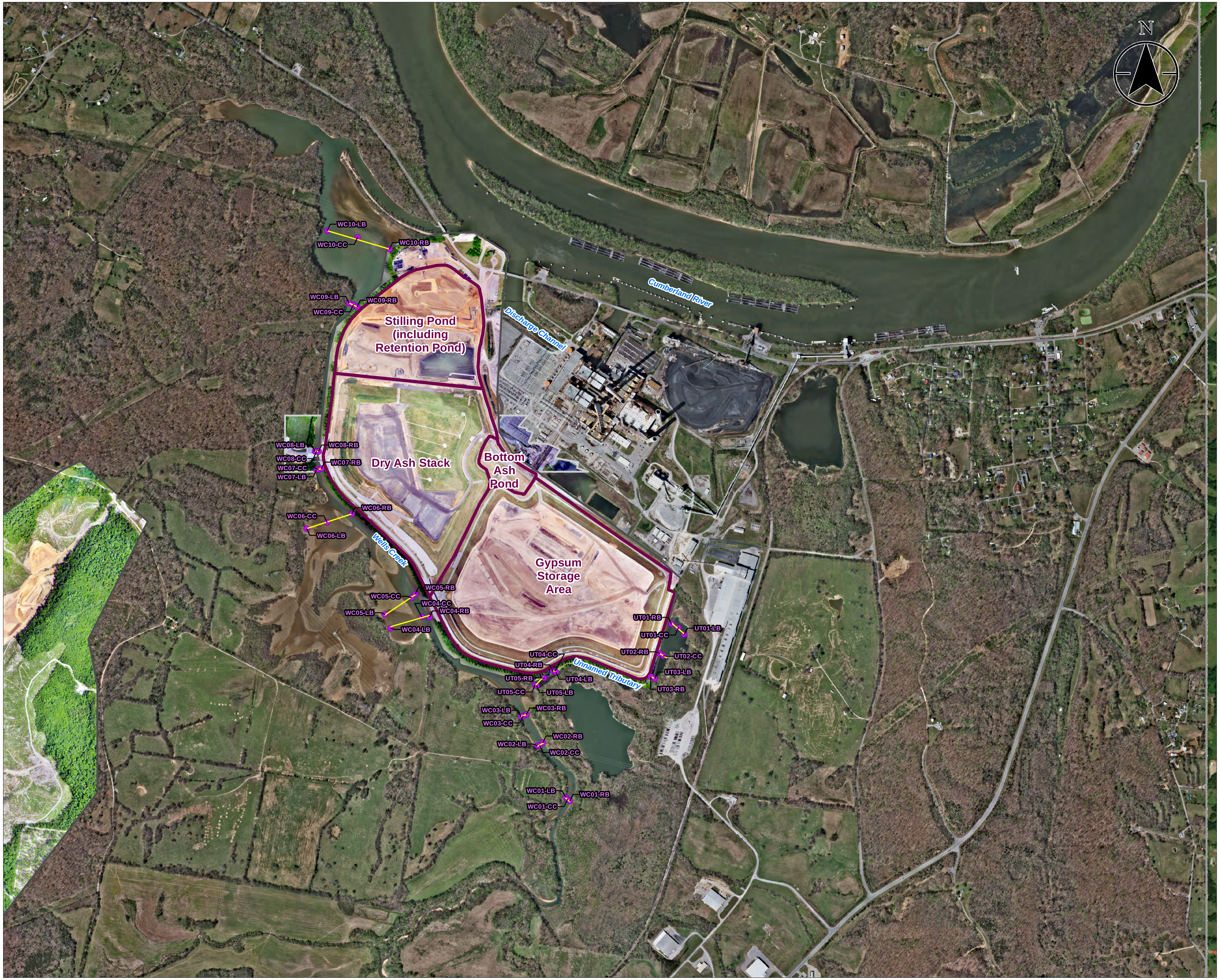


Exhibit No.

J.1-2a

Title

Surface Streams Sampling Locations - August 2019

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location 175568209

Stewart County, Tennessee

Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

0 650 1,300 1,950 2,600 Feet

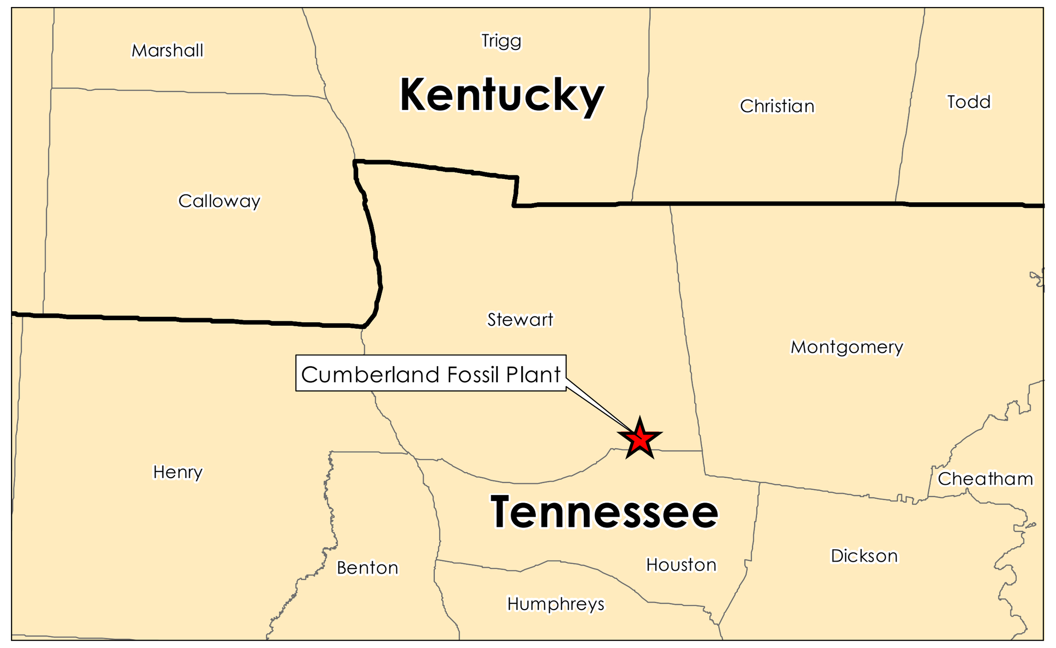
1:7,800 (At original document size of 22x34)

Legend

- Surface Streams Sampling Locations
- Surface Streams Sampling Locations – Transect
- 2017 Imagery Boundary
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022); Esri World Imagery
3. Note: Due to the dredging operations, surface water sampling in the Cumberland River was delayed until September. This sampling event is presented on Exhibits J.1-3 and J.1-3a.



Stantec TVA

U:\TVA-EIP\175568209_CUF_Phase2\gis\mxd\EAR\J.1-2a_SurfaceStream_Sampling_Location_August2019.mxd Revised: 2022-10-27 By: mbough

Exhibit No.

J.1-3

Title

Surface Stream Sampling Locations - September 2019

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

0 1,250 2,500 3,750 5,000 Feet

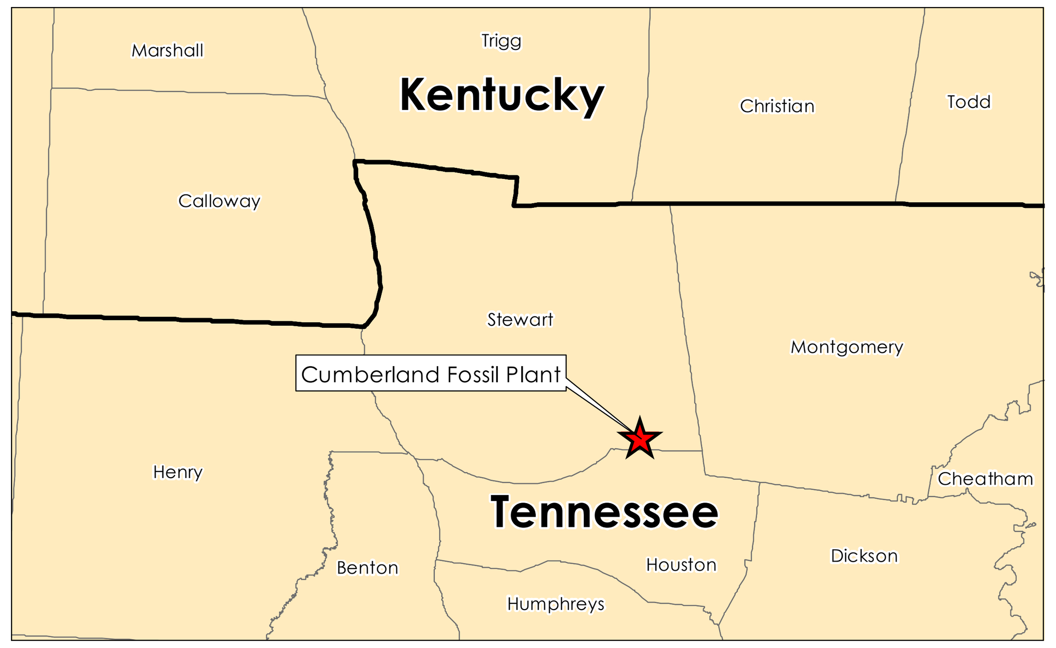
1:15,000 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022); Esri World Imagery



Stantec TVA

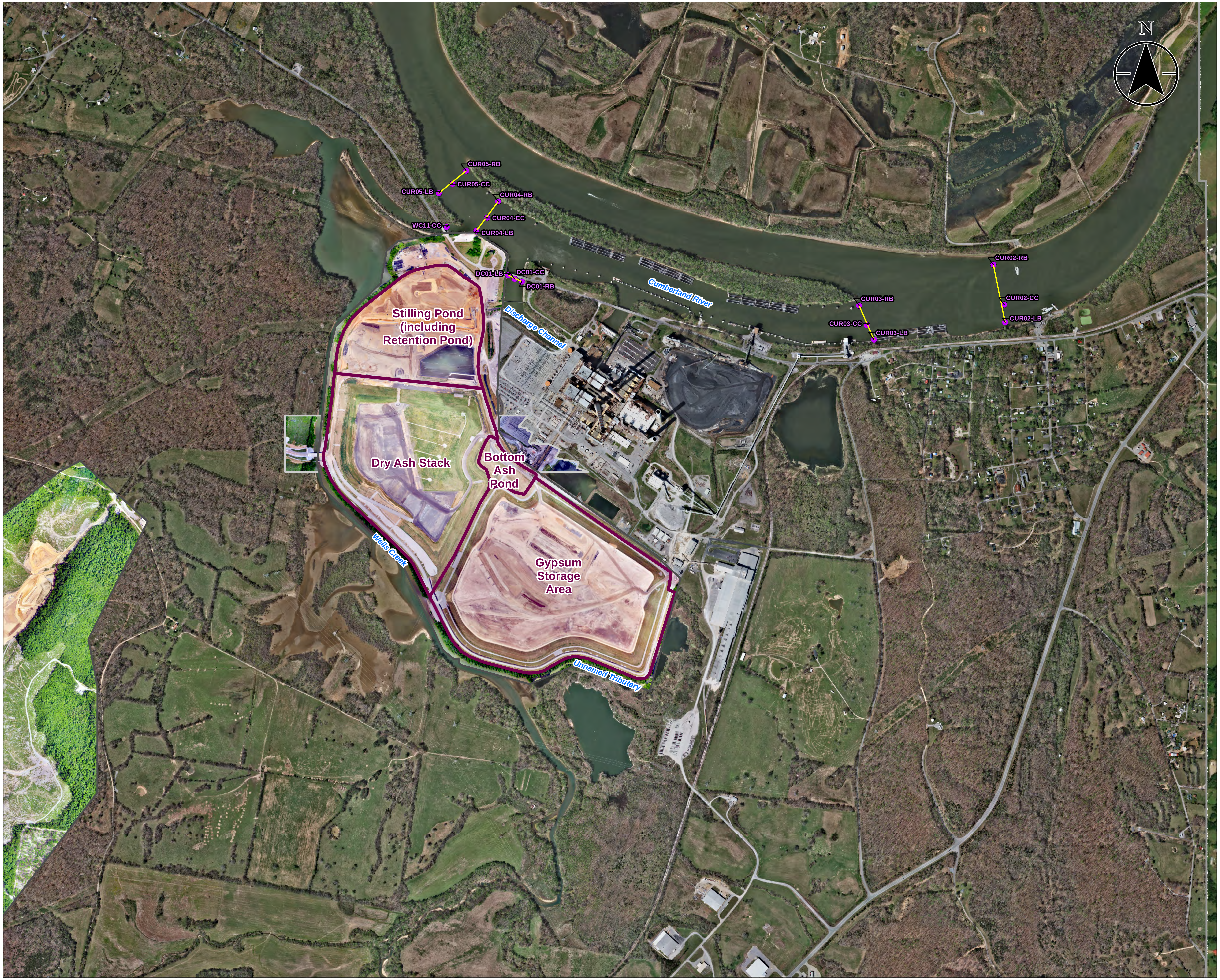


Exhibit No.
J.1-3a

Title

Surface Stream Sampling Locations - September 2019

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

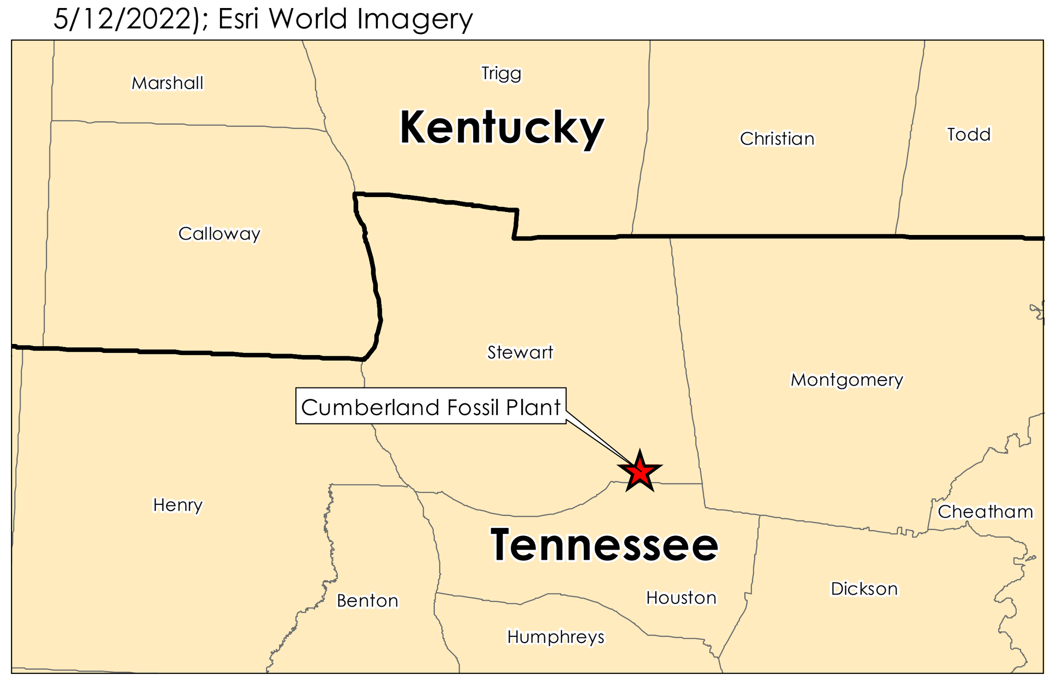
0 650 1,300 1,950 2,600 Feet
1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- 2017 Imagery Boundary
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022); Esri World Imagery



Stantec TVA

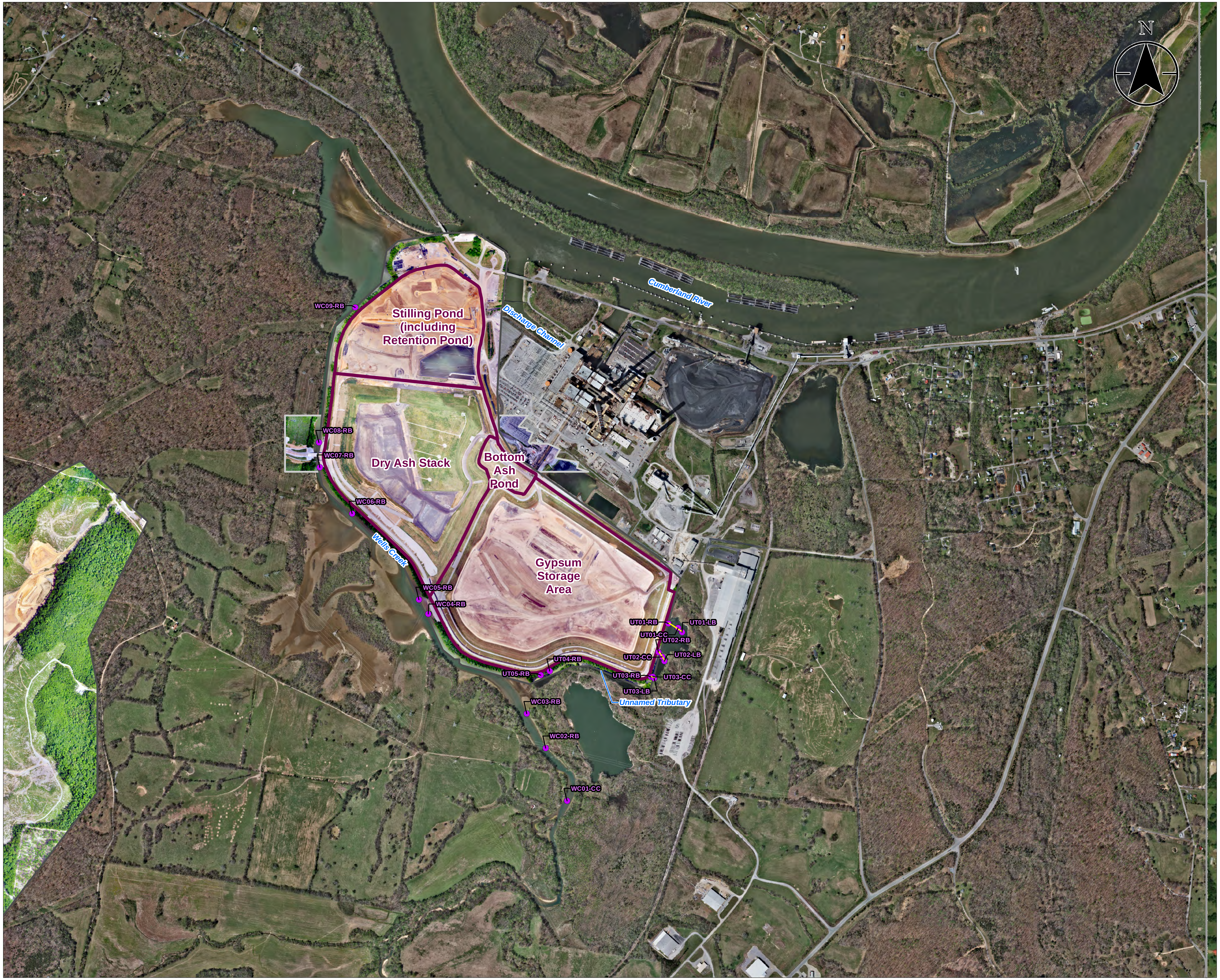


Exhibit No.

J.1-4

Title

Surface Stream Sampling Locations - December 2019

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

0 650 1,300 1,950 2,600 Feet

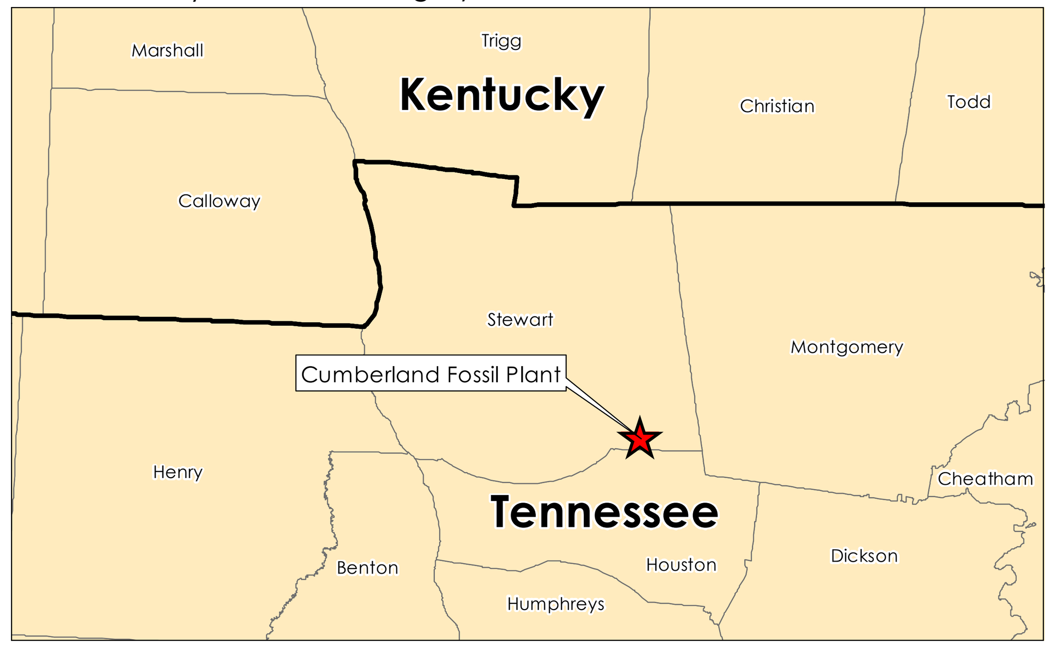
1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- 2017 Imagery Boundary
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022); Esri World Imagery



Stantec TVA

Exhibit No.

J.1-5

Title

Surface Stream Sampling Locations - May 2020

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2022-10-27
Technical Review by ME on 2022-10-27

0 650 1,300 1,950 2,600 Feet

1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- 2017 Imagery Boundary
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022); Esri World Imagery

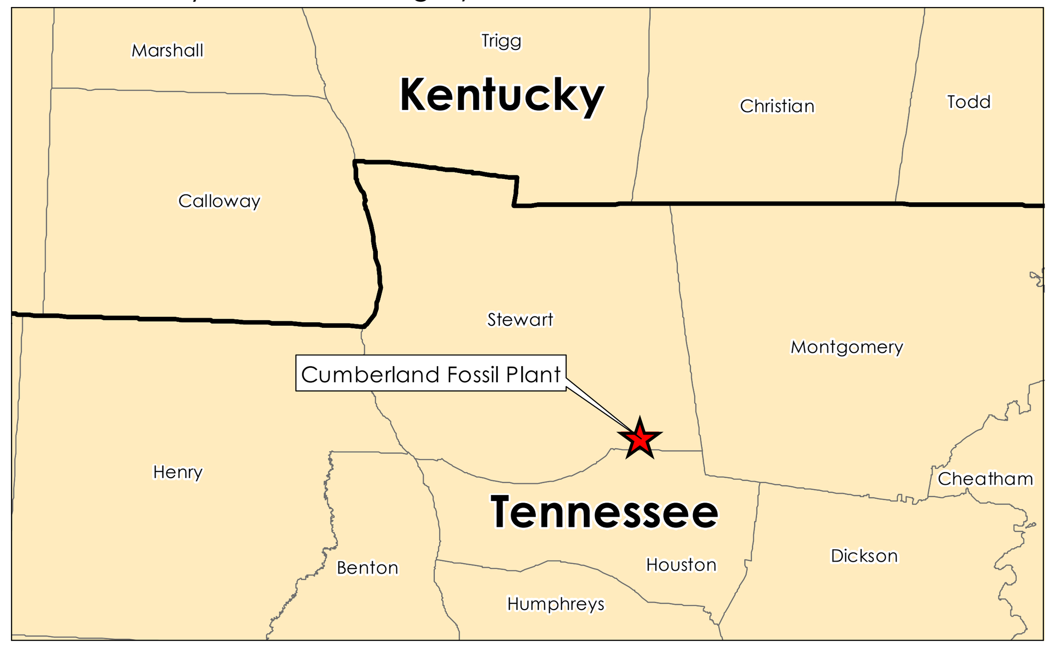


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Exhibit No.
J.1-6

Title
Phase 2 Surface Stream Sampling Locations – June 2021

Client/Project
Tennessee Valley Authority
Cumberland Fossil Plant

Project Location
Stewart County, Tennessee

175568209
Prepared by MB on 2022-12-13
Technical Review by JC on 2022-12-13

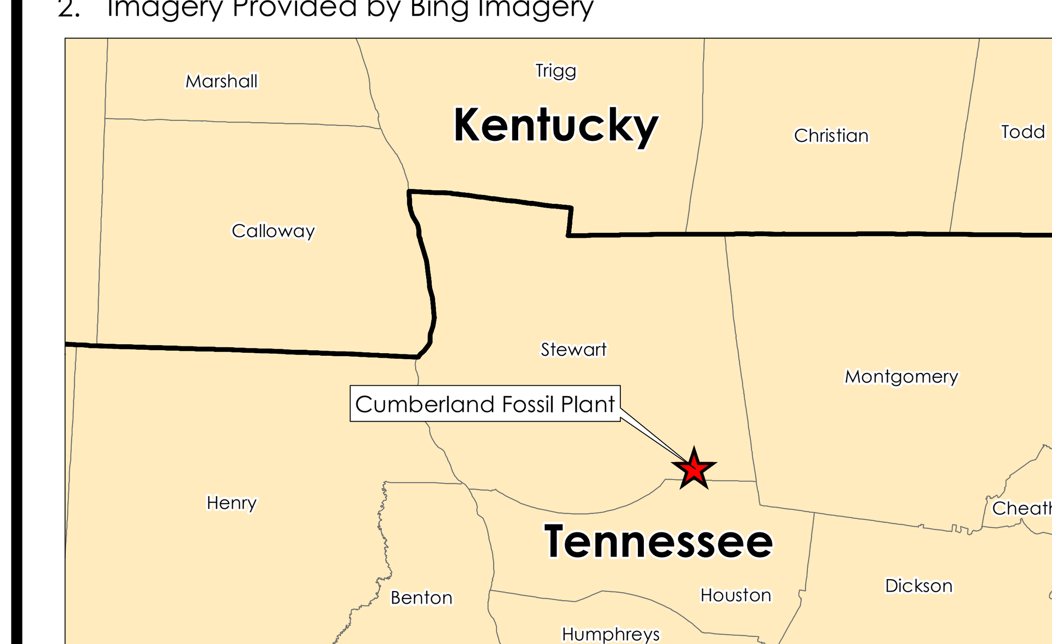
0 125 250 375 500 Feet
1:1,500 (At original document size of 22x34)

Legend

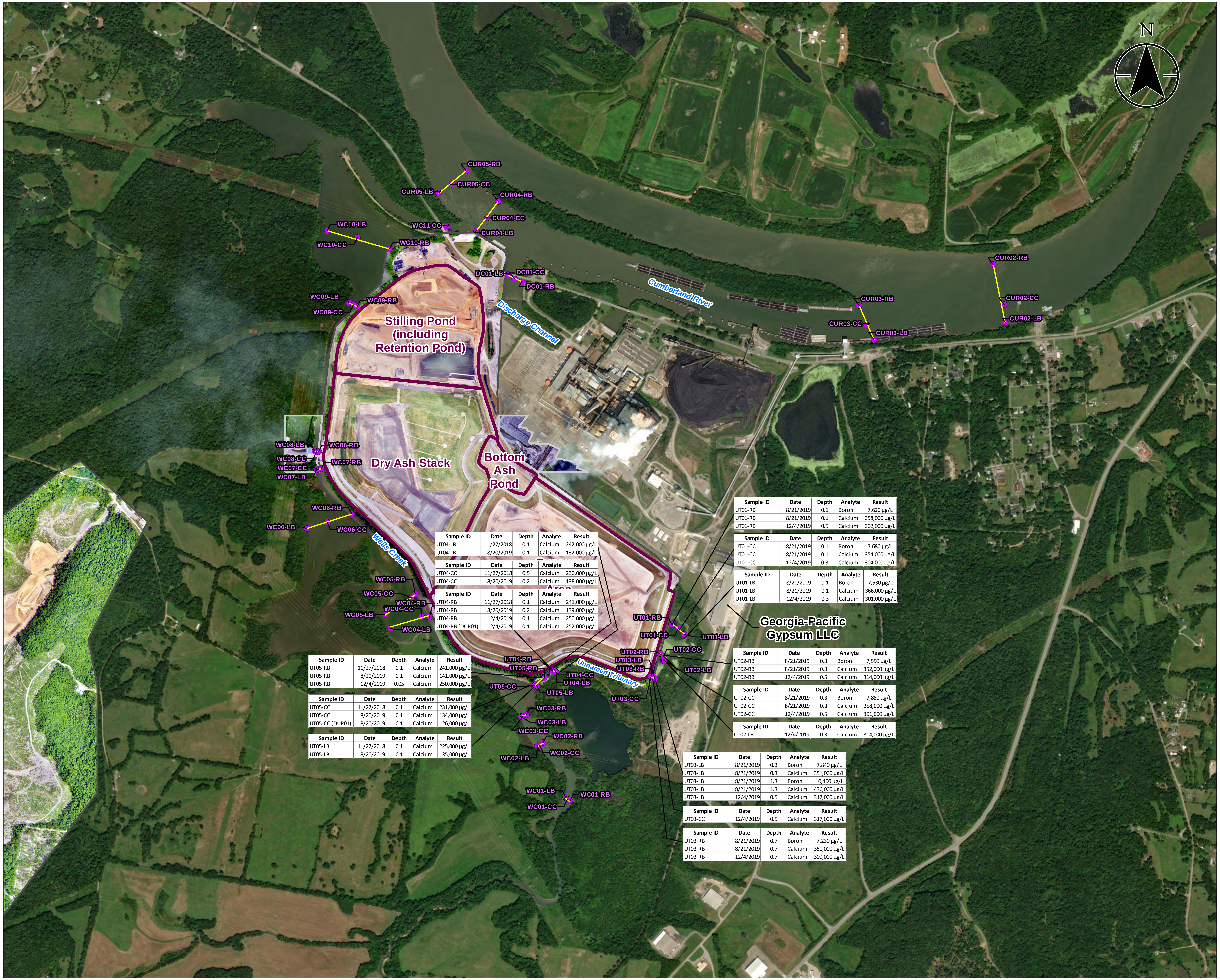
- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Bing Imagery



Stantec
TVA



Sample ID	Date	Depth	Analyte	Result
UT01-RB	8/21/2019	0.1	Boron	7,620 µg/L
UT01-RB	8/21/2019	0.1	Calcium	358,000 µg/L
UT01-RB	12/4/2019	0.5	Calcium	302,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT01-CC	8/21/2019	0.1	Boron	7,680 µg/L
UT01-CC	8/21/2019	0.1	Calcium	354,000 µg/L
UT01-CC	12/4/2019	0.3	Calcium	304,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT01-LB	8/21/2019	0.1	Boron	7,530 µg/L
UT01-LB	8/21/2019	0.1	Calcium	366,000 µg/L
UT01-LB	12/4/2019	0.3	Calcium	301,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT04-LB	11/27/2018	0.1	Calcium	242,000 µg/L
UT04-LB	8/20/2019	0.1	Calcium	132,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT04-CC	11/27/2018	0.5	Calcium	230,000 µg/L
UT04-CC	8/20/2019	0.2	Calcium	138,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT04-RB	11/27/2018	0.1	Calcium	241,000 µg/L
UT04-RB	8/20/2019	0.2	Calcium	139,000 µg/L
UT04-RB	12/4/2019	0.1	Calcium	250,000 µg/L
UT04-RB (DUP01)	12/4/2019	0.1	Calcium	252,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT05-RB	11/27/2018	0.1	Calcium	241,000 µg/L
UT05-RB	8/20/2019	0.1	Calcium	141,000 µg/L
UT05-RB	12/4/2019	0.05	Calcium	250,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT05-CC	11/27/2018	0.1	Calcium	231,000 µg/L
UT05-CC	8/20/2019	0.1	Calcium	134,000 µg/L
UT05-CC (DUP01)	8/20/2019	0.1	Calcium	126,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT05-LB	11/27/2018	0.1	Calcium	225,000 µg/L
UT05-LB	8/20/2019	0.1	Calcium	135,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT02-RB	8/21/2019	0.3	Boron	7,550 µg/L
UT02-RB	8/21/2019	0.3	Calcium	352,000 µg/L
UT02-RB	12/4/2019	0.5	Calcium	314,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT02-CC	8/21/2019	0.3	Boron	7,880 µg/L
UT02-CC	8/21/2019	0.3	Calcium	358,000 µg/L
UT02-CC	12/4/2019	0.5	Calcium	301,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT02-LB	12/4/2019	0.3	Calcium	314,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT03-LB	8/21/2019	0.3	Boron	7,840 µg/L
UT03-LB	8/21/2019	0.3	Calcium	351,000 µg/L
UT03-LB	8/21/2019	1.3	Boron	10,400 µg/L
UT03-LB	8/21/2019	1.3	Calcium	436,000 µg/L
UT03-LB	12/4/2019	0.5	Calcium	312,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT03-CC	12/4/2019	0.5	Calcium	317,000 µg/L

Sample ID	Date	Depth	Analyte	Result
UT03-RB	8/21/2019	0.7	Boron	7,230 µg/L
UT03-RB	8/21/2019	0.7	Calcium	350,000 µg/L
UT03-RB	12/4/2019	0.7	Calcium	309,000 µg/L

Exhibit No.
J.1-7

Title
Surface Stream Sampling Results above Ecological Screening Values

Client/Project
Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2022-12-12
Technical Review by ME on 2022-12-12

0 650 1,300 1,950 2,600 Feet
1:7,800 (At original document size of 22x34)

Legend

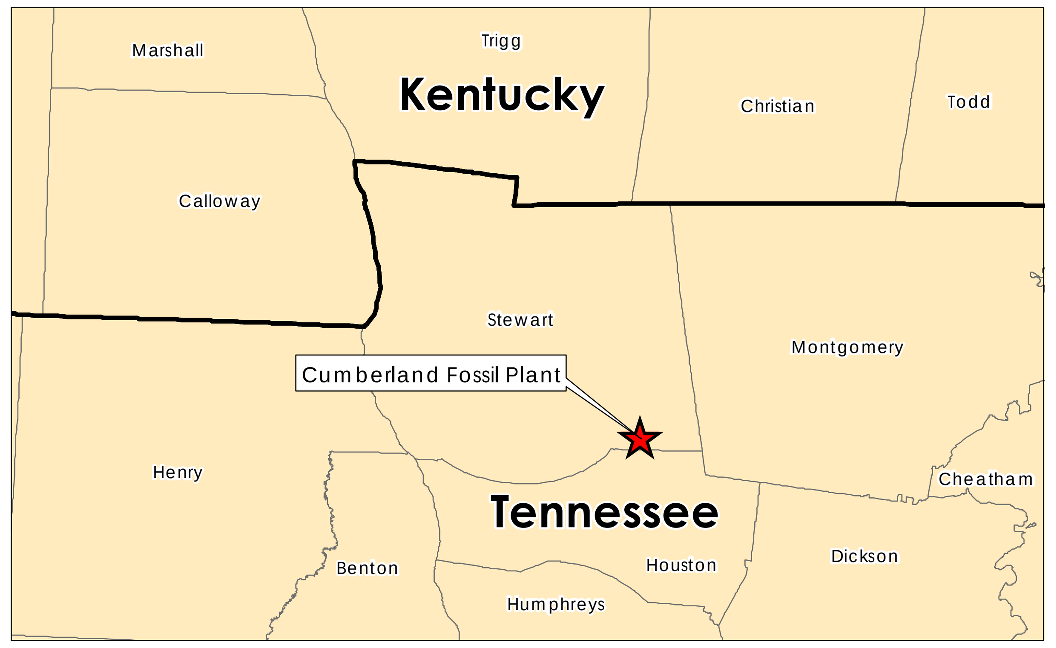
- Surface Stream Sampling Locations
- Surface Stream Sampling Locations - Transect
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

ESV - Ecological Screening Value
CC - Center Channel
RB- Right Bank
LB- Left Bank
µg/L - micrograms per Liter

Boron Acute ESV	34,000 µg/L
Boron Chronic ESV	7,200 µg/L
Calcium Chronic ESV	116,000 µg/L

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022) and Esri World Imagery
3. Note: Due to the dredging operations, surface water sampling in the Cumberland River was delayed until September. This sampling event is presented on Exhibits A.6 and A.6.1.



Stantec
TVA

V:\TVA-EIP\175568209_CUF_Phase2\gis\mxd\EAR\J.1-7_SurfaceStream_Sampling_Results_Above_ESV.mxd Revised: 2022-12-12 By: mbough

Exhibit No.
J.1-8

Title

Phase 2 Surface Stream Sampling Results above Ecological Screening Levels

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by MB on 2022-12-13
Technical Review by JC on 2022-12-13

0 125 250 375 500 Feet
1:1,500 (At original document size of 22x34)

Legend

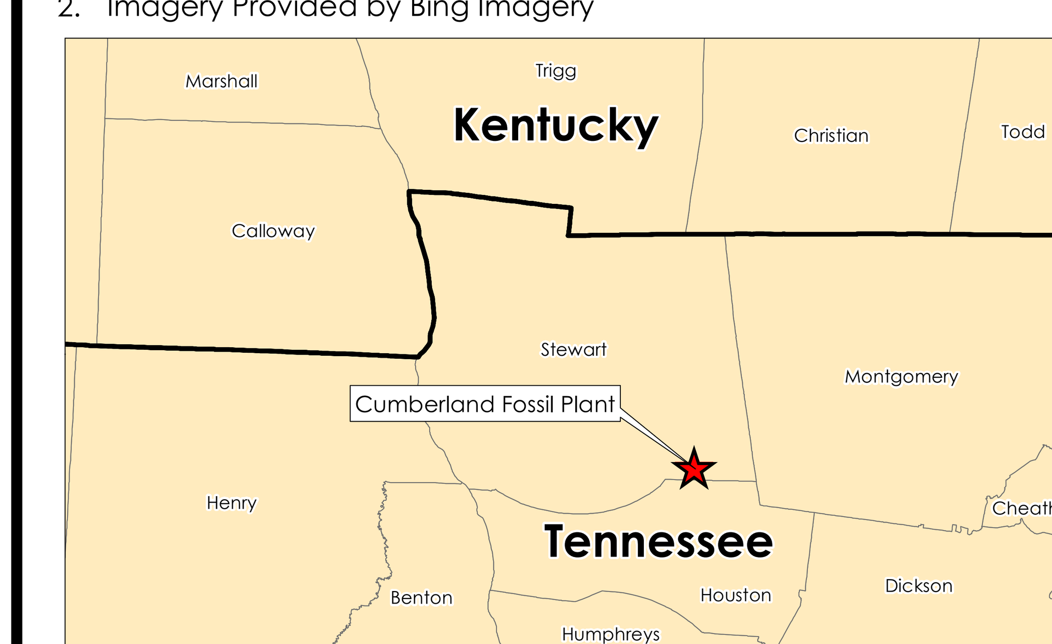
- Surface Stream Sampling Locations (Phase 2)
- Surface Stream Sampling Locations – Transect (Phase 2)
- CCR Unit Area (Approximate)

ESV - Ecological Screening Value
CC - Center Channel
RB- Right Bank
LB- Left Bank
µg/L - micrograms per Liter

Boron Acute ESV	34,000 µg/L
Boron Chronic ESV	7,200 µg/L
Calcium Chronic ESV	116,000 µg/L

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Bing Imagery



Stantec
TVA

APPENDIX J.2

SURFACE STREAM SAMPLING AND ANALYSIS REPORT

Cumberland Fossil Plant - Surface Stream Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Cumberland Fossil Plant
Cumberland City, Tennessee

November 22, 2021

Prepared by:

Tennessee Valley Authority
Chattanooga, Tennessee

Revision Record

Revision	Description	Date
0	Submittal to TDEC	November 2, 2021
1	Addresses November 22, 2021 TDEC Review Comments and Issued for TDEC	November 22, 2021

Table of Contents

LIST OF APPENDICES

APPENDIX A - EXHIBITS

APPENDIX B - TABLES

Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CEC	Civil and Environmental Consultants, Inc.
CFR	Code of Federal Regulations
COC	Chain-of-Custody
CUF Plant	Cumberland Fossil Plant
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
EnvStds	Environmental Standards, Inc.
GPS	Global Positioning System
ID	Identification
IDW	Investigation Derived Waste
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) has prepared this sampling and analysis report (SAR) to document completion of activities related to Phase 1 of the surface stream investigation at TVA's Cumberland Fossil Plant (CUF Plant) in Cumberland City, Tennessee.

The purpose of the surface stream investigation is to collect stream samples to characterize surface stream water quality conditions in the vicinity of the CUF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The Surface Stream Sampling and Analysis Plan (SAP) (Stantec 2018a) provides a phased approach for evaluating potential impacts of Coal Combustion Residuals (CCR) on surface streams in the vicinity of the CUF Plant. The purpose of this SAR is to document the work performed and to present the information and data collected during the execution of Phase 1 of the Surface Stream SAP. This SAR is not intended to provide conclusions or evaluate results. The scope of the surface stream investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the CUF Plant. The evaluation of the results will consider other aspects of the environmental investigation, as well as data collected under other State a CCR programs, and will be presented in the Environmental Assessment Report (EAR).

Phase 1 surface stream investigation activities were performed in general accordance with the following documents developed by TVA to satisfy the requirements of the TDEC Order at the CUF Plant:

- *Surface Stream SAP* (Stantec 2018a)
- *Benthic SAP* (Stantec 2018b)
- *Environmental Investigation Plan (EIP)* (Stantec 2018c)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

Phase 1 of the surface stream investigation was implemented in accordance with TVA- and TDEC-approved Programmatic and Project-specific changes. Variations in scope and procedures from those outlined in the Surface Stream SAP and occurring during field activities due to field conditions and programmatic updates are referenced in Section 3.6.

Phase 1 surface stream investigation field activities were completed in seven field mobilizations between November 5, 2018 and May 27, 2020. TVA personnel performed the field work activities. Laboratory analysis of constituents was performed by Eurofins TestAmerica, Inc. (TestAmerica) in Pittsburgh, Pennsylvania, and St. Louis, Missouri (radium samples only). Additional Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

Ash content in sediment samples collected from the two upstream-most impoundments on the unnamed tributary to Wells Creek (herein referred to as the 'Unnamed Tributary') was above the 20 percent ash Phase 2 trigger level. In accordance with the Benthic SAP, the retained sediment samples collected from deeper strata within this upper reach of the Unnamed Tributary were analyzed for CCR-related constituents. In addition, a Phase 2 *Benthic and Surface Stream SAPs – Addendum* 1 (Stantec 2021) was prepared and implemented in June and July 2021. The results from the Phase 2 sampling are not yet available; these data will be reported in a future update of the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objective of the investigation conducted pursuant to the Surface Stream SAP was to characterize surface stream water quality on or adjacent to the CUF Plant property in response to the TDEC Order. The investigation included samples collected from locations upstream of, adjacent to, and downstream of the CUF Plant CCR units. The phased approach for the surface stream investigation was to:

- Phase 1: Collect field measurements of water quality parameters and surface stream samples for chemical analyses at SAP specified locations during two seasonal sampling events to evaluate the potential presence of constituents related to CCR in surface streams.
- Phase 2: Collect additional surface stream samples where ash content exceeded 20% in one or more of the sediment samples collected in accordance with the CUF Plant Benthic SAP.

The scope of work for Phase 1 of the surface stream investigation consisted of sampling at 24 transect locations (up to 72 individual stations) during two different seasonal periods. This SAR describes the activities related to sampling events performed between November 5, 2018 and May 27, 2020, the scope of which included:

- Verifying and documenting sampling locations using global positioning system (GPS) coordinates
- Collecting in-situ field measurements of surface water quality parameters
- Collecting surface water grab samples and associated quality control (QC) samples for laboratory analysis.

Phase 2 was implemented because ash content in sediment samples collected from the two upstream-most impoundments on the Unnamed Tributary was above the 20 percent ash Phase 2 trigger level. A Phase 2 *Benthic and Surface Stream SAPs – Addendum* 1 (Stantec 2021) was prepared to describe a Phase 2 supplemental investigation to further characterize sediment and surface stream water quality in the Unnamed Tributary and immediate downstream of its confluence with Wells Creek. Phase 2 sampling was conducted in June and July 2021. The results from implementation of the Benthic and Surface Stream SAPs Addendum 1 are not yet available; these data will be reported in a future update of the EAR.

3.0 FIELD ACTIVITIES

Surface stream investigation field activities were conducted between November 5, 2018 and May 27, 2020. Due to appreciable rainfall during 2018 through 2020, there were extended periods when flows in the Cumberland River where above the flow restrictions specified in the SAP (see Section 3.3.1). This necessitated several mobilization to complete the Phase 1 scope of work. In addition, the Unnamed Tributary is located along the southeastern boundary of the CUF Plant and is partly on Georgia-Pacific Gypsum LLC property. An access agreement was establish in July 2019 that allowed sampling to be performed throughout the Unnamed Tributary.

The sampling events and the transect locations sampled are provided below.

- November 5, 2018 – Cumberland River (transects CuR01, CuR02, CuR03, CuR06, and CuR07)
- November 27, 28, and 29, 2018 – Wells Creek (transects WC01-WC10) and lower reach of the Unnamed Tributary (transects UT04 and UT05)
- August 13, 2019 – Wells Creek (transects WC01-WC10)
- August 20 and 21, 2019 – Unnamed Tributary (all transect locations)
- September 4, 2019 – Cumberland River (all transect locations), Discharge Channel (transect DC01), and Wells Creek (transect WC11)
- December 4 and 5, 2019 – Upper reach of the Unnamed Tributary (transects UT01, UT02, and UT03), and additional sample collections on the lower reach of the Unnamed Tributary (transects UT04 and UT05) and on Wells Creek (transects WC01-WC09)
- May 27, 2020 – Cumberland River (transects CuR02, CuR04, CuR05, CuR06), Discharge Channel (transect DC01), and Wells Creek (transect WC11).

TVA performed sample collection activities based on guidance and specifications listed in TVA's Technical Instructions (TIs), the SAP, and the QAPP, except as noted in the Variations section of this report (Section 3.6). As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under contract with TVA. EnvStds also conducted audits of field activities and provided quality reviews of field documentation. In addition, Civil and Environmental Consultants, Inc. (CEC), on behalf of TDEC, accompanied TVA during surface stream sampling on November 29, 2018, and May 27, 2020. CEC obtained split samples from stations CUF-WC05-CC, CUF-WC05-RB, and CUF-WC04-RB in November 2018, and from each station and sample depth along transect CUF-CuR05 in May 2020.

During the surface stream investigation, TVA:

- Verified that stream conditions met the flow requirements specified in the SAP or the flow variance was approved by TDEC

- Verified and documented sampling locations using the GPS
- Collected surface stream analytical samples from the 24 transects specified in the SAP during two seasonal sampling events
- Recorded field measurements of surface stream water quality parameters at the sampled stations
- Collected QC samples including 14 matrix spike/matrix spike duplicate/lab duplicates, 15 field duplicates, 14 field banks, 12 equipment blanks and 12 filter blanks
- Shipped the collected surface stream samples via commercial courier service to TestAmerica for analysis.

Details on each activity are presented in the sections below.

3.1 SAMPLING LOCATIONS

Surface stream sampling was conducted at 24 transect locations under the surface stream investigation scope of work. The TDEC Order CCR units at the CUF Plant as well as the surface stream sampling locations are shown on Exhibits A.1, A.1a, A.2, A.2a, A.3, A.3a, A.4, A.4a, A.5, and A.6 in Appendix A. Table B.1 provides a summary of the sampling locations. Table B.2 summarizes the corresponding sampling locations for the surface stream, benthic, and fish tissue investigations, as identified in their respective SAPs.

Sampling locations consisted of seven transects on the Cumberland River, eleven transects on Wells Creek, five transects on the Unnamed Tributary, and one transect in the CUF Plant cooling water discharge channel. These locations were selected to generally coincide with the sediment sample locations (Stantec 2018b). Transects extended across the width of the stream perpendicular to the direction of flow. Three sampling stations were proposed along each transect; the stream thalweg (deepest point), left bank, and right bank stations. “Left bank” and “right bank” were determined with a downstream-facing orientation. However, as allowed for in the Surface Stream SAP, the number of sampling stations was adjusted to accommodate shallow and/or narrow sampling transects. In total, samples were collected at 70 of the 72 proposed stations; only the center channel station was sampled at WC11 due to the narrow width of the channel. Additionally, the number of stations sampled varied by season due to changes in water depth and stream width. Similarly, depending on water depth at a station, surface, mid-depth, and/or epibenthic (within 0.5 meters of the streambed) samples were collected. Surface stream samples collected during this investigation are summarized in Table B.3 in Appendix B.

3.2 **DOCUMENTATION**

TVA maintained field documentation in accordance with TVA TI ENV-TI-05.80.03, *Field Record Keeping* and the QAPP. Field activities were recorded in field logbooks. Health and safety forms were completed in accordance with TVA health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

TVA used program-specific field forms and field logbooks to record field observations and data for specific activities. Field forms used during the surface stream investigation included:

- *Field Standardization of Instruments Form*
- *Water Quality Data Field Sheet*
- *Chain-of-Custody (COC).*

3.2.1.1 Field Logbook

TVA field sampling personnel recorded field activities, observations, and supporting information (e.g., GPS coordinates, sample collection depths) in field logbooks to chronologically document the activities and progress of the field program. Deviations from the SAP, TIs, or QAPP were documented in the field logbooks.

3.2.1.2 Field Standardization of Instruments Form

TVA field sampling personnel performed daily calibrations of multi-parameter sondes and documented the results on TVA Form 30035, *Field Standardization of Instruments*. The form documents temperature verification and calibration results for dissolved oxygen, pH, specific conductance, turbidity, and oxidation-reduction potential (ORP), and verifies that the field instrument used was operating within acceptance criteria. Additional information on equipment calibration is provided in Section 3.2.2.

3.2.1.3 Water Quality Data Field Sheet

TVA field sampling personnel electronically logged the field parameters measured by the multi-parameter sondes using Hydrolab™ Surveyor 4a data loggers. Field measurement also were recorded on the *Water Quality Data Field Sheet*.

3.2.1.4 Chain-of-Custody Forms

TVA field sampling personnel completed *COCs*, listing each surface stream sample. The sample identification (ID), sample location, sample depth, type of sample, sample date and time, analyses requested, and sample custody record were recorded on the *COCs*. The Field Team Leader or designee reviewed the *COCs* for completeness and correctness, and a QC check was performed for samples in each cooler comparing sample IDs to those on the corresponding *COC*. *COC*s were completed in accordance with *ENV-TI-05.80.02, Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to measure water quality parameters were calibrated each day prior to use as specified by the SAP, QAPP, and TVA Technical Instruction ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde*. Post-sampling verifications of field instrument calibrations were performed to evaluate whether instruments remained within acceptance criteria throughout the event. Temperature readings were verified using a calibrated National Institute of Standards and Technology-traceable thermometer. Barometric pressures were determined using a portable barometer calibrated using National Weather Service barometric pressure readings at Lovell Field (KCHA) in Chattanooga, Tennessee. Additional details regarding equipment calibration were recorded on a *Field Standardization of Instruments Form*, as described in Section 3.2.1.2.

3.3 SAMPLING METHODS

The following sections present data collection and sampling procedures used in the surface stream investigation.

3.3.1 Streamflow

Streamflow during sampling events on the Cumberland River was within the seasonal interquartile range (25th to 75th percentile) with the exception of the May 27, 2020 sampling event. Based on analysis of the mean daily flows for the Cumberland River at Cheatham Dam during the period between 1985 through 2017, mean daily flow on May 27, 2020 was approximately 1300cfs above the spring 75th percentile. Additional information is provided in Section 3.6.2, Variations in Procedures.

3.3.2 Thermal Stratification

The water column was thermally stratified in the Cumberland River during the September 2019 and May 2020 sampling events, and in Wells Creek and the Unnamed Tributary during the August 2019 sampling event.

3.3.3 Surface Stream Field Measurements

A Hydrolab™ DS5X multi-parameter sonde was used to record a water column profile of conventional water quality parameters at approximately one-meter depth intervals at each sample station in accordance with the SAP and ENV-TI-05.80.46, *Field Measurement Using A Multi-Parameter Sonde*. These parameters included:

- Temperature (degrees Celsius)
- Dissolved Oxygen (milligrams per liter)
- Specific Conductance (microsiemens per centimeter)
- ORP (millivolts)
- pH (Standard Units)
- Turbidity (Nephelometric Turbidity Units).

3.3.4 Surface Stream Analytical Samples

Surface stream samples were collected using peristaltic pumps equipped with dedicated, certified clean tubing for each sample. Discrete samples were collected in accordance with ENV-TI-05.80.40, *Surface Water Sampling*. Analytical samples, including field duplicates, were collected from surface stream stations as shown in Table B.3 in Appendix B. Split samples collected by CEC during this investigation are also identified in Table B.3.

Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line. Field sampling personnel wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when collecting and handling samples at each station. When filling sample bottles, care was taken to avoid overfilling and diluting preservatives. Sample containers were filled in thirds. Sample containers for radium analysis were filled and capped first, before filling additional bottles. Next, sample containers for total suspended solids, total dissolved solids, and anions were filled and capped, then sample containers for total metals and dissolved metals were filled and capped individually. Dissolved metals samples were filtered during sample collection at each location by attaching a new, certified clean high-capacity inline 0.45-micron filter to the pump discharge line. These filters were treated as single-use filters and were discarded after each sample collection.

Samples were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* Field sampling personnel secured caps on each sample container, attached a signed and dated custody seal across the cap, and placed the samples in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with TVA ENV-TI-05.80.04, *Field Sampling Quality Control.*

Surface stream samples were analyzed for the CCR-related constituents listed in Appendices III and IV of Title 40 of the Code of Federal Regulations (CFR) Part 257 (40 CFR 257). In addition, in order to maintain continuity with other TDEC environmental programs, five inorganic constituents (copper, nickel, silver, vanadium, and zinc) listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV also were analyzed. The combined federal CCR Appendices III and IV constituents and TDEC Appendix I inorganic constituents are hereafter be referred to collectively as “CCR Parameters” for the surface stream investigation. For geochemical evaluation, additional cations were included supplemental to the CCR Parameters. The additional geochemical parameters included magnesium, manganese, and iron.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during the surface stream investigation included:

- Used calibration solutions
- Decontamination fluids
- Disposable personal protective equipment (PPE)
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; the CUF Plant-specific waste management plan; and local, state, and federal regulations. Calibration solutions used onsite were containerized and stored for disposal as directed by the CUF Plant facility management. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were placed in garbage bags and disposed of in a general trash dumpster onsite or at another TVA facility.

3.5 SAMPLE SHIPMENT

Samples were packed, transported, and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. Samples were shipped via a commercial courier to either the TestAmerica facility in Nashville, Tennessee, or in Pittsburgh, Pennsylvania, for official sample login. Once samples were logged, the radium samples were shipped under internal lab protocols to the TestAmerica St. Louis, Missouri, laboratory. TestAmerica submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the surface stream investigation were outlined in the SAP, QAPP, and applicable TVA TIs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for the surface stream investigation at the CUF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- The Surface Stream SAP for Phase 1 was written such that velocity of the streamflow would be measured at each surface water sampling station. As approved by TDEC, velocity was not measured.
- A cooler containing four of 10 radium samples collected from transect STR-CuR04 on May 27, 2020 was misplaced by the courier. The six radium samples from transect STR-CuR04 that were analyzed included samples collected from each station (thalweg, left bank, and right bank). As approved by TDEC, supplemental surface water samples were not collected from transect STR-CuR04.
- On December 4, 2019, additional surface water samples were collected from the right-bank stations on the Unnamed Tributary transects STR-UT04 and STR-UT05. These samples were collected to coincide with the seasonal sampling event at stations farther upstream on the Unnamed Tributary. The collected samples were analyzed for the CCR Parameters and the additional geochemical parameters.

- On December 5, 2019, to assist in characterizing surface water quality in Wells Creek, additional surface water samples were collected at the center channel station at STR-WC01 and at each right-bank station on transects STR-WC02 through STR-WC09. The collected samples were analyzed for the CCR Parameters and the additional geochemical parameters.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- The Surface Stream SAP for Phase 1 was written such that streamflow during sampling events should be within the seasonal or monthly interquartile range (25th to 75th percentile) based on analysis of the mean daily flows at the nearest United States Geological Survey (USGS) gauge. Based on analysis of the mean daily flows for the Cumberland River at Cheatham Dam during the period between 1985 through 2017, mean daily flow in the Cumberland River during the May 27, 2020 sampling event was approximately 1,300 cubic feet per second above the 75th percentile. Due to appreciable rainfall during 2018 through 2020, there were extended periods when flows in the Cumberland River where above the flow restrictions specified in the SAP. Therefore, given this minimal exceedance of the 75th percentile, TDEC approved the May 2020 sampling.

- Surface stream samples were not collect from the mid-epilimnion or the mid-hypolimnion at three center channel stations (STR-CuR04-CC, STR-CuR05-CC, and STR-CuR06-CC) in the Cumberland River that exhibited thermal stratification during the September 2019 sampling event. Thermal differences up to approximately 6°C were measured within the water column upstream and downstream of the CUF Plant cooling water discharge. Upstream of the CUF Plant, the greatest temperature changes occurred in the upper water column (0.5 to 1.5 meters or 0.5 to 3.0 meters). Downstream of the CUF Plant, water temperature readings were reported as variable as the heated cooling water dispersed across the river channel and mixed within the upper water column. At the aforementioned center channel stations, surface stream water samples were collected from the surface, mid-water column, and epibenthic depths defined in the SAP for stations not exhibiting thermal stratification. However, further review of the water column profiles indicates that surface stream water samples should have been collected from the surface, mid-epilimnion, mid-hypolimnion, and epibenthic depths as defined in the SAP for stations exhibiting thermal stratification. At station STR-CuR04-CC, the demarcation of epilimnetic water (i.e., surface water composed largely of water from the heated discharge), the thermocline (between 5 and 7 meters), and hypolimnetic water was distinct. At stations STR-CuR05-CC and STR-CuR06–CC, water temperatures changed appreciably in the upper six meters of the water column, but the demarcation of cooler hypolimnetic water was distinct. The other in situ measured parameters exhibited little to no change within the water column at these sampling stations.

- The Surface Stream SAP for Phase 1 was written such that sediment and surface stream sampling were anticipated to be conducted during the same sampling event. However, concurrent sampling was not desirable due to the differing logistics for the two sampling methodologies, the difficulty of obtaining depositional sediments in a riverine environment (i.e., mainstream of the Cumberland River within the CUF Plant study area), the amount of equipment required to sample both matrices concurrently, and the increased potential for cross-contamination. In addition, the goal of surface stream sampling includes collecting samples from a waterbody within as short a timeframe as possible in order to limit potential differences in water quality conditions resulting from day-to-day variances in reservoir operations, runoff, and other climatic conditions. Based on these considerations, TDEC approved sediment and surface stream sampling to be performed at different times.

4.0 SUMMARY

The data presented in this report are from the surface stream investigation sampling at the CUF Plant. The scope of work during this investigation included Phase 1 surface stream sampling at 24 transect locations (70 individual stations) during two seasonal sampling events. Phase 1 sampling was performed between November 5, 2018 and May 27, 2020. An additional surface water sampling event was conducted in the lower reach of the Unnamed Tributary (STR-UT04 and STR-UT05) and in Wells Creek (STR-WC01 through STR-WC09) in December 2019.

A summary of samples collected, along with field duplicates, is presented in Table B.3. Surface stream field measurements are presented in Table B.4. Analytical data for CCR Parameters and geochemical parameters are presented in Table B.5. Analytical data were reported by TestAmerica and data verification or validation was performed by EnvStds.

TVA has completed Phase 1 of the surface stream investigation at the CUF Plant in Cumberland City, Tennessee, in accordance with the Surface Stream SAP and TDEC-approved SAP modifications, as documented herein. The data collected during Phase 1 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete dataset from Phase 1 of the surface stream investigation will be evaluated along with data collected under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This evaluation will be provided in the EAR.

Based on the collective results from Phase 1 sediment and surface stream sampling, an addendum to the CUF Plant Benthic and Surface Stream SAPs was prepared to describe a Phase 2 supplemental investigation to further characterize sediment and surface stream water quality in the Unnamed Tributary and immediate downstream of its confluence with Wells Creek. Phase 2 supplemental sediment and surface stream sampling was conducted in June and July 2021 in accordance with the *Benthic and Surface Stream SAP - Addendum 1*. Sampling and analysis results for the Phase 2 sampling are not yet available; those data will be evaluated and reported in a future update of the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Cumberland Fossil Plant Environment Investigation. Revision 2.* Prepared for Tennessee Valley Authority. January 2018.

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Tennessee Department of Environment and Conservation (TDEC). 2015. *Commissioner's Order No. OGC15-0177.* August 6, 2015.

Tennessee Valley Authority (TVA), ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA, ENV-TI-05.80.03, *Field Record Keeping*.

TVA, ENV-TI-05.80.04, *Field Sampling Quality Control*.

TVA, ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*.

TVA, ENV-TI-05.80.06, *Handling and Shipping of Samples*.

TVA, ENV-TI-05.80.40, *Surface Water Sampling*.

TVA, ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde*.

APPENDIX A - EXHIBITS

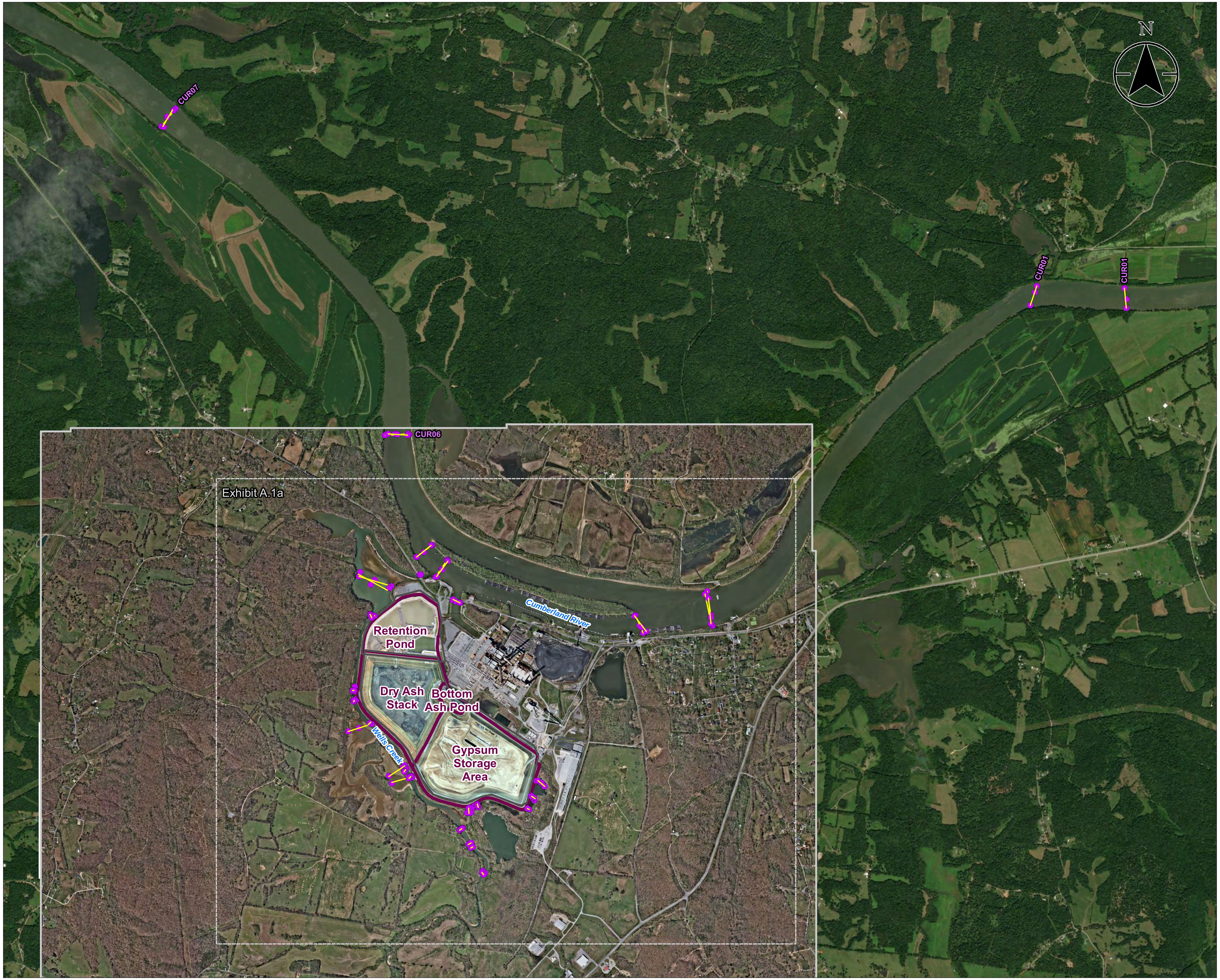


Exhibit No.
A.1

Title
Surface Stream Sampling Locations - TDEC Order Sampling Events

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2021-08-25
Technical Review by ME on 2021-08-25

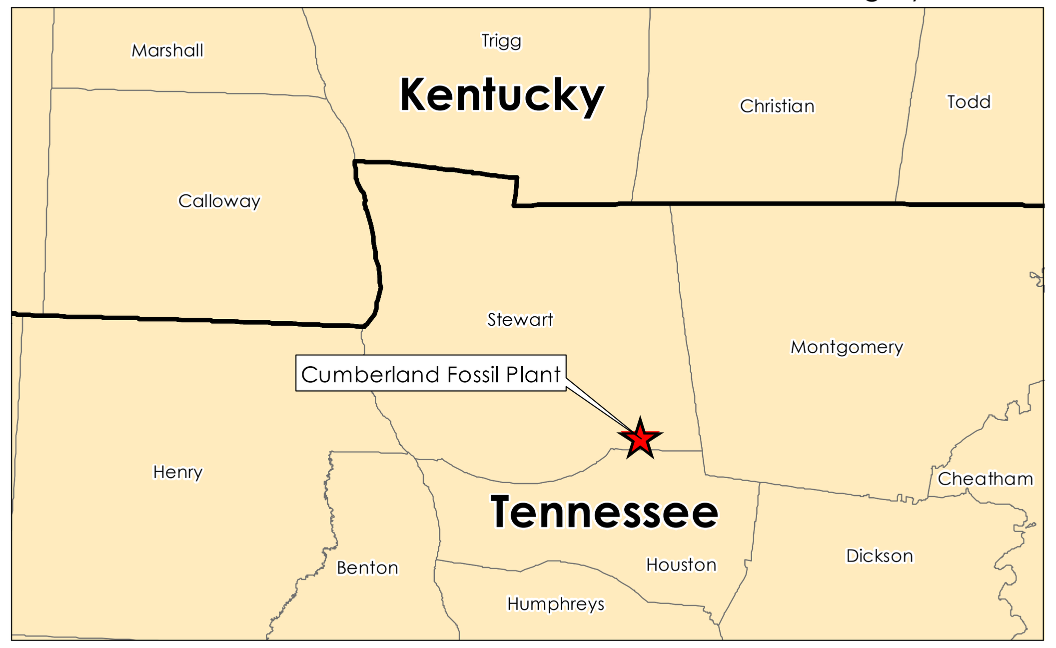
0 1,250 2,500 3,750 5,000 Feet
1:15,000 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery



Stantec TVA

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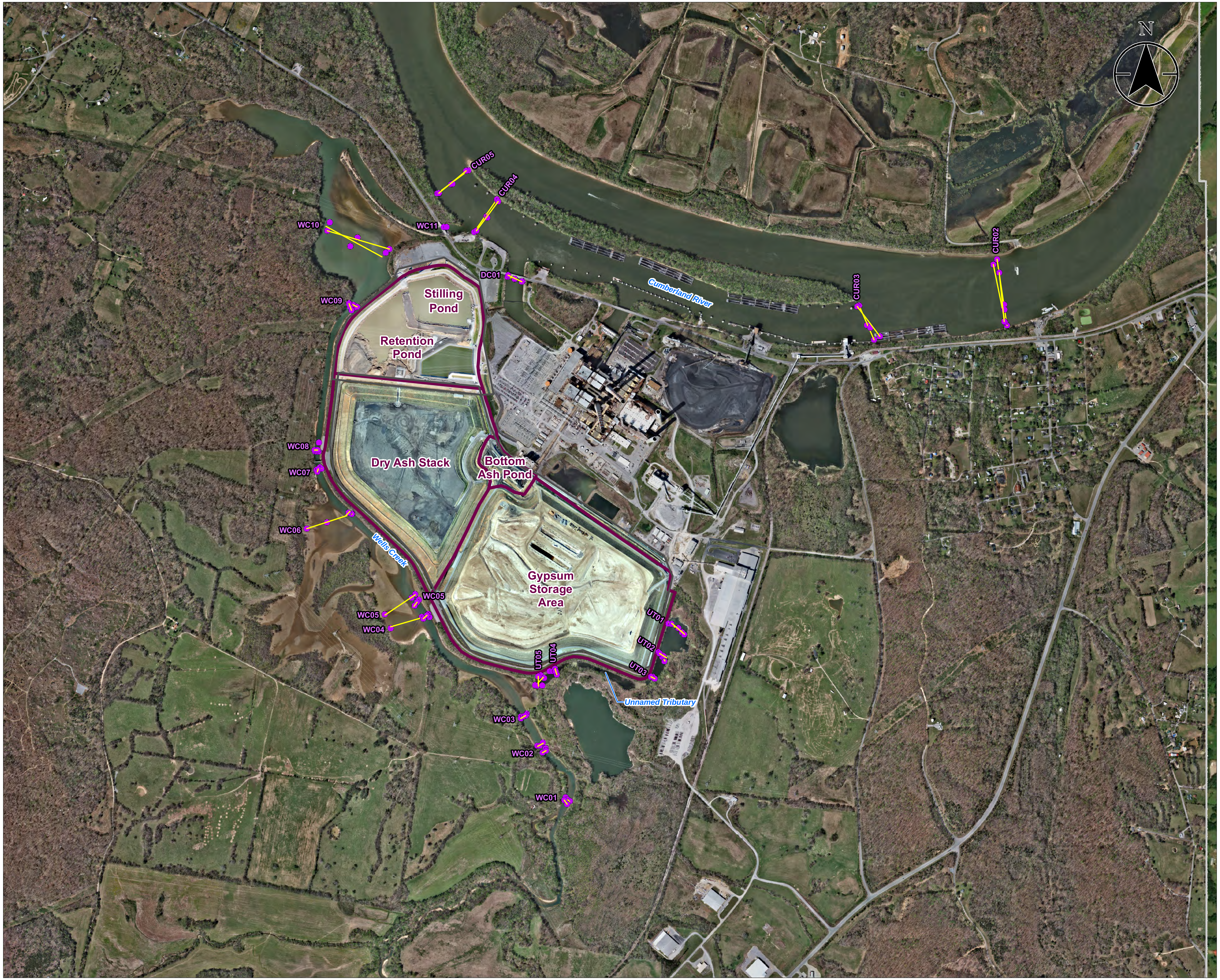


Exhibit No.

A.1a

Title

Surface Stream Sampling Locations - TDEC Order Sampling Events

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2021-11-22
Technical Review by ME on 2021-11-22

0 650 1,300 1,950 2,600 Feet

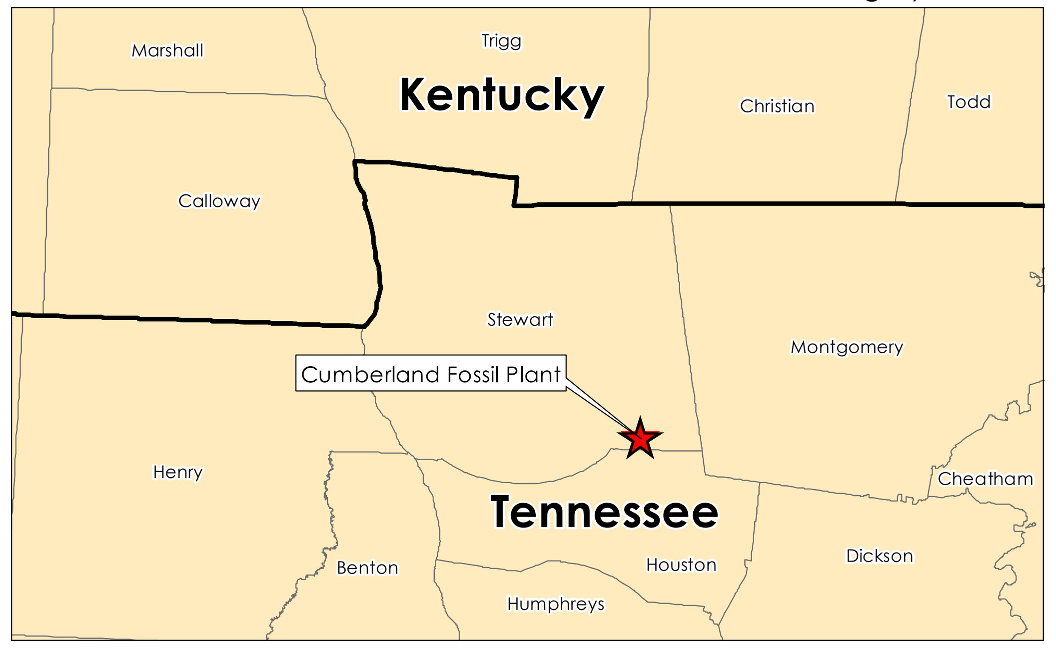
1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery



Stantec TVA

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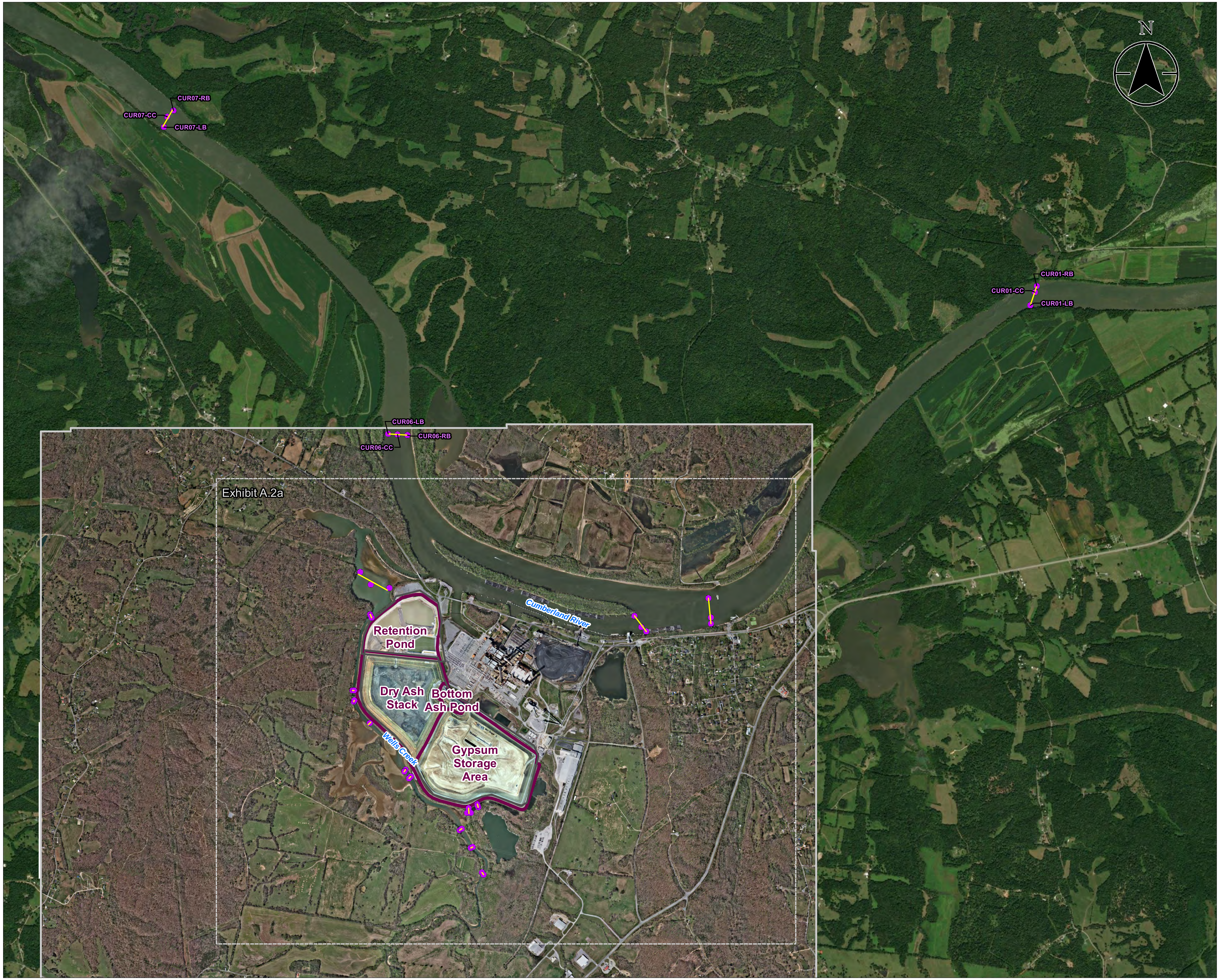


Exhibit No.
A.2

Title
Surface Stream Sampling Locations - November 2018

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2021-08-25
Technical Review by ME on 2021-08-25

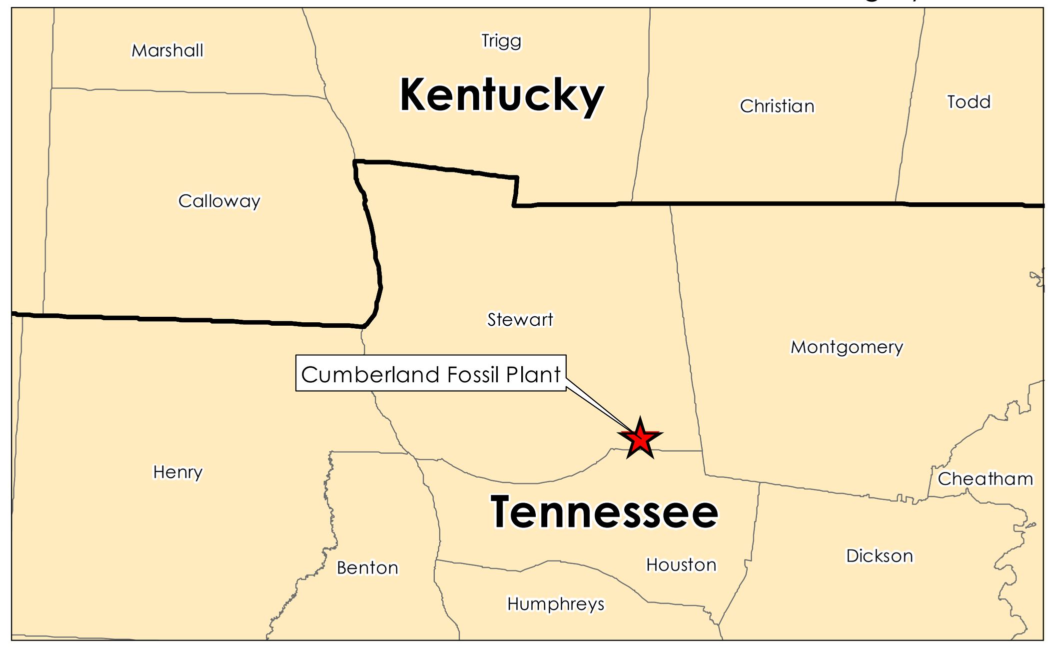
0 | 1,250 | 2,500 | 3,750 | 5,000 Feet
1:15,000 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery



Stantec
TVA

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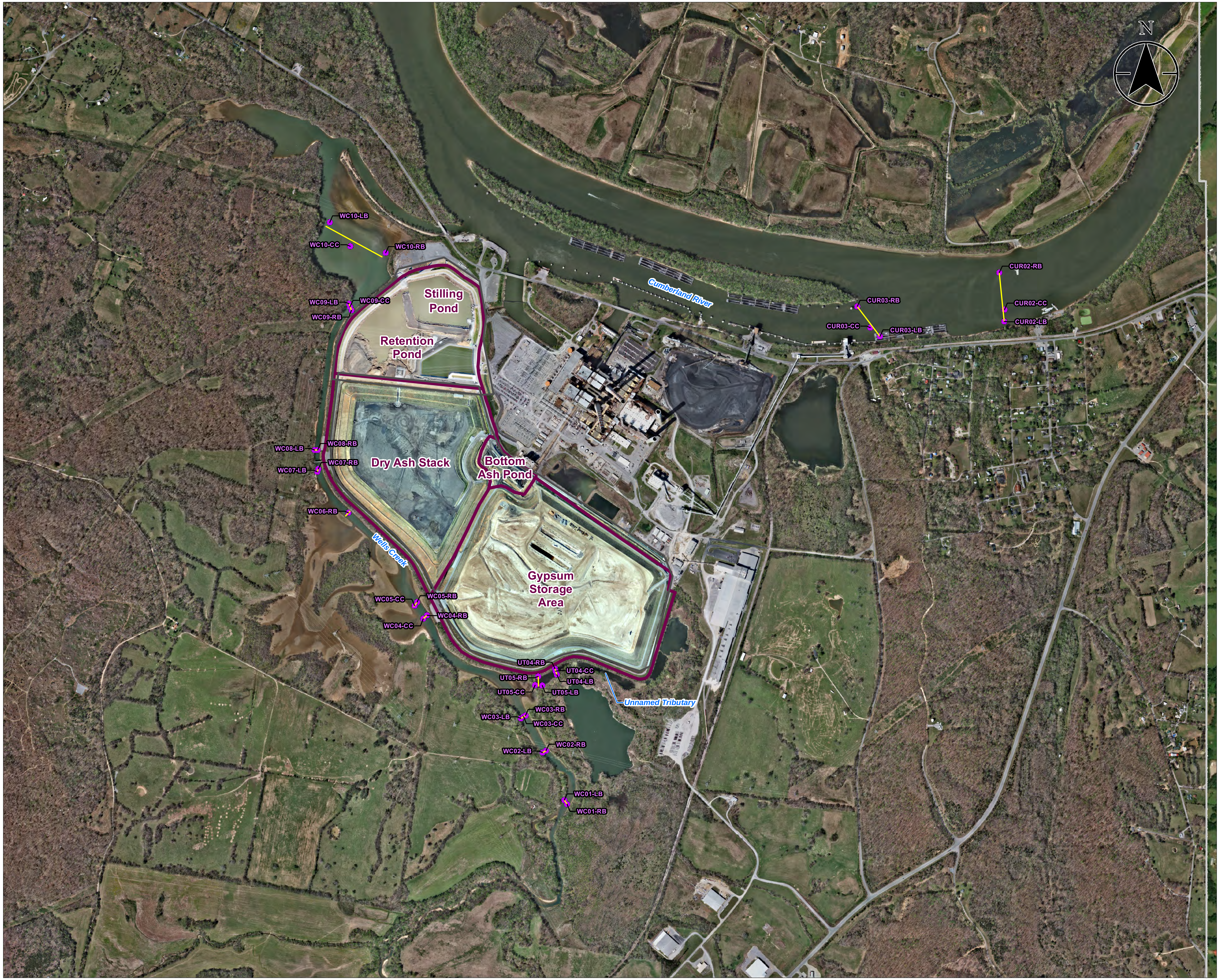


Exhibit No.

A.2a

Title

Surface Stream Sampling Locations - November 2018

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2021-11-22
Technical Review by ME on 2021-11-22

0 650 1,300 1,950 2,600 Feet

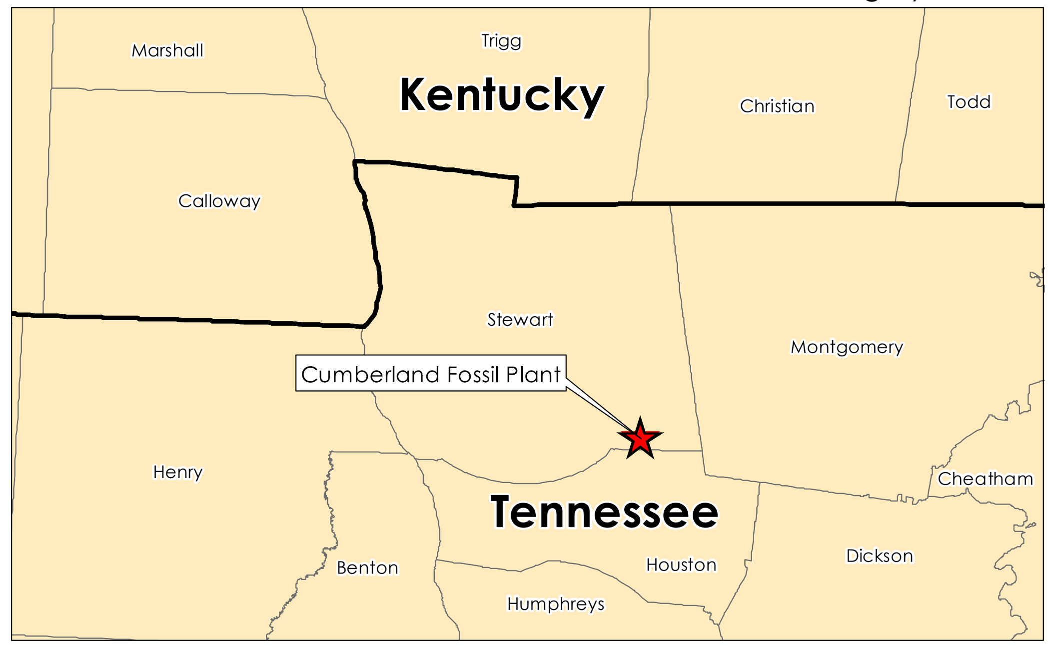
1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery



Stantec

TVA

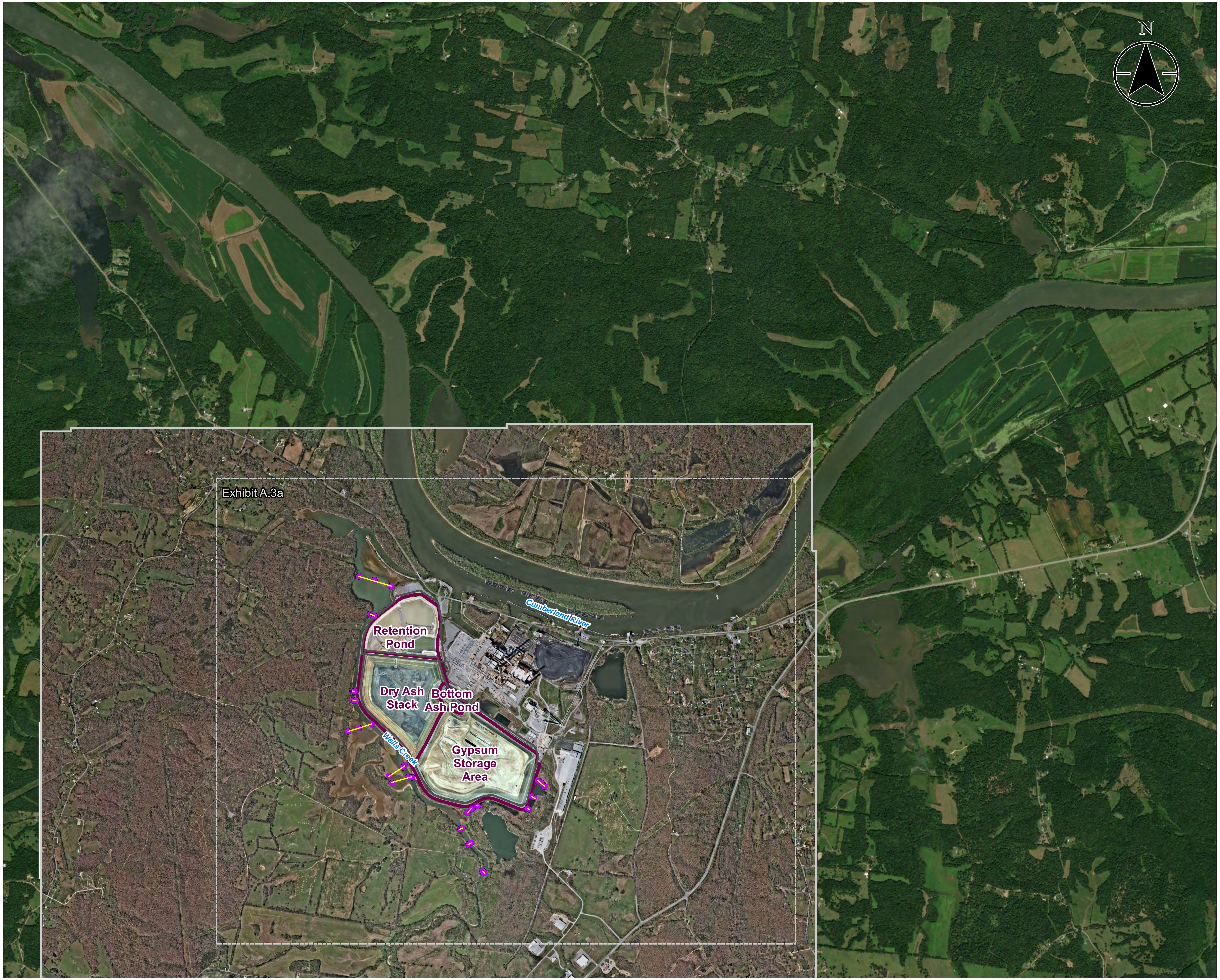


Exhibit No.
A.3

Title
Surface Stream Sampling Locations - August 2019

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2021-08-25
Technical Review by ME on 2021-08-25

0 1,250 2,500 3,750 5,000 Feet
1:15,000 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery
3. Note: Due to the dredging operations, surface water sampling in the Cumberland River was delayed until September. This sampling event is presented on Exhibits A.4 and A.4a.

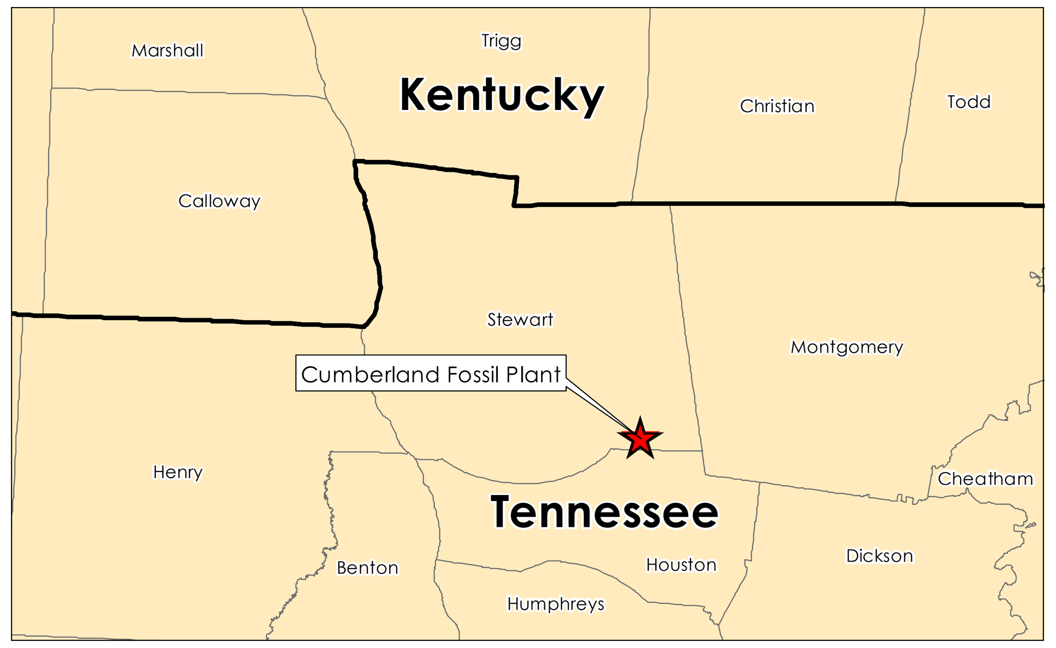


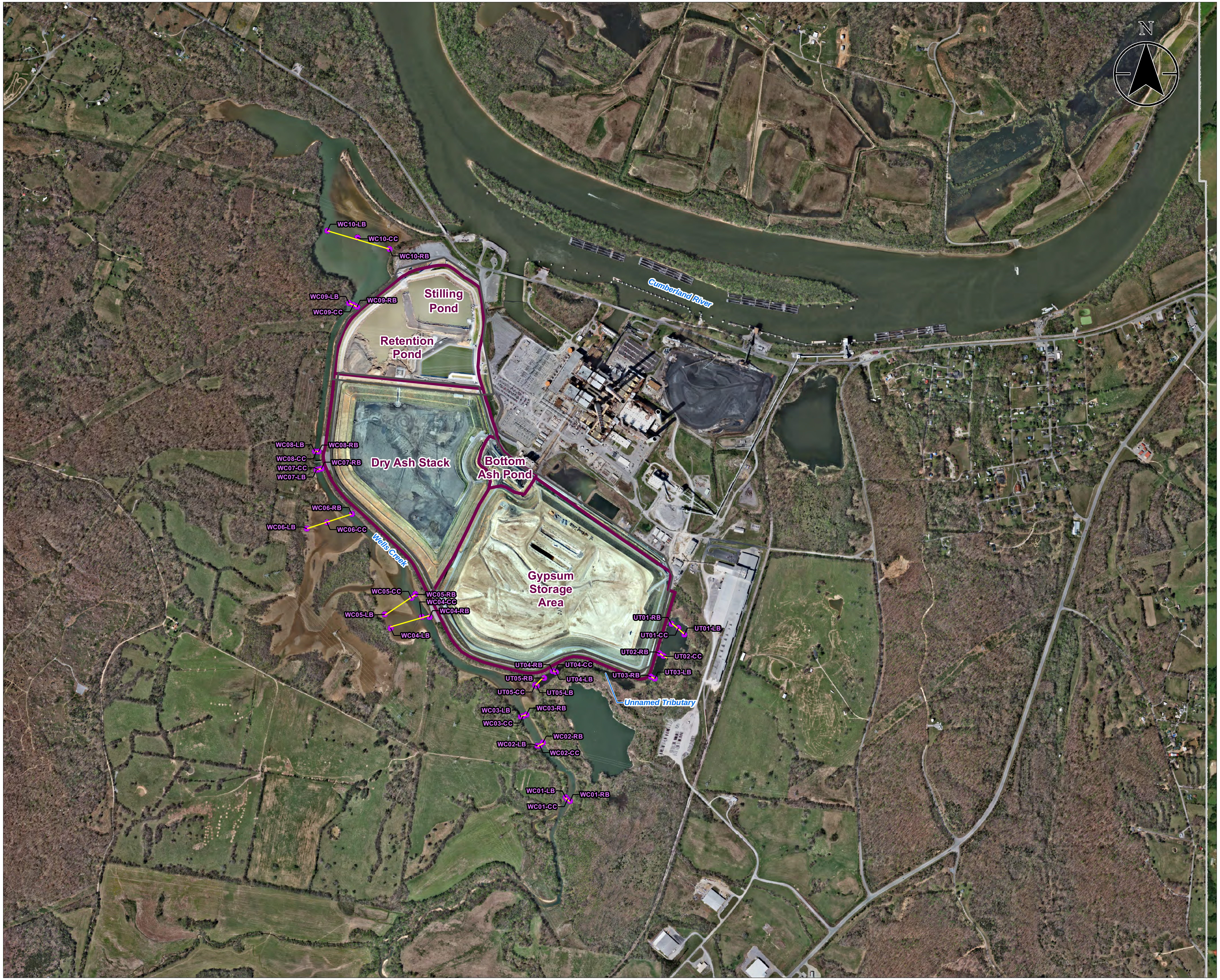
Exhibit No.
A.3a

Title
Surface Stream Sampling Locations - August 2019

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2021-11-22
Technical Review by ME on 2021-11-22



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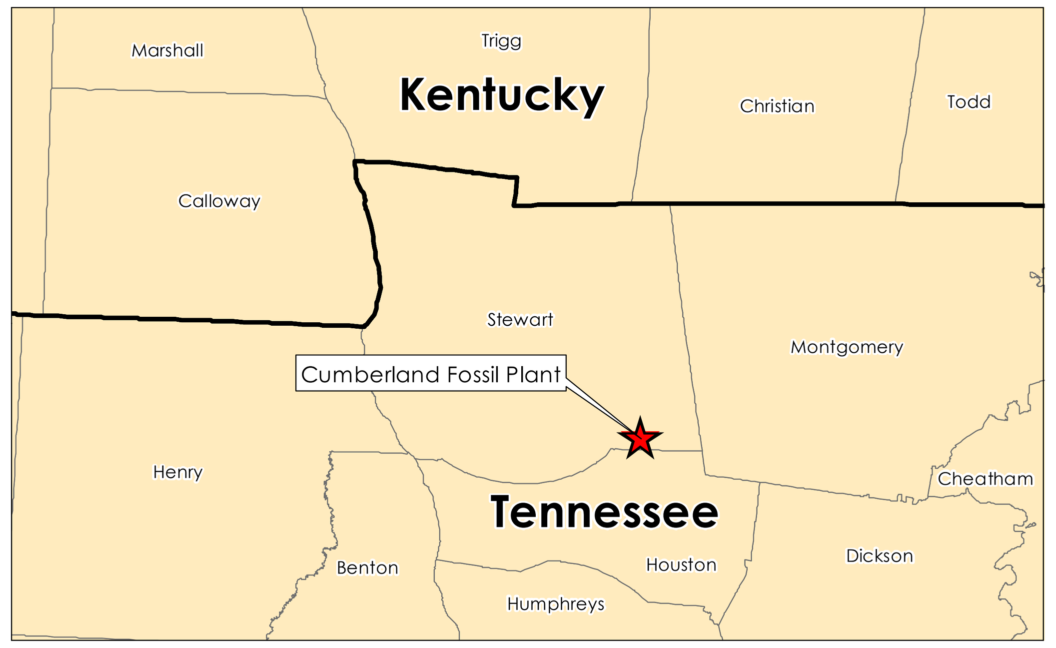
Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery
3. Note: Due to the dredging operations, surface water sampling in the Cumberland River was delayed until September. This sampling event is presented on Exhibits A.4 and A.4a.



Stantec
TVA

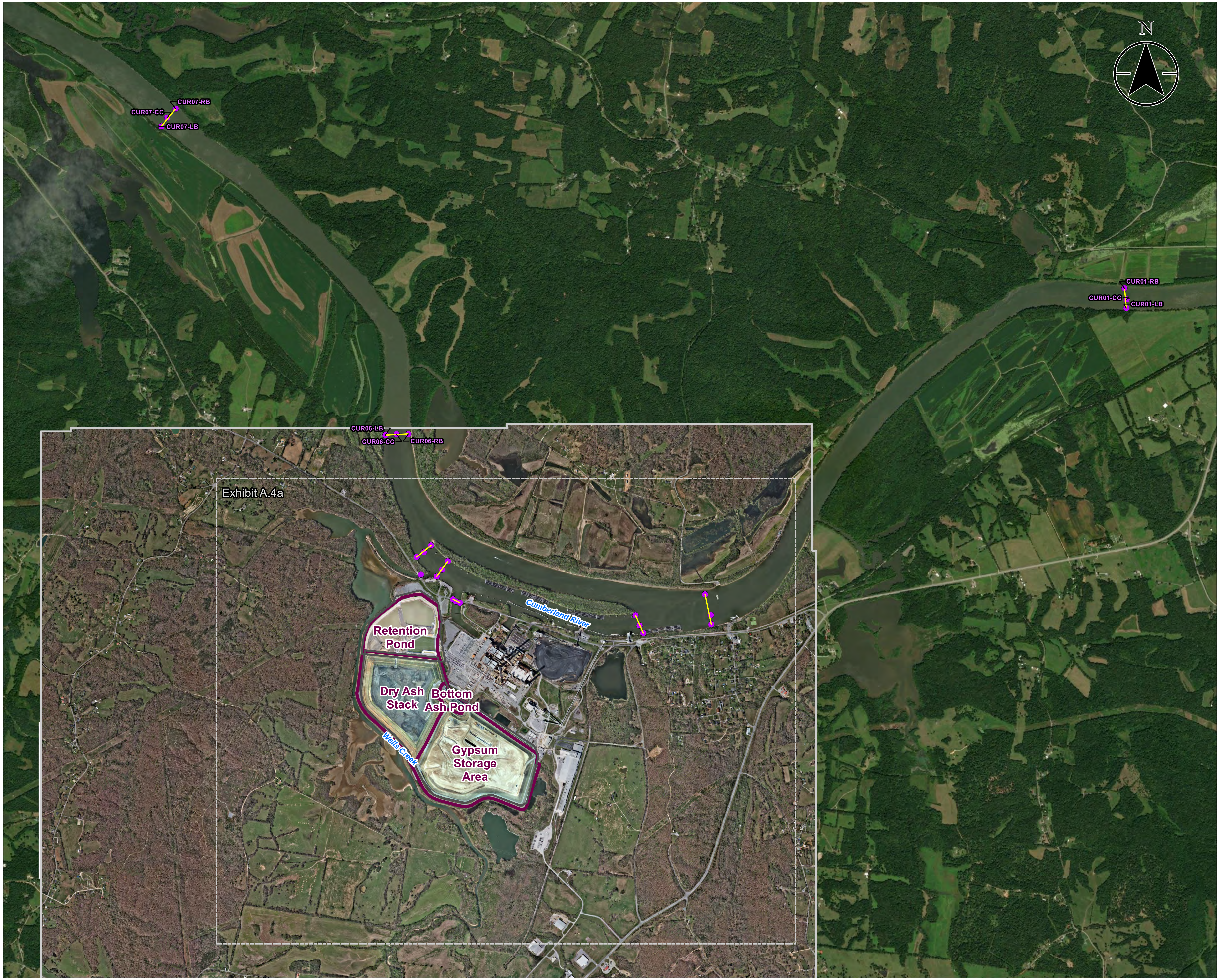


Exhibit No.

A.4

Title

Surface Stream Sampling Locations - September 2019

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209

Prepared by DMB on 2021-08-25
Technical Review by ME on 2021-08-25

0 1,250 2,500 3,750 5,000 Feet

1:15,000 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
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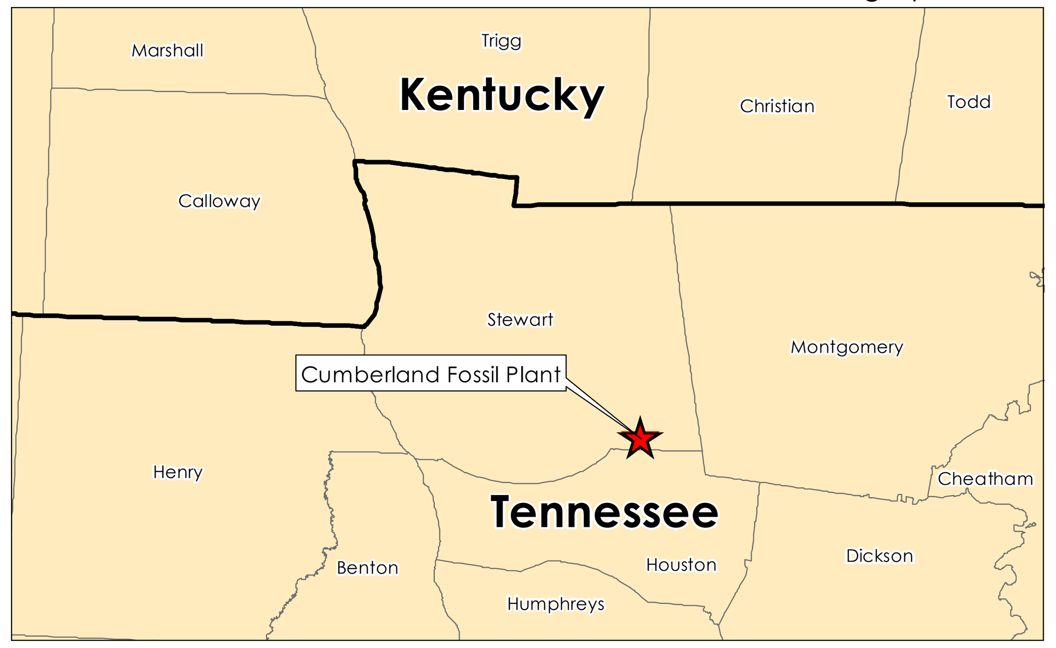


Stantec TVA

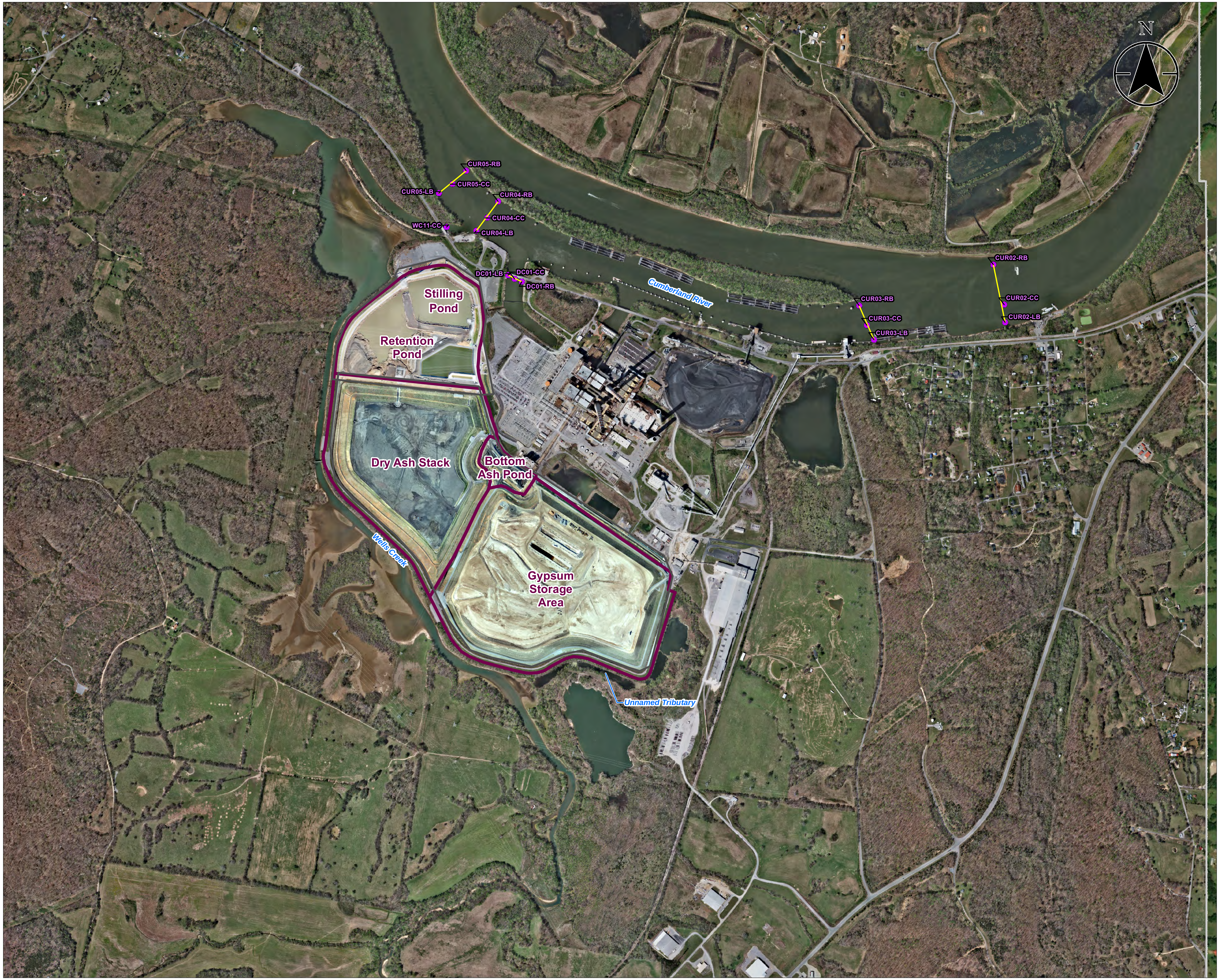


Exhibit No.

A.4a

Title

Surface Stream Sampling Locations - September 2019

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by DMB on 2021-11-22
Technical Review by ME on 2021-11-22

0 650 1,300 1,950 2,600 Feet

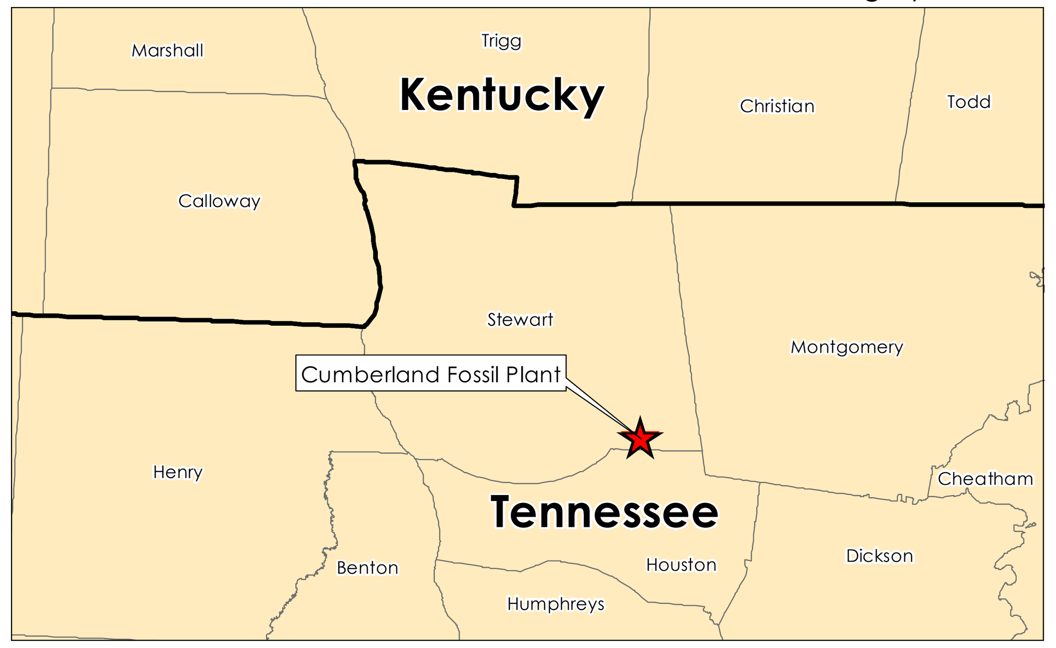
1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery



Stantec TVA

U:\TVA-EIP\175568209_CUF_Phase2\gis\mxd\ENV_SARS\CUF_STR_ExhibitA.4a_SurfaceStream_Sampling_Location_September2019.mxd Revised: 2021-11-22 By: mbough

Exhibit No.
A.5

Title
Surface Stream Sampling Locations - December 2019

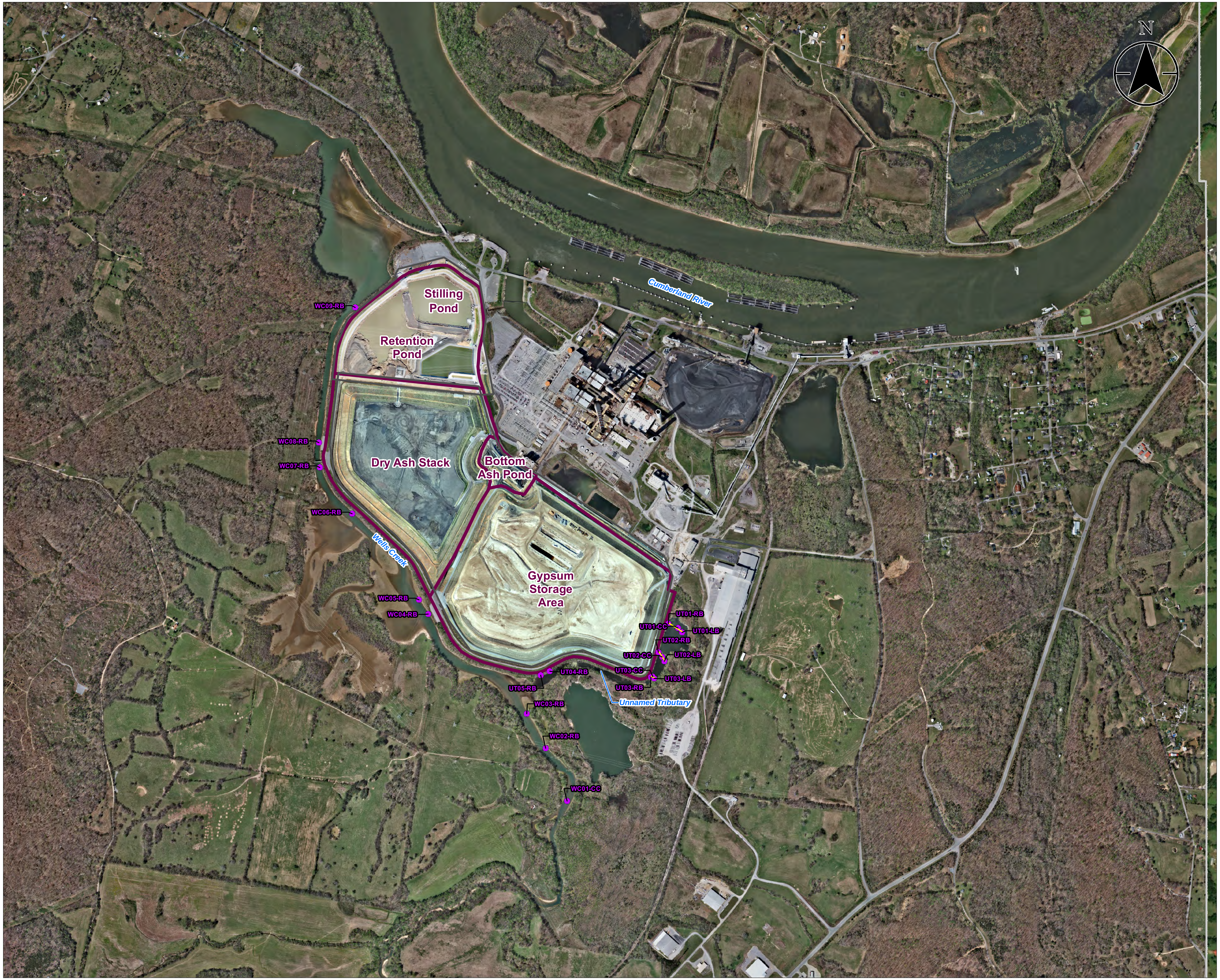
Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by DMB on 2021-11-22
Technical Review by ME on 2021-11-22

0 650 1,300 1,950 2,600 Feet

1:7,800 (At original document size of 22x34)

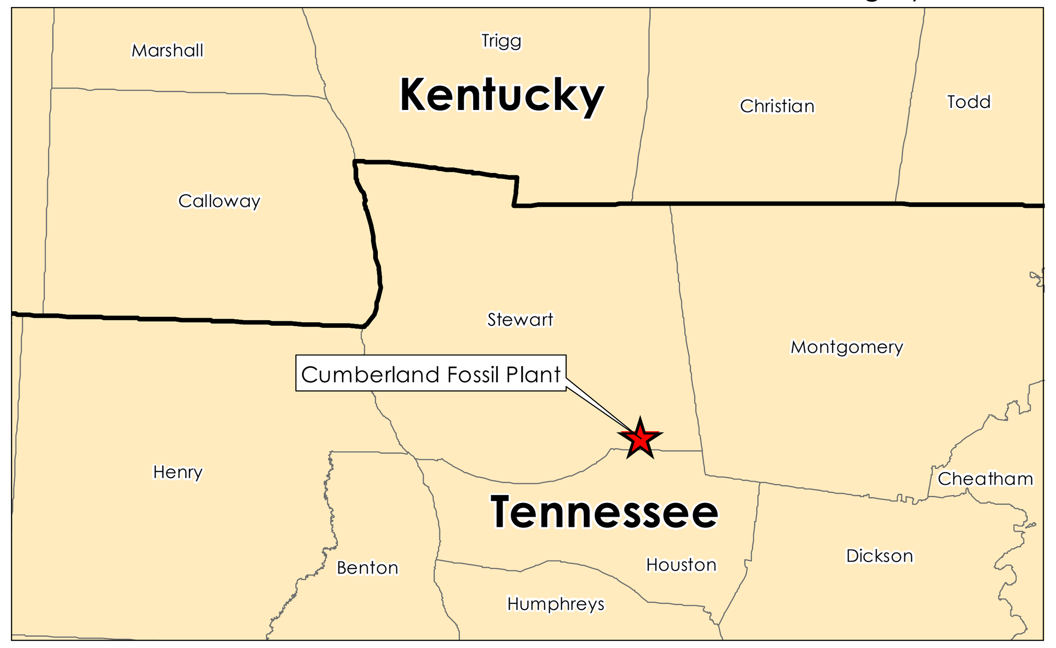


Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery



Stantec
TVA

Exhibit No.

A.6

Title

Surface Stream Sampling Locations - May 2020

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location: Stewart County, Tennessee

175568209
Prepared by DMB on 2021-11-22
Technical Review by ME on 2021-11-22

0 | 650 | 1,300 | 1,950 | 2,600 Feet

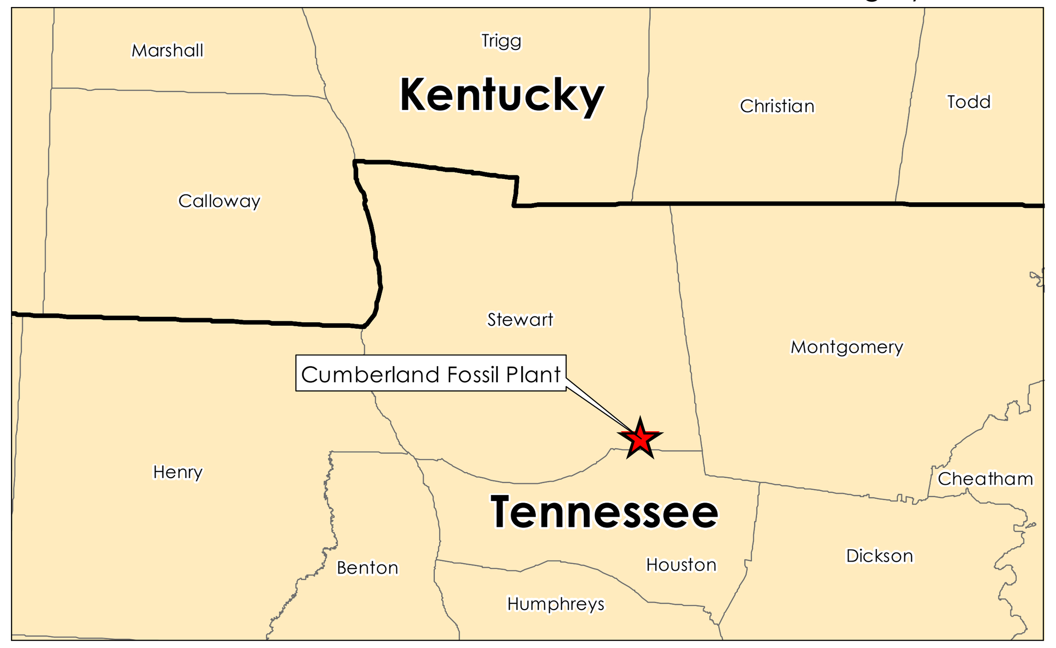
1:7,800 (At original document size of 22x34)

Legend

- Surface Stream Sample Locations
- Surface Stream Sample Locations – Transect
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; Esri World Imagery



Stantec

TVA

U:\TVA-EP\175568209_CUF_Phase2\gis\mxd\ENV_SARS\CUF_STR_ExhibitA.6_SurfaceStream_Sampling_Location_May2020.mxd Revised: 2021-11-22 By: mbough

APPENDIX B - TABLES

TABLE B.1 – Surface Stream Sampling Locations
Cumberland Fossil Plant

Transect Location ID	Description
STR-CuR01	Cumberland River upstream of CUF Plant (Background)
STR-CuR02	Cumberland River upstream of CUF Plant (Background)
STR-CuR03	Cumberland River just upstream of the storm water pond discharge
STR-CuR04	Cumberland River downstream of the ash pond discharge and the cooling water discharge channel
STR-CuR05	Cumberland River downstream of confluence of Wells Creek
STR-CuR06	Cumberland River downstream of CUF Plant
STR-CuR07	Cumberland River downstream of CUF Plant
STR-DC-01	CUF Plant cooling water discharge channel
STR-WC01	Wells Creek upstream of CUF Plant (Background)
STR-WC02	Wells Creek upstream of CUF Plant (Background)
STR-WC03	Wells Creek upstream of CUF Plant (Background)
STR-WC04	Wells Creek downstream of Unnamed Tributary, and adjacent to historic graded filter slope stabilization
STR-WC05	Wells Creek downstream of graded filter slope stabilization
STR-WC06	Wells Creek upstream of an area of interest
STR-WC07	Wells Creek at an area of interest
STR-WC08	Wells Creek at graded filter slope stabilization
STR-WC09	Wells Creek adjacent to location where dike crosses the pre-construction Wells Creek alignment
STR-WC10	Wells Creek adjacent to ash pond
STR-WC11	Wells Creek at the Cumberland City Rd. bridge
STR-UT01	Unnamed Tributary to Wells Creek upstream of graded filter slope stabilization
STR-UT02	Unnamed Tributary to Wells Creek at graded filter slope stabilization
STR-UT03	Unnamed Tributary to Wells Creek downstream of graded filter slope stabilization
STR-UT04	Unnamed Tributary to Wells Creek at graded filter slope stabilization
STR-UT05	Unnamed Tributary to Wells Creek downstream of graded filter slope stabilization

Notes:
ID Identification

TABLE B.2 – Corresponding Environmental Sampling Locations
Cumberland Fossil Plant

<table>
<tr><th colspan="5">Corresponding Sampling Locations</th></tr>
<tr><th>Surface Stream</th><th>Sediment</th><th>Benthic Community</th><th>Mayfly</th><th>Fish Tissue</th></tr>
<tr><td>STR-CuR01</td><td>–</td><td>MAC-CuR04</td><td>CuRU</td><td>CuRU</td></tr>
<tr><td>STR-CuR02</td><td>SED-CuR01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-CuR03</td><td>SED-CuR03</td><td>MAC-CuR01</td><td>–</td><td>–</td></tr>
<tr><td>–</td><td>SED-CuR04</td><td>MAC-CuR02</td><td rowspan="4">CuRA</td><td rowspan="4">CuRA</td></tr>
<tr><td>STR-CuR04</td><td>SED-CuR05</td><td>–</td></tr>
<tr><td>–</td><td>SED-CuR06</td><td>MAC-CuR03</td></tr>
<tr><td>STR-CuR05</td><td>SED-CuR07</td><td>–</td></tr>
<tr><td>STR-CuR06</td><td>–</td><td>MAC-CuR05</td><td>–</td><td>–</td></tr>
<tr><td>STR-CuR07</td><td>–</td><td>–</td><td>CuRD</td><td>CuRD</td></tr>
<tr><td>STR-DC01</td><td>SED-DC01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC01</td><td>SED-WC01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC02</td><td>SED-WC02</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC03</td><td>SED-WC03</td><td>MAC-WC01</td><td>–</td><td>–</td></tr>
<tr><td>–</td><td>–</td><td>MAC-WC03</td><td rowspan="5">WCU</td><td rowspan="5">WCU</td></tr>
<tr><td>STR-WC04</td><td>SED-WC04</td><td>–</td></tr>
<tr><td>STR-WC05</td><td>SED-WC05</td><td>–</td></tr>
<tr><td>–</td><td>–</td><td>MAC-WC04</td></tr>
<tr><td>STR-WC06</td><td>SED-WC06</td><td>–</td></tr>
<tr><td>STR-WC07</td><td>SED-WC07</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC08</td><td>SED-WC08</td><td>MAC-WC06</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC09</td><td>SED-WC09</td><td>–</td><td rowspan="2">WCD</td><td rowspan="2">WCD</td></tr>
<tr><td>STR-WC10</td><td>SED-WC10</td><td>–</td></tr>
<tr><td>STR-UT01</td><td>SED-UT01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT02</td><td>SED-UT02</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT03</td><td>SED-UT03</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT04</td><td>SED-UT04</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT05</td><td>SED-UT05</td><td>–</td><td>–</td><td>–</td></tr>
</table>

Notes:

– Not applicable

TABLE B.3 – Summary of Surface Stream Samples
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	Sample Date	Sample ID	Parent Sample ID	Analytical Sample Depth (m)	Sample Type[1]	Field Measurements						Analytical				
						Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Metals, Total	Metals, Dissolved	Anions	General Chemistry	Radiological
STR-CuR01	05-Nov-2018	CUF-STR-CUR01-LB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-LB-MID-20181105		1.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-LB-BOT-20181105		3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-CC-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP04-20181105	CUF-STR-CUR01-CC-SUR-20181105	0.5	FD							x	x	x	x	x
		CUF-STR-CUR01-CC-MID-20181105		5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-CC-BOT-20181105		10	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-RB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-RB-MID-20181105		2.7	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-RB-BOT-20181105		5	N	x	x	x	x	x	x	x	x	x	x	x
	04-Sep-2019	CUF-STR-CUR01-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-LB-MID-20190904		4.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-LB-BOT-20190904		8.4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP04-20190904	CUF-STR-CUR01-CC-SUR-20190904	0.5	FD							x	x	x	x	x
		CUF-STR-CUR01-CC-MID-20190904		5.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-CC-BOT-20190904		10.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-RB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR01-RB-BOT-20190904		2.5	N	x	x	x	x	x	x	x	x	x	x	x
STR-CuR02	05-Nov-2018	CUF-STR-CUR02-LB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-LB-MID-20181105		3.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-LB-BOT-20181105		7	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-MID-20181105		5.25	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-BOT-20181105		10	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-RB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-RB-MID-20181105		1.75	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-RB-BOT-20181105		3.1	N	x	x	x	x	x	x	x	x	x	x	x
	04-Sep-2019	CUF-STR-CUR02-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-LB-BOT-20190904		2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-MID-20190904		6.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-BOT-20190904		11.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-RB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-RB-BOT-20190904		2.1	N	x	x	x	x	x	x	x	x	x	x	x
	27-May-2020	CUF-STR-CUR02-LB-MID-20200527		0.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP02-20200527	CUF-STR-CUR02-LB-MID-20200527	0.8	FD							x	x	x	x	x
		CUF-STR-CUR02-CC-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-MID-20200527		6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-CC-BOT-20200527		11.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR02-RB-MID-20200527		0.8	N	x	x	x	x	x	x	x	x	x	x	x

See last page for notes.

TABLE B.3 – Summary of Surface Stream Samples
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	Sample Date	Sample ID	Parent Sample ID	Analytical Sample Depth (m)	Sample Type[1]	Field Measurements: Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Analytical: Metals, Total	Metals, Dissolved	Anions	General Chemistry	Radiological
STR-CuR03	05-Nov-2018	CUF-STR-CUR03-LB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-LB-MID-20181105		2.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP02-20181105	CUF-STR-CuR03-LB-MID-20181105	2.5	FD							x	x	x	x	x
		CUF-STR-CUR03-LB-BOT-20181105		4.9	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-CC-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-CC-MID-20181105		5.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-CC-BOT-20181105		10.7	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-RB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-RB-MID-20181105		2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-RB-BOT-20181105		4.2	N	x	x	x	x	x	x	x	x	x	x	x
	04-Sep-2019	CUF-STR-CUR03-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-LB-MID-20190904		2.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-LB-BOT-20190904		4.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-CC-MID-20190904		5.9	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-CC-BOT-20190904		11.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-RB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR03-RB-BOT-20190904		2.3	N	x	x	x	x	x	x	x	x	x	x	x
STR-CuR04	04-Sep-2019	CUF-STR-CUR04-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-LB-BOT-20190904		1.4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-CC-MID-20190904		6.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-CC-BOT-20190904		12.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-RB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-RB-MID-20190904		2.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-RB-BOT-20190904		4.2	N	x	x	x	x	x	x	x	x	x	x	x
	27-May-2020	CUF-STR-CUR04-LB-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-LB-BOT-20200527		2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-CC-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	
		CUF-STR-CUR04-CC-ME-20200527		3.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-CC-MID-20200527		7	N	x	x	x	x	x	x	x	x	x	x	
		CUF-STR-CUR04-CC-BOT-20200527		14	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR04-RB-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP01-20200527	CUF-STR-CUR04-RB-SUR-20200527	0.5	FD							x	x	x	x	x
		CUF-STR-CUR04-RB-MID-20200527		2	N	x	x	x	x	x	x	x	x	x	x	
		CUF-STR-CUR04-RB-BOT-20200527		3.2	N	x	x	x	x	x	x	x	x	x	x	

See last page for notes.

TABLE B.3 – Summary of Surface Stream Samples
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	Sample Date	Sample ID	Parent Sample ID	Analytical Sample Depth (m)	Sample Type[1]	Field Measurements						Analytical				
						Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Metals, Total	Metals, Dissolved	Anions	General Chemistry	Radiological
STR-CuR05	04-Sep-2019	CUF-STR-CUR05-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-LB-BOT-20190904		2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-CC-MID-20190904		6.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-CC-BOT-20190904		12.7	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-RB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-RB-BOT-20190904		1.8	N	x	x	x	x	x	x	x	x	x	x	x
	27-May-2020	CUF-STR-CUR05-LB-SUR-20200527		0.5	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-LB-MID-20200527		1.6	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-LB-BOT-20200527		2.7	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-CC-SUR-20200527		0.5	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-CC-MID-20200527		7.4	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-CC-BOT-20200527		14.4	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-RB-SUR-20200527		0.5	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR05-RB-BOT-20200527		1.7	N[2]	x	x	x	x	x	x	x	x	x	x	x
STR-CuR06	05-Nov-2018	CUF-STR-CUR06-LB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-LB-MID-20181105		4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-LB-BOT-20181105		7.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-MID-20181105		4.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-BOT-20181105		8.4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-MID-20181105		4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-BOT-20181105		7.5	N	x	x	x	x	x	x	x	x	x	x	x
	04-Sep-2019	CUF-STR-CUR06-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-LB-BOT-20190904		2.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-MID-20190904		4.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-BOT-20190904		9	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-MID-20190904		2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-BOT-20190904		3.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP02-20190904	CUF-STR-CUR06-RB-BOT-20190904	3.5	FD							x	x	x	x	x
	27-May-2020	CUF-STR-CUR06-LB-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-LB-BOT-20200527		2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-MID-20200527		5.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-CC-BOT-20200527		10.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-MID-20200527		2.7	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR06-RB-BOT-20200527		5	N	x	x	x	x	x	x	x	x	x	x	x

See last page for notes.

TABLE B.3 – Summary of Surface Stream Samples
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	Sample Date	Sample ID	Parent Sample ID	Analytical Sample Depth (m)	Sample Type[1]	Field Measurements						Analytical				
						Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Metals, Total	Metals, Dissolved	Anions	General Chemistry	Radiological
STR-CuR07	05-Nov-2018	CUF-STR-CUR07-LB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-LB-MID-20181105		5.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-LB-BOT-20181105		10.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-CC-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-CC-MID-20181105		5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP01-20181105	CUF-STR-CUR07-CC-MID-20181105	5	FD							x	x	x	x	x
		CUF-STR-CUR07-CC-BOT-20181105		10	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-RB-SUR-20181105		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-RB-MID-20181105		4.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-RB-BOT-20181105		9.2	N	x	x	x	x	x	x	x	x	x	x	x
	04-Sep-2019	CUF-STR-CUR07-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-LB-MID-20190904		3.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-LB-BOT-20190904		5.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-CC-MID-20190904		5.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-CC-BOT-20190904		10.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-RB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-RB-MID-20190904		3.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-CUR07-RB-BOT-20190904		5.9	N	x	x	x	x	x	x	x	x	x	x	x
STR-DC01	04-Sep-2019	CUF-STR-DC01-LB-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-LB-MID-20190904		2.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-LB-BOT-20190904		3.9	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-CC-MID-20190904		3.4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-CC-BOT-20190904		6.4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-RB-MID-20190904		0.9	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP03-20190904	CUF-STR-DC01-RB-MID-20190904	0.9	FD							x	x	x	x	x
	27-May-2020	CUF-STR-DC01-LB-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-LB-MID-20200527		1.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-LB-BOT-20200527		3.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-CC-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-CC-MID-20200527		4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-CC-BOT-20200527		7.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DC01-RB-MID-20200527		1	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC01	29-Nov-2018	CUF-STR-WC01-LB-SUR-20181129		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC01-RB-SUR-20181129		0.3	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC01-LB-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC01-CC-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC01-RB-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC01-CC-SUR-20191205		0.5	N	x	x	x	x	x	x	x	x	x	x	x

See last page for notes.

TABLE B.3 – Summary of Surface Stream Samples
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	Sample Date	Sample ID	Parent Sample ID	Analytical Sample Depth (m)	Sample Type[1]	Field Measurements						Analytical				
						Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Metals, Total	Metals, Dissolved	Anions	General Chemistry	Radiological
STR-WC02	28-Nov-2018	CUF-STR-WC02-LB-SUR-20181128		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC02-RB-SUR-20181128		0.6	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC02-LB-SUR-20190813		0.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC02-CC-MID-20190813		0.85	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC02-RB-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC02-RB-SUR-20191205		0.5	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC03	29-Nov-2018	CUF-STR-WC03-LB-SUR-20181129		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC03-CC-SUR-20181129		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC03-RB-SUR-20181129		0.3	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC03-LB-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC03-CC-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC03-RB-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC03-RB-SUR-20191205		0.25	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC04	29-Nov-2018	CUF-STR-WC04-CC-SUR-20181129		0.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC04-RB-SUR-20181129		0.6	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP02-20181129	CUF-STR-WC04-RB-SUR-20181129	0.6	FD							x	x	x	x	x
	13-Aug-2019	CUF-STR-WC04-LB-SUR-20190813		0.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC04-CC-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC04-RB-SUR-20190813		0.3	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC04-RB-SUR-20191205		0.3	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC05	29-Nov-2018	CUF-STR-WC05-CC-SUR-20181129		0.1	N[2]	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC05-RB-SUR-20181129		0.6	N[2]	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC05-LB-SUR-20190813		0.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC05-CC-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP02-20190813	CUF-STR-WC05-CC-MID-20190813	0.6	FD							x	x	x	x	x
		CUF-STR-WC05-RB-SUR-20190813		0.2	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC05-RB-SUR-20191205		0.3	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC06	28-Nov-2018	CUF-STR-WC06-RB-SUR-20181128		0.6	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC06-LB-SUR-20190813		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC06-CC-SUR-20190813		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC06-RB-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC06-RB-SUR-20191205		0.5	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC07	28-Nov-2018	CUF-STR-WC07-LB-SUR-20181128		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC07-RB-SUR-20181128		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC07-RB-BOT-20181128		1.5	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC07-LB-SUR-20190813		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC07-CC-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC07-CC-BOT-20190813		1.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC07-RB-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP01-20190813	CUF-STR-WC07-RB-SUR-20190813	0.5	FD							x	x	x	x	x
	05-Dec-2019	CUF-STR-WC07-RB-SUR-20191205		0.5	N	x	x	x	x	x	x	x	x	x	x	x

See last page for notes.

TABLE B.3 – Summary of Surface Stream Samples
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	Sample Date	Sample ID	Parent Sample ID	Analytical Sample Depth (m)	Sample Type[1]	Field Measurements: Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Analytical: Metals, Total	Metals, Dissolved	Anions	General Chemistry	Radiological
STR-WC08	28-Nov-2018	CUF-STR-WC08-LB-SUR-20181128		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP01-20181128	CUF-STR-WC08-LB-SUR-20181128	0.5	FD							x	x	x	x	x
		CUF-STR-WC08-LB-BOT-20181128		1.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC08-RB-SUR-20181128		0.75	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC08-LB-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC08-CC-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC08-CC-BOT-20190813		1.9	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC08-RB-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC08-RB-SUR-20191205		0.5	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC09	28-Nov-2018	CUF-STR-WC09-LB-SUR-20181128		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC09-LB-BOT-20181128		1.9	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC09-CC-SUR-20181128		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC09-CC-BOT-20181128		2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC09-RB-SUR-20181128		0.5	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC09-LB-MID-20190813		0.6	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC09-CC-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC09-CC-BOT-20190813		2.4	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC09-RB-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
	05-Dec-2019	CUF-STR-WC09-RB-SUR-20191205		0.5	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC10	28-Nov-2018	CUF-STR-WC10-LB-SUR-20181128		0.8	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC10-CC-SUR-20181128		0.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC10-RB-SUR-20181128		0.3	N	x	x	x	x	x	x	x	x	x	x	x
	13-Aug-2019	CUF-STR-WC10-LB-SUR-20190813		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC10-LB-BOT-20190813		1.7	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC10-CC-SUR-20190813		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC10-RB-SUR-20190813		0.2	N	x	x	x	x	x	x	x	x	x	x	x
STR-WC11	04-Sep-2019	CUF-STR-WC11-CC-SUR-20190904		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP01-20190904	CUF-STR-WC11-CC-SUR-20190904	0.5	FD							x	x	x	x	x
		CUF-STR-WC11-CC-BOT-20190904		1.3	N	x	x	x	x	x	x	x	x	x	x	x
	27-May-2020	CUF-STR-WC11-CC-SUR-20200527		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-WC11-CC-BOT-20200527		2.5	N	x	x	x	x	x	x	x	x	x	x	x
STR-UT01	21-Aug-2019	CUF-STR-UT01-LB-SUR-20190821		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT01-CC-SUR-20190821		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT01-RB-SUR-20190821		0.1	N	x	x	x	x	x	x	x	x	x	x	x
	04-Dec-2019	CUF-STR-UT01-LB-SUR-20191204		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT01-CC-SUR-20191204		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT01-RB-SUR-20191204		0.5	N	x	x	x	x	x	x	x	x	x	x	x
STR-UT02	21-Aug-2019	CUF-STR-UT02-CC-SUR-20190821		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT02-RB-SUR-20190821		0.3	N	x	x	x	x	x	x	x	x	x	x	x
	04-Dec-2019	CUF-STR-UT02-LB-SUR-20191204		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT02-CC-SUR-20191204		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT02-RB-SUR-20191204		0.5	N	x	x	x	x	x	x	x	x	x	x	x

See last page for notes.

TABLE B.3 – Summary of Surface Stream Samples
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	Sample Date	Sample ID	Parent Sample ID	Analytical Sample Depth (m)	Sample Type[1]	Field Measurements: Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Analytical: Metals, Total	Metals, Dissolved	Anions	General Chemistry	Radiological
STR-UT03	21-Aug-2019	CUF-STR-UT03-LB-SUR-20190821		0.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT03-LB-BOT-20190821		1.3	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT03-RB-MID-20190821		0.7	N	x	x	x	x	x	x	x	x	x	x	x
	04-Dec-2019	CUF-STR-UT03-LB-SUR-20191204		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT03-CC-SUR-20191204		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT03-RB-MID-20191204		0.7	N	x	x	x	x	x	x	x	x	x	x	x
STR-UT04	27-Nov-2018	CUF-STR-UT04-LB-SUR-20181127		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT04-CC-SUR-20181127		0.5	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT04-RB-SUR-20181127		0.1	N	x	x	x	x	x	x	x	x	x	x	x
	20-Aug-2019	CUF-STR-UT04-LB-SUR-20190820		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT04-CC-SUR-20190820		0.2	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT04-RB-SUR-20190820		0.2	N	x	x	x	x	x	x	x	x	x	x	x
	04-Dec-2019	CUF-STR-UT04-RB-SUR-20191204		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP01-20191204	CUF-STR-UT04-RB-SUR-20191204	0.1	FD							x	x	x	x	x
STR-UT05	27-Nov-2018	CUF-STR-UT05-LB-SUR-20181127		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT05-CC-SUR-20181127		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT05-RB-SUR-20181127		0.1	N	x	x	x	x	x	x	x	x	x	x	x
	20-Aug-2019	CUF-STR-UT05-LB-SUR-20190820		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-UT05-CC-SUR-20190820		0.1	N	x	x	x	x	x	x	x	x	x	x	x
		CUF-STR-DUP01-20190820	CUF-STR-UT05-CC-SUR-20190820	0.1	FD							x	x	x	x	x
		CUF-STR-UT05-RB-SUR-20190820		0.1	N	x	x	x	x	x	x	x	x	x	x	x
	04-Dec-2019	CUF-STR-UT05-RB-SUR-20191204		0.05	N	x	x	x	x	x	x	x	x	x	x	x

Notes:

DO	Dissolved Oxygen
ORP	Oxidation Reduction Potential
Sp. Cond.	Specific Conductance
Temp	Water Temperature

Metals, Total and Dissolved		SW-846 Method 6020A
Mercury, Total and Dissolved		SW-846 Method 7470A
Anions (chloride, fluoride, and sulfate)		SW-846 Method 9056A
General Chemistry:	Total Dissolved Solids	SM 2540C
	Total Suspended Solids	SM 2540D
	Hardness	SM 2340B
Radiological:	Radium-226	US EPA Method 903.0
	Radium-228 by US EPA 904.0	US EPA Method 904.0
	Radium-226/228	Calculation by US EPA Method 903.0/US EPA Method 904.0

1. Sample Type: N = Normal Environmental Sample
FD = Field Duplicate Sample

2. Split sample was collected by Civil and Environmental Consultants, Inc. (CEC)

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River November 2018	STR-CUR01-LB	11/5/2018	15.72	7.75	259.3	8.62	88.5	9.6	128	0.3	7.6	0.5	1.5	3
	STR-CUR01-LB	11/5/2018	15.71	7.74	259.4	8.60	88.3	9.8	128	1.5				
	STR-CUR01-LB	11/5/2018	15.71	7.75	260.8	8.60	88.3	10.8	126	3				
	STR-CUR01-LB	11/5/2018	15.71	7.74	260.1	8.57	88.0	11.0	124	4				
	STR-CUR01-LB	11/5/2018	15.71	7.74	260.0	8.58	88.1	11.4	123	5				
	STR-CUR01-LB	11/5/2018	15.71	7.74	259.7	8.58	88.1	12.8	121	6				
	STR-CUR01-LB	11/5/2018	15.71	7.74	260.1	8.60	88.3	15.0	119	7				
	STR-CUR01-LB	11/5/2018	15.71	7.76	260.2	8.60	88.3	10.5	137	7.6				
	STR-CUR01-CC	11/5/2018	15.70	7.75	259.1	8.61	88.4	10.5	139	0.3	11.3	0.5	5	10
	STR-CUR01-CC	11/5/2018	15.70	7.75	259.2	8.58	88.0	10.7	138	1.5				
	STR-CUR01-CC	11/5/2018	15.69	7.75	259.5	8.61	88.3	10.8	138	3				
	STR-CUR01-CC	11/5/2018	15.69	7.75	259.6	8.59	88.2	10.9	138	4				
	STR-CUR01-CC	11/5/2018	15.69	7.74	259.6	8.56	87.8	11.1	138	5				
	STR-CUR01-CC	11/5/2018	15.69	7.75	259.6	8.56	87.9	11.2	138	6				
	STR-CUR01-CC	11/5/2018	15.70	7.74	259.9	8.57	87.9	11.4	138	7				
	STR-CUR01-CC	11/5/2018	15.69	7.74	259.6	8.55	87.8	11.6	138	8				
	STR-CUR01-CC	11/5/2018	15.69	7.74	260.1	8.55	87.8	11.8	138	9				
	STR-CUR01-CC	11/5/2018	15.69	7.73	259.2	8.54	87.6	11.9	138	10				
	STR-CUR01-CC	11/5/2018	15.69	7.74	259.3	8.54	87.7	12.1	137	10.3				
	STR-CUR01-RB	11/5/2018	15.77	7.78	259.7	8.66	89.0	11.7	140	0.3	6.6	0.5	2.7	5
	STR-CUR01-RB	11/5/2018	15.80	7.78	260.1	8.61	88.3	12.2	140	1.5				
	STR-CUR01-RB	11/5/2018	15.74	7.76	260.1	8.59	88.3	12.7	141	3				
	STR-CUR01-RB	11/5/2018	15.73	7.77	260.2	8.55	87.8	13.2	140	4				
	STR-CUR01-RB	11/5/2018	15.72	7.76	259.5	8.54	87.7	13.5	140	5				
	STR-CUR01-RB	11/5/2018	15.72	7.77	259.9	8.52	87.5	12.4	140	5.7				
	STR-CUR02-LB	11/5/2018	15.51	7.66	251.0	8.86	90.6	10.1	151	0.3	6.65	0.5	3.5	7
	STR-CUR02-LB	11/5/2018	15.51	7.67	250.4	8.84	90.4	10.1	151	1.5				
	STR-CUR02-LB	11/5/2018	15.52	7.67	250.6	8.85	90.5	10.0	151	3				
	STR-CUR02-LB	11/5/2018	15.52	7.68	249.9	8.84	90.4	10.2	150	4				
	STR-CUR02-LB	11/5/2018	15.52	7.68	249.7	8.88	90.8	9.7	150	5				
	STR-CUR02-LB	11/5/2018	15.52	7.66	250.4	8.88	90.8	10.4	151	6				
	STR-CUR02-LB	11/5/2018	15.52	7.66	249.5	8.88	90.7	11.7	150	7				
	STR-CUR02-CC	11/5/2018	15.63	7.72	252.7	8.78	89.9	10.4	152	0.3	10.7	0.5	5.25	10
	STR-CUR02-CC	11/5/2018	15.63	7.71	252.8	8.78	90.0	10.7	152	1.5				
	STR-CUR02-CC	11/5/2018	15.53	7.69	252.7	8.74	89.4	11.0	152	3				
	STR-CUR02-CC	11/5/2018	15.54	7.69	252.3	8.70	89.0	11.2	153	4				
	STR-CUR02-CC	11/5/2018	15.50	7.70	252.8	8.70	88.9	11.4	152	5				
	STR-CUR02-CC	11/5/2018	15.50	7.70	252.8	8.69	88.8	11.4	152	6				
	STR-CUR02-CC	11/5/2018	15.50	7.69	252.0	8.70	88.9	11.4	152	7				
	STR-CUR02-CC	11/5/2018	15.50	7.70	252.2	8.67	88.6	11.7	152	8				
	STR-CUR02-CC	11/5/2018	15.50	7.70	252.7	8.68	88.7	12.0	152	9				
	STR-CUR02-CC	11/5/2018	15.50	7.68	252.4	8.69	88.8	15.2	152	10				
	STR-CUR02-CC	11/5/2018	15.49	7.69	251.3	8.71	89.0	10.1	152	10.6				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	μS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River November 2018	STR-CUR02-RB	11/5/2018	15.72	7.75	253.4	8.88	91.2	10.8	149	0.3	3.7	0.5	1.75	3.1
	STR-CUR02-RB	11/5/2018	15.63	7.74	253.7	8.85	90.7	11.5	148	1.5				
	STR-CUR02-RB	11/5/2018	15.60	7.72	253.4	8.80	90.0	12.4	149	3				
	STR-CUR02-RB	11/5/2018	15.60	7.72	253.0	8.74	89.5	11.5	147	3.6				
	STR-CUR03-LB	11/5/2018	15.31	7.63	244.2	8.75	89.0	10.7	78	0.3	5.2	0.5	2.5	4.9
	STR-CUR03-LB	11/5/2018	15.31	7.59	243.6	8.78	89.3	10.7	79	1.5				
	STR-CUR03-LB	11/5/2018	15.30	7.58	243.9	8.75	89.0	11.0	68	3				
	STR-CUR03-LB	11/5/2018	15.30	7.59	244.5	8.73	88.8	11.0	65	4				
	STR-CUR03-LB	11/5/2018	15.30	7.61	244.3	8.76	89.1	11.3	60	5				
	STR-CUR03-LB	11/5/2018	15.30	7.60	243.5	8.76	89.1	12.1	57	6				
	STR-CUR03-LB	11/5/2018	15.30	7.60	243.8	8.77	89.2	12.5	49	7				
	STR-CUR03-LB	11/5/2018	15.30	7.62	243.9	8.67	88.2	70.0	35	7.2				
	STR-CUR03-CC	11/5/2018	15.40	7.62	246.6	8.83	90.1	11.3	146	0.3	11.4	0.5	5.5	10.7
	STR-CUR03-CC	11/5/2018	15.39	7.66	246.3	8.83	90.0	11.4	144	1.5				
	STR-CUR03-CC	11/5/2018	15.38	7.66	246.3	8.82	89.9	11.2	145	3				
	STR-CUR03-CC	11/5/2018	15.37	7.61	246.3	8.82	89.8	11.3	147	4				
	STR-CUR03-CC	11/5/2018	15.39	7.64	247.3	8.82	89.9	11.3	146	5				
	STR-CUR03-CC	11/5/2018	15.39	7.63	246.3	8.79	89.7	11.4	146	6				
	STR-CUR03-CC	11/5/2018	15.37	7.62	246.0	8.82	89.9	11.4	147	7				
	STR-CUR03-CC	11/5/2018	15.37	7.63	245.6	8.82	89.9	11.5	146	8				
	STR-CUR03-CC	11/5/2018	15.36	7.62	245.7	8.81	89.8	11.4	147	9				
	STR-CUR03-CC	11/5/2018	15.36	7.62	246.0	8.79	89.6	11.7	147	10				
	STR-CUR03-CC	11/5/2018	15.36	7.63	246.0	8.81	89.8	11.9	146	11				
	STR-CUR03-CC	11/5/2018	15.36	7.61	246.1	8.78	89.5	11.7	146	11.3				
	STR-CUR03-RB	11/5/2018	15.43	7.66	248.5	8.90	90.9	11.7	142	0.3	4.6	0.5	2	4.2
	STR-CUR03-RB	11/5/2018	15.41	7.63	248.6	8.79	89.6	12.2	143	1.5				
	STR-CUR03-RB	11/5/2018	15.41	7.60	248.6	8.79	89.7	12.3	144	3				
	STR-CUR03-RB	11/5/2018	15.40	7.61	248.4	8.75	89.3	14.9	143	4				
	STR-CUR03-RB	11/5/2018	15.41	7.60	248.4	8.78	89.5	12.3	143	4.5				
	STR-CUR06-LB	11/5/2018	16.28	7.80	244.8	8.86	92.0	10.8	211	0.3	8.0	0.5	4	7.5
	STR-CUR06-LB	11/5/2018	16.20	7.80	244.6	8.85	91.8	11.2	211	1.5				
	STR-CUR06-LB	11/5/2018	15.70	7.76	240.6	8.68	89.1	11.5	211	3				
	STR-CUR06-LB	11/5/2018	15.63	7.75	240.9	8.66	88.7	11.6	212	4				
	STR-CUR06-LB	11/5/2018	15.58	7.74	240.2	8.65	88.6	11.9	212	5				
	STR-CUR06-LB	11/5/2018	15.52	7.73	240.4	8.64	88.3	12.2	213	6				
	STR-CUR06-LB	11/5/2018	15.52	7.71	240.2	8.64	88.3	13.0	214	7				
	STR-CUR06-LB	11/5/2018	15.52	7.69	240.4	8.66	88.5	15.2	216	7.9				
	STR-CUR06-CC	11/5/2018	16.55	7.85	247.2	8.96	93.7	10.9	211	0.3	9.1	0.5	4.5	8.4
	STR-CUR06-CC	11/5/2018	16.10	7.81	244.4	8.83	91.4	11.1	211	1.5				
	STR-CUR06-CC	11/5/2018	15.73	7.81	242.7	8.81	90.5	11.3	212	3				
	STR-CUR06-CC	11/5/2018	15.55	7.80	242.3	8.80	90.0	11.5	212	4				
	STR-CUR06-CC	11/5/2018	15.54	7.80	242.3	8.79	89.9	11.7	212	5				
	STR-CUR06-CC	11/5/2018	15.54	7.79	242.0	8.79	89.9	12.0	213	6				
	STR-CUR06-CC	11/5/2018	15.54	7.78	241.8	8.77	89.7	12.4	214	7				
	STR-CUR06-CC	11/5/2018	15.52	7.75	241.8	8.75	89.4	12.4	216	8				
	STR-CUR06-CC	11/5/2018	15.51	7.71	241.8	8.75	89.5	12.7	218	8.9				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River November 2018	STR-CUR06-RB	11/5/2018	15.60	7.83	242.6	8.87	90.8	12.6	213	0.3	7.9	0.5	4	7.5
	STR-CUR06-RB	11/5/2018	15.58	7.83	243.6	8.81	90.2	12.6	213	1.5				
	STR-CUR06-RB	11/5/2018	15.56	7.81	244.2	8.80	90.1	12.9	214	3				
	STR-CUR06-RB	11/5/2018	15.56	7.81	243.8	8.79	89.9	12.9	214	4				
	STR-CUR06-RB	11/5/2018	15.56	7.80	243.6	8.79	89.9	12.9	215	5				
	STR-CUR06-RB	11/5/2018	15.56	7.79	243.1	8.78	89.9	13.0	215	6				
	STR-CUR06-RB	11/5/2018	15.56	7.78	243.3	8.78	89.9	12.6	216	7				
	STR-CUR06-RB	11/5/2018	15.56	7.75	243.8	8.78	89.8	12.1	220	7.5				
	STR-CUR07-LB	11/5/2018	15.38	7.69	240.2	8.46	86.3	12.9	177	0.3	11.0	0.5	5.5	10.5
	STR-CUR07-LB	11/5/2018	15.38	7.69	240.2	8.46	86.2	13.0	177	1.5				
	STR-CUR07-LB	11/5/2018	15.38	7.68	240.0	8.46	86.2	13.1	176	3				
	STR-CUR07-LB	11/5/2018	15.38	7.67	240.1	8.46	86.3	13.0	176	4				
	STR-CUR07-LB	11/5/2018	15.38	7.67	240.0	8.41	85.8	13.0	176	5				
	STR-CUR07-LB	11/5/2018	15.38	7.66	239.8	8.47	86.3	13.1	176	6				
	STR-CUR07-LB	11/5/2018	15.38	7.66	240.8	8.42	85.9	13.3	176	7				
	STR-CUR07-LB	11/5/2018	15.38	7.65	240.1	8.39	85.5	13.5	177	8				
	STR-CUR07-LB	11/5/2018	15.38	7.64	240.6	8.43	85.9	13.6	177	9				
	STR-CUR07-LB	11/5/2018	15.38	7.63	240.0	8.43	86.0	13.5	179	10				
	STR-CUR07-LB	11/5/2018	15.38	7.62	240.2	8.44	86.1	13.2	181	10.7				
	STR-CUR07-CC	11/5/2018	15.52	7.78	239.0	8.65	88.5	12.0	198	0.3	10.5	0.5	5	10
	STR-CUR07-CC	11/5/2018	15.47	7.78	238.7	8.59	87.8	12.1	198	1.5				
	STR-CUR07-CC	11/5/2018	15.46	7.77	239.0	8.57	87.5	12.3	198	3				
	STR-CUR07-CC	11/5/2018	15.47	7.77	239.7	8.52	87.0	12.4	198	4				
	STR-CUR07-CC	11/5/2018	15.45	7.76	239.0	8.56	87.3	12.3	198	5				
	STR-CUR07-CC	11/5/2018	15.46	7.76	239.3	8.54	87.2	12.3	198	6				
	STR-CUR07-CC	11/5/2018	15.46	7.75	239.5	8.51	86.9	12.8	198	7				
	STR-CUR07-CC	11/5/2018	15.45	7.74	240.0	8.51	86.8	12.5	199	8				
	STR-CUR07-CC	11/5/2018	15.45	7.73	239.5	8.53	87.1	12.2	200	9				
	STR-CUR07-CC	11/5/2018	15.44	7.71	239.1	8.53	87.1	12.3	201	10				
	STR-CUR07-CC	11/5/2018	15.44	7.67	239.0	8.52	86.9	14.7	203	10.3				
	STR-CUR07-RB	11/5/2018	15.52	7.82	238.8	8.63	88.2	10.5	205	0.3	10.0	0.5	4.5	9.2
	STR-CUR07-RB	11/5/2018	15.50	7.81	238.5	8.64	88.3	12.2	205	1.5				
	STR-CUR07-RB	11/5/2018	15.51	7.82	239.5	8.63	88.2	12.4	204	3				
	STR-CUR07-RB	11/5/2018	15.49	7.81	238.4	8.63	88.2	12.6	204	4				
	STR-CUR07-RB	11/5/2018	15.48	7.81	238.7	8.64	88.2	12.6	204	5				
	STR-CUR07-RB	11/5/2018	15.48	7.81	239.0	8.64	88.3	12.8	204	6				
	STR-CUR07-RB	11/5/2018	15.48	7.80	238.7	8.62	88.1	13.0	205	7				
	STR-CUR07-RB	11/5/2018	15.48	7.79	238.4	8.61	88.0	13.5	205	8				
	STR-CUR07-RB	11/5/2018	15.48	7.77	238.4	8.61	87.9	14.5	206	9				
	STR-CUR07-RB	11/5/2018	15.48	7.76	238.7	8.60	87.9	15.6	207	9.8				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River September 2019	STR-CUR01-LB	9/4/2019	28.26	7.71	209.4	9.00	117.9	17.4	186	0.5	8.9	0.5	4.5	8.4
	STR-CUR01-LB	9/4/2019	27.26	7.47	209.9	8.25	106.2	18.2	192	1.5				
	STR-CUR01-LB	9/4/2019	26.71	7.26	210.4	7.27	92.6	18.8	195	3				
	STR-CUR01-LB	9/4/2019	26.61	7.23	210.0	7.23	92.0	19.0	194	4				
	STR-CUR01-LB	9/4/2019	26.61	7.24	210.2	7.24	92.1	19.2	193	5				
	STR-CUR01-LB	9/4/2019	26.61	7.23	210.3	7.23	92.0	19.6	192	6				
	STR-CUR01-LB	9/4/2019	26.60	7.24	210.8	7.21	91.7	19.6	191	7				
	STR-CUR01-LB	9/4/2019	26.60	7.26	210.2	7.19	91.4	21.0	184	8				
	STR-CUR01-LB	9/4/2019	26.59	7.26	211.4	7.14	90.8	21.9	173	8.5				
	STR-CUR01-CC	9/4/2019	28.16	8.13	210.2	10.65	139.3	15.2	200	0.5	10.9	0.5	5.5	10.5
	STR-CUR01-CC	9/4/2019	27.00	7.89	210.7	8.92	114.3	16.3	206	1.5				
	STR-CUR01-CC	9/4/2019	26.60	7.24	211.7	7.41	94.2	17.6	217	3				
	STR-CUR01-CC	9/4/2019	26.56	7.22	211.5	7.30	92.8	18.0	217	4				
	STR-CUR01-CC	9/4/2019	26.56	7.23	211.4	7.31	92.9	18.2	217	5				
	STR-CUR01-CC	9/4/2019	26.55	7.24	211.1	7.26	92.2	18.8	216	6				
	STR-CUR01-CC	9/4/2019	26.57	7.23	210.8	7.30	92.8	19.1	216	7				
	STR-CUR01-CC	9/4/2019	26.57	7.23	211.6	7.27	92.4	19.9	215	8				
	STR-CUR01-CC	9/4/2019	26.55	7.22	211.2	7.20	91.5	21.1	215	9				
	STR-CUR01-CC	9/4/2019	26.55	7.23	210.6	7.17	91.1	22.0	214	10				
	STR-CUR01-CC	9/4/2019	26.55	7.24	210.7	7.18	91.2	21.5	215	10.5				
	STR-CUR01-RB	9/4/2019	29.30	7.89	210.0	9.44	126.0	17.8	184	0.5	2.95	0.5	–	2.5
	STR-CUR01-RB	9/4/2019	27.61	7.53	208.0	8.10	104.9	20.3	192	1.5				
	STR-CUR01-RB	9/4/2019	26.72	7.20	208.9	7.05	89.9	21.6	194	2.45				
	STR-CUR02-LB	9/4/2019	28.89	7.61	210.1	8.32	110.2	15.6	203	0.5	2.55	0.5	–	2
	STR-CUR02-LB	9/4/2019	26.93	7.37	207.1	7.52	96.2	17.3	207	1.5				
	STR-CUR02-LB	9/4/2019	26.94	7.37	207.5	7.47	95.6	17.2	204	2				
	STR-CUR02-CC	9/4/2019	28.19	8.09	207.1	10.31	134.9	14.3	213	0.5	12.25	0.5	6.1	11.8
	STR-CUR02-CC	9/4/2019	27.96	8.03	206.2	10.21	133.0	15.1	218	1.5				
	STR-CUR02-CC	9/4/2019	27.40	7.65	206.0	9.16	118.2	16.8	227	3				
	STR-CUR02-CC	9/4/2019	26.70	7.20	206.8	7.14	91.0	18.1	231	4				
	STR-CUR02-CC	9/4/2019	26.68	7.18	206.9	7.12	90.7	18.4	232	5				
	STR-CUR02-CC	9/4/2019	26.67	7.17	207.0	7.11	90.5	18.6	232	6				
	STR-CUR02-CC	9/4/2019	26.67	7.18	206.8	7.10	90.4	18.8	232	7				
	STR-CUR02-CC	9/4/2019	26.67	7.19	206.4	7.09	90.3	19.2	231	8				
	STR-CUR02-CC	9/4/2019	26.68	7.19	206.8	7.08	90.2	19.9	231	9				
	STR-CUR02-CC	9/4/2019	26.68	7.19	207.0	7.12	90.7	20.1	231	10				
	STR-CUR02-CC	9/4/2019	26.68	7.20	207.3	7.10	90.4	20.4	231	11				
	STR-CUR02-CC	9/4/2019	26.68	7.22	206.9	7.10	90.4	22.5	229	11.75				
	STR-CUR02-RB	9/4/2019	30.81	8.15	213.0	9.96	136.4	16.3	197	0.5	2.6	0.5	–	2.1
	STR-CUR02-RB	9/4/2019	28.10	7.56	208.0	8.64	112.9	18.7	212	1.5				
	STR-CUR02-RB	9/4/2019	27.76	7.56	207.5	8.37	108.7	19.7	211	2.1				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River September 2019	STR-CUR03-LB	9/4/2019	32.82	7.73	223.9	9.00	127.5	16.3	200	0.5	5.3	0.5	2.6	4.8
	STR-CUR03-LB	9/4/2019	29.13	7.24	217.2	7.10	94.5	18.8	210	1.5				
	STR-CUR03-LB	9/4/2019	27.06	7.12	210.6	6.83	87.6	21.5	213	3				
	STR-CUR03-LB	9/4/2019	26.90	7.17	210.1	6.91	88.4	23.4	211	4				
	STR-CUR03-LB	9/4/2019	26.90	7.23	210.1	6.89	88.1	25.3	206	4.8				
	STR-CUR03-CC	9/4/2019	31.98	7.71	221.7	9.09	127.0	15.2	218	0.5	11.75	0.5	5.9	11.3
	STR-CUR03-CC	9/4/2019	28.83	7.41	214.1	7.89	104.4	16.0	226	1.5				
	STR-CUR03-CC	9/4/2019	26.98	7.28	207.2	7.23	92.6	17.4	230	3				
	STR-CUR03-CC	9/4/2019	26.91	7.18	208.0	7.19	92.0	18.0	230	4				
	STR-CUR03-CC	9/4/2019	26.82	7.19	207.3	7.17	91.5	18.7	230	5				
	STR-CUR03-CC	9/4/2019	26.78	7.19	208.0	7.10	90.6	19.3	230	6				
	STR-CUR03-CC	9/4/2019	26.77	7.17	207.7	7.10	90.6	19.8	230	7				
	STR-CUR03-CC	9/4/2019	26.75	7.18	207.2	7.08	90.3	20.2	230	8				
	STR-CUR03-CC	9/4/2019	26.76	7.18	207.3	7.08	90.3	21.0	228	9				
	STR-CUR03-CC	9/4/2019	26.76	7.18	207.5	7.08	90.3	22.5	229	10				
	STR-CUR03-CC	9/4/2019	26.77	7.19	206.8	7.08	90.3	24.5	228	11.25				
	STR-CUR03-RB	9/4/2019	28.40	7.57	212.0	8.36	109.8	11.2	213	0.5	2.8	0.5	–	2.3
	STR-CUR03-RB	9/4/2019	28.00	7.48	210.1	8.16	106.4	12.3	215	1.5				
	STR-CUR03-RB	9/4/2019	26.84	7.34	207.5	7.22	92.2	15.5	214	2.2				
	STR-CUR04-LB	9/4/2019	32.91	7.83	248.5	7.99	113.4	13.5	173	0.5	1.9	0.5	–	1.4
	STR-CUR04-LB	9/4/2019	32.55	7.68	245.0	7.59	107.1	13.1	178	1.5				
	STR-CUR04-CC	9/4/2019	33.05	7.70	251.9	7.20	102.4	16.5	176	0.5	13.0	0.5	6.5	12.5
	STR-CUR04-CC	9/4/2019	32.85	7.66	243.1	7.12	101.0	16.5	173	1.5				
	STR-CUR04-CC	9/4/2019	32.20	7.64	225.1	7.08	99.3	16.3	161	3				
	STR-CUR04-CC	9/4/2019	32.11	7.61	228.9	7.09	99.3	16.2	160	4				
	STR-CUR04-CC	9/4/2019	31.63	7.57	228.8	7.08	98.3	16.2	160	5				
	STR-CUR04-CC	9/4/2019	29.91	7.55	218.0	7.10	95.7	16.2	165	6				
	STR-CUR04-CC	9/4/2019	27.82	7.53	217.9	7.16	93.1	16.5	168	7				
	STR-CUR04-CC	9/4/2019	27.47	7.53	219.2	7.06	91.2	17.1	169	8				
	STR-CUR04-CC	9/4/2019	27.43	7.55	220.2	7.08	91.4	18.0	168	9				
	STR-CUR04-CC	9/4/2019	27.41	7.57	220.9	7.05	91.0	19.0	168	10				
	STR-CUR04-CC	9/4/2019	27.23	7.57	221.4	6.97	89.7	20.0	168	11				
	STR-CUR04-CC	9/4/2019	27.11	7.56	222.1	6.86	88.1	20.4	169	12				
	STR-CUR04-CC	9/4/2019	27.10	7.56	222.2	6.74	86.5	17.7	170	13				
	STR-CUR04-RB	9/4/2019	33.28	7.68	229.8	7.19	102.7	18.0	137	0.5	4.78	0.5	2.3	4.2
	STR-CUR04-RB	9/4/2019	32.99	7.67	227.8	7.15	101.6	18.1	132	1.5				
	STR-CUR04-RB	9/4/2019	31.49	7.63	226.4	7.04	97.5	18.7	135	3				
	STR-CUR04-RB	9/4/2019	31.51	7.65	225.4	7.14	99.0	18.5	133	4				
	STR-CUR05-LB	9/4/2019	32.93	7.73	248.3	7.37	104.6	12.7	163	0.5	2.4	0.5	–	2
	STR-CUR05-LB	9/4/2019	32.86	7.65	248.2	7.31	103.7	13.0	168	1.5				
	STR-CUR05-LB	9/4/2019	32.84	7.67	248.4	7.30	103.5	12.9	170	2				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River September 2019	STR-CUR05-CC	9/4/2019	33.30	7.71	247.0	7.19	102.7	16.0	160	0.5	13.2	0.5	6.5	12.7
	STR-CUR05-CC	9/4/2019	32.99	7.68	238.0	7.10	100.9	15.9	153	1.5				
	STR-CUR05-CC	9/4/2019	31.95	7.67	226.0	7.10	99.2	15.5	146	3				
	STR-CUR05-CC	9/4/2019	31.19	7.66	233.7	7.10	97.9	15.4	145	4				
	STR-CUR05-CC	9/4/2019	29.62	7.62	224.7	7.08	95.0	15.4	148	5				
	STR-CUR05-CC	9/4/2019	28.40	7.59	223.4	7.15	93.9	15.6	151	6				
	STR-CUR05-CC	9/4/2019	28.09	7.66	223.9	7.14	93.3	16.2	150	7				
	STR-CUR05-CC	9/4/2019	27.94	7.63	223.3	7.17	93.4	17.0	150	8				
	STR-CUR05-CC	9/4/2019	27.41	7.63	222.1	7.12	91.9	18.0	149	9				
	STR-CUR05-CC	9/4/2019	27.20	7.63	221.7	7.14	91.8	19.1	149	10				
	STR-CUR05-CC	9/4/2019	27.12	7.63	221.6	7.14	91.7	20.8	148	11				
	STR-CUR05-CC	9/4/2019	27.09	7.63	221.0	7.14	91.6	26.3	147	12				
	STR-CUR05-CC	9/4/2019	27.08	7.63	221.2	7.07	90.7	32.7	144	13				
	STR-CUR05-RB	9/4/2019	32.88	7.68	227.2	7.21	102.3	17.6	141	0.5	2.39	0.5	–	1.8
	STR-CUR05-RB	9/4/2019	32.11	7.67	227.2	7.17	100.4	19.7	142	1.5				
	STR-CUR05-RB	9/4/2019	32.21	7.63	226.2	7.20	101.0	22.5	136	2				
	STR-CUR06-LB	9/4/2019	32.51	7.31	236.1	7.52	106.0	14.4	213	0.5	3.0	0.5	–	2.5
	STR-CUR06-LB	9/4/2019	32.16	7.52	235.0	7.54	105.7	15.9	213	1.5				
	STR-CUR06-LB	9/4/2019	31.99	7.28	235.3	7.41	103.6	17.5	215	2.5				
	STR-CUR06-CC	9/4/2019	32.84	7.25	235.4	7.28	103.2	15.4	216	0.5	9.5	0.5	4.8	9
	STR-CUR06-CC	9/4/2019	31.94	7.22	233.8	7.20	100.5	15.4	217	1.5				
	STR-CUR06-CC	9/4/2019	31.51	7.19	231.3	7.06	97.9	15.3	218	3				
	STR-CUR06-CC	9/4/2019	30.40	7.20	229.2	7.03	95.6	15.2	219	4				
	STR-CUR06-CC	9/4/2019	28.48	7.21	224.6	7.08	93.1	15.2	219	5				
	STR-CUR06-CC	9/4/2019	27.75	7.23	220.7	7.11	92.3	14.8	220	6				
	STR-CUR06-CC	9/4/2019	27.41	7.25	220.3	7.18	92.7	14.7	219	7				
	STR-CUR06-CC	9/4/2019	27.09	7.20	217.0	7.15	91.7	18.4	217	8				
	STR-CUR06-CC	9/4/2019	26.91	7.29	219.4	6.92	88.5	21.1	216	9				
	STR-CUR06-RB	9/4/2019	32.75	7.27	230.1	7.40	104.7	17.4	219	0.5	4.02	0.5	2	3.5
	STR-CUR06-RB	9/4/2019	32.28	7.24	228.6	7.37	103.5	17.4	221	1.5				
	STR-CUR06-RB	9/4/2019	29.67	7.19	226.0	7.08	95.1	18.5	222	3				
	STR-CUR06-RB	9/4/2019	29.67	7.19	225.9	7.05	94.7	18.4	222	3.5				
	STR-CUR07-LB	9/4/2019	29.46	7.16	226.4	7.51	100.5	15.0	210	0.5	6.3	0.5	3.2	5.8
	STR-CUR07-LB	9/4/2019	29.42	7.09	227.0	7.16	95.7	17.3	211	1.5				
	STR-CUR07-LB	9/4/2019	29.04	7.03	223.2	7.02	93.2	19.2	211	3				
	STR-CUR07-LB	9/4/2019	28.45	6.98	218.0	6.91	90.8	22.6	211	4				
	STR-CUR07-LB	9/4/2019	27.90	6.91	214.5	6.60	85.9	31.2	210	5				
	STR-CUR07-LB	9/4/2019	27.60	6.90	213.8	6.50	84.2	36.2	210	5.8				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River September 2019	STR-CUR07-CC	9/4/2019	30.20	7.24	232.4	7.69	104.2	12.6	220	0.5	11.16	0.5	5.1	10.8
	STR-CUR07-CC	9/4/2019	29.83	7.16	229.8	7.40	99.7	13.2	223	1.5				
	STR-CUR07-CC	9/4/2019	28.58	7.06	218.9	7.07	93.1	14.1	225	3				
	STR-CUR07-CC	9/4/2019	27.80	7.04	216.2	7.00	91.0	15.1	226	4				
	STR-CUR07-CC	9/4/2019	27.40	7.04	214.9	7.02	90.6	15.8	226	5				
	STR-CUR07-CC	9/4/2019	27.35	7.03	215.0	7.01	90.4	16.5	227	6				
	STR-CUR07-CC	9/4/2019	27.30	7.03	214.4	7.00	90.2	18.1	227	7				
	STR-CUR07-CC	9/4/2019	27.30	6.93	214.9	7.00	90.2	20.4	227	8				
	STR-CUR07-CC	9/4/2019	27.23	6.98	214.8	6.84	88.0	23.3	228	9				
	STR-CUR07-CC	9/4/2019	27.23	6.97	216.0	6.80	87.5	25.8	228	10				
	STR-CUR07-CC	9/4/2019	27.23	6.93	214.8	6.71	86.3	29.0	229	10.6				
	STR-CUR07-RB	9/4/2019	30.37	7.28	233.3	7.73	105.1	13.3	185	0.5	6.4	0.5	3.1	5.9
	STR-CUR07-RB	9/4/2019	29.93	7.23	229.5	7.40	99.8	14.8	184	1.5				
	STR-CUR07-RB	9/4/2019	29.08	7.09	224.2	7.10	94.4	16.0	183	3				
	STR-CUR07-RB	9/4/2019	28.12	7.09	217.1	6.90	90.2	17.9	181	4				
	STR-CUR07-RB	9/4/2019	27.60	7.09	214.9	6.92	89.6	20.7	178	5				
	STR-CUR07-RB	9/4/2019	27.50	7.03	214.6	6.70	86.6	31.8	176	5.9				
Wells Creek (WC11) September 2019	STR-WC11-CC	9/4/2019	32.43	7.63	249.8	7.20	101.4	16.4	164	0.5	1.75	0.5	–	1.3
	STR-WC11-CC	9/4/2019	32.34	7.51	247.9	7.15	100.5	17.1	174	1.5				
Discharge Channel September 2019	STR-DC01-LB	9/4/2019	33.81	7.69	271.2	7.14	102.9	18.5	173	0.5	4.4	0.5	2.2	3.9
	STR-DC01-LB	9/4/2019	33.79	7.62	243.2	7.16	103.1	18.6	174	1.5				
	STR-DC01-LB	9/4/2019	33.79	7.65	246.2	7.13	102.7	18.6	177	3				
	STR-DC01-LB	9/4/2019	33.79	7.64	251.5	7.12	102.6	18.9	177	4				
	STR-DC01-CC	9/4/2019	33.99	7.67	214.3	7.19	103.9	19.4	223	0.5	6.89	0.5	3.4	6.4
	STR-DC01-CC	9/4/2019	34.00	7.62	218.3	7.22	104.4	19.4	214	1.5				
	STR-DC01-CC	9/4/2019	34.01	7.65	234.7	7.20	104.1	19.2	215	3				
	STR-DC01-CC	9/4/2019	34.01	7.60	233.6	7.21	104.2	19.3	217	4				
	STR-DC01-CC	9/4/2019	34.01	7.60	216.1	7.19	103.9	19.4	222	5				
	STR-DC01-CC	9/4/2019	34.01	7.64	213.3	7.18	103.8	19.7	224	6				
	STR-DC01-RB	9/4/2019	33.96	7.67	213.6	7.21	104.1	22.1	215	0.5	1.99	–	0.9	–
	STR-DC01-RB	9/4/2019	33.93	7.63	213.1	7.21	104.1	22.6	216	1.5				
Cumberland River May 2020	STR-CUR02-LB	5/27/2020	20.41	7.71	184.7	9.51	107.5	16.4	151	0.5	1.6	–	0.8	–
	STR-CUR02-LB	5/27/2020	20.40	7.71	184.7	9.49	107.2	17.1	154	1				
	STR-CUR02-CC	5/27/2020	20.37	7.69	183.5	9.40	106.2	15.7	130	0.5	12.0	0.5	6	11.5
	STR-CUR02-CC	5/27/2020	20.37	7.71	183.8	9.40	106.2	15.7	130	1				
	STR-CUR02-CC	5/27/2020	20.36	7.69	183.9	9.35	105.6	16.6	130	2				
	STR-CUR02-CC	5/27/2020	20.38	7.69	184.0	9.41	106.3	15.6	131	3				
	STR-CUR02-CC	5/27/2020	20.37	7.68	183.9	9.36	105.7	16.6	137	4				
	STR-CUR02-CC	5/27/2020	20.37	7.67	184.0	9.38	105.9	17.4	132	5				
	STR-CUR02-CC	5/27/2020	20.35	7.67	184.2	9.38	105.9	18.3	132	6				
	STR-CUR02-CC	5/27/2020	20.36	7.67	184.1	9.38	105.9	17.8	133	7				
	STR-CUR02-CC	5/27/2020	20.36	7.66	184.2	9.38	105.9	18.8	133	8				
	STR-CUR02-CC	5/27/2020	20.35	7.66	184.2	9.38	105.9	18.3	134	9				
	STR-CUR02-CC	5/27/2020	20.35	7.65	184.3	9.38	105.9	18.5	135	10				
	STR-CUR02-CC	5/27/2020	20.35	7.64	184.2	9.40	106.1	18.3	137	11				
	STR-CUR02-CC	5/27/2020	20.35	7.64	184.3	9.40	106.1	19.9	137	11.5				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River May 2020	STR-CUR02-RB	5/27/2020	20.42	7.72	184.0	9.59	108.4	14.9	137	0.5	1.7	–	0.8	–
	STR-CUR02-RB	5/27/2020	20.39	7.72	184.1	9.54	107.8	15.5	138	1				
	STR-CUR04-LB	5/27/2020	24.01	7.79	206.2	9.67	117.1	14.5	25	0.5	2.5	0.5	–	2
	STR-CUR04-LB	5/27/2020	23.11	7.76	208.2	9.77	116.4	15.6	16	1				
	STR-CUR04-LB	5/27/2020	21.75	7.55	198.1	9.01	104.5	31.4	0	2				
	STR-CUR04-CC	5/27/2020	26.30	7.80	203.4	9.37	118.4	15.7	87	0.5	14.4	0.5	3.5 7	14
	STR-CUR04-CC	5/27/2020	26.10	7.74	207.0	9.30	117.1	15.5	88	1				
	STR-CUR04-CC	5/27/2020	24.09	7.74	195.4	9.24	112.1	15.4	89	2				
	STR-CUR04-CC	5/27/2020	23.99	7.73	192.1	9.33	113.0	15.1	90	3				
	STR-CUR04-CC	5/27/2020	23.51	7.71	188.4	9.25	111.0	14.2	90	4				
	STR-CUR04-CC	5/27/2020	23.12	7.71	187.1	9.32	111.0	14.4	91	5				
	STR-CUR04-CC	5/27/2020	23.23	7.69	188.7	9.31	111.1	13.9	91	6				
	STR-CUR04-CC	5/27/2020	21.67	7.68	186.6	9.26	107.3	12.9	92	7				
	STR-CUR04-CC	5/27/2020	20.48	7.68	185.8	9.26	104.8	12.5	93	8				
	STR-CUR04-CC	5/27/2020	20.18	7.66	184.2	9.23	103.9	15.3	94	9				
	STR-CUR04-CC	5/27/2020	20.18	7.65	184.1	9.22	103.7	16.4	94	10				
	STR-CUR04-CC	5/27/2020	20.18	7.65	183.6	9.20	103.5	16.3	95	11				
	STR-CUR04-CC	5/27/2020	20.17	7.65	183.6	9.22	103.7	17.5	95	12				
	STR-CUR04-CC	5/27/2020	20.17	7.64	184.9	9.18	103.3	19.3	95	13				
	STR-CUR04-CC	5/27/2020	20.17	7.65	184.2	9.21	103.6	24.1	96	14				
	STR-CUR04-RB	5/27/2020	26.05	7.74	199.5	9.25	116.3	16.0	50	0.5	3.7	0.5	2	3.2
	STR-CUR04-RB	5/27/2020	26.00	7.75	199.5	9.26	116.4	17.6	47	1				
	STR-CUR04-RB	5/27/2020	25.71	7.73	197.7	9.24	115.5	16.6	45	2				
	STR-CUR04-RB	5/27/2020	25.59	7.70	196.7	9.25	115.4	21.7	42	3				
	STR-CUR05-LB	5/27/2020	24.97	7.72	201.9	9.37	115.5	13.7	50	0.5	3.2	0.5	1.6	2.7
	STR-CUR05-LB	5/27/2020	24.60	7.71	198.8	9.38	114.9	14.8	46	1				
	STR-CUR05-LB	5/27/2020	23.96	7.70	196.8	9.39	113.6	15.4	64	2				
	STR-CUR05-LB	5/27/2020	23.89	7.68	196.7	9.38	113.4	16.0	61	3				
	STR-CUR05-CC	5/27/2020	25.99	7.77	204.1	9.39	118.0	15.2	83	0.5	14.9	0.5	7.4	14.4
	STR-CUR05-CC	5/27/2020	25.89	7.75	199.6	9.39	117.8	16.1	84	1				
	STR-CUR05-CC	5/27/2020	24.86	7.70	195.2	9.28	114.2	15.0	84	2				
	STR-CUR05-CC	5/27/2020	23.70	7.68	191.2	9.23	111.2	14.1	86	3				
	STR-CUR05-CC	5/27/2020	21.76	7.68	186.7	9.31	108.0	13.1	87	4				
	STR-CUR05-CC	5/27/2020	21.40	7.67	186.7	9.34	107.6	13.0	87	5				
	STR-CUR05-CC	5/27/2020	20.83	7.66	184.6	9.32	106.2	14.6	88	6				
	STR-CUR05-CC	5/27/2020	20.32	7.66	184.7	9.28	104.7	14.7	88	7				
	STR-CUR05-CC	5/27/2020	20.25	7.66	183.9	9.31	104.9	13.8	88	8				
	STR-CUR05-CC	5/27/2020	20.23	7.65	183.7	9.28	104.5	15.2	88	9				
	STR-CUR05-CC	5/27/2020	20.21	7.65	183.6	9.31	104.8	16.7	88	10				
	STR-CUR05-CC	5/27/2020	20.16	7.65	183.6	9.28	104.4	18.9	89	11				
	STR-CUR05-CC	5/27/2020	20.16	7.64	183.6	9.31	104.7	20.7	89	12				
	STR-CUR05-CC	5/27/2020	20.16	7.63	183.5	9.31	104.7	20.8	89	13				
	STR-CUR05-CC	5/27/2020	20.16	7.63	185.8	9.29	104.5	20.1	90	14				
	STR-CUR05-CC	5/27/2020	20.16	7.63	184.3	9.30	104.6	23.0	90	14.5				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Cumberland River May 2020	STR-CUR05-RB	5/27/2020	25.30	7.71	196.0	9.26	114.9	17.0	88	0.5	2.2	0.5	–	1.7
	STR-CUR05-RB	5/27/2020	22.98	7.69	187.3	9.29	110.4	16.9	88	1				
	STR-CUR05-RB	5/27/2020	20.80	7.66	184.1	9.30	105.9	18.0	90	2				
	STR-CUR06-LB	5/27/2020	21.51	7.46	187.9	9.37	108.2	9.5	110	0.5	2.5	0.5	–	2
	STR-CUR06-LB	5/27/2020	21.46	7.42	188.5	9.36	108.0	9.0	113	1				
	STR-CUR06-LB	5/27/2020	21.35	7.36	187.8	9.36	107.8	9.9	119	2				
	STR-CUR06-CC	5/27/2020	21.38	7.64	192.3	9.21	106.1	10.0	91	0.5	11.0	0.5	5.5	10.5
	STR-CUR06-CC	5/27/2020	21.30	7.63	187.3	9.36	107.7	10.2	92	1				
	STR-CUR06-CC	5/27/2020	20.70	7.60	184.4	9.35	106.3	11.0	93	2				
	STR-CUR06-CC	5/27/2020	20.66	7.59	184.1	9.34	106.1	10.9	94	3				
	STR-CUR06-CC	5/27/2020	20.55	7.58	184.0	9.37	106.2	11.7	94	4				
	STR-CUR06-CC	5/27/2020	20.30	7.61	183.6	9.39	105.9	11.2	93	5				
	STR-CUR06-CC	5/27/2020	20.25	7.56	183.5	9.34	105.2	16.5	96	6				
	STR-CUR06-CC	5/27/2020	20.25	7.55	183.6	9.34	105.2	14.5	96	7				
	STR-CUR06-CC	5/27/2020	20.24	7.55	183.5	9.31	104.9	15.4	97	8				
	STR-CUR06-CC	5/27/2020	20.24	7.55	183.7	9.36	105.4	16.9	97	9				
	STR-CUR06-CC	5/27/2020	20.22	7.54	183.9	9.33	105.1	16.4	97	10				
	STR-CUR06-CC	5/27/2020	20.22	7.53	183.9	9.32	104.9	15.9	98	10.5				
	STR-CUR06-RB	5/27/2020	23.22	7.71	189.1	9.44	112.7	13.3	87	0.5	5.1	0.5	2.7	5
	STR-CUR06-RB	5/27/2020	22.92	7.69	187.4	9.40	111.5	14.0	88	1				
	STR-CUR06-RB	5/27/2020	22.58	7.67	189.1	9.43	111.2	14.0	89	2				
	STR-CUR06-RB	5/27/2020	21.95	7.66	185.1	9.37	109.1	15.1	90	3				
	STR-CUR06-RB	5/27/2020	21.62	7.64	185.0	9.50	109.9	15.1	90	4				
	STR-CUR06-RB	5/27/2020	21.05	7.63	185.1	9.37	107.2	16.3	91	4.5				
Wells Creek (WC11) May 2020	STR-WC11-CC	5/27/2020	22.30	7.81	198.5	9.72	114.0	15.1	82	0.5	3.0	0.5	–	2.5
	STR-WC11-CC	5/27/2020	21.50	7.74	191.8	9.44	109.0	16.4	82	1				
	STR-WC11-CC	5/27/2020	21.36	7.73	189.4	9.46	108.9	16.1	80	2				
	STR-WC11-CC	5/27/2020	21.42	7.73	189	9.5	109.5	15.7	75	2.5				
Discharge Channel May 2020	STR-DC01-LB	5/27/2020	26.36	7.73	213.7	9.37	118.5	17.0	84	0.5	3.6	0.5	1.8	3.1
	STR-DC01-LB	5/27/2020	26.36	7.74	217.3	9.36	118.4	16.9	83	1				
	STR-DC01-LB	5/27/2020	26.36	7.75	212.9	9.34	118.1	17.1	83	2				
	STR-DC01-LB	5/27/2020	26.36	7.73	212.1	9.38	118.7	17.5	82	3				
	STR-DC01-CC	5/27/2020	26.26	7.74	193.6	9.42	118.9	17.8	101	0.5	8.1	0.5	4	7.6
	STR-DC01-CC	5/27/2020	26.28	7.75	194.5	9.41	118.9	17.8	101	1				
	STR-DC01-CC	5/27/2020	26.33	7.74	200.4	9.37	118.5	17.7	101	2				
	STR-DC01-CC	5/27/2020	26.26	7.73	194.7	9.39	118.6	17.9	103	3				
	STR-DC01-CC	5/27/2020	26.27	7.72	196.4	9.39	118.6	18.0	103	4				
	STR-DC01-CC	5/27/2020	26.29	7.72	201.6	9.39	118.6	17.9	103	5				
	STR-DC01-CC	5/27/2020	26.28	7.72	200.4	9.42	119.0	18.3	105	6				
	STR-DC01-CC	5/27/2020	26.24	7.71	192.3	9.40	118.6	18.4	106	7				
	STR-DC01-CC	5/27/2020	26.17	7.71	194.8	9.41	118.6	18.6	107	8				
	STR-DC01-RB	5/27/2020	26.15	7.74	191.1	9.38	118.2	18.6	114	0.5	2.0	–	1	–
	STR-DC01-RB	5/27/2020	26.15	7.74	191.3	9.39	118.3	18.7	114	1				
	STR-DC01-RB	5/27/2020	26.15	7.74	191.5	9.41	118.6	19.1	115	1.5				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Wells Creek November 2018	STR-WC01-LB	11/29/2018	8.37	7.30	306.1	10.96	95.4	1.1	119	0.3	0.9	0.5	–	–
	STR-WC01-LB	11/29/2018	8.37	7.16	306.1	10.99	95.6	1.2	130	0.87				
	STR-WC01-RB	11/29/2018	8.45	7.31	306.9	11.02	96.1	0.9	127	0.32	0.8	0.3	–	–
	STR-WC01-RB	11/29/2018	8.44	7.26	306.6	11.06	96.4	1.3	147	0.78				
	STR-WC02-LB	11/28/2018	7.88	7.32	309.4	11.70	100.0	0.8	173	0.3	1.1	0.5	–	–
	STR-WC02-LB	11/28/2018	7.53	7.22	307.4	11.82	100.2	1.4	178	1.05				
	STR-WC02-RB	11/28/2018	7.55	7.30	307.3	11.80	100.1	2.2	171	0.3	1.3	0.6	–	–
	STR-WC02-RB	11/28/2018	7.49	7.22	306.4	11.81	100.0	0.9	177	1.28				
	STR-WC03-LB	11/29/2018	8.03	7.26	309.6	10.56	91.1	3.0	137	0.3	0.65	0.3	–	–
	STR-WC03-LB	11/29/2018	8.02	7.12	310.4	10.51	90.7	2.6	144	0.62				
	STR-WC03-CC	11/29/2018	8.04	7.19	311.2	10.38	89.6	2.8	145	0.3	1.0	0.5	–	–
	STR-WC03-CC	11/29/2018	8.03	6.89	310.6	10.48	90.4	3.5	156	0.92				
	STR-WC03-RB	11/29/2018	8.09	7.24	309.5	10.54	91.1	2.6	154	0.3	0.65	0.3	–	–
	STR-WC03-RB	11/29/2018	8.11	7.12	309.1	10.67	92.3	3.1	158	0.61				
	STR-WC04-CC	11/29/2018	7.77	7.32	328.0	10.35	88.8	2.6	146	0.3	0.5	0.2	–	–
	STR-WC04-CC	11/29/2018	7.77	7.25	333.2	10.40	89.2	4.0	149	0.5				
	STR-WC04-RB	11/29/2018	7.75	7.33	325.9	10.32	88.5	1.1	143	0.3	1.35	0.6	–	–
	STR-WC04-RB	11/29/2018	7.77	7.31	325.4	10.40	89.2	1.1	144	1.3				
	STR-WC05-CC	11/29/2018	7.69	7.33	349.8	10.70	91.6	2.1	111	0.3	0.8	0.1	–	–
	STR-WC05-CC	11/29/2018	7.70	7.30	360.5	10.71	91.7	2.8	118	0.65				
	STR-WC05-RB	11/29/2018	7.54	7.36	325.0	10.57	90.1	1.8	142	0.3	1.35	0.6	–	–
	STR-WC05-RB	11/29/2018	7.55	7.27	324.9	10.55	90.0	4.0	146	1.32				
	STR-WC06-RB	11/28/2018	7.61	7.26	332.9	11.10	94.3	2.0	183	0.3	1.35	0.6	–	–
	STR-WC06-RB	11/28/2018	7.62	7.13	332.6	11.12	94.5	2.3	187	1.31				
	STR-WC07-LB	11/28/2018	7.35	7.40	326.2	11.84	99.9	1.5	183	0.3	1.3	0.6	–	–
	STR-WC07-LB	11/28/2018	7.31	7.32	324.4	11.93	100.6	1.5	185	1.27				
	STR-WC07-RB	11/28/2018	7.18	7.44	322.5	12.32	103.5	2.2	183	0.3	1.95	0.5	–	1.5
	STR-WC07-RB	11/28/2018	7.06	7.40	320.8	12.53	105.0	2.8	184	1.5				
	STR-WC07-RB	11/28/2018	7.01	7.00	320.7	12.56	105.1	3.3	189	1.92				
	STR-WC08-LB	11/28/2018	7.06	7.40	323.6	11.87	99.4	1.9	161	0.3	1.8	0.5	–	1.2
	STR-WC08-LB	11/28/2018	6.93	7.39	323.3	11.96	99.9	2.1	162	1.5				
	STR-WC08-LB	11/28/2018	6.86	7.32	322.1	12.00	100.0	2.6	163	1.74				
	STR-WC08-RB	11/28/2018	7.22	7.46	323.7	12.05	101.4	1.0	174	0.3	1.6	0.75	–	–
	STR-WC08-RB	11/28/2018	6.92	7.48	321.6	12.32	102.9	1.0	175	1.52				
	STR-WC09-LB	11/28/2018	5.90	7.48	317.7	11.84	96.3	1.3	108	0.3	2.5	0.5	–	1.9
	STR-WC09-LB	11/28/2018	5.87	7.44	317.8	11.84	96.3	1.1	111	1.5				
	STR-WC09-LB	11/28/2018	5.88	7.38	318.5	11.90	96.8	1.5	112	2.45				
	STR-WC09-CC	11/28/2018	6.03	7.60	319.8	11.80	96.3	1.2	148	0.3	2.6	0.5	–	2
	STR-WC09-CC	11/28/2018	6.00	7.47	319.6	11.80	96.3	1.2	150	1.5				
	STR-WC09-CC	11/28/2018	5.98	7.36	319.4	11.84	96.5	1.2	156	2.56				
	STR-WC09-RB	11/28/2018	6.03	7.34	320.2	11.91	97.2	2.0	183	0.3	1.2	0.5	–	–
	STR-WC09-RB	11/28/2018	6.06	7.20	319.6	11.90	97.2	2.1	190	1				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Wells Creek November 2018	STR-WC10-LB	11/28/2018	6.04	7.60	315.7	12.14	99.1	2.2	154	0.3	1.65	0.8	–	–
	STR-WC10-LB	11/28/2018	6.04	7.58	315.3	12.20	99.6	2.1	156	1.5				
	STR-WC10-LB	11/28/2018	5.90	7.59	315.5	12.18	99.1	2.0	156	1.61				
	STR-WC10-CC	11/28/2018	5.86	7.51	315.8	12.40	100.8	1.5	174	0.3	0.6	0.2	–	–
	STR-WC10-RB	11/28/2018	6.20	7.34	314.4	12.70	104.1	2.3	173	0.3	0.6	0.3	–	–
Wells Creek August 2019	STR-WC01-LB	8/13/2019	28.50	8.19	297.4	11.90	157.4	12.1	82	0.5	1.2	–	0.6	–
	STR-WC01-LB	8/13/2019	26.00	7.54	312.0	5.90	74.6	12.8	89	1				
	STR-WC01-CC	8/13/2019	27.10	7.95	305.2	9.40	121.3	11.0	88	0.5	1.1	–	0.6	–
	STR-WC01-CC	8/13/2019	26.80	7.71	311.3	8.24	105.8	11.9	94	1				
	STR-WC01-RB	8/13/2019	28.90	8.51	287.8	13.76	183.3	21.3	-39	0.5	1.2	–	0.6	–
	STR-WC01-RB	8/13/2019	26.30	7.61	309.7	6.72	85.5	45.9	-45	1				
	STR-WC02-LB	8/13/2019	31.40	8.64	286.6	13.95	194.1	8.8	65	0.2	0.5	0.2	–	–
	STR-WC02-CC	8/13/2019	30.40	8.49	287.2	12.63	172.7	10.9	-3	0.5	1.7	–	0.85	–
	STR-WC02-CC	8/13/2019	26.10	7.63	311.1	5.74	72.7	14.7	-20	1				
	STR-WC02-RB	8/13/2019	30.50	8.56	290.1	12.95	177.4	20.1	12	0.5	0.9	0.5	–	–
	STR-WC03-LB	8/13/2019	27.70	7.95	302.1	10.79	140.7	19.5	31	0.5	1.1	–	0.6	–
	STR-WC03-LB	8/13/2019	27.80	7.93	299.1	10.35	135.2	29.3	16	1				
	STR-WC03-CC	8/13/2019	27.40	7.80	299.4	9.56	124.0	20.6	79	0.5	1.2	–	0.6	–
	STR-WC03-CC	8/13/2019	25.80	7.46	311.1	5.50	69.3	14.7	84	1				
	STR-WC03-RB	8/13/2019	28.40	8.21	302.7	9.20	121.5	18.1	-60	0.5	1.2	–	0.6	–
	STR-WC03-RB	8/13/2019	25.90	7.44	311.2	5.43	68.6	25.1	-18	1				
	STR-WC04-LB	8/13/2019	30.80	8.11	319.9	11.51	158.5	43.1	114	0.2	0.4	0.2	–	–
	STR-WC04-CC	8/13/2019	29.70	8.24	312.9	11.97	161.7	14.0	32	0.5	1.2	–	0.6	–
	STR-WC04-CC	8/13/2019	27.70	7.57	318.4	7.24	94.4	48.0	62	1				
	STR-WC04-RB	8/13/2019	31.70	8.33	323.9	12.41	173.5	13.0	113	0.3	0.5	0.3	–	–
	STR-WC05-LB	8/13/2019	30.90	8.02	318.0	9.15	126.2	19.4	93	0.2	0.4	0.2	–	–
	STR-WC05-CC	8/13/2019	28.80	7.88	318.4	8.56	113.8	20.6	153	0.5	1.2	–	0.6	–
	STR-WC05-CC	8/13/2019	27.20	7.50	330.1	6.69	86.5	25.1	158	1				
	STR-WC05-RB	8/13/2019	31.50	8.19	316.1	10.99	153.2	23.9	169	0.2	0.5	0.2	–	–
	STR-WC06-LB	8/13/2019	32.86	7.84	317.8	10.50	149.7	31.4	194	0.1*	0.1	0.1	–	–
	STR-WC06-CC	8/13/2019	32.72	8.07	316.7	11.47	163.2	26.8	210	0.3*	0.3	0.1	–	–
	STR-WC06-RB	8/13/2019	32.20	7.94	318.0	10.99	155.0	19.0	194	0.5	1.21	0.5	–	–
	STR-WC06-RB	8/13/2019	27.71	7.31	323.3	6.85	89.4	32.3	207	1.21*				
	STR-WC07-LB	8/13/2019	31.14	7.67	318.9	9.58	132.7	17.9	209	0.58*	0.58	0.3	–	–
	STR-WC07-CC	8/13/2019	31.08	7.76	318.2	10.86	150.3	20.1	204	0.5	2.3	0.5	–	1.8
	STR-WC07-CC	8/13/2019	28.88	7.30	322.2	7.02	93.5	30.2	219	1.5				
	STR-WC07-CC	8/13/2019	28.30	7.29	325.3	7.04	92.8	29.1	223	2.3*				
	STR-WC07-RB	8/13/2019	31.13	7.73	319.4	9.81	135.9	17.9	211	0.5	0.93	0.5	–	–
	STR-WC07-RB	8/13/2019	29.38	7.37	325.1	7.88	105.9	24.5	222	0.93*				
	STR-WC08-LB	8/13/2019	31.47	7.63	320.0	8.79	122.4	16.5	203	0.5	1.35	–	0.6	–
	STR-WC08-LB	8/13/2019	29.48	7.32	320.3	7.30	98.3	25.1	210	1.35*				
	STR-WC08-CC	8/13/2019	30.94	7.62	318.9	9.10	125.6	19.5	179	0.5	2.38	0.5	–	1.9
	STR-WC08-CC	8/13/2019	29.11	7.32	320.1	7.10	94.9	23.0	185	1.5				
	STR-WC08-CC	8/13/2019	28.64	7.25	320.9	6.38	84.6	28.7	181	2.38*				
	STR-WC08-RB	8/13/2019	31.19	7.65	318.7	9.33	129.3	19.1	205	0.5	1.3	0.5	–	–
	STR-WC08-RB	8/13/2019	29.18	7.31	324.7	6.64	88.9	26.7	217	1.3*				

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Wells Creek August 2019	STR-WC09-LB	8/13/2019	31.17	7.68	308.4	8.32	115.3	18.5	208	0.5	1.28	–	0.6	–
	STR-WC09-LB	8/13/2019	29.78	7.44	312.4	6.63	89.7	16.7	216	1.28*				
	STR-WC09-CC	8/13/2019	30.35	7.71	311.3	8.87	121.2	18.8	174	0.5	2.93	0.5	–	2.4
	STR-WC09-CC	8/13/2019	29.64	7.39	312.8	6.62	89.3	24.9	177	1.5				
	STR-WC09-CC	8/13/2019	29.19	7.17	326.2	4.27	57.2	34.1	177	2.93*				
	STR-WC09-RB	8/13/2019	30.75	7.62	309.5	8.31	114.3	16.7	174	0.5	0.9	0.5	–	–
	STR-WC09-RB	8/13/2019	29.73	7.37	314.0	6.52	88.1	18.3	173	0.9*				
	STR-WC10-LB	8/13/2019	31.30	7.90	287.1	9.64	133.9	15.6	170	0.5	2.18	0.5	–	1.7
	STR-WC10-LB	8/13/2019	29.59	7.46	309.6	6.91	93.2	21.8	176	1.5				
	STR-WC10-LB	8/13/2019	29.31	7.33	311.2	4.84	64.9	25.7	177	2.18*				
	STR-WC10-CC	8/13/2019	30.62	7.75	309.0	9.65	132.5	20.2	188	0.5	0.7	0.3	–	–
	STR-WC10-CC	8/13/2019	30.47	7.74	309.4	9.25	126.6	23.5	191	0.7*				
	STR-WC10-RB	8/13/2019	32.92	7.95	305.9	9.49	135.5	19.1	192	0.3*	0.3	0.2	–	–
Wells Creek December 2019	STR-WC01-CC	12/5/2019	9.25	7.83	287.9	10.17	90.2	1.3	90	0.5	1.1	0.5	–	–
	STR-WC02-RB	12/5/2019	9.48	7.80	294.2	9.88	88.1	2.3	130	0.5	1.3	0.5	–	–
	STR-WC03-RB	12/5/2019	9.68	7.77	292.5	10.00	89.6	5.2	131	0.2	0.5	0.25	–	–
	STR-WC04-RB	12/5/2019	9.60	7.77	317.3	9.86	88.2	4.0	128	0.2	0.5	0.3	–	–
	STR-WC05-RB	12/5/2019	9.58	7.73	310	9.76	87.3	0.0	132	0.3	0.65	0.3	–	–
	STR-WC06-RB	12/5/2019	9.43	7.76	309.4	9.83	87.6	2.1	124	0.5	0.9	0.5	–	–
	STR-WC07-RB	12/5/2019	8.86	7.73	302.4	10.09	88.7	2.0	124	0.5	1.0	0.5	–	–
	STR-WC08-RB	12/5/2019	8.66	7.68	300.6	9.98	87.3	2.2	125	0.5	0.9	0.5	–	–
	STR-WC09-RB	12/5/2019	8.37	7.56	297.2	10.13	88.0	2.0	126	0.5	1.03	0.5	–	–
Unnamed Tributary November 2018	STR-UT04-LB	11/27/2018	4.64	7.4	1327	11.22	88.1	0.9	158	0.1	0.2	0.1	–	–
	STR-UT04-CC	11/27/2018	5.80	7.6	1331	10.8	87.4	0.0	158	0.3	1.25	0.5	–	–
	STR-UT04-CC	11/27/2018	5.70	7.6	1329	10.7	86.3	0.0	158	0.6				
	STR-UT04-CC	11/27/2018	6.50	7.6	1279	10.6	87.2	0.0	32	1.2				
	STR-UT04-RB	11/27/2018	6.30	7.53	1326	11.03	90.3	0.0	164	0.1	0.2	0.1	–	–
	STR-UT05-LB	11/27/2018	4.85	7.39	1325	11.27	89.0	0.7	154	0.1	0.2	0.1	–	–
	STR-UT05-CC	11/27/2018	5.03	7.71	1323	10.89	86.4	0.0	156	0.1	0.2	0.1	–	–
	STR-UT05-RB	11/27/2018	6.42	6.82	1333	12.43	102.1	0.0	170	0.1	0.2	0.1	–	–
	STR-UT05-RB**	11/27/2018	6.60	7.5	1337	12.26	101.2	0.0	161	0.1				
Unnamed Tributary August 2019	STR-UT01-LB	8/21/2019	31.68	7.86	1954	10.90	152.4	18.7	-23	0.1	0.2	0.1	–	–
	STR-UT01-CC	8/21/2019	31.77	7.59	1954	6.95	95.3	17.0	35	0.1	0.2	0.1	–	–
	STR-UT01-RB	8/21/2019	30.10	7.21	1969	5.40	72.0	33.6	-208	0.1	0.2	0.1	–	–
	STR-UT02-CC	8/21/2019	25.47	7.00	1984	0.00	0.0	17.3	-333	0.34	0.9	0.3	–	–
	STR-UT02-RB	8/21/2019	25.41	6.98	1986	0.00	0.0	21.4	-326	0.3	0.8	0.3	–	–
	STR-UT03-LB	8/21/2019	25.45	7.00	1978	0.00	0.0	76.5	-268	0.3	1.75	0.3	–	1.3
	STR-UT03-LB	8/21/2019	24.14	6.84	2318	0.00	0.0	42.5	-383	1.0				
	STR-UT03-LB	8/21/2019	22.15	6.84	2664	0.00	0.0	73.2	-403	1.5				
	STR-UT03-RB	8/21/2019	25.47	7.05	1957	0.00	0.0	82.8	-189	0.3	1.1	–	0.7	–
	STR-UT04-LB	8/20/2019	31.85	7.63	917.6	5.60	78.1	4.6	46	0.1	0.2	0.1	–	–
	STR-UT04-CC	8/20/2019	31.40	7.81	923.6	5.10	70.6	3.0	58	0.3	0.4	0.2	–	–
	STR-UT04-RB	8/20/2019	31.85	7.74	925.0	6.40	89.3	3.4	178	0.2	0.4	0.2	–	–
	STR-UT05-LB	8/20/2019	28.11	7.10	903.5	0.16	2.1	5.7	57	0.2	0.3	0.1	–	–
	STR-UT05-CC	8/20/2019	27.53	7.16	902.5	0.47	6.1	3.6	141	0.1	0.2	0.1	–	–
	STR-UT05-RB	8/20/2019	31.77	7.66	913.3	8.00	111.5	5.2	166	0.1	0.2	0.1	–	–

See last page for notes.

TABLE B.4 – Surface Stream Field Measurement Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Sampling Event	Station ID	Sample Date	Temperature	pH	Specific Conductivity	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	SU	µS/cm	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Unnamed Tributary December 2019	STR-UT01-LB	12/4/2019	8.65	7.97	1547	17.80	157.4	5.2	55	0.3	0.7	0.3	–	–
	STR-UT01-CC	12/4/2019	8.62	7.93	1545	17.70	156.4	16.5	47	0.3	0.6	0.3	–	–
	STR-UT01-RB	12/4/2019	7.96	7.78	1541	16.30	141.7	16.5	115	0.3	0.6	0.5	–	–
	STR-UT02-LB	12/4/2019	7.72	7.86	1568	15.34	132.6	13.1	33	0.5	0.7	0.3	–	–
	STR-UT02-CC	12/4/2019	7.50	7.80	1569	14.29	122.9	2.7	62	0.5	0.92	0.5	–	–
	STR-UT02-RB	12/4/2019	7.58	7.73	1576	13.70	118.0	7.5	23	0.5	1.02	0.5	–	–
	STR-UT03-LB	12/4/2019	6.41	7.78	1570	14.43	120.8	15.1	63	0.5	1.15	0.5	–	–
	STR-UT03-CC	12/4/2019	6.53	7.82	1572	13.86	116.3	14.9	64	0.5	1.0	0.5	–	–
	STR-UT03-RB	12/4/2019	6.49	7.57	1573	13.80	115.7	12.6	23	0.5	1.5	–	0.7	–
	STR-UT03-RB	12/4/2019	6.59	7.68	1687	13.60	114.3	13.9	31	1.0		–	–	–
	STR-UT04-RB	12/4/2019	8.27	8.13	1300	14.72	128.9	9.5	4	0.2	0.3	0.1	–	–
	STR-UT05-RB	12/4/2019	10.17	8.34	1340	18.60	170.4	4.6	121	0.04	0.05	0.05	–	–

Notes:

°C	degrees Celsius
%	percent
ID	Identification
m	meter
mg/L	milligrams per Liter
µS/cm	microsiemens per centimeter
mV	millivolts
NTU	Nephelometric Turbidity Units
SU	Standard Units
*	Maximum water depth recorded for bottom measurements. Measurements taken approximately 0.05 meters off bottom.
**	Second field measurements taken approximately two meters from initial measurements.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR01														
Sample Date	05-Nov-2018										04-Sep-2019				
Sample ID	CUF-STR-CUR01-LB-SUR-20181105	CUF-STR-CUR01-LB-MID-20181105	CUF-STR-CUR01-LB-BOT-20181105	CUF-STR-CUR01-CC-SUR-20181105	CUF-STR-DUP04-20181105	CUF-STR-CUR01-CC-MID-20181105	CUF-STR-CUR01-CC-BOT-20181105	CUF-STR-CUR01-RB-SUR-20181105	CUF-STR-CUR01-RB-MID-20181105	CUF-STR-CUR01-RB-BOT-20181105	CUF-STR-CUR01-LB-SUR-20190904	CUF-STR-CUR01-LB-MID-20190904	CUF-STR-CUR01-LB-BOT-20190904	CUF-STR-CUR01-CC-SUR-20190904	CUF-STR-DUP04-20190904
Sample Depth (m)	0.5	1.5	3	0.5	0.5	5	10	0.5	2.7	5	0.5	4.5	8.4	0.5	0.5
Sample Type[1]	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	FD
Parent Sample ID					CUF-STR-CUR01-CC-SUR-20181105										CUF-STR-CUR01-CC-SUR-20190904
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	1.12 UJ	<1.12	0.514 J	0.614 J	0.433 J	0.447 J	0.586 J
Arsenic	0.363 J	28.3	0.366 J	0.423 J	0.692 J	0.702 J	0.461 J	0.596 J	<0.323	0.748 J	0.873 J	0.970 J	0.956 J	0.922 J	0.873 J
Barium	24.8	27.9	26.2	24.3	27.0	25.4	25.6	26.0	25.1	25.6	22.9	24.0	25.2	22.1	24.3
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	0.076 J	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	37800	37900	37500	37300	37300	37100	37200	35800	36700	37200	26200	26000	26200	26100	27300
Chromium	0.795 U*	1.04 U*	<0.631	<0.631	1.57 U*	0.899 U*	<0.631	<0.631	<0.631	<0.631	2.56	3.17	3.19	2.57	2.97
Cobalt	0.387 J	0.545	0.329 J	0.279 J	0.254 J	0.221 J	0.32 J	0.386 J	0.269 J	0.325 J	0.317 U*	0.376 U*	0.482 J	0.213 U*	0.224 U*
Copper	<1.3	2.53	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	0.910 J	0.969 J	1.04 J	0.763 J	0.841 J
Iron	402	914	507	381 J	423	495	538	480	354	455	423	608	738	248	271
Lead	0.424 J	1.52	0.496 J	0.375 J	0.338 J	0.441 J	0.49 J	0.469 J	0.391 J	0.435 J	0.454 U*	0.595 U*	0.693 U*	0.298 U*	0.282 U*
Lithium	4.41 J	5.22	4.84 J	4.68 J	<2.56	4.71 J	4.78 J	4.39 J	4.60 J	4.98 J	<3.39	<3.39	<3.39	<3.39	3.68 J
Magnesium	6030	6040	5980	6040	6140	6020	6040	5770	5940	6030	5460	5370	5610	5480	5710
Manganese	52.8	62.7	58.9	48.7	50.4	58.2	65.9	56.5	54.1	59.7	55.7	70.5	80.6	39.8	42.3
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	2.02 U*	1.05 U*	0.551 U*	0.48 U*	<0.474	<0.474	<0.474	0.496 U*	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	1.21	1.96	1.51	0.931 J	0.72 J	1.4	1.19	1.25	1.22	1.1	0.742 J	0.904 J	1.07	0.546 J	0.529 J
Selenium	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	0.088 J	0.102 J	<0.063	<0.063	<0.063	<0.063	<0.063	0.081 J	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	1.85 U*	2.59 U*	2.37 U*	1.91 U*	2.31 U*	2.13 U*	1.98 U*	2.11 U*	1.86 U*	2.18 U*	2.81	3.34	3.43	2.75	2.76
Zinc	4.29 U*	9.14 U*	4.02 U*	2.98 U*	2.8 U*	4.37 U*	3.69 U*	3.17 U*	4.27 U*	4.17 U*	78.7	6.49 U*	6.55 U*	5.22 U*	6.38 U*
Metals, Dissolved (µg/L)															
Antimony	<1.12	1.15 J	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	3.64 J	1.16 J	0.584 J	0.512 J	0.491 J	0.429 J	0.564 J
Arsenic	0.542 J	<0.323	<0.323	1.16	0.587 J	0.598 J	0.437 J	0.331 J	0.395 J	<0.323	0.790 J	0.751 J	0.803 J	0.766 J	0.766 J
Barium	22.9	20.5	19.4	21.0	22.6	20.4	20.3	20.8	20.7	19.1	19.4	18.3	20.5	20.4	21.8
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	38900	35800	36700	35900	37500	36500	36400	36200	36800	37100	24900	24100	26300	26700	27200
Chromium	1.1 U*	<0.631	<0.631	<0.631	1.19 U*	<0.631	<0.631	<0.631	<0.631	<0.631	2.63	2.36	2.35	2.34	2.60
Cobalt	<0.075	0.086 J	0.105 J	0.26 J	<0.075	<0.075	0.108 J	0.1 J	0.157 J	0.089 J	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	0.742 J	<0.627	<0.627	0.654 J	0.638 J
Iron	<14.1	<14.1	<14.1	538 J	21.2 J	<14.1	<14.1	<14.1	16.1 J	<14.1	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	<0.094	<0.094	<0.094	0.451 J	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	<2.56	2.76 J	<2.56	3.11 J	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	3.48 J
Magnesium	5840	5710	5890	5900	6100	5950	5930	5920	6000	6100	5180	5000	5420	5580	5670
Manganese	6.21	7.15	6.13	7.66	3.63 J	3.78 J	4.28 J	11.9	12.3	12.6	1.57 J	2.14 J	3.22 J	<1.35	<1.35
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	<0.474	0.814 U*	0.618 U*	0.521 U*	<0.474	<0.474	<0.474	<0.474	2.3 U*	1.01 U*	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	0.481 J	1.05	0.655 J	1.51 J	0.312 UJ	0.86 J	1.32	0.983 J	1.15	0.881 J	<0.336	<0.336	<0.336	<0.336	<0.336
Selenium	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	0.066 J	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	1.95 U*	1.45 U*	1.35 U*	1.77 U*	1.91 U*	1.37 U*	1.51 U*	1.30 U*	1.64 U*	1.35 U*	2.48	2.30	2.34	2.41	2.43
Zinc	4.13 U*	2.84 U*	2.58 U*	3.81 U*	2.73 U*	3.06 U*	2.94 U*	14 U*	2.69 U*	<2.42	3.43 J	3.82 J	3.74 J	4.02 J	5.39
Anions (mg/L)															
Chloride	5.60	5.52	5.65	5.67	5.41	5.59	5.49	4.02	5.51	5.43	3.37	3.34	3.38	3.47	3.52
Fluoride	0.0907 J	0.0894 J	0.0902 J	0.0901 J	0.0861 J	0.0909 J	0.0893 J	0.0788 J	0.0888 J	0.0856 J	0.0688 J	0.0689 J	0.0736 J	0.0775 J	0.0755 J
Sulfate	20.5	20.1	20.2	20.6	19.7	20.3	20.0	16.7	20.0	19.6	22.6	22.5	23.0	23.0	23.3
Radiological (pCi/L)															
Radium-226	0.0893 +/-(0.0839) U	0.0705 +/-(0.0730) U	0.0477 +/-(0.0718) U	0.0736 +/-(0.0730) U	0.0615 +/-(0.0643) U	0.0751 +/-(0.0811) U	0.0422 +/-(0.0711) U	0.0693 +/-(0.0741) U	0.121 +/-(0.0831)	0.121 +/-(0.0861)	0.0984 +/-(0.0914) U	0.0659 +/-(0.0788) U	0.0475 +/-(0.0868) U	0.0102 +/-(0.0689) U	-0.0265 +/-(0.0724) U
Radium-228	-0.123 +/-(0.274) U	0.183 +/-(0.259) U	0.0960 +/-(0.274) U	0.386 +/-(0.332) U	-0.0102 +/-(0.320) U	0.167 +/-(0.405) U	0.142 +/-(0.304) U	-0.00876 +/-(0.331) U	-0.0729 +/-(0.284) U	0.229 +/-(0.316) U	0.113 +/-(0.265) U	0.360 +/-(0.233) U*	0.327 +/-(0.269) U	0.0737 +/-(0.245) U	0.517 +/-(0.441) UJ
Radium-226+228	0.0893 +/-(0.287) U	0.254 +/-(0.269) U	0.144 +/-(0.283) U	0.460 +/-(0.340) U	0.0615 +/-(0.326) U	0.242 +/-(0.413) U	0.184 +/-(0.312) U	0.0693 +/-(0.339) U	0.121 +/-(0.296) J	0.350 +/-(0.328) J	0.212 +/-(0.280) U	0.426 +/-(0.246) U*	0.374 +/-(0.283) U	0.0839 +/-(0.255) U	0.517 +/-(0.447) UJ
General Chemistry (mg/L)															
Hardness (as CaCO3)	119	120	118	118	118	117	118	113	116	118	87.9	87.0	88.5	87.7	91.7
Total Dissolved Solids	124	136	133	121	122	129	127	146	126	134	128	120	117	122	123
Total Suspended Solids	13.8	16.9	16.7	14.0	14.3	18.5	20.6	14.5	14.7	16.6	14.9	21.6	27.9	8.71	10.1

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR01				STR-CuR02										
Sample Date	04-Sep-2019				05-Nov-2018									04-Sep-2019	
Sample ID	CUF-STR-CUR01-CC-MID-20190904	CUF-STR-CUR01-CC-BOT-20190904	CUF-STR-CUR01-RB-SUR-20190904	CUF-STR-CUR01-RB-BOT-20190904	CUF-STR-CUR02-LB-SUR-20181105	CUF-STR-CUR02-LB-MID-20181105	CUF-STR-CUR02-LB-BOT-20181105	CUF-STR-CUR02-CC-SUR-20181105	CUF-STR-CUR02-CC-MID-20181105	CUF-STR-CUR02-CC-BOT-20181105	CUF-STR-CUR02-RB-SUR-20181105	CUF-STR-CUR02-RB-MID-20181105	CUF-STR-CUR02-RB-BOT-20181105	CUF-STR-CUR02-LB-SUR-20190904	CUF-STR-CUR02-LB-BOT-20190904
Sample Depth (m)	5.5	10.5	0.5	2.5	0.5	3.5	7	0.5	5.25	10	0.5	1.75	3.1	0.5	2
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID															
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	0.424 J	1.73 J	0.784 J	0.648 J	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378
Arsenic	1.02	1.36	0.903 J	1.11	0.638 J	0.720 J	0.721 J	0.691 J	0.722 J	0.729 J	0.697 J	0.714 J	0.674 J	1.08	0.907 J
Barium	25.3	27.1	21.4	25.5	25.7	27.6	26.6	27.1	26.5	26.2	26.4	26.6	26.1	28.1	31.1 J
Beryllium	<0.182	0.463 U*	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	0.437 U*	<0.182
Boron	<38.6	46.2 J	55.2 J	<38.6	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	41.8 J	<38.6
Cadmium	<0.125	0.230 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.135 J	<0.125
Calcium	27200	27400	25600	26200	34400	36300	35500	35600	35700	36100	36500	36400	35700	26200	24800
Chromium	2.84	3.82	2.77	3.28	1.51 U*	1.76 U*	1.72 U*	1.80 U*	1.54 U*	1.62 U*	1.55 U*	1.75 U*	1.81 U*	3.58	4.62
Cobalt	0.413 U*	0.662	0.242 U*	0.538	0.244 J	0.322 J	0.293 J	0.282 J	0.285 J	0.299 J	0.254 J	0.288 J	0.290 J	0.384 U*	0.392 U*
Copper	1.12 J	1.44 J	0.870 J	1.17 J	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	2.15	<1.3	1.06 J	0.963 J
Iron	646	785	288	807	445	530	510	505	459	533	413	528	501	464	542
Lead	0.630 U*	0.941 J	0.369 U*	0.817 U*	0.382 J	0.438 J	0.398 J	0.382 J	0.407 J	0.450 J	0.357 J	0.435 J	0.408 J	0.521 U*	0.558 U*
Lithium	<3.39	4.44 J	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	4.56 J	3.97 J
Magnesium	5820	6010	5450	5720	5890	6170	6030	6040	6010	5980	6170	6070	5890	6080	5750
Manganese	75.2	87.1	48.3	96.9	51.1	58.7	56.2	54.5	54.8	59.6	51.3	59.0	58.3	70.1	74.8
Mercury	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101
Molybdenum	<0.610	0.673 J	<0.610	<0.610	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474	<0.610	<0.610
Nickel	0.887 J	1.21	0.439 J	1.09	0.871 J	1.14	1.11	1.03	0.859 J	0.925 J	0.771 J	0.988 J	0.937 J	1.07	1.56
Selenium	<1.51	2.13 J	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177
Thallium	<0.148	0.408 U*	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	0.233 U*	<0.148
Vanadium	3.40	4.12	2.97	3.65	2.35 U*	3.04 U*	2.90 U*	2.83 U*	2.42 U*	2.64 U*	2.53 U*	2.61 U*	2.53 U*	3.84	3.61
Zinc	7.05 U*	7.10 U*	4.74 U*	6.17 U*	3.11 U*	4.41 U*	3.93 U*	3.54 U*	3.26 U*	3.71 U*	3.65 U*	4.04 U*	4.54 U*	5.68 U*	5.76 U*
Metals, Dissolved (µg/L)															
Antimony	0.445 J	1.03 J	0.785 J	0.594 J	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	0.605 J
Arsenic	0.818 J	0.902 J	0.920 J	0.861 J	0.489 J	0.536 J	0.534 J	0.514 J	0.516 J	0.517 J	0.398 J	0.406 J	0.581 J	0.843 J	1.02
Barium	20.2	20.3	20.7	19.8	23.1	23.2	22.6	22.4	22.3	23.0	22.7	23.3	23.0	24.3	66.6 J
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	0.608 U*
Boron	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	58.5 J
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.196 J
Calcium	27400	26500	27000	25400	36500	36700	36300	36700	37000	37100	37300	37800	37600	26200	26200
Chromium	2.65	2.87	2.75	2.76	0.958 U*	1.05 U*	1.06 U*	1.06 U*	1.06 U*	1.00 U*	<0.631	<0.631	1.04 U*	2.96	3.31
Cobalt	0.0880 U*	0.0990 J	0.0940 J	0.0840 J	<0.075	0.104 J	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075	0.116 J	0.220 J
Copper	1.07 J	1.13 J	0.674 J	<0.627	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	0.682 J	0.751 J
Iron	513	<19.5	<19.5	<19.5	15.2 J	<14.1	16.8 J	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<19.5	<19.5
Lead	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	0.216 J
Lithium	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	3.96 J	5.23
Magnesium	5730	5620	5840	5510	5870	5810	5720	5810	5770	5840	5970	6110	5950	6000	6000
Manganese	2.10 J	2.02 J	2.37 J	8.11	5.17	5.98	5.78	3.05 J	3.60 J	3.47 J	4.71 J	5.93	6.01	4.34 J	4.54 J
Mercury	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101
Molybdenum	<0.610	<0.610	<0.610	<0.610	<0.474	0.509 J	0.494 J	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474	<0.610	0.636 J
Nickel	0.430 J	0.417 J	<0.336	<0.336	0.427 J	0.525 J	0.458 J	0.457 J	0.427 J	0.500 J	0.493 J	0.450 J	0.466 J	0.626 J	0.676 J
Selenium	<1.51	1.71 J	1.57 J	<1.51	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177
Thallium	<0.148	0.148 U*	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	0.317 U*
Vanadium	2.40	2.84	2.65	2.69	1.92 U*	2.39 U*	2.27 U*	1.67 U*	1.89 U*	1.85 U*	<0.899	<0.899	1.96 U*	2.81	3.08
Zinc	4.41 J	3.83 J	3.75 J	3.24 J	<2.42	3.07 U*	4.34 U*	<2.42	2.59 U*	2.43 U*	3.19 U*	3.82 U*	18.9 J	3.89 J	6.25
Anions (mg/L)															
Chloride	3.43	3.56	3.38	3.32	5.06	5.14	5.16	5.15	5.15	5.14	5.20	5.24	5.30	3.38	3.24
Fluoride	0.0707 J	0.0763 J	0.0705 J	0.0671 J	0.0848 J	0.0834 J	0.0863 J	0.0835 J	0.0851 J	0.0842 J	0.0848 J	0.0857 J	0.0877 J	0.0681 J	0.0678 J
Sulfate	23.0	23.8	22.8	22.7	20.6	20.4	20.9	20.4	20.4	20.5	20.6	20.7	21.3	23.1	22.5
Radiological (pCi/L)															
Radium-226	0.0742 +/-(0.0720) U	-0.00689 +/-(0.0653) U	-0.0505 +/-(0.0540) U	0.0173 +/-(0.0618) U	0.138 +/-(0.118) U	0.125 +/-(0.0910)	0.116 +/-(0.0850)	0.0444 +/-(0.0565) U	0.100 +/-(0.0755) U	0.00745 +/-(0.0624) U	0.0591 +/-(0.0654) U	0.0532 +/-(0.0746) U	0.00811 +/-(0.0532) U	0.0181 +/-(0.0755) U	0.0513 +/-(0.0910) U
Radium-228	0.138 +/-(0.268) U	0.208 +/-(0.278) U	0.0531 +/-(0.321) U	-0.302 +/-(0.235) U	-0.256 +/-(0.330) U	0.000 +/-(0.263) U	-0.109 +/-(0.238) U	0.125 +/-(0.230) U	0.0549 +/-(0.240) U	-0.155 +/-(0.230) U	0.104 +/-(0.226) U	-0.0967 +/-(0.288) U	0.268 +/-(0.277) U	0.136 +/-(0.303) UJ	0.272 +/-(0.408) UJ
Radium-226+228	0.213 +/-(0.278) U	0.208 +/-(0.286) U	0.0531 +/-(0.326) U	0.0173 +/-(0.243) U	0.138 +/-(0.350) U	0.125 +/-(0.278) J	0.116 +/-(0.253) J	0.169 +/-(0.237) U	0.155 +/-(0.252) U	0.00745 +/-(0.238) U	0.163 +/-(0.235) U	0.0532 +/-(0.298) U	0.276 +/-(0.282) U	0.154 +/-(0.312) UJ	0.323 +/-(0.418) UJ
General Chemistry (mg/L)															
Hardness (as CaCO3)	91.9	93.2	86.4	89.0	112	111	115	117	119	116	117	116	113	90.5	85.6
Total Dissolved Solids	110	111	115	97.0	142	133	130	124	133	115	133	134	129	105	130
Total Suspended Solids	22.4	26.9	10.9	29.1	13.9	13.9	14.9	12.5	15.6	17.3	12.0	16.8	17.1	16.1	22.4

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR02											STR-CuR03			
Sample Date	04-Sep-2019					27-May-2020						05-Nov-2018			
Sample ID	CUF-STR-CUR02-CC-SUR-20190904	CUF-STR-CUR02-CC-MID-20190904	CUF-STR-CUR02-CC-BOT-20190904	CUF-STR-CUR02-RB-SUR-20190904	CUF-STR-CUR02-RB-BOT-20190904	CUF-STR-CUR02-LB-MID-20200527	CUF-STR-DUP02-20200527	CUF-STR-CUR02-CC-SUR-20200527	CUF-STR-CUR02-CC-MID-20200527	CUF-STR-CUR02-CC-BOT-20200527	CUF-STR-CUR02-RB-MID-20200527	CUF-STR-CUR03-LB-SUR-20181105	CUF-STR-CUR03-LB-MID-20181105	CUF-STR-DUP02-20181105	CUF-STR-CUR03-LB-BOT-20181105
Sample Depth (m)	0.5	6.1	11.8	0.5	2.1	0.8	0.8	0.5	6	11.5	0.8	0.5	2.5	2.5	4.9
Sample Type[1]	N	N	N	N	N	N	FD	N	N	N	N	N	N	FD	N
Parent Sample ID							CUF-STR-CUR02-LB-MID-20200527							CUF-STR-CuR03-LB-MID-20181105	
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	1.81 J	1.74 J	0.920 J	0.756 J	0.672 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	1.12 UJ	3.54 J	<1.12
Arsenic	0.976 J	0.986 J	0.992 J	0.852 J	1.13	<0.313	0.462 J	0.357 J	0.365 J	0.438 J	<0.313	0.702 J	0.659 J	0.435 J	0.749 J
Barium	20.7	23.4	25.1	22.1	23.9	24.7	21.4	22.7	24.6	29.2	23.4	26.4	26.2	24.2	27.6
Beryllium	0.253 U*	0.252 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057
Boron	<38.6	39.1 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3	<30.3
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125
Calcium	24500	24500	25200	25200	24600	24700	24500	25200	24800	25100	24300	33600	34600	32000	34900
Chromium	2.57	3.40	3.06	2.73	3.13	<1.53	<1.53	<1.53	1.66 J	<1.53	2.05	1.62 U*	1.68 U*	<0.631	1.66 U*
Cobalt	0.284 U*	0.467 U*	0.468 U*	0.328 U*	0.433 U*	0.227 J	0.285 J	0.221 J	0.271 J	0.298 J	0.287 J	0.28 J	0.282 J	0.381 J	0.284 J
Copper	1.00 J	1.09 J	1.11 J	1.12 J	1.05 J	<0.627	0.766 J	<0.627	<0.627	<0.627	0.740 J	<1.3	<1.3	<1.3	<1.3
Iron	256	657	708	391	698	386	408	370	504	583	542	466	470	386	507
Lead	0.386 U*	0.641 U*	0.761 U*	0.544 U*	0.772 U*	0.356 J	0.396 J	0.319 J	0.425 J	0.567 J	0.371 J	0.378 J	0.388 J	0.384 J	0.411 J
Lithium	4.21 J	4.28 J	3.93 J	3.42 J	3.64 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	2.89 J	<2.56
Magnesium	5180	5280	5560	5320	5300	5060	4890	5350	5310	5140	5160	6120	6250	5750	6340
Manganese	42.6	76.1	88.1	55.7	75.9	53.7	47.7	48.9	64.1	70.4	52.6	54.4	56.9	50.1	58.4
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	2.3 U*	<0.474
Nickel	0.529 J	1.03	0.875 J	0.672 J	0.888 J	0.749 J	0.750 J	0.636 J	0.859 J	0.917 J	2.23	1.03	1.06	1.3	1.19
Selenium	<1.51	1.70 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121
Thallium	0.214 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	0.067 J	<0.063
Vanadium	2.95	3.60	3.45	2.99	3.42	<0.991	<0.991	<0.991	<0.991	<0.991	1.09	2.41 U*	2.4 U*	1.86 U*	2.56 U*
Zinc	4.17 U*	6.01 U*	6.25 U*	4.90 U*	5.74 U*	<3.22	<3.22	<3.22	3.45 J	4.30 J	<3.22	3.17 U*	4.04 U*	3.41 U*	3.7 U*
Metals, Dissolved (µg/L)															
Antimony	2.36	1.11 J	1.03 J	0.699 J	0.497 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<1.12
Arsenic	1.08	0.837 J	0.842 J	0.863 J	0.736 J	<0.313	<0.313	0.368 J	<0.313	<0.313	<0.313	0.554 J	0.532 J	<0.323	0.587 J
Barium	19.8	19.9	19.6	19.6	19.9	20.2	17.7	19.5	20.6	19.1	19.7	22.8	23.3	19.2	22.4
Beryllium	0.476 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057
Boron	51.0 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3	<30.3
Cadmium	0.156 J	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125
Calcium	25100	25500	25400	25800	23800	25300	24000	24800	25300	23600	24200	35400	35800	32900	34900
Chromium	2.92	2.55	2.54	2.63	2.26	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	1.07 U*	1.1 U*	<0.631	1.06 U*
Cobalt	0.187 U*	0.0770 U*	0.0940 U*	0.0990 U*	0.0770 U*	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.075	<0.075	0.076 J	<0.075
Copper	1.02 J	0.712 J	0.663 J	0.708 J	0.670 J	<0.627	<0.627	1.37 U*	1.20 U*	<0.627	<0.627	<1.3	<1.3	<1.3	<1.3
Iron	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	19.9 J	<19.5	<19.5	<14.1	<14.1	<14.1	<14.1
Lead	0.210 J	<0.128	<0.128	0.181 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094	<0.094
Lithium	4.64 J	<3.39	4.18 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56
Magnesium	5390	5420	5410	5450	5120	5240	4740	5200	5380	4910	5020	5870	5960	6050	5720
Manganese	<1.35	2.85 J	4.87 J	3.71 J	3.95 J	8.02	7.16	1.28 J	1.62 J	1.11 J	5.92	6.38	7.42	6.73	7.83
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	0.679 U*	<0.474
Nickel	0.409 J	<0.336	<0.336	0.342 J	<0.336	<0.336	<0.336	1.20	0.649 J	0.355 J	0.377 J	0.544 J	0.571 J	1.16	0.467 J
Selenium	1.98 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121
Thallium	0.273 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063
Vanadium	2.94	2.39	2.54	2.58	2.09	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	2.05 U*	2.14 U*	1.23 U*	2.24 U*
Zinc	3.30 J	3.56 J	4.13 J	5.16	3.59 J	<3.22	3.96 J	3.60 J	<3.22	<3.22	<3.22	3.63 U*	<2.42	2.58 U*	<2.42
Anions (mg/L)															
Chloride	3.34	3.31	3.33	3.49	3.30	2.92 J	4.56 J	3.60	3.01	3.00	7.25	4.77	4.82	5.05	4.80
Fluoride	0.0688 J	0.0737 J	0.0681 J	0.0723 J	0.0729 J	0.0749 J	0.0744 J	0.0692 J	0.0718 J	0.0752 J	0.0746 J	0.0786 J	0.0803 J	0.0842 J	0.0805 J
Sulfate	23.0	23.0	23.3	23.2	23.0	19.0	19.1	18.9	18.8	19.2	19.0	20.6	20.6	22.1	20.7
Radiological (pCi/L)															
Radium-226	-0.0526 +/-(0.0557) U	0.0911 +/-(0.0859) U	0.0667 +/-(0.0741) U	-0.0139 +/-(0.0710) U	-0.0385 +/-(0.0704) U	0.332 +/-(0.215) J	-0.0836 +/-(0.141) UJ	0.181 +/-(0.163) U	0.217 +/-(0.174) U	0.130 +/-(0.161) U	0.0971 +/-(0.148) U	0.106 +/-(0.0824) U	0.0334 +/-(0.0705) U	0.0571 +/-(0.0712) U	0.0105 +/-(0.0662) U
Radium-228	0.587 +/-(0.319) U*	0.327 +/-(0.298) U	0.0778 +/-(0.236) U	-0.0504 +/-(0.232) U	-0.0364 +/-(0.263) U	-0.0452 +/-(0.345) U	0.728 +/-(0.399) U*	1.07 +/-(2.26) UJ	0.120 +/-(0.375) U	0.319 +/-(0.360) U	0.231 +/-(0.432) U	0.0131 +/-(0.219) U	0.393 +/-(0.321) U	-0.0959 +/-(0.280) U	0.314 +/-(0.275) U
Radium-226+228	0.587 +/-(0.324) U*	0.419 +/-(0.310) U	0.144 +/-(0.247) U	0.000 +/-(0.243) U	0.000 +/-(0.272) U	0.332 +/-(0.407) J	0.728 +/-(0.423) U*	1.25 +/-(2.27) UJ	0.337 +/-(0.413) U	0.449 +/-(0.394) U	0.328 +/-(0.457) U	0.119 +/-(0.234) U	0.426 +/-(0.329) U	0.0571 +/-(0.289) U	0.325 +/-(0.283) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	82.5	82.9	85.8	84.8	83.3	82.4	81.3	84.9	83.7	83.9	81.8	114	110	104	110
Total Dissolved Solids	122	126	125	122	113	115	120	114	107	121	113	132	133	124	125
Total Suspended Solids	9.43	22.3	22.9	16.1	23.6	16.8	14.1	13.7	17.2	22.7	15.6	13.5	14.9	14.3	14.0

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR03					
Sample Date	05-Nov-2018					
Sample ID	CUF-STR-CUR03-CC-SUR-20181105	CUF-STR-CUR03-CC-MID-20181105	CUF-STR-CUR03-CC-BOT-20181105	CUF-STR-CUR03-RB-SUR-20181105	CUF-STR-CUR03-RB-MID-20181105	CUF-STR-CUR03-RB-BOT-20181105
Sample Depth (m)	0.5	5.5	10.7	0.5	2	4.2
Sample Type[1]	N	N	N	N	N	N
Parent Sample ID						
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)						
Antimony	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12
Arsenic	0.682 J	0.696 J	0.681 J	0.714 J	0.676 J	0.722 J
Barium	26.6	28.1	29	27.3	26.7	27.8
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057
Boron	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	35000	35400	35000	35500	35200	35800
Chromium	1.64 U*	1.8 U*	1.94 U*	1.62 U*	1.65 U*	1.77 U*
Cobalt	0.293 J	0.333 J	0.389 J	0.312 J	0.264 J	0.29 J
Copper	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
Iron	483	592	752	536	454	533
Lead	0.365 J	0.462 J	0.59 J	0.421 J	0.359 J	0.461 J
Lithium	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56
Magnesium	6150	6250	6040	6060	6190	6240
Manganese	56.1	65.8	75	59.8	54.3	60.1
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474
Nickel	1.01	1.3	1.29	1.19	0.954 J	0.996 J
Selenium	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063
Vanadium	2.56 U*	2.72 U*	3.11 U*	2.56 U*	2.27 U*	2.55 U*
Zinc	3.62 U*	3.77 U*	5.44 U*	3.57 U*	3.25 U*	4.14 U*
Metals, Dissolved (µg/L)						
Antimony	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12
Arsenic	0.52 J	0.544 J	0.491 J	0.521 J	0.52 J	0.565 J
Barium	22.2	22.7	23.4	23.1	22.4	23.5
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057
Boron	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	35100	35700	36600	37100	36000	36300
Chromium	1.05 U*	1.06 U*	1.03 U*	1.05 U*	1.05 U*	1.03 U*
Cobalt	<0.075	<0.075	<0.075	<0.075	<0.075	<0.075
Copper	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3
Iron	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1
Lead	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094
Lithium	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56
Magnesium	5650	5730	5860	5970	5780	5850
Manganese	4.88 J	5.07	5.74	4.28 J	3.75 J	4.02 J
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653
Molybdenum	<0.474	<0.474	<0.474	<0.474	<0.474	<0.474
Nickel	0.411 J	0.489 J	0.471 J	0.44 J	0.457 J	0.564 J
Selenium	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063
Vanadium	2.06 U*	2.09 U*	2.11 U*	1.69 U*	1.83 U*	1.89 U*
Zinc	3.22 U*	2.74 U*	<2.42	3.14 U*	3.03 U*	4.34 U*
Anions (mg/L)						
Chloride	5.06	5.03	4.93	5.06	5.01	5.10
Fluoride	0.0851 J	0.0837 J	0.0808 J	0.0850 J	0.0827 J	0.0840 J
Sulfate	21.9	21.5	20.9	21.1	20.8	21.3
Radiological (pCi/L)						
Radium-226	0.0557 +/-(0.0689) U	0.0869 +/-(0.0787) U	0.0838 +/-(0.104) U	0.0721 +/-(0.0965) U	0.0795 +/-(0.116) U	0.00420 +/-(0.0775) U
Radium-228	0.338 +/-(0.321) U	-0.0565 +/-(0.236) U	0.0335 +/-(0.359) U	-0.133 +/-(0.342) U	0.167 +/-(0.414) U	0.273 +/-(0.388) U
Radium-226+228	0.394 +/-(0.328) U	0.0869 +/-(0.249) U	0.117 +/-(0.374) U	0.0721 +/-(0.355) U	0.246 +/-(0.430) U	0.277 +/-(0.396) U
General Chemistry (mg/L)						
Hardness (as CaCO3)	109	111	114	111	108	114
Total Dissolved Solids	137	131	130	141	131	132
Total Suspended Solids	15.0	18.5	23.2	15.2	13.3	18.6

Transect Location ID	STR-CuR03							
Sample Date	04-Sep-2019							
Sample ID	CUF-STR-CUR03-LB-SUR-20190904	CUF-STR-CUR03-LB-MID-20190904	CUF-STR-CUR03-LB-BOT-20190904	CUF-STR-CUR03-CC-SUR-20190904	CUF-STR-CUR03-CC-MID-20190904	CUF-STR-CUR03-CC-BOT-20190904	CUF-STR-CUR03-RB-SUR-20190904	CUF-STR-CUR03-RB-BOT-20190904
Sample Depth (m)	0.5	2.6	4.8	0.5	5.9	11.3	0.5	2.3
Sample Type[1]	N	N	N	N	N	N	N	N
Parent Sample ID								
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)								
Antimony	<0.378	<0.378	<0.378	<0.378	0.503 J	<0.378	<0.378	<0.378
Arsenic	1.06	1.10	1.16	0.979 J	0.949 J	1.22	0.991 J	0.870 J
Barium	24.1	26.9	27.9	24.7	25.0	29.8	25.9	31.1
Beryllium	0.196 U*	0.185 U*	<0.182	<0.182	<0.182	0.501 U*	<0.182	<0.182
Boron	65.3 J	<38.6	<38.6	45.8 J	<38.6	<38.6	<38.6	<38.6
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	0.212 J	<0.125	<0.125
Calcium	28000	26600	27600	28500	26400	25800	25400	25700
Chromium	3.22	3.39	3.44	3.07	3.04	3.84	3.35	3.39
Cobalt	0.249 U*	0.501	0.583	0.289 U*	0.389 U*	0.550	0.278 U*	0.296 U*
Copper	1.99 J	1.23 J	1.30 J	1.75 J	1.13 J	1.23 J	1.14 J	1.86 J
Iron	288	746	968	359	646	682	305	366
Lead	0.318 U*	0.749 U*	0.949 J	0.344 U*	0.558 U*	0.807 U*	0.374 U*	0.406 U*
Lithium	5.33	5.18	5.33	4.95 J	3.72 J	5.36	4.06 J	3.79 J
Magnesium	6200	5990	6240	6340	5690	6060	5790	5960
Manganese	47.6	89.3	108	53.5	74.9	89.6	54.0	56.3
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	0.987 J	1.35	1.58	1.11	0.895 J	1.32	0.868 J	0.973 J
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	<0.148	<0.148	0.316 U*	<0.148	<0.148
Vanadium	3.38	3.96	4.06	3.38	3.20	4.05	3.39	3.42
Zinc	4.50 U*	6.57 U*	7.36 U*	5.22 U*	6.94 U*	8.49 U*	4.71 U*	6.11 U*
Metals, Dissolved (µg/L)								
Antimony	0.949 J	0.713 J	0.649 J	0.442 J	0.641 J	<0.378	<0.378	<0.378
Arsenic	0.869 J	0.753 J	0.859 J	0.721 J	0.833 J	0.845 J	0.832 J	0.909 J
Barium	22.6	22.7	21.8	21.6	21.2	24.1	22.5	25.5
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.182	0.186 U*	<0.182	<0.182
Boron	48.7 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	28200	26200	26600	27300	27400	25200	25400	25900
Chromium	2.74	2.45	2.81	2.10	2.94	2.76	3.40	3.68
Cobalt	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	0.117 J	0.0870 J	0.0780 J
Copper	1.42 J	1.58 J	0.688 J	1.16 J	0.712 J	0.654 J	0.788 J	<0.627
Iron	<19.5	<19.5	73.6	30.4 J	<19.5	<19.5	<19.5	<19.5
Lead	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	4.61 J	3.85 J	3.86 J	<3.39	4.45 J	3.81 J	3.69 J	3.99 J
Magnesium	5900	5570	5550	5570	5840	5860	5740	5980
Manganese	1.95 J	5.47	12.3	<1.35	1.93 J	3.02 J	<1.35	<1.35
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	0.338 J	0.365 J	<0.336	<0.336	<0.336	0.537 J	0.559 J	0.659 J
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	<0.148	<0.148	0.170 U*	<0.148	<0.148
Vanadium	2.52	2.58	2.48	2.10	2.84	2.65	3.16	3.37
Zinc	4.04 J	4.33 J	3.29 J	<3.22	4.69 J	5.36	3.94 J	3.46 J
Anions (mg/L)								
Chloride	4.15	3.33	3.33	3.89	3.30	3.29	3.38	3.39
Fluoride	0.0788 J	0.0672 J	0.0665 J	0.0758 J	0.0675 J	0.0692 J	0.0691 J	0.0723 J
Sulfate	24.1	22.5	22.7	23.3	22.8	23.0	22.7	22.9
Radiological (pCi/L)								
Radium-226	0.0265 +/-(0.0791) U	0.000 +/-(0.0688) U	0.0117 +/-(0.0750) U	0.00466 +/-(0.0730) U	0.0260 +/-(0.0577) U	0.0475 +/-(0.0827) U	-0.0261 +/-(0.0657) U	0.0532 +/-(0.0743) U
Radium-228	0.152 +/-(0.249) UJ	-0.212 +/-(0.238) UJ	0.443 +/-(0.389) UJ	0.532 +/-(0.346) U*	0.00269 +/-(0.238) UJ	0.342 +/-(0.468) UJ	0.00280 +/-(0.351) UJ	-0.0141 +/-(0.265) UJ
Radium-226+228	0.179 +/-(0.261) UJ	0.000 +/-(0.248) UJ	0.455 +/-(0.396) UJ	0.536 +/-(0.354) U*	0.0287 +/-(0.245) UJ	0.390 +/-(0.475) UJ	0.00280 +/-(0.357) UJ	0.0532 +/-(0.275) UJ
General Chemistry (mg/L)								
Hardness (as CaCO3)	95.4	91.1	94.6	97.3	89.4	89.4	87.3	88.7
Total Dissolved Solids	132	122	104	124	110	129	119	128
Total Suspended Solids	8.50	23.1	31.4	10.6	16.6	24.4	11.0	11.0

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR04														
Sample Date	04-Sep-2019								27-May-2020						
Sample ID	CUF-STR-CUR04-LB-SUR-20190904	CUF-STR-CUR04-LB-BOT-20190904	CUF-STR-CUR04-CC-SUR-20190904	CUF-STR-CUR04-CC-MID-20190904	CUF-STR-CUR04-CC-BOT-20190904	CUF-STR-CUR04-RB-SUR-20190904	CUF-STR-CUR04-RB-MID-20190904	CUF-STR-CUR04-RB-BOT-20190904	CUF-STR-CUR04-LB-SUR-20200527	CUF-STR-CUR04-LB-BOT-20200527	CUF-STR-CUR04-CC-SUR-20200527	CUF-STR-CUR04-CC-ME-20200527	CUF-STR-CUR04-CC-MID-20200527	CUF-STR-CUR04-CC-BOT-20200527	CUF-STR-CUR04-RB-SUR-20200527
Sample Depth (m)	0.5	1.4	0.5	6.5	12.5	0.5	2.3	4.2	0.5	2	0.5	3.5	7	14	0.5
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID															
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	0.387 J	0.388 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	1.26	1.28	1.21	1.07	1.19	0.854 J	0.847 J	0.919 J	0.407 J	0.392 J	0.395 J	0.473 J	0.387 J	0.445 J	0.422 J
Barium	26.6	29.7	26.2	27.8	30.0	26.4	25.1	31.5	25.6	25.3	23.6	23.7	23.5	24.4	25.2
Beryllium	0.250 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	163	140	160	44.5 J	38.7 J	94.9	55.5 J	46.7 J	139	73.3 J	237	95.4	44.8 J	<38.6	111
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	29600	31100	30800	28500	29400	29100	28100	29400	29100	28800	27800	25700	24900	24200	26600
Chromium	2.99	3.18	3.23	3.32	3.91	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	0.474 J	0.509	0.431 U*	0.411 U*	0.613	0.423 U*	0.404 U*	0.450 U*	0.314 J	0.309 J	0.284 J	0.267 J	0.271 J	0.321 J	0.340 J
Copper	2.69	2.71	2.77	1.64 J	1.63 J	2.55	2.25	1.94 J	1.53 J	0.989 J	2.27	1.50 J	0.798 J	<0.627	1.99 J
Iron	459	605	601	504	859	562	588	639	461	534	575	528	430	592	602
Lead	0.536 J	0.584 J	0.652 J	0.590 J	0.998 J	0.619 J	0.621 J	0.691 J	0.458 J	0.442 J	0.479 J	0.483 J	1.23	0.497 J	0.510 J
Lithium	4.34 J	<3.39	4.82 J	4.71 J	4.68 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	7280	7660	8030	6280	6390	6290	5990	6110	5590	5440	6290	5590	5380	5130	5980
Manganese	77.5	94.5	88.0	73.8	121	83.3	83.2	89.3	81.2	89.1	65.2	60.4	48.4	71.1	68.9
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	0.928 J	0.944 J	1.10 J	<0.610	<0.610	0.707 J	0.658 J	0.616 J	0.922 J	<0.610	1.42 J	<0.610	<0.610	<0.610	0.837 J
Nickel	1.40	1.38	1.45	1.06	1.39	1.33	1.16	1.23	1.04	1.16	1.21	1.08	0.975 J	0.973 J	1.04
Selenium	1.78 J	1.53 J	1.67 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	0.217 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.436 U*	0.167 U*	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	3.39	3.73	4.65	3.48	4.27	2.20	2.04	2.25	<0.991	1.15	1.22	1.17	1.03	1.46	1.48
Zinc	5.53 U*	6.24 U*	11.4 U*	8.46 U*	6.74 U*	<3.22	3.32 U*	4.21 U*	<3.22	<3.22	3.97 J	<3.22	3.79 J	3.84 J	<3.22
Metals, Dissolved (µg/L)															
Antimony	0.415 U*	<0.378	0.403 U*	0.456 U*	0.422 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	1.09 U*	1.03 U*	1.25 U*	1.13 U*	1.09 U*	0.673 U*	0.647 U*	0.682 U*	<0.313	<0.313	<0.313	<0.313	<0.313	<0.313	<0.313
Barium	24.3	25.1	23.0	23.3	24.0	21.4	21.7	22.0	21.3	22.6	21.1	19.7	19.8	19.8	20.4
Beryllium	<0.182	<0.182	0.275 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	153 U*	137 U*	163 U*	<38.6	<38.6	66.8 U*	63.5 U*	40.7 U*	138	64.1 J	227	76.9 J	41.7 J	<38.6	96.7
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	31000	31500	29300	27400	27900	27900	28700	27900	28700	28200	27700	25200	25200	24500	25600
Chromium	3.00 U*	2.69 U*	2.79 U*	3.03 U*	2.90 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	0.134 U*	0.128 U*	0.240 U*	0.138 U*	0.151 U*	0.0750 U*	<0.0750	0.0850 U*	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134
Copper	1.92 J	1.80 J	2.08	1.07 J	0.932 J	1.59 J	1.64 J	1.16 J	0.797 U*	<0.627	1.09 U*	0.906 U*	<0.627	<0.627	1.35 U*
Iron	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	126	20.0 J	28.1 J	<19.5	<19.5	<19.5	66.9	<19.5
Lead	<0.128	<0.128	0.139 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	3.54 J	<3.39	4.54 J	3.51 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	7580	7700	7500	5960	5900	6040	6150	5840	5620	5260	6440	5440	5290	5090	5760
Manganese	2.79 J	7.38	7.79	1.55 J	7.99	5.23	4.05 J	4.16 J	20.5	24.3	9.92	5.58	2.77 J	1.74 J	8.97
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	1.01 J	1.04 J	1.18 J	<0.610	<0.610	0.735 J	0.703 J	<0.610	0.932 J	<0.610	1.36 J	0.645 J	<0.610	<0.610	0.722 J
Nickel	0.832 J	0.843 J	0.920 J	0.704 J	0.547 J	0.711 J	0.741 J	0.519 J	0.551 J	0.572 J	0.700 J	0.466 J	0.403 J	0.440 J	0.626 J
Selenium	1.83 J	<1.51	1.99 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	0.289 J	<0.148	<0.148	<0.148	<0.148	<0.148	0.223 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	3.28 U*	2.85 U*	3.02 U*	3.13 U*	3.08 U*	1.44 U*	1.59 U*	1.72 U*	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	3.59 J	3.56 J	6.72	6.10	5.05	<3.22	11.8 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	8.21
Anions (mg/L)															
Chloride	7.02	6.87	7.54	3.65	3.61	5.31	4.75	4.51	5.07	4.15	6.41 J	2.88	3.31	3.76	4.04 J
Fluoride	0.119	0.114	0.122	0.0832 J	0.0809 J	0.0969 J	0.0893 J	0.0896 J	0.0935 J	0.0866 J	0.0698 J	0.0729 J	0.0861 J	0.0845 J	0.0539 J
Sulfate	30.6	30.7	32.0	23.7	22.8	27.4	26.0	25.2	20.3	19.8	28.5	18.6	20.6	19.8	24.9
Radiological (pCi/L)															
Radium-226	0.0441 +/-(0.0913) U	-0.0273 +/-(0.0798) U	0.0219 +/-(0.0829) U	0.157 +/-(0.107) U*	0.106 +/-(0.114) U	-0.0176 +/-(0.0897) U	-0.0641 +/-(0.0829) U	0.0746 +/-(0.0943) U	0.141 +/-(0.236) U	0.293 +/-(0.255) U	–	0.260 +/-(0.233) U	–	0.0527 +/-(0.240) U	0.457 +/-(0.324) U
Radium-228	0.462 +/-(0.269) U*	1.08 +/-(0.421) U*	0.337 +/-(0.249) UJ	-0.0435 +/-(0.220) UJ	0.564 +/-(0.313) U*	0.484 +/-(0.278) U*	1.08 +/-(0.349) U*	0.616 +/-(0.308) U*	0.645 +/-(0.421) U*	0.325 +/-(0.373) U	–	0.290 +/-(0.313) U	–	0.466 +/-(0.427) U	-0.0407 +/-(0.376) U
Radium-226+228	0.506 +/-(0.284) U*	1.08 +/-(0.428) U*	0.359 +/-(0.262) UJ	0.157 +/-(0.245) U*	0.670 +/-(0.333) U*	0.484 +/-(0.292) U*	1.08 +/-(0.359) U*	0.690 +/-(0.322) U*	0.786 +/-(0.483) U*	0.619 +/-(0.452) U	–	0.550 +/-(0.390) U	–	0.519 +/-(0.490) U	0.457 +/-(0.496) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	104	109	110	97.0	99.7	98.6	94.8	98.6	95.8	94.4	95.2	87.3	84.4	81.6	91.1
Total Dissolved Solids	172	147	111	112	127	146	135	102	113	123	126	120	120	106	121
Total Suspended Solids	18.0	20.4	16.7	25.2	31.3	22.8	31.1	25.1	14.6	19.0	18.2	19.0	14.0	25.3	21.6

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR04			STR-CuR05											
Sample Date	27-May-2020			04-Sep-2019							27-May-2020				
Sample ID	CUF-STR-DUP01-20200527	CUF-STR-CUR04-RB-MID-20200527	CUF-STR-CUR04-RB-BOT-20200527	CUF-STR-CUR05-LB-SUR-20190904	CUF-STR-CUR05-LB-BOT-20190904	CUF-STR-CUR05-CC-SUR-20190904	CUF-STR-CUR05-CC-MID-20190904	CUF-STR-CUR05-CC-BOT-20190904	CUF-STR-CUR05-RB-SUR-20190904	CUF-STR-CUR05-RB-BOT-20190904	CUF-STR-CUR05-LB-SUR-20200527	CUF-STR-CUR05-LB-MID-20200527	CUF-STR-CUR05-LB-BOT-20200527	CUF-STR-CUR05-CC-SUR-20200527	CUF-STR-CUR05-CC-MID-20200527
Sample Depth (m)	0.5	2	3.2	0.5	2	0.5	6.5	12.7	0.5	1.8	0.5	1.6	2.7	0.5	7.4
Sample Type[1]	FD	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID	CUF-STR-CUR04-RB-SUR-20200527														
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<0.378	<0.378	<0.378	0.816 J	0.509 J	<0.378	0.394 J	0.487 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.508 J	0.373 J	0.428 J	1.08	1.03	0.837 J	0.913 J	1.06	0.895 J	0.837 J	0.603 J	0.528 J	0.485 J	0.402 J	0.347 J
Barium	22.4	25.7	23.7	27.4	26.7	31.5	25.9	27.6	25.9	27.4	24.3	24.3	25.0	22.7	25.7
Beryllium	<0.182	<0.182	<0.182	0.223 U*	0.269 U*	<0.182	0.254 U*	0.314 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	105	117	111	194	147	120	55.9 J	<38.6	52.3 J	63.1 J	136	118	162	<38.6	<38.6
Cadmium	<0.217	<0.217	<0.217	<0.125	0.135 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	25200	26500	26200	31300	31900	30400	28900	29000	28900	29600	27300	27100	27600	25400	26100
Chromium	<1.53	<1.53	<1.53	1.89 J	1.73 J	<1.53	1.61 J	1.92 J	1.60 J	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	0.335 J	0.337 J	0.280 J	0.433 U*	0.445 U*	0.411 U*	0.360 U*	0.577	0.430 U*	0.414 U*	0.259 J	0.284 J	0.298 J	0.239 J	0.501
Copper	2.14	2.99	1.99 J	2.91	2.65	2.94	1.53 J	1.51 J	2.36	2.28	1.66 J	1.67 J	1.86 J	0.735 J	0.682 J
Iron	538	654	614	404	547	543	509	791	540	525	435	456	529	504	820
Lead	0.479 J	1.34	0.520 J	0.500 J	0.647 J	0.597 J	0.482 J	0.854 J	0.619 J	0.601 J	0.372 J	0.579 J	0.476 J	0.417 J	0.666 J
Lithium	<3.39	4.89 J	<3.39	3.41 J	5.37	<3.39	4.41 J	3.92 J	3.47 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	5300	5900	5600	8090	7360	6790	5750	5710	6020	6250	6070	5800	6200	5420	5520
Manganese	59.1	71.7	68.6	76.3	80.3	86.3	67.8	104	81.4	83.9	60.8	60.9	63.0	53.5	84.3
Mercury	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	0.812 J	0.820 J	0.684 J	1.08 J	1.29 J	1.01 J	<0.610	<0.610	0.661 J	0.679 J	0.842 J	0.755 J	1.02 J	<0.610	<0.610
Nickel	0.962 J	1.53	1.06	1.40	1.38	1.30	0.945 J	1.25	1.38	1.34	1.20	0.971 J	1.19	0.850 J	1.19
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	0.162 U*	<0.148	0.191 U*	<0.148	<0.148	0.166 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	1.11	1.33	1.19	2.20	2.56	2.01	2.20	2.71	2.27	1.97	1.04	<0.991	1.10	1.04	1.37
Zinc	<3.22	8.97	3.29 J	3.32 U*	3.39 U*	4.07 U*	<3.22	4.29 U*	<3.22	<3.22	<3.22	<3.22	3.49 J	<3.22	4.51 J
Metals, Dissolved (µg/L)															
Antimony	<0.378	<0.378	<0.378	0.656 U*	<0.378	<0.378	<0.378	0.451 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.330 J	<0.313	<0.313	0.893 U*	0.681 U*	0.712 U*	0.912 U*	0.818 U*	0.752 U*	0.713 U*	<0.313	<0.313	0.371 J	<0.313	<0.313
Barium	19.5	21.2	19.3	23.5 J	22.9	23.1	23.9	22.8	22.8	22.3	20.9	21.8	19.4	18.6	19.9
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.407 J	0.196 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	92.1	155	101	171 U*	144 U*	129 U*	41.0 U*	<38.6	54.9 U*	55.0 U*	128	116	152	<38.6	<38.6
Cadmium	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	0.170 J	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	26400	26300	25300	31000	31800	31300	28700	29200	29600	29000	27700	27800	26700	24900	25400
Chromium	<1.53	<1.53	<1.53	1.73 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	2.05	<1.53	<1.53	<1.53
Cobalt	<0.134	<0.134	<0.134	0.151 U*	0.0840 U*	0.0900 U*	0.188 U*	0.128 U*	0.0990 U*	0.0980 U*	<0.134	<0.134	<0.134	<0.134	<0.134
Copper	1.54 U*	1.27 U*	1.06 U*	1.92 J	1.69 J	1.90 J	1.22 J	0.905 J	1.62 J	1.44 J	1.08 U*	1.04 U*	1.32 U*	<0.627	<0.627
Iron	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	30.4 J	43.2 J	<19.5	23.2 J	<19.5
Lead	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.173 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	<3.39	3.95 J	<3.39	<3.39	3.39 J	3.60 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	5450	5810	5420	7800	7230	7160	5840	5690	6120	5940	6110	5900	6030	5210	5300
Manganese	8.16	9.06	8.70	3.34 J	3.87 J	7.08	<1.35	7.05	3.62 J	2.63 J	11.2	8.58	8.11	3.47 J	2.17 J
Mercury	<0.130	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	0.773 J	0.794 J	0.631 J	1.06 J	1.19 J	1.22 J	0.685 J	<0.610	0.703 J	0.699 J	0.897 J	0.853 J	0.968 J	<0.610	<0.610
Nickel	0.463 J	0.672 J	0.426 J	0.846 J	0.698 J	0.906 J	0.818 J	0.517 J	0.848 J	0.573 J	0.593 J	0.545 J	0.761 J	0.487 J	<0.336
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	0.439 J	<0.148	0.172 J	<0.148	<0.148	0.345 J	0.169 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	<0.991	<0.991	<0.991	1.82 U*	1.31 U*	1.70 U*	1.40 U*	1.90 U*	1.48 U*	1.33 U*	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions (mg/L)															
Chloride	4.48	4.41	4.23 J	8.04	7.62	6.01	3.75	3.62	4.33	4.77	5.33	4.60	4.87	3.10	2.89
Fluoride	0.0903 J	0.0893 J	0.0595 J	0.130	0.129	0.107	0.0788 J	0.0768 J	0.0866 J	0.0929 J	0.0938 J	0.0849 J	0.0800 J	0.0684 J	0.0754 J
Sulfate	20.9	20.9	25.3	33.1	32.5	28.6	23.3	23.0	24.9	26.4	22.5	21.1	21.5	19.3	18.7
Radiological (pCi/L)															
Radium-226	0.225 +/-(0.195) U	–	–	-0.0506 +/-(0.0681) U	0.0554 +/-(0.0833) U	-0.0422 +/-(0.0750) U	0.0262 +/-(0.0916) U	0.143 +/-(0.110) U	-0.0744 +/-(0.0770) U	0.0307 +/-(0.0916) U	0.0193 +/-(0.0758) U	0.00625 +/-(0.0583) U	0.179 +/-(0.117)	0.0848 +/-(0.0942) U	0.0766 +/-(0.0884) U
Radium-228	-0.188 +/-(0.334) U	–	–	0.478 +/-(0.264) U*	1.68 +/-(0.351) U*	1.07 +/-(0.308) U*	0.350 +/-(0.257) UJ	0.272 +/-(0.209) UJ	3.34 +/-(0.530) J	1.13 +/-(0.325) U*	-0.188 +/-(0.236) U	0.146 +/-(0.265) U	0.466 +/-(0.285)	0.228 +/-(0.260) U	0.227 +/-(0.278) U
Radium-226+228	0.225 +/-(0.387) U	–	–	0.478 +/-(0.273) U*	1.74 +/-(0.361) U*	1.07 +/-(0.317) U*	0.376 +/-(0.273) UJ	0.415 +/-(0.236) UJ	3.34 +/-(0.536) J BC	1.16 +/-(0.338) U*	0.0193 +/-(0.248) U	0.152 +/-(0.271) U	0.645 +/-(0.308)	0.313 +/-(0.277) U	0.303 +/-(0.292) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	84.8	90.4	88.5	111	110	104	95.8	95.9	97.0	99.6	93.1	91.4	94.4	85.8	87.9
Total Dissolved Solids	117	134	113	146	125	123	120	110	80.0	146	149	138	141	128	105
Total Suspended Solids	21.2	22.7	22.2	16.3	17.6	21.7	17.9	27.2	21.5	23.0	15.7	17.5	19.0	16.2	24.2

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR05			STR-CuR06											
Sample Date	27-May-2020			05-Nov-2018									04-Sep-2019		
Sample ID	CUF-STR-CUR05-CC-BOT-20200527	CUF-STR-CUR05-RB-SUR-20200527	CUF-STR-CUR05-RB-BOT-20200527	CUF-STR-CUR06-LB-SUR-20181105	CUF-STR-CUR06-LB-MID-20181105	CUF-STR-CUR06-LB-BOT-20181105	CUF-STR-CUR06-CC-SUR-20181105	CUF-STR-CUR06-CC-MID-20181105	CUF-STR-CUR06-CC-BOT-20181105	CUF-STR-CUR06-RB-SUR-20181105	CUF-STR-CUR06-RB-MID-20181105	CUF-STR-CUR06-RB-BOT-20181105	CUF-STR-CUR06-LB-SUR-20190904	CUF-STR-CUR06-LB-BOT-20190904	CUF-STR-CUR06-CC-SUR-20190904
Sample Depth (m)	14.4	0.5	1.7	0.5	4	7.5	0.5	4.5	8.4	0.5	4	7.5	0.5	2.5	0.5
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID															
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<0.378	<0.378	<0.378	<1.12	2.58	<1.12	3.02	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	0.454 J	0.565 J	0.476 J	0.706 J	0.562 J	0.577 J	0.43 J	0.583 J	0.653 J	0.703 J	0.566 J	0.735 J	0.968 J	1.01	0.996 J
Barium	22.9	23.9	24.9	22.7	25.3	22.9	23.2	25.6	25	24.9	24.2	28.4	25.2	25.8	26.4
Beryllium	<0.182	<0.182	<0.182	<0.057	0.057 J	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	75.8 J	107	<38.6	<30.3	<30.3	<30.3	38 J	<30.3	<30.3	<30.3	<30.3	<30.3	99.2	99.9	100
Cadmium	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	26100	27100	25800	34700	34400	33800	35200	35800	36500	35400	34800	36200	29200	29300	29800
Chromium	<1.53	<1.53	<1.53	<0.631	<0.631	0.667 J	0.634 J	<0.631	0.66 J	0.638 J	0.678 J	2.23	2.61	3.09	2.53
Cobalt	0.347 J	0.262 J	0.352 J	0.311 U*	0.362 U*	0.437 U*	0.404 U*	0.416 U*	0.374 U*	0.364 U*	0.373 U*	0.367 J	0.328 U*	0.331 U*	0.382 U*
Copper	1.83 J	1.60 J	2.82	1.56 J	<1.3	<1.3	1.52 J	<1.3	<1.3	<1.3	<1.3	<1.3	2.39	2.41	2.42
Iron	579	489	611	356	394	475	296	329	494	465	453	637	411	415	510
Lead	0.543 J	0.419 J	0.585 J	0.379 J	0.392 J	0.496 J	0.34 J	0.405 J	0.564 J	0.464 J	0.493 J	0.552 J	0.486 U*	0.473 U*	0.533 U*
Lithium	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	3.65 U*	4.68 J	4.67 J	4.37 J
Magnesium	5520	5860	5560	6550	6460	6380	6630	6650	6780	6700	6430	6140	6850	6910	6920
Manganese	65.9	63.0	67.5	49.2	55.2	61.5	49.9	56.8	64.1	63.5	60.8	73.7	66.9	65.5	75.1
Mercury	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	<0.610	0.778 J	<0.610	0.715 U*	1.78 U*	0.764 U*	2.14 U*	0.771 U*	0.592 U*	<0.474	<0.474	0.554 J	0.776 J	0.833 J	0.843 J
Nickel	1.17	0.913 J	7.72	1.5 U*	1.38 U*	1.48 U*	1.51 U*	1.63 U*	1.53 U*	1.61 U*	2.43 U*	0.997 U*	1.19	1.16	1.43
Selenium	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	<0.063	0.071 U*	<0.063	0.08 U*	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148
Vanadium	<0.991	1.04	1.15	1.62	1.78	1.93	1.6	1.63	2.17	1.98	2	2.95	3.04	3.46	3.13
Zinc	3.39 J	4.28 J	4.44 J	5.24 U*	5.19 U*	29.7	4.43 U*	7.01 U*	9.41 U*	5.16 U*	6.66 U*	6.56 U*	5.40 U*	5.57 U*	6.33 U*
Metals, Dissolved (µg/L)															
Antimony	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	0.617 J	0.592 J	0.688 J
Arsenic	<0.313	<0.313	0.477 J	0.328 J	0.443 J	0.392 J	0.526 J	0.418 J	0.409 J	0.492 J	0.366 J	0.528 J	0.762 J	0.846 J	0.844 J
Barium	20.5	19.3	20.3	18.5	20.3	19.5	19.7	20.4	19.8	21.9	20.1	24.8	22.8	22.4	22.8
Beryllium	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	77.9 J	111	<38.6	<30.3	<30.3	<30.3	32.8 J	<30.3	<30.3	<30.3	<30.3	<30.3	76.1 J	77.3 J	77.3 J
Cadmium	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	27000	25700	25700	35000 J	34100 J	32600 J	33900 J	33500 J	34300 J	35500 J	35100 J	37700	29600	29000	29100
Chromium	<1.53	<1.53	<1.53	<0.631	<0.631	<0.631	<0.631	<0.631	<0.631	<0.631	<0.631	1.79 J	2.36	2.85	2.69
Cobalt	<0.134	<0.134	<0.134	0.085 U*	0.152 U*	<0.075	0.133 U*	0.101 U*	0.091 U*	0.091 U*	0.097 U*	0.089 J	0.0750 J	<0.0750	<0.0750
Copper	1.23 U*	0.916 U*	<0.627	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.45 J	1.48 J	1.56 J
Iron	<19.5	<19.5	<19.5	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<19.5	<19.5	<19.5
Lead	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	2.73 U*	4.05 J	4.12 J	4.17 J
Magnesium	5810	5540	5450	6510	6410	6000	6310	6190	6350	6630	6400	6200	6360	6370	6460
Manganese	9.99	7.91	5.03	5.28	6.3	6.06	5.55	6.12	6.47	11.3	7.05	8.45	1.82 J	2.08 J	<1.35
Mercury	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	0.686 J	0.655 J	<0.610	0.706 U*	0.87 U*	0.588 U*	1.21 U*	0.495 U*	0.487 U*	<0.474	<0.474	0.48 J	0.826 J	0.830 J	0.788 J
Nickel	0.539 J	0.669 J	0.469 J	1.09 U*	0.968 U*	1.29 U*	1.13 U*	0.797 U*	1.51 U*	1.19 U*	1.17 U*	0.543 U*	0.636 J	0.633 J	0.630 J
Selenium	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	1.57 J
Silver	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148
Vanadium	<0.991	<0.991	<0.991	<0.899	<0.899	0.901 J	<0.899	0.901 J	<0.899	0.931 J	<0.899	2	2.55	2.80	2.90
Zinc	<3.22	<3.22	<3.22	2.56 U*	<2.42	4.34 U*	2.6 U*	3.47 U*	2.68 U*	2.98 U*	5.44 U*	2.79 U*	3.69 J	3.70 J	3.82 J
Anions (mg/L)															
Chloride	3.71 J	4.34 J	2.98 J	4.42	3.70	3.66	4.03	3.74	3.46	3.30	3.93	3.78	5.47	5.55	5.52
Fluoride	0.0537 J	0.0573 J	0.0475 J	0.107	0.0718 J	0.0684 J	0.0738 J	0.0704 J	0.0654 J	0.0631 J	0.0757 J	0.0712 J	0.105	0.105	0.105
Sulfate	24.1	24.3	22.5	23.0	19.2	18.7	21.3	18.6	17.6	16.4	19.0	18.8	27.2	27.1	27.0
Radiological (pCi/L)															
Radium-226	0.161 +/-(0.147) U	0.0777 +/-(0.111) U	-0.0940 +/-(0.257) U	-0.00141 +/-(0.0936) U	0.0320 +/-(0.108) U	0.00273 +/-(0.0859) U	0.0802 +/-(0.119) U	0.0715 +/-(0.112) U	-0.00421 +/-(0.0835) U	0.151 +/-(0.137) U	0.0200 +/-(0.0965) U	-0.00834 +/-(0.0828) U	0.0984 +/-(0.0883) U	0.0558 +/-(0.0834) U	0.173 +/-(0.100)
Radium-228	0.557 +/-(0.426) U	0.0323 +/-(0.256) U	0.352 +/-(0.383) U	0.0556 +/-(0.220) U	0.0642 +/-(0.203) U	-0.0271 +/-(0.219) U	0.437 +/-(0.270)	0.0356 +/-(0.232) U	-0.156 +/-(0.210) U	0.0358 +/-(0.248) U	0.149 +/-(0.234) U	-0.0811 +/-(0.214) U	0.337 +/-(0.318) UJ	0.0387 +/-(0.280) UJ	0.00909 +/-(0.315) UJ
Radium-226+228	0.718 +/-(0.451) U	0.110 +/-(0.279) U	0.352 +/-(0.461) U	0.0556 +/-(0.239) U	0.0962 +/-(0.230) U	0.00273 +/-(0.235) U	0.517 +/-(0.295) J	0.107 +/-(0.258) U	0.000 +/-(0.226) U	0.186 +/-(0.283) U	0.169 +/-(0.253) U	0.000 +/-(0.229) U	0.435 +/-(0.330) UJ	0.0945 +/-(0.292) UJ	0.182 +/-(0.330) J
General Chemistry (mg/L)															
Hardness (as CaCO3)	87.8	91.9	87.3	114	112	111	115	117	119	116	113	116	101	102	103
Total Dissolved Solids	133	139	113	132	139	141	136	130	139	146	133	148	122	122	202
Total Suspended Solids	21.6	29.3	21.6	11.6	16.0	17.6	11.9	14.4	17.2	16.2	17.6	20.2	14.3	13.5	18.1

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR06													
Sample Date	04-Sep-2019						27-May-2020							
Sample ID	CUF-STR-CUR06-CC-MID-20190904	CUF-STR-CUR06-CC-BOT-20190904	CUF-STR-CUR06-RB-SUR-20190904	CUF-STR-CUR06-RB-MID-20190904	CUF-STR-CUR06-RB-BOT-20190904	CUF-STR-DUP02-20190904	CUF-STR-CUR06-LB-SUR-20200527	CUF-STR-CUR06-LB-BOT-20200527	CUF-STR-CUR06-CC-SUR-20200527	CUF-STR-CUR06-CC-MID-20200527	CUF-STR-CUR06-CC-BOT-20200527	CUF-STR-CUR06-RB-SUR-20200527	CUF-STR-CUR06-RB-MID-20200527	CUF-STR-CUR06-RB-BOT-20200527
Sample Depth (m)	4.8	9	0.5	2	3.5	3.5	0.5	2	0.5	5.5	10.5	0.5	2.7	5
Sample Type[1]	N	N	N	N	N	FD	N	N	N	N	N	N	N	N
Parent Sample ID						CUF-STR-CUR06-RB-BOT-20190904								
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)														
Antimony	<0.378	<0.378	<0.378	0.432 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	1.12	1.08	0.984 J	1.40	1.10	1.02	0.554 J	0.357 J	0.323 J	0.481 J	0.486 J	0.338 J	0.367 J	0.528 J
Barium	27.5	26.5	26.3	25.6	27.3	27.3	23.9	23.7	22.5	22.7	26.3	24.9	23.2	25.8
Beryllium	<0.182	<0.182	<0.182	0.619 U*	0.320 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	59.8 J	<38.6	71.0 J	105	80.3	71.8 J	55.2 J	46.8 J	40.1 J	<38.6	<38.6	66.4 J	51.1 J	<38.6
Cadmium	<0.125	<0.125	<0.125	0.153 J	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	29000	28800	28900	28800	29100	29300	27100	26200	26200	26300	26600	27400	26700	26700
Chromium	3.10	3.21	5.29	3.35	3.31	2.91	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	0.436 U*	0.406 U*	0.364 U*	0.499 J	0.481 J	0.426 U*	0.269 J	0.291 J	0.209 J	0.290 J	0.368 J	0.238 J	0.312 J	0.340 J
Copper	1.73 J	2.04	2.44	2.53	1.82 J	2.58	1.16 J	0.863 J	1.03 J	0.791 J	0.880 J	1.42 J	1.45 J	1.34 J
Iron	660	606	507	494	687	626	406	462	333	553	627	473	534	717
Lead	0.610 U*	0.589 U*	0.546 U*	0.697 U*	0.698 U*	0.631 U*	0.379 J	0.444 J	0.329 J	0.509 J	0.619 J	0.446 J	0.473 J	0.608 J
Lithium	4.37 J	4.61 J	4.64 J	5.97	5.03	6.31	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	6470	6140	6640	6630	6500	6490	5910	5690	5620	5550	5580	6060	5590	5700
Manganese	76.2	74.5	74.1	73.6	83.8	82.0	48.7	53.8	42.3	64.6	75.7	55.6	59.6	72.9
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	0.639 J	<0.610	0.693 J	0.832 J	0.640 J	0.657 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	1.23	1.14	1.27	1.36	1.44	1.34	0.844 J	0.940 J	0.704 J	0.875 J	1.14	0.980 J	0.965 J	1.16
Selenium	<1.51	<1.51	<1.51	1.75 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	0.295 U*	<0.148	<0.148	<0.148	<0.148	<0.148	0.177 U*	<0.148	<0.148	<0.148	<0.148
Vanadium	3.64	3.58	3.48	3.71	3.78	3.29	1.03	1.01	<0.991	<0.991	1.48	0.991 J	1.09	1.33
Zinc	5.61 U*	6.36 U*	6.37 U*	6.11 U*	6.34 U*	6.57 U*	<3.22	<3.22	<3.22	<3.22	4.84 J	<3.22	4.16 J	4.82 J
Metals, Dissolved (µg/L)														
Antimony	0.578 J	<0.378	0.569 J	<0.378	1.29 J	0.835 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.832 J	0.817 J	0.855 J	0.843 J	0.815 J	0.904 J	<0.313	0.337 J	<0.313	<0.313	0.421 J	0.573 J	0.421 J	0.315 J
Barium	22.0	21.4	22.8	22.1	21.5	22.7	21.6	19.6	19.1	19.2	21.6	19.9	20.2	20.9
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	43.7 J	<38.6	63.2 J	63.4 J	60.4 J	49.0 J	55.0 J	49.8 J	47.4 J	<38.6	<38.6	71.9 J	41.6 J	<38.6
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	27900	27700	29300	29400	27200	28900	26700	26700	25500	26100	25800	25600	26700	24700
Chromium	2.44	1.86 U*	2.75	2.29 U*	2.49	2.65	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	<0.0750	0.0980 U*	<0.0750	0.0940 U*	0.0960 J	0.0770 J	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134	<0.134
Copper	1.06 J	1.15 J	1.58 J	1.73 J	1.00 J	1.32 J	<0.627	0.738 U*	<0.627	<0.627	<0.627	1.02 U*	0.690 U*	<0.627
Iron	<19.5	<19.5	<19.5	<19.5	19.5 UJ	160 J	<19.5	<19.5	<19.5	21.6 J	<19.5	<19.5	<19.5	19.6 J
Lead	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	3.80 J	3.66 J	4.44 J	4.16 J	4.18 J	4.39 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	5830	6130	6350	6930	5570	6060	5730	5630	5280	5630	5450	5500	5660	5230
Manganese	<1.35	1.55 J	3.10 J	3.39 J	1.99 J	2.66 J	4.19 J	3.97 J	2.95 J	1.76 J	1.52 J	5.36	7.02	3.26 J
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	<0.610	<0.610	0.737 J	0.680 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	0.555 J	0.681 J	0.524 J	0.870 J	0.436 J	0.625 J	0.436 J	0.448 J	0.455 J	0.463 J	0.483 J	0.494 J	0.484 J	0.338 J
Selenium	<1.51	<1.51	<1.51	<1.51	1.57 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.250 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	2.73	1.42	2.75	1.55	2.70	2.92	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	<3.22	4.06 U*	3.50 J	3.72 U*	3.49 J	3.89 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions (mg/L)														
Chloride	4.30	3.72	4.81	4.84	4.39	4.40	3.57	3.51	3.40	3.00	2.94	4.49	3.30	3.18
Fluoride	0.0902 J	0.0786 J	0.100	0.0927 J	0.0834 J	0.0900 J	0.0726 J	0.0805 J	0.0756 J	0.0778 J	0.0757 J	0.0852 J	0.0772 J	0.0710 J
Sulfate	24.7	22.9	25.7	25.8	24.7	24.7	19.5	19.9	19.7	19.5	19.1	21.2	19.4	19.0
Radiological (pCi/L)														
Radium-226	0.0206 +/-(0.0779) U	-0.00321 +/-(0.0674) U	0.0532 +/-(0.0744) U	0.0268 +/-(0.0795) U	-0.0371 +/-(0.0878) UJ	0.187 +/-(0.124) J	0.0273 +/-(0.107) U	-0.0106 +/-(0.0563) U	0.0231 +/-(0.0797) U	0.00401 +/-(0.119) U	0.0707 +/-(0.0993) U	-0.0342 +/-(0.0684) U	0.131 +/-(0.128) U	0.0119 +/-(0.0727) U
Radium-228	-0.113 +/-(0.286) UJ	0.273 +/-(0.292) UJ	0.235 +/-(0.284) UJ	0.124 +/-(0.271) UJ	0.106 +/-(0.394) UJ	0.150 +/-(0.311) UJ	0.189 +/-(0.363) U	-0.0625 +/-(0.255) U	-0.226 +/-(0.258) U	-0.128 +/-(0.258) U	0.0709 +/-(0.259) U	0.0844 +/-(0.308) U	0.0953 +/-(0.278) U	-0.177 +/-(0.219) U
Radium-226+228	0.0206 +/-(0.296) UJ	0.273 +/-(0.300) UJ	0.288 +/-(0.294) UJ	0.151 +/-(0.282) UJ	0.106 +/-(0.404) U	0.337 +/-(0.335) J	0.216 +/-(0.378) U	0.000 +/-(0.261) U	0.0231 +/-(0.270) U	0.00401 +/-(0.284) U	0.142 +/-(0.277) U	0.0844 +/-(0.316) U	0.226 +/-(0.306) U	0.0119 +/-(0.231) U
General Chemistry (mg/L)														
Hardness (as CaCO3)	99.1	97.2	99.5	99.2	99.4	99.9	91.9	88.9	88.7	88.6	89.3	93.4	89.7	90.1
Total Dissolved Solids	116	126	132	136	129	129	102	103	131	110	108	110	134	101
Total Suspended Solids	19.1	19.8	15.4	18.8	22.4	20.6	13.8	16.3	11.7	16.9	22.9	15.4	19.9	22.4

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR07														
Sample Date	05-Nov-2018										04-Sep-2019				
Sample ID	CUF-STR-CUR07-LB-SUR-20181105	CUF-STR-CUR07-LB-MID-20181105	CUF-STR-CUR07-LB-BOT-20181105	CUF-STR-CUR07-CC-SUR-20181105	CUF-STR-CUR07-CC-MID-20181105	CUF-STR-DUP01-20181105	CUF-STR-CUR07-CC-BOT-20181105	CUF-STR-CUR07-RB-SUR-20181105	CUF-STR-CUR07-RB-MID-20181105	CUF-STR-CUR07-RB-BOT-20181105	CUF-STR-CUR07-LB-SUR-20190904	CUF-STR-CUR07-LB-MID-20190904	CUF-STR-CUR07-LB-BOT-20190904	CUF-STR-CUR07-CC-SUR-20190904	CUF-STR-CUR07-CC-MID-20190904
Sample Depth (m)	0.5	5.5	10.5	0.5	5	5	10	0.5	4.5	9.2	0.5	3.2	5.8	0.5	5.1
Sample Type[1]	N	N	N	N	N	FD	N	N	N	N	N	N	N	N	N
Parent Sample ID						CUF-STR-CUR07-CC-MID-20181105									
Level of Review[2]	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.607 J	0.651 J	0.548 J	0.634 J	0.57 J	0.667 J	0.692 J	0.52 J	0.678 J	0.582 J	0.946 J	0.941 J	0.963 J	0.816 J	0.837 J
Barium	23.2	24	25.7	21.7	25.9	27.3	24.9	23.9	23.1	25.2	26.4	26.4	28.1	26.2	24.7
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	0.275 U*	0.192 U*	<0.182	0.216 U*	<0.182
Boron	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	66.3 J	<38.6	45.2 J	76.7 J	<38.6
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	34900	33800	33700	33300	33800	34900	34800	33900	33100	35800	31300	29400	28900	31600	29100
Chromium	0.653 J	0.73 J	0.78 J	<0.631	0.631 J	2.11	0.715 J	<0.631	<0.631	0.716 J	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	0.409 U*	0.393 U*	0.45 U*	0.395 U*	0.246 U*	0.305 J	0.358 U*	0.262 U*	0.342 U*	0.471 J	0.294 U*	0.421 U*	0.460 J	0.280 U*	0.322 U*
Copper	1.34 J	<1.3	1.33 J	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.73 J	2.11	1.51 J	1.66 J	1.37 J
Iron	436	496	514	400	440	505	578	407	349	619	281	423	699	354	351
Lead	0.443 J	0.542 J	0.584 J	0.386 J	0.446 J	0.413 J	0.633 J	0.441 J	0.381 J	0.617 J	0.322 U*	0.537 U*	0.787 U*	0.359 U*	0.425 U*
Lithium	<2.56	<2.56	<2.56	<2.56	<2.56	3.01 U*	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	6420	6160	6280	6250	6370	6140	6650	6330	6250	6830	7440	6900	6690	7490	6740
Manganese	60.3	62.5	67.6	50.3	58.1	61	72.2	53.2	45.8	74.7	58.7	79.1	106	61.3	68.8
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	0.478 U*	0.659 U*	<0.474	0.559 U*	<0.474	0.518 J	0.505 U*	0.71 U*	1.71 U*	0.632 U*	0.863 J	0.694 J	0.615 J	0.729 J	<0.610
Nickel	1.13 U*	1.42 U*	1.39 U*	1.91 U*	1.41 U*	0.935 U*	2.59 U*	1.36 U*	1.29 U*	1.73 U*	1.09	0.885 J	1.22	0.870 J	0.615 J
Selenium	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	0.118 U*	<0.063	0.207 U*	<0.148	<0.148	<0.148	<0.148
Vanadium	1.44	1.78	1.9	1.67	1.7 J	2.75 J	1.98	1.54	1.32	1.88	1.88	2.64	2.26	1.92	1.65
Zinc	5.26 U*	4.85 U*	5.58 U*	5.08 U*	8.65 U*	4.23 U*	6.31 U*	4.4 U*	5.7 U*	9.22 U*	4.50 U*	5.80 U*	6.17 U*	4.66 U*	6.35 U*
Metals, Dissolved (µg/L)															
Antimony	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	<1.12	2.36	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.347 J	0.502 J	<0.323	0.397 J	0.449 J	0.574 J	0.369 J	0.416 J	0.422 J	0.375 J	0.810 J	0.727 J	0.685 J	0.706 J	0.743 J
Barium	19.7	20.2	18.3	20.6	19.6	24.1	21.3	19.7	20.2	20.4	23.4	21.6	23.9	23.2	22.0
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	<0.057	0.221 U*	<0.182	<0.182	<0.182	<0.182
Boron	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	65.0 J	71.1 J	42.8 J	74.0 J	<38.6
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	31200	32800	32800	34500	34100	35800	34700	34900	33300 J	34000 J	30500	29100	29100	30600	29400
Chromium	<0.631	<0.631	<0.631	<0.631	<0.631	1.58 J	<0.631	<0.631	<0.631	<0.631	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	<0.075	0.075 U*	<0.075	<0.075	0.079 U*	<0.075	0.08 U*	0.147 U*	0.084 U*	0.094 U*	0.0920 J	0.0810 J	0.0750 J	<0.0750	<0.0750
Copper	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.07 J	1.87 J	0.822 J	1.06 J	0.825 J
Iron	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	<14.1	54.9	<19.5	150	<19.5	41.5 J
Lead	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	1.95 J	<0.128	<0.128	<0.128
Lithium	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	5720	5970	6120	6470	6430	6230	6580	6580	6260	6420	7130	6720	6790	7180	6730
Manganese	4.78 J	5.78	5.62	4.62 J	4.32 J	4.4 J	5.27	5.22	5.39	10.6	16.6	2.74 J	8.02	<1.35	8.91
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	0.516 U*	0.513 U*	<0.474	0.572 U*	0.491 U*	0.523 J	0.505 U*	1.68 U*	0.893 U*	0.484 U*	0.818 J	0.620 J	0.633 J	0.764 J	<0.610
Nickel	1.1 U*	0.943 U*	0.824 U*	1.23 U*	1.4 U*	0.659 U*	1.29 U*	0.758 U*	1.13 U*	0.902 U*	0.518 J	<0.336	0.485 J	0.556 J	0.526 J
Selenium	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	<0.063	0.08 U*	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	<0.899	<0.899	<0.899	1.06	1.03	1.91	1.17	0.931 J	0.927 J	<0.899	1.43	1.52	1.28	1.55	1.47
Zinc	5.17 U*	3.6 U*	3.58 U*	2.79 U*	3.31 U*	3.52 U*	2.94 U*	2.44 U*	3.87 U*	4.42 U*	3.55 U*	4.53 U*	3.76 U*	3.34 U*	5.73 U*
Anions (mg/L)															
Chloride	3.73	3.80	3.70	3.82	3.76	3.67	3.68	3.68	3.62	3.68	4.83	4.01	3.79	4.89	3.65
Fluoride	0.0715 J	0.0725 J	0.0706 J	0.0711 J	0.0705 J	0.0708 J	0.0689 J	0.0697 J	0.0692 J	0.0704 J	0.100	0.0864 J	0.0925 J	0.0965 J	0.0794 J
Sulfate	19.2	19.1	19.3	20.3	19.7	19.6	19.3	19.3	18.7	19.2	25.6	24.4	23.9	25.7	23.4
Radiological (pCi/L)															
Radium-226	0.00313 +/-(0.0655) U	-0.00534 +/-(0.0594) U	0.00858 +/-(0.0777) U	0.0125 +/-(0.0651) U	0.0989 +/-(0.0863) U	0.0625 +/-(0.0856) U	0.0379 +/-(0.0588) U	-0.00108 +/-(0.0601) U	0.0391 +/-(0.0672) U	0.105 +/-(0.122) U	-0.0172 +/-(0.0807) U	0.0892 +/-(0.0922) U	-0.0460 +/-(0.0607) U	0.0619 +/-(0.0982) U	0.0132 +/-(0.0711) U
Radium-228	-0.239 +/-(0.220) U	-0.0732 +/-(0.224) U	0.136 +/-(0.251) U	-0.0496 +/-(0.201) U	-0.219 +/-(0.220) U	0.197 +/-(0.364) U	0.0193 +/-(0.248) U	0.0473 +/-(0.264) U	0.0600 +/-(0.269) U	0.244 +/-(0.220) U	0.795 +/-(0.440) U*	0.364 +/-(0.319) U	0.605 +/-(0.423) U	-0.117 +/-(0.365) U	0.837 +/-(0.365) U*
Radium-226+228	0.00313 +/-(0.230) U	0.000 +/-(0.232) U	0.144 +/-(0.263) U	0.0125 +/-(0.211) U	0.0989 +/-(0.236) U	0.260 +/-(0.374) U	0.0572 +/-(0.255) U	0.0473 +/-(0.271) U	0.0992 +/-(0.277) U	0.349 +/-(0.252) U	0.795 +/-(0.447) U*	0.453 +/-(0.332) U	0.605 +/-(0.427) U	0.0619 +/-(0.378) U	0.850 +/-(0.372) U*
General Chemistry (mg/L)															
Hardness (as CaCO3)	114	110	110	109	111	112	114	111	108	118	109	102	99.7	110	100
Total Dissolved Solids	132	134	124	125	116	129	141	124	132	138	122	107	110	127	120
Total Suspended Solids	15.2	19.0	22.1	13.2	18.1	17.5	20.2	14.8	17.1	24.6	9.80	17.7	21.2	10.2	13.4

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-CuR07				STR-DC01									
Sample Date	04-Sep-2019				04-Sep-2019							27-May-2020		
Sample ID	CUF-STR-CUR07-CC-BOT-20190904	CUF-STR-CUR07-RB-SUR-20190904	CUF-STR-CUR07-RB-MID-20190904	CUF-STR-CUR07-RB-BOT-20190904	CUF-STR-DC01-LB-SUR-20190904	CUF-STR-DC01-LB-MID-20190904	CUF-STR-DC01-LB-BOT-20190904	CUF-STR-DC01-CC-SUR-20190904	CUF-STR-DC01-CC-MID-20190904	CUF-STR-DC01-CC-BOT-20190904	CUF-STR-DC01-RB-MID-20190904	CUF-STR-DUP03-20190904	CUF-STR-DC01-LB-SUR-20200527	CUF-STR-DC01-LB-MID-20200527	CUF-STR-DC01-LB-BOT-20200527
Sample Depth (m)	10.8	0.5	3.1	5.9	0.5	2.2	3.9	0.5	3.4	6.4	0.9	0.9	0.5	1.8	3.1
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	N	FD	N	N	N
Parent Sample ID												CUF-STR-DC01-RB-MID-20190904			
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<0.378	<0.378	2.03	<0.378	0.400 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.726 J	0.916 J	1.12	1.19	1.30	1.21	1.22	1.16	1.16	1.04	1.11	1.08	0.385 J	0.377 J	0.455 J
Barium	26.2	25.0	25.9	25.3	28.4	29.2	27.7	26.8	27.0	27.1	27.5	27.2	25.6	24.0	25.0
Beryllium	<0.182	<0.182	0.273 U*	<0.182	<0.182	<0.182	<0.182	0.474 U*	0.290 U*	0.227 U*	0.196 U*	<0.182	<0.182	<0.182	<0.182
Boron	<38.6	74.7 J	52.8 J	90.1	269	269	198	102	49.5 J	57.0 J	<38.6	<38.6	79.6 J	167	219
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	29500	30900	28100	28200	32400	32700	30800	27700	26700	27300	26800	27300	28200	27100	28700
Chromium	<1.53	<1.53	3.21	3.00	3.46	3.32	3.20	2.96	3.00	3.07	3.21	2.76	<1.53	<1.53	<1.53
Cobalt	0.368 U*	0.319 U*	0.371 U*	0.279 U*	0.536	0.562	0.524	0.540	0.553	0.492 J	0.520	0.490 J	0.327 J	0.288 J	0.297 J
Copper	1.05 J	1.35 J	1.61 J	2.83	3.22	3.39	3.34	3.58	2.72	2.73	5.02 J	2.65 J	1.95 J	1.85 J	1.78 J
Iron	474	283	386	341	617	701	636	725	796	647	819 J	603 J	551	442	529
Lead	0.513 U*	0.318 U*	0.518 U*	0.396 U*	0.653 J	0.675 J	0.628 J	0.858 J	0.781 J	0.728 J	0.835 J	0.775 J	0.502 J	0.519 J	0.490 J
Lithium	<3.39	<3.39	6.31	5.26	4.03 J	<3.39	<3.39	5.25	4.62 J	4.34 J	4.30 J	3.80 J	<3.39	<3.39	<3.39
Magnesium	6740	7300	5950	6340	9310	9490	8420	6680	6070	6360	6150	6210	6370	5990	6310
Manganese	82.6	59.4	57.6	58.3	104	107	99.6	93.5	92.6	92.2	94.7	96.2	69.7	66.8	71.0
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	<0.610	0.668 J	0.657 J	<0.610	1.48 J	1.54 J	1.16 J	0.767 J	<0.610	<0.610	<0.610	<0.610	1.30 J	0.967 J	1.27 J
Nickel	0.864 J	0.915 J	1.02	0.920 J	1.76	1.84	2.14	1.78	1.45	1.44	1.54	1.29	1.32	1.21	1.33
Selenium	<1.51	<1.51	<1.51	<1.51	2.22 J	2.13 J	1.78 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	0.224 U*	<0.148	<0.148	<0.148	<0.148	0.186 U*	<0.148	0.148 UJ	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	1.85	1.81	3.53	5.44	4.04	3.92	3.77	3.51	3.43	3.29	3.44	3.16	1.19	<0.991	1.09
Zinc	17.9 U*	7.23 U*	5.64 U*	5.04 U*	7.52 U*	6.89 U*	6.15 U*	8.62 U*	11.3 U*	12.5 U*	7.00 U*	3.84 U*	3.82 J	<3.22	4.34 J
Metals, Dissolved (µg/L)															
Antimony	<0.378	<0.378	<0.378	0.909 J	<0.378	0.386 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.733 J	0.641 J	0.911 J	0.888 J	1.03 U*	1.00 U*	1.03 U*	0.896 U*	0.986 U*	0.985 U*	0.706 U*	0.773 U*	<0.313	<0.313	0.373 J
Barium	23.5	22.2	22.1	22.5	26.5	24.1	23.5	22.1	23.1	23.0	21.3	21.9	21.0	20.2	21.8
Beryllium	<0.182	<0.182	0.194 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	<38.6	70.6 J	<38.6	39.5 J	297 U*	307 U*	177 U*	61.3 U*	<38.6	51.6 U*	<38.6	<38.6	<38.6	161	222
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.217
Calcium	29200	30700	27700	28100	34000	33300	30500	26500	27300	28500	27200	27900	27600	27000	28700
Chromium	<1.53	<1.53	1.86 U*	2.29	2.58 U*	2.88 U*	3.02 U*	2.50 U*	3.05 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	<0.0750	<0.0750	0.130 U*	0.0970 J	0.147 U*	0.159 U*	0.120 U*	0.110 U*	0.123 U*	0.138 U*	<0.0750	<0.0750	<0.134	<0.134	<0.134
Copper	<0.627	1.06 J	1.17 J	1.06 J	2.30	2.26	2.31	1.88 J	2.03	2.16	1.95 J	1.57 J	1.57 U*	1.25 U*	1.52 U*
Iron	<19.5	<19.5	<19.5	49.4 J	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	35.5 J
Lead	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	4.23 J	4.01 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	6600	7420	6360	5850	9970	9810	8120	6200	6180	6670	6250	6460	6020	5940	6470
Manganese	<1.35	<1.35	<1.35	10.7	19.7	19.8	11.2	4.94 J	3.67 J	4.11 J	4.25 J	4.02 J	10.6	8.90	10.9
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.130
Molybdenum	<0.610	0.827 J	<0.610	<0.610	1.80 J	1.81 J	1.09 J	<0.610	<0.610	1.04 J	<0.610	<0.610	1.23 J	0.930 J	1.29 J
Nickel	<0.336	0.419 J	0.569 J	0.511 J	1.22	1.24	1.05	0.758 J	0.660 J	0.415 J	0.515 J	0.584 J	0.739 J	0.664 J	0.844 J
Selenium	<1.51	<1.51	<1.51	<1.51	2.27 J	2.46 J	1.94 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	0.223 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	1.20 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	1.23	1.32	1.47	2.62	3.03 U*	3.09 U*	3.01 U*	2.57 U*	2.82 U*	1.40 U*	1.38 U*	1.29 U*	<0.991	<0.991	<0.991
Zinc	9.12 U*	4.95 U*	3.74 U*	3.55 J	3.85 J	3.66 J	3.50 J	7.76	7.64	6.44 U*	3.29 U*	4.14 U*	<3.22	<3.22	<3.22
Anions (mg/L)															
Chloride	3.55	5.12	4.09	3.97	10.6	9.31	8.94	5.06	3.77	4.47	3.47	3.41	6.98	6.36	6.39
Fluoride	0.0851 J	0.104	0.0908 J	0.0826 J	0.155	0.150	0.140	0.0987 J	0.0842 J	0.0881 J	0.0736 J	0.0752 J	0.105	0.102	0.101
Sulfate	23.2	26.1	24.6	24.2	38.2	36.1	34.6	27.1	24.6	26.0	23.8	23.5	25.6	24.6	23.6
Radiological (pCi/L)															
Radium-226	-0.0238 +/-(0.0599) U	0.0135 +/-(0.0650) U	0.00202 +/-(0.0793) U	-0.0186 +/-(0.0614) U	0.0303 +/-(0.0811) U	0.0384 +/-(0.103) U	0.0140 +/-(0.0753) U	0.0105 +/-(0.0711) U	0.0516 +/-(0.0776) U	-0.0341 +/-(0.0606) U	-0.0388 +/-(0.0652) U	0.0679 +/-(0.0838) U	0.112 +/-(0.163) U	0.123 +/-(0.231) U	0.240 +/-(0.193) U
Radium-228	0.343 +/-(0.308) U	0.688 +/-(0.395) U*	0.405 +/-(0.354) U	0.364 +/-(0.291) U	0.632 +/-(0.350) U*	0.677 +/-(0.398) U*	0.100 +/-(0.325) U	0.591 +/-(0.338) U*	0.491 +/-(0.335) U	0.478 +/-(0.288) U*	0.473 +/-(0.329) U	1.03 +/-(0.388) U*	0.0882 +/-(0.361) U	0.0697 +/-(0.400) U	0.0101 +/-(0.337) U
Radium-226+228	0.343 +/-(0.314) U	0.701 +/-(0.400) U*	0.407 +/-(0.363) U	0.364 +/-(0.297) U	0.663 +/-(0.359) U*	0.715 +/-(0.411) U*	0.114 +/-(0.334) U	0.602 +/-(0.345) U*	0.542 +/-(0.344) U	0.478 +/-(0.294) U*	0.473 +/-(0.335) U	1.09 +/-(0.397) U*	0.200 +/-(0.396) U	0.192 +/-(0.462) U	0.250 +/-(0.388) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	101	107	94.7	96.5	119	121	112	96.7	91.7	94.4	92.2	93.7	96.6	92.2	97.7
Total Dissolved Solids	118	112	110	110	149	142	144	115	121	149	106	117	131	133	130
Total Suspended Solids	16.5	10.3	11.5	11.6	24.7	25.3	21.6	29.2	29.1	30.0	32.0	32.5	19.2	20.0	20.9

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-DC01				STR-WC01						STR-WC02				
Sample Date	27-May-2020				29-Nov-2018		13-Aug-2019			05-Dec-2019	28-Nov-2018		13-Aug-2019		
Sample ID	CUF-STR-DC01-CC-SUR-20200527	CUF-STR-DC01-CC-MID-20200527	CUF-STR-DC01-CC-BOT-20200527	CUF-STR-DC01-RB-MID-20200527	CUF-STR-WC01-LB-SUR-20181129	CUF-STR-WC01-RB-SUR-20181129	CUF-STR-WC01-LB-MID-20190813	CUF-STR-WC01-CC-MID-20190813	CUF-STR-WC01-RB-MID-20190813	CUF-STR-WC01-CC-SUR-20191205	CUF-STR-WC02-LB-SUR-20181128	CUF-STR-WC02-RB-SUR-20181128	CUF-STR-WC02-LB-SUR-20190813	CUF-STR-WC02-CC-MID-20190813	CUF-STR-WC02-RB-SUR-20190813
Sample Depth (m)	0.5	4	7.6	1	0.5	0.3	0.6	0.6	0.6	0.5	0.5	0.6	0.2	0.85	0.5
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID															
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	0.634 J	0.466 J	0.490 J	0.501 J	0.442 J	0.438 J	0.709 U*	0.571 U*	0.666 U*	<0.323	0.516 U*	0.49 U*	0.676 U*	0.765 U*	0.807 U*
Barium	23.6	25.1	26.0	25.5	29.5	30.6	39.3 U*	36.9 U*	42.5 U*	31.5	28.8	28	40.5 U*	46.3	38.8 U*
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	0.256 U*	<0.182	<0.182	<0.182	<0.057	<0.057	<0.182	<0.182	0.325 U*
Boron	70.8 J	69.1 J	172	<38.6	<30.3	42.6 U*	41.9 J	<38.6	<38.6	41.6 U*	<30.3	<30.3	<38.6	<38.6	49.6 J
Cadmium	<0.217	0.304 J	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	25800	25900	26400	25700	56400	57200	57600	55100	58500	52900	56000	56200	53300	55900	53400
Chromium	3.42	<1.53	<1.53	<1.53	2.33 U*	2.48 U*	1.82 U*	<1.53	<1.53	<1.53	1.78 U*	2.12 U*	<1.53	1.81 U*	<1.53
Cobalt	0.378 J	0.356 J	0.369 J	0.342 J	0.146 U*	0.263 U*	0.358 J	0.351 J	0.506	0.123 U*	0.115 U*	0.105 U*	0.490 J	0.778	0.495 J
Copper	3.31	2.18	9.84	1.99 J	<1.3	<1.3	1.12 U*	<0.627	0.683 U*	<0.627	<1.3	<1.3	0.627 U*	0.923 U*	0.752 U*
Iron	902	561	630	578	149	146	332	338	602	119	154 J	135 J	596	1100	546
Lead	0.467 J	0.552 J	0.601 J	0.521 J	<0.094	<0.094	0.430 J	0.383 J	0.616 J	<0.128	<0.094	<0.094	0.643 J	1.04	0.697 J
Lithium	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<3.39	<3.39	<3.39
Magnesium	5490	5460	5820	5330	4910	4590	4970	4820	5090	4400	4850	4820	4690	4860	4880
Manganese	66.6	65.6	73.2	67.8	55.1	51.4	110	107	136	36.5	62.2	56.8	153	254	130
Mercury	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	0.107 U*	0.109 U*	0.107 U*	<0.101	<0.0653	<0.0653	0.124 U*	0.121 U*	0.110 U*
Molybdenum	<0.610	<0.610	0.824 J	<0.610	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.610	<0.610	<0.610
Nickel	1.34 R	1.11	1.45	1.13	<0.312	<0.312	0.367 U*	0.347 U*	0.520 U*	<0.336	<0.312	<0.312	0.509 U*	0.948 U*	0.615 U*
Selenium	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	<0.148	0.630 U*	0.259 U*	0.178 U*	<0.063	<0.063	0.229 U*	<0.148	<0.148	<0.148	<0.063	<0.063	<0.148	<0.148	0.199 U*
Vanadium	1.36	1.13	1.43	<0.991	1.57 U*	2.07 U*	1.99 U*	1.73 U*	2.09 U*	<0.991	1.13 U*	1.27 U*	2.13 U*	2.68 U*	2.00 U*
Zinc	3.98 J	3.36 J	5.57	<3.22	<2.42	<2.42	5.23 U*	3.68 U*	5.22 U*	3.73 U*	<2.42	<2.42	5.13 U*	6.95 U*	5.31 U*
Metals, Dissolved (µg/L)															
Antimony	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	0.384 J	<0.313	<0.313	0.332 J	0.381 J	0.399 J	0.493 J	0.533 J	0.529 J	0.379 J	0.416 U*	0.447 U*	0.506 J	0.530 J	0.612 J
Barium	21.5	19.6	20.3	20.4	27.8	28.6	34.8	36.2	36.2	29.2	27.5	27.3	35.6	36.0	33.9
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.182	0.269 J	<0.182	<0.182	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	136	76.6 J	95.1	<38.6	<30.3	<30.3	<38.6	43.3 J	<38.6	<38.6	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	<0.217	<0.217	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	26800	25700	25000	25000	53700	54800	53200	55200	55700	52000	55100	54100	52700	52900	51200
Chromium	<1.53	<1.53	<1.53	<1.53	1.91 U*	2.22 U*	<1.53	<1.53	<1.53	<1.53	1.59 U*	2.06 U*	<1.53	<1.53	<1.53
Cobalt	<0.134	<0.134	<0.134	<0.134	0.119 J	0.099 J	0.163 J	0.200 J	0.195 J	0.129 J	0.113 J	0.104 J	0.155 J	0.209 J	0.163 J
Copper	2.07 U*	1.30 U*	1.23 U*	1.29 U*	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<1.3	<1.3	<0.627	<0.627	<0.627
Iron	20.7 J	20.6 J	<19.5	<19.5	43.5 J	47.9 J	<19.5	<19.5	30.1 J	20.0 U*	34.8 J	58 J	<19.5	<19.5	<19.5
Lead	0.440 J	<0.128	<0.128	<0.128	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<3.39	<3.39	<3.39
Magnesium	5840	5260	5320	5220	4710	4360	4680	4800	4810	4380 J	4730	4650	4640	4540	4610
Manganese	8.40	6.61	6.42	6.23	48.6	47.9	68.4	84.1	92.5	33.3	59.4	53.9	93.7	176	78.6
Mercury	<0.130	<0.130	<0.130	<0.130	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	0.935 J	<0.610	<0.610	<0.610	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.610	<0.610	<0.610
Nickel	10.5 R	0.535 J	0.515 J	0.466 J	<0.312	<0.312	<0.336	0.424 J	<0.336	<0.336	<0.312	<0.312	<0.336	<0.336	<0.336
Selenium	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	0.347 J	0.309 J	0.183 J	<0.148	<0.063	<0.063	<0.148	0.193 J	<0.148	0.154 J	<0.063	<0.063	<0.148	<0.148	<0.148
Vanadium	<0.991	<0.991	<0.991	<0.991	1.31	1.8	1.31	1.36	1.47	1.37	0.997 J	1.24	1.31	1.44	1.43
Zinc	<3.22	<3.22	<3.22	<3.22	<2.42	<2.42	<3.22	3.35 U*	3.40 U*	4.12 U*	<2.42	<2.42	<3.22	<3.22	<3.22
Anions (mg/L)															
Chloride	4.48 J	3.77	4.99 J	2.95	4.61	4.61	3.68	4.56	4.59	4.36	4.75	4.85	3.57	3.49	3.68
Fluoride	0.0477 J	0.0752 J	0.0563 J	0.0796 J	0.0693 J	0.0688 J	0.0448 J	0.343	0.433	0.0472 J	0.0716 J	0.0738 J	0.0777 J	0.0758 J	0.0725 J
Sulfate	24.0	20.1	25.6	18.4	6.34	6.46	4.92	6.24	6.17	6.88	8.44	7.49	5.59	4.96	6.02
Radiological (pCi/L)															
Radium-226	0.201 +/-(0.168) U	0.204 +/-(0.186) U	0.0858 +/-(0.175) U	0.204 +/-(0.209) U	0.00447 +/-(0.0463) U	0.0182 +/-(0.0487) U	0.0598 +/-(0.0902) U	0.0901 +/-(0.0916) U	0.0935 +/-(0.0948) U	-0.0268 +/-(0.0722) U	0.0700 +/-(0.0651) U	0.0880 +/-(0.0658) U	0.0225 +/-(0.0853) U	0.157 +/-(0.106)	0.00225 +/-(0.0883) U
Radium-228	0.626 +/-(0.377) U*	0.772 +/-(0.374) U*	0.656 +/-(0.388) U*	0.143 +/-(0.414) U	0.0348 +/-(0.173) U	0.213 +/-(0.197) U	-0.00241 +/-(0.237) U	0.200 +/-(0.268) U	0.0430 +/-(0.259) U	0.197 +/-(0.219) U	0.0367 +/-(0.229) U	0.176 +/-(0.242) U	0.246 +/-(0.279) U	0.182 +/-(0.303) U	-0.229 +/-(0.286) U
Radium-226+228	0.827 +/-(0.413) U*	0.976 +/-(0.418) U*	0.741 +/-(0.426) U*	0.348 +/-(0.464) U	0.0392 +/-(0.179) U	0.231 +/-(0.203) U	0.0598 +/-(0.254) U	0.290 +/-(0.283) U	0.137 +/-(0.276) U	0.197 +/-(0.231) U	0.107 +/-(0.238) U	0.264 +/-(0.251) U	0.269 +/-(0.292) U	0.339 +/-(0.321) J	0.00225 +/-(0.299) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	87.0	87.0	89.9	86.2	161	162	164	157	167	150	160	160	152	160	153
Total Dissolved Solids	118	118	119	112	176	176	176	169	170	145	167	175	128	117	171
Total Suspended Solids	20.0	21.0	22.7	21.6	1.00	1.00	12.1 J	11.6 J	21.0 J	1.90	<0.500	<0.500	22.9 J	43.5	16.1 J

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-WC02	STR-WC03							STR-WC04						
Sample Date	05-Dec-2019	29-Nov-2018			13-Aug-2019			05-Dec-2019	29-Nov-2018			13-Aug-2019			05-Dec-2019
Sample ID	CUF-STR-WC02-RB-SUR-20191205	CUF-STR-WC03-LB-SUR-20181129	CUF-STR-WC03-CC-SUR-20181129	CUF-STR-WC03-RB-SUR-20181129	CUF-STR-WC03-LB-MID-20190813	CUF-STR-WC03-CC-MID-20190813	CUF-STR-WC03-RB-MID-20190813	CUF-STR-WC03-RB-SUR-20191205	CUF-STR-WC04-CC-SUR-20181129	CUF-STR-WC04-RB-SUR-20181129	CUF-STR-DUP02-20181129	CUF-STR-WC04-LB-SUR-20190813	CUF-STR-WC04-CC-MID-20190813	CUF-STR-WC04-RB-SUR-20190813	CUF-STR-WC04-RB-SUR-20191205
Sample Depth (m)	0.5	0.3	0.5	0.3	0.6	0.6	0.6	0.25	0.2	0.6	0.6	0.2	0.6	0.3	0.3
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	FD	N	N	N	N
Parent Sample ID											CUF-STR-WC04-RB-SUR-20181129				
Level of Review[2]	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
Metals, Total (µg/L)															
Antimony	<0.378	<1.12	<1.12	<1.12	0.512 U*	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	<0.323	0.456 J	0.581 J	0.573 J	1.13 U*	0.618 U*	0.776 U*	0.404 J	0.453 J	0.427 J	0.39 J	1.33 U*	0.876 U*	1.04 U*	0.396 J
Barium	34.6	28.8	28.6	30.1	48.3	40.9 U*	45.2 U*	35.3	30.7	28.3	28.9	62.6	46.1 U*	46.6	32.0
Beryllium	<0.182	<0.057	<0.057	<0.057	0.471 U*	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182
Boron	49.2 U*	<30.3	<30.3	42.1 J	62.1 J	<38.6	<38.6	55.7 U*	82.4	68.9 J	64.7 U*	148	92.4	188	61.3 U*
Cadmium	<0.125	<0.125	<0.125	<0.125	0.191 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	54400	57200	55600	56300	53500	53600	54200	54500	58700	58300	55100	52300	53700	57500	56700
Chromium	<1.53	1.76 U*	2.17 U*	2.38 U*	2.54 U*	<1.53	<1.53	1.86 U*	2 U*	1.71 U*	2.07 U*	3.16 U*	<1.53	<1.53	1.91 U*
Cobalt	0.150 U*	0.137 U*	0.144 U*	0.306 U*	0.809	0.364 J	0.525	0.170 U*	0.142 U*	0.152 U*	0.135 U*	0.756	0.410 J	0.407 J	0.206 U*
Copper	<0.627	<1.3	<1.3	<1.3	1.44 U*	0.777 U*	0.905 U*	<0.627	<1.3	<1.3	<1.3	0.879 U*	0.776 U*	0.974 U*	<0.627
Iron	132	178	192	165	1080	380	623	138	185	174 J	240 J	973	484	503	168
Lead	<0.128	0.128 J	<0.094	<0.094	1.02	0.420 J	0.594 J	0.145 U*	0.135 J	<0.094	0.098 J	0.889 J	0.442 J	0.418 J	0.156 U*
Lithium	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	3.54 U*	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	4560	4960	4820	4910	4920	4820	4970	4660	5010	5000	4490	5010	5180	6170	4940
Manganese	42.6	75.4	73.5	69.1	229	114	200	46.0	101	104	100	440	217	250	60.4
Mercury	<0.101	<0.0653	<0.0653	<0.0653	0.140 U*	0.134 U*	0.134 U*	<0.101	<0.0653	<0.0653	<0.0653	0.159 U*	0.154 U*	0.148 U*	<0.101
Molybdenum	<0.610	<0.474	<0.474	0.514 J	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.474	<0.610	<0.610	0.820 J	<0.610
Nickel	<0.336	<0.312	<0.312	0.336 J	1.11 U*	0.474 U*	0.638 U*	<0.336	<0.312	<0.312	<0.312	0.915 U*	0.552 U*	0.672 U*	<0.336
Selenium	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.063	<0.063	<0.063	0.277 U*	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148
Vanadium	<0.991	1.09 U*	1.25 U*	2.19 U*	3.08 U*	1.78 U*	2.19 U*	1.31 U*	1.21 U*	1.05 U*	1.55 U*	2.71 U*	2.02 U*	2.22 U*	1.38 U*
Zinc	4.58 U*	4.13 J	<2.42	88.1	8.48 U*	4.35 U*	5.20 U*	4.18 U*	<2.42	<2.42	2.89 J	6.51 U*	5.84 U*	5.31 U*	3.91 U*
Metals, Dissolved (µg/L)															
Antimony	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378
Arsenic	0.326 J	0.432 J	0.454 J	0.472 J	0.643 J	0.472 J	0.596 J	0.391 J	0.371 J	0.377 J	0.338 J	1.02	0.708 J	0.894 J	0.377 J
Barium	30.7	28	28.8	29.1	39.7	38.4	39.6	32.6	29.1	28.4	30.7	31.2	35.5	34.4	30.6
Beryllium	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182	0.305 J	<0.182
Boron	50.9 U*	<30.3	39.4 J	<30.3	41.7 J	<38.6	<38.6	57.5 U*	76.6 J	71.2 J	69.5 U*	159	99.6	222	62.1 U*
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	54100	56100	56300	56500	52800	53400	53000	54200	60000	59200	60200	53300	54100	57000	56500
Chromium	<1.53	2.07 U*	1.99 U*	2.05 U*	<1.53	<1.53	<1.53	1.75 J	1.59 U*	1.59 U*	1.65 U*	1.76 U*	<1.53	<1.53	1.55 J
Cobalt	0.137 J	0.122 J	0.235 J	0.15 J	0.220 J	0.162 J	0.198 J	0.137 J	0.125 J	0.124 J	0.123 J	0.129 J	0.118 J	0.189 J	0.163 J
Copper	<0.627	<1.3	<1.3	<1.3	0.764 U*	0.635 U*	0.654 U*	<0.627	<1.3	<1.3	<1.3	0.632 U*	<0.627	0.694 U*	<0.627
Iron	<19.5	24.7 J	35.4 J	31.9 J	<19.5	<19.5	<19.5	<19.5	25.8 J	29.1 J	38.7 J	30.5 U*	<19.5	<19.5	19.8 U*
Lead	<0.128	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128
Lithium	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	3.71 U*	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39
Magnesium	4630 J	4860	4900	4940	4820	4840	4930	4630 J	5130	5070	4910	5090	5240	6130	4950 J
Manganese	38.3	71.2	71.5	66.3	154	75.0	118	41.1	101	102	108	51.7	6.40	31.1	55.7
Mercury	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101
Molybdenum	<0.610	<0.474	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	<0.474	<0.474	<0.474	<0.610	<0.610	0.872 J	<0.610
Nickel	<0.336	<0.312	<0.312	<0.312	<0.336	<0.336	<0.336	<0.336	<0.312	<0.312	<0.312	<0.336	<0.336	<0.336	<0.336
Selenium	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148	0.191 J	<0.148
Vanadium	0.991 J	1.2	1.85	1.63	1.47	1.33	1.39	1.21	0.985 J	1.03	1.4	1.87	1.37	1.51	1.13
Zinc	3.45 U*	<2.42	<2.42	2.73 J	3.93 U*	3.36 U*	<3.22	3.22 UJ	<2.42	<2.42	2.58 J	<3.22	3.75 U*	3.38 U*	3.40 U*
Anions (mg/L)															
Chloride	5.18	4.76	5.40	4.75	3.70	3.62	3.82	4.62	7.25	6.89	6.79	9.10	6.29	10.1	6.20
Fluoride	0.0626 J	0.0726 J	0.0918 J	0.0701 J	0.0760 J	0.0549 J	0.0435 J	0.0488 J	0.0700 J	0.0696 J	0.0723 J	0.0407 J	0.0439 J	0.105	0.0539 J
Sulfate	10.6	7.85	8.36	7.35	5.59	4.86	5.77	9.21	12.3	12.1	11.9	12.1	9.42	33.8	16.2
Radiological (pCi/L)															
Radium-226	-0.0520 +/-(0.0548) U	0.0101 +/-(0.0417) U	0.0551 +/-(0.0521) U	0.0130 +/-(0.0474) U	0.148 +/-(0.122) U	-0.0193 +/-(0.0733) U	0.0325 +/-(0.0870) U	0.0758 +/-(0.0844) U	0.0540 +/-(0.0552) U	0.0151 +/-(0.0511) U	-0.00939 +/-(0.0375) U	0.0709 +/-(0.101) U	-0.0681 +/-(0.0788) U	0.0116 +/-(0.0971) U	0.130 +/-(0.120) U
Radium-228	0.665 +/-(0.278)	-0.0442 +/-(0.200) U	-0.0666 +/-(0.199) U	-0.0448 +/-(0.228) U	0.0299 +/-(0.329) U	0.0828 +/-(0.263) U	-0.0754 +/-(0.288) U	0.370 +/-(0.280) U	0.276 +/-(0.233) U	0.0480 +/-(0.166) U	0.330 +/-(0.251) U	0.0656 +/-(0.266) U	0.00977 +/-(0.258) U	0.388 +/-(0.355) U	0.0308 +/-(0.328) U
Radium-226+228	0.665 +/-(0.283) J	0.0101 +/-(0.204) U	0.0551 +/-(0.206) U	0.0130 +/-(0.233) U	0.178 +/-(0.351) U	0.0828 +/-(0.273) U	0.0325 +/-(0.301) U	0.445 +/-(0.292) U	0.330 +/-(0.239) U	0.0631 +/-(0.174) U	0.330 +/-(0.254) U	0.136 +/-(0.285) U	0.00977 +/-(0.270) U	0.400 +/-(0.368) U	0.161 +/-(0.349) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	155	163	159	161	154	154	156	155	167	166	156	151	155	169	162
Total Dissolved Solids	149	200	184	176	179	176	176	146	193	195	186	204	185	229	154
Total Suspended Solids	4.00	1.40	2.80	2.80	36.4	11.4 J	21.1 J	4.60	2.60	1.10	1.40	50.7	14.2 J	15.3 J	6.00

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-WC05							STR-WC06					STR-WC07		
Sample Date	29-Nov-2018		13-Aug-2019				05-Dec-2019	28-Nov-2018	13-Aug-2019			05-Dec-2019	28-Nov-2018		
Sample ID	CUF-STR-WC05-CC-SUR-20181129	CUF-STR-WC05-RB-SUR-20181129	CUF-STR-WC05-LB-SUR-20190813	CUF-STR-WC05-CC-MID-20190813	CUF-STR-DUP02-20190813	CUF-STR-WC05-RB-SUR-20190813	CUF-STR-WC05-RB-SUR-20191205	CUF-STR-WC06-RB-SUR-20181128	CUF-STR-WC06-LB-SUR-20190813	CUF-STR-WC06-CC-SUR-20190813	CUF-STR-WC06-RB-SUR-20190813	CUF-STR-WC06-RB-SUR-20191205	CUF-STR-WC07-LB-SUR-20181128	CUF-STR-WC07-RB-SUR-20181128	CUF-STR-WC07-RB-BOT-20181128
Sample Depth (m)	0.1	0.6	0.2	0.6	0.6	0.2	0.3	0.6	0.1	0.1	0.5	0.5	0.6	0.5	1.5
Sample Type[1]	N	N	N	N	FD	N	N	N	N	N	N	N	N	N	N
Parent Sample ID					CUF-STR-WC05-CC-MID-20190813										
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12
Arsenic	0.381 J	0.47 J	1.94 U*	0.886 U*	0.872 U*	1.03 U*	0.361 J	0.353 U*	1.73 U*	1.36 U*	1.28 U*	0.417 J	0.365 U*	0.459 U*	0.509 U*
Barium	28.9	28.6	55.7	40.9 U*	42.6 U*	42.5 U*	31.1	29.4	63.5	49.4	45.1	31.7	28	28.7	32.2
Beryllium	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057
Boron	155	67 J	158	136	131	127	54.6 U*	93.2	132	137	148	61.3 U*	77.8 J	79.9 J	78 J
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	63200	59200	55500	55500	56200	54300	55000	59200	55500	57000	56200	56200	55500	56600	57100
Chromium	1.44 U*	1.9 U*	2.31 U*	<1.53	<1.53	<1.53	1.60 U*	1.13 U*	1.76 U*	1.61 U*	<1.53	1.91 U*	1.26 U*	1.91 U*	1.83 U*
Cobalt	0.159 U*	0.169 U*	1.10	0.481 J	0.450 J	0.481 J	0.182 U*	0.139 U*	1.10	0.577	0.508	0.165 U*	0.164 U*	0.145 U*	0.155 U*
Copper	<1.3	<1.3	1.30 U*	0.648 U*	0.651 U*	0.697 U*	<0.627	<1.3	2.06 U*	1.14 U*	0.909 U*	<0.627	<1.3	<1.3	<1.3
Iron	197	181	1590	589	562	618	125	169 J	1530	615	512	167	160 J	169 J	161 J
Lead	0.12 J	<0.094	1.39	0.560 J	0.553 J	0.649 J	0.149 U*	<0.094	1.31	0.697 J	0.574 J	0.156 U*	0.189 J	<0.094	<0.094
Lithium	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56
Magnesium	5320	5050	5410	5210	5300	5190	4740	5100	5590	5760	5620	4760	4940	5030	5130
Manganese	139	101	656	327	329	308	57.0	117	400	301	270	58.2	107	107	107
Mercury	<0.0653	<0.0653	0.179 U*	0.197 U*	0.130 U*	0.426 U*	<0.101	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653
Molybdenum	<0.474	<0.474	<0.610	<0.610	<0.610	<0.610	<0.610	<0.474	0.646 J	<0.610	0.622 J	<0.610	<0.474	<0.474	<0.474
Nickel	<0.312	<0.312	1.46 U*	0.496 U*	0.420 U*	0.634 U*	<0.336	<0.312	1.46	0.832 J	0.759 J	0.403 J	<0.312	<0.312	<0.312
Selenium	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813
Silver	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063
Vanadium	0.98 U*	1.18 U*	3.84 U*	2.05 U*	1.91 U*	2.17 U*	1.23 U*	<0.899	3.63 U*	2.77 U*	2.44 U*	1.31 U*	0.948 U*	1.22 U*	1.27 U*
Zinc	<2.42	<2.42	8.37 U*	4.65 U*	4.10 U*	4.82 U*	3.68 U*	2.76 J	21.7 U*	5.76 U*	8.46 U*	3.93 U*	<2.42	3.5 J	<2.42
Metals, Dissolved (µg/L)															
Antimony	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12
Arsenic	0.351 J	0.405 J	1.33	1.10	0.652 J	0.784 J	0.453 J	0.363 U*	1.24	1.07	1.03	0.402 J	<0.323	0.393 U*	0.42 U*
Barium	28.2	28.5	27.7	34.8	32.1	30.3	34.1	28.9	36.7	35.4	35.1	32.5	33.7	27.8	29.2
Beryllium	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057
Boron	147	68.6 J	158	130	127	123	58.3 U*	91.7	130	134	140	62.9 U*	76.7 J	78.4 J	78.6 J
Cadmium	<0.125	<0.125	<0.125	0.243 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	61600	59700	54100	56900	53400	51500	55000	59300	53900	55700	55300	56800	58100	57100	58400
Chromium	1.45 U*	1.47 U*	<1.53	1.53 U*	<1.53	<1.53	2.08	1.26 U*	<1.53	<1.53	<1.53	1.97 J	1.62 U*	1.54 U*	1.89 U*
Cobalt	0.14 J	0.135 J	0.178 J	0.341 J	0.134 J	0.122 J	0.167 J	0.121 J	0.140 J	0.142 J	0.146 J	0.146 J	0.15 J	0.124 J	0.137 J
Copper	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	1.30 U*	<1.3	1.04 U*	<0.627	<0.627	<0.627	1.59 J	<1.3	<1.3
Iron	45.2 J	33.6 J	36.3 U*	22.4 U*	<19.5	<19.5	<19.5	23.3 J	36.6 J	<19.5	19.8 J	<19.5	25.3 J	22.9 J	30.2 J
Lead	<0.094	<0.094	<0.128	0.266 J	<0.128	<0.128	<0.128	<0.094	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094
Lithium	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<3.39	<3.39	<3.39	<3.39	3 J	<2.56	<2.56
Magnesium	5160	5140	5260	5300	5050	4930	4850 J	5130	5430	5620	5520	4890 J	5050	5030	5210
Manganese	129	101	149	133	123	47.7	51.9	111	30.1	10.0	8.99	51.9	110	104	105
Mercury	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.0653	0.108 J	0.115 J	0.139 J	<0.101	<0.0653	<0.0653	<0.0653
Molybdenum	<0.474	<0.474	<0.610	0.612 J	<0.610	<0.610	<0.610	<0.474	<0.610	<0.610	0.641 J	<0.610	<0.474	<0.474	<0.474
Nickel	<0.312	<0.312	<0.336	0.397 J	<0.336	<0.336	0.358 J	<0.312	0.349 J	0.367 J	0.358 J	<0.336	<0.312	<0.312	0.407 J
Selenium	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813
Silver	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	<0.063	<0.063	<0.148	0.483 J	<0.148	<0.148	<0.148	<0.063	<0.148	<0.148	<0.148	0.159 J	<0.063	<0.063	<0.063
Vanadium	0.937 J	0.952 J	1.84	1.64	1.29	1.35	1.35	0.923 J	2.12	1.80	1.62	1.20	1.03	1	1.1
Zinc	<2.42	<2.42	<3.22	5.15 U*	3.39 U*	8.35 U*	3.86 U*	<2.42	3.63 J	4.59 J	3.54 J	3.46 U*	<2.42	<2.42	<2.42
Anions (mg/L)															
Chloride	10.9	7.42	8.78	7.25	7.11	7.03	6.27	8.33	7.17	8.26	8.77	6.63	7.58	7.52	7.44
Fluoride	0.0698 J	0.0801 J	0.0445 J	0.0415 J	0.0478 J	0.0393 J	0.0551 J	0.0810 J	0.0746 J	0.0753 J	0.0812 J	0.0571 J	0.0715 J	0.0750 J	0.0709 J
Sulfate	17.9	12.6	10.5	11.2	11.0	9.98	16.0	14.4	9.95	10.4	11.3	15.7	14.1	13.9	14.0
Radiological (pCi/L)															
Radium-226	0.0877 +/-(0.0636)	0.00470 +/-(0.0444) U	0.0665 +/-(0.110) U	0.101 +/-(0.0948) U	0.0536 +/-(0.0881) U	0.0471 +/-(0.0793) U	0.129 +/-(0.0851)	0.0162 +/-(0.0419) U	0.137 +/-(0.159) U	0.0463 +/-(0.108) U	0.0445 +/-(0.0871) U	-0.0466 +/-(0.0622) U	0.0161 +/-(0.0545) U	0.0486 +/-(0.0548) U	0.0396 +/-(0.0546) U
Radium-228	0.209 +/-(0.210) U	0.328 +/-(0.235) U	-0.0717 +/-(0.325) U	0.239 +/-(0.321) U	0.269 +/-(0.278) U	0.103 +/-(0.274) U	0.363 +/-(0.250) U	-0.139 +/-(0.185) U	-0.0566 +/-(0.377) U	0.237 +/-(0.261) U	0.197 +/-(0.229) U	0.0133 +/-(0.239) U	0.138 +/-(0.242) U	-0.0268 +/-(0.206) U	0.125 +/-(0.234) U
Radium-226+228	0.297 +/-(0.219) J	0.333 +/-(0.239) U	0.0665 +/-(0.343) U	0.340 +/-(0.335) U	0.323 +/-(0.292) U	0.150 +/-(0.285) U	0.492 +/-(0.264) J	0.0162 +/-(0.190) U	0.137 +/-(0.409) U	0.283 +/-(0.282) U	0.241 +/-(0.245) U	0.0133 +/-(0.247) U	0.154 +/-(0.248) U	0.0486 +/-(0.213) U	0.164 +/-(0.240) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	180	169	161	160	162	157	157	169	162	166	163	160	159	162	164
Total Dissolved Solids	220	185	198	191	189	179	161	178	196	197	193	169	175	191	187
Total Suspended Solids	2.20	1.10	53.4	22.6 J	23.1 J	24.3 J	4.60	1.00	59.8	31.2	20.4	4.40	0.700	<0.500	1.20

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-WC07						STR-WC08								
Sample Date	13-Aug-2019					05-Dec-2019	28-Nov-2018				13-Aug-2019				05-Dec-2019
Sample ID	CUF-STR-WC07-LB-SUR-20190813	CUF-STR-WC07-CC-SUR-20190813	CUF-STR-WC07-CC-BOT-20190813	CUF-STR-WC07-RB-SUR-20190813	CUF-STR-DUP01-20190813	CUF-STR-WC07-RB-SUR-20191205	CUF-STR-WC08-LB-SUR-20181128	CUF-STR-DUP01-20181128	CUF-STR-WC08-LB-BOT-20181128	CUF-STR-WC08-RB-SUR-20181128	CUF-STR-WC08-LB-MID-20190813	CUF-STR-WC08-CC-SUR-20190813	CUF-STR-WC08-CC-BOT-20190813	CUF-STR-WC08-RB-SUR-20190813	CUF-STR-WC08-RB-SUR-20191205
Sample Depth (m)	0.3	0.5	1.8	0.5	0.5	0.5	0.5	0.5	1.2	0.75	0.6	0.5	1.9	0.5	0.5
Sample Type[1]	N	N	N	N	FD	N	N	FD	N	N	N	N	N	N	N
Parent Sample ID					CUF-STR-WC07-RB-SUR-20190813			CUF-STR-WC08-LB-SUR-20181128							
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
Metals, Total (µg/L)															
Antimony	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	1.26 U*	1.01 U*	2.01 U*	1.07 U*	1.26 U*	0.433 J	0.591 U*	0.49 U*	0.442 U*	0.524 U*	1.15 U*	1.04 U*	1.11 U*	1.09 U*	0.413 J
Barium	38.3	35.4	48.3	41.8	50.7	30.7	28.7	29.1	29.5	27.5	37.5	35.7	48.3	37.8	31.0
Beryllium	0.266 U*	0.225 U*	0.863 U*	0.219 U*	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057	0.233 U*	0.197 U*	0.252 U*	0.221 U*	<0.182
Boron	126	122	135	135	134	59.1 U*	76.4 J	72.9 J	83.8	77.6 J	131	122	125	134	61.9 J
Cadmium	<0.125	<0.125	0.538 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	51000	50200	52400	53600	54900	55400	52600 J	57900	58000	53800	51600	48900	55000	52400	55000
Chromium	<1.53	<1.53	<1.53	<1.53	2.28 U*	<1.53	1.99 U*	2.02 U*	1.54 U*	1.84 U*	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	0.427 J	0.362 J	1.03	0.470 J	0.548	0.195 U*	0.236 U*	0.151 U*	0.234 U*	0.184 U*	0.330 J	0.288 J	0.605	0.326 J	0.165 U*
Copper	12.5	<0.627	1.25 U*	0.929 U*	1.32 U*	<0.627	<1.3	<1.3	<1.3	<1.3	<0.627	<0.627	0.666 U*	0.670 U*	0.637 J
Iron	482	304	770	535 J	708 J	142	138 J	148 J	154 J	147 J	310	236	596	332	106
Lead	0.488 J	0.436 J	1.45	0.595 J	0.617 J	0.176 U*	<0.094	<0.094	<0.094	<0.094	0.423 J	0.393 J	0.718 J	0.387 J	0.132 U*
Lithium	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	5210	5120	5280	5490	5540	4810	4740	5220	5240	4790	5240	4970	5450	5370	4750
Manganese	252	245	411	291	297	44.0	91.5 J	101	101	96.4	239	231	360	240	48.1
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	<0.610	<0.610	1.02 J	<0.610	<0.610	<0.610	0.49 J	<0.474	<0.474	<0.474	<0.610	<0.610	0.645 J	<0.610	<0.610
Nickel	1.02	0.778 J	1.89	1.49	0.930 J	0.545 J	0.312 UJ	<0.312	<0.312	<0.312	0.712 J	0.601 J	0.950 J	1.02	<0.336
Selenium	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51
Silver	<0.177	<0.177	0.274 J	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	1.17 U*	<0.148	<0.148	0.261 U*	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	1.94 U*	1.42 U*	2.59 U*	2.03 U*	3.02 U*	1.13 U*	1.59 U*	1.28 U*	1.09 U*	1.19 U*	1.56 U*	1.31 U*	2.12 U*	1.90 U*	1.12 U*
Zinc	11.9 U*	3.78 U*	5.19 U*	6.74 U*	5.34 U*	4.09 U*	<2.42	<2.42	<2.42	<2.42	3.45 U*	<3.22	5.61 U*	3.80 U*	3.44 U*
Metals, Dissolved (µg/L)															
Antimony	<0.378	1.53 J	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	0.933 J	1.04	0.953 J	0.835 J	0.970 J	0.476 J	0.344 J	0.34 U*	0.431 U*	0.392 U*	0.772 J	0.855 J	0.937 J	0.793 J	0.373 J
Barium	34.7	27.7	41.5	28.8	36.1	29.9	33.6	27.6	28.6	28.7	27.3	29.7	28.4	30.2	30.9
Beryllium	<0.182	0.375 U*	0.197 U*	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.057	0.242 U*	0.302 U*	0.190 U*	0.190 U*	<0.182
Boron	128	133	130	130	132	56.7 U*	82.3	71.9 J	81.5	74.7 J	123	131	119	141	61.2 J
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	0.150 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	50200	52100	52900	53600	54600	53400	59300 J	57600	58300	53500	47400	52500	50300	50700	55200
Chromium	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	2.09 U*	1.38 U*	1.56 U*	1.11 U*	<1.53	<1.53	<1.53	<1.53	1.98 J
Cobalt	0.268 J	0.139 J	0.424 J	<0.0750	0.129 J	0.162 J	0.366 J	0.118 J	0.163 J	0.133 J	0.104 J	0.0970 J	0.104 J	0.0930 J	0.132 J
Copper	<0.627	<0.627	0.724 U*	<0.627	0.706 U*	<0.627	1.46 J	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	259	<19.5	485	<19.5	20.0 J	<19.5	54.6	20.7 J	28.7 J	37.7 J	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	0.278 J	<0.128	0.531 J	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	3.76 J	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	5210	5300	5340	5490	5440	4720 J	5110	5150	5270	4820	4830	5320	5030	5130	4850
Manganese	154	2.88 J	285	11.0	10.9	36.2	103 J	97.7	94.8	91.7	4.25 J	2.37 J	48.1	26.5	42.2
Mercury	<0.101	<0.101	0.196 J	0.168 J	0.104 J	<0.101	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	<0.610	1.53 J	<0.610	<0.610	<0.610	<0.610	0.89 J	<0.474	<0.474	<0.474	<0.610	<0.610	<0.610	0.791 J	<0.610
Nickel	0.977 J	0.452 J	1.16	0.510 J	<0.336	0.438 J	2.44 J	0.312 UJ	<0.312	<0.312	0.379 J	0.398 J	0.584 J	0.355 J	<0.336
Selenium	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51	<1.51	<0.813	<0.813	<0.813	<0.813	1.51 UJ	1.51 UJ	1.51 UJ	1.51 UJ	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	1.07	<0.148	<0.148	<0.148	0.341 J	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	1.91	1.11	1.85	1.08	1.80	1.22	1.47	0.956 J	1.14	<0.899	1.10	1.22	1.23	1.14	1.36
Zinc	3.71 J	<3.22	4.38 J	<3.22	<3.22	3.28 U*	3.14 J	<2.42	<2.42	<2.42	<3.22	<3.22	<3.22	<3.22	3.79 U*
Anions (mg/L)															
Chloride	8.26	8.29	8.43	8.82	7.42	6.18	7.52	7.45	7.33	7.34	8.91	8.86	8.59	8.85	6.38
Fluoride	0.0770 J	0.0753 J	0.0769 J	0.0803 J	0.0741 J	0.0490 J	0.0889 J	0.0801 J	0.0717 J	0.0710 J	0.0825 J	0.0830 J	0.0817 J	0.0831 J	0.0469 J
Sulfate	10.6	10.7	11.1	11.5	10.5	15.5	14.5	13.7	14.0	14.0	11.9	11.7	11.3	11.7	15.6
Radiological (pCi/L)															
Radium-226	-0.00896 +/-(0.0850) U	0.0410 +/-(0.0910) U	0.0253 +/-(0.0959) U	0.0570 +/-(0.0991) U	0.117 +/-(0.133) U	0.0713 +/-(0.0643) U	0.0157 +/-(0.0416) U	0.0114 +/-(0.0503) U	0.0415 +/-(0.0511) U	0.0704 +/-(0.0658) U	0.120 +/-(0.112) U	0.155 +/-(0.136) U	-0.103 +/-(0.0916) U	0.0277 +/-(0.0924) U	-0.0522 +/-(0.0696) U
Radium-228	0.267 +/-(0.248) U	0.289 +/-(0.277) U	0.331 +/-(0.261) U	0.360 +/-(0.258) U	-0.304 +/-(0.367) U	0.186 +/-(0.249) U	0.224 +/-(0.225) U	0.108 +/-(0.225) U	0.126 +/-(0.219) U	0.0408 +/-(0.249) U	0.192 +/-(0.229) U	0.207 +/-(0.252) U	0.214 +/-(0.257) U	0.201 +/-(0.230) U	-0.0332 +/-(0.281) U
Radium-226+228	0.267 +/-(0.262) U	0.330 +/-(0.292) U	0.356 +/-(0.278) U	0.416 +/-(0.276) U	0.117 +/-(0.390) U	0.258 +/-(0.257) U	0.240 +/-(0.229) U	0.119 +/-(0.231) U	0.168 +/-(0.225) U	0.111 +/-(0.258) U	0.312 +/-(0.255) U	0.362 +/-(0.286) U	0.214 +/-(0.273) U	0.229 +/-(0.248) U	0.000 +/-(0.289) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	149	146	153	156	160	158	151	166	166	154	150	143	160	153	157
Total Dissolved Solids	195	194	196	195	199	155	191	190	182	184	200	191	181	190	157
Total Suspended Solids	20.2	21.4	41.6	22.2	21.6	2.90	0.900	0.800	<1.00	0.500	20.2	19.6	32.0	17.8	3.00

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-WC09										STR-WC10				
Sample Date	28-Nov-2018					13-Aug-2019				05-Dec-2019	28-Nov-2018			13-Aug-2019	
Sample ID	CUF-STR-WC09-LB-SUR-20181128	CUF-STR-WC09-LB-BOT-20181128	CUF-STR-WC09-CC-SUR-20181128	CUF-STR-WC09-CC-BOT-20181128	CUF-STR-WC09-RB-SUR-20181128	CUF-STR-WC09-LB-MID-20190813	CUF-STR-WC09-CC-SUR-20190813	CUF-STR-WC09-CC-BOT-20190813	CUF-STR-WC09-RB-SUR-20190813	CUF-STR-WC09-RB-SUR-20191205	CUF-STR-WC10-LB-SUR-20181128	CUF-STR-WC10-CC-SUR-20181128	CUF-STR-WC10-RB-SUR-20181128	CUF-STR-WC10-LB-SUR-20190813	CUF-STR-WC10-LB-BOT-20190813
Sample Depth (m)	0.5	1.9	0.5	2	0.5	0.6	0.5	2.4	0.5	0.5	0.8	0.2	0.3	0.5	1.7
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID															
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (µg/L)															
Antimony	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378
Arsenic	0.325 J	<0.323	<0.323	<0.323	<0.323	1.37 U*	1.17 U*	1.45 U*	0.988 U*	0.389 J	<0.323	<0.323	<0.323	1.08 U*	1.31 U*
Barium	31.4	30.5	32.4	32.1	30.9	37.2	34.5	51.8	36.9	30.5	29.6	29.9	30.6	27.6	38.1
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	0.316 U*	0.233 U*	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182
Boron	52.6 J	60.2 J	48.6 J	74 J	62.4 J	155	147	151	141	53.7 J	58.9 J	54.4 J	56.2 J	166	157
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	56000	55700	56400	55300	55400	51500	49000	51700	48800	54200	53400	54000	54600	40500	50900
Chromium	1.08 U*	1.05 U*	0.957 U*	0.962 U*	0.835 U*	2.01 U*	2.18 U*	<1.53	<1.53	1.95 U*	0.943 U*	1.03 U*	1.03 U*	2.34 U*	2.28 U*
Cobalt	0.101 U*	0.115 U*	0.097 U*	0.165 U*	0.158 U*	0.469 J	0.312 J	0.573	0.380 J	0.190 U*	0.098 U*	0.107 U*	0.101 U*	0.249 J	0.395 J
Copper	<1.3	<1.3	<1.3	<1.3	<1.3	1.41 U*	1.12 U*	<0.627	<0.627	<0.627	<1.3	<1.3	<1.3	1.86 U*	1.51 U*
Iron	154	154	171	147	149	602	375	498	324	133	146	146	156	306	575
Lead	<0.094	0.124 J	<0.094	<0.094	<0.094	0.523 J	0.327 J	0.586 J	0.408 J	0.139 U*	<0.094	<0.094	0.118 J	0.286 J	0.496 J
Lithium	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39
Magnesium	4410	4400	4190	4410	4330	5690	5330	5540	5580	4660	4220	4190	4190	5970	5690
Manganese	88.4	87	91.8	92.1	98.8	226	204	312	222	43.1	70.5	76	78.2	139	246
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101
Molybdenum	<0.474	<0.474	<0.474	<0.474	<0.474	0.834 J	0.671 J	1.26 J	0.796 J	<0.610	<0.474	<0.474	<0.474	0.786 J	0.701 J
Nickel	<0.312	<0.312	<0.312	<0.312	<0.312	0.921 J	0.596 J	0.760 J	0.737 J	<0.336	<0.312	<0.312	<0.312	0.679 J	0.794 J
Selenium	<0.813	<0.813	<0.813	<0.813	<0.813	<1.51	<1.51	1.51 UJ	1.51 UJ	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177
Thallium	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	1.42	0.263 U*	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148
Vanadium	0.938 U*	1.05 U*	0.953 U*	1.43 U*	1.02 U*	3.05 U*	2.62 U*	1.54 U*	1.39 U*	1.36 U*	0.911 U*	1.02 U*	1.04 U*	2.34 U*	2.86 U*
Zinc	<2.42	<2.42	<2.42	<2.42	<2.42	4.28 U*	4.03 U*	3.91 U*	3.39 U*	3.33 U*	<2.42	3 J	<2.42	3.99 U*	5.39 U*
Metals, Dissolved (µg/L)															
Antimony	<1.12	<1.12	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378
Arsenic	<0.323	<0.323	<0.323	<0.323	<0.323	1.07	1.04	1.08	0.841 J	0.363 J	<0.323	<0.323	<0.323	0.984 J	1.12
Barium	31.2	30.7	30.1	30.4	30.5	27.8	26.8	44.2	26.3	29.4	28.3	29	29.1	23.8	27.0
Beryllium	<0.057	<0.057	<0.057	<0.057	<0.057	<0.182	<0.182	0.242 U*	0.223 U*	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182
Boron	49.3 J	54.9 J	69.3 J	61.5 J	59 J	155	151	152	144	52.3 J	56.4 J	52.7 J	72.1 J	172	162
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	56300	57200	55500	53700	56700	51100	50500	52000	47600	54000	53200	54000	55200	44600	51400
Chromium	0.993 U*	0.976 U*	0.943 U*	0.8 U*	0.989 U*	2.12 U*	1.85 U*	<1.53	<1.53	1.65 J	1.02 U*	0.999 U*	1.04 U*	2.07 U*	2.44 U*
Cobalt	<0.075	0.091 J	0.127 J	0.121 J	0.115 J	0.0950 J	0.0860 J	0.305 J	0.0900 J	0.114 J	0.076 J	0.083 J	0.09 J	0.0830 J	0.100 J
Copper	<1.3	<1.3	<1.3	<1.3	<1.3	0.982 U*	0.726 U*	1.33 U*	2.51 U*	<0.627	<1.3	<1.3	<1.3	1.32 U*	2.78 U*
Iron	48.2 J	35.1 J	40.5 J	23.9 J	24 J	<19.5	<19.5	254	<19.5	<19.5	16.6 J	19.5 J	19.4 J	<19.5	22.4 J
Lead	<0.094	<0.094	<0.094	<0.094	<0.094	<0.128	<0.128	0.325 J	<0.128	<0.128	<0.094	<0.094	<0.094	<0.128	<0.128
Lithium	<2.56	<2.56	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39
Magnesium	4300	4500	4550	4210	4390	5610	5540	5570	5430	4710	4140	4210	4570	6140	5800
Manganese	82.9	84	80.4	79.6	98.9	6.35	<1.35	208	12.5	37.8	63.6	68.4	65.7	<1.35	9.81
Mercury	<0.0653	<0.0653	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101
Molybdenum	<0.474	<0.474	<0.474	<0.474	<0.474	0.802 J	0.697 J	0.769 J	0.689 J	<0.610	<0.474	<0.474	<0.474	0.818 J	0.782 J
Nickel	<0.312	<0.312	0.32 J	<0.312	<0.312	0.369 J	<0.336	1.06	0.617 J	<0.336	<0.312	<0.312	<0.312	0.391 J	0.469 J
Selenium	0.813 UJ	0.813 UJ	0.813 UJ	0.813 UJ	0.813 UJ	<1.51	<1.51	1.51 UJ	1.51 UJ	<1.51	0.813 UJ	0.813 UJ	0.813 UJ	<1.51	<1.51
Silver	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177
Thallium	<0.063	<0.063	<0.063	<0.063	<0.063	<0.148	<0.148	0.394 J	0.172 J	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148
Vanadium	<0.899	0.91 J	0.96 J	1.08	1.01	2.18	2.05	1.21	1.04	1.20	0.987 J	0.978 J	0.989 J	2.00	2.42
Zinc	<2.42	<2.42	<2.42	<2.42	<2.42	3.31 J	<3.22	<3.22	<3.22	3.81 U*	<2.42	<2.42	<2.42	<3.22	3.99 J
Anions (mg/L)															
Chloride	7.51	7.38	7.24	7.41	7.44	8.76	8.30	8.61	8.36	5.51	6.92	6.83	7.43	8.53	8.20
Fluoride	0.0586 J	0.0940 J	0.0936 J	0.0620 J	0.0999 J	0.0898 J	0.0814 J	0.0790 J	0.0810 J	0.0493 J	0.0819 J	0.0649 J	0.101	0.0989 J	0.0803 J
Sulfate	14.1	14.0	14.3	14.6	14.2	14.4	12.8	12.9	13.1	13.0	13.7	13.3	14.5	18.4	13.3
Radiological (pCi/L)															
Radium-226	0.0447 +/-(0.0551) U	0.0451 +/-(0.0512) U	0.0663 +/-(0.0545) U	-0.00378 +/-(0.0397) U	0.0466 +/-(0.0514) U	0.0241 +/-(0.0913) U	0.0473 +/-(0.0843) U	-0.0208 +/-(0.0845) U	0.0596 +/-(0.104) U	0.0223 +/-(0.0598) U	0.0367 +/-(0.0409) U	0.0462 +/-(0.0521) U	0.0775 +/-(0.0587) U	-0.0654 +/-(0.0854) U	0.00937 +/-(0.118) U
Radium-228	0.272 +/-(0.236) U	0.0648 +/-(0.209) U	0.111 +/-(0.214) U	0.222 +/-(0.244) U	0.229 +/-(0.253) U	0.0876 +/-(0.263) U	0.290 +/-(0.263) U	-0.271 +/-(0.223) U	-0.0491 +/-(0.233) U	0.00444 +/-(0.220) U	-0.0248 +/-(0.192) U	0.101 +/-(0.202) U	0.349 +/-(0.242) U	0.0445 +/-(0.285) U	0.0402 +/-(0.262) U
Radium-226+228	0.316 +/-(0.242) U	0.110 +/-(0.215) U	0.177 +/-(0.221) U	0.222 +/-(0.247) U	0.276 +/-(0.258) U	0.112 +/-(0.278) U	0.338 +/-(0.276) U	0.000 +/-(0.238) U	0.0596 +/-(0.255) U	0.0268 +/-(0.228) U	0.0367 +/-(0.196) U	0.147 +/-(0.209) U	0.426 +/-(0.249) U	0.0445 +/-(0.298) U	0.0496 +/-(0.287) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	158	157	158	156	156	152	144	152	145	155	151	152	154	126	151
Total Dissolved Solids	181	175	191	192	190	181	180	189	180	158	187	178	176	172	179
Total Suspended Solids	1.30	1.30	1.30	1.10	1.30	27.8	17.4	24.2	26.0	3.20	0.700	2.20	2.00	12.0	21.6

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-WC10		STR-WC11					STR-UT01						STR-UT02	
Sample Date	13-Aug-2019		04-Sep-2019			27-May-2020		21-Aug-2019			04-Dec-2019			21-Aug-2019	
Sample ID	CUF-STR-WC10-CC-SUR-20190813	CUF-STR-WC10-RB-SUR-20190813	CUF-STR-WC11-CC-SUR-20190904	CUF-STR-DUP01-20190904	CUF-STR-WC11-CC-BOT-20190904	CUF-STR-WC11-CC-SUR-20200527	CUF-STR-WC11-CC-BOT-20200527	CUF-STR-UT01-LB-SUR-20190821	CUF-STR-UT01-CC-SUR-20190821	CUF-STR-UT01-RB-SUR-20190821	CUF-STR-UT01-LB-SUR-20191204	CUF-STR-UT01-CC-SUR-20191204	CUF-STR-UT01-RB-SUR-20191204	CUF-STR-UT02-CC-SUR-20190821	CUF-STR-UT02-RB-SUR-20190821
Sample Depth (m)	0.3	0.2	0.5	0.5	1.3	0.5	2.5	0.1	0.1	0.1	0.3	0.3	0.5	0.3	0.3
Sample Type[1]	N	N	N	FD	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID				CUF-STR-WC11-CC-SUR-20190904											
Level of Review[2]	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Metals, Total (µg/L)															
Antimony	<0.378	<0.378	<0.378	<0.378	0.625 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.388 J	<0.378
Arsenic	1.16 U*	1.14 U*	1.08	1.04	1.36	<0.313	0.717 J	1.54	1.38	1.44	0.650 J	0.678 J	0.792 J	1.38	1.43
Barium	32.9	33.3	36.1	34.4	41.8	23.7	22.9	89.7	89.1	88.9	32.3	31.8	32.0	95.3	90.1
Beryllium	<0.182	<0.182	<0.182	<0.182	0.425 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	150	149	150	134	206	91.7	41.7 J	7530	7680	7620	3730	3750	3700	7880	7550
Cadmium	<0.125	<0.125	<0.125	<0.125	0.127 J	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	49000	49400	39200	39700	45700	25900	24700	366000	354000	358000	301000	304000	302000	358000	352000
Chromium	2.06 U*	1.85 U*	<1.53	<1.53	<1.53	<1.53	<1.53	2.15 U*	<1.53	<1.53	1.58 U*	1.75 U*	1.97 U*	<1.53	1.65 U*
Cobalt	0.272 J	0.349 J	0.526	0.459 J	0.639	0.252 J	0.481 J	0.419 J	0.371 J	0.357 J	1.32	1.40	1.35	0.297 J	0.292 J
Copper	1.18 U*	0.935 U*	1.76 J	1.86 J	1.47 J	0.744 J	1.15 J	0.662 J	<0.627	0.668 J	<0.627	<0.627	0.726 J	<0.627	0.707 J
Iron	240	431	568	549	725	358	562	170	165	150	1140	1240	1320	90.1	84.3
Lead	0.307 J	0.410 J	0.584 J	0.606 J	0.721 J	0.325 J	0.614 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	3.54 U*	4.54 U*	5.14 U*	<3.39	<3.39
Magnesium	5420	5550	6770	6450	6530	5350	5010	34300	33500	33500	26400	26800	26800	33200	32000
Manganese	197	215	187	179	252	56.6	64.0	4280	4230	4240	2620	2700	2700	4660	4470
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	<0.610	0.675 J	0.756 J	0.913 J	0.821 J	<0.610	<0.610	23.5	22.8	22.7	58.6	59.6	57.4	19.8	23.3
Nickel	0.519 J	0.673 J	1.09	1.27	1.08	0.867 J	0.976 J	0.513 J	0.589 J	0.617 J	0.960 J	0.991 J	1.01	0.571 J	0.556 J
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	<0.148	0.218 U*	<0.148	0.361 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	2.45 U*	2.53 U*	2.18	2.40	2.60	<0.991	1.20	2.23	1.81	1.92	1.09	1.20	1.27	1.85	2.59
Zinc	3.64 U*	4.39 U*	3.63 U*	3.79 U*	4.26 U*	4.76 J	<3.22	4.68 U*	4.57 U*	4.37 U*	3.75 U*	4.74 U*	4.45 U*	9.30 U*	3.24 U*
Metals, Dissolved (µg/L)															
Antimony	<0.378	<0.378	0.538 U*	<0.378	1.13 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	1.08	0.917 J	1.06 U*	0.806 U*	1.15 U*	<0.313	0.417 J	1.28	1.21	1.36	0.550 J	0.465 J	0.554 J	1.32	1.49
Barium	30.9	27.2	28.8 J	27.5	28.2 J	21.0	19.1	87.3	87.4	88.3	28.0	28.2	29.8	93.4	88.1
Beryllium	<0.182	<0.182	0.338 J	<0.182	0.228 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	164	147	196 U*	136 U*	193 U*	93.7	40.4 J	7550	7720	7650	3570	3390	3480	7510	7520
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.217	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	53600	48900	41600	40500	39700	26800	25600	353000	355000	355000	303000	298000	302000	358000	351000
Chromium	1.87 U*	<1.53	<1.53	<1.53	1.77 U*	<1.53	<1.53	1.54 J	<1.53	2.09	<1.53	<1.53	<1.53	<1.53	2.48
Cobalt	0.139 J	0.0840 J	0.184 U*	0.0940 U*	0.157 U*	<0.134	<0.134	0.263 J	0.271 J	0.288 J	1.26	1.20	1.27	0.228 J	0.209 J
Copper	1.00 U*	<0.627	0.917 J	0.857 J	1.20 J	<0.627	<0.627	<0.627	0.733 J	1.53 J	<0.627	<0.627	<0.627	0.640 J	0.786 J
Iron	63.9	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	49.4 J	59.3	51.2	61.7 U*	72.3 U*	155 U*	55.0	59.5
Lead	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	<3.39	<3.39	3.44 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	5940	5500	6680	6070	6980	5480	5050	33500	33100	33100	27000	26200	27000	32600	32000
Manganese	40.4	22.3	29.2	28.1	10.4	14.0	11.1	4170	4140	4210	2570	2530	2760	4540	4420
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.130	<0.130	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	0.722 J	0.693 J	0.853 J	0.840 J	0.917 J	<0.610	<0.610	23.0	22.6	22.3	59.5	57.7	57.5	16.3	20.3
Nickel	0.435 J	<0.336	0.447 J	0.547 J	0.608 J	0.458 J	0.390 J	0.337 J	0.462 J	0.402 J	0.917 J	0.890 J	0.918 J	0.403 J	0.427 J
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	0.213 J	<0.148	0.179 J	<0.148	0.275 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	2.14	1.66	1.43 U*	1.62 U*	2.03 U*	<0.991	<0.991	1.79	1.69	2.31	<0.991	<0.991	<0.991	2.00	2.85
Zinc	3.30 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	3.40 U*	3.58 U*	<3.22	<3.22	3.42 J
Anions (mg/L)															
Chloride	8.25	8.73	7.53	7.74	8.16	4.48	3.32	123	122	122	70.3	73.8	71.2	126	126
Fluoride	0.0820 J	0.0910 J	0.113	0.110	0.0930 J	0.0865 J	0.0828 J	0.126 J	0.124 J	0.128 J	0.200	0.127	0.120	0.121 J	0.122 J
Sulfate	13.1	14.6	28.4	26.6	21.0	20.7	19.8	841	835	829	689	635	677	855	839
Radiological (pCi/L)															
Radium-226	0.0568 +/-(0.118) U	0.0282 +/-(0.0938) U	0.0984 +/-(0.0997) U	0.111 +/-(0.106) U	0.00518 +/-(0.0812) U	0.0179 +/-(0.155) U	0.0899 +/-(0.180) U	0.0847 +/-(0.166) U	0.130 +/-(0.171) U	0.110 +/-(0.166) U	-0.0209 +/-(0.101) U	0.133 +/-(0.104) U	0.0341 +/-(0.104) U	0.0606 +/-(0.181) U	-0.0564 +/-(0.138) U
Radium-228	0.314 +/-(0.276) U	0.199 +/-(0.322) U	0.804 +/-(0.285) U*	0.469 +/-(0.298) U*	0.255 +/-(0.241) UJ	0.602 +/-(0.452) U	-0.0661 +/-(0.348) U	0.238 +/-(0.361) U	0.121 +/-(0.366) U	0.260 +/-(0.452) U	0.109 +/-(0.299) U	0.288 +/-(0.320) U	0.0940 +/-(0.339) U	0.582 +/-(0.456) U	0.411 +/-(0.473) U
Radium-226+228	0.371 +/-(0.300) U	0.227 +/-(0.335) U	0.903 +/-(0.302) U*	0.580 +/-(0.316) U*	0.260 +/-(0.254) UJ	0.620 +/-(0.478) U	0.0899 +/-(0.392) U	0.323 +/-(0.397) U	0.251 +/-(0.404) U	0.370 +/-(0.482) U	0.109 +/-(0.316) U	0.421 +/-(0.336) U	0.128 +/-(0.355) U	0.643 +/-(0.491) U	0.411 +/-(0.493) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	145	146	126	126	141	86.8	82.4	1060	1020	1030	861	870	864	1030	1010
Total Dissolved Solids	184	187	145	154	162	135	119	1770	1750	1770	1250	1190	1200	1770	1770
Total Suspended Solids	20.0	17.4	22.4	22.6	30.6	10.7	21.7	18.0	16.3	15.0	18.3	19.7	19.7	12.2	13.2

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-UT02			STR-UT03						STR-UT04					
Sample Date	04-Dec-2019			21-Aug-2019			04-Dec-2019			27-Nov-2018			20-Aug-2019		
Sample ID	CUF-STR-UT02-LB-SUR-20191204	CUF-STR-UT02-CC-SUR-20191204	CUF-STR-UT02-RB-SUR-20191204	CUF-STR-UT03-LB-SUR-20190821	CUF-STR-UT03-LB-BOT-20190821	CUF-STR-UT03-RB-MID-20190821	CUF-STR-UT03-LB-SUR-20191204	CUF-STR-UT03-CC-SUR-20191204	CUF-STR-UT03-RB-MID-20191204	CUF-STR-UT04-LB-SUR-20181127	CUF-STR-UT04-CC-SUR-20181127	CUF-STR-UT04-RB-SUR-20181127	CUF-STR-UT04-LB-SUR-20190820	CUF-STR-UT04-CC-SUR-20190820	CUF-STR-UT04-RB-SUR-20190820
Sample Depth (m)	0.3	0.5	0.5	0.3	1.3	0.7	0.5	0.5	0.7	0.1	0.5	0.1	0.1	0.2	0.2
Sample Type[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID															
Level of Review[2]	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Metals, Total (μg/L)															
Antimony	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378	<0.378
Arsenic	0.676 J	0.646 J	0.674 J	1.45	2.02	1.31	0.604 J	0.684 J	0.653 J	0.736 J	0.583 J	0.639 J	1.47	1.43	1.63
Barium	26.5	27.3	26.2	88.0	135	84.3	27.6	28.9	26.8	27.5	29.4	28.1	33.9	35.3	40.0
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	4250	4120	4360	7840	10400	7230	4490	4550	4370	3050	2910	3070	2480	2600	2580
Cadmium	0.137 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	314000	301000	314000	351000	436000	350000	312000	317000	309000	242000	230000	241000	132000	138000	139000
Chromium	<1.53	<1.53	1.76 U*	<1.53	<1.53	<1.53	<1.53	1.78 U*	1.99 U*	1.7 U*	1.37 U*	1.32 U*	<1.53	<1.53	<1.53
Cobalt	0.963	1.07	0.970	0.300 J	0.525	0.277 J	0.933	0.997	0.949	0.172 U*	0.155 U*	0.16 U*	0.0950 J	0.106 J	0.107 J
Copper	0.630 J	0.645 J	0.699 J	<0.627	0.642 J	0.761 J	0.958 J	0.967 J	0.898 J	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627
Iron	496	623	471	77.3	104	68.9	544	552	473	36.1 J	42.2 J	40.3 J	63.8	76.3	88.5
Lead	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.145 J	0.156 J	0.131 J	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128
Lithium	3.41 U*	<3.39	4.99 U*	<3.39	4.90 J	<3.39	3.51 U*	4.70 U*	4.94 U*	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39
Magnesium	26200	25600	26100	31500	29200	32300	26200	26400	25800	23500	22800	23700	18700	19200	18700
Manganese	1710	1940	1660	4400	5680	4300	1740	1810	1560	170	216	222	893	967	1210
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	62.1	59.4	62.1	20.1	38.5	19.7	62.3	62.9	60.3	14.2	13.6	14.0	24.1	25.0	25.3
Nickel	0.969 J	0.987 J	1.24	0.517 J	0.907 J	0.539 J	1.02	1.17	1.10	0.634 J	0.645 J	0.605 J	0.491 J	0.607 J	0.599 J
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	0.248 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148	<0.148
Vanadium	1.01	<0.991	1.18	1.92	3.92	1.86	1.22	1.43	1.43	1.5 U*	1.31 U*	1.51 U*	1.31	1.21	1.21
Zinc	4.12 U*	3.73 U*	4.56 U*	3.26 U*	6.40 U*	3.55 U*	7.08 U*	7.07 U*	7.24 U*	<2.42	<2.42	<2.42	<3.22	<3.22	<3.22
Metals, Dissolved (μg/L)															
Antimony	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<1.12	<1.12	<1.12	0.458 J	<0.378	<0.378
Arsenic	0.559 J	0.512 J	0.621 J	1.30	1.79	1.30	0.559 J	0.575 J	0.507 J	0.55 J	0.608 J	0.65 J	1.50	1.52	1.65
Barium	22.9	26.3	23.1	91.9	132	86.7	23.7	24.4	23.2	27.7	27.4	29.3	33.2	31.2	34.3
Beryllium	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182
Boron	3960	4030	4160	7670	10300	7710	4460	4350	4390	3140	2870	3030	2520	2590	2540
Cadmium	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	307000	314000	310000	370000	423000	363000	310000	311000	311000	244000	235000	246000	132000	138000	139000
Chromium	1.71 J	<1.53	2.19	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	1.08 U*	1.27 U*	1.39 U*	<1.53	<1.53	<1.53
Cobalt	0.827	0.964	0.861	0.242 J	0.423 J	0.228 J	0.772	0.832	0.789	0.161 J	0.148 J	0.173 J	0.111 J	0.101 J	<0.0750
Copper	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627
Iron	<19.5	28.4 U*	26.7 U*	43.0 J	<19.5	44.1 J	<19.5	19.6 U*	<19.5	<14.1	29 J	14.3 J	<19.5	<19.5	<19.5
Lead	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128
Lithium	4.03 J	<3.39	5.48	<3.39	4.62 J	<3.39	4.89 J	3.89 J	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39
Magnesium	26000	26800	26200	33600	28200	32800	25800	25700	25700	24100	23000	24100	18500	18900	19000
Manganese	1260	1740	1280	4590	5510	4400	1310	1400	1180	155	203	225	773	749	879
Mercury	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101
Molybdenum	61.7	62.2	61.4	18.3	15.8	19.4	61.4	62.0	61.1	14.2	13.6	14.4	24.9	25.0	25.1
Nickel	0.998 J	0.907 J	0.874 J	0.473 J	0.557 J	0.420 J	0.831 J	0.854 J	0.805 J	0.672 J	0.632 J	0.64 J	0.448 J	0.495 J	0.482 J
Selenium	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.063	<0.063	<0.063	0.204 J	<0.148	<0.148
Vanadium	1.11	<0.991	1.26	1.78	3.01	1.65	1.31	1.04	<0.991	1.12 U*	1.25 U*	1.44 U*	1.02	1.12	1.16
Zinc	3.81 U*	<3.22	4.20 U*	<3.22	<3.22	<3.22	<3.22	3.54 U*	<3.22	<2.42	<2.42	<2.42	<3.22	<3.22	3.59 J
Anions (mg/L)															
Chloride	72.1	75.1	79.4	126	172	125	79.3	77.6	74.9	80.8	76.1	80.9	80.4	81.5	81.5
Fluoride	0.136	0.151	0.139	0.126 J	0.115 J	0.118 J	0.151	0.147	0.144	0.208	0.217	0.222	0.156	0.152	0.154
Sulfate	661	643	814	860	696	849	612	656	631	487	439	491	204	206	205
Radiological (pCi/L)															
Radium-226	0.147 +/-(0.143) U	0.103 +/-(0.123) U	-0.0235 +/-(0.0707) U	0.109 +/-(0.177) U	0.202 +/-(0.202) U	-0.191 +/-(0.129) U	-0.0703 +/-(0.0922) U	0.0105 +/-(0.0796) U	-0.0884 +/-(0.110) U	0.00316 +/-(0.0323) U	0.0197 +/-(0.0406) U	0.0786 +/-(0.0567)	-0.0555 +/-(0.107) U	-0.0351 +/-(0.134) U	0.0208 +/-(0.158) U
Radium-228	0.0285 +/-(0.387) U	0.308 +/-(0.405) U	0.396 +/-(0.424) U	0.505 +/-(0.421) U	0.283 +/-(0.340) U	-0.0705 +/-(0.342) U	-0.317 +/-(0.346) U	0.125 +/-(0.414) U	0.639 +/-(0.498) U	0.0166 +/-(0.217) U	0.412 +/-(0.229)	0.0208 +/-(0.194) U	-0.0366 +/-(0.387) U	0.0301 +/-(0.355) U	0.390 +/-(0.383) U
Radium-226+228	0.175 +/-(0.413) U	0.411 +/-(0.423) U	0.396 +/-(0.430) U	0.614 +/-(0.457) U	0.484 +/-(0.395) U	0.000 +/-(0.366) U	0.000 +/-(0.358) U	0.135 +/-(0.422) U	0.639 +/-(0.510) U	0.0197 +/-(0.219) U	0.432 +/-(0.233) J	0.0994 +/-(0.202) J	0.000 +/-(0.402) U	0.0301 +/-(0.379) U	0.411 +/-(0.414) U
General Chemistry (mg/L)															
Hardness (as CaCO3)	892	858	891	1010	1210	1010	887	899	878	701	668	699	407	424	424
Total Dissolved Solids	1250	1230	1260	1730	1970	1740	1270	1260	1290	1060	1010	1010	687	678	701
Total Suspended Solids	17.8	16.3	11.3	27.8	19.2	29.0	17.0	18.7	16.8	0.700	0.800	1.30	5.30	6.90	7.80

See last page for notes.

TABLE B.5 – Surface Stream Analytical Results
Cumberland Fossil Plant
November 2018, August/September 2019, December 2019, and May 2020

Transect Location ID	STR-UT04		STR-UT05							
Sample Date	04-Dec-2019		27-Nov-2018			20-Aug-2019				04-Dec-2019
Sample ID	CUF-STR-UT04-RB-SUR-20191204	CUF-STR-DUP01-20191204	CUF-STR-UT05-LB-SUR-20181127	CUF-STR-UT05-CC-SUR-20181127	CUF-STR-UT05-RB-SUR-20181127	CUF-STR-UT05-LB-SUR-20190820	CUF-STR-UT05-CC-SUR-20190820	CUF-STR-DUP01-20190820	CUF-STR-UT05-RB-SUR-20190820	CUF-STR-UT05-RB-SUR-20191204
Sample Depth (m)	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.05
Sample Type[1]	N	FD	N	N	N	N	N	FD	N	N
Parent Sample ID		CUF-STR-UT04-RB-SUR-20191204						CUF-STR-UT05-CC-SUR-20190820		
Level of Review[2]	Validated	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
Metals, Total (μg/L)										
Antimony	<0.378	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378	1.12 J	<0.378	<0.378
Arsenic	0.529 J	0.835 J	0.577 J	0.617 J	0.6 J	1.53	1.58	1.49	1.38	0.508 J
Barium	25.0	28.7	26.6	26.8	28.6	49.4	49.2	46.5	38.9	23.9
Beryllium	<0.182	0.233 J	<0.057	<0.057	<0.057	<0.182	<0.182	0.324 J	<0.182	<0.182
Boron	3320	3200	2730	2790	2940	2520	2550	2390	2530	3050 J
Cadmium	<0.125	<0.217	<0.125	<0.125	<0.125	0.315 J	<0.125	<0.125	<0.125	<0.125
Calcium	250000	252000	225000	231000	241000	135000	134000	126000	141000	250000
Chromium	<1.53	<1.53	1.67 U*	1.5 U*	1.69 U*	<1.53	<1.53	<1.53	<1.53	1.74 U*
Cobalt	0.389 J	0.332 J	0.145 U*	0.168 U*	0.195 U*	0.216 J	0.214 J	0.263 J	0.157 J	0.383 J
Copper	<0.627	<0.627	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	89.1	81.6 U*	35.5 J	33.8 J	39.9 J	228	250	254	101	54.9
Lead	<0.128	<0.128	<0.094	<0.094	<0.094	0.421 J	0.376 J	0.416 J	<0.128	<0.128
Lithium	3.42 U*	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	4.14 U*
Magnesium	23400	24100	21700	22000	23400	19100	18900	18300	18500	22900
Manganese	329	305	162	159	223	1720	1700	1630	1050	281
Mercury	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	31.5	31.9	13.6	13.6	14.3	21.2	21.7	21.9	24.4	31.6
Nickel	0.753 J	0.336 UJ	0.592 J	0.587 J	0.712 J	0.855 J	0.719 J	0.854 J	0.656 J	0.682 J
Selenium	<1.51	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148	0.952 U*	<0.148	<0.148
Vanadium	<0.991	1.48	1.47 U*	1.48 U*	1.45 U*	1.40	1.28	1.21	1.21	1.12
Zinc	3.45 U*	3.85 U*	<2.42	<2.42	<2.42	7.35 U*	3.24 U*	3.66 U*	3.70 U*	4.36 U*
Metals, Dissolved (μg/L)										
Antimony	<0.378	<0.378	<1.12	<1.12	<1.12	<0.378	<0.378	0.454 J	<0.378	<0.378
Arsenic	0.493 J	1.21	0.595 J	0.609 J	0.542 J	1.50	1.53	1.48	1.40	0.523 J
Barium	24.6	24.9	26.9	26.4	27.5	45.1	46.8	43.1	32.7	25.5
Beryllium	<0.182	0.299 J	<0.057	<0.057	<0.057	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	3130	3230	2780	2650	2860	2490	2540	2480	2550	3430 J
Cadmium	<0.125	<0.217	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	254000	252000	232000	230000	245000	136000	134000	129000	139000	264000
Chromium	<1.53	<1.53	1.46 U*	2.02 U*	1.41 U*	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	0.398 J	0.331 J	0.154 J	0.16 J	0.167 J	0.0770 J	0.0980 J	0.131 J	0.0980 J	0.374 J
Copper	<0.627	1.07 U*	<1.3	<1.3	<1.3	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	<19.5	<19.5	17.3 J	<14.1	<14.1	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	<0.128	<0.128	<0.094	<0.094	<0.094	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	<3.39	<3.39	<2.56	<2.56	<2.56	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	23500	24200 J	22300	21700	23300	18600	19000	18700	18800	24100 J
Manganese	242	226	163	154	216	1520	1670	1650	793	207
Mercury	<0.101	<0.101	<0.0653	<0.0653	<0.0653	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	31.9	31.2	14.1	13.6	14.3	22.2	22.2	21.5	24.9	33.5
Nickel	0.799 J	1.86 J	0.603 J	0.619 J	0.593 J	0.564 J	0.634 J	0.554 J	0.436 J	0.742 J
Selenium	<1.51	<1.51	<0.813	<0.813	<0.813	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	<0.177	<0.177	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	<0.148	<0.148	<0.063	<0.063	<0.063	<0.148	<0.148	0.376 J	<0.148	<0.148
Vanadium	0.991 UJ	2.00 J	1.39 U*	1.6 U*	1.44 U*	<0.991	<0.991	<0.991	1.05	<0.991
Zinc	3.26 U*	3.22 UJ	<2.42	<2.42	<2.42	4.70 J	<3.22	<3.22	<3.22	3.57 U*
Anions (mg/L)										
Chloride	62.1	62.3	81.2	76.3	77.4	81.1	82.3	79.5	80.4	73.2
Fluoride	0.123	0.115	0.205	0.201	0.202	0.152	0.158	0.159	0.156	0.157
Sulfate	563 J	488	480	477	487	207	212	205	203	575 J
Radiological (pCi/L)										
Radium-226	-0.0888 +/-(0.0963) U	-0.0161 +/-(0.101) U	0.0327 +/-(0.0487) U	0.0147 +/-(0.0437) U	0.0746 +/-(0.0574) U	-0.0555 +/-(0.160) U	0.164 +/-(0.174) U	-0.0493 +/-(0.124) U	-0.173 +/-(0.154) U	-0.0700 +/-(0.114) U
Radium-228	0.0529 +/-(0.401) U	0.308 +/-(0.390) U	0.193 +/-(0.223) U	0.0504 +/-(0.225) U	0.410 +/-(0.246)	0.151 +/-(0.402) U	0.184 +/-(0.366) U	0.552 +/-(0.446) U	0.194 +/-(0.492) U	0.324 +/-(0.427) U
Radium-226+228	0.0529 +/-(0.412) U	0.308 +/-(0.403) U	0.226 +/-(0.228) U	0.0651 +/-(0.229) U	0.485 +/-(0.253) J	0.151 +/-(0.433) U	0.348 +/-(0.405) U	0.552 +/-(0.463) U	0.194 +/-(0.516) U	0.324 +/-(0.442) U
General Chemistry (mg/L)										
Hardness (as CaCO3)	721	721	651	667	698	416	412	390	428	718
Total Dissolved Solids	990	1000	1030	1070	1040	652	669	678	703	1070
Total Suspended Solids	7.40	7.10	0.800	1.22	0.900	11.2	11.0	9.50	10.7	8.00

See last page for notes.

Notes:

<	Analyte was not detected at a concentration greater than the Method Detection Limit
–	Not available
ID	identification
J	quantitation is approximate due to limitations identified during data validation.
m	meter
mg/L	milligrams per Liter
µg/L	micrograms per Liter
pCi/L	picocuries per Liter
R	Unreliable positive result: analyte may or may not be present in sample.
U	not detected
U*	This result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level.
UJ	This analyte was not detected, but the reporting limit may or may not be higher due to a bias identified during data validation

1. Sample Type: N - Normal Environmental Sample, FD - Field Duplicate Sample
2. Level of review is defined in the Quality Assurance Project Plan

APPENDIX J.3

TECHNICAL EVALUATION OF SEDIMENT AND BENTHIC MACROINVERTEBRATE DATA

TVA TENNESSEE VALLEY AUTHORITY

Appendix J.3 – Technical Evaluation of Sediment and Benthic Macroinvertebrate Data

Cumberland Fossil Plant

Cumberland City, Tennessee

Tennessee Valley Authority

TVA

Title and Approval Page

Title of Document:	Appendix J.3 – Technical Evaluation of Sediment and Benthic Macroinvertebrate Data Cumberland Fossil Plant Tennessee Valley Authority Cumberland City, Tennessee
Prepared By:	Tennessee Valley Authority
Effective Date:	August 14, 2023 Revision: 2

TVA Compliance Point of Contact	8/2/23 Date
TVA Technical Point of Contact	8/2/23 Date
TVA Limnologist, Fisheries & Aquatic Monitoring	8/2/23 Date
QA Oversight Manager	8/1/23 Date

TVA

Revision Log

Revision	Date	Description
0	April 29, 2022	Submittal to TDEC
1	January 26, 2023	Addresses August 9, 2022 TDEC Review Comments and Issued for TDEC
2	August 14, 2023	Addresses May 16, 2023 TDEC Review Comments and Issued for TDEC

TVA

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Acronyms and Abbreviations

ATL	Alternate Thermal Limit
BIP	Balanced Indigenous Population
CARA	Corrective Action and Risk Assessment
CBR	Critical Body Residue
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations, Part 257
CFR	Code of Federal Regulations
CUF Plant	Cumberland Fossil Plant
CuRM	Cumberland River Mile
CWA	Clean Water Act
EAR	Environmental Assessment Report
EI	Environmental Investigation
EIP	Environmental Investigation Plan
ENT	Effective Number of Taxa
ESV	Ecological Screening Value
Georgia-Pacific	Georgia-Pacific Gypsum LLC
HBI	Hilsenhoff Biotic Index
LOAEL	Lowest Observed Adverse Effect Level
NOAEL	No Observed Adverse Effect Level
NPDES	National Pollutant Discharge Elimination System
%	Percent
PLM	Polarized Light Microscopy
RBI	Reservoir Benthic Index
REH	Reservoir Ecological Health
RFAI	Reservoir Fish Assemblage Index
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TTR	Total Taxa Richness
TVA	Tennessee Valley Authority
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

Chapter 1 Introduction

The Tennessee Valley Authority (TVA) has prepared this technical evaluation appendix to summarize historical and recent sediment, benthic macroinvertebrate, and mayfly sampling data at TVA's Cumberland Fossil Plant (CUF Plant) in Cumberland City, Tennessee. This technical appendix provides a detailed evaluation of these data to support information provided in the Environmental Assessment Report (EAR) to fulfill the requirements for the Tennessee Department of Environment and Conservation-issued Commissioner's Order No. OGC15-0177 (TDEC Order) Program (TDEC 2015).

Chapter 2 Sediment, Benthic Macroinvertebrates, and Mayfly Investigation

The purpose of the sediment and benthic macroinvertebrate investigations was to characterize concentrations of Coal Combustion Residuals (CCR)-related constituents in sediments and mayfly (*Hexagenia* spp.) tissues and to evaluate potential ecological impacts through multi-metric analysis of benthic macroinvertebrate community composition in the vicinity of the CCR management units at the CUF Plant.

Benthic macroinvertebrates are aquatic organisms that live in and on riverbed substrates, are relatively immobile, and are an important part of the local food chain. Because benthic macroinvertebrates are relatively immobile and have been shown to be sensitive to environmental stressors, they serve as indicators of changes in the environment. Therefore, sediment (i.e., benthic habitat) and benthic macroinvertebrate assessments are effective in characterizing spatial differences in potential impacts of CCR material in surface streams on or adjacent to the CUF Plant CCR management units.

For this investigation, TVA reviewed historical sediment and benthic macroinvertebrate studies in streams and rivers adjacent to the CUF Plant. In addition, the recent TDEC Order Environmental Investigation (EI) included collecting benthic macroinvertebrate samples to assess community composition and representative biological integrity, and sediment samples for laboratory chemistry analysis. Since the previous studies did not include benthic macroinvertebrate bioaccumulation analysis, TVA collected and analyzed mayflies for evaluation of bioaccumulation of CCR constituents.

The following chapters summarize the previous studies and present overall sediment, benthic invertebrate and mayfly investigation and evaluation findings based on data obtained during previous studies and the EI for the CUF Plant.

2.1 Historical Studies

Historically, TVA has conducted biological assessments by periodically monitoring aquatic communities (fish and benthic macroinvertebrates) near the CUF Plant to evaluate their status upstream and downstream of the plant's thermal discharge. This monitoring is conducted to support continuance of the CUF Alternate Thermal Limit (ATL) for the thermal discharge established under the National Pollutant Discharge Elimination System (NPDES) permit for the facility (NPDES Permit Number TN0005789). Renewal of the permit is based on successful demonstration, in accordance with Section 316(a) [1] of the federal Clean Water Act (CWA), that a balanced indigenous population (BIP[2]) of fish and wildlife is present and being maintained in the Cumberland River (Barkley Reservoir) downstream of the plant. The primary focus of the biological assessments conducted by TVA in accordance with the CWA consisted of collecting and analyzing biological data from fish (Appendix J.5) and benthic macroinvertebrate communities to characterize the compositions of those communities upstream and downstream of the CUF Plant. Historical sediment sampling information and benthic macroinvertebrate assessments are summarized in Chapters 2.1.1 and 2.1.2 below, respectively.

[1] Section 316(a) of the CWA authorizes ATLs for the control of the thermal component of a point source discharge so long as the NPDES permit ATLs assure the protection of a BIP of aquatic life.

[2] 40 C.F.R. § 125.71(c) (2021).

2.1.1 Historical Sediment Studies

TVA conducted a limited sediment sampling study in Wells Creek in 2002 (Environmental Engineering Services 2002) to investigate the presence of an unknown milky white substance observed intermittently in Wells Creek and in the Unnamed Tributary, which leads into Wells Creek between the CUF Plant Gypsum Storage Area and the Georgia-Pacific Gypsum LLC (Georgia-Pacific) access roads. Georgia-Pacific is a drywall construction company adjacent to the CUF Plant that uses gypsum produced as a byproduct from the CUF Plant flue gas desulfurization process to manufacture wallboard for the construction industry. Sediment samples were collected from two locations within the Unnamed Tributary and analyzed for approximately half of the CCR constituents, including arsenic, barium, beryllium, boron, cadmium, calcium, lead, nickel, thallium, strontium, and sulfate. The results suggested that surface runoff was the cause of the white substance rather than groundwater seepage from the Gypsum Storage Area.

Additionally, in 1997, 2002, 2007, and 2012, the United States Army Corps of Engineers (USACE) collected sediment data in the Cumberland River in the general vicinity of the CUF Plant (USACE 2018). They collected sediment samples from four locations in the Cumberland River: Cumberland River Mile (CuRM) 31.5, 71.0, 100.1, and 124.0 and from two locations in smaller tributaries (Little River Mile 9.3 located downstream from CuRM 71.0 and Red River Mile 0.4 located upstream from CuRM 124.0). The CuRM 100.1 sampling location (approximately 3 miles downstream from the CUF Plant) is the nearest USACE sampling location to the CUF Plant, which is located at CuRM 102.8. The sediment samples were analyzed for CCR constituents listed in Appendices III and IV of Title 40, Code of Federal Regulations, Part 257 (CCR Rule) and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04, including antimony, arsenic, barium, cadmium, chromium, cobalt, lead, mercury, molybdenum, mercury, selenium, and thallium.

2.1.1.1 Historical Sediment Studies Conclusions

Based on a comparison of the 2002 CCR constituent results for the two sediment samples collected from the Unnamed Tributary to the Ecological Screening Values (ESVs) described in Chapter 3.1 and provided in Appendix A.2, concentrations in both samples were less than the available chronic and acute ESVs. The 1997-2012 USACE data were not evaluated due to the distance of the sampling locations from the CUF Plant.

2.1.2 Historical Benthic Macroinvertebrate Studies

From 1973 through 1976, TVA conducted Section 316(a) demonstration-related studies of the CUF Plant thermal discharge to support the initial and subsequent ATL requests for the site discharge, and to demonstrate compliance with the CWA (TVA 1977). These studies were conducted in general accordance with United States Environmental Protection Agency's (USEPA) Interagency Section 316(a) technical guidance manual (USEPA 1977) and consisted of sampling of the aquatic community including benthic macroinvertebrates. Hydrothermal modeling results, water quality, and other parameters also were evaluated. From 1978 to 1979, supplemental benthic macroinvertebrate community data were collected in expanded study areas downstream of the CUF Plant to cover a greater reach of the Cumberland River (Barkley Reservoir) (TVA 1983).

The 1970s study findings were interpreted initially by USEPA and subsequently by TDEC as evidence of a BIP downstream of the CUF Plant and supported TDEC's decisions to continue the ATL in the facility's subsequent NPDES permit renewals. However, in 2001, TVA and TDEC reached an agreement whereby TVA's Reservoir Ecological Health (REH) monitoring program became the accepted study design for measuring the presence and maintenance of a BIP to support Section 316(a)-based ATLs and subsequent NPDES permit renewals (TVA 2019). A component of REH monitoring program is a multi-metric approach to data evaluation for fish communities known as the Reservoir Fish Assemblage Index (RFAI). Initially, the Section 316(a) demonstration studies focused on fish community sampling (TVA 2019). In 2008, benthic macroinvertebrate sampling was added to the REH monitoring program, and in 2009, analysis of benthic macroinvertebrate communities using the REH Reservoir Benthic Index (RBI[3]) was added to the Section 316(a) program to evaluate composition of the benthic community upstream and downstream of the CUF Plant (TVA 2019). The RBI is a multi-metric index developed by TVA in 1991 to reflect biological integrity within the various zones of reservoir systems associated with their facilities.

When benthic macroinvertebrate sampling was added in 2008, two sampling transects were selected to evaluate potential effects of the CUF Plant's thermal discharge on benthic macroinvertebrate communities in the Cumberland River (TVA 2017a). Transects across the full width of the reservoir were established upstream at CuRM 106.6 and downstream at CuRM 102. Grab samples were collected with either a Ponar or Peterson dredge at points equally spaced along each transect. The benthic samples were evaluated using seven metrics that represent different community characteristics. These metrics can be evaluated individually for community condition comparison and can also be combined as component metrics to generate the multi-metric RBI. The seven individual component metrics are detailed in TVA (2017a). Results for each metric were assigned a score of 1, 3 or 5 based on comparison to reference conditions developed for REH river-to-reservoir transition areas. For each sample, these weighted scores for the seven-component metrics were then summed to produce an RBI Total Score. Total Scores are paired with categorical ratings that can then be used to streamline comparative evaluations of ecological conditions.

A difference of four points or less between the downstream location RBI score and the upstream location RBI score indicates statistical similarity of the benthic macroinvertebrate communities between two locations (TVA 2019). This variance was used as the basis for determining an absence of impact on the benthic macroinvertebrate community related to the thermal discharge at the CUF Plant. RBI scores for the previously collected samples can be found in TVA (2010, 2011, 2012, 2013, 2015a, 2015b, 2016, 2017a, 2017b, 2019, and 2020).

2.1.2.1 Historical Benthic Macroinvertebrate Studies Conclusions

The 1970s data related to benthic macroinvertebrate communities showed the following key findings (TVA 2019):

- The assemblages of benthic macroinvertebrates were diverse and, in general, relatively abundant and consistent with biota of an impounded river
- The benthic communities were similar among the sample locations.

Since initiation of benthic sampling in 2008 in support of the ATL, the CUF Plant benthic sample results have continued to show overall similarities in numbers of species, mean densities, and relative compositions of functional feeding groups across the seasons and between upstream and downstream locations (TVA 2020). Stable upstream and downstream RBI scores throughout the period of monitoring demonstrated the capacity of the benthic community to sustain itself through cyclic seasonal changes (TVA 2019). Generally, the benthic macroinvertebrate community structure, based on BIP Element 1 (diversity at all trophic levels), Element 2 (sustain through seasonal changes), and Element 3 (food chain

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[3] RBI data supplement RFAI data (refer to Chapter 7.3.3) to demonstrate a BIP in support of continuance of the ATL at the CUF Plant.

species), demonstrates that a seasonally abundant and diverse community is present both downstream and upstream of the CUF Plant (TVA 2019).

The Section 316(a) benthic sampling results do not include bioaccumulation analysis for CCR constituents. However, those transect locations (CuRM 106.6 and CuRM 102) were included in the TDEC Order benthic investigation, and the historical data from the Section 316(a) monitoring were used to support the TDEC Order investigation activities summarized in the EAR and this technical appendix.

2.1.3 Historical Mayfly Tissue Studies

Mayfly sampling during previous studies were limited to those collected as part of the overall benthic community RBI sampling. Mayflies were not historically collected for bioaccumulation analysis for the constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters).

2.2 TDEC Order Investigation Activities

The objectives of the TDEC Order benthic investigation were to characterize sediment chemistry, benthic macroinvertebrate community composition, and benthic macroinvertebrate bioaccumulation in surface streams in proximity to the CUF Plant CCR management units to evaluate if CCR material and/or dissolved CCR constituents have moved into surface water, potentially impacting aquatic life. TVA performed EI sample collection activities in five waterbodies proximate to the CUF Plant, including the Cumberland River, Wells Creek, Unnamed Tributary, Discharge Channel, and the TVA Embayment. The EI activities were conducted in general accordance with the *Environmental Investigation Plan (EIP)* (TVA 2018), *Benthic Sampling and Analysis Plan (SAP)* (Stantec 2018), *Benthic and Surface Streams Sampling and Analysis Plans - Addendum 1* (Stantec 2021), and *Quality Assurance Project Plan* (Environmental Standards 2018), including TVA- and TDEC-approved programmatic and project-specific changes made after approval of the EIP. Descriptions of sample location selection, collection methodologies, analyses, and quality assurance/quality control for the benthic investigation are provided in the *Benthic Sampling and Analysis Report (SAR)* (Appendix J.4) and the *Benthic and Sediment SAR Addendum* (Appendix J.5).

The scope of the EI sampling activities is described below.

<u>Sediment</u>

During October 2018, August 2019 and December 2019, sediment samples were collected from transects in the Cumberland River (CuR01 through CuR07), the Plant Discharge Channel (DC01), Wells Creek (WC01 through WC10), the Unnamed Tributary (UT01 through UT05), and the TVA Embayment (PO01). Sediment samples also were collected from a single point (UT01.5) in the Unnamed Tributary, and the center channel location at transect WC09 in Wells Creek was resampled to further characterize sediment concentrations of CCR-related constituents at these locations. Attempts were made to collect sediment samples from the left descending bank, center channel, and the right descending bank at each transect, however sufficient sediment for sample collection was not encountered at some locations. Refer to Exhibit J.3-1 for the sample locations. Surface sediment samples (depths of 0-0.5 feet) were collected from each of the sampling points, except as shown on Exhibit J.3-1. Deeper sediment intervals (up to about 6 feet) were sampled where more sediment accumulation was present.

Samples collected from the Discharge Channel are not included in the evaluation presented in this appendix, nor in the statistical analysis of the EI data presented in Appendix E.5, since conditions in the Discharge Channel are not representative of natural surface stream conditions.

As described in further detail in Section 3.1, Polarized Light Microscopy (PLM) results above the 20% ash value in sediment samples collected from the UT01 through UT03 locations in August 2019 triggered Phase 2 of the Benthic SAP. The Phase 2 supplemental sampling consisted of additional sediment and surface stream water sample collection in June and July 2021 for further evaluation of whether CCR constituents have migrated into the Unnamed Tributary. The sediment samples were collected along three transects in the Unnamed Tributary, at seven individual (single-point) locations in the Unnamed Tributary, and at one transect in Wells Creek. Surface sediment samples from depths up to 0.7 feet were collected from each sampling location. Deeper sediment intervals (up to about 2.6 feet) were sampled where more sediment accumulation was present. Refer to Exhibit J.3-2 for the sample locations.

Benthic Macroinvertebrates

Benthic macroinvertebrate sampling was conducted within the Cumberland River and Wells Creek for the TDEC Order EI, as shown on Exhibits J.3-3 and J.3-3a. The Cumberland River was sampled at five transect locations: two upstream control locations, two adjacent to the CUF Plant, and one downstream of the CUF Plant: Wells Creek was sampled at six transects, with one upstream control at WC01 and five transects representative of conditions adjacent to the CUF Plant.

Sampling was performed on September 17 and 18, 2018 along transects, each composed of five samples/grabs, using a Ponar dredge sampling device, as described in the SAR (Appendix J.4). Results for each of the five grab samples from each transect were composited to minimize the effects of intra-transect habitat heterogeneity and to capture a comprehensive cross-section of the community (as discussed in Chapter 3.2.1).

Mayfly Tissue

For the TDEC Order EI, mayfly tissue samples were collected in June/July 2019 from three areas (reaches) of the Cumberland River at upstream, adjacent, and downstream locations relative to the CCR management units, and from two areas of Wells Creek adjacent to the CCR management units. The sample reaches are shown on Exhibit J.3-4.

Mayfly tissue samples were also collected in June 2018, prior to implementation of the SAP under the TDEC Order; that sampling also was conducted in accordance with the SAP-defined protocols and procedures and was performed within the same sampling reaches identified in the SAP. A comparison between the two sampling events is provided in Chapter 3.3, although the 2018 event is considered supplemental data to the TDEC Order scope.

Chapter 3 Results and Discussion

Data from the EI were collected from locations along sample transects from the five waterbodies proximate to the CUF Plant. The results of the sample analyses and evaluation are discussed in the Chapters below.

TDEC approved acute and chronic ESVs for the EAR (Table 1-3 and Appendix A.2) were used to evaluate whether identified CCR constituent concentrations in sediment samples may be indicative of potential impacts to aquatic life. Acute ESVs are concentrations of CCR Parameters that are protective of aquatic organisms for short-term exposure (typically a period of days), and chronic ESVs are protective of aquatic organisms for long-term exposure (typically the duration of an entire life cycle, although that can vary by species).

The EAR screening levels are generic (not specific to an individual ecological receptor) and are protective of ecological health. Most screening levels are not regulatory standards and are conservatively based on published health studies. Concentrations above the screening level do not necessarily mean that an adverse health effect is occurring, but rather that further evaluation is required in the Corrective Action/Risk Assessment (CARA) Plan to determine if an unacceptable risk exists, and corrective action is required.

Statistical evaluation of the EI sediment and mayfly tissue data for the CUF Plant is presented in Appendices E.6 and E.7, respectively, and benthic macroinvertebrate community data are further evaluated in Attachment J.3-A of this appendix. This appendix summarizes the results of these evaluations relative to the objective of the sediment and benthic macroinvertebrate community investigations.

3.1 Sediment

In October 2018, August 2019 and December 2019, a total of 68 shallow sediment samples (19 from the Cumberland River, 29 from Wells Creek 14 from the Unnamed Tributary, three from the TVA Embayment, and three from the Plant Discharge Channel), 57 deeper sediment samples (17 from the Cumberland River, 26 from Wells Creek, six from the Unnamed Tributary, three from the TVA Embayment, and five from the Plant Discharge Channel), and six field duplicate samples were collected from the water bodies proximal to the CUF Plant as described in Chapter 2.2. Both the shallow and deeper sediment samples collected were analyzed for percent (%) ash. The shallow sediment samples were analyzed by an accredited laboratory for the following CCR-related constituents, hereafter referred to collectively as “CCR Parameters,” and the deeper sediments were retained for later analysis if required.

- CCR Rule Appendix III Constituents including boron, calcium, chloride, fluoride, pH, and sulfate
- CCR Rule Appendix IV Constituents including antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, fluoride, lead, lithium, mercury, molybdenum, selenium, thallium, and radium 226/228
- Tennessee Rule 0400-11-01-.04, Appendix 1 Inorganic Constituents including copper, nickel, silver, vanadium, and zinc
- Strontium.

The sediment sample results compared to acute and chronic ESVs are provided on Table J.3-1.

3.1.1 Exploratory Data Analysis

Based on the phased approach proposed in the *Benthic SAP*, the 68 shallow sediment samples, 57 deeper sediment samples, and six duplicate samples were analyzed using PLM for % ash. The 68 sediment samples collected from the upper six inches at each location and three of the duplicate samples were also analyzed for the CCR Parameters as part of Phase 1. The 57 deeper sediment samples and three deeper duplicate samples collected for the analysis of CCR Parameters were retained for possible future analysis, pending the results of the PLM analysis.

None of the PLM results for sediment samples collected from the Cumberland River, Wells Creek, and the TVA Embayment were above the 20% ash threshold defined for the EAR (Table 1-3 and Appendix A.2) that would trigger additional analyses. PLM results for multiple sediment samples collected from the UT01 through UT03 locations in the two farthest upstream impoundments of the Unnamed Tributary (Ponds 3A and 3B) were above the 20% ash threshold, however PLM results for samples collected further downstream at the UT04 and UT05 locations were below that threshold. The PLM results above the 20% ash value at the UT01 through UT03 locations triggered Phase 2 of the Benthic SAP. The Phase 2 activities consisted of the following:

- The retained deeper sediment samples from the UT01 through UT03 locations collected during Phase 1 were analyzed for the CCR Parameters.
- In June and July 2021, TVA conducted additional sediment sampling in the Unnamed Tributary and at a location in Wells Creek directly downstream from the confluence with the Unnamed Tributary in accordance with the Benthic and Surface Streams SAP Addendum (Stantec 2021).

During the Phase 2 sampling, a total of 19 shallow sediment samples (three from Wells Creek and 16 from the Unnamed Tributary), two deeper sediment samples from the Unnamed Tributary, and two duplicate samples were collected from the water bodies proximal to the CUF Plant as described in Chapter 2.2. All of the sediment samples collected were analyzed for % ash and the CCR Parameters. The sediment sample results compared to acute and chronic ESVs are provided on Table J.3-1.

The Phase 1 exploratory data analysis identified two statistically significant outliers in the sediment concentration dataset that were suitable for removal from further statistical analysis (see Appendix E.6 for further rationale and discussion regarding outlier disposition). With these two outliers removed from the dataset, a comparison of sediment concentrations to the TDEC-approved acute ESVs showed that none of the CCR Parameters were present at concentrations above the TDEC-approved acute ESVs, although concentrations of five CCR Parameters were above the chronic ESVs for one or more locations (Appendix E.6). Concentrations of the remaining CCR Parameters were below their respective chronic and acute ESVs in the Phase 1 sediment samples. Refer to Table J.3-1 for a summary of the sediment analytical results and ESVs. Additional information regarding the procedures used for the exploratory data analysis used for the CUF Plant sediment investigation is provided in Appendix E.6. Below is a summary of the sample locations and CCR Parameters that were detected at concentrations above their respective ESVs:

- Arsenic concentrations were reported above the chronic ESV in one sample collected from an adjacent location in Wells Creek and one sample collected from an adjacent location in the Unnamed Tributary. Arsenic concentrations were below the chronic and acute ESVs in the remaining 66 shallow sediment samples, including the re-sample of the location in Wells Creek that was initially reported at a concentration above the chronic ESV and three duplicate samples analyzed for the CCR Parameters.

- One barium concentration was reported above the chronic ESV in one sample from an adjacent location in the Unnamed Tributary. Barium concentrations were below the chronic and acute ESVs in the remaining 67 shallow sediment samples and three duplicate samples analyzed for the CCR Parameters.

- Beryllium concentrations were reported above the chronic ESV in two samples collected from adjacent locations in Wells Creek. Beryllium concentrations were below the chronic and acute ESVs in the remaining 66 shallow sediment samples and three duplicate samples analyzed for the CCR Parameters.

- Molybdenum concentrations were reported above the chronic ESV in nine samples and one duplicate sample collected from adjacent locations in the Unnamed Tributary. Molybdenum concentrations were below the chronic and acute ESVs in the remaining 59 shallow sediment samples and two duplicate samples analyzed for the CCR Parameters.

- Selenium concentrations were reported above the chronic ESV in two samples collected from adjacent locations in the Unnamed Tributary. Selenium concentrations were below the chronic and acute ESVs in the remaining 66 shallow sediment samples and three duplicate samples analyzed for the CCR Parameters.

Based on the Phase 2 exploratory data analysis, PLM results for the sediments collected from each sample location in the UT0.5 transect (the farthest upstream sample locations in Pond 3B) were above the 20% ash threshold. PLM results for samples collected further downstream in the Unnamed Tributary at the UT01 though UT05 locations and at the WC03.5 location in Wells Creek were below that threshold. A comparison of sediment concentrations to the TDEC-approved acute ESVs showed that none of the CCR Parameters were present at concentrations above the TDEC-approved acute ESVs in the Phase 2 samples. Concentrations of five CCR Parameters were above the chronic ESVs for one or more locations (Appendix E.6). Concentrations of the remaining CCR Parameters were below their respective chronic and acute ESVs in the Phase 2 sediment samples. Refer to Table J.3-1 for a summary of the sediment analytical results and ESVs. Additional information regarding the procedures used for the Phase 2 exploratory data analysis used for the CUF Plant sediment investigation is provided in Appendix E.6. Below is a summary of the sample locations and CCR Parameters that were detected at concentrations above their respective ESVs:

- Arsenic concentrations were reported above the chronic ESV in three samples collected in Pond 3B of the Unnamed Tributary. Arsenic concentrations were below the chronic and acute ESVs in the remaining 20 sediment samples (including the two duplicate samples).

- Barium concentrations were reported above the chronic ESV in three samples collected in Pond 3B of the Unnamed Tributary. Barium concentrations were below the chronic and acute ESVs in the remaining 20 sediment samples (including the two duplicate samples).

- One beryllium concentration was reported above the chronic ESV in one sample collected in Pond 1 of the Unnamed Tributary. Beryllium concentrations were below the chronic and acute ESVs in the remaining 22 sediment samples (including the two duplicate samples).

- Molybdenum concentrations were reported above the chronic ESV in 12 samples and one duplicate sample collected from locations in Ponds 2, 3A and 3B of the Unnamed Tributary. Molybdenum concentrations were below the chronic and acute ESVs in the remaining nine sediment samples and one duplicate sample analyzed for the CCR Parameters.

- One nickel concentration was reported above the chronic ESV in one sample collected in Pond 1 of the Unnamed Tributary. Nickel concentrations were below the chronic and acute ESVs in the remaining 22 sediment samples (including the two duplicate samples).

3.2 Benthic Macroinvertebrate Community Analysis

Benthic macroinvertebrates are aquatic organisms that live in and on riverbed substrates, are relatively immobile, and are an important part of the local food chain. Because benthic macroinvertebrates are relatively immobile and have been shown to be sensitive to environmental stressors, they serve as indicators of spatial differences in the environment. Therefore, sediment (i.e., benthic habitat) and benthic macroinvertebrate assessments are effective in characterizing potential impacts to surface streams where these communities may exist in proximity to the CUF Plant CCR management units.

A benthic macroinvertebrate community assessment uses various aspects of community structure, indicator taxa presence and relative abundance, composition, richness, and sensitivity metrics based on laboratory processed macroinvertebrate sample results (Chapter 3.2.1). The objective of community analysis is to characterize biological integrity as a reflection of the cumulative effects of water quality, habitat quality and availability, changes in flow regime and other possible stressors as they influence community composition. This community-based evaluation does not use ESVs to directly evaluate potential biological impacts above or below a set threshold. Instead, it relies on a representative cross-section of supported taxa and interpretation of comparative results where upstream communities represent control conditions, and adjacent and downstream communities are compared against those controls to evaluate apparent differences.

Multi-metric analyses are used to quantify these differences and evaluate the presence and magnitude of environmental stressors and, ultimately, to determine whether degradation has occurred. Degradation observable in community data does not necessarily indicate potential impacts from CUF Plant CCR management units. If present, the degree of degradation at adjacent and downstream sampling stations may indicate that further evaluation of potential impacts using multiple lines of evidence (i.e., results of surface stream sampling, benthic sediment sampling, and mayfly and fish tissue analyses) are necessary, as discussed in Chapter 7.0 of the EAR.

3.2.1 Metric Computations

Benthic macroinvertebrate samples were processed by a qualified laboratory to generate complete taxa lists and individual taxon counts for each sampling location. These community composition data were then used to calculate RBI and supplemental metrics for comparative analysis of conditions upstream, adjacent, and downstream of the CUF Plant within the Cumberland River and Wells Creek.

Past practice has been that the multi-metric RBI was applied by treating the five Ponar grabs along each transect as individual samples, with metric values subsequently averaged to represent localized conditions. The representativeness and robustness of the RBI was improved for this investigation by compositing the laboratory results from the five Ponar grabs to generate a comprehensive taxa list for each transect prior to calculating RBI outcomes. This approach captures a more complete cross-section of the benthic community and minimizes the influence of physical habitat heterogeneity in the various zones along the transect. Habitat differences in these zones may affect metric outcomes if treated as separate samples. By minimizing localized habitat constraints, the analysis should provide a more accurate reflection of water quality conditions. Given the adjustment to methods, the results presented herein are suitable for spatial relationship comparative evaluation, but they should not be directly compared to RBI scores or descriptive rating categories from historical studies. Should that comparison be needed, the raw data are available to use with the past RBI calculation practice.

A suite of metrics was applied to raw benthic macroinvertebrate taxa lists and counts for each study transect, as provided in Benthic Community Summary Sheets in Attachment J.3-A. For the purposes of the EAR, this discussion focuses on the RBI multi-metric total scores and associated ratings to draw spatial comparisons, should their results provide corroborative or otherwise auxiliary information relative to the findings of the RBI. Individual component metrics and supplemental metrics are highlighted and discussed in Chapter 3.2.1.1 and Chapter 3.2.1.2**.**

Reservoir Benthic Index (RBI)

The RBI was developed by TVA and implemented in support of Section 316(a) biological monitoring requirements to be representative of river-to-reservoir transition areas and has been applied to EIP sampling to characterize overall biological integrity surrounding the CUF Plant. The RBI methodology uses seven metrics that represent different benthic community characteristics. Results for each metric are assigned a weighted score of 1, 3, or 5 based on established and TDEC-approved categorical value ranges (TVA 2020, Table A-5). The seven weighted scores are then summed to produce a RBI total score that characterizes the condition of the benthic community in a range from “Very Poor” to “Excellent”.

The seven-component metrics of the RBI are based on genus-level taxonomy and include:

1. Total Taxa Richness (TTR) – The total number of different genera (or next lowest practicable level of taxonomy) identified within the sample
2. Ephemeroptera, Plecoptera, and Trichoptera (EPT) Richness – The total number of different mayfly (Ephemeroptera), stonefly (Plecoptera), and caddisfly (Trichoptera) genera identified within the sample
3. Percent Grabs Containing Long-lived Organisms – Calculated from the raw laboratory data, in which the five grabs from each transect are treated as separate samples. Long-lived organisms, for the purpose of this metric, include Asiatic clams (*Corbicula fluminea*), giant burrowing mayflies (*Hexagenia* spp.), mussels (Unionidae and Dreissenidae), and snails (Gastropoda). A grab is considered “containing long-lived organisms” if one or more individuals from any of these assemblages is identified.
4. Percent Oligochaeta – The proportion of aquatic worms from the major group Oligochaeta in the sample
5. Percent Top Two Dominant Taxa – The proportion of the sample comprised by the two most abundant genera
6. Total Abundance Less Chironomidae and Oligochaeta – The total count of organisms in the sample, excluding midges (Chironomidae) and aquatic worms belonging to the major group Oligochaeta
7. Percent Grabs Containing No Organisms – Calculated from the raw laboratory data in which the five grabs from each transect are treated as separate samples, the proportion of the five Ponar grab samples that did not contain any benthic macroinvertebrates.

As provided in the TVA report, *Biological Monitoring of the Cumberland River near Cumberland Fossil Plant Discharge* during 2015 (TVA 2016), the following categorical ratings correspond to total score ranges summed from weighted component metric scores:

- Excellent (30-35)
- Good (24-29)
- Fair (19-23)
- Poor (13-18)
- Very Poor (7-12).

Supplemental Metrics

Four additional metrics, supplemental to the RBI were also included in this analysis as stand-alone indicators of biological health. The following supplemental metrics were applied to samples from the Cumberland River and Wells Creek:

1. Hilsenhoff Biotic Index (HBI) – An index that measures community sensitivity to environmental stress, based on Tennessee-specific tolerance values assigned to individual taxa and their relative abundances. Tolerance values were provided from Appendix C-3 of the TDEC Division of Water Resources *Quality System Standard Operating Procedure for Macroinvertebrate Stream Surveys* (TDEC 2017). These values are consistent with North Carolina state tolerance values adopted for use in Tennessee. The HBI is calculated using the following equation:

$$\text{FBI/HBI} = \sum_{i=1}^{S} \frac{x_i t_i}{n}$$

x_i = number of individuals in taxon

t_i = tolerance value of taxon

n = total abundance of sample

S = total number of taxa

HBI scores fall into seven categorical ratings that reflect ecological conditions designed for use in wadable streams. While these categories may not be accurately descriptive of conditions in reservoir-associated systems, such as the Cumberland River and Wells Creek, the value ranges in each category are shown in the figures referenced in forthcoming chapters to help evaluate meaningful differences during comparative analysis. Categorical titles, as listed below, have not been labeled or discussed for the figures referenced in Chapter 3.2.1.2, as they do not accurately describe conditions for this application. The score ranges within each category remain applicable, however, having been established based on rigorous empirical data and statistical analyses in the development of the HBI model to represent significant differences in community sensitivity (Hilsenhoff 1987). The HBI categories are as follows:

- Excellent (0.00-3.50)
- Very Good (3.51-4.50)
- Good (4.51-5.50)
- Fair (5.51-6.50)
- Fairly Poor (6.51-7.5)
- Poor (7.51-8.50)
- Very Poor (8.51-10.00).

2. Intolerant Taxa Richness – The number of different taxa with assigned tolerance values less than or equal to 3.0
3. Percent Tolerant Taxa – The proportion of organisms in a sample with assigned tolerance values greater than 3.0
4. Percent EPT-H – The proportion of mayflies, stoneflies, and caddisflies represented in the sample, less the caddisfly family Hydropsychidae.

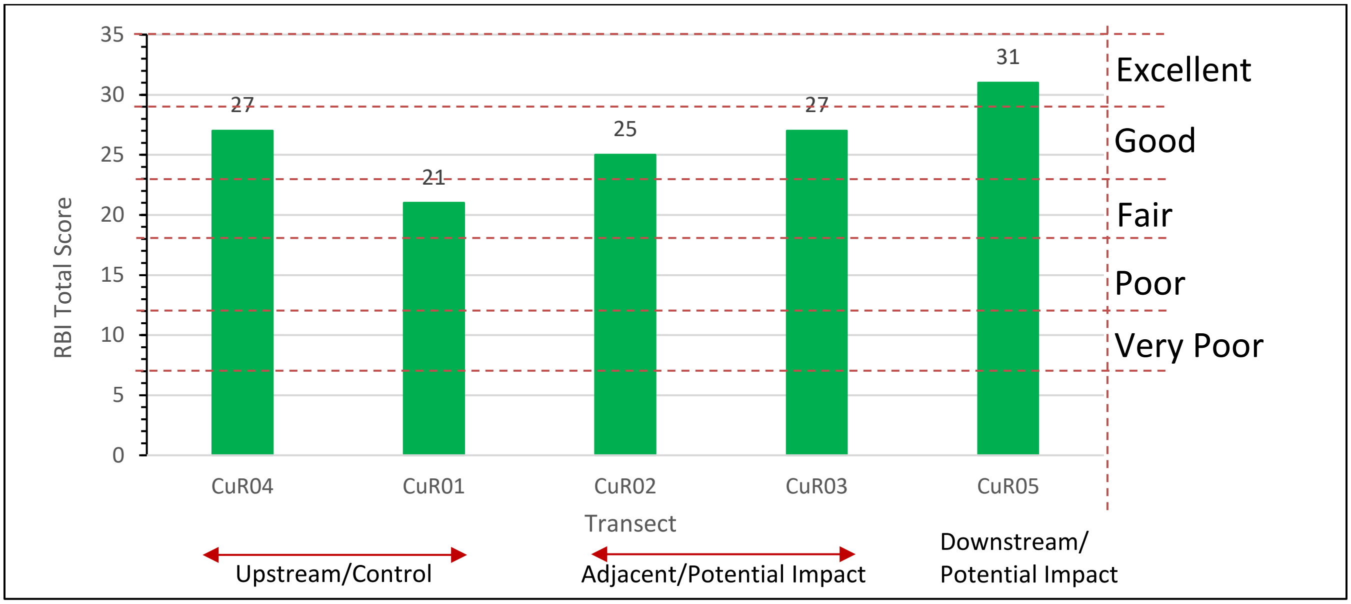
Additionally, functional feeding groups were assigned to each taxon, and community distributions were calculated as relative abundance (%). Taxa lists, the metrics described above, and feeding group distributions are included on benthic community summary sheets in Attachment J.3-A along with a summary table of feeding group distributions across the monitoring locations.

The following subsections summarize the results of the RBI applied to the Cumberland River and Wells Creek. Additionally, relationships among sampling location results observed in TTR and the HBI are also presented. Complete taxa lists, counts, metric results, and functional feeding group distributions are included in the Benthic Community Summary Sheets in Attachment J.3-A.

3.2.1.1 Reservoir Benthic Index Results

Cumberland River - RBI

Figure J.3-1 presents the RBI Total Scores and associated categorical ratings from the September 2018 (Low Pool) macroinvertebrate survey on the Cumberland River. The weighted combination of multiple indicator metrics to derive the RBI values provides a comprehensive representation of overall biological integrity for streamlined spatial comparisons across transects.



Note: Red dashed lines represent categorical rating thresholds.
Figure J.3-1 – Cumberland River 2018 RBI Results Summary

Biological integrity is similar for transects adjacent to and downstream of the CUF Plant CCR management units as compared to upstream transects. Results were between 'Fair' and 'Excellent' at all five sampling transects, and RBI Total Scores generally improved moving from upstream to downstream. The furthest downstream location, CuR05, reflected higher biological integrity than both upstream controls at CuR04 and CuR01, and each downstream and adjacent transect was categorically higher than or equivalent to these unimpacted control sites. Of the sampled stations, the transect at CuR01, slightly upstream of the CCR management units, reflected the lowest biological integrity, both categorically and in RBI Total Score.

For comparison, Figure J.3-2 provides historical average RBI results and associated categorical ratings from various biological monitoring studies performed by TVA in the Cumberland River. The historical data demonstrate a generally positive trend over time in which biological integrity improved from 2009 to 2019. From 2014 forward, findings were similar to those generated from EIP data for 2018 (Figure J.3-1), where biological integrity was consistently the same or higher downstream of the CUF Plant compared to upstream controls. Therefore, neither the EI data collected in 2018 nor historical data suggest potential impacts on benthic macroinvertebrate communities from the CUF Plant CCR management units.

Results and Discussion

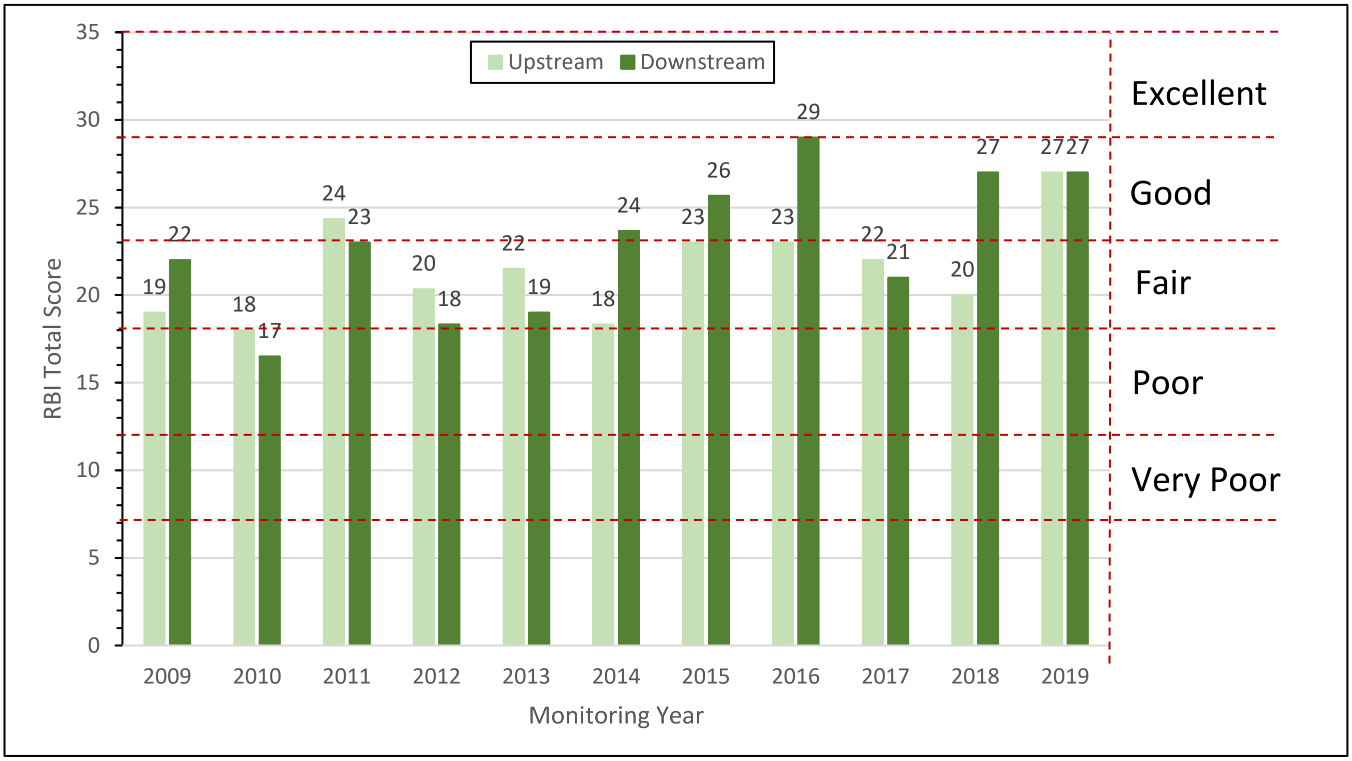


Figure J.3-2. Cumberland River Historical Average RBI Results Summary

<u>Wells Creek - RBI</u>

Figure J.3-3 depicts (Low Pool) RBI Total Scores and associated ratings determined for Wells Creek in September 2018. Spatial comparisons of these values can be used to observe patterns and possible trends reflective of changes in biological integrity downstream of a potential impact source compared to upstream control conditions. Transects WC02, WC03, WC04, WC05 and WC06 represent potentially impacted locations adjacent to the CUF Plant CCR management units. Transect WC01 represents upstream or background control conditions presumably unimpacted by the plant-related influences, including CCR materials. Historical monitoring was not performed within Wells Creek for comparison to the EI results below.

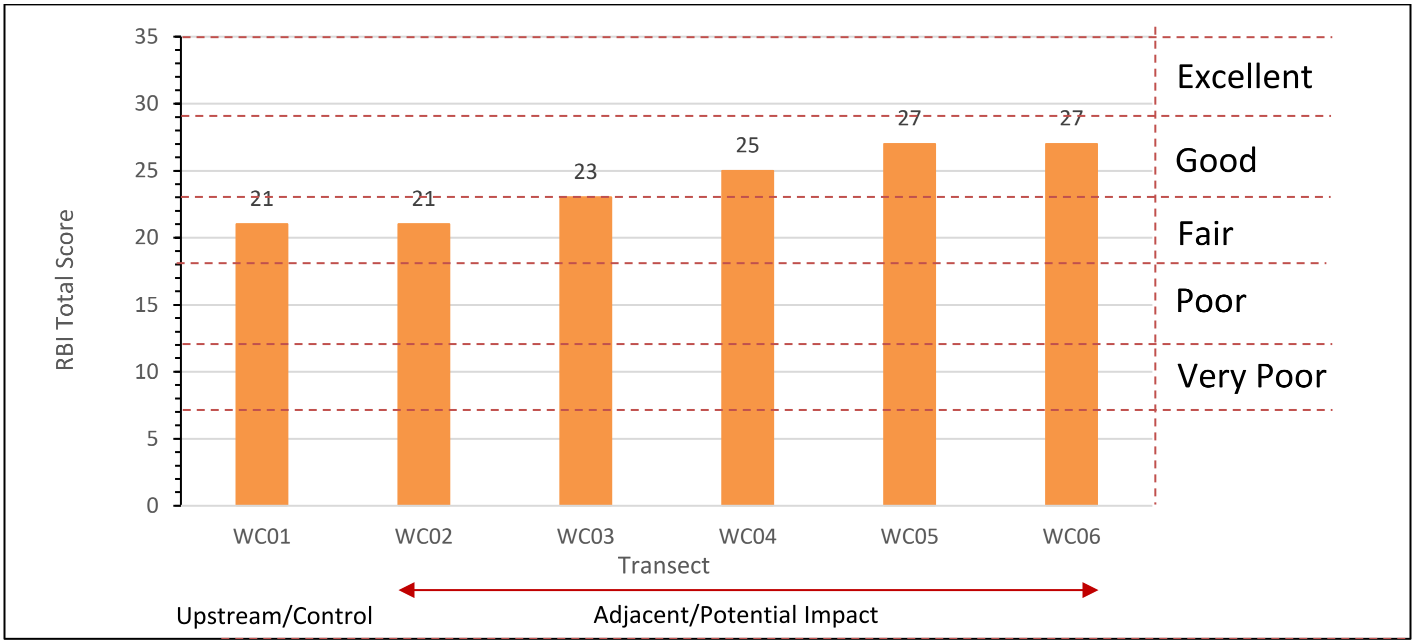


Figure J.3-3 – Wells Creek 2018 RBI Results Summary

Similar to the results from the Cumberland River, RBI scores in Wells Creek increased from upstream to downstream reflecting a possible positive trend in biological integrity. As such, environmental stressors present at the WC01 control location, upstream of potential impacts from the CUF Plant CCR management units, appear to be reduced in transects adjacent to the facility. Adjacent communities were generally within the “Good” range, and the RBI scores were higher than for the upstream control at WC01, which scored within the “Fair” category. These multi-metric findings indicate CUF Plant CCR management units appear to have no potential impacts on benthic communities in Wells Creek.

3.2.1.2 Key RBI Component Metrics and Supplemental Metrics

<u>Total Taxa Richness</u>

TTR is the number of different types of organisms observed within the benthic community at each location (typically as genera or next lowest taxonomic level). As stressors increase, they constrain the community by selecting against more sensitive organisms and specialist feeders, so a reduction in total richness is expected with increased environmental stress. TTR results are depicted in Figures J.3-4 and J.3-5 for the Cumberland River and Wells Creek, respectively.

Within the Cumberland River (Figure J.3-4), adjacent and downstream communities had higher taxa richness than the control transect CuR01 slightly upstream of the CUF Plant CCR management units; however, they were slightly lower than the control farther upstream at CuR04. These results demonstrate that community richness in potential impact areas was approximately equivalent to average richness at the control sites and therefore, unaffected by the CCR management units. Richness was generally consistent across adjacent transects, indicating a similar level of environmental stress from water quality and available habitat.

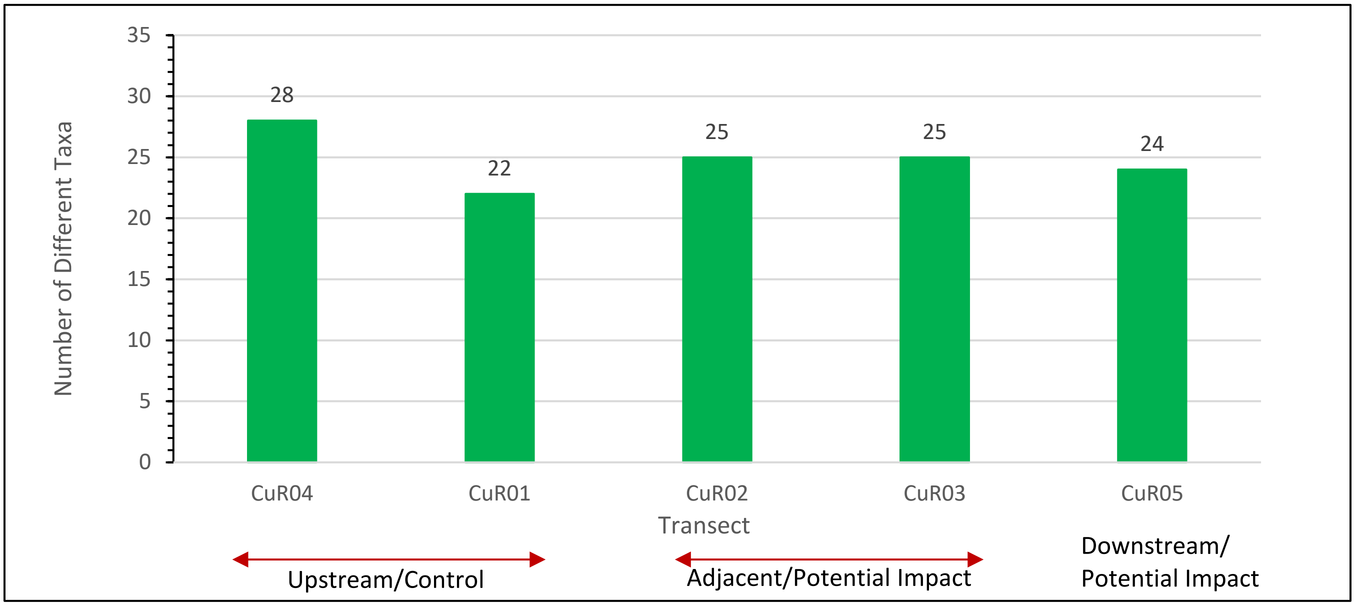


Figure J.3-4 – Total Taxa Richness Summary for the Cumberland River, 2018

In Wells Creek, richness adjacent to the CCR management units was similar to or higher than upstream controls, and the farthest downstream locations (at WC05 and WC06) contained the richest communities (Figure J.3-5). Spatial relationships in richness values observed both from Wells Creek and the Cumberland River support the RBI multi-metric findings previously discussed, which indicated conditions in the vicinity of the CUF Plant CCR management units are at least as favorable as at unimpacted upstream locations. Similarly, the results provide no evidence that CUF Plant operations are constraining downstream communities, nor do they suggest any potential biological impacts from the CUF Plant CCR management units.

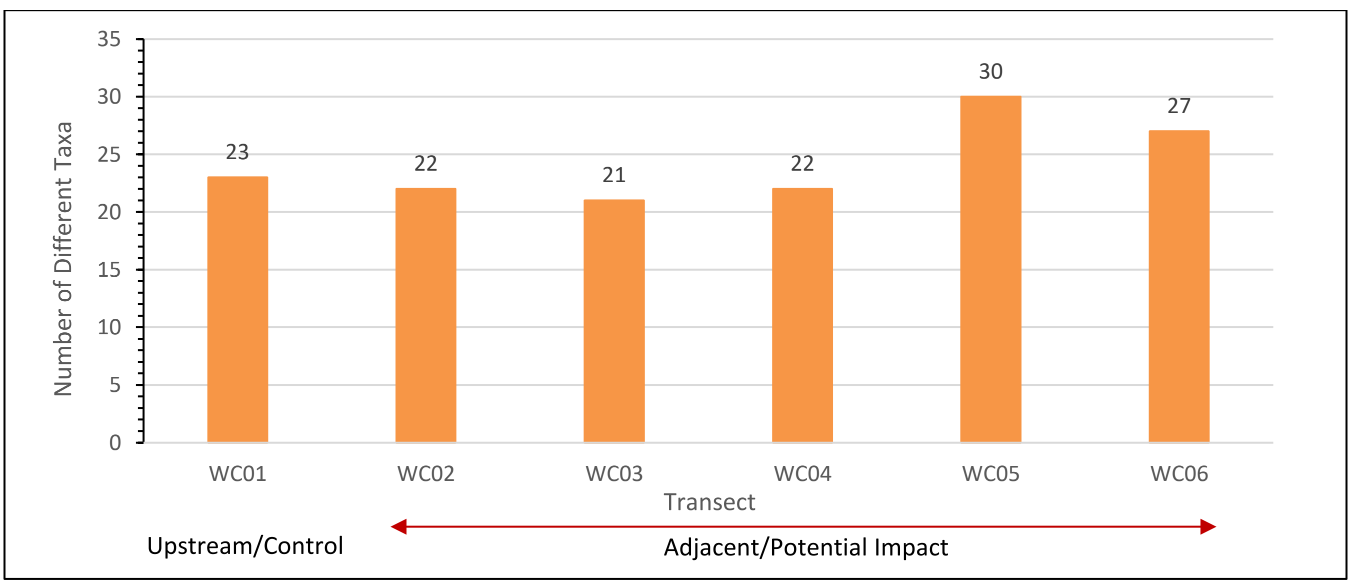
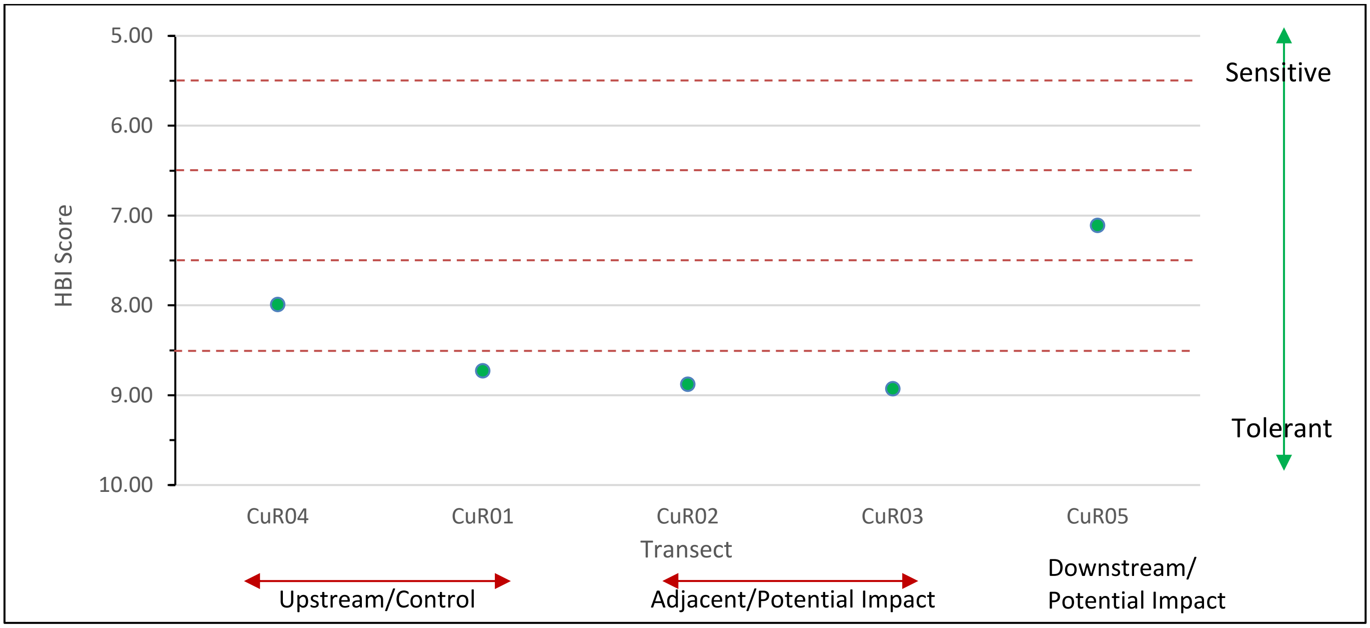


Figure J.3-5 – Total Taxa Richness Summary for Wells Creek, 2018

Hilsenhoff Biotic Index

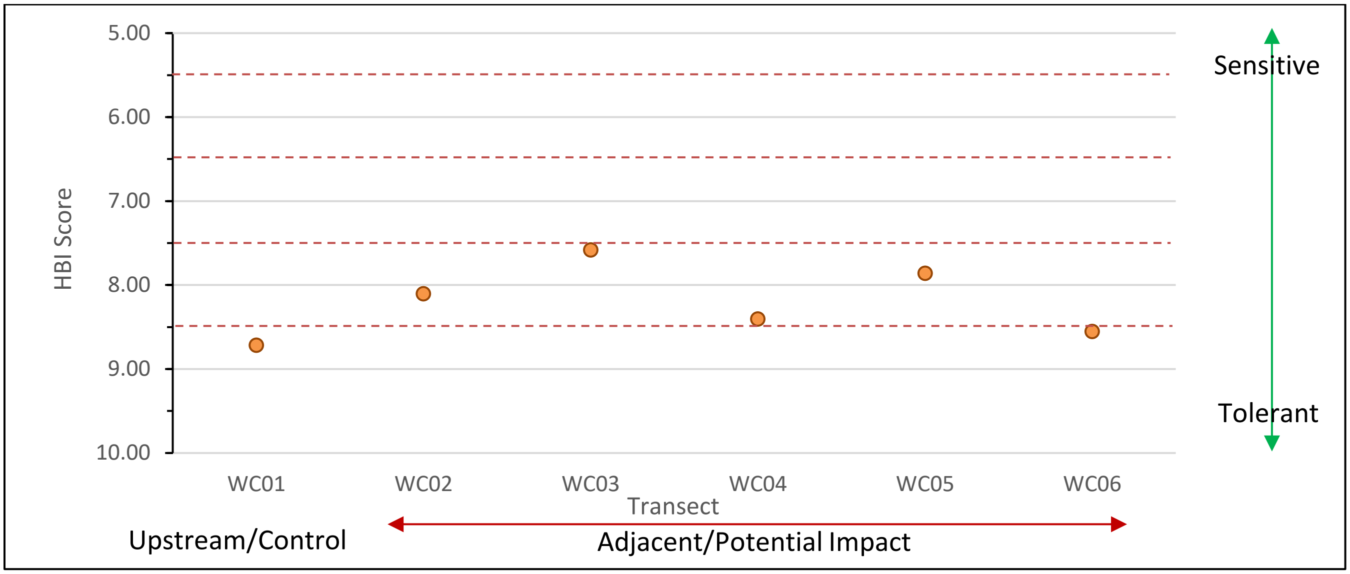
The HBI is a supplemental metric not included in the RBI multi-metric calculation; however, it provides corroborative information to help qualify those results. The HBI is a sensitivity metric that measures community environmental stress tolerance using individual taxa tolerance values weighted by relative abundance to output an average representative tolerance value for the community as a whole. More sensitive communities have lower HBI scores; higher HBI values reflect higher levels of environmental stress and a resulting more tolerant community. Figures J.3-6 and J.3-7 present HBI results for the Cumberland River and Wells Creek, respectively. Dashed red lines represent categorical breaks (e.g., Excellent, Good, Fair, etc.) to help visualize significant differences among locations, as described in Chapter 3.2.1.



Note: Red dashed lines represent categorical rating thresholds.

Figure J.3-6 – Hilsenhoff Biotic Index Summary for the Cumberland River, 2018

Spatial relationships for the HBI in the Cumberland River were similar to the RBI results previously discussed--the downstream-most station reflected most favorable biological conditions supporting a more sensitive community than either of the two upstream controls at CuR01 and CuR04. While the two transects adjacent to the CUF Plant (CuR02 and CuR03) scored slightly lower than CuR04, the farthest upstream transect, benthic communities at these locations had similar stress sensitivity/tolerance to the control at CuR01 and were within the same categorical range.



Note: Red dashed lines represent categorical rating thresholds.
Figure J.3-7 – Hilsenhoff Biotic Index Summary for Wells Creek, 2018

In Wells Creek, community sensitivity was more consistent across transects, with four of the five locations adjacent to the CUF Plant CCR management units falling within the same range. The downstream-most transect at WC06 was minimally outside of this range, but the upstream control location at WC01 similarly had the most stress-tolerant community in Total Score. These results indicate that environmental stressors adjacent to the CUF Plant CCR management units are roughly equivalent or slightly less severe than for conditions at upstream controls. Spatial relationships in HBI data do not indicate limiting effects that would have resulted in higher proportions of more tolerant organisms adjacent to the CUF Plant CCR management units.

3.3 Mayfly Tissue

In both 2018 and 2019, composite samples of mayfly (*Hexagenia* spp.) nymphs were collected from random locations in two reaches of Wells Creek adjacent to the plant (one upstream and one downstream) and three separate reaches of the Cumberland River (upstream, adjacent, and downstream of the CUF Plant), as shown on Exhibit J.3-4. In accordance with the SAP, a portion of the mayfly nymphs collected from each reach had their digestive systems depurated prior to preparing the composite samples for laboratory analysis. The remaining non-depurated mayfly nymphs from each reach were prepared as separate composite samples.

Composite samples of mayfly adults were collected from random locations in the same reaches in Wells Creek and in the Cumberland River. In 2019, adult mayflies were not encountered in adequate numbers in the area designated as upstream in Wells Creek to obtain sufficient sample mass for analysis.

The depurated mayfly nymph, non-depurated mayfly nymph, and adult mayfly composite samples were submitted for laboratory analysis of metals included in the CCR Parameters list (excluding radium 226/228). A summary of the mayfly tissue analytical results for beryllium, mercury, and selenium, identified in the exploratory data analysis for the Cumberland River and Wells Creek, is provided in Table J.3-2.

For mayfly tissue samples collected in Wells Creek, the only constituent identified for further evaluation based on sediment or surface stream sampling results above their respective ESVs was beryllium (Appendix E.7). In addition, mercury and selenium were reviewed due to their bioaccumulative characteristics. The depurated and non-depurated results were compared to Critical Body Residue (CBR) values for No Observed Adverse Effect Levels (NOAELs) and Lowest Observed Adverse Effect Levels (LOAELs), except for beryllium, for which NOAELs and LOAELs are not available.

None of the 2018 or 2019 Wells Creek composite mayfly sample concentrations were above the NOAEL or LOAEL for mercury. Below is a summary of the constituents and sample locations with results above NOAELs/LOAELs in Wells Creek adjacent to the CUF Plant CCR management units:

- In 2018, selenium concentrations in the downstream depurated mayfly nymph composite tissue sample were above the NOAEL for selenium. Selenium concentrations in the upstream depurated mayfly nymph composite tissue sample, the upstream and downstream non-depurated mayfly nymph composite tissue samples, and the upstream and downstream adult mayfly composite tissue samples were above both the NOAEL and LOAEL.

- In 2019, selenium concentrations in the upstream and downstream depurated mayfly nymph composite tissue sample and the downstream non-depurated mayfly nymph composite tissue sample were above the NOAEL for selenium. Selenium concentrations in the upstream non-depurated mayfly nymph composite tissue samples and the downstream adult mayfly composite tissue samples were above both the NOAEL and LOAEL.

For mayfly tissue samples collected in the Cumberland River, no constituents were identified for further evaluation based on sediment sampling and/or surface stream sampling results above their respective ESVs; however, mercury and selenium were reviewed further due to their bioaccumulative characteristics (Appendix E.7). None of the 2018 or 2019 Cumberland River composite mayfly sample concentrations were above the NOAEL or LOAEL for mercury. Below is a summary of the constituents and sample locations with results above the selenium NOAEL/LOAEL in the Cumberland River:

- In 2018, selenium concentrations in the upstream and adjacent depurated mayfly nymph composite tissue samples were above the NOAEL for selenium. The selenium concentrations in the downstream depurated composite tissue sample, the upstream, adjacent, and downstream non-depurated mayfly nymph composite tissue samples, and the upstream, adjacent, and downstream adult mayfly composite tissue samples were above both the NOAEL and LOAEL.

- In 2019, selenium concentrations in the upstream and downstream depurated mayfly nymph composite tissue sample and the upstream non-depurated mayfly nymph composite tissue sample were above the NOAEL for selenium. The selenium concentrations in the adjacent depurated composite tissue sample, the adjacent and downstream non-depurated mayfly nymph composite tissue samples, and the upstream, adjacent, and downstream adult mayfly composite tissue samples were above both the NOAEL and LOAEL.

Chapter 4 Summary

The following chapters summarize the evaluation findings presented in this appendix for sediment, benthic macroinvertebrate, and mayfly tissue based on historical information and EI sampling results. These data are further evaluated in the context of other environmental data in Appendices J.1 and J.2 of the EAR.

4.1 Sediment Quality

During development of the EIP, TDEC requested an evaluation of potential CCR materials deposition on the streambed of water bodies in proximity to the CUF Plant including a map depicting the location of CCR material in the stream, if identified during the investigation. Exhibit J.3-5 shows the distribution of % ash results above the 20% Phase 2 trigger and CCR Parameter results above their respective chronic ESVs for the sediment samples collected in 2018-2019, as described below and in Chapter 3.1. Exhibit J.3-6 shows the distribution of % ash results above the 20% Phase 2 trigger and CCR Parameter results above their respective chronic ESVs for the sediment samples collected in 2021, as described below and in Chapter 3.1.

The 2018-2019 PLM sample analysis results summarized in Chapter 3.1.1 above indicate very little CCR material is present in the Unnamed Tributary, except in the two farthest upstream impoundments in the Unnamed Tributary (UT01 through UT03 sediment sample locations within Ponds 3A and 3B). Further downstream in the Unnamed Tributary, ash was either not detected or was detected at concentrations below the 20% Phase 2 trigger (i.e., between 1% and 2% ash at UT04 and between 4% and 11% ash at UT05). The PLM sample analysis results from the Phase 2 supplemental sampling conducted in June and July 2021 summarized in Chapter 3.1.1 above indicate the presence of CCR material above 20% only in the farthest upstream transect (UT0.5) in Pond 3B of the Unnamed Tributary. Further downstream in the Unnamed Tributary and in Wells Creek ash was either not detected or was detected at concentrations below the 20% Phase 2 trigger (i.e., between 1% and 11% ash). The data indicate that the maximum potential extent of CCR materials appear to be limited to the two farthest upstream impoundments (Ponds 3A and 3B) of the Unnamed Tributary.

In Wells Creek and the Cumberland River, % ash results were either not detected or detected at very low levels (i.e., between 1% and 4% ash), with very little variation in results among sample locations.

Sediment sampling results for most CCR Parameters were below their respective ESVs. In the Cumberland River, the sediment results were below their respective ESVs. The concentrations of beryllium for two locations in Wells Creek (1.36 milligrams per kilogram [mg/kg] at WC08 and 1.52 mg/kg at WC09) were slightly above the chronic ESV of 1.2 mg/kg.

Sediment sampling results for most CCR Parameters were below their respective ESVs in the Unnamed Tributary as well, however arsenic, barium, molybdenum, and selenium were present at concentrations above their respective chronic ESVs in one or more sediment samples from the farthest upstream impoundment (Pond 3B). Molybdenum was also present at concentrations above its chronic ESV at two sample locations in Pond 3A (UT02 and UT03) and one location in Pond 2 (UT03.25), and beryllium and nickel were present at concentrations above their respective chronic ESVs at one sample location in Pond 1 (UT04). The absence of these constituents at concentrations above ESVs in sediment samples downstream in Wells Creek and the Cumberland River indicate any potential impacts are limited to the Unnamed Tributary, primarily in the farthest upstream impoundments.

In summary, % ash and CCR Parameter concentrations in sediment samples from the Cumberland River and Wells Creek were below chronic ESVs, except for beryllium in two sediment samples from Wells Creek. These results indicate that sediment quality in the Cumberland River and Wells Creek are within ranges that are protective of aquatic life. Phase 1 sediment sampling results identified arsenic, barium, molybdenum, and selenium above chronic ESVs in the two farthest upstream impoundments of the Unnamed Tributary (Ponds 3A and 3B). Phase 2 sediment sampling results identified arsenic, barium, and molybdenum above chronic ESVs in Pond 3B of the Unnamed Tributary, molybdenum above its chronic ESV in Ponds 3A and 2, and beryllium and nickel results above their respective chronic ESVs at one location in Pond 1. Further evaluation of the CCR Parameters detected in sediment samples above ESVs will completed in the CARA Plan.

4.2 Benthic Macroinvertebrate Community Analysis

Generally, the benthic macroinvertebrate community metrics were corroborative and demonstrated spatially consistent relationships among indicators. The RBI results for the Cumberland River and Wells Creek, representative of overall biological integrity, generally showed Total Scores improving from upstream to downstream and healthier communities adjacent to and downstream of the CUF Plant in comparison to upstream control transects. This relationship was also observed in historical data from the Cumberland River, particularly from 2014 to the most recent sampling event in 2019 and does not reflect potential impacts associated with CUF Plant CCR management units.

The select component and supplemental metrics included in the Benthic Community Analysis discussion in Chapter 3.2 corroborate the findings of the RBI evaluation. In the Cumberland River, benthic communities adjacent and downstream of the CCR management units were similarly rich compared to average results for the two upstream control locations and TTR was consistent moving downstream. In Wells Creek, the three upstream-most transects had similar taxa richness, but the two transects farthest downstream supported the richest communities within the system. As taxa richness is expected to decrease with increased environmental stress, and congruent with the RBI multi-metric results, these findings do not suggest potential impacts from the CUF Plant CCR management units have occurred, nor do they demonstrate degradation of the benthic community in downstream receiving waters.

Community sensitivity, examined through the HBI, did not follow a clear pattern nor did it demonstrate definitive spatial trends. However, the downstream-most transect in the Cumberland River supported a more sensitive benthic community than either of the two control transects. In Wells Creek, HBI Total Scores for the five transects adjacent to the CCR management units demonstrated greater community sensitivity, while the upstream control transects contained the most stress-tolerant communities. These results suggest that environmental stressors are more prevalent or more affective upstream of the CUF Plant, and CCR management units have not resulted in potential impacts to adjacent or downstream benthic communities.

In summary, benthic communities within adjacent and downstream areas appear to be at least as healthy, rich, and sensitive as unimpacted control locations upstream of the CUF Plant CCR management units. Impacts on surface stream water quality or other operational impacts are not reflected in the benthic community data.

4.3 Mayfly Tissue

The distribution of mayfly tissue results above their respective CBR values, as described below and in Chapter 3.3, is illustrated on Exhibit J.3-7.

For Wells Creek, no spatial comparisons can be made because samples were collected at adjacent locations only. For mayfly composite tissue samples collected in the Cumberland River, mercury and selenium were reviewed due to their bioaccumulative characteristics. None of the 2018 or 2019 Cumberland River composite mayfly sample concentrations were above the NOAEL or LOAEL for mercury. The selenium concentrations for the 2018 upstream and adjacent depurated mayfly nymph composite tissue samples, the 2019 upstream and downstream depurated mayfly nymph composite tissue samples, and the upstream non-depurated mayfly nymph composite tissue sample from the Cumberland River were above the NOAEL for selenium. Selenium concentrations for the downstream non-depurated Cumberland River composite tissue samples were above both the NOAEL and LOAEL for selenium. There was, however, only minimal variability in selenium concentrations relative to sampling locations (i.e., upstream versus adjacent and downstream), which suggests that concentrations greater than NOAELs and/or LOAELs in adjacent or downstream samples are not related to CUF Plant CCR management unit activities. The benthic macroinvertebrate community sampling results indicate bioaccumulation of these CCR Parameter metals is not impacting benthic macroinvertebrate populations in Wells Creek or the Cumberland River. Further evaluation of the ecological implications of the mayfly tissue concentrations will be completed in the CARA Plan.

Chapter 5 References

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TABLES

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		CuR01						
Sample Date						11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18
Sample ID						CUF-SED-CuR01-CORCC-0.0/0.5-20181011	CUF-SED-CuR01-CORCC-0.0/0.5-20181011	CUF-SED-CuR01-CORLB-0.0/0.5-20181011	CUF-SED-CuR01-CORLB-0.0/0.5-20181011	CUF-SED-CuR01-CORRB-0.0/0.5-20181011	CUF-SED-CuR01-CORRB-0.0/0.5-20181011	CUF-SED-CuR01-CORRB-0.5/1.4-20181011
Parent Sample ID												
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.4 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC							
Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.120 J	-	0.223 J	-	0.197 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	2.99	-	4.34	-	4.17	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	30.5	-	82.7	-	65.4	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.396	-	0.846	-	0.663	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	1.67 J	-	2.69 J	-	2.67 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.257	-	0.387	-	0.581	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	8,090	-	5,790	-	5,780	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	9.34	-	11.4	-	10.3	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	3.73	-	7.99	-	7.04	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	3.03	-	9.45	-	8.36	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	8.37	-	14.2	-	12.1	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	3.73 J	-	10.6 J	-	7.51 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	<0.0430	-	0.0565 J	-	<0.0542	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.779 J	-	1.12	-	0.690 J	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	6.03	-	12.8	-	10.7	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.239 J	-	0.411	-	0.467	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0254 J	-	0.0443 J	-	0.0434 J	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	19.3	-	25.2	-	20.7	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.210	-	0.210	-	0.133	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	6.89	-	16.0	-	12.0	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	36.9	-	52.4	-	52.6	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.427 +/-(0.126)J	-	1.05 +/-(0.229)J	-	1.44 +/-(0.323)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	0.306 +/-(0.170)	-	1.02 +/-(0.272)	-	1.17 +/-(0.300)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	0.733 +/-(0.212)J	-	2.07 +/-(0.356)J	-	2.61 +/-(0.441)J	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<10.4	-	<12.2	-	<12.9	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	<1.19	-	<1.40	-	<1.47	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	29.8 U*	-	89.4 J	-	156 J	-
General Chemistry												
% ASH	%	20[E]	40[F]	n/v	n/v	<1	-	1	-	<1	-	<1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.4	-	7.4	-	6.9	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	20.7	-	20.6	-	20.8	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		CuR02				CuR03		
Sample Date						11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18
Sample ID						CUF-SED-CuR02-CORCC-0.0/0.5-20181011	CUF-SED-CuR02-CORCC-0.0/0.5-20181011	CUF-SED-CuR02-CORRB-0.0/0.5-20181011	CUF-SED-CuR02-CORRB-0.0/0.5-20181011	CUF-SED-CuR03-CORLB-0.0/0.5-20181010	CUF-SED-CuR03-CORLB-0.0/0.5-20181010	CUF-SED-CuR03-CORLB-0.5/5.0-20181010
Parent Sample ID												
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC							
Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.241 J	-	0.214 J	-	0.209 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	5.38 J	-	4.32	-	4.22	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	85.2 J	-	70.4	-	65.7	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.832 J	-	0.691	-	0.670	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	3.00 J	-	2.33 J	-	2.23 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.856 J	-	0.578	-	0.385	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	5,310 J	-	5,280	-	6,520	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	12.6 J	-	11.1	-	10.9	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	8.37 J	-	7.33	-	7.06	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	10.6 J	-	8.40	-	8.02	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	16.1 J	-	12.7	-	12.8	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	10.9 J	-	8.72 J	-	7.45 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0588 UJ	-	<0.0525	-	<0.0468	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.936 J	-	0.729 J	-	0.757	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	14.0 J	-	11.5	-	10.4	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.544 J	-	0.475	-	0.509	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0510 J	-	0.0496 J	-	0.0451 J	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	25.9 J	-	19.8	-	21.7	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.181 J	-	0.133	-	0.139	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	15.4 J	-	13.4	-	13.6	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	110 J	-	63.7	-	49.6	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.20 +/-(0.255)J	-	1.15 +/-(0.259)J	-	0.989 +/-(0.277)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.26 +/-(0.330)	-	1.07 +/-(0.282)	-	0.875 +/-(0.317)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.46 +/-(0.417)J	-	2.22 +/-(0.383)J	-	1.86 +/-(0.421)J	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	14.4 UJ	-	<12.4	-	<10.9	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.65 UJ	-	<1.41	-	<1.25	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	43.8 U*	-	70.1 J	-	134 J	-
General Chemistry												
% ASH	%	20[E]	40[F]	n/v	n/v	<1	-	<1	-	1	-	<1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.5	-	7.0	-	6.7	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	20.4	-	20.4	-	20.7	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location						CuR03					CuR04			
Sample Date		Freshwater Sediment		Sediment Quality		10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18
Sample ID						CUF-SED-CuR03-CORRB-0.0/0.5-20181010	CUF-SED-CuR03-CORRB-0.0/0.5-20181010	CUF-SED-CuR03-CORRB-0.5/2.1-20181010	CUF-SED-CuR03-CORRB-2.1/2.6-20181010	CUF-SED-CuR03-CORRB-2.6/3.1-20181010	CUF-SED-CuR04-CORCC-0.0/0.5-20181010	CUF-SED-CuR04-CORCC-0.0/0.5-20181010	CUF-SED-CuR04-CORLB-0.0/0.5-20181010	CUF-SED-CuR04-CORLB-0.0/0.5-20181010
Parent Sample ID														
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.1 ft	2.1 - 2.6 ft	2.6 - 3.1 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Validated
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.103 J	-	-	-	-	0.178 J	-	0.186 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	2.74	-	-	-	-	3.18	-	3.88
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	26.2	-	-	-	-	39.4	-	64.6
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.353	-	-	-	-	0.489	-	0.647
Boron	mg/kg	n/v	n/v	n/v	n/v	-	1.09 J	-	-	-	-	3.62 J	-	2.95 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.196	-	-	-	-	0.382	-	0.526
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	9,900	-	-	-	-	6,200	-	6,810
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	7.14	-	-	-	-	8.31	-	10.6
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	3.44	-	-	-	-	4.58	-	7.12
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	2.32	-	-	-	-	5.56	-	9.00
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	6.53	-	-	-	-	9.23	-	12.7
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	2.75 J	-	-	-	-	5.11 J	-	7.97 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	<0.0398	-	-	-	-	<0.0439	-	<0.0491
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.488 U*	-	-	-	-	0.647	-	1.15
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	5.21	-	-	-	-	7.64	-	11.1
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.274 J	-	-	-	-	0.288 J	-	0.414
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0214 J	-	-	-	-	0.0313 J	-	0.0504 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	22.0	-	-	-	-	17.2	-	23.1
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.0561 J	-	-	-	-	0.0988	-	0.206
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	5.50	-	-	-	-	7.95	-	12.7
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	25.2	-	-	-	-	40.2	-	55.7
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.449 +/-(0.132)J	-	-	-	-	0.912 +/-(0.231)J	-	1.21 +/-(0.247)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	0.0881 +/-(0.250)U	-	-	-	-	0.495 +/-(0.203)	-	0.906 +/-(0.214)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	0.537 +/-(0.283)J	-	-	-	-	1.41 +/-(0.308)J	-	2.12 +/-(0.327)J
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<9.39	-	-	-	-	<10.1	-	<11.4
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	<1.07	-	-	-	-	<1.16	-	1.33 U*
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	14.2 U*	-	-	-	-	103 J	-	127 J
General Chemistry														
% ASH	%	20[E]	40[F]	n/v	n/v	<1	-	2	1	1	3	-	1	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.2	-	-	-	-	7.1	-	7.0
Temperature	DEG C	n/v	n/v	n/v	n/v	-	20.3	-	-	-	-	20.4	-	20.2

See notes on last page.

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Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location						CuR04						CuR05			
Sample Date		Freshwater Sediment		Sediment Quality		10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	10-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18
Sample ID						CUF-SED-CuR04-CORLB-0.5/2.1-20181010	CUF-SED-CuR04-CORLB-2.1/2.9-20181010	CUF-SED-CuR04-DUP01-20181010	CUF-SED-CuR04-CORRB-0.0/0.5-20181010	CUF-SED-CuR04-CORRB-0.0/0.5-20181010	CUF-SED-CuR04-CORRB-0.5/1.3-20181010	CUF-SED-CuR05-CORCC-0.0/0.5-20181009	CUF-SED-CuR05-CORCC-0.0/0.5-20181009	CUF-SED-CuR05-CORLB-0.0/0.5-20181009	CUF-SED-CuR05-CORLB-0.0/0.5-20181009
Parent Sample ID								CUF-SED-CuR04-CORLB-0.5/2.1-20181010							
Sample Depth						0.5 - 2.1 ft	2.1 - 2.9 ft	0.5 - 2.1 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.3 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Validated
		Chronic	Acute	TEC	PEC										
Metals															
Antimony	mg/kg	2^{A}	25^{B}	n/v	n/v	-	-	-	-	0.104 J	-	-	0.186 J	-	0.198 J
Arsenic	mg/kg	9.8^{A}	33^{B}	9.8^{C}	33^{D}	-	-	-	-	2.72	-	-	5.45	-	4.03
Barium	mg/kg	240^{A}	$22,925^{B}$	n/v	n/v	-	-	-	-	35.6	-	-	60.8	-	66.3
Beryllium	mg/kg	1.2^{A}	42^{B}	n/v	n/v	-	-	-	-	0.380	-	-	0.663	-	0.608
Boron	mg/kg	n/v	n/v	n/v	n/v	-	-	-	-	1.70 J	-	-	2.39 J	-	2.38 J
Cadmium	mg/kg	1^{A}	5^{B}	1^{C}	5^{D}	-	-	-	-	0.192	-	-	0.540	-	0.501
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	-	7,830	-	-	6,770	-	7,540
Chromium	mg/kg	43.4^{A}	111^{B}	43^{C}	110^{D}	-	-	-	-	7.68	-	-	11.0	-	10.1
Cobalt	mg/kg	50^{A}	n/v	50^{C}	n/v	-	-	-	-	4.17	-	-	7.63	-	6.91
Copper	mg/kg	31.6^{A}	149^{B}	32^{C}	150^{D}	-	-	-	-	4.26	-	-	8.36	-	9.33
Lead	mg/kg	35.8^{A}	128^{B}	36^{C}	130^{D}	-	-	-	-	8.02	-	-	11.8	-	12.7
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	-	4.50 J	-	-	7.10 J	-	6.92 J
Mercury	mg/kg	0.18^{A}	1.1^{B}	0.18^{C}	1.1^{D}	-	-	-	-	<0.0411	-	-	<0.0482	-	<0.0461
Molybdenum	mg/kg	38^{A}	$69,760^{B}$	n/v	n/v	-	-	-	-	0.482 J	-	-	0.890 U*	-	0.825 U*
Nickel	mg/kg	22.7^{A}	48.6^{B}	23^{C}	49^{D}	-	-	-	-	6.93	-	-	11.5	-	10.2
Selenium	mg/kg	2^{A}	2.9^{B}	n/v	n/v	-	-	-	-	0.184 J	-	-	0.456	-	0.495
Silver	mg/kg	1^{A}	2.2^{B}	n/v	n/v	-	-	-	-	0.0321 J	-	-	0.0432 J	-	0.0708
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	-	19.5	-	-	22.3	-	23.4
Thallium	mg/kg	1.2^{A}	10^{B}	n/v	n/v	-	-	-	-	0.0787	-	-	0.134	-	0.127
Vanadium	mg/kg	66^{A}	564^{B}	n/v	n/v	-	-	-	-	7.25	-	-	11.8	-	11.6
Zinc	mg/kg	121^{A}	459^{B}	120^{C}	460^{D}	-	-	-	-	28.3	-	-	57.8	-	51.5
Radiological Parameters															
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	-	-	-	0.687 +/-(0.155)	-	-	0.807 +/-(0.232)	-	1.16 +/-(0.287)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	-	-	-	0.639 +/-(0.170)	-	-	0.926 +/-(0.395)	-	0.954 +/-(0.400)
Radium-226+228	pCi/g	90^{A}	90^{B}	n/v	n/v	-	-	-	-	1.33 +/-(0.230)	-	-	1.73 +/-(0.458)	-	2.11 +/-(0.492)
Anions															
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	-	<9.87	-	-	11.1 UR	-	10.9 UR
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	-	<1.13	-	-	1.27 UR	-	1.34 U*
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	-	-	-	33.8 J	-	-	65.7 J	-	43.0 J
General Chemistry															
% ASH	%	20^{E}	40^{F}	n/v	n/v	<1	1	<1	<1	-	<1	<1	-	<1	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	-	-	-	7.1	-	-	7.1	-	6.8
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	21.4	-	-	20.5	-	20.2

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		CuR05					CuR06			
Sample Date						9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18
Sample ID						CUF-SED-CuR05-CORLB-0.5/2.0-20181009	CUF-SED-CuR05-CORLB-2.0/4.7-20181009	CUF-SED-CuR05-CORRB-0.0/0.5-20181009	CUF-SED-CuR05-CORRB-0.0/0.5-20181009	CUF-SED-CuR05-CORRB-0.5/1.6-20181009	CUF-SED-CuR06-CORCC-0.0/0.5-20181009	CUF-SED-CuR06-CORCC-0.0/0.5-20181009	CUF-SED-CuR06-CORLB-0.0/0.5-20181009	CUF-SED-CuR06-CORLB-0.0/0.5-20181009
Parent Sample ID														
Sample Depth						0.5 - 2 ft	2 - 4.7 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.6 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Validated
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	-	-	0.394 J	-	-	0.193 J	-	0.220 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	-	-	3.83	-	-	5.32	-	4.51
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	-	-	57.2	-	-	68.6	-	85.4
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	-	-	0.572	-	-	0.678	-	0.743
Boron	mg/kg	n/v	n/v	n/v	n/v	-	-	-	2.34 J	-	-	4.76 J	-	2.60 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	-	-	0.409	-	-	0.600	-	0.750
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	7,210	-	-	6,980	-	5,470
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	-	-	9.38	-	-	12.0	-	11.3
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	-	-	5.87	-	-	7.45	-	7.87
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	-	-	6.99	-	-	11.4	-	11.6
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	-	-	10.8	-	-	12.9	-	15.0
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	6.41 J	-	-	7.78 J	-	8.19 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	-	-	<0.0438	-	-	<0.0505	-	0.0488 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	-	-	1.12	-	-	0.873 U*	-	0.990 U*
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	-	-	9.21	-	-	11.5	-	12.1
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	-	-	0.364 J	-	-	0.441	-	0.567
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	-	-	0.0438 J	-	-	0.0540 J	-	0.0721 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	22.2	-	-	28.6	-	21.1
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	-	-	0.196	-	-	0.141	-	0.158
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	-	-	10.8	-	-	12.9	-	14.5
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	-	-	48.2	-	-	61.4	-	70.9
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	-	-	1.06 +/-(0.236)	-	-	1.05 +/-(0.270)	-	1.30 +/-(0.338)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	-	-	0.955 +/-(0.292)	-	-	0.841 +/-(0.323)	-	1.20 +/-(0.287)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	-	-	2.02 +/-(0.375)	-	-	1.89 +/-(0.421)	-	2.50 +/-(0.443)
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	10.4 UR	-	-	26.6 U*	-	10.7 UR
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	1.19 UR	-	-	1.36 UR	-	1.65 U*
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	-	-	70.5 J	-	-	219 J	-	82.7 J
General Chemistry														
% ASH	%	20[E]	40[F]	n/v	n/v	<1	1	<1	-	<1	<1	-	1	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	-	-	6.9	-	-	7.1	-	6.9
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	20.2	-	-	19.9	-	20.0

See notes on last page.

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Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		CuR06				CuR07				
Sample Date						9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	8-Oct-18	8-Oct-18	8-Oct-18	8-Oct-18	8-Oct-18
Sample ID						CUF-SED-CuR06-CORLB-0.5/6.0-20181009	CUF-SED-CuR06-CORRB-0.0/0.5-20181009	CUF-SED-CuR06-CORRB-0.0/0.5-20181009	CUF-SED-CuR06-CORRB-0.5/1.7-20181009	CUF-SED-CuR07-CORLB-0.0/0.5-20181008	CUF-SED-CuR07-CORLB-0.0/0.5-20181008	CUF-SED-CuR07-CORLB-0.5/4.3-20181008	CUF-SED-CuR07-DUP01-20181008	CUF-SED-CuR07-DUP01-20181008
Parent Sample ID													CUF-SED-CuR07-CORLB-0.0/0.5-20181008	CUF-SED-CuR07-CORLB-0.0/0.5-20181008
Sample Depth						0.5 - 6 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.7 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 4.3 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Validated
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	-	0.327 J	-	-	0.357 J	-	-	0.324 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	-	6.08	-	-	6.04	-	-	6.24
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	-	81.6	-	-	115	-	-	119
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	-	0.774	-	-	0.951	-	-	0.970
Boron	mg/kg	n/v	n/v	n/v	n/v	-	-	2.56 J	-	-	2.97 J	-	-	2.96 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	-	0.509	-	-	0.571	-	-	0.556
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	-	5,340	-	-	5,920	-	-	6,200
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	-	12.7	-	-	17.6	-	-	18.4
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	-	8.83	-	-	10.5	-	-	10.6
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	-	12.5	-	-	13.5	-	-	13.9
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	-	19.7	-	-	27.1	-	-	27.6
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	-	7.83 J	-	-	9.76 J	-	-	10.5 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	-	0.0702 J	-	-	0.0609 J	-	-	0.0682 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	-	1.34	-	-	1.96	-	-	1.51
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	-	12.3	-	-	16.0	-	-	16.9
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	-	0.573	-	-	0.695	-	-	0.704
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	-	0.155	-	-	0.324	-	-	0.321
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	-	22.0	-	-	26.2	-	-	27.5
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	-	0.164	-	-	0.293	-	-	0.230
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	-	16.5	-	-	20.5	-	-	20.7
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	-	57.6	-	-	76.6	-	-	78.1
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	-	1.20 +/-(0.250)	-	-	1.64 +/-(0.358)	-	-	1.27 +/-(0.260)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	-	1.15 +/-(0.277)	-	-	1.44 +/-(0.369)	-	-	1.33 +/-(0.297)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	-	2.35 +/-(0.373)	-	-	3.08 +/-(0.514)	-	-	2.60 +/-(0.395)J
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	-	11.3 UR	-	-	10.5 UR	-	-	10.7 UR
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	-	1.76 U*	-	-	2.10 U*	-	-	2.04 U*
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	-	144 J	-	-	38.1 U*	-	-	33.4 U*
General Chemistry														
% ASH	%	20[E]	40[F]	n/v	n/v	2	<1	-	3	2	-	2	<1	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	-	6.9	-	-	6.9	-	-	7.0
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	20.0	-	-	20.0	-	-	20.0

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		CuR07							DC01		
Sample Date						9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18
Sample ID						CUF-SED-CuR07-CORCC-0.0/0.5-20181009	CUF-SED-CuR07-CORCC-0.0/0.5-20181009	CUF-SED-CuR07-CORRB-0.0/0.5-20181009	CUF-SED-CuR07-CORRB-0.0/0.5-20181009	CUF-SED-CuR07-CORRB-0.5/3.4-20181009	CUF-SED-CuR07-CORRB-3.4/4.8-20181009	CUF-SED-CuR07-CORRB-4.8/5.7-20181009	CUF-SED-DC01-CORCC-0.0/0.5-20181009	CUF-SED-DC01-CORCC-0.0/0.5-20181009	CUF-SED-DC01-CORCC-0.5/1.0-20181009
Parent Sample ID															
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 3.4 ft	3.4 - 4.8 ft	4.8 - 5.7 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC										
Metals															
Antimony	mg/kg	2^{A}	25^{B}	n/v	n/v	-	0.214 J	-	0.184 J	-	-	-	-	0.335 J	-
Arsenic	mg/kg	9.8^{A}	33^{B}	9.8^{C}	33^{D}	-	4.30	-	3.65	-	-	-	-	5.22	-
Barium	mg/kg	240^{A}	$22,925^{B}$	n/v	n/v	-	72.8	-	60.3	-	-	-	-	63.2	-
Beryllium	mg/kg	1.2^{A}	42^{B}	n/v	n/v	-	0.706	-	0.588	-	-	-	-	0.578	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.40 J	-	2.08 J	-	-	-	-	5.36	-
Cadmium	mg/kg	1^{A}	5^{B}	1^{C}	5^{D}	-	0.604	-	0.620	-	-	-	-	0.355	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	5,750	-	6,120	-	-	-	-	51,200	-
Chromium	mg/kg	43.4^{A}	111^{B}	43^{C}	110^{D}	-	11.7	-	10.4	-	-	-	-	10.0	-
Cobalt	mg/kg	50^{A}	n/v	50^{C}	n/v	-	7.44	-	6.87	-	-	-	-	5.68	-
Copper	mg/kg	31.6^{A}	149^{B}	32^{C}	150^{D}	-	11.2	-	9.89	-	-	-	-	8.79	-
Lead	mg/kg	35.8^{A}	128^{B}	36^{C}	130^{D}	-	14.4	-	12.3	-	-	-	-	14.1	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	7.98 J	-	6.65 J	-	-	-	-	5.33 J	-
Mercury	mg/kg	0.18^{A}	1.1^{B}	0.18^{C}	1.1^{D}	-	<0.0513	-	0.0602 J	-	-	-	-	<0.0426	-
Molybdenum	mg/kg	38^{A}	$69,760^{B}$	n/v	n/v	-	0.900 U*	-	0.852 U*	-	-	-	-	2.32	-
Nickel	mg/kg	22.7^{A}	48.6^{B}	23^{C}	49^{D}	-	11.8	-	10.4	-	-	-	-	8.98	-
Selenium	mg/kg	2^{A}	2.9^{B}	n/v	n/v	-	0.492	-	0.468	-	-	-	-	0.437	-
Silver	mg/kg	1^{A}	2.2^{B}	n/v	n/v	-	0.0515 J	-	0.0674 J	-	-	-	-	0.0868	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	20.8	-	20.2	-	-	-	-	44.9	-
Thallium	mg/kg	1.2^{A}	10^{B}	n/v	n/v	-	0.153	-	0.134	-	-	-	-	0.156	-
Vanadium	mg/kg	66^{A}	564^{B}	n/v	n/v	-	13.9	-	11.6	-	-	-	-	11.9	-
Zinc	mg/kg	121^{A}	459^{B}	120^{C}	460^{D}	-	58.7	-	58.2	-	-	-	-	44.7	-
Radiological Parameters															
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.05 +/-(0.227)	-	1.32 +/-(0.289)	-	-	-	-	1.26 +/-(0.276)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.06 +/-(0.266)	-	1.16 +/-(0.319)	-	-	-	-	0.726 +/-(0.370)	-
Radium-226+228	pCi/g	90^{A}	90^{B}	n/v	n/v	-	2.11 +/-(0.350)	-	2.48 +/-(0.430)	-	-	-	-	1.99 +/-(0.462)J	-
Anions															
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	12.1 UR	-	10.6 UR	-	-	-	-	9.87 UR	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.42 U*	-	1.39 U*	-	-	-	-	1.30 U*	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	106 J	-	116 J	-	-	-	-	54.2 J	-
General Chemistry															
% ASH	%	20^{E}	40^{F}	n/v	n/v	<1	-	<1	-	<1	1	1	<1	-	3
pH (lab)	SU	n/v	n/v	n/v	n/v	-	6.9	-	6.8	-	-	-	-	7.1	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	20.1	-	19.9	-	-	-	-	20.1	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location						DC01								
Sample Date						9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18	9-Oct-18
Sample ID		Freshwater Sediment		Sediment Quality		CUF-SED-DC01-CORLB-0.0/0.5-20181009	CUF-SED-DC01-CORLB-0.0/0.5-20181009	CUF-SED-DC01-CORLB-0.5/1.9-20181009	CUF-SED-DC01-CORRB-0.0/0.5-20181009	CUF-SED-DC01-CORRB-0.0/0.5-20181009	CUF-SED-DC01-CORRB-0.5/2.2-20181009	CUF-SED-DC01-CORRB-0.5/2.2-20181009	CUF-SED-DC01-CORRB-2.2/5.6-20181009	CUF-SED-DC01-CORRB-5.6/6.0-20181009
Parent Sample ID														
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.9 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.2 ft	0.5 - 2.2 ft	2.2 - 5.6 ft	5.6 - 6 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.401 J	-	-	0.261 J	-	0.292 J	-	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	5.54	-	-	3.62	-	4.50	-	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	119	-	-	49.8	-	64.3	-	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.637	-	-	0.509	-	0.675	-	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	4.34 J	-	-	5.91	-	7.75	-	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.419	-	-	0.300	-	0.524	-	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	24,900	-	-	11,200	-	10,700	-	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	11.7	-	-	10.3	-	13.6	-	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	7.04	-	-	5.53	-	7.12	-	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	10.4	-	-	8.64	-	11.9	-	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	20.7	-	-	19.5	-	20.5	-	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	6.06 J	-	-	5.25 J	-	6.73 J	-	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0619 J	-	-	<0.0415	-	0.0604 J	-	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.63	-	-	1.02	-	1.10	-	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	12.5	-	-	8.92	-	11.6	-	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.518	-	-	0.350	-	0.443	-	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.111	-	-	0.0661 J	-	0.146	-	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	53.6	-	-	26.0	-	28.6	-	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.237	-	-	0.121	-	0.153	-	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	11.1	-	-	9.20	-	11.8	-	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	56.4	-	-	47.4	-	72.7	-	-
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.873 +/-(0.198)J	-	-	1.04 +/-(0.252)J	-	0.864 +/-(0.239)J	-	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	0.520 +/-(0.171)	-	-	0.327 +/-(0.213)U	-	0.204 +/-(0.307)U	-	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	1.39 +/-(0.262)J	-	-	1.37 +/-(0.330)J	-	1.07 +/-(0.389)J	-	-
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	9.82 UR	-	-	9.77 UR	-	9.71 UR	-	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.40 U*	-	-	1.12 UR	-	1.57 U*	-	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	36.8 J	-	-	20.4 U*	-	10.6 U*	-	-
General Chemistry														
% ASH	%	20[E]	40[F]	n/v	n/v	2	-	<1	<1	-	1	-	1	1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.1	-	-	7.2	-	7.0	-	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	20.1	-	-	20.2	-	20.2	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		PO01						
Sample Date						18-Oct-18	18-Oct-18	18-Oct-18	18-Oct-18	18-Oct-18	18-Oct-18	18-Oct-18
Sample ID						CUF-SED-PO01-CORCC-0.0/0.5-20181018	CUF-SED-PO01-CORCC-0.5/1.4-20181018	CUF-SED-PO01-CORLB-0.0/0.5-20181018	CUF-SED-PO01-CORRB-0.0/0.5-20181018	CUF-SED-PO01-CORRB-0.5/1.3-20181018	CUF-SED-PO01-CORRB-1.3/2.3-20181018	CUF-SED-PO01-DUP01-20181018
Parent Sample ID												CUF-SED-PO01-CORRB-1.3/2.3-20181018
Sample Depth						0 - 0.5 ft	0.5 - 1.4 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.3 ft	1.3 - 2.3 ft	1.3 - 2.3 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.185 J	0.232 J	0.251 J	0.125 J	-	-	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	5.48	7.23	8.01 J	3.95	-	-	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	67.7	81.9	80.4 J	38.9	-	-	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.653	0.752	0.914 J	0.380	-	-	-
Boron	mg/kg	n/v	n/v	n/v	n/v	3.91 J	3.16 J	4.62 J	4.85 J	-	-	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.332	0.333	0.430 J	0.220	-	-	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	14,400 J	5,820 J	16,400 J	15,400 J	-	-	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	14.7 J	15.8 J	18.5 J	9.32 J	-	-	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	9.61	10.2	14.0 J	7.15	-	-	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	13.7	15.1	15.7 J	8.51	-	-	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	13.8	17.0	18.3 J	8.53	-	-	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	7.50 J	7.48 J	8.77 J	3.80 J	-	-	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0656 J	0.0654 J	0.0693 J	0.0479 J	-	-	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	0.844	1.05	1.18 J	0.515	-	-	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	15.2	16.2	19.5 J	9.69	-	-	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	0.431 J	0.506	0.648 J	0.514	-	-	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0591 J	0.0699 J	0.0632 J	0.0343 J	-	-	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	31.8	24.4	34.7 J	22.8	-	-	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.228	0.222	0.283 J	0.154	-	-	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	21.7	24.8	28.6 J	15.7	-	-	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	54.9	53.9	64.6 J	34.7	-	-	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	-	-	-	-	-	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	43.5	26.6	47.0 J	25.9	-	-	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	1.77 U*	2.45 U*	2.44 U*	1.28 UJ	-	-	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	1,050	43.5	196 J	426	-	-	-
General Chemistry												
% ASH	%	20[E]	40[F]	n/v	n/v	1	<1	3	1	1	1	2
pH (lab)	SU	n/v	n/v	n/v	n/v	7.2	7.2	7.0	7.1	-	-	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		UT0.5				UT01			
Sample Date						29-Jul-21	29-Jul-21	29-Jul-21	29-Jul-21	21-Aug-19	21-Aug-19	21-Aug-19	21-Aug-19
Sample ID						CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	CUF-SED-UT0.5-DUP01-20210729	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	CUF-SED-UT0.5-CORRB-0.0/0.5-20210729	CUF-SED-UT01-CORCC-0.0/0.5-20190821	CUF-SED-UT01-CORLB-0.0/0.5-20190821	CUF-SED-UT01-CORRB-0.0/0.5-20190821	CUF-SED-UT01-DUP01-20190821
Parent Sample ID							CUF-SED-UT0.5-CORCC-0.0/0.4-20210729						CUF-SED-UT01-CORRB-0.0/0.5-20190821
Sample Depth						0 - 0.4 ft	0 - 0.4 ft	0 - 0.3 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC								
Metals													
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.206 J	0.210 J	0.212 J	0.329 J	0.243 J	0.296 J	0.247 J	0.284 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	8.25 J	8.40 J	**10.3 J[AC]**	**12.7 J[AC]**	5.97 J	7.26 J	8.40 J	8.75 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	167 J	172 J	159 J	**348 J[A]**	188 J	140 J	188 J	190 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.987 J	1.06 J	1.04 J	1.17 J	1.06 J	0.952 J	1.10 J	1.05 J
Boron	mg/kg	n/v	n/v	n/v	n/v	44.9 J	48.5 J	33.0 J	176 J	54.8 J	37.4 J	81.9 J	91.0 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.302 J	0.340 J	0.410 J	0.508 J	0.308 J	0.328 J	0.301 J	0.300 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	73,100 J	69,600 J	67,200 J	44,300 J	59,500 J	82,400 J	39,600 J	30,900 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	14.5 J	15.2 J	15.6 J	17.1 J	13.3 J	14.1 J	14.8 J	13.5 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	10.1 J	10.4 J	11.9 J	14.2 J	9.43 J	9.04 J	13.1 J	13.4 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	13.8 J	13.8 J	14.7 J	15.0 J	12.4 J	13.6 J	12.3 J	10.5 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	14.6 J	14.9 J	14.8 J	17.8 J	17.9 J	15.7 J	19.7 J	19.3 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	12.0 J	11.6 J	11.1 J	9.78 J	8.32 J	10.2 J	7.19 J	6.08 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0599 J	0.0717 J	0.0804 J	0.0699 J	0.0535 J	0.0681 J	0.0490 J	0.0417 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	**105 J[A]**	**107 J[A]**	**218 J[A]**	**1,090 J[A]**	**73.6 J[A]**	**72.5 J[A]**	**173 J[A]**	**208 J[A]**
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	21.2 J	21.1 J	20.6 J	20.0 J	15.4 J	18.2 J	14.5 J	12.2 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	1.02 J	1.14 J	1.47 J	1.73 J	1.57 J	1.75 J	1.65 J	1.33 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0362 J	0.0381 J	0.0347 UJ	0.0391 J	0.0451 J	0.0457 J	0.0570 J	0.0383 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	132 J	128 J	117 J	87.0 J	78.0 J	116 J	58.1 J	44.3 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.413 J	0.438 J	0.406 J	0.561 J	0.390 J	0.410 J	0.378 J	0.321 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	26.4 J	27.4 J	28.5 J	36.4 J	24.9 J	23.7 J	26.1 J	25.4 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	80.6 J	80.8 J	77.0 J	85.1 J	54.5 J	76.9 J	51.0 J	43.7 J
Radiological Parameters													
Radium-226	pCi/g	n/v	n/v	n/v	n/v	1.17 +/-(0.342)J	1.73 +/-(0.577)J	1.13 +/-(0.385)J	-	1.58 +/-(0.414)	1.25 +/-(0.350)	1.40 +/-(0.331)	1.08 +/-(0.317)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.47 +/-(0.415)	0.902 +/-(0.798)UJ	1.35 +/-(0.479)J	-	1.54 +/-(0.515)	1.06 +/-(0.341)	1.02 +/-(0.479)	1.25 +/-(0.307)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	2.64 +/-(0.538)J	2.63 +/-(0.985)J	2.48 +/-(0.615)J	-	3.12 +/-(0.661)	2.31 +/-(0.489)	2.42 +/-(0.582)	2.33 +/-(0.441)
Anions													
Chloride	mg/kg	n/v	n/v	n/v	n/v	95.6 J	103 J	50.8 J	307 J	202 J	107 J	622 J	647 J
Fluoride	mg/kg	n/v	n/v	n/v	n/v	4.29 J	4.18 J	7.79 J	4.69 J	4.63 J	4.84 J	3.75 J	3.91 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	2,660 J	2,430 J	1,460 J	18,600 J	2,460 J	1,440 J	2,150 J	3,340 J
General Chemistry													
% ASH	%	20[E]	40[F]	n/v	n/v	**25 J[E]**	**39 J[E]**	**40[E]**	**24[E]**	**29[E]**	**27[E]**	**21[E]**	**29[E]**
pH (lab)	SU	n/v	n/v	n/v	n/v	7.9	7.9	7.7	8.2	7.4	7.4	7.4	7.2
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location						UT01			UT01.5			
Sample Date						25-Jun-21	25-Jun-21	25-Jun-21	21-Aug-19	23-Jun-21	23-Jun-21	25-Jun-21
Sample ID		Freshwater Sediment		Sediment Quality		CUF-SED-UT01-CORCC-0.0/0.4-20210625	CUF-SED-UT01-CORLB-0.0/0.5-20210625	CUF-SED-UT01-CORRB-0.0/0.5-20210625	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	CUF-SED-UT01.5-CORCC-0.0/0.5-20210623	CUF-SED-UT01.5-CORLB-0.0/0.5-20210623	CUF-SED-UT01.5-CORRB-0.0/0.2-20210625
Parent Sample ID												
Sample Depth						0 - 0.4 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.2 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.192 J	0.264 J	0.515 J	0.279 J	0.223 J	0.260 J	0.248 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	5.29 J	6.03 J	**14.9 J[AC]**	8.36 J	8.56 J	6.63 J	7.62 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	157 J	200 J	**618 J[A]**	183 J	184 J	**265 J[A]**	231 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.806 J	0.867 J	1.12 J	0.993 J	0.796 J	1.09 J	1.14 J
Boron	mg/kg	n/v	n/v	n/v	n/v	47.1 J	30.4 J	78.6 J	71.4 J	56.8 J	27.9 J	63.7 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.342 J	0.224 J	0.439 J	0.363 J	0.294 J	0.223 J	0.442 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	83,800 J	48,800 J	50,300 J	107,000 J	56,100 J	40,100 J	89,600 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	13.4 J	14.8 J	19.4 J	13.6 J	13.0 J	14.0 J	18.9 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	9.08 J	9.19 J	17.2 J	12.3 J	10.9 J	25.7 J	11.4 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	10.6 J	11.0 J	14.7 J	12.8 J	11.0 J	11.2 J	14.5 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	12.1 J	13.4 J	19.0 J	16.2 J	13.1 J	20.0 J	16.9 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	9.36 J	10.2 J	12.0 J	9.19 J	8.12 J	7.15 J	13.0 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0531 J	0.0437 J	0.0675 J	0.0682 J	0.0588 J	0.0427 J	0.0821 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	**90.8 J[A]**	**126 J[A]**	**571 J[A]**	**209 J[A]**	**317 J[A]**	**46.9 J[A]**	**209 J[A]**
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	15.5 J	15.7 J	21.0 J	17.2 J	14.8 J	13.9 J	20.5 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	1.40 J	0.850 J	1.84 J	**2.51 J[A]**	1.41 J	0.734 J	1.96 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0368 UJ	0.0394 J	0.0476 UJ	0.0496 UJ	0.0429 UJ	0.0446 J	0.0504 UJ
Strontium	mg/kg	n/v	n/v	n/v	n/v	121 J	79.1 J	100 J	130 J	83.1 J	61.2 J	127 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.396 J	0.353 J	0.711 J	0.460 J	0.383 J	0.261 J	0.550 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	25.9 J	25.7 J	39.5 J	26.9 J	25.7 J	32.7 J	33.5 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	57.4 J	55.7 J	91.5 J	63.3 J	52.6 J	41.7 J	79.1 J
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.68 +/-(0.374)J	2.41 +/-(0.509)J	0.632 +/-(0.383)	1.62 +/-(0.376)J	0.196 +/-(0.294)UJ	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.75 +/-(0.457)J	1.06 +/-(0.698)J	0.597 +/-(0.727)U	0.480 +/-(0.601)UJ	1.32 +/-(0.509)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.43 +/-(0.591)J	3.47 +/-(0.864)J	1.23 +/-(0.822)J	2.10 +/-(0.709)J	1.52 +/-(0.588)J	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	225 J	42.7 J	1,050 J	266 J	555 J	46.7 J	1,040 J
Fluoride	mg/kg	n/v	n/v	n/v	n/v	4.09 J	6.49 J	4.53 J	5.58 J	7.31 J	3.62 J	8.68 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	2,350 J	1,130 J	3,300 J	2,730 J	2,990 J	1,190 J	4,550 J
General Chemistry												
% ASH	%	20[E]	40[F]	n/v	n/v	11	7	10	**30[E]**	6	6	7
pH (lab)	SU	n/v	n/v	n/v	n/v	7.5	7.6	7.4	7.3	7.4	7.4	7.3
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		UT02				UT03				UT03.25	UT03.5
Sample Date						21-Aug-19	21-Aug-19	21-Aug-19	25-Jun-21	21-Aug-19	21-Aug-19	21-Aug-19	25-Jun-21	24-Jun-21	24-Jun-21
Sample ID						CUF-SED-UT02-CORCC-0.0/0.5-20190821	CUF-SED-UT02-CORRB-0.0/0.5-20190821	CUF-SED-UT02-CORRB-0.5/2.0-20190821	CUF-SED-UT02-CORRB-0.0/0.5-20210625	CUF-SED-UT03-CORCC-0.0/0.5-20190821	CUF-SED-UT03-CORCC-0.5/1.0-20190821	CUF-SED-UT03-CORLB-0.0/0.5-20190821	CUF-SED-UT03-CORRB-0.0/0.5-20210625	CUF-SED-UT03.25-CORCC-0.0/0.5-20210624	CUF-SED-UT03.5-CORCC-0.0/0.7-20210624
Parent Sample ID															
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 2 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.7 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC										
Metals															
Antimony	mg/kg	2^{A}	25^{B}	n/v	n/v	0.389 J	0.249	0.260 J	0.236 J	0.295	0.174	0.277 J	0.182 J	0.108 J	0.192 J
Arsenic	mg/kg	9.8^{A}	33^{B}	9.8^{C}	33^{D}	**12.3 J^{AC}**	5.56	7.99 J	7.61 J	6.28	4.21	3.01 J	6.39 J	3.50 J	4.11 J
Barium	mg/kg	240^{A}	22,925^{B}	n/v	n/v	**448 J^{A}**	119	195 J	216 J	43.3	46.8	95.0 J	168 J	90.6 J	115 J
Beryllium	mg/kg	1.2^{A}	42^{B}	n/v	n/v	0.972 J	1.12	1.04 J	0.912 J	0.984	0.763	0.765 J	0.789 J	0.458 J	0.951 J
Boron	mg/kg	n/v	n/v	n/v	n/v	60.6 J	47.0	66.6 J	76.8 J	20.3	15.6	204 J	40.5 J	23.8 U*	13.3 U*
Cadmium	mg/kg	1^{A}	5^{B}	1^{C}	5^{D}	0.418 J	0.241	0.392 J	0.272 J	0.168	0.186	0.139 J	0.276 J	0.203 J	0.265 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	42,500 J	45,600	36,100 J	50,600 J	61,100	96,200	44,600 J	65,000 J	112,000 J	61,500 J
Chromium	mg/kg	43.4^{A}	111^{B}	43^{C}	110^{D}	12.0 J	13.7	13.9 J	15.5 J	21.8	10.2	11.0 J	14.4 J	10.0 J	15.3 J
Cobalt	mg/kg	50^{A}	n/v	50^{C}	n/v	16.3 J	10.4	10.2 J	11.5 J	8.44	7.92	7.10 J	10.5 J	5.26 J	7.74 J
Copper	mg/kg	31.6^{A}	149^{B}	32^{C}	150^{D}	15.6 J	11.0	11.0 J	10.8 J	9.06	6.98	9.79 J	10.4 J	7.63 J	12.8 J
Lead	mg/kg	35.8^{A}	128^{B}	36^{C}	130^{D}	15.1 J	19.5	12.7 J	14.3 J	13.9	11.9	12.5 J	14.7 J	7.93 J	17.6 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	7.08 J	6.97	8.27 J	10.1 J	5.14	5.99	9.15 J	8.89 J	6.99 J	12.4 J
Mercury	mg/kg	0.18^{A}	1.1^{B}	0.18^{C}	1.1^{D}	0.0466 J	0.0320	0.0544 J	0.0435 J	0.0225 J	0.0293 J	0.0413 J	0.0458 J	0.0351 J	0.0433 J
Molybdenum	mg/kg	38^{A}	69,760^{B}	n/v	n/v	**839 J^{A}**	**170^{A}**	**237 J^{A}**	**380 J^{A}**	**54.3^{A}**	23.8	**78.8 J^{A}**	**141 J^{A}**	**42.0 J^{A}**	7.82 J
Nickel	mg/kg	22.7^{A}	48.6^{B}	23^{C}	49^{D}	12.7 J	12.1	14.1 J	14.4 J	9.52	9.10	10.1 J	13.5 J	9.52 J	15.2 J
Selenium	mg/kg	2^{A}	2.9^{B}	n/v	n/v	**2.56 J^{A}**	0.980	1.43 J	1.51 J	0.827	0.308 J	1.53 J	0.662 J	0.691 J	0.377 J
Silver	mg/kg	1^{A}	2.2^{B}	n/v	n/v	0.0438 J	0.0821 J	0.0503 UJ	0.0383 J	0.0430 J	0.0380 J	0.0713 UJ	0.0446 J	0.0339 UJ	0.0416 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	53.0 J	38.5	46.3 J	63.0 J	43.2	85.8	59.8 J	66.5 J	118 J	69.2 J
Thallium	mg/kg	1.2^{A}	10^{B}	n/v	n/v	0.432 J	0.310	0.323 J	0.369 J	0.303	0.203	0.451 J	0.313 J	0.343 J	0.347 J
Vanadium	mg/kg	66^{A}	564^{B}	n/v	n/v	33.9 J	24.1	33.3 J	34.6 J	21.3	17.0	26.8 J	25.3 J	14.8 J	23.4 J
Zinc	mg/kg	121^{A}	459^{B}	120^{C}	460^{D}	47.5 J	41.6	50.1 J	50.4 J	26.1	30.8	34.7 J	48.8 J	34.5 J	61.6 J
Radiological Parameters															
Radium-226	pCi/g	n/v	n/v	n/v	n/v	1.08 +/-(0.435)	0.178 +/-(0.619)U	0.607 +/-(0.431)	2.01 +/-(0.562)J	0.838 +/-(0.188)	0.822 +/-(0.292)	0.654 +/-(0.395)	1.17 +/-(0.266)J	0.903 +/-(0.271)J	0.714 +/-(0.294)UJ
Radium-228	pCi/g	n/v	n/v	n/v	n/v	0.840 +/-(0.579)U	1.60 +/-(0.439)	0.622 +/-(0.654)U	0.593 +/-(0.593)UJ	0.737 +/-(0.320)	1.11 +/-(0.318)	0.634 +/-(0.627)U	0.903 +/-(0.320)J	0.684 +/-(0.384)	1.17 +/-(0.410)
Radium-226+228	pCi/g	90^{A}	90^{B}	n/v	n/v	1.92 +/-(0.724)J	1.78 +/-(0.759)J	1.23 +/-(0.783)J	2.60 +/-(0.817)J	1.58 +/-(0.371)	1.93 +/-(0.432)	1.29 +/-(0.741)J	2.07 +/-(0.416)J	1.59 +/-(0.470)J	1.88 +/-(0.505)J
Anions															
Chloride	mg/kg	n/v	n/v	n/v	n/v	254 J	386	12.6 UR	603 J	41.0	36.3 J	580 J	298 J	122 J	91.4 J
Fluoride	mg/kg	n/v	n/v	n/v	n/v	4.71 J	4.62 J	2.21 UR	3.43 J	2.53 J	2.06 J	6.69 J	1.71 UJ	3.86 J	4.16 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	2,240 J	1,960 J	43.3 J	3,520 J	340 J	1,980 J	2,180 J	1,070 J	860 J	507 J
General Chemistry															
% ASH	%	20^{E}	40^{F}	n/v	n/v	**41^{EF}**	**29^{E}**	10	7	**22^{E}**	**32^{E}**	**22^{E}**	8	5	1
pH (lab)	SU	n/v	n/v	n/v	n/v	7.2	7.2	7.3	7.3	7.4	7.2	7.5	7.7	7.5	7.7
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		UT03.75		UT04				
Sample Date						24-Jun-21	24-Jun-21	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18
Sample ID						CUF-SED-UT03.75-CORCC-0.0/0.5-20210624	CUF-SED-UT03.75-CORCC-0.5/1.0-20210624	CUF-SED-UT04-CORCC-0.0/0.5-20181017	CUF-SED-UT04-CORCC-0.5/3.2-20181017	CUF-SED-UT04-CORLB-0.0/0.5-20181017	CUF-SED-UT04-CORLB-0.5/2.7-20181017	CUF-SED-UT04-CORLB-2.7/3.5-20181017
Parent Sample ID												
Sample Depth						0 - 0.5 ft	0.5 - 1 ft	0 - 0.5 ft	0.5 - 3.2 ft	0 - 0.5 ft	0.5 - 2.7 ft	2.7 - 3.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.174 J	0.194 J	0.118 J	-	0.156 J	-	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	5.09 J	5.32	5.14 J	-	3.56 J	-	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	120 J	116 J	61.1 J	-	54.1 J	-	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.916 J	0.927	0.718 J	-	0.655 J	-	-
Boron	mg/kg	n/v	n/v	n/v	n/v	24.7 U*	12.6 U*	14.6 J	-	17.1 J	-	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.294 J	0.240	0.539 J	-	0.322 J	-	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	92,700 J	47,100	17,800 J	-	13,200 J	-	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	17.7 J	16.2	13.6 J	-	15.2 J	-	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	8.50 J	7.89	13.0 J	-	7.57 J	-	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	12.9 J	12.3	11.7 J	-	10.6 J	-	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	14.5 J	15.3	10.8 J	-	8.99 J	-	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	14.6 J	15.2	6.14 J	-	8.35 J	-	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0387 J	0.0410	0.0602 UJ	-	0.0596 UJ	-	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	34.7 J	10.4	13.2 J	-	8.20 J	-	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	16.7 J	16.4	13.2 J	-	13.2 J	-	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	0.692 J	0.339 J	0.727 J	-	0.650 J	-	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0400 J	0.0401 J	0.0418 J	-	0.0530 J	-	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	112 J	64.5	29.6 J	-	24.5 J	-	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.424 J	0.390	0.208 J	-	0.212 J	-	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	25.8 J	26.1	22.1 J	-	21.1 J	-	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	62.7 J	58.4	47.7 J	-	49.1 J	-	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	1.07 +/-(0.362)J	1.55 +/-(0.364)J	0.811 +/-(0.405)J	-	1.14 +/-(0.302)J	-	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.02 +/-(0.496)J	1.66 +/-(0.342)	1.61 +/-(0.514)	-	0.998 +/-(0.301)	-	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	2.09 +/-(0.614)J	3.21 +/-(0.499)J	2.42 +/-(0.654)J	-	2.14 +/-(0.426)J	-	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	116 J	50.1	102 J	-	116 J	-	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	6.78 J	6.91	3.31 U*	-	3.21 U*	-	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	739 J	407	224 J	-	153 J	-	-
General Chemistry												
% ASH	%	20[E]	40[F]	n/v	n/v	4	6	2	<1	1	<1	<1
pH (lab)	SU	n/v	n/v	n/v	n/v	7.6	7.8	7.3	-	7.2	-	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		UT04				UT05			
Sample Date						17-Oct-18	17-Oct-18	24-Jun-21	24-Jun-21	17-Oct-18	17-Oct-18	17-Oct-18	24-Jun-21
Sample ID						CUF-SED-UT04-CORRB-0.0/0.5-20181017	CUF-SED-UT04-CORRB-0.5/3.1-20181017	CUF-SED-UT04-CORCC-0.0/0.5-20210624	CUF-SED-UT04-CORCC-0.5/2.6-20210624	CUF-SED-UT05-CORCC-0.0/0.5-20181017	CUF-SED-UT05-CORLB-0.0/0.5-20181017	CUF-SED-UT05-CORRB-0.0/0.5-20181017	CUF-SED-UT05-CORCC-0.0/0.5-20210624
Parent Sample ID													
Sample Depth						0 - 0.5 ft	0.5 - 3.1 ft	0 - 0.5 ft	0.5 - 2.6 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC								
Metals													
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.209 J	-	0.222 J	0.309 J	0.180 J	0.300 J	0.132 J	0.183 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	5.78 J	-	6.29 J	7.85	5.75 J	4.34 J	3.23 J	5.72 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	54.0	-	97.8 J	132 J	55.7 J	52.1	63.0 J	80.8 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.699	-	1.07 J	**1.26[A]**	0.747 J	1.07	0.494 J	0.807 J
Boron	mg/kg	n/v	n/v	n/v	n/v	17.5	-	18.1 U*	12.2 U*	20.8 J	15.7	28.2 J	24.4 U*
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.308	-	0.373 J	0.377	0.493 J	0.483	0.312 J	0.370 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	15,100	-	18,500 J	16,700	39,500 J	7,780	68,400 J	71,100 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	16.5 J	-	21.3 J	21.9	18.4 J	18.9 J	13.7 J	16.3 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	7.96	-	9.64 J	10.3	10.2 J	10.3	6.81 J	8.28 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	11.9	-	14.7 J	16.2	12.1 J	11.3	9.44 J	10.4 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	10.4	-	14.8 J	18.0	12.1 J	14.1	8.47 J	11.9 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	7.83 J	-	15.4 J	16.4	7.48 J	6.96 J	6.58 J	10.9 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	<0.0600	-	0.0480 J	0.0642	0.0744 UJ	<0.0547	0.0613 UJ	0.0564 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	16.1	-	22.8 J	6.38	35.1 J	29.4	12.9 J	34.2 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	14.7	-	19.8 J	**24.1[AC]**	16.2 J	16.8	11.9 J	14.4 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	0.517 J	-	0.482 J	0.340 J	0.861 J	0.576	0.813 J	0.825 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0407 J	-	0.0461 J	0.0595 J	0.0595 J	0.0672 J	0.0462 J	0.0430 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	25.9	-	35.7 J	41.6	48.8 J	18.8	76.8 J	88.6 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.221	-	0.373 J	0.386	0.249 J	0.238	0.199 J	0.293 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	26.8	-	33.7 J	35.3	26.6 J	29.8	19.4 J	23.0 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	50.4 J	-	76.7 J	87.0	61.0 J	57.5 J	48.1 J	58.7 J
Radiological Parameters													
Radium-226	pCi/g	n/v	n/v	n/v	n/v	1.35 +/-(0.338)J	-	1.54 +/-(0.358)J	1.70 +/-(0.341)J	0.896 +/-(0.339)J	0.899 +/-(0.276)J	0.937 +/-(0.300)J	-0.312 +/-(0.622)UJ
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.69 +/-(0.438)	-	1.49 +/-(0.471)	1.54 +/-(0.461)J	1.09 +/-(0.552)	1.20 +/-(0.536)	1.51 +/-(0.371)	1.46 +/-(0.702)J
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	3.04 +/-(0.553)J	-	3.03 +/-(0.592)J	3.24 +/-(0.573)J	1.99 +/-(0.648)J	2.10 +/-(0.603)J	2.45 +/-(0.477)J	1.46 +/-(0.938)J
Anions													
Chloride	mg/kg	n/v	n/v	n/v	n/v	105	-	112 J	93.7	100 J	74.1	169 J	88.4 J
Fluoride	mg/kg	n/v	n/v	n/v	n/v	3.24 U*	-	5.83 J	5.81	4.30 U*	3.70 U*	3.08 U*	3.71 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	148	-	499 J	172	632 J	425	636 J	772 J
General Chemistry													
% ASH	%	20[E]	40[F]	n/v	n/v	2	<1	6	5	5	11	4	8
pH (lab)	SU	n/v	n/v	n/v	n/v	7.3	-	7.4	7.6	7.3	7.4	7.1	7.6
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-

See notes on last page.

Stantec

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		WC01						WC02			
Sample Date						18-Oct-18	18-Oct-18	18-Oct-18	18-Oct-18	18-Oct-18	18-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18
Sample ID						CUF-SED-WC01-CORCC-2.2/3.0-20181018	CUF-SED-WC01-CORLB-0.0/0.5-20181018	CUF-SED-WC01-CORLB-0.5/3.8-20181018	CUF-SED-WC01-CORRB-0.0/0.5-20181018	CUF-SED-WC01-CORRB-0.5/2.4-20181018	CUF-SED-WC01-CORRB-2.4/4.5-20181018	CUF-SED-WC02-CORCC-0.0/0.5-20181017	CUF-SED-WC02-DUP01-20181017	CUF-SED-WC02-CORLB-0.0/0.5-20181017	CUF-SED-WC02-CORLB-0.5/2.5-20181017
Parent Sample ID													CUF-SED-WC02-CORCC-0.0/0.5-20181017		
Sample Depth						2.2 - 3 ft	0 - 0.5 ft	0.5 - 3.8 ft	0 - 0.5 ft	0.5 - 2.4 ft	2.4 - 4.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC										
Metals															
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.198 J	-	0.133 J	-	-	0.158 J	0.170 J	0.154 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	3.29 J	-	2.82 J	-	-	2.53 J	2.93 J	2.56 J	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	56.3	-	19.8	-	-	30.2	35.6	30.8	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.588	-	0.465	-	-	0.455	0.527	0.454	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	1.12 J	-	0.663 J	-	-	1.25 J	1.44 J	1.01 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.390	-	0.259	-	-	0.406	0.465	0.409	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	1,750	-	667	-	-	3,950	4,460	2,740	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	16.5 J	-	30.9 J	-	-	17.6 J	21.4 J	18.9 J	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	9.96	-	6.50	-	-	6.64	7.80	5.87	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	8.85	-	2.87	-	-	5.72	6.59	5.14	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	13.7	-	5.02	-	-	7.03	8.65	7.20	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	3.44 J	-	1.12 J	-	-	2.82 J	3.36 J	2.56 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0641 J	-	<0.0429	-	-	<0.0475	0.0491 J	<0.0419	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.610	-	0.423	-	-	0.422	0.500	0.444	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	12.1	-	8.58	-	-	9.70	11.9	9.03	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.430	-	0.164 J	-	-	0.307 J	0.400	0.294 J	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0677	-	0.141	-	-	0.0801	0.106	0.0997	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	6.92	-	2.56	-	-	8.74	10.9	7.15	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.136	-	0.0606 J	-	-	0.104	0.123	0.0973	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	22.8	-	15.4	-	-	15.1	18.0	14.3	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	49.0 J	-	32.3 J	-	-	38.8 J	46.5 J	36.2 J	-
Radiological Parameters															
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.12 +/-(0.330)J	-	0.401 +/-(0.177)J	-	-	0.802 +/-(0.234)J	0.911 +/-(0.303)J	0.799 +/-(0.223)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.12 +/-(0.458)	-	0.122 +/-(0.258)U	-	-	0.536 +/-(0.236)	0.504 +/-(0.431)U	0.515 +/-(0.255)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.24 +/-(0.565)J	-	0.523 +/-(0.313)J	-	-	1.34 +/-(0.332)J	1.42 +/-(0.527)J	1.31 +/-(0.339)J	-
Anions															
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<9.43	-	<10.3	-	-	<11.5	<11.8	<9.79	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.08 UJ	-	1.17 UJ	-	-	1.40 U*	1.37 U*	1.18 U*	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	12.3 U*	-	43.1	-	-	15.1 U*	24.6 U*	15.6 U*	-
General Chemistry															
% ASH	%	20[E]	40[F]	n/v	n/v	2	2	1	1	<1	1	1	1	2	<1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.1	-	7.3	-	-	7.1	7.2	7.1	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		WC02			WC03					
Sample Date						17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18	17-Oct-18
Sample ID						CUF-SED-WC02-CORLB-2.5/4.6-20181017	CUF-SED-WC02-CORRB-0.0/0.5-20181017	CUF-SED-WC02-CORRB-0.5/2.3-20181017	CUF-SED-WC03-CORCC-0.0/0.5-20181017	CUF-SED-WC03-CORCC-1.0/2.1-20181017	CUF-SED-WC03-CORCC-2.1/3.2-20181017	CUF-SED-WC03-CORCC-3.2/5.4-20181017	CUF-SED-WC03-CORLB-0.0/0.5-20181017	CUF-SED-WC03-CORLB-0.5/3.3-20181017
Parent Sample ID														
Sample Depth						2.5 - 4.6 ft	0 - 0.5 ft	0.5 - 2.3 ft	0 - 0.5 ft	1 - 2.1 ft	2.1 - 3.2 ft	3.2 - 5.4 ft	0 - 0.5 ft	0.5 - 3.3 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.190 J	-	0.192 J	-	-	-	0.159 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	3.05 J	-	3.36 J	-	-	-	2.68 J	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	47.1	-	42.5	-	-	-	34.7	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.569	-	0.595	-	-	-	0.446	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	1.45 J	-	1.59 J	-	-	-	1.32 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.433	-	0.528	-	-	-	0.425	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	4,640	-	4,780	-	-	-	4,160	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	15.7 J	-	20.7 J	-	-	-	18.5 J	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	8.70	-	8.54	-	-	-	7.45	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	11.5	-	7.92	-	-	-	6.52	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	12.6	-	10.2	-	-	-	8.22	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	4.13 J	-	3.62 J	-	-	-	3.01 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0621 J	-	0.0487 J	-	-	-	<0.0453	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.507	-	0.518	-	-	-	0.435	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	12.5	-	12.6	-	-	-	10.7	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.486	-	0.364 J	-	-	-	0.371	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.133	-	0.0978	-	-	-	0.0851	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	10.9	-	10.7	-	-	-	9.30	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.141	-	0.131	-	-	-	0.116	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	20.3	-	20.2	-	-	-	16.7	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	51.4 J	-	51.2 J	-	-	-	43.6 J	-
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.27 +/-(0.292)J	-	0.694 +/-(0.229)J	-	-	-	0.731 +/-(0.237)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.01 +/-(0.252)	-	0.560 +/-(0.357)	-	-	-	0.653 +/-(0.308)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.28 +/-(0.386)J	-	1.25 +/-(0.424)J	-	-	-	1.38 +/-(0.389)J	-
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<10.7	-	22.5 U*	-	-	-	<10.7	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.58 U*	-	1.36 U*	-	-	-	1.22 U*	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	37.8	-	21.5 U*	-	-	-	14.8 U*	-
General Chemistry														
% ASH	%	20[E]	40[F]	n/v	n/v	3	<1	1	<1	2	<1	1	1	1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.3	-	7.2	-	-	-	7.2	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location						WC03			WC03.5				WC04		
Sample Date		Freshwater Sediment		Sediment Quality		17-Oct-18	17-Oct-18	17-Oct-18	24-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21	16-Oct-18	16-Oct-18	16-Oct-18
Sample ID						CUF-SED-WC03-CORLB-3.3/4.7-20181017	CUF-SED-WC03-CORRB-0.0/0.5-20181017	CUF-SED-WC03-CORRB-0.5/3.8-20181017	CUF-SED-WC03.5-CORCC-0.0/0.5-20210624	CUF-SED-WC03.5-CORLB-0.0/0.5-20210624	CUF-SED-WC03.5-DUP01-20210624	CUF-SED-WC03.5-CORRB-0.0/0.7-20210624	CUF-SED-WC04-CORCC-0.0/0.5-20181016	CUF-SED-WC04-CORCC-0.5/1.9-20181016	CUF-SED-WC04-CORLB-0.0/0.5-20181016
Parent Sample ID											CUF-SED-WC03.5-CORLB-0.0/0.5-20210624				
Sample Depth						3.3 - 4.7 ft	0 - 0.5 ft	0.5 - 3.8 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.7 ft	0 - 0.5 ft	0.5 - 1.9 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC										
Metals															
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.215 J	-	0.152 J	0.222 J	0.227 J	0.204 J	0.230 J	-	0.216 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	3.78 J	-	3.44	4.17 J	3.77	3.67	4.21 J	-	3.69 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	57.8	-	29.8 J	69.9 J	67.7 J	47.9 J	75.1	-	63.1
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.684	-	0.540	0.778 J	0.736	0.655	0.776	-	0.805
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.37 J	-	13.2 U*	4.77 U*	4.54 U*	21.7	18.6	-	3.30 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.533	-	0.404	0.646 J	0.581	0.493	0.520	-	0.665
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	5,950	-	4,820	6,670 J	6,150	8,530	4,680	-	14,500
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	17.8 J	-	16.2	14.8 J	14.7	14.4	16.7 J	-	18.9 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	9.64	-	6.40	8.47 J	8.18	8.33	11.4	-	11.2
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	9.59	-	5.32	9.22 J	8.86	8.19	9.83	-	11.7
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	11.8	-	8.66	12.7 J	11.9	11.8	13.4	-	13.5
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	4.58 J	-	3.57	5.43 J	6.05	5.42	5.70 J	-	5.63 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0599 J	-	0.0369	0.0515 J	0.0612	0.0445	0.0619 J	-	0.0713 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.584	-	0.638	0.595 J	0.541	0.744	0.664	-	0.553
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	14.1	-	9.74	13.7 J	13.8	12.2	15.1	-	17.0
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.587	-	0.228 J	0.426 J	0.360 J	0.329 J	0.434	-	0.535
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0611 J	-	0.0858	0.0570 J	0.0552 J	0.0642 J	0.0588 J	-	0.0668 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	12.7	-	9.55	14.7 J	14.4	15.1	11.9	-	21.5
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.154	-	0.134	0.184 J	0.180	0.169	0.189	-	0.183
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	23.1	-	14.6	20.0 J	19.7	18.4	25.8	-	25.4
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	57.4 J	-	43.4	62.7 J	61.4	54.9	55.2 J	-	72.6 J
Radiological Parameters															
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.980 +/-(0.318)J	-	1.29 +/-(0.300)	1.14 +/-(0.234)	1.51 +/-(0.330)	1.39 +/-(0.320)J	1.21 +/-(0.256)	-	1.13 +/-(0.324)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	0.643 +/-(0.359)U	-	1.09 +/-(0.357)	1.05 +/-(0.325)J	0.317 +/-(0.533)UJ	0.945 +/-(0.396)	0.960 +/-(0.279)	-	1.08 +/-(0.514)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	1.62 +/-(0.480)J	-	2.38 +/-(0.466)	2.19 +/-(0.400)J	1.83 +/-(0.627)J	2.34 +/-(0.509)J	2.17 +/-(0.379)	-	2.21 +/-(0.608)J
Anions															
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	90.5	-	184	7.82 UJ	<7.64	138	395	-	17.9 U*
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.59 U*	-	<1.10	1.36 UJ	<1.33	<1.17	1.91 U*	-	1.59 U*
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	60.1	-	343	26.0 J	20.0	665	568	-	51.1
General Chemistry															
% ASH	%	20[E]	40[F]	n/v	n/v	1	2	<1	<1	<1	<1	<1	3	<1	<1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.0	-	7.3	7.2	7.2	7.5	7.1	-	7.3
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-	-	-

See notes on last page.

Stantec

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		WC04				WC05				
Sample Date						16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18
Sample ID						CUF-SED-WC04-CORLB-0.5/2.4-20181016	CUF-SED-WC04-CORRB-0.0/0.5-20181016	CUF-SED-WC04-CORRB-0.5/2.0-20181016	CUF-SED-WC04-CORRB-2.0/2.9-20181016	CUF-SED-WC05-CORCC-0.0/0.5-20181016	CUF-SED-WC05-CORLB-0.0/0.5-20181016	CUF-SED-WC05-CORLB-0.5/1.5-20181016	CUF-SED-WC05-CORLB-1.5/2.8-20181016	CUF-SED-WC05-DUP01-20181016
Parent Sample ID														CUF-SED-WC05-CORLB-0.5/1.5-20181016
Sample Depth						0.5 - 2.4 ft	0 - 0.5 ft	0.5 - 2 ft	2 - 2.9 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.5 ft	1.5 - 2.8 ft	0.5 - 1.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.199 J	-	-	0.203 J	0.247 J	-	-	0.239 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	3.89 J	-	-	2.80	3.58 J	-	-	4.16 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	58.8	-	-	50.9	63.2	-	-	61.5
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.750	-	-	0.667	0.761	-	-	0.806
Boron	mg/kg	n/v	n/v	n/v	n/v	-	3.58 J	-	-	5.62 J	3.62 J	-	-	3.16 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.707	-	-	0.736	0.727	-	-	0.674
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	10,300	-	-	9,530	10,200	-	-	6,400
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	19.5 J	-	-	11.7	18.4 J	-	-	17.8 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	9.68	-	-	6.82	10.7	-	-	10.4
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	10.7	-	-	9.26	11.4	-	-	11.6
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	12.2	-	-	11.6	13.2	-	-	14.1
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	5.68 J	-	-	4.30 J	5.69 J	-	-	5.44 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0731 J	-	-	0.0633 J	0.0696 J	-	-	0.0798 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.591	-	-	0.353 J	0.612	-	-	0.579
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	15.8	-	-	9.73	16.3	-	-	16.3
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.475	-	-	0.529	0.564	-	-	0.652
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0677 J	-	-	0.0499 J	0.0645 J	-	-	0.0721 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	18.8	-	-	14.2	17.6	-	-	13.5
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.181	-	-	0.142	0.181	-	-	0.177
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	24.1	-	-	14.2	24.7	-	-	24.3
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	67.0 J	-	-	46.6	71.2 J	-	-	69.1 J
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.19 +/-(0.361)J	-	-	0.923 +/-(0.346)J	1.28 +/-(0.292)J	-	-	1.23 +/-(0.277)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.65 +/-(0.417)	-	-	1.36 +/-(0.623)	1.22 +/-(0.349)	-	-	1.52 +/-(0.324)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.84 +/-(0.552)J	-	-	2.28 +/-(0.713)J	2.50 +/-(0.455)J	-	-	2.75 +/-(0.426)J
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	63.6	-	-	19.5 U*	<11.7	-	-	13.0 U*
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.82 U*	-	-	1.47 U*	1.57 U*	-	-	1.88 U*
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	120	-	-	61.3	63.4	-	-	25.9 U*
General Chemistry														
% ASH	%	20[E]	40[F]	n/v	n/v	<1	<1	4	2	<1	<1	<1	2	<1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.1	-	-	7.7	7.4	-	-	7.6
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		WC05			WC06				
Sample Date						16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18	16-Oct-18
Sample ID						CUF-SED-WC05-CORRB-0.0/0.5-20181016	CUF-SED-WC05-CORRB-0.5/0.9-20181016	CUF-SED-WC05-CORRB-0.9/4.6-20181016	CUF-SED-WC06-CORCC-0.0/0.5-20181016	CUF-SED-WC06-CORCC-0.5/1.3-20181016	CUF-SED-WC06-CORCC-1.3/2.7-20181016	CUF-SED-WC06-CORLB-0.0/0.5-20181016	CUF-SED-WC06-CORRB-0.0/0.5-20181016
Parent Sample ID													
Sample Depth						0 - 0.5 ft	0.5 - 0.9 ft	0.9 - 4.6 ft	0 - 0.5 ft	0.5 - 1.3 ft	1.3 - 2.7 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC								
Metals													
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.239 J	-	-	0.185 J	-	-	0.225 J	0.249 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	3.19	-	-	2.33	-	-	2.67 J	3.62
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	49.4	-	-	57.5	-	-	73.9 J	68.3
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.698	-	-	0.695	-	-	0.806 J	0.927
Boron	mg/kg	n/v	n/v	n/v	n/v	2.91 J	-	-	2.12 J	-	-	2.86 J	2.73 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.589	-	-	0.542	-	-	0.566 J	0.597
Calcium	mg/kg	n/v	n/v	n/v	n/v	7,530	-	-	8,670	-	-	3,380 J	6,980
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	13.0	-	-	10.9	-	-	12.9 J	13.4
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	7.71	-	-	7.70	-	-	8.84 J	9.63
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	8.27	-	-	7.80	-	-	9.42 J	9.11
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	12.2	-	-	12.3	-	-	13.7 J	14.7
Lithium	mg/kg	n/v	n/v	n/v	n/v	4.08 J	-	-	4.97 J	-	-	6.52 J	6.81 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0665 J	-	-	0.0675 J	-	-	0.0737 J	0.0541 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	0.458	-	-	0.360 J	-	-	0.554 J	0.528
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	10.2	-	-	9.47	-	-	11.3 J	11.9
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	0.547	-	-	0.468	-	-	0.540 J	0.581
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0559 J	-	-	0.0583 J	-	-	0.0506 J	0.0397 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	12.7	-	-	14.2	-	-	11.9 J	13.3
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.156	-	-	0.176	-	-	0.202 J	0.192
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	14.7	-	-	14.4	-	-	17.2 J	19.2
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	47.0	-	-	44.4	-	-	51.0 J	51.9
Radiological Parameters													
Radium-226	pCi/g	n/v	n/v	n/v	n/v	0.745 +/-(0.265)J	-	-	1.18 +/-(0.320)J	-	-	1.06 +/-(0.346)J	1.25 +/-(0.379)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.10 +/-(0.336)	-	-	1.32 +/-(0.358)	-	-	0.932 +/-(0.480)	2.03 +/-(0.484)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	1.85 +/-(0.428)J	-	-	2.50 +/-(0.480)J	-	-	1.99 +/-(0.592)J	3.28 +/-(0.615)J
Anions													
Chloride	mg/kg	n/v	n/v	n/v	n/v	<12.6	-	-	<11.0	-	-	14.3 UJ	<12.6
Fluoride	mg/kg	n/v	n/v	n/v	n/v	1.64 U*	-	-	1.43 U*	-	-	1.63 UJ	1.73 U*
Sulfate	mg/kg	n/v	n/v	n/v	n/v	66.7	-	-	80.7	-	-	32.6 J	97.2
General Chemistry													
% ASH	%	20[E]	40[F]	n/v	n/v	3	2	<1	<1	2	<1	<1	3
pH (lab)	SU	n/v	n/v	n/v	n/v	7.0	-	-	7.6	-	-	7.1	7.2
Temperature	DEG C	n/v	n/v	n/v	n/v	-	-	-	-	-	-	-	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location						WC07						WC08		
Sample Date						11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18
Sample ID		Freshwater Sediment		Sediment Quality		CUF-SED-WC07-CORCC-0.0/0.5-20181011	CUF-SED-WC07-CORCC-0.0/0.5-20181011	CUF-SED-WC07-CORLB-0.0/0.5-20181011	CUF-SED-WC07-CORLB-0.0/0.5-20181011	CUF-SED-WC07-CORRB-0.0/0.5-20181011	CUF-SED-WC07-CORRB-0.0/0.5-20181011	CUF-SED-WC08-CORCC-0.0/0.5-20181011	CUF-SED-WC08-CORCC-0.0/0.5-20181011	CUF-SED-WC08-CORLB-0.0/0.5-20181011
Parent Sample ID														
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.273 J	-	0.277 J	-	0.262 J	-	0.445 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	4.41 J	-	4.25 J	-	4.14 J	-	9.10 J	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	84.2 J	-	82.8 J	-	77.7 J	-	96.3 J	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.997 J	-	0.992 J	-	0.927 J	-	**1.36 J[A]**	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	3.81 J	-	3.79 J	-	4.55 J	-	9.63 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.621 J	-	0.649 J	-	0.631 J	-	0.702 J	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	11,900 J	-	12,700 J	-	11,700 J	-	12,700 J	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	16.0 J	-	16.2 J	-	14.8 J	-	24.4 J	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	9.81 J	-	10.4 J	-	9.57 J	-	14.3 J	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	11.5 J	-	12.2 J	-	11.0 J	-	14.0 J	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	15.5 J	-	15.6 J	-	14.8 J	-	20.1 J	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	7.99 J	-	7.71 J	-	6.87 J	-	8.46 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0782 J	-	0.0816 J	-	0.0782 J	-	0.0715 UJ	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.622 J	-	0.682 J	-	0.602 J	-	1.32 J	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	13.8 J	-	14.6 J	-	12.7 J	-	18.5 J	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.613 J	-	0.641 J	-	0.609 J	-	1.41 J	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0535 J	-	0.0549 J	-	0.0612 J	-	0.0618 J	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	20.9 J	-	25.1 J	-	20.5 J	-	22.2 J	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.206 J	-	0.208 J	-	0.208 J	-	0.227 J	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	20.6 J	-	20.2 J	-	18.9 J	-	27.0 J	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	63.1 J	-	64.2 J	-	58.5 J	-	79.6 J	-
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.46 +/-(0.316)	-	1.27 +/-(0.387)	-	1.96 +/-(0.452)	-	2.45 +/-(0.478)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.63 +/-(0.399)	-	1.42 +/-(0.437)	-	1.54 +/-(0.396)	-	1.70 +/-(0.521)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.09 +/-(0.509)	-	2.69 +/-(0.584)	-	3.50 +/-(0.601)	-	4.15 +/-(0.707)J	-
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	15.4 UR	-	15.2 UR	-	27.9 U*	-	72.6 J	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.75 UR	-	1.79 U*	-	1.86 UR	-	1.92 UR	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	211 J	-	212 J	-	205 J	-	309 J	-
General Chemistry														
% ASH	%	20[E]	40[F]	n/v	n/v	2	-	<1	-	<1	-	<1	-	<1
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.0	-	7.1	-	7.0	-	6.9	-
Temperature	DEG C	n/v	n/v	n/v	n/v	-	21.4	-	21.3	-	21.3	-	21.3	-

See notes on last page.

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Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location						WC08			WC09				
Sample Date		Freshwater Sediment		Sediment Quality		11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	5-Dec-19
Sample ID						CUF-SED-WC08-CORLB-0.0/0.5-20181011	CUF-SED-WC08-CORRB-0.0/0.5-20181011	CUF-SED-WC08-CORRB-0.0/0.5-20181011	CUF-SED-WC09-CORCC-0.0/0.5-20181011	CUF-SED-WC09-CORCC-0.0/0.5-20181011	CUF-SED-WC09-CORRB-0.0/0.5-20181011	CUF-SED-WC09-CORRB-0.0/0.5-20181011	CUF-SED-WC09-CORCC-0.0/0.5-20191205
Parent Sample ID													
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC								
Metals													
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.274 J	-	0.293 J	-	1.48 J	-	0.271 J	0.238 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	5.56 J	-	7.61 J	-	**29.7 J[AC]**	-	4.22 J	4.69 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	97.7 J	-	101 J	-	101 J	-	76.9 J	70.2 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	1.05 J	-	1.07 J	-	**1.52 J[A]**	-	0.869 J	0.730 J
Boron	mg/kg	n/v	n/v	n/v	n/v	4.35 J	-	7.99 J	-	12.8 J	-	6.23 J	8.95 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.587 J	-	0.676 J	-	0.541 J	-	0.623 J	0.479 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	14,300 J	-	13,600 J	-	17,700 J	-	11,900 J	10,200 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	17.4 J	-	17.5 J	-	29.6 J	-	14.4 J	11.9 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	10.4 J	-	11.7 J	-	14.2 J	-	9.41 J	7.95 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	13.8 J	-	13.9 J	-	16.3 J	-	10.5 J	7.99 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	16.4 J	-	17.9 J	-	29.0 J	-	14.6 J	11.2 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	8.93 J	-	8.74 J	-	10.0 J	-	7.35 J	5.47 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0768 J	-	0.0684 UJ	-	0.0634 UJ	-	0.0704 UJ	0.0661 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	0.652 J	-	0.881 J	-	29.9 J	-	0.827 J	0.810 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	15.0 J	-	16.0 J	-	16.7 J	-	13.2 J	11.2 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	0.683 J	-	0.598 J	-	1.62 J	-	0.657 J	1.81 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0561 J	-	0.0576 J	-	0.0526 J	-	0.0529 J	0.0399 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	25.4 J	-	29.6 J	-	43.0 J	-	18.6 J	17.6 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.222 J	-	0.225 J	-	0.278 J	-	0.222 J	0.197 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	22.0 J	-	22.7 J	-	50.9 J	-	19.6 J	16.6 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	66.2 J	-	68.8 J	-	65.2 J	-	59.1 J	50.8 J
Radiological Parameters													
Radium-226	pCi/g	n/v	n/v	n/v	n/v	1.68 +/-(0.339)	-	1.68 +/-(0.342)J	-	2.01 +/-(0.430)J	-	1.56 +/-(0.329)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.35 +/-(0.421)	-	1.48 +/-(0.433)	-	1.35 +/-(0.298)	-	1.34 +/-(0.341)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	3.03 +/-(0.541)	-	3.16 +/-(0.552)J	-	3.36 +/-(0.523)J	-	2.90 +/-(0.474)J	-
Anions													
Chloride	mg/kg	n/v	n/v	n/v	n/v	15.6 UR	-	41.6 U*	-	78.0 J	-	89.5 J	103 J
Fluoride	mg/kg	n/v	n/v	n/v	n/v	2.00 U*	-	1.87 UR	-	1.69 UJ	-	1.89 UJ	1.59 UJ
Sulfate	mg/kg	n/v	n/v	n/v	n/v	249 J	-	265 J	-	67.2 J	-	87.6 J	71.1 J
General Chemistry													
% ASH	%	20[E]	40[F]	n/v	n/v	-	<1	-	<1	-	<1	-	-
pH (lab)	SU	n/v	n/v	n/v	n/v	7.0	-	7.1	-	6.9	-	6.7	7.3
Temperature	DEG C	n/v	n/v	n/v	n/v	21.3	-	21.4	-	21.4	-	21.4	-

See notes on last page.

Table J.3-1 : Sediment Analytical Results
Cumberland Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		WC10								
Sample Date						11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18	11-Oct-18
Sample ID						CUF-SED-WC10-CORCC-0.0/0.5-20181011	CUF-SED-WC10-CORCC-0.0/0.5-20181011	CUF-SED-WC10-CORCC-0.5/1.9-20181011	CUF-SED-WC10-CORLB-0.0/0.5-20181011	CUF-SED-WC10-CORLB-0.0/0.5-20181011	CUF-SED-WC10-CORLB-0.5/3.0-20181011	CUF-SED-WC10-CORLB-3.0/3.5-20181011	CUF-SED-WC10-CORRB-0.0/0.5-20181011	CUF-SED-WC10-CORRB-0.0/0.5-20181011
Parent Sample ID														
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.9 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 3 ft	3 - 3.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute	TEC	PEC									
Metals														
Antimony	mg/kg	2^{A}	25^{B}	n/v	n/v	-	0.285 J	-	-	0.235 J	-	-	-	0.282 J
Arsenic	mg/kg	9.8^{A}	33^{B}	9.8^{C}	33^{D}	-	5.43	-	-	3.61	-	-	-	4.09
Barium	mg/kg	240^{A}	$22,925^{B}$	n/v	n/v	-	69.4	-	-	66.8	-	-	-	71.5
Beryllium	mg/kg	1.2^{A}	42^{B}	n/v	n/v	-	0.884	-	-	0.770	-	-	-	0.984
Boron	mg/kg	n/v	n/v	n/v	n/v	-	3.88 J	-	-	3.08 J	-	-	-	3.40 J
Cadmium	mg/kg	1^{A}	5^{B}	1^{C}	5^{D}	-	0.561	-	-	0.557	-	-	-	0.702
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	16,000	-	-	15,200	-	-	-	13,400
Chromium	mg/kg	43.4^{A}	111^{B}	43^{C}	110^{D}	-	14.9	-	-	12.3	-	-	-	15.2
Cobalt	mg/kg	50^{A}	n/v	50^{C}	n/v	-	12.0	-	-	7.63	-	-	-	11.5
Copper	mg/kg	31.6^{A}	149^{B}	32^{C}	150^{D}	-	10.1	-	-	9.62	-	-	-	11.3
Lead	mg/kg	35.8^{A}	128^{B}	36^{C}	130^{D}	-	16.0	-	-	12.4	-	-	-	18.0
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	7.10 J	-	-	6.74 J	-	-	-	7.56 J
Mercury	mg/kg	0.18^{A}	1.1^{B}	0.18^{C}	1.1^{D}	-	0.0649 J	-	-	0.0730 J	-	-	-	0.0586 J
Molybdenum	mg/kg	38^{A}	$69,760^{B}$	n/v	n/v	-	1.56	-	-	0.652 J	-	-	-	0.930 J
Nickel	mg/kg	22.7^{A}	48.6^{B}	23^{C}	49^{D}	-	12.9	-	-	11.0	-	-	-	14.2
Selenium	mg/kg	2^{A}	2.9^{B}	n/v	n/v	-	0.632	-	-	0.558	-	-	-	0.753
Silver	mg/kg	1^{A}	2.2^{B}	n/v	n/v	-	0.0485 J	-	-	0.0370 J	-	-	-	0.0520 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	24.9	-	-	20.6	-	-	-	21.4
Thallium	mg/kg	1.2^{A}	10^{B}	n/v	n/v	-	0.243	-	-	0.213	-	-	-	0.257
Vanadium	mg/kg	66^{A}	564^{B}	n/v	n/v	-	18.1	-	-	17.0	-	-	-	20.0
Zinc	mg/kg	121^{A}	459^{B}	120^{C}	460^{D}	-	52.7	-	-	52.3	-	-	-	57.4
Radiological Parameters														
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.54 +/-(0.343)J	-	-	1.81 +/-(0.378)J	-	-	-	1.53 +/-(0.367)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	0.532 +/-(0.183)U	-	-	1.65 +/-(0.448)	-	-	-	1.03 +/-(0.557)
Radium-226+228	pCi/g	90^{A}	90^{B}	n/v	n/v	-	2.07 +/-(0.389)J	-	-	3.46 +/-(0.586)J	-	-	-	2.56 +/-(0.667)J
Anions														
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<12.6	-	-	<13.5	-	-	-	<13.2
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	<1.44	-	-	2.49 U*	-	-	-	<1.51
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	397 J	-	-	579 J	-	-	-	273 J
General Chemistry														
% ASH	%	20^{E}	40^{F}	n/v	n/v	1	-	<1	<1	-	<1	1	<1	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	6.9	-	-	6.8	-	-	-	7.1
Temperature	DEG C	n/v	n/v	n/v	n/v	-	20.7	-	-	20.8	-	-	-	20.7

Notes:

A	Freshwater Sediment Screening Values - Chronic
B	Freshwater Sediment Screening Values - Acute
C	Sediment Quality Assessment Guidelines - TEC
D	Sediment Quality Assessment Guidelines - PEC
E	Trigger for Phase 2 sampling
F	Threshold value for potential effects to benthic fauna
6.5^{A}	Concentration is greater than or equal to the indicated standard.
15.2	measured concentration did not exceed the indicated standard
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
ft	feet
ID	Identification
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
J	quantitation is approximate due to limitations identified during data validation
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
UR	Unreliable reporting or detection limit; compound may or may not be present in sample.
%	percent
DEG C	Degrees Celsius
mg/kg	milligrams per kilogram
pCi/g	picocuries per gram
SU	Standard Unit

1. Level of review is defined in the Quality Assurance Project Plan.
2. Value determined to be a statistical outlier and not presented in this data set (see Appendix E.6).

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TABLE J.3-2 : Mayfly Analytical Results
Cumberland Fossil Plant
June 2018, and June/July 2019

Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Beryllium mg/kg n/v	Mercury mg/kg 27^{AB}	Selenium mg/kg 0.51^{AB}
CuRA	5-Jun-18	CUF-MFN-CuRA-20180605		Normal Environmental Sample	Validated	0.082 J	0.0091 U*	**0.67^{AB}**
	7-Jun-18	CUF-MFP-CuRA-20180607		Normal Environmental Sample	Validated	<0.061	0.0038 U*	**0.42^{A}**
	22-Jun-18	CUF-MFA-CuRA-20180622		Normal Environmental Sample	Validated	<0.063	0.026 U*	**0.75^{AB}**
MFA-CURA	3-Jul-19	CUF-MFA-CURA-20190703		Normal Environmental Sample	Final-Verified	<0.030	0.019 U*	**0.81^{AB}**
MFN-CURA	4-Jun-19	CUF-MFN-CURA-20190604		Normal Environmental Sample	Final-Verified	0.037 J	0.012 U*	**0.86^{AB}**
MFP-CURA	4-Jun-19	CUF-MFP-CURA-20190604		Normal Environmental Sample	Final-Verified	<0.032	0.0090 U*	**0.63^{AB}**
CuRD	6-Jun-18	CUF-MFP-CuRD-20180606		Normal Environmental Sample	Validated	<0.065	<0.0031	**0.58^{AB}**
	7-Jun-18	CUF-MFN-CuRD-20180607		Normal Environmental Sample	Validated	<0.063	0.014 U*	**0.74^{AB}**
	19-Jun-18	CUF-MFA-CuRD-20180619		Normal Environmental Sample	Validated	<0.065	0.019 U*	**0.72^{AB}**
MFA-CURD	3-Jul-19	CUF-MFA-CURD-20190703		Normal Environmental Sample	Final-Verified	<0.033	0.022 U*	**0.79^{AB}**
MFN-CURD	4-Jun-19	CUF-MFN-CURD-20190604		Normal Environmental Sample	Final-Verified	0.041 J	0.012 U*	**0.63^{AB}**
	4-Jun-19	CUF-MFN-DUP01-20190604	CUF-MFN-CURD-20190604	Field Duplicate Sample	Final-Verified	0.046 J	0.016 U*	**0.57^{AB}**
MFP-CURD	4-Jun-19	CUF-MFP-CURD-20190604		Normal Environmental Sample	Final-Verified	<0.032	0.0086 U*	**0.37^{A}**
CuRU	6-Jun-18	CUF-MFP-CuRU-20180606		Normal Environmental Sample	Validated	<0.064	0.0057 U*	**0.47^{A}**
	7-Jun-18	CUF-MFN-CuRU-20180607		Normal Environmental Sample	Validated	<0.066	0.011 U*	**0.58^{AB}**
	23-Jun-18	CUF-MFA-CuRU-20180623		Normal Environmental Sample	Validated	<0.061	0.026 U*	**0.90^{AB}**
MFA-CURU	3-Jul-19	CUF-MFA-CURU-20190703		Normal Environmental Sample	Final-Verified	<0.032	0.023 U*	**0.65^{AB}**
	3-Jul-19	CUF-MFA-DUP02-20190703	CUF-MFA-CURU-20190703	Field Duplicate Sample	Final-Verified	<0.030	0.028 U*	**0.50^{A}**
MFN-CURU	5-Jun-19	CUF-MFN-CURU-20190605		Normal Environmental Sample	Final-Verified	0.038 J	0.014 U*	**0.50^{A}**
MFP-CURU	5-Jun-19	CUF-MFP-CURU-20190605		Normal Environmental Sample	Final-Verified	<0.031	<0.0070	**0.40^{A}**
	5-Jun-19	CUF-MFP-DUP01-20190605	CUF-MFP-CURU-20190605	Field Duplicate Sample	Final-Verified	<0.031	0.0079 U*	**0.38^{A}**
MFA-WCD	3-Jul-19	CUF-MFA-WCD-20190703		Normal Environmental Sample	Final-Verified	<0.033	0.016 U*	**0.63^{AB}**
	3-Jul-19	CUF-MFA-DUP01-20190703	CUF-MFA-WCD-20190703	Field Duplicate Sample	Final-Verified	<0.030	0.019 U*	**0.60^{AB}**
MFN-WCD	3-Jun-19	CUF-MFN-WCD-20190603		Normal Environmental Sample	Final-Verified	0.050 J	0.018 U*	**0.47^{A}**
MFP-WCD	3-Jun-19	CUF-MFP-WCD-20190603		Normal Environmental Sample	Final-Verified	<0.031	<0.0072	**0.36^{A}**
WCD	5-Jun-18	CUF-MFN-WCD-20180605		Normal Environmental Sample	Validated	0.088 J	0.0034 U*	**0.58^{AB}**
	6-Jun-18	CUF-MFP-WCD-20180606		Normal Environmental Sample	Validated	<0.066	<0.0029	**0.48^{A}**
	22-Jun-18	CUF-MFA-WCD-20180622		Normal Environmental Sample	Validated	<0.064	0.017 U*	**0.96^{AB}**
MFN-WCU	3-Jun-19	CUF-MFN-WCU-20190603		Normal Environmental Sample	Final-Verified	0.075 J	0.016 U*	**0.54^{AB}**
MFP-WCU	4-Jun-19	CUF-MFP-WCU-20190604		Normal Environmental Sample	Final-Verified	<0.031	0.0077 U*	**0.35^{A}**
WCU	5-Jun-18	CUF-MFN-WCU-20180605		Normal Environmental Sample	Validated	<0.064	0.025 U*	**0.78^{AB}**
	6-Jun-18	CUF-MFP-WCU-20180606		Normal Environmental Sample	Validated	<0.064	0.011 U*	**0.60^{AB}**
	22-Jun-18	CUF-MFA-WCU-20180622		Normal Environmental Sample	Validated	<0.065	0.045	**0.98^{AB}**

Notes:

A	Critical Body Residue NOAEL
B	Critical Body Residue LOAEL
6.5^{A}	Concentration exceeds the indicated standard as described in Note 2 below.
15.2	measured concentration did not exceed the indicated standard
<0.50	Laboratory reporting limit was greater than the applicable standard.
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
n/v	No standard/guideline value.
J	quantitation is approximate due to limitations identified during data validation
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
%	percent
mg/kg	milligrams per kilogram

1. Level of review is defined in the Quality Assurance Project Plan.

2. Mayfly tissue sampling results were evaluated using Critical Body Residue (CBR) values for the CCR parameters detected above ESVs in surface stream water and sediment samples (see Section 4.3). Also, due to their potential for bioaccumulation, mercury and selenium were included in this evaluation for water bodies sampled for mayflies. Based on this approach, beryllium, mercury and selenium results in Wells Creek results in the Cumberland River are presented above.

EXHIBITS

Exhibit No.

J.3-1

Title

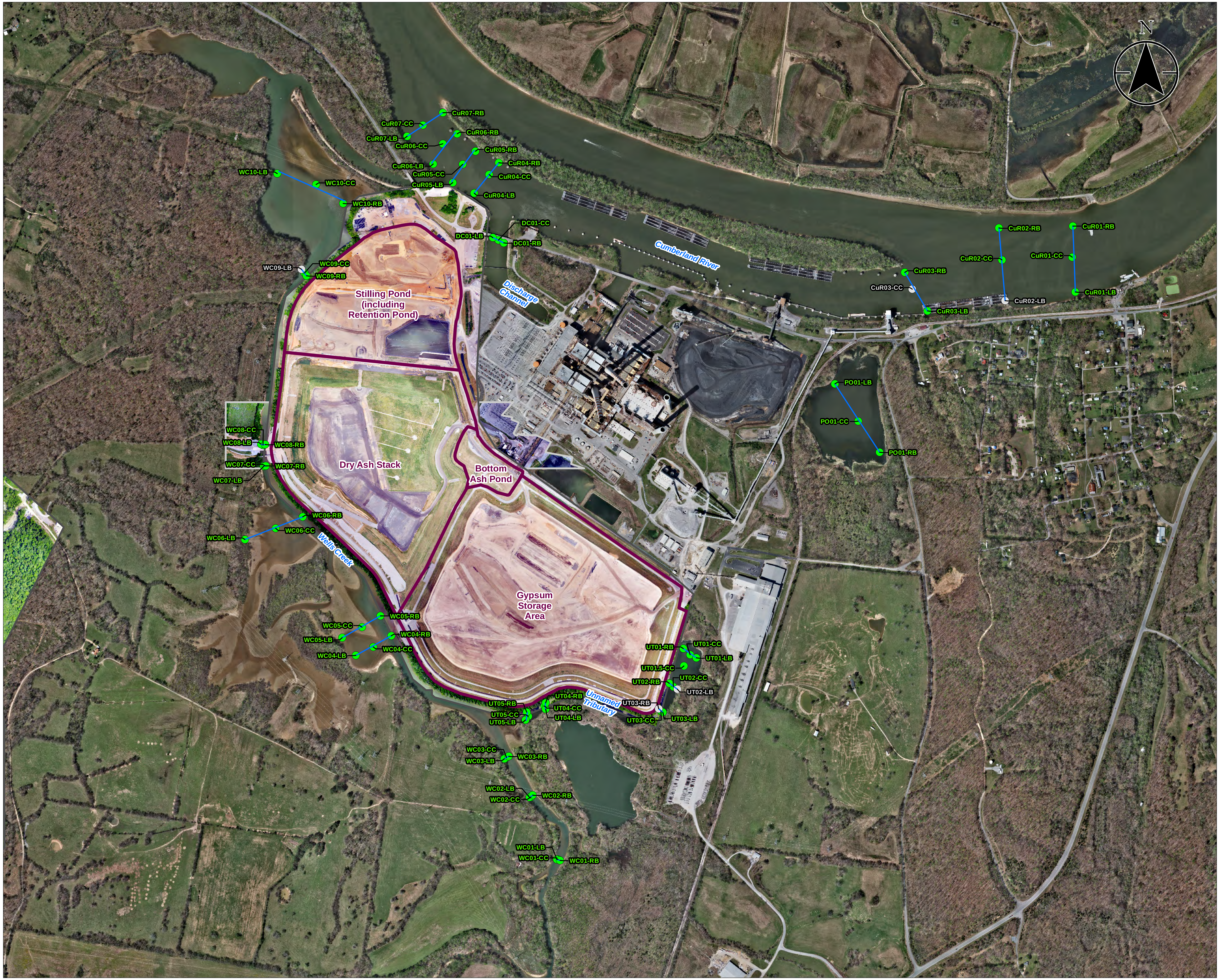
Sediment Sampling Locations

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location: Stewart County, Tennessee

175568209
Prepared by LMB on 2022-10-27
Technical Review by AT on 2022-10-27



0 550 1,100 1,650 2,200 Feet

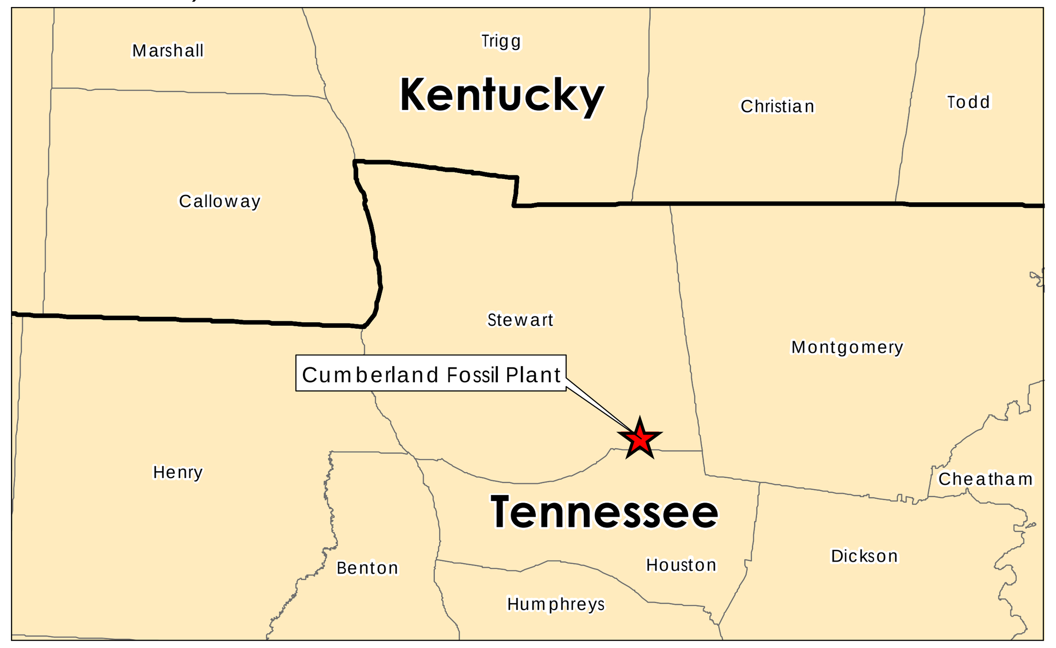
1:6,600 (At original document size of 22x34)

Legend

- Sediment Sampling Locations - Collected
- Sediment Sampling Locations - Attempted: Insufficient Sediment for Sampling
- Sediment Sampling Locations - Transects
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022)



Stantec TVA

Exhibit No.
J.3-2

Title
Phase 2 Sediment Sampling Locations - June/July 2021

Client/Project
Tennessee Valley Authority
Cumberland Fossil Plant

Project Location
Stewart County, Tennessee

175568209
Prepared by MB on 2022-12-15
Technical Review by JC on 2022-12-15

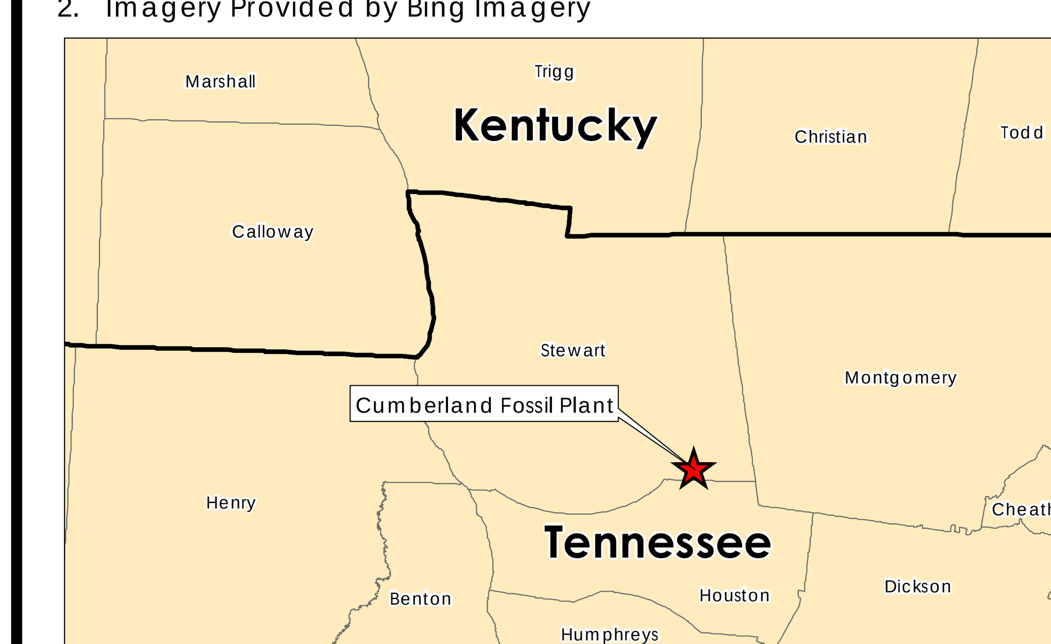
0 125 250 375 500 Feet
1:1,500 (At original document size of 22x34)

Legend

- Sediment Sampling Locations
- Sediment Sampling Locations - Transects
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Bing Imagery



Stantec TVA

Exhibit No.

J.3-3

Title

Benthic Macroinvertebrate Sampling Locations

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by LMB on 2022-12-15
Technical Review by AT on 2022-12-15

0 1,000 2,000 3,000 4,000 Feet

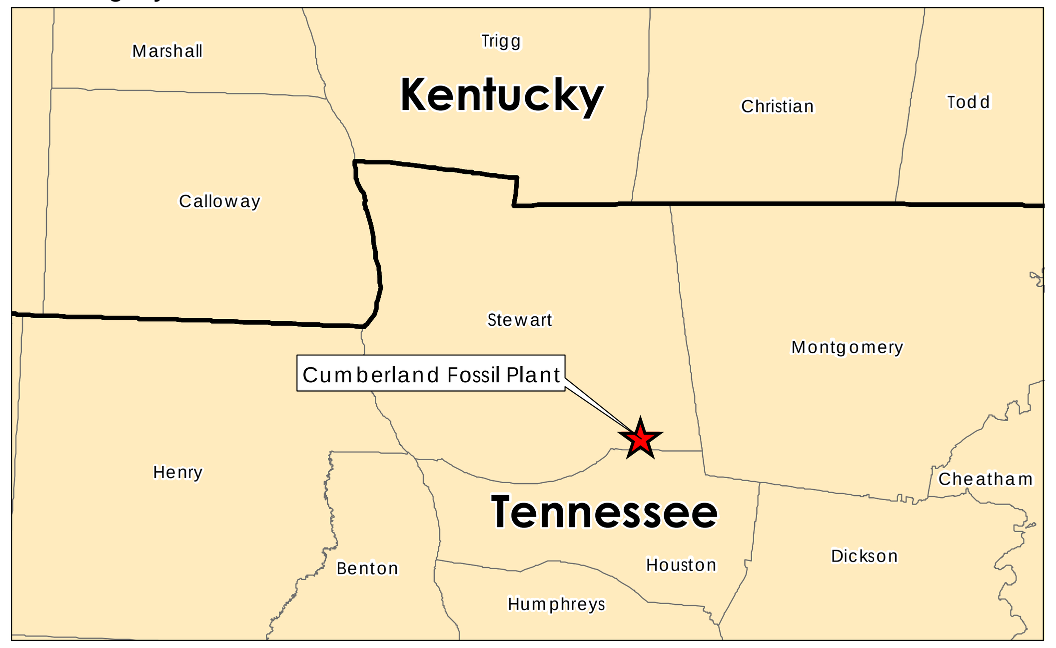
1:12,000 (At original document size of 22x34)

Legend

- Benthic Macroinvertebrate Sampling Locations
- Benthic Macroinvertebrate Sampling Locations - Transects
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022); Esri World Imagery



Stantec TVA

U:\TVA-EIP\175568209_CUF_Phase2\gis\mxd\EAR\J.3-3_Benthic_Macro_Sampling_Locations.mxd Revised: 2022-12-15 By: TRink

Exhibit No.

J.3-3a

Title

Benthic Macroinvertebrate Sampling Locations

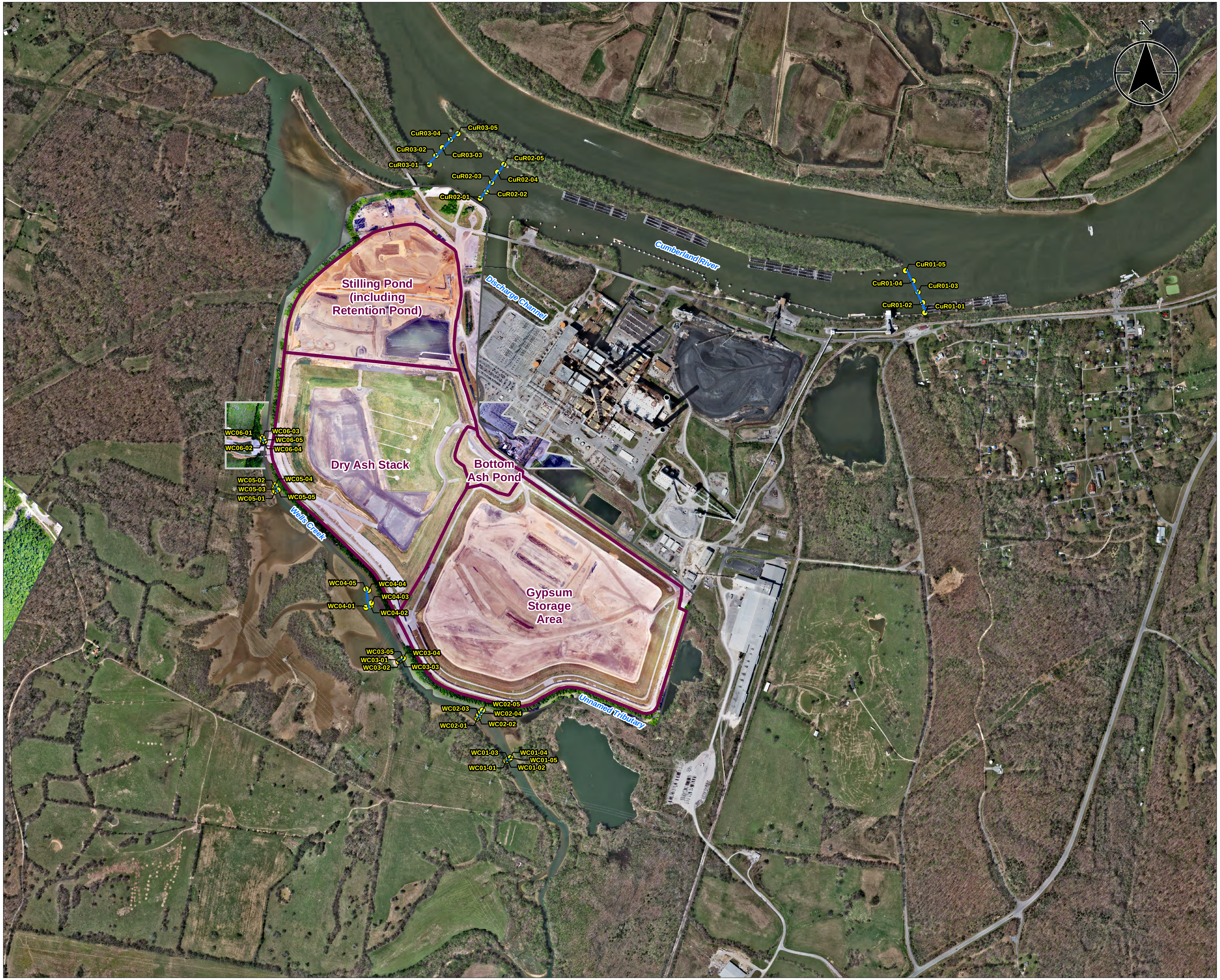
Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location | 175568209
Stewart County, Tennessee | Prepared by LMB on 2022-12-15
Technical Review by AT on 2022-12-15

0 | 550 | 1,100 | 1,650 | 2,200 Feet

1:6,600 (At original document size of 22x34)

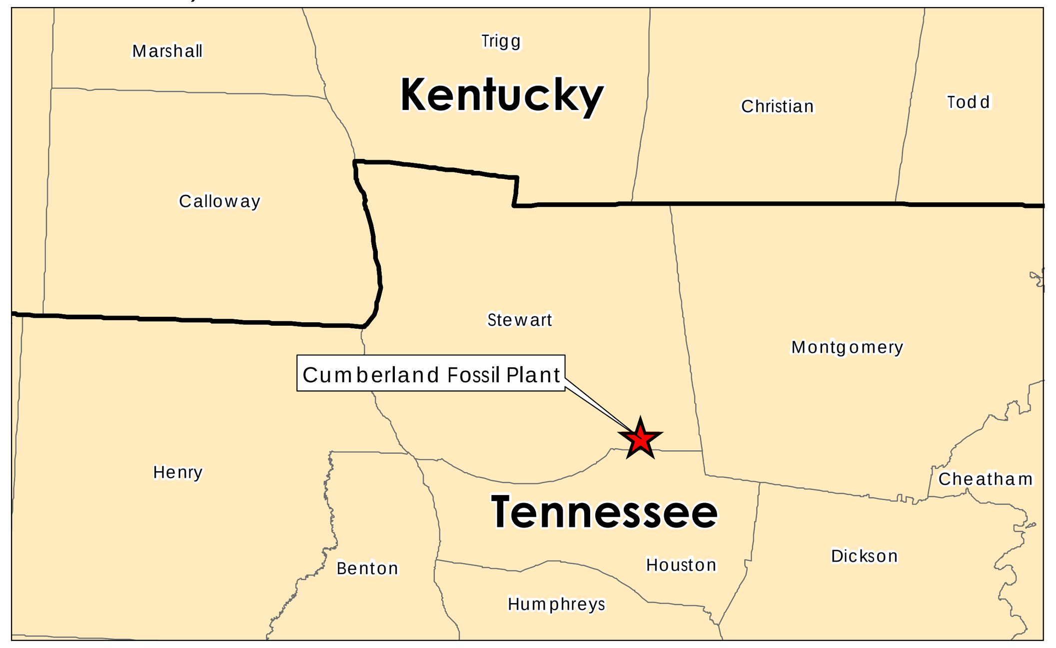


Legend

- Benthic Macroinvertebrate Sampling Locations
- Benthic Macroinvertebrate Sampling Locations - Transects
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022)



Stantec TVA

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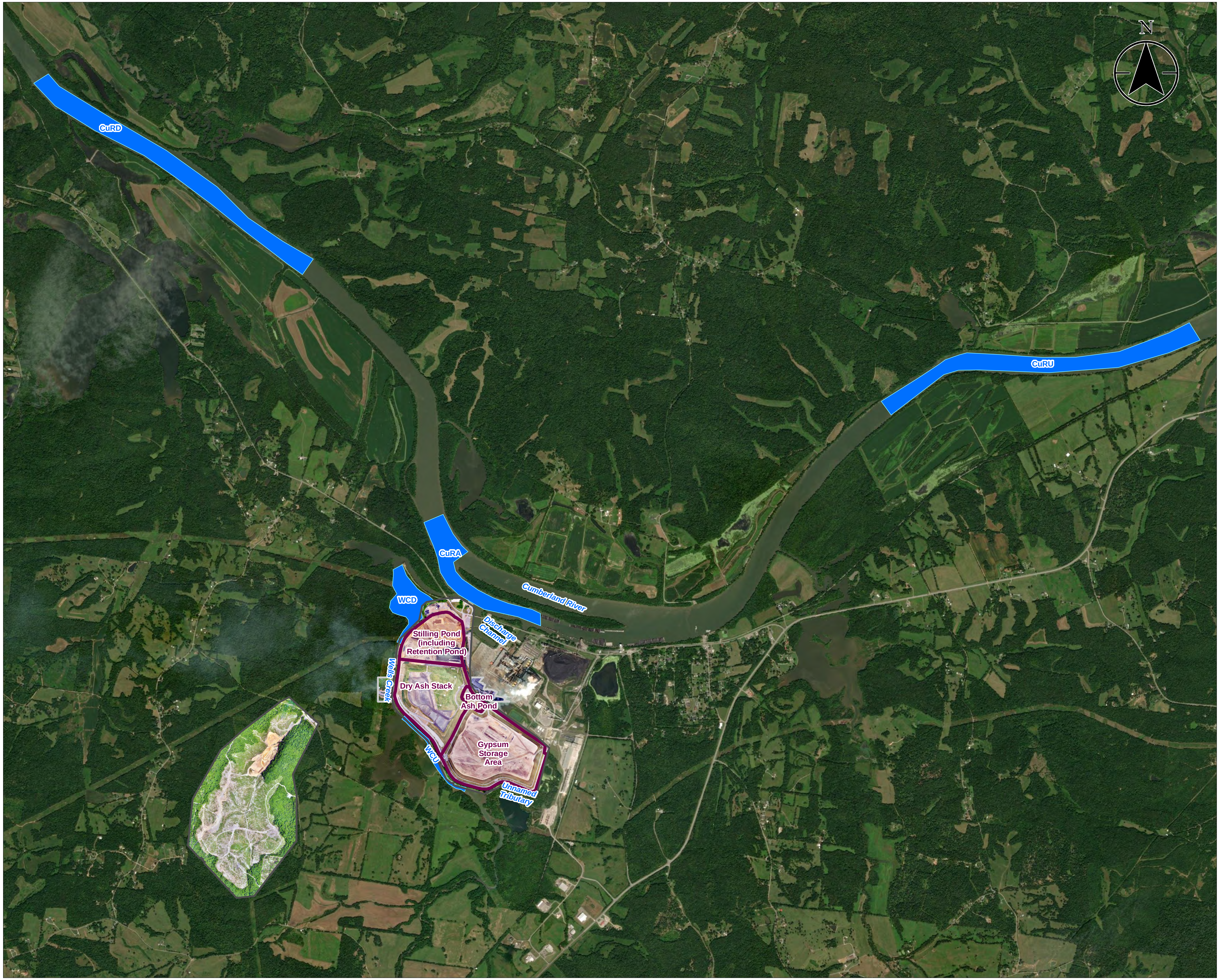


Exhibit No.

J.3-4

Title

Mayfly Sampling Reaches

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by LMB on 2022-12-15
Technical Review by AT on 2022-12-15

0 1,500 3,000 4,500 6,000 Feet

1:18,000 (At original document size of 22x34)

Legend

Mayfly Sampling Locations
CuRU – Cumberland River Upstream
CuRA – Cumberland River Adjacent
CuRD – Cumberland River Downstream
WCU – Wells Creek Upstream
WCD – Wells Creek Downstream

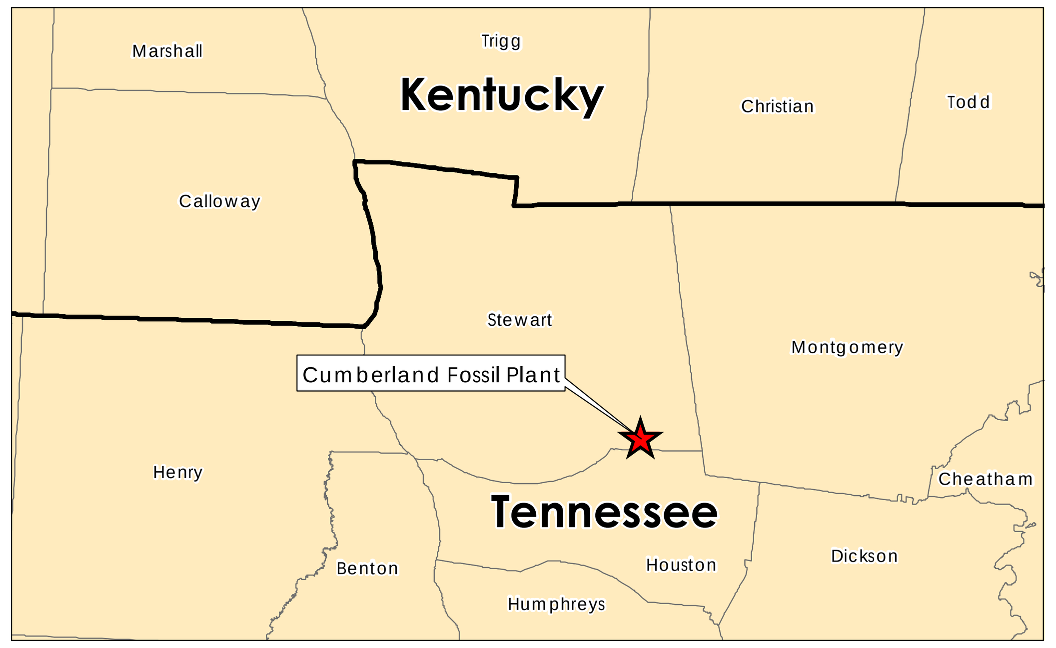
2021 Imagery Boundary

2022 Imagery Boundary

CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022); Esri World Imagery



Stantec TVA

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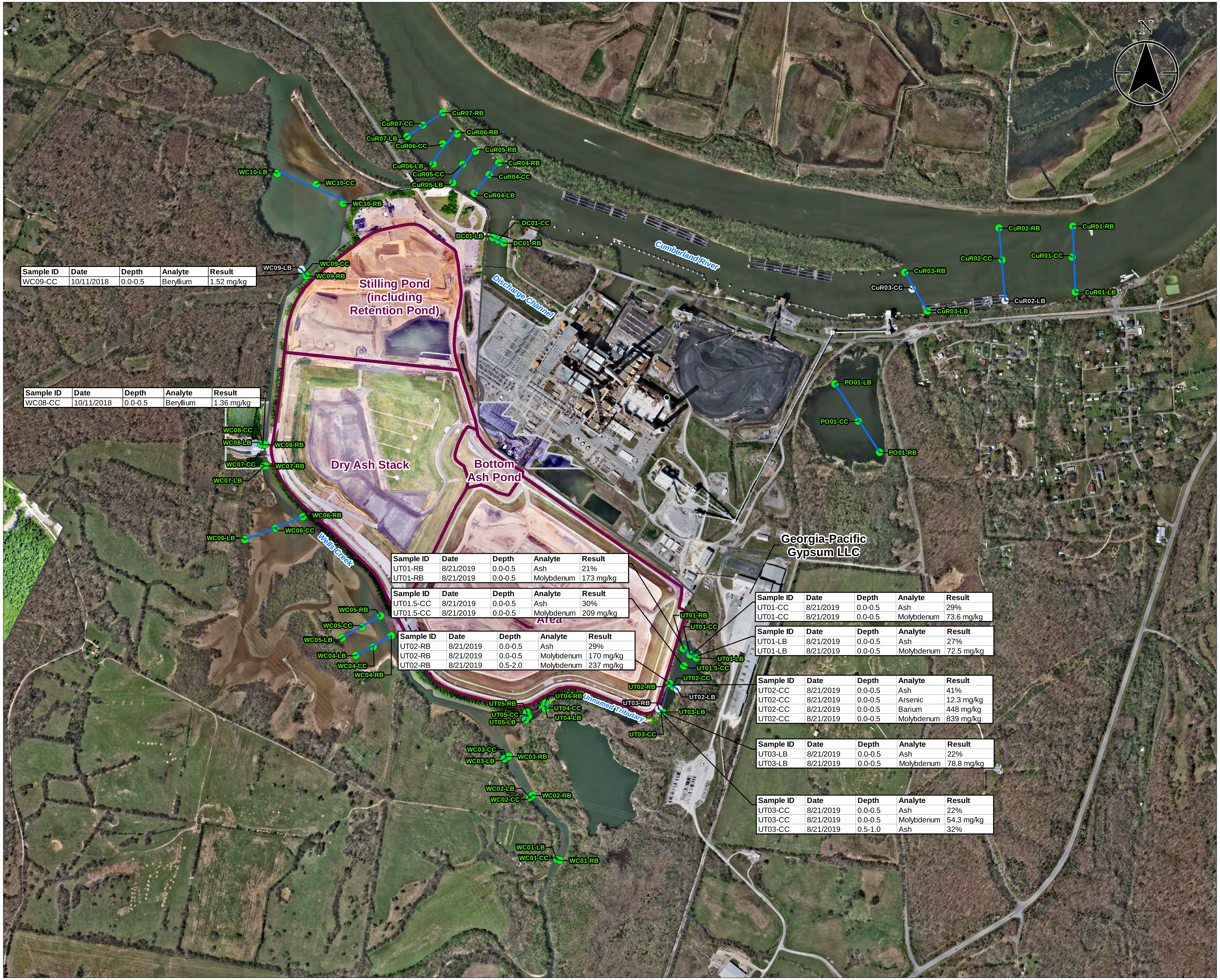


Sample ID	Date	Depth	Analyte	Result
WC09-CC	10/11/2018	0.0-0.5	Beryllium	1.52 mg/kg

Sample ID	Date	Depth	Analyte	Result
WC08-CC	10/11/2018	0.0-0.5	Beryllium	1.36 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01-RB	8/21/2019	0.0-0.5	Ash	21%
UT01-RB	8/21/2019	0.0-0.5	Molybdenum	173 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01.5-CC	8/21/2019	0.0-0.5	Ash	30%
UT01.5-CC	8/21/2019	0.0-0.5	Molybdenum	209 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT02-RB	8/21/2019	0.0-0.5	Ash	29%
UT02-RB	8/21/2019	0.0-0.5	Molybdenum	170 mg/kg
UT02-RB	8/21/2019	0.5-2.0	Molybdenum	237 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01-CC	8/21/2019	0.0-0.5	Ash	29%
UT01-CC	8/21/2019	0.0-0.5	Molybdenum	73.6 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01-LB	8/21/2019	0.0-0.5	Ash	27%
UT01-LB	8/21/2019	0.0-0.5	Molybdenum	72.5 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT02-CC	8/21/2019	0.0-0.5	Ash	41%
UT02-CC	8/21/2019	0.0-0.5	Arsenic	12.3 mg/kg
UT02-CC	8/21/2019	0.0-0.5	Barium	448 mg/kg
UT02-CC	8/21/2019	0.0-0.5	Molybdenum	839 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT03-LB	8/21/2019	0.0-0.5	Ash	22%
UT03-LB	8/21/2019	0.0-0.5	Molybdenum	78.8 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT03-CC	8/21/2019	0.0-0.5	Ash	22%
UT03-CC	8/21/2019	0.0-0.5	Molybdenum	54.3 mg/kg
UT03-CC	8/21/2019	0.5-1.0	Ash	32%

Exhibit No.
J.3-5

Title
Sediment Sampling Results above Ecological Screening Values

Client/Project
Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by LMB on 2022-12-15
Technical Review by AT on 2022-12-15

0 550 1,100 1,650 2,200 Feet
1:6,600 (At original document size of 22x34)

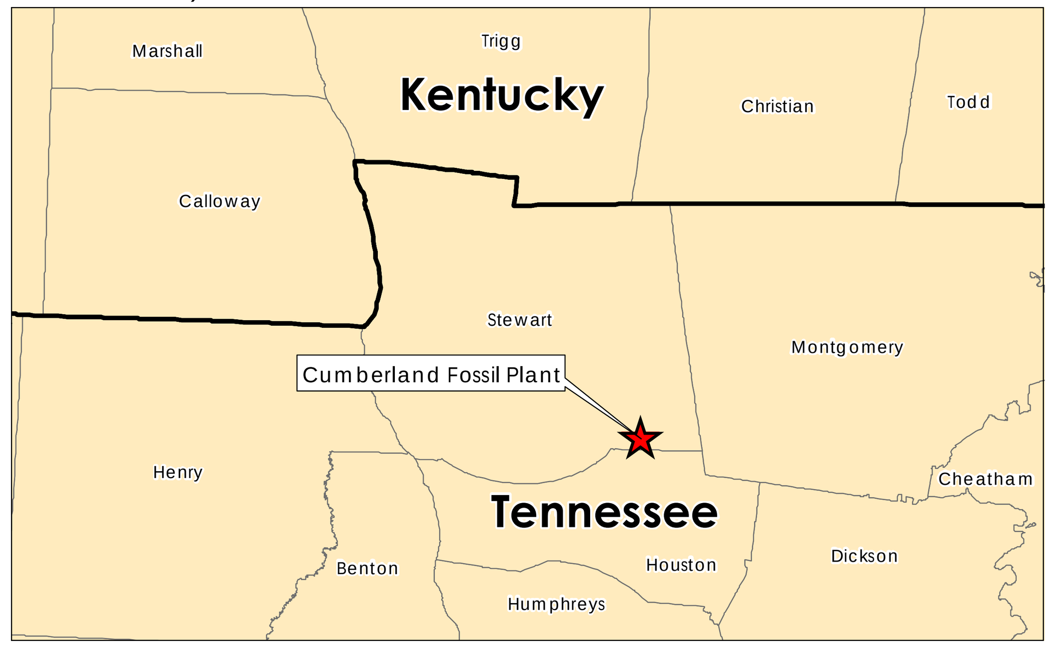
Legend

- Sediment Sampling Locations - Collected
- Sediment Sampling Locations - Attempted: Insufficient Sediment for Sampling
- Sediment Sampling Locations - Transect
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

Abbreviations:
CC - Center Channel
RB- Right Bank
LB- Left Bank
mg/kg - milligrams per kilogram

Chronic Ecological Screening Values	
% Ash	20%
Arsenic	9.8 mg/kg
Barium	240 mg/kg
Beryllium	1.2 mg/kg
Molybdenum	38 mg/kg

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017) and TVA (5/21/2021 and 5/12/2022)



Stantec TVA

Exhibit No.
J.3-6

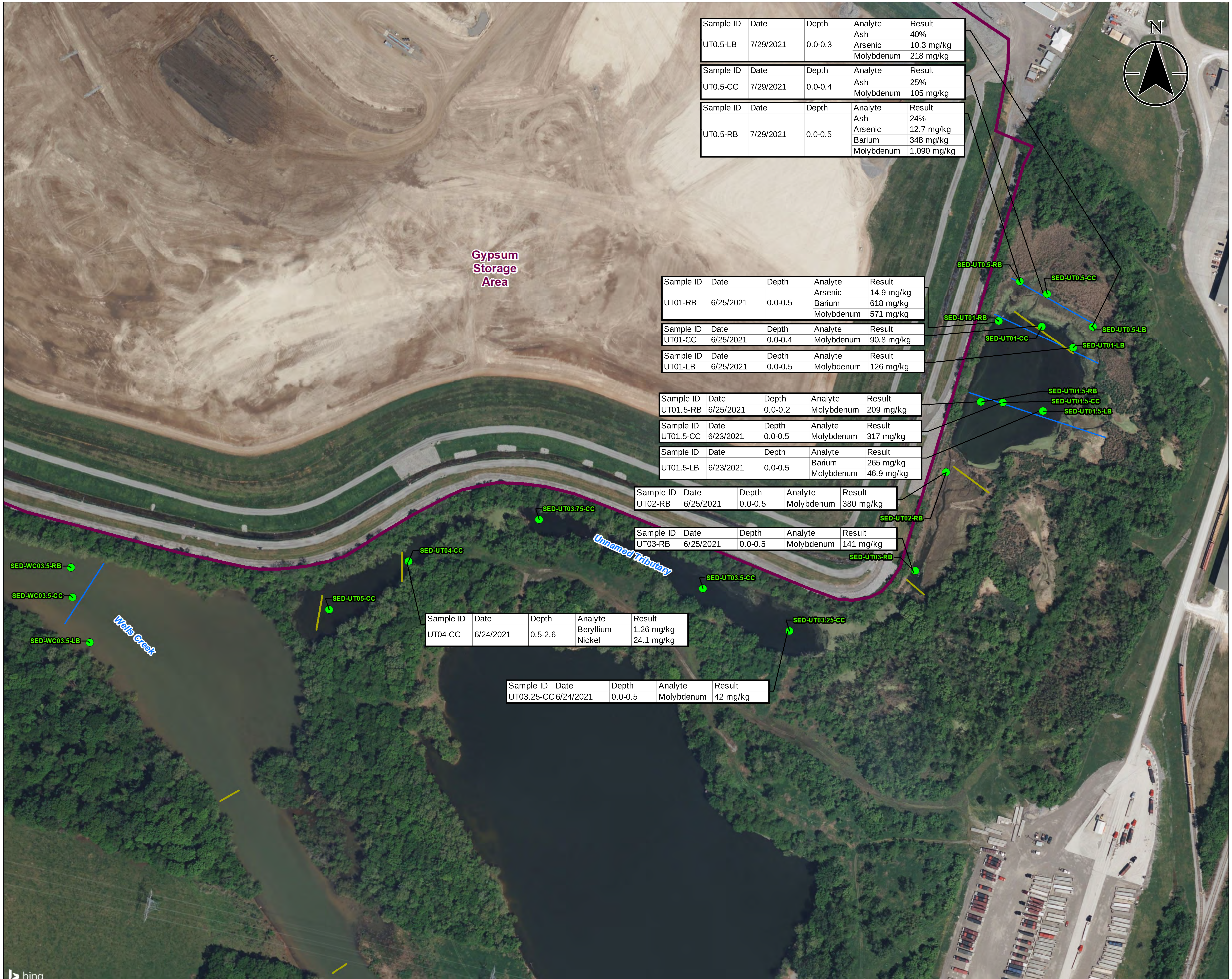
Title
Phase 2 Sediment Sampling Results above Ecological Screening Levels

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by MB on 2022-12-15
Technical Review by JC on 2022-12-15

0 125 250 375 500 Feet
1:1,500 (At original document size of 22x34)



Sample ID	Date	Depth	Analyte	Result
UT0.5-LB	7/29/2021	0.0-0.3	Ash	40%
			Arsenic	10.3 mg/kg
			Molybdenum	218 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT0.5-CC	7/29/2021	0.0-0.4	Ash	25%
			Molybdenum	105 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT0.5-RB	7/29/2021	0.0-0.5	Ash	24%
			Arsenic	12.7 mg/kg
			Barium	348 mg/kg
			Molybdenum	1,090 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01-RB	6/25/2021	0.0-0.5	Arsenic	14.9 mg/kg
			Barium	618 mg/kg
			Molybdenum	571 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01-CC	6/25/2021	0.0-0.4	Molybdenum	90.8 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01-LB	6/25/2021	0.0-0.5	Molybdenum	126 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01.5-RB	6/25/2021	0.0-0.2	Molybdenum	209 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01.5-CC	6/23/2021	0.0-0.5	Molybdenum	317 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT01.5-LB	6/23/2021	0.0-0.5	Barium	265 mg/kg
			Molybdenum	46.9 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT02-RB	6/25/2021	0.0-0.5	Molybdenum	380 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT03-RB	6/25/2021	0.0-0.5	Molybdenum	141 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT04-CC	6/24/2021	0.5-2.6	Beryllium	1.26 mg/kg
			Nickel	24.1 mg/kg

Sample ID	Date	Depth	Analyte	Result
UT03.25-CC	6/24/2021	0.0-0.5	Molybdenum	42 mg/kg

Legend

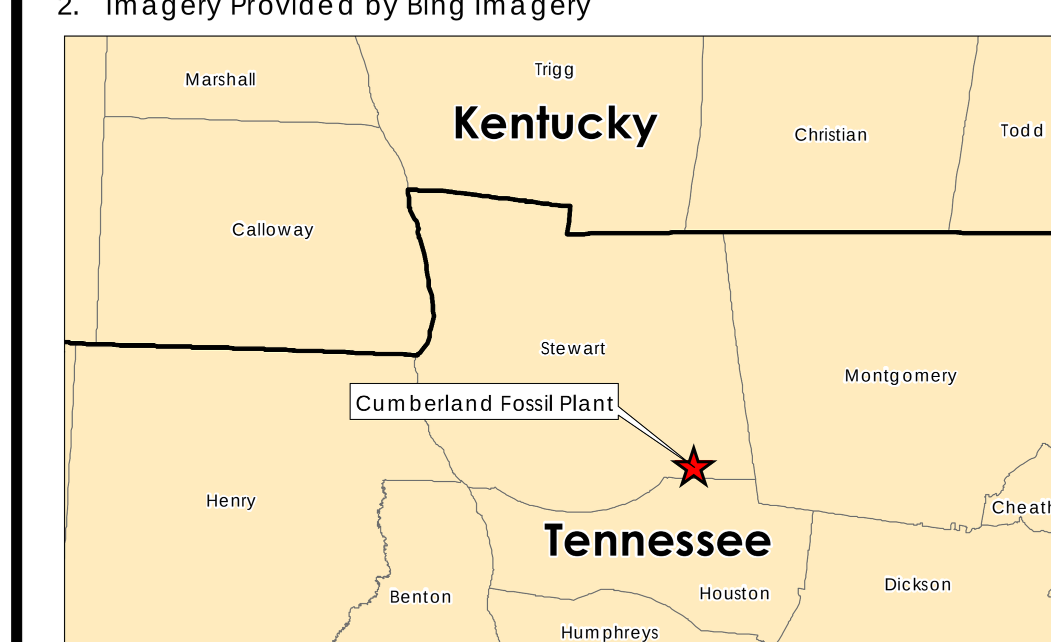
- Sediment Sampling Locations (Phase 2)
- Sediment Sampling Locations - Transect (Phase 1)
- Sediment Sampling Locations - Transects (Phase 2)
- CCR Unit Area (Approximate)

Abbreviations:
CC - Center Channel
RB- Right Bank
LB- Left Bank
mg/kg - milligrams per kilogram

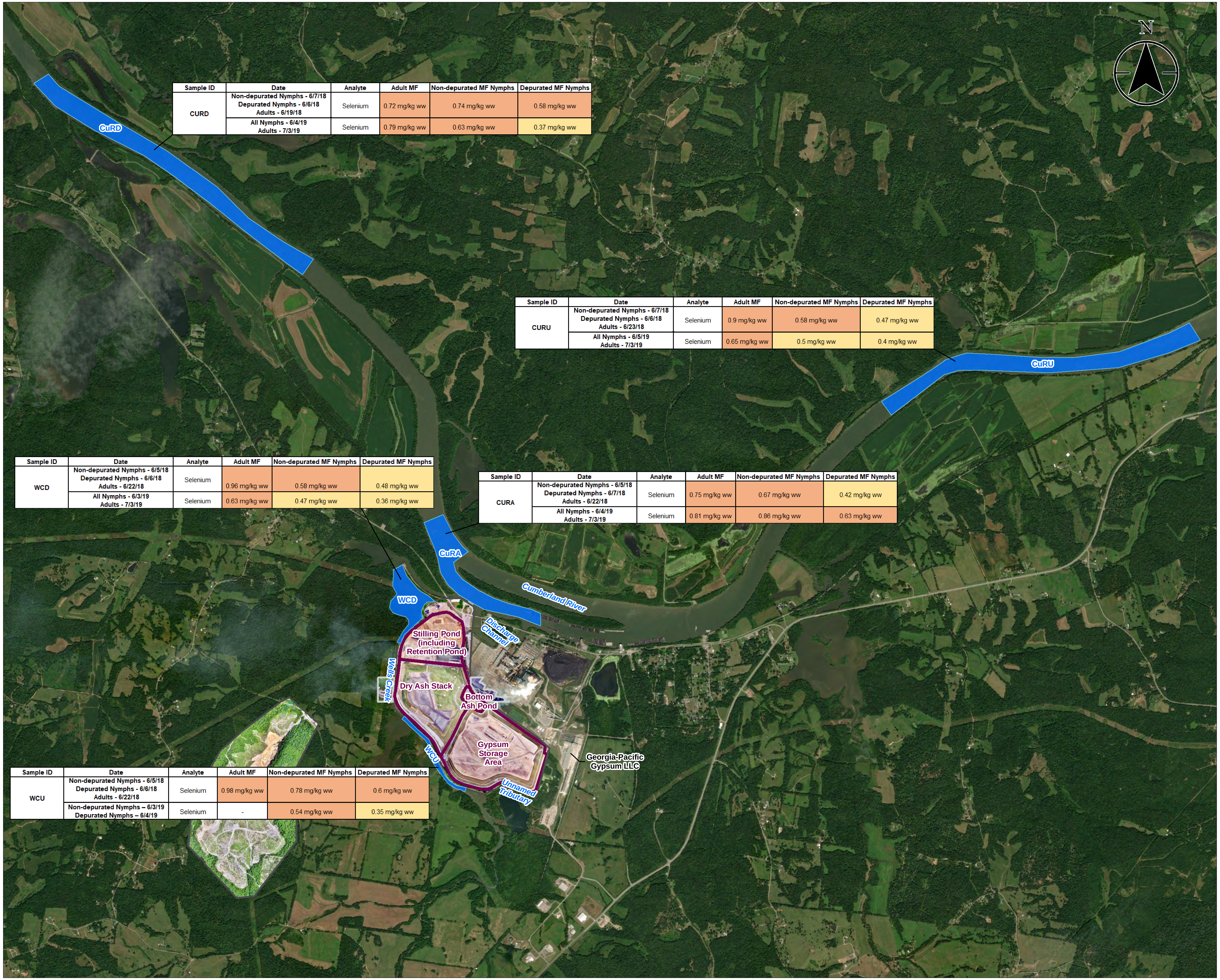
Chronic Ecological Screening Values	
% Ash	20%
Arsenic	9.8 mg/kg
Barium	240 mg/kg
Beryllium	1.2 mg/kg
Molybdenum	38 mg/kg
Nickel	22.7 mg/kg

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Bing Imagery



Stantec TVA



Sample ID	Date	Analyte	Adult MF	Non-depurated MF Nymphs	Depurated MF Nymphs
CURD	Non-depurated Nymphs - 6/7/18 Depurated Nymphs - 6/6/18 Adults - 6/19/18	Selenium	0.72 mg/kg ww	0.74 mg/kg ww	0.58 mg/kg ww
	All Nymphs - 6/4/19 Adults - 7/3/19	Selenium	0.79 mg/kg ww	0.63 mg/kg ww	0.37 mg/kg ww

Sample ID	Date	Analyte	Adult MF	Non-depurated MF Nymphs	Depurated MF Nymphs
CURU	Non-depurated Nymphs - 6/7/18 Depurated Nymphs - 6/6/18 Adults - 6/23/18	Selenium	0.9 mg/kg ww	0.58 mg/kg ww	0.47 mg/kg ww
	All Nymphs - 6/5/19 Adults - 7/3/19	Selenium	0.65 mg/kg ww	0.5 mg/kg ww	0.4 mg/kg ww

Sample ID	Date	Analyte	Adult MF	Non-depurated MF Nymphs	Depurated MF Nymphs
WCD	Non-depurated Nymphs - 6/5/18 Depurated Nymphs - 6/6/18 Adults - 6/22/18	Selenium	0.96 mg/kg ww	0.58 mg/kg ww	0.48 mg/kg ww
	All Nymphs - 6/3/19 Adults - 7/3/19	Selenium	0.63 mg/kg ww	0.47 mg/kg ww	0.36 mg/kg ww

Sample ID	Date	Analyte	Adult MF	Non-depurated MF Nymphs	Depurated MF Nymphs
CURA	Non-depurated Nymphs - 6/5/18 Depurated Nymphs - 6/7/18 Adults - 6/22/18	Selenium	0.75 mg/kg ww	0.67 mg/kg ww	0.42 mg/kg ww
	All Nymphs - 6/4/19 Adults - 7/3/19	Selenium	0.81 mg/kg ww	0.86 mg/kg ww	0.63 mg/kg ww

Sample ID	Date	Analyte	Adult MF	Non-depurated MF Nymphs	Depurated MF Nymphs
WCU	Non-depurated Nymphs - 6/5/18 Depurated Nymphs - 6/6/18 Adults - 6/22/18	Selenium	0.98 mg/kg ww	0.78 mg/kg ww	0.6 mg/kg ww
	Non-depurated Nymphs – 6/3/19 Depurated Nymphs – 6/4/19	Selenium	-	0.54 mg/kg ww	0.35 mg/kg ww

Exhibit No.
J.3-7

Title
Mayfly Sampling Results above Critical Body Residue Values

Client/Project
Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location 175568209
Stewart County, Tennessee
Prepared by DMB on 2022-12-15
Technical Review by JC on 2022-12-15

0 1,500 3,000 4,500 6,000 Feet
1:18,000 (At original document size of 22x34)

Legend

Mayfly Sampling Reaches
CuRU – Cumberland River Upstream
CuRA – Cumberland River Adjacent
CuRD – Cumberland River Downstream
WCU – Wells Creek Upstream
WCD – Wells Creek Downstream

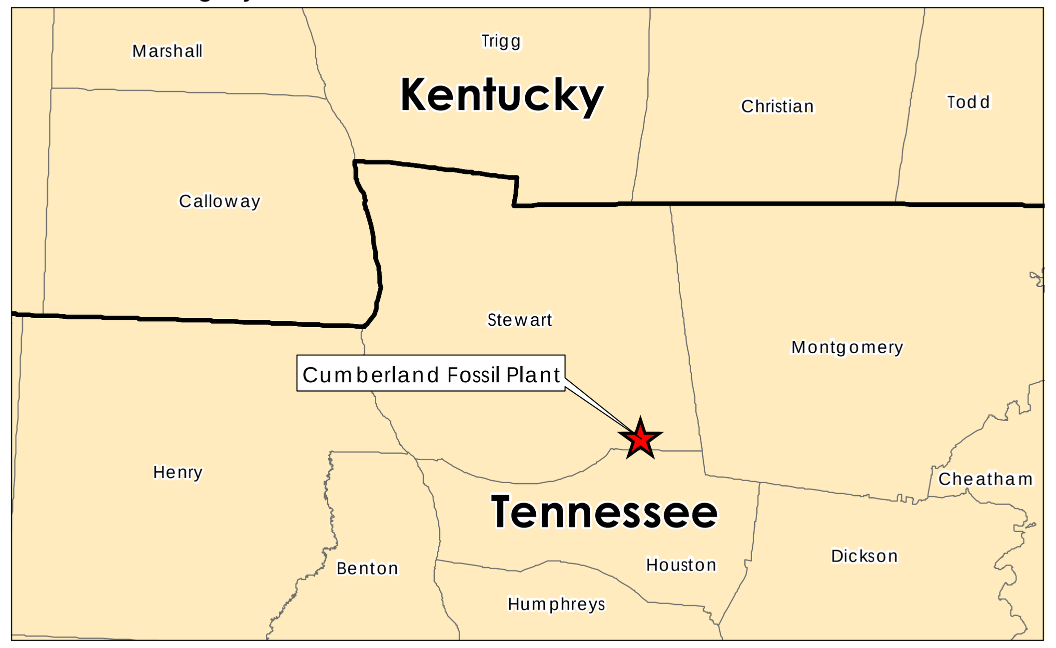
2021 Imagery Boundary
2022 Imagery Boundary
CCR Unit Area (Approximate)
Concentration > CBR NOAEL
Concentration > CBR LOAEL

Abbreviations:
mg/kg ww Milligrams per kilogram wet weight
CBR Critical body residue
NOAEL No observed adverse effect level
LOAEL Lowest observed adverse effect level
MF Mayflies

	Mayfly Tissue Critical Body Residue	
	NOAEL	LOAEL
Selenium	0.051	0.51

CBR NOAEL and LOAEL values are provided in Table 1-4 and Appendix A.2

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022) and Esri World Imagery



Stantec TVA

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ATTACHMENT J.3-A - BENTHIC COMMUNITY SUMMARY SHEETS

Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Cumberland River
Site: MAC-CUR01 (CURM 103.8)
Date: 09/17/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	3
Bivalvia	Corbiculidae	Corbicula fluminea <10mm	CF	6.6	3
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	2
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	3
Diptera	Ceratopogonidae	Ceratoponidae	PR	6.8	8
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chaoboridae	Chaoborus sp.	PR	8.5	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	73
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	11
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	1
Diptera	Chironomidae	Microchironomus sp.	CG	4	1
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	3
Diptera	Chironomidae	Procladius sp.	CG	8.8	7
Diptera	Chironomidae	Stictochironomus caffrarius	CG	5.4	8
Diptera	Chironomidae	Tanypodinae	CG	6.6	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	9
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	1
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	2
Hirudinea	Glossiphoniidae	Helobdella sp.	PR	9.3	2
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	12
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	14
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	10
Oligochaeta	Naididae	Stylaria lacustris	CG	8.4	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	9
Oligochaeta	Naididae	Tubificinae wohc	CG	10	154
Tricladida	Planariidae	Girardia tigrina	CG	7.1	2
			Total Organisms Collected		**344**

Reservoir Benthic Index

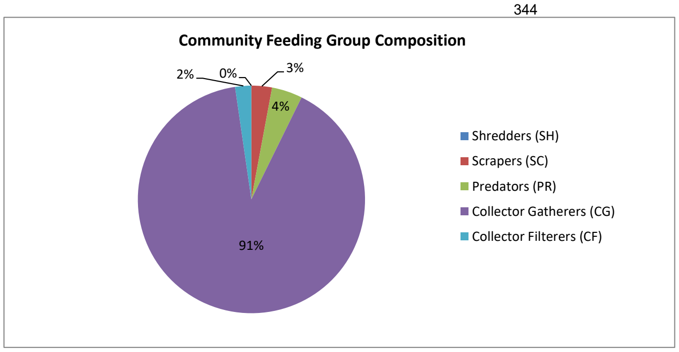
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	22	5	
EPT Richness (Genus)	0	1	
Percent Grabs Containing Long Lived Organisms	80.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gast
Percent Oligochaeta	58.1	1	
Percent Top Two Dominant Taxa (Genus)	68.6	5	(Tibificinae, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	38	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**21**	**FAIR**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	8.73	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	0		
Percent Tolerant Taxa (TV > 3)	100.0		
Percent EPT-H	0.00		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	10	3
Predators (PR)	15	4
Collector Gatherers (CG)	311	90
Collector Filterers (CF)	8	2
	344	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Cumberland River
Site: MAC-CUR02 (CURM 102.8)
Date: 09/17/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	1
Bivalvia	Corbiculidae	Corbicula fluminea >10mm	CF	6.6	15
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	8
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	2
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	4
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	39
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	18
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	9
Diptera	Chironomidae	Procladius sp.	CG	8.8	4
Diptera	Chironomidae	Stictochironomus caffrarius	CG	5.4	2
Diptera	Chironomidae	Tanypus concavus	CG	9.2	1
Ephemeroptera	Ephemeridae	Hexagenia sp. >10mm	CG	4.4	1
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	5
Gastropoda	Pleuroceridae	Lithasia armigera	SC	6	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	5
Gastropoda	Pleuroceridae	Pleurocera canaliculata excuratum	SC	6	3
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	3
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	7
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	9
Oligochaeta	Naididae	Bratislavia unidentata	CG	8.28	5
Oligochaeta	Naididae	Dero sp.	CG	9.8	5
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	14
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	19
Oligochaeta	Naididae	Tubificinae whc	CG	10	22
Oligochaeta	Naididae	Tubificinae wohc	CG	10	185
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	2
Trichoptera	Polycentropodidae	Polycentropodidae	CF	3.68	1
			Total Organisms Collected		**392**

Reservoir Benthic Index

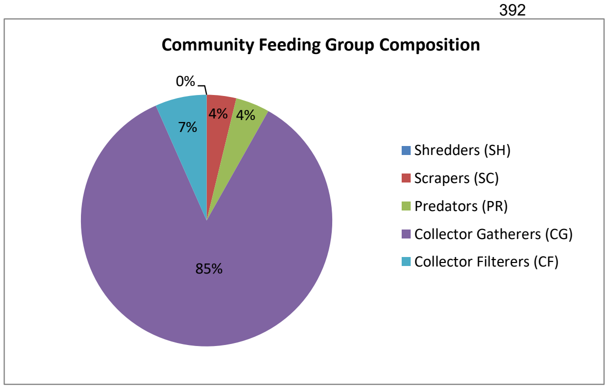
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	25	5	
EPT Richness (Genus)	1	3	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenid
Percent Oligochaeta	66.1	1	
Percent Top Two Dominant Taxa (Genus)	62.8	5	(Tubificinae, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	60	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**25**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	8.88	Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	1.0	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	15	4
Predators (PR)	17	4
Collector Gatherers (CG)	334	85
Collector Filterers (CF)	26	7
	392	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Cumberland River
Site: MAC-CUR03 (CURM 102.7)
Date: 09/17/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	4
Bivalvia	Corbiculidae	Corbicula fluminea >10mm	CF	6.6	12
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	8
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	4
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	9
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	2
Diptera	Chironomidae	Ablabesmyia sp.	CG	7.1	1
Diptera	Chironomidae	Axarus sp.	CG	2	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	62
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	4
Diptera	Chironomidae	Epoicocladius sp.	CG	0.1	1
Diptera	Chironomidae	Harnischia sp.	CG	9.1	1
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	3
Diptera	Chironomidae	Procladius sp.	CG	8.8	4
Diptera	Chironomidae	Stictochironomus caffrarius	CG	5.4	4
Ephemeroptera	Ephemeridae	Hexagenia sp. >10mm	CG	4.4	6
Gastropoda	Hydrobiidae	Hydrobiidae	SC	4.1	1
Gastropoda	Planorbidae	Gyraulus parvus	SC	4.2	1
Hirudinea	Hirudinea	Hirudinea	PR	8	1
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	2
Hirudinea	Glossiphoniidae	Helobdella stagnalis	PR	9.3	1
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	9
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	9
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	8
Oligochaeta	Naididae	Pristina sp.	CG	7.7	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	13
Oligochaeta	Naididae	Tubificinae wohc	CG	10	216
Trichoptera	Hydroptilidae	Orthotrichia sp.	SC	8.3	1
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	3
			Total Organisms Collected		**392**

Reservoir Benthic Index

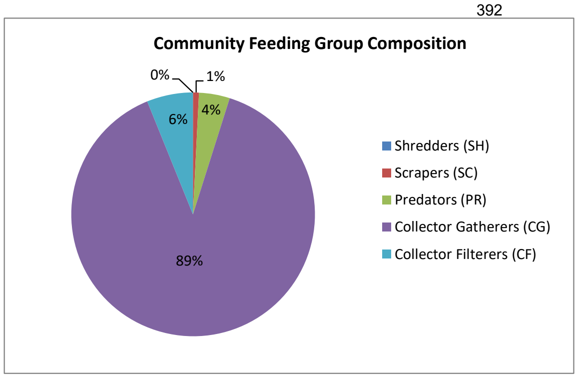
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	24	5	
EPT Richness (Genus)	3	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae
Percent Oligochaeta	65.3	1	
Percent Top Two Dominant Taxa (Genus)	74.2	5	(Chironomus, Tubificinae wohc)
Total Abundance Less Chironomidae and Oligochaeta	53	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**27**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	8.93	Very Poor	T
Intolerant Taxa Richness (TV ≤ 3)	2		
Percent Tolerant Taxa (TV > 3)	99.5		
Percent EPT-H	2.6		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	3	1
Predators (PR)	16	4
Collector Gatherers (CG)	349	89
Collector Filterers (CF)	24	6
	392	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Cumberland River
Site: MAC-CUR04 (CURM 106.56)
Date: 09/18/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	11
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	35
Bivalvia	Sphaeriidae	Pisidium sp.	CF	6.6	1
Bivalvia	Unionidae	Cyclonaias pustulosa	CF	6	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	24
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	4
Diptera	Chironomidae	Ablabesmyia sp.	CG	7.1	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	63
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	6
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	1
Diptera	Chironomidae	Glyptotendipes sp.	CG	8.6	1
Diptera	Chironomidae	Polypedilum flavum	CG	6.1	1
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	3
Diptera	Chironomidae	Procladius sp.	CG	8.8	2
Diptera	Chironomidae	Stictochironomus caffrarius	CG	5.4	3
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	2
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	3
Gastropoda	Hydrobiidae	Birgella subglobosa	SC	4.1	1
Gastropoda	Pleuroceridae	Lithasia armigera	SC	6	1
Gastropoda	Pleuroceridae	Pleurocera canaliculata excuratum	SC	6	2
Gastropoda	Viviparidae	Viviparus georgianus	SC	6	1
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	1
Odonata/Anisoptera	Gomphidae	Stylurus sp.	PR	4	1
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	1
Oligochaeta	Naididae	Bratislavia unidentata	CG	8.28	1
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	11
Oligochaeta	Naididae	Tubificinae whc	CG	10	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	58
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	3
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	1
Tricladida	Planariidae	Girardia tigrina	CG	7.1	3
			Total Organisms Collected		**250**

Reservoir Benthic Index

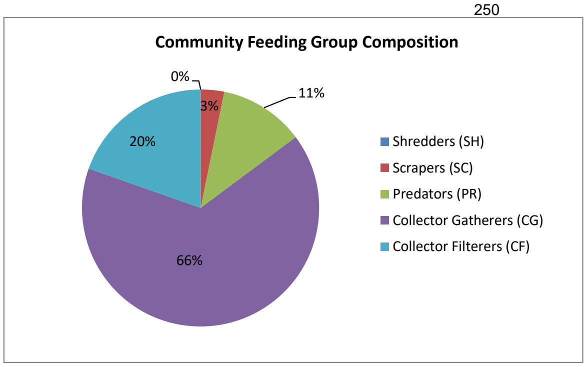
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	28	5	
EPT Richness (Genus)	3	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae,
Percent Oligochaeta	29.6	1	
Percent Top Two Dominant Taxa (Genus)	48.8	5	(Tubificinae, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	91	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**27**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	7.99	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	0		
Percent Tolerant Taxa (TV > 3)	100.00		
Percent EPT-H	3.60		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	8	3
Predators (PR)	29	12
Collector Gatherers (CG)	164	66
Collector Filterers (CF)	49	20
	250	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Cumberland River
Site: MAC-CUR05 (CURM 102.06)
Date: 09/18/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	11
Bivalvia	Corbiculidae	Corbicula fluminea <10mm	CF	6.6	15
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	70
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	22
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	1
Diptera	Chironomidae	Ablabesmyia janta	CG	7.1	1
Diptera	Chironomidae	Axarus sp.	CG	2	9
Diptera	Chironomidae	Coelotanypus sp.	CG	8	69
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	3
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	6
Diptera	Chironomidae	Epoicocladius sp.	CG	0.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	2
Diptera	Chironomidae	Stictochironomus caffrarius	CG	5.4	2
Diptera	Chironomidae	Tanypus concavus	CG	9.2	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	3
Ephemeroptera	Ephemeridae	Hexagenia sp. >10mm	CG	4.4	9
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	17
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	1
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	1
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	1
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	2
Oligochaeta	Naididae	Tubificinae wohc	CG	10	23
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	7
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	2
			Total Organisms Collected		**280**

Reservoir Benthic Index

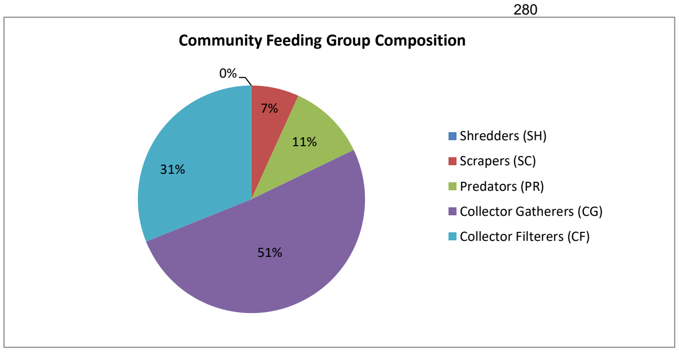
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	24	5	
EPT Richness (Genus)	3	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gast
Percent Oligochaeta	8.9	5	
Percent Top Two Dominant Taxa (Genus)	49.6	5	(Musculium, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	157	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	7.11	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	0		
Percent Tolerant Taxa (TV > 3)	100.0		
Percent EPT-H	6.4		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	19	7
Predators (PR)	31	11
Collector Gatherers (CG)	143	51
Collector Filterers (CF)	87	31
	280	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Wells Creek
Site: MAC-WC01 (WRM 2.3)
Date: 09/17/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	38
Coleoptera	Elmidae	Dubiraphia sp.	CG	5.5	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	16
Diptera	Chironomidae	Ablabesmyia janta	CG	7.1	2
Diptera	Chironomidae	Chironomus sp.	CG	9.3	13
Diptera	Chironomidae	Cladopelma sp.	CG	3.5	2
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	4
Diptera	Chironomidae	Coelotanypus sp.	CG	8	3
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	5
Diptera	Chironomidae	Einfeldia natchitocheae	CG	7.1	1
Diptera	Chironomidae	Microchironomus sp.	CG	4	12
Diptera	Chironomidae	Paralauterborniella nigrohalteralis	CG	4.9	6
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	16
Diptera	Chironomidae	Polypedilum sp.	CG	6.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	9
Diptera	Chironomidae	Tanypus concavus	CG	9.2	4
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	19
Ephemeroptera	Ephemeridae	Hexagenia sp. <10mm	CG	4.4	2
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	2
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Dero digitata	CG	9.8	9
Oligochaeta	Naididae	Dero sp.	CG	9.8	3
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	52
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	3
Oligochaeta	Naididae	Tubificinae whc	CG	10	11
Oligochaeta	Naididae	Tubificinae wohc	CG	10	196
			Total Organisms Collected		**432**

Reservoir Benthic Index

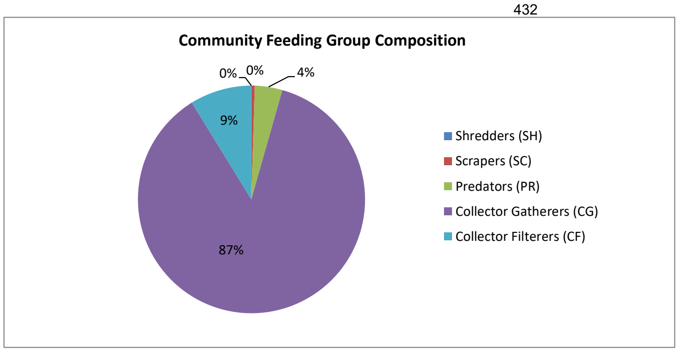
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	23	5	
EPT Richness (Genus)	1	3	
Percent Grabs Containing Long Lived Organisms	40.0	1	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gast
Percent Oligochaeta	63.7	1	
Percent Top Two Dominant Taxa (Genus)	60.6	5	(Tubificinae, Limnodrilus)
Total Abundance Less Chironomidae and Oligochaeta	60	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**21**	**FAIR**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	8.72	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	0		
Percent Tolerant Taxa (TV > 3)	100.0		
Percent EPT-H	0.5		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	2	0
Predators (PR)	17	4
Collector Gatherers (CG)	375	87
Collector Filterers (CF)	38	9
	432	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Wells Creek
Site: MAC-WC02 (WRM 2.19)
Date: 09/17/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	11
Coleoptera	Elmidae	Dubiraphia sp.	CG	5.5	2
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	26
Diptera	Chironomidae	Chironomus sp.	CG	9.3	13
Diptera	Chironomidae	Cladopelma sp.	CG	3.5	1
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	13
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	9
Diptera	Chironomidae	Einfeldia natchitocheae	CG	7.1	32
Diptera	Chironomidae	Microchironomus sp.	CG	4	25
Diptera	Chironomidae	Paralauterborniella nigrohalteralis	CG	4.9	2
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	34
Diptera	Chironomidae	Procladius sp.	CG	8.8	3
Diptera	Chironomidae	Rheotanytarsus exiguus gp.	CG	4.7	1
Diptera	Chironomidae	Tanypus concavus	CG	9.2	9
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	105
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	7
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	7
Oligochaeta	Naididae	Dero digitata	CG	9.8	4
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	42
Oligochaeta	Naididae	Limnodrilus sp.	CG	9.5	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	23
Oligochaeta	Naididae	Tubificinae wohc	CG	10	179
			Total Organisms Collected		**552**

Reservoir Benthic Index

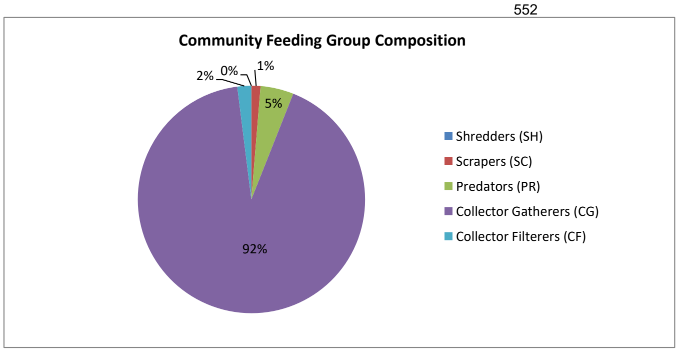
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	22	5	
EPT Richness (Genus)	0	1	
Percent Grabs Containing Long Lived Organisms	80.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gast
Percent Oligochaeta	46.6	1	
Percent Top Two Dominant Taxa (Genus)	55.6	5	(Tubificinae, Tanytarsus)
Total Abundance Less Chironomidae and Oligochaeta	46	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**21**	**FAIR**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	8.10	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	0		
Percent Tolerant Taxa (TV > 3)	100.0		
Percent EPT-H	0.0		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	7	1
Predators (PR)	26	5
Collector Gatherers (CG)	508	92
Collector Filterers (CF)	11	2
	552	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Wells Creek
Site: MAC-WC03 (WRM 1.96)
Date: 09/17/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	16
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	192
Coleoptera	Elmidae	Dubiraphia sp.	CG	5.5	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	10
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	5
Diptera	Chironomidae	Ablabesmyia mallochi	CG	7.1	2
Diptera	Chironomidae	Chironomus sp.	CG	9.3	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	6
Diptera	Chironomidae	Glyptotendipes sp.	CG	8.6	3
Diptera	Chironomidae	Microchironomus sp.	CG	4	1
Diptera	Chironomidae	Paratendipes albimanus/duplicatus	CG	5.6	1
Diptera	Chironomidae	Phaenopsectra obediens	CG	6.85	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	5
Ephemeroptera	Ephemeridae	Hexagenia sp. >10mm	CG	4.4	5
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	1
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	2
Hirudinea	Glossiphoniidae	Helobdella stagnalis	PR	9.3	10
Isopoda	Asellidae	Lirceus sp.	CG	7.4	1
Oligochaeta	Naididae	Branchiodrilus hortensis	CG	8	6
Oligochaeta	Naididae	Dero digitata	CG	9.8	2
Oligochaeta	Naididae	Haemonais waldvogeli	CG	4	3
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	11
Oligochaeta	Naididae	Tubificinae whc	CG	10	15
Oligochaeta	Naididae	Tubificinae wohc	CG	10	39
			Total Organisms Collected		**340**

Reservoir Benthic Index

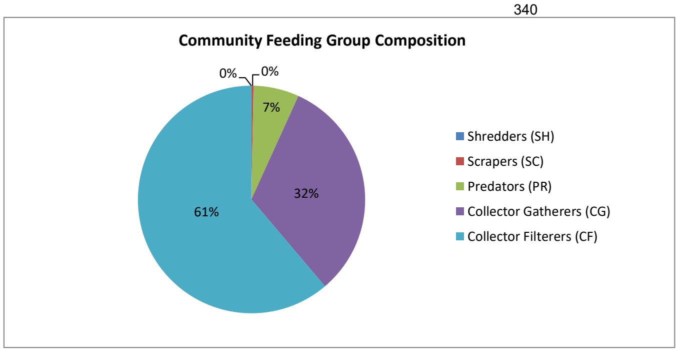
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	21	5	
EPT Richness (Genus)	1	3	
Percent Grabs Containing Long Lived Organisms	60.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gast
Percent Oligochaeta	22.4	1	
Percent Top Two Dominant Taxa (Genus)	77.1	5	(Tubificinae, Sphaeriidae)
Total Abundance Less Chironomidae and Oligochaeta	238	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**23**	**FAIR**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	7.58	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	0		
Percent Tolerant Taxa (TV > 3)	100.0		
Percent EPT-H	1.5		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	1	0
Predators (PR)	22	6
Collector Gatherers (CG)	109	32
Collector Filterers (CF)	208	61
	340	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Wells Creek
Site: MAC-WC04(WRM 1.82)
Date: 09/18/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	16
Bivalvia	Unionidae	Unionidae	CF	6	1
Coleoptera	Elmidae	Dubiraphia sp.	CG	5.5	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	4
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	4
Diptera	Chironomidae	Chironomus sp.	CG	9.3	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	53
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	1
Diptera	Chironomidae	Einfeldia natchitocheae	CG	7.1	9
Diptera	Chironomidae	Glyptotendipes sp.	CG	8.6	1
Diptera	Chironomidae	Microchironomus sp.	CG	4	16
Diptera	Chironomidae	Procladius sp.	CG	8.8	10
Diptera	Chironomidae	Tanypus concavus	CG	9.2	7
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	87
Ephemeroptera	Ephemeridae	Hexagenia sp. >10mm	CG	4.4	3
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	4
Hirudinea	-	Hirudinea	PR	8	1
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	13
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	3
Oligochaeta	Naididae	Dero digitata	CG	9.8	42
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	47
Oligochaeta	Naididae	Tubificinae wohc	CG	10	130
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	1
			Total Organisms Collected		**455**

Reservoir Benthic Index

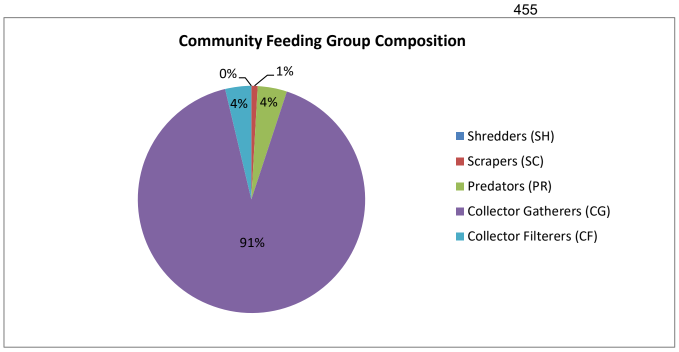
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	22	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	80.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gast
Percent Oligochaeta	48.8	1	
Percent Top Two Dominant Taxa (Genus)	47.7	5	(Tubificinae, Tanytarsus)
Total Abundance Less Chironomidae and Oligochaeta	44	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**25**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	8.40	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	0		
Percent Tolerant Taxa (TV > 3)	100.0		
Percent EPT-H	0.9		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	4	1
Predators (PR)	19	4
Collector Gatherers (CG)	415	91
Collector Filterers (CF)	17	4
	455	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Wells Creek
Site: MAC-WC05(WRM 1.47)
Date: 09/18/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	8
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	9
Diptera	Chironomidae	Ablabesmyia janta	CG	7.1	11
Diptera	Chironomidae	Chironomus sp.	CG	9.3	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	45
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	3
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	202
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	11
Diptera	Chironomidae	Einfeldia natchitocheae	CG	7.1	1
Diptera	Chironomidae	Glyptotendipes sp.	CG	8.6	21
Diptera	Chironomidae	Microchironomus sp.	CG	4	31
Diptera	Chironomidae	Microtendipes pedellus gp.	CG	4.6	45
Diptera	Chironomidae	Polypedilum (Asheum) beckae	CG	6.1	4
Diptera	Chironomidae	Procladius sp.	CG	8.8	3
Diptera	Chironomidae	Tanypus concavus	CG	9.2	10
Diptera	Chironomidae	Tanytarsus sp.	CG	9.2	52
Gastropoda	Ancylidae	Ferrissia rivularis	SC	6.6	4
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	1
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	1
Gastropoda	Planorbidae	Menetus dilatatus	SC	7.6	4
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata excuratum	SC	6	17
Hirudinea	Glossiphoniidae	Glossiphoniidae	PR	8.6	7
Hirudinea	Glossiphoniidae	Helobdella stagnalis	PR	9.3	1
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	8
Oligochaeta	Naididae	Bratislavia unidentata	CG	8.28	194
Oligochaeta	Naididae	Dero digitata	CG	9.8	33
Oligochaeta	Naididae	Dero sp.	CG	9.8	17
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	13
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	6
Oligochaeta	Naididae	Naidinae	CG	8	19
Oligochaeta	Naididae	Nais pardalis	CG	8.7	79
Oligochaeta	Naididae	Nais sp.	CG	8.7	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	2
Oligochaeta	Naididae	Tubificinae wohc	CG	10	92
Trichoptera	Hydroptilidae	Orthotrichia sp.	SC	8.3	4
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	93
			Total Organisms Collected		**1055**

Reservoir Benthic Index

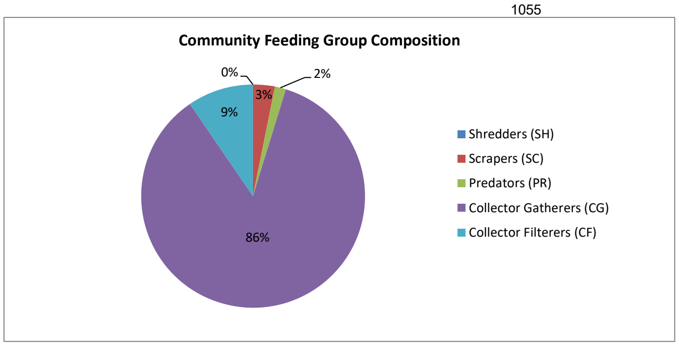
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	30	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastro
Percent Oligochaeta	44.0	1	
Percent Top Two Dominant Taxa (Genus)	38.6	5	(Dicrotendipes, Bratislavia)
Total Abundance Less Chironomidae and Oligochaeta	151	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**27**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.86	Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	9.2	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	33	3
Predators (PR)	17	2
Collector Gatherers (CG)	904	86
Collector Filterers (CF)	101	10
	1055	100



Benthic Community Summary Sheets

Cumberland Fossil Plant
Waterbody: Wells Creek
Site: MAC-WC06 (WRM 1.36)
Date: 09/18/2018

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	1
Bivalvia	Sphaeriidae	Sphaeriidae	CF	6.9	10
Coleoptera	Elmidae	Dubiraphia sp.	CG	5.5	5
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	45
Diptera	Ceratopogonidae	Palpomyia-Bezzia gp.	PR	6	5
Diptera	Chironomidae	Coelotanypus sp.	CG	8	135
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	23
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	1
Diptera	Chironomidae	Glyptotendipes sp.	CG	8.6	8
Diptera	Chironomidae	Parachironomus frequens	CG	8	5
Diptera	Chironomidae	Stictochironomus caffrarius	CG	5.4	1
Diptera	Chironomidae	Tanypus concavus	CG	9.2	13
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	23
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	1
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	8.9	7
Gastropoda	Pleuroceridae	Elimia sp.	SC	2.7	1
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata excuratum	SC	6	49
Hirudinea	-	Hirudinea	PR	8	1
Hirudinea	Glossiphoniidae	Glossiphoniidae	PR	8.6	1
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	2
Hirudinea	Glossiphoniidae	Helobdella sp.	PR	9.3	1
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	43
Oligochaeta	Naididae	Bratislavia unidentata	CG	8.28	40
Oligochaeta	Naididae	Dero digitata	CG	9.8	2
Oligochaeta	Naididae	Dero sp.	CG	9.8	19
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	34
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	13
Oligochaeta	Naididae	Naidinae	CG	8	10
Oligochaeta	Naididae	Nais pardalis	CG	8.7	8
Oligochaeta	Naididae	Tubificinae wohc	CG	10	305
Trichoptera	Hydroptilidae	Hydroptila sp.	SC	6.5	1
Trichoptera	Hydroptilidae	Orthotrichia sp.	SC	8.3	1
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	4
Trichoptera	Leptohyphidae	Tricorythodes sp.	CG	5	1
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	1
			Total Organisms Collected		**822**

Reservoir Benthic Index

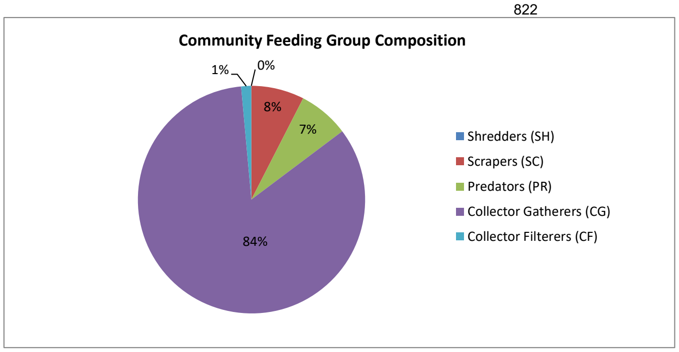
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	27	5	
EPT Richness (Genus)	5	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gast
Percent Oligochaeta	57.7	1	
Percent Top Two Dominant Taxa (Genus)	53.5	5	(Tubificinae, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	139	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**27**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value		
Hilsenhoff Biotic Index (HBI)	8.55	Poor	T
Intolerant Taxa Richness (TV ≤ 3)	1		
Percent Tolerant Taxa (TV > 3)	0.12		
Percent EPT-H	0.97		

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	62	8
Predators (PR)	59	7
Collector Gatherers (CG)	689	84
Collector Filterers (CF)	12	1
	822	100



APPENDIX J.4

BENTHIC INVESTIGATION SAMPLING AND ANALYSIS REPORT

Cumberland Fossil Plant - Benthic Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Cumberland Fossil Plant
Cumberland City, Tennessee

November 22, 2021

TVA TENNESSEE VALLEY AUTHORITY

Prepared by:

Tennessee Valley Authority

Revision Record

Revision	Description	Date
0	Submittal to TDEC	October 7, 2021
1	Addresses November 17, 2021 TDEC Review Comments and Issued for TDEC	November 22, 2021

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LIST OF APPENDICES

APPENDIX C – PHOTOGRAPHIC LOGS

Abbreviations

ºC	degrees Celsius
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257, five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04, and strontium
CEC	Civil & Environmental Consultants, Inc.
CFR	Code of Federal Regulations
COC	Chain-of-Custody
CUF Plant	Cumberland Fossil Plant
DI	Deionized
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
EnvStds	Environmental Standards, Inc.
GPS	Global Positioning System
ID	Identification
IDW	Investigation Derived Waste
PLM	Polarized Light Microscopy
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
RJ Lee	RJ Lee Group, Inc.
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
SOP	Standard Operating Procedure
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) has prepared this sampling and analysis report (SAR) to document the completion of activities related to Phase 1 of the benthic investigation at TVA's Cumberland Fossil Plant (CUF Plant) in Cumberland City, Tennessee.

The purpose of the benthic investigation is to characterize sediment chemistry, benthic macroinvertebrate (invertebrate) communities, and benthic invertebrate (mayfly) bioaccumulation in the vicinity of the CUF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The Benthic Sampling and Analysis Plan (SAP) (Stantec 2018a) provides a phased approach for evaluating potential impacts of Coal Combustion Residuals (CCR) on surface streams in the vicinity of the CUF Plant. The purpose of this SAR is to document the work performed and to present the information and data collected during the execution of Phase 1 of the Benthic SAP. This SAR is not intended to provide conclusions or evaluate results. The scope of the benthic investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the CUF Plant. The evaluation of the results will consider other aspects of the environmental investigation, as well as data collected under other State and/or CCR programs, and will be presented in the Environmental Assessment Report (EAR).

Phase 1 benthic investigation activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order:

- *Benthic SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

Phase 1 of the benthic investigation was implemented in accordance with TVA- and TDEC-approved Programmatic and Project-specific changes. Variations in scope and procedures from those outlined in the Benthic SAP and occurring during field activities due to field conditions and programmatic updates are referenced in Section 3.6.

Sediment sampling under Phase 1 of the benthic scope of work was conducted during October 2018 and on August 21 and December 5, 2019. Benthic invertebrate community sampling was conducted in September 2018. Samples of mayfly (*Hexagenia* spp.) nymphs and adults were initially collected in June 2018. Although the 2018 mayfly sampling was completed prior to TDEC's approval of the final Benthic SAP, it was conducted in accordance with the subsequently approved methods, applicable Technical Instructions (TIs) and Standard Operating Procedures (SOPs), and was performed within the same sampling reaches identified in the final SAP. Additional mayfly sampling under the TDEC-approved

Benthic SAP scope of work was conducted in June and July 2019. TVA personnel performed the sample collection and processing activities.

Laboratory analysis of constituents in sediments was performed by Eurofins TestAmerica, Inc. (TestAmerica) in Nashville, Tennessee; Pittsburgh, Pennsylvania; and St. Louis, Missouri (radium samples only); and by RJ Lee Group, Inc. (RJ Lee) in Monroeville, Pennsylvania (percent ash). Laboratory analysis of constituents in mayflies was performed by Pace Analytical in Green Bay, Wisconsin. Sample processing and taxonomy of benthic invertebrate community samples was performed by Pennington and Associates, Inc. in Cookeville, Tennessee. TVA performed verification of quantitative benthic invertebrate community data. Additional Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

Ash content in sediment samples collected from the two upstream-most impoundments on the unnamed tributary to Wells Creek (herein referred to as the ‘Unnamed Tributary’) was above the 20 percent ash Phase 2 trigger level. In accordance with the Benthic SAP, the retained sediment samples collected from deeper strata within this upper reach of the Unnamed Tributary were analyzed for CCR-related constituents. In addition, a Phase 2 *Benthic and Surface Stream SAPs – Addendum* 1 (Stantec 2021) was prepared and implemented in June and July 2021. The results from the Phase 2 sampling are not yet available; these data will be reported in a future update of the EAR.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the investigation conducted pursuant to the Benthic SAP are to characterize sediment chemistry, benthic invertebrate communities, and benthic invertebrate bioaccumulation in surface streams on or adjacent to the CUF Plant property to evaluate whether CCR constituents have migrated into those surface streams and, if so, the magnitude and extent of any effects on benthic organisms. To assist in the evaluation, samples of mayfly nymphs and adults also were collected in June 2018, prior to TDEC's approval of the final Benthic SAP. Each component of the benthic investigation included samples collected from locations upstream of, adjacent to, and downstream of the CUF Plant CCR units. The phased approach for the benthic investigation was to:

Phase 1

- Collect sediment samples for chemical analyses to evaluate the potential presence of material and/or constituents related to CCR
  - Analyze surficial sediments (upper six inches) and sediments collected from deeper strata for percentage ash
  - Analyze surficial sediment samples for CCR-related constituents
  - Retain sediment sampled from deeper strata for analysis of CCR-related constituents, pending the results of Phase 1 analyses
- Collect quantitative samples of benthic invertebrate populations to assess the condition of the benthic communities
- Collect composite samples of mayfly nymphs (both depurated and non-depurated) and composite samples of mayfly adults for analysis of CCR constituents to evaluate potential bioaccumulation.

Phase 2

- Perform chemical analyses of retained sediment samples from any deeper strata where ash content exceeded 20 percent in one or more of the sediment samples collected during Phase 1
- Evaluate the need for additional sediment samples depending on the location(s) of the exceedance(s) and the collective results of the Phase 1 data.

The scope of work for Phase 1 of the benthic investigation consisted of collecting samples of sediments from 24 transect locations, benthic invertebrate populations from 11 transect locations, and mayflies from five river reaches. In June 2018, mayfly nymphs and adults also were collected from the five sampling reaches designated in the Benthic SAP. This report describes the activities related to the sampling events performed to complete Phase 1 as well as the additional mayfly sampling conducted in June 2018.

Phase 2 chemical analyses were implemented for the two upstream-most impoundments on the Unnamed Tributary because ash content greater than 20 percent was identified in the sediment samples collected. In accordance with the Benthic SAP, Phase 2 included analyzing the retained sediment samples collected from deeper strata within this upper reach of the Unnamed Tributary for CCR-related constituents. A *Benthic and Surface Stream SAPs – Addendum* 1 (Stantec 2021) also was prepared to describe a Phase 2 supplemental investigation to further characterize sediment and surface stream water quality in the Unnamed Tributary and immediate downstream of its confluence with Wells Creek. Phase 2 sampling was conducted in June and July 2021. The results from implementation of the Benthic and Surface Stream SAPs Addendum 1 are not yet available; those data will be reported in a future update of the EAR.

3.0 FIELD ACTIVITIES

Sediment sampling under Phase 1 of the benthic scope of work was conducted during the weeks of October 8 and October 15, 2018, and on August 21 and December 5, 2019. Benthic invertebrate community sampling was conducted the week of September 17, 2018. Mayfly nymph sampling and processing was conducted the week of June 3, 2019. Adult mayflies were collected the week of July 3, 2019, and processed between July 25 and 29, 2019. Additional samples of mayfly nymphs and adults were collected in June 2018 prior to TDEC's approval of the final Benthic SAP. In 2018, mayfly nymphs were collected and processed the week of June 4, and adult mayflies were collected between June 19 and 25, and processed between June 28 and July 26.

TVA performed the benthic investigation sample collection activities based on guidance and specifications listed in TVA's TIs and SOPs, the SAP, and the QAPP, except as noted in the Variations section of this report (Section 3.6). As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under contract with TVA. In addition, Civil and Environmental Consultants, Inc. (CEC), on behalf of TDEC, accompanied TVA during sediment sampling on October 16, 2018 and obtained split samples from surficial sediments collected at each station on transects SED-WC05 and SED-WC06.

During the benthic investigation, TVA:

- Verified and documented sampling locations using the global positioning system (GPS)
- Collected sediment samples from 24 transects and one single-point location
- Collected quantitative benthic invertebrate community samples from 11 transects
- Collected mayfly nymphs from five sampling reaches in 2018 and in 2019, and generated composite samples of non-depurated nymphs and of depurated nymphs for each sampling reach
- Collected adult mayflies from the five sampling reaches in 2018 and from four sampling reaches in 2019, and generated composite samples of adult male imagoes for each sampling reach
- Collected quality control (QC) samples including five sediment matrix spike/matrix spike duplicate/lab duplicates, one replicate sample, six field duplicates, two field banks, and nine equipment blanks; and four mayfly field duplicates and 19 equipment blanks
- Shipped the sediment samples to Test America and RJ Lee, and the mayfly samples to Pace Analytical via commercial courier service for analysis
- Conveyed the benthic invertebrate community samples to Pennington and Associates, Inc. for quantitative processing.

Details on each activity are presented in the sections below.

3.1 SAMPLING LOCATIONS

The sediment, benthic invertebrate community, and mayfly sampling locations and the TDEC Order CCR units at the CUF Plant are shown on Exhibits A.1, A.2, A.2a, and A.3 (Appendix A). Tables B.1 through B.3 (Appendix B) provide summaries of the sampling locations. Table B.4 summarizes the corresponding sampling locations for the surface stream, benthic, and fish tissue investigations, as identified in their respective SAPs.

Sediment

Sediment sampling was conducted at 24 transect locations under Phase 1 of the benthic investigation scope of work (Exhibit A.1). These locations represent background and onsite conditions and were selected to generally coincide with the surface stream sample locations (Stantec 2018c). Sampling locations consisted of seven transects on the main stream of the Cumberland River and one in the CUF Plant cooling water discharge channel, 10 transects in Wells Creek and five transects in the Unnamed Tributary, and one transect in the embayment bordering the northeast corner of the plant. Sample transects were established across the width of the stream perpendicular to the direction of flow. Along each transect, attempts were made to collect samples at center channel, left bank, and right bank stations. “Left bank” and “right bank” were determined with a downstream-facing orientation. In total, sediments were obtained from 68 stations; 67 of the 72 stations proposed in the SAP and one additional station (UT01.5-CC) on the Unnamed Tributary. Additional information regarding the samples that were not collected is provided in Section 3.6.1, Variations in Scope.

Benthic Invertebrate Community

Benthic invertebrate community sampling was conducted at 11 transect locations as shown on Exhibits A.2 and A.2a. These locations were selected to generally coincide with the sediment and surface stream sample locations or with historical biological monitoring locations used to support continuance of the CUF Thermal Limit site discharge National Pollutant Discharge Elimination System permit. Sampling locations consisted of five transects on the mainstream of the Cumberland River and six on Wells Creek. Sample transects were established across the width of the stream perpendicular to the direction of flow, and discrete grab samples were collected from five approximately equally spaced stations along each transect.

Mayfly

Mayfly nymph and adult sample locations were randomly selected within the five sampling reaches depicted on Exhibit A.3. These areas represent background and onsite conditions and coincide with the fish tissue sampling areas (Stantec 2018d), and also incorporate many of the sediment and benthic invertebrate community sample transects. In 2019, adult mayflies were not encountered in adequate numbers in the upstream reach of Wells Creek (i.e., WCU) to obtain the sample mass necessary for analysis. Additional information regarding the collection of adult mayflies is provided in Section 3.6.1, Variations in Scope.

3.2 DOCUMENTATION

TVA maintained field documentation in accordance with TVA TI ENV-TI-05.80.03, *Field Record Keeping* and the QAPP. Field activities were recorded in field logbooks. Health and safety forms were completed in accordance with TVA health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

TVA used program-specific field forms and field logbooks to record field observations and data for specific activities. Field forms used during the benthic investigation included:

- *Reservoir Benthic Macroinvertebrate Community Field Data Form*
- *Benthic Invertebrate Bioaccumulation Field Form and Sample Custody Record*
- *TVA Biota Field Chain-of-Custody (COC)*
- *Laboratory COCs.*

3.2.1.1 Field Logbook

TVA field sampling personnel recorded field activities, observations, and supporting information (e.g., GPS coordinates, sample collection depths) in field logbooks to chronologically document the activities and progress of the field program. Deviations from the SAP, TIs, SOPs, or QAPP were documented in the field logbooks.

3.2.1.2 Reservoir Benthic Macroinvertebrate Field Data Form

TVA field sampling personnel completed a *Reservoir Benthic Macroinvertebrate Community Field Data Form* for each benthic invertebrate community transect. The form documented the field collection team, sample identifications (IDs), collection dates and times, waypoint IDs, water depths, visual assessments of substrate composition, and photograph IDs for specimens not retained (i.e., native freshwater mussels).

3.2.1.3 Benthic Invertebrate Bioaccumulation Field Form and Sample Custody Record

TVA field sampling personnel completed a *Benthic Invertebrate Bioaccumulation Field Form and Sample Custody Record* for each sampling reach. The form documented the field collection team, the sampling reach/area, collection date and times, waypoint IDs, and the number of mayfly nymphs collected in each Ponar or Peterson substrate grab during field collections, and the custody record for the collected organisms.

3.2.1.4 TVA Biota Field Chain-of-Custody

TVA field sampling personnel completed *Biota Field COCs* to document the mayflies collected during the invertebrate bioaccumulation investigation field activities. The *Biota Field COC* documents the field collection team, sampling locations, collection dates and times, the number of sample containers containing the collected adult mayflies or the number of mayfly nymphs retained from each sampling reach, and the custody record for the collected organisms.

3.2.1.5 Laboratory Chain-of-Custody

TVA personnel completed *Laboratory* COCs, listing each sediment, mayfly, and benthic invertebrate community sample. Information applicable to each sample matrix (i.e., sample ID, sample location, sample depth, type of sample, sample date and time, and/or analyses requested) and the sample custody record were recorded on the *COCs*. The Field Team Leader or designee reviewed the *COCs* for completeness and correctness, and a QC check was performed for samples in each cooler comparing sample IDs to those on the corresponding *COC*. *COCs* were completed in accordance with *ENV-TI-05.80.02, Sample Labeling and Custody*.

3.2.2 Photographs

Photographs of the Phase 1 sediment cores and Ponar grabs, and the benthic invertebrate community substrate samples were taken during the benthic investigation and are provided in Attachments C.1 and C.2, respectively, in Appendix C.

3.3 SAMPLING METHODS

The following sections present data collection and sampling procedures used in the benthic investigation.

3.3.1 Sediment Sampling

Sediment samples were collected at 24 transect locations under Phase 1 of the benthic investigation scope of work (Exhibit A.1). One additional sediment core (UT01.5-CC) was collected on the Unnamed Tributary, and a replicate sample of surficial sediments was collected at station WC09-CC on Wells Creek. Sediment samples were collected in accordance with ENV-TI-05.80.50, *Soil and Sediment Sampling* and ENV-TI-05.80.04, *Field Sampling Quality Control*. The analytical samples collected, including field duplicates and the replicate sample, are listed in Table B.5 (Appendix B). Split samples collected by CEC during this investigation are also identified in Table B.5.

At each station, a VibeCore™ sampler with attached decontaminated polycarbonate core tube was advanced the full six-foot length of the core tube or until refusal. Upon retrieval, the core was inspected and distinct horizons identified based on color, texture, and other visual characteristics.

A sediment sample was collected from the upper six inches of each sediment core. For each distinct horizon identified below six inches, the sediment was portioned and homogenized to create a representative sample. Additionally, if no distinct horizons were identified, then the core was segmented at approximately equal intervals based on the assumption that deeper sediments were deposited over an extended time period, and each segment was homogenized to create a representative sample. Twigs, roots, leaves, rocks, and miscellaneous debris were removed to the extent practical. Samples were not collected for deeper sediment-free native soil (i.e., parent material) if recovered. At locations where sediment sample collection using the VibeCore^{TM} sampler was not successful due to limited depositional sediments or other site conditions, attempts were made to collect surficial sediments using a decontaminated Wildco^{TM} Petite Ponar Dredge. Descriptions of the sediment samples collected, including the sediment core lengths and depths of horizon changes, if applicable, are provided in Table B.6.

Core tubes were decontaminated and sealed individually in plastic tubing prior to mobilizing to the field. Core tubes were replaced between sampling stations. Each sediment core sample was discharged on to a half-round PVC pipe enclosed in new plastic tubing and each sediment horizon was transferred to a decontaminated plastic bowl for homogenization. For surficial sediments collected using a Petite Ponar Dredge, the surface water was slowly decanted from the dredge and the sediment grabs were deposited directly into a decontaminated plastic bowl and homogenized. Decontamination of sampling equipment was conducted in accordance with TVA, ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*.

Sediments were homogenized in the field using new, certified clean scoops and decontaminated plastic bowls. Scoops were treated as single-use and were discarded after each sample collection. Homogenized sediments were transferred to laboratory-supplied sample containers. Samples were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* Field sampling personnel secured caps on each container, attached a custody seal across the caps, and placed samples in coolers; samples for metals and anions were maintained in ice. Field sampling personnel wore new, clean nitrile gloves when handling sample containers and sampling equipment that could potentially come in contact with sediment samples. New gloves were used when collecting and handling samples at each station.

For Phase 1, collected sediment samples were analyzed for the presence of ash (percent ash) by polarized light microscopy (PLM). Surficial sediments (0 to 6 inches deep) also were analyzed for the CCR-related constituents listed in Appendices III and IV of Title 40 of the Code of Federal Regulations (CFR) Part 257 (40 CFR 257) and strontium. In addition, in order to maintain continuity with other TDEC environmental programs, five inorganic constituents (copper, nickel, silver, vanadium, and zinc) listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV also were analyzed. The combined federal CCR Appendices III and IV constituents, strontium, and TDEC Appendix I inorganic constituents are hereafter referred to as “CCR Parameters” for the benthic investigation.

Phase 1 sediment samples collected from deeper strata for the analysis of CCR Parameters were held pending the results of the Phase 1 percent ash analyses. Phase 2 was implemented for the upstream reach of the Unnamed Tributary (UT01, UT01.5, UT02, and UT03) because ash content greater than 20 percent was identified in 10 of the 11 sediment samples collected. In accordance with the SAP, the retained sediments collected from deeper strata (i.e., UT02-RB-0.5/2.0 and UT03-CC-0.5/1.0) in the upstream reach of the Unnamed Tributary also were analyzed for CCR Parameters.

Laboratory analysis of CCR Parameters was performed by TestAmerica in Pittsburgh, Pennsylvania and St. Louis, Missouri (radium samples only). RJ Lee in Monroeville, Pennsylvania performed PLM analysis to determine percent ash. Sediment analytical data are presented in Tables B.7

3.3.2 Benthic Invertebrate Community Sampling

Quantitative benthic invertebrate community samples were collected at 11 transect locations under Phase 1 of the benthic investigation scope of work (Exhibit A.2 and A.2a). Benthic invertebrate community samples were collected in accordance with TVA-KIF-SOP-35, *Standard Operating Procedure for: Reservoir Benthic Macroinvertebrate Sampling.* A list of the benthic community samples collected is provided in Table B.8

Benthic community sampling transects were established across the width of the stream perpendicular to the direction of flow, and discrete grab samples were collected from five approximately equally spaced locations along each transect using a standard Ponar dredge. Care was taken to collect samples only from the permanently wetted bottom portion of the reservoir (i.e., below the elevation of the minimum winter pool level). For each sample, water depth and a visual assessment of substrate composition were recorded. Sampling personnel also recorded the estimated percentage of the dredge that was filled with substrate when the sample was retrieved (i.e., % Dredge Full). The field data are provided in Table B.8.

Each sample was washed over a 500-micron mesh screen to remove finer materials. The substrate retained on the screen was photographed and then was transferred into sample containers along with the benthic organisms. Each sample was preserved with a 10 percent buffered formalin solution and each sample container received an internal and external sample label and a custody seal that was placed across the cap. Photographs of native mussels substituted for preservation, and the number collected and released was recorded on the *Reservoir Benthic Macroinvertebrate Community Field Data Form*. Samples were submitted under chain of custody to Pennington and Associates, Inc. for processing and the identification and enumeration of organisms to the lowest practicable taxonomic level. The benthic invertebrate taxonomic data are provided in Table B.9

3.3.3 Mayfly Sampling

Samples of mayfly nymphs were collected from the five river reaches specified under Phase 1 of the benthic investigation scope of work (Exhibit A.3) in both 2018 and 2019. In 2018, samples of mayfly adults were collected from the five river reaches. In 2019, samples of mayfly adults were collected from only four of the five river reaches. Mayfly samples were collected in accordance with TVA-KIF-SOP-29, *Standard Operating Procedure for: Mayfly Sampling* and ENV-TI-05.80.04, *Field Sampling Quality Control*. The analytical samples collected, including field duplicates, are listed in Table B.10.

Mayfly nymphs were collected by taking multiple random Ponar or Peterson grabs of sediment within a sample reach and selectively removing the organisms. Each sediment grab was emptied onto a stainless steel, Nitex, or Teflon screen then rinsed with river water to remove fine sediments and expose the nymphs. The nymphs were then removed from the screen using decontaminated stainless steel forceps and placed into a clean plastic container filled with surface water from the sampling location to allow preliminary removal of substrate adhering to the organisms. Nymphs that appeared damaged (i.e.

severed head/abdomen) were discarded. Undamaged nymphs collected from an area were randomly sorted into composite samples, with a minimum of 50 to 75 nymphs for each depurated (i.e., held 48-hrs to allow evacuation of digestive system contents) and non-depurated sample. Additional nymphs were collected to form duplicate and archived samples.

Nymphs collected for analysis without depuration of their gut contents were transferred into certified clean, glass sample containers and held in wet ice at temperatures less than six degrees Celsius (ºC) pending processing. These nymphs were triple rinsed with deionized (DI) water and transferred to new, certified clean glass containers, weighed, and frozen within 24 hours of collection to form the non-depurated samples for each location. Nymphs collected for depuration prior to laboratory analysis were maintained alive by proportioning the nymphs between two or more certified clean, glass quart sample containers filled with surface water from the sampling reach and maintaining the containers in a cooler containing wet ice pending transport to the off-site processing location. These nymphs were held in a DI water bath for a 48-hour depuration period. DI water baths consisted of decontaminated six-quart plastic containers partially filled with DI water which was periodically exchanged throughout the depuration period. After 48 hours, the nymphs were triple rinsed with DI water and transferred to new, certified clean glass containers, weighed, and frozen to form the depurated samples for each location. Mayfly samples were maintained at or below −20 ºC in secure freezers at the TVA Chickamauga Power Service Center. Personnel wore new, clean nitrile gloves when handling and processing mayflies.

Adult mayflies were opportunistically collected by direct removal from vegetation or other structures along the shoreline or by use of sweep nets. The adult mayflies collected from a sample reach were transferred to certified clean, one-quart glass composite sample containers and maintained in a cooler with wet ice at temperatures less than 6 ºC pending transfer to a freezer or a cooler containing dry-ice within 24 hours. Adult mayflies were transported to TVA Chickamauga Power Service Center and maintained at or below −20 ºC in secure freezers until processed. Adult mayflies were sorted by gender and life stage (i.e., subimago and imago). Sample types submitted for analysis were composites of male imagoes. Personnel wore new, clean nitrile gloves when handling and processing mayflies.

Mayfly samples were submitted to Pace Analytical in Green Bay, Wisconsin to be analyzed for percent moisture and CCR Parameters. As specified in the SAP, the mayfly tissue analysis did not include chloride, fluoride, pH, sulfate, or radium. The analytical data for mayflies are presented in Tables B.11.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during the benthic investigation included:

- Disposable personal protective equipment (PPE)
- Decontamination fluids
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; the CUF Plant-specific waste management plan; and local, state, and federal regulations. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite or at another TVA facility.

3.5 SAMPLE SHIPMENT

Samples were packed and transported or shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. Samples were shipped as described below.

- Sediment samples were shipped via a commercial courier to either the TestAmerica facility in Nashville, Tennessee, or in Pittsburgh, Pennsylvania, for official sample login. Once samples were logged, the radium samples were shipped under internal lab protocols to the TestAmerica St. Louis, Missouri, laboratory. Samples to be analyzed for percent ash by PLM were shipped to RJ Lee located in Monroeville, Pennsylvania. TestAmerica and RJ Lee submitted sample receipt confirmation forms to EnvStds for review and confirmation.

- Mayfly samples were shipped overnight on dry ice via a commercial courier to Pace Analytical in Green Bay, Wisconsin. Pace Analytical submitted sample receipt confirmation forms to EnvStds for review and confirmation.

- Benthic invertebrate community samples were relinquished to Pennington and Associates, Inc., Cookeville, Tennessee.

3.6 VARIATIONS

The proposed scope and procedures for the benthic investigation were outlined in the SAP, QAPP, and applicable TVA TIs and SOPs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for the benthic investigation at the CUF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Sediment samples were not obtained at 5 of the 72 sediment sampling stations proposed under Phase 1 of the Benthic SAP. Insufficient depositional sediments were encountered at stations CUR02-LB, CUR03-CC, WC09-LB, UT02-LB, and UT03-RB to form samples. The intent of the SAP was to collect samples representative of the sediments at each location. A lack of samples from areas of the river with limited deposition does not affect the ability to characterize the sediments within the CUF Plant study area, thus the samples collected from 67 stations, as well as the sample collected from the additional station (UT01.5-CC) on the Unnamed Tributary, were sufficient to meet the overall intent of Phase 1 sampling.

- A sediment core was collected at an additional station on the Unnamed Tributary that was not proposed in the Benthic SAP. This sample was collected to assist in characterizing the sediments (depositional silts and clays) within the Unnamed Tributary due to the appreciable depth of the organic material (decaying duckweed, *Lemna* sp.) overlaying these sediments. This station was assigned the ID UT01.5-CC to represent its approximate location relative to those (UT01 and UT02) proposed in the SAP.

- Selected sediment samples collected on transect SED-PO01, located in the embayment to the northeast of the CUF Plant, were analyzed for percentage ash and the CCR parameters (excluding radium). These samples included the surficial sediments collected at center channel, left bank, and right bank stations, and the sediments collected from the deeper stratum (0.5 to 1.4 feet) at the center channel station. Per Phase 1 of the Benthic SAP, these samples were to be analyzed only for percentage ash. The CCR parameters were included in the analyses due to the embayment's proximity to the CUF Plant and its general isolation from other waterbodies.

- A replicate sample of surficial sediments was collected at station WC09-CC. TVA initially sampled station WC09-CC on October 11, 2018. This sediment sample was reported to have an atypically higher arsenic concentration than observed at the other sampling locations. On December 5, 2019, TVA collected a second sample at WC09-CC to support further evaluation of arsenic concentrations in sediments at this station.

- In 2019, adult mayflies were not encountered in adequate numbers in the upstream sampling reach of Wells Creek (i.e., WCU) to obtain sufficient sample mass for analysis. However, adult mayflies were collected from this reach in 2018 and analyzed for CCR Parameters.

- In 2018, samples of mayfly nymphs and adults were collected from the five river reaches specified under Phase 1 of the benthic investigation scope of work. Although this sampling was completed prior to TDEC's approval of the final Benthic SAP, it was conducted in accordance with the subsequently approved methods and applicable TIs and SOPs, and was performed within the same sampling reaches identified in the final SAP.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- Adult mayflies were sorted by gender and life stage (i.e., subimago and imago). These distinctions were not specified in the SAP. However, studies have shown that constituent concentrations can differ between the genders and life stages of adult mayflies (Arcadis 2016). Therefore, to reduce the possibility of spatial differences in constituent concentrations due to differing compositions of gender and life stages among samples, composites of male imagoes were submitted from each sample reach for analysis. Female mayflies were not encountered in adequate numbers to obtain sufficient sample mass for analysis.

- Photographs were not available for the following benthic invertebrate community substrate samples: CUR02-BEN02, WC01-BEN01, WC01-BEN02, and WC05-BEN05

- Photographs were not available for the following surficial sediment samples (i.e., Ponar grabs) that were analyzed: SED-CuR01-CC, SED-CuR04-CC, SED-CuR05-CC, SED-CuR06-CC, SED-WC02-CC, SED-WC06-LB, SED-WC07-LB, SED-WC07-RB, SED-WC08-LB, SED-WC08-CC, SED-WC08-RB, SED-WC09-CC, and SED-WC09-RB

- The Benthic SAP for Phase 1 was written such that sediment and surface stream sampling were anticipated to be conducted during the same sampling event. However, concurrent sampling was not desirable due to the differing logistics for the two sampling methodologies, the difficulty of obtaining depositional sediments in a riverine environment (i.e., mainstream of the Cumberland River within the CUF Plant study area), the amount of equipment required to sample both matrices concurrently, and the increased potential for cross-contamination. In addition, the goal of surface stream sampling includes collecting samples from a waterbody within as short a timeframe as possible in order to limit potential differences in water quality conditions resulting from day-to-day variances in reservoir operations, runoff, and other climatic conditions. Based on these considerations, TDEC approved sediment and surface stream sampling to be performed at different times.

4.0 SUMMARY

The data presented in this report are from the benthic investigation sampling at the CUF Plant. The scope of work during this investigation included Phase 1 sediment sampling at 24 transect locations plus one additional single-point location on the Unnamed Tributary, benthic invertebrate community sampling at 11 transect locations, and benthic invertebrate (mayfly) bioaccumulation sampling in five river reaches. Additional samples of mayfly nymphs and adults also were collected from the five sampling reaches in June 2018, prior to TDEC's approval of the final Benthic SAP. Sediment, benthic invertebrate community and mayfly sampling locations are summarized in Tables B.1 through B.3, and depicted on Exhibits A.1 through A.3, respectively.

Phase 2 chemical analyses were implemented for the upstream reach of the Unnamed Tributary (UT01, UT01.5, UT02, and UT03) because ash content greater than 20 percent was identified in the sediment samples collected. In accordance with the Benthic SAP, the retained sediment samples collected from deeper strata within the upstream reach of the Unnamed Tributary were analyzed for CCR Parameters.

A summary of sediment samples collected, including field duplicates and replicate samples, is presented in Table B.5. Sediment field data are presented in Table B.6. Sediment analytical data for CCR Parameters are presented in Tables B.7. Analytical data were reported by TestAmerica and RJ Lee, and data verification or validation was performed by EnvStds.

The benthic invertebrate community field data are presented in Table B.8, and the taxonomic dataset is presented in Table B.9. Quantitative benthic invertebrate community data were reported by Pennington and Associates, Inc. and verified by TVA.

A summary of invertebrate bioaccumulation (mayfly) samples collected, including field duplicates, is presented in Table B.10. Mayfly analytical data for percent moisture and CCR Parameters, excluding chloride, fluoride, pH, sulfate, and radium are presented in Tables B.11. Analytical data were reported by Pace Analytical, and data verification or validation was performed by EnvStds.

TVA has completed Phase 1 of the benthic investigation at the CUF Plant in Cumberland City, Tennessee, in accordance with the Benthic SAP and TDEC-approved SAP modifications, as documented herein. The data collected during Phase 1 are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete dataset from Phase 1 of the benthic investigation will be evaluated along with data collected under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This evaluation will be provided in the EAR.

Based on the collective results from Phase 1 sediment and surface stream sampling, an addendum to the CUF Plant Benthic and Surface Stream SAPs was prepared to describe a Phase 2 supplemental investigation to further characterize sediment and surface stream water quality in the Unnamed Tributary and immediate downstream of its confluence with Wells Creek. Phase 2 supplemental sediment and surface stream sampling was conducted in June and July 2021 in accordance with the *Benthic and Surface Stream SAPs - Addendum 1*. Sampling and analysis results for the Phase 2 sampling are not yet available; those data will be evaluated and reported in a future update of the EAR.

5.0 REFERENCES

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APPENDIX A - EXHIBITS

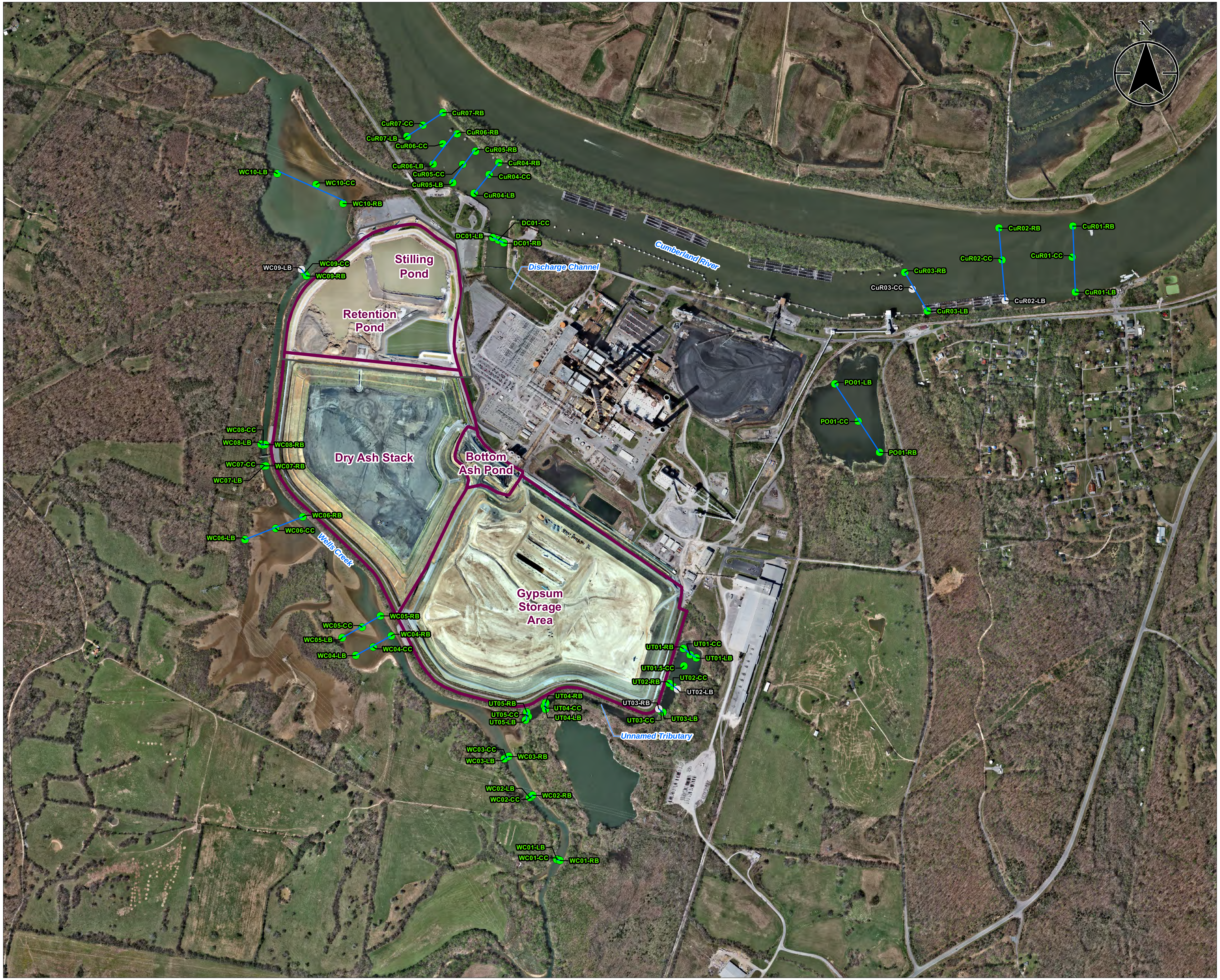


Exhibit No.
A.1

Title
Sediment Sampling Locations

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

175568209
Prepared by LMB on 2021-11-18
Technical Review by AT on 2021-11-18

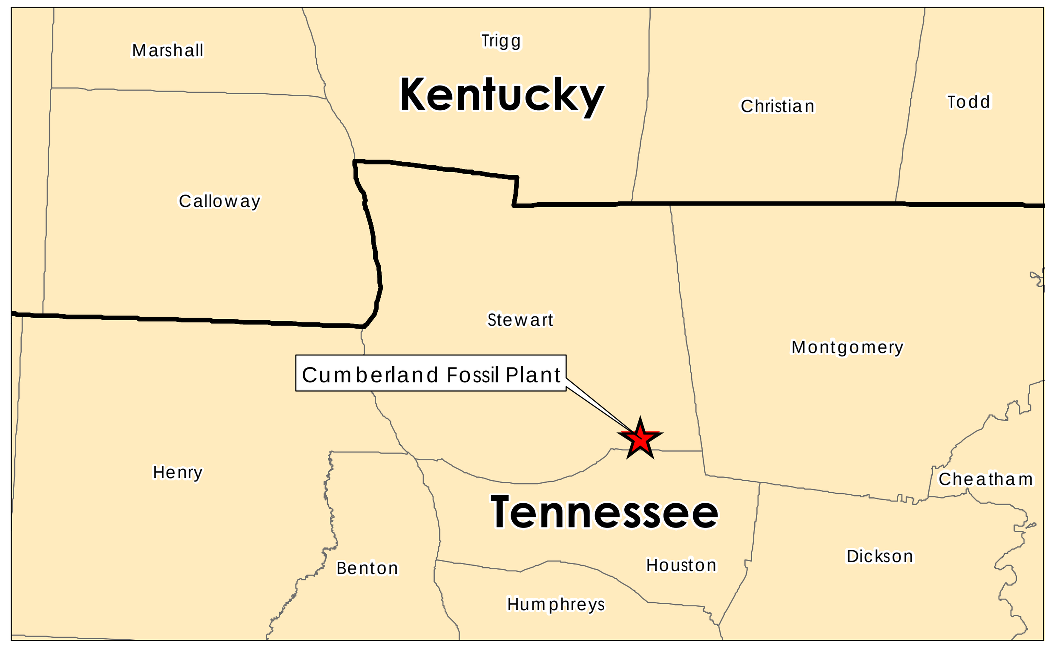
0 | 550 | 1,100 | 1,650 | 2,200 Feet
1:6,600 (At original document size of 22x34)

Legend

- Sediment Sampling Locations - Collected
- Sediment Sampling Locations - Attempted: Insufficient Sediment for Sampling
- Sediment Sampling Location Transects
- CCR Unit Area (Approximate)
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019



Stantec TVA

Exhibit No.

A.2

Title

Benthic Invertebrate Community Sampling Locations

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

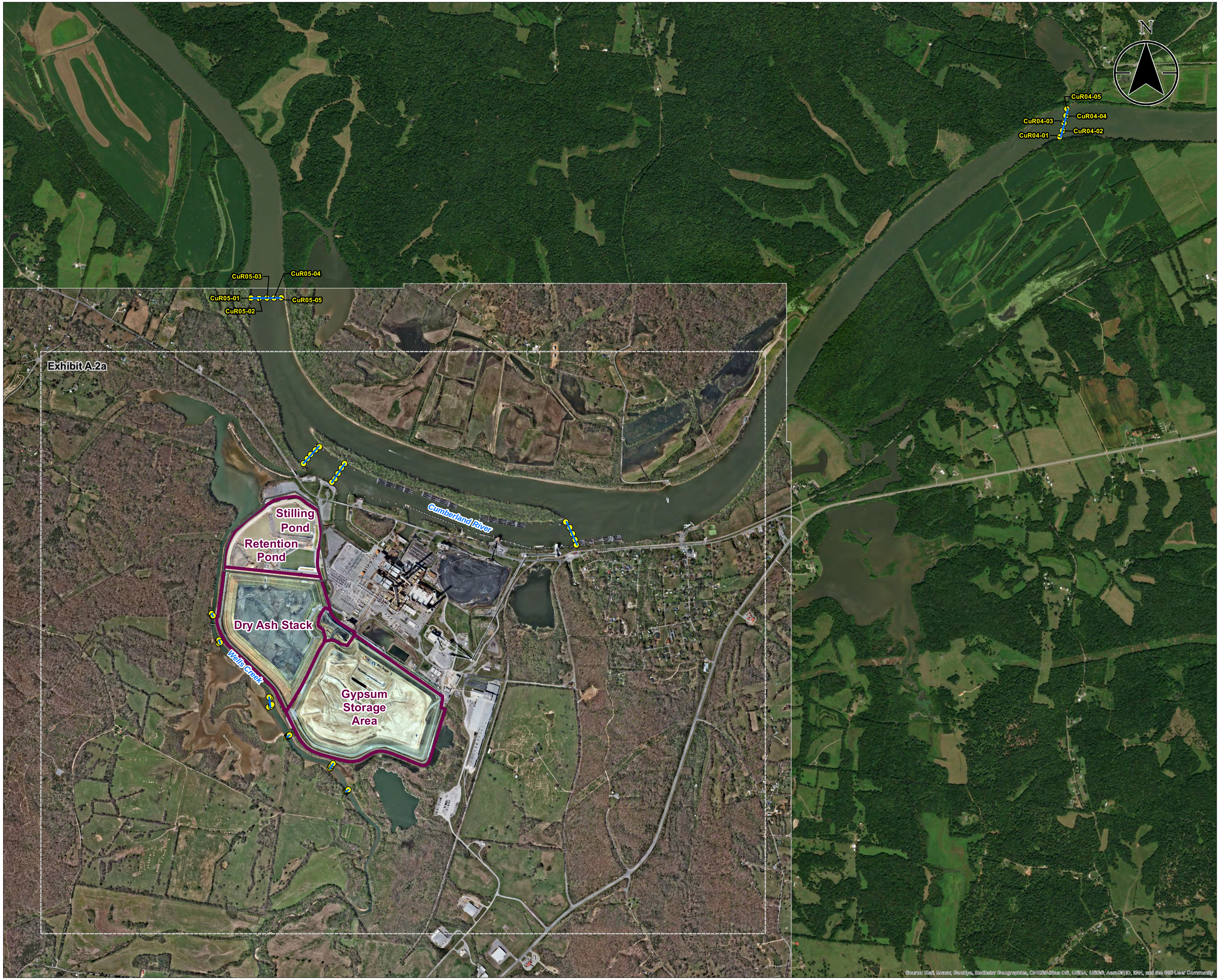
Project Location

Stewart County, Tennessee

175568209
Prepared by LMB on 2021-09-03
Technical Review by AT on 2021-09-03

0 1,000 2,000 3,000 4,000 Feet

1:12,000 (At original document size of 22x34)

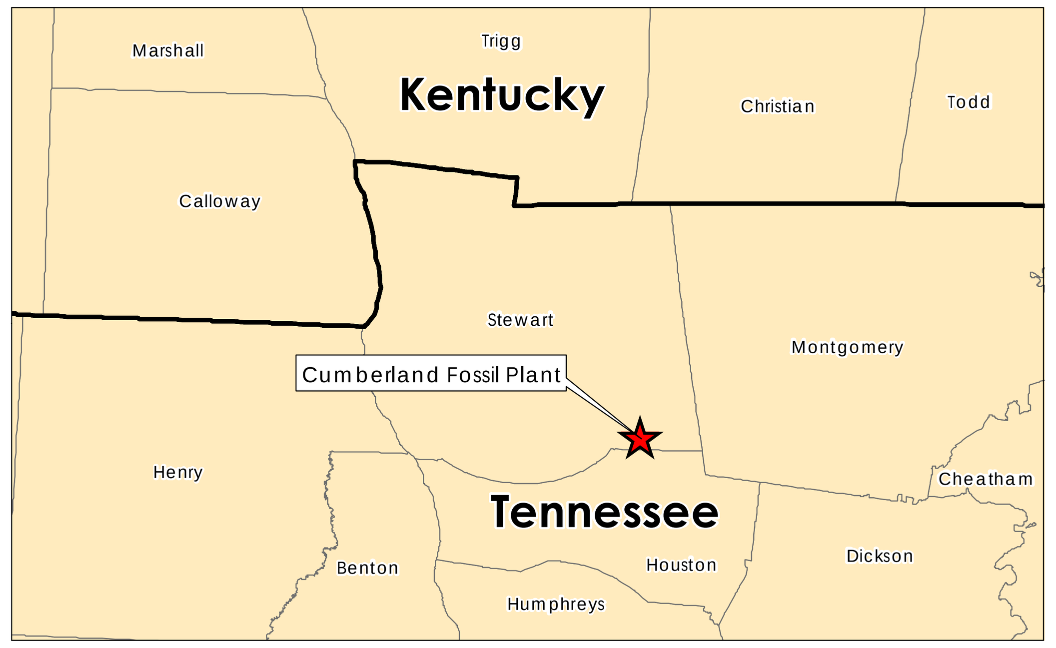


Legend

- Benthic Invertebrate Community Sampling Locations
- Benthic Invertebrate Community Sampling Locations - Transect
- CCR Unit Area (Approximate)
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019



Stantec TVA

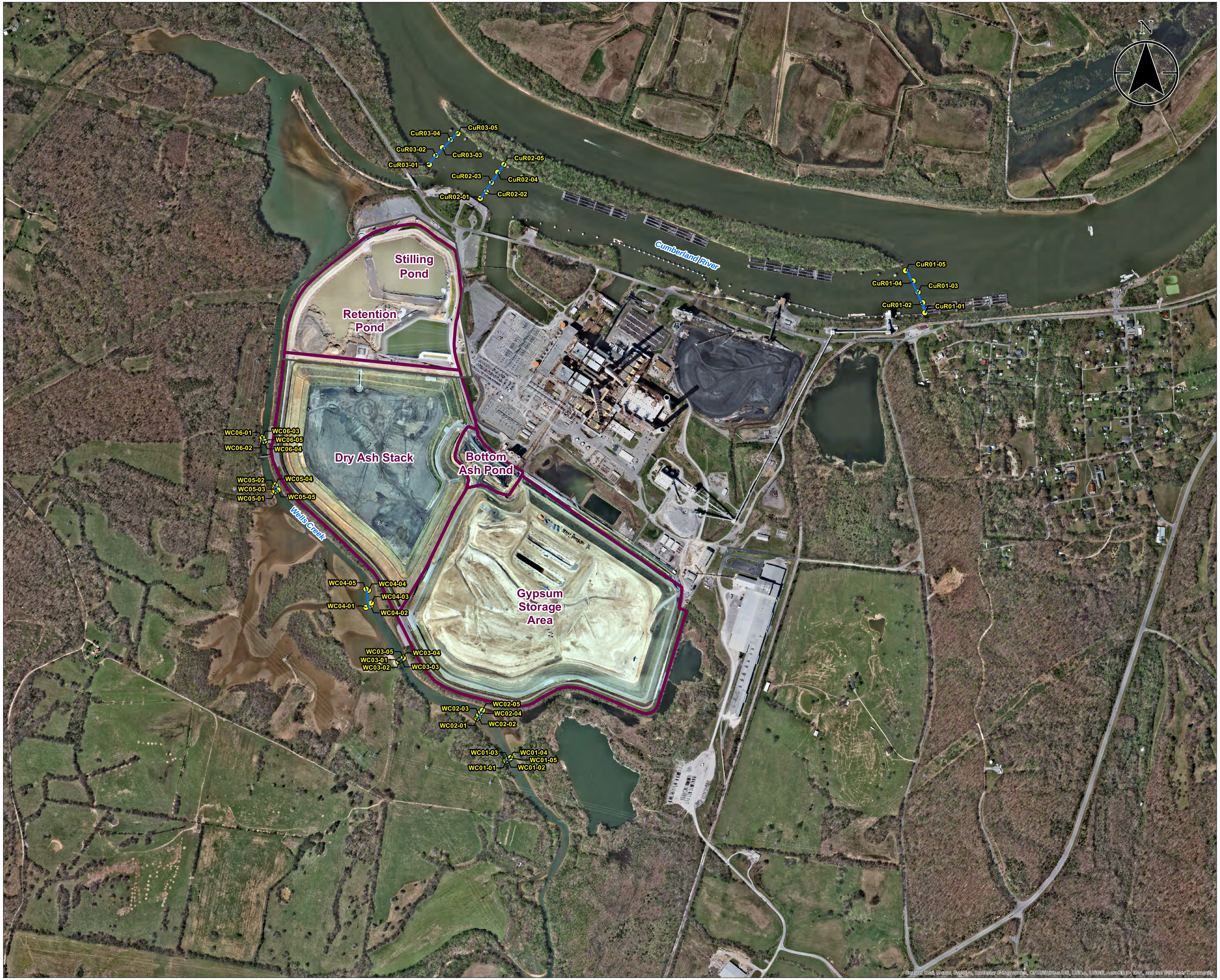


Exhibit No.

A.2a

Title

Benthic Invertebrate Community Sampling Locations

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location

Stewart County, Tennessee

175568209

Prepared by LMB on 2021-09-03
Technical Review by AT on 2021-09-03

0 | 550 | 1,100 | 1,650 | 2,200 Feet

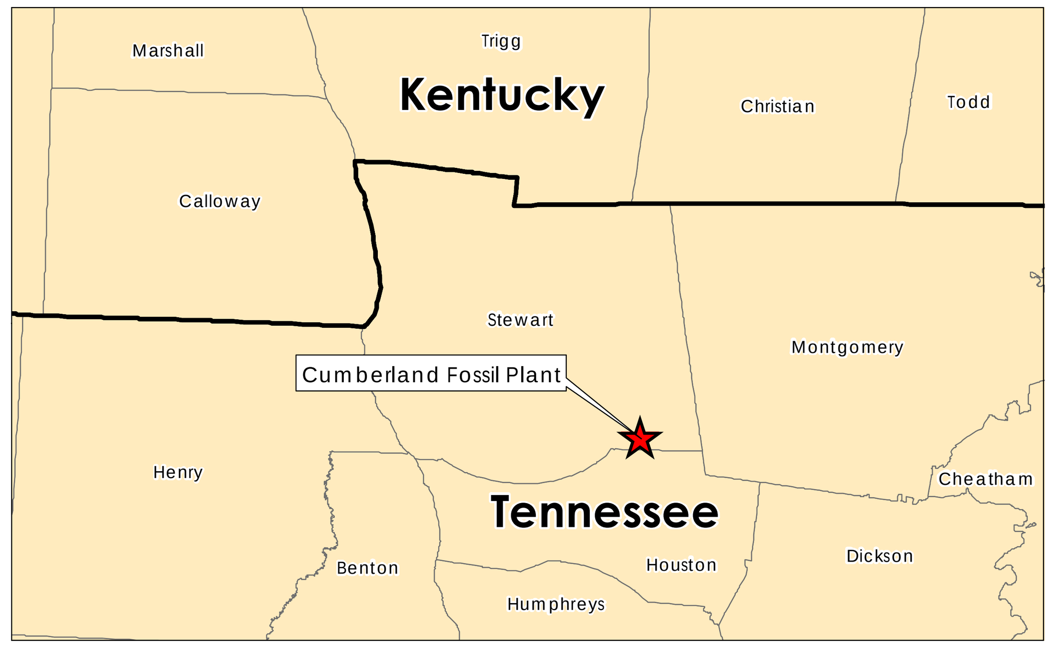
1:6,600 (At original document size of 22x34)

Legend

- Benthic Invertebrate Community Sampling Locations
- Benthic Invertebrate Community Sampling Locations - Transect
- CCR Unit Area (Approximate)
- 2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019



Stantec

TVA

Disclaimer: Stantec assumes no responsibility for data supplied in electronic format. The recipient accepts full responsibility for verifying the accuracy and completeness of the data. The recipient releases Stantec, its officers, employees, consultants and agents, from any and all claims arising in any way from the content or provision of the data.

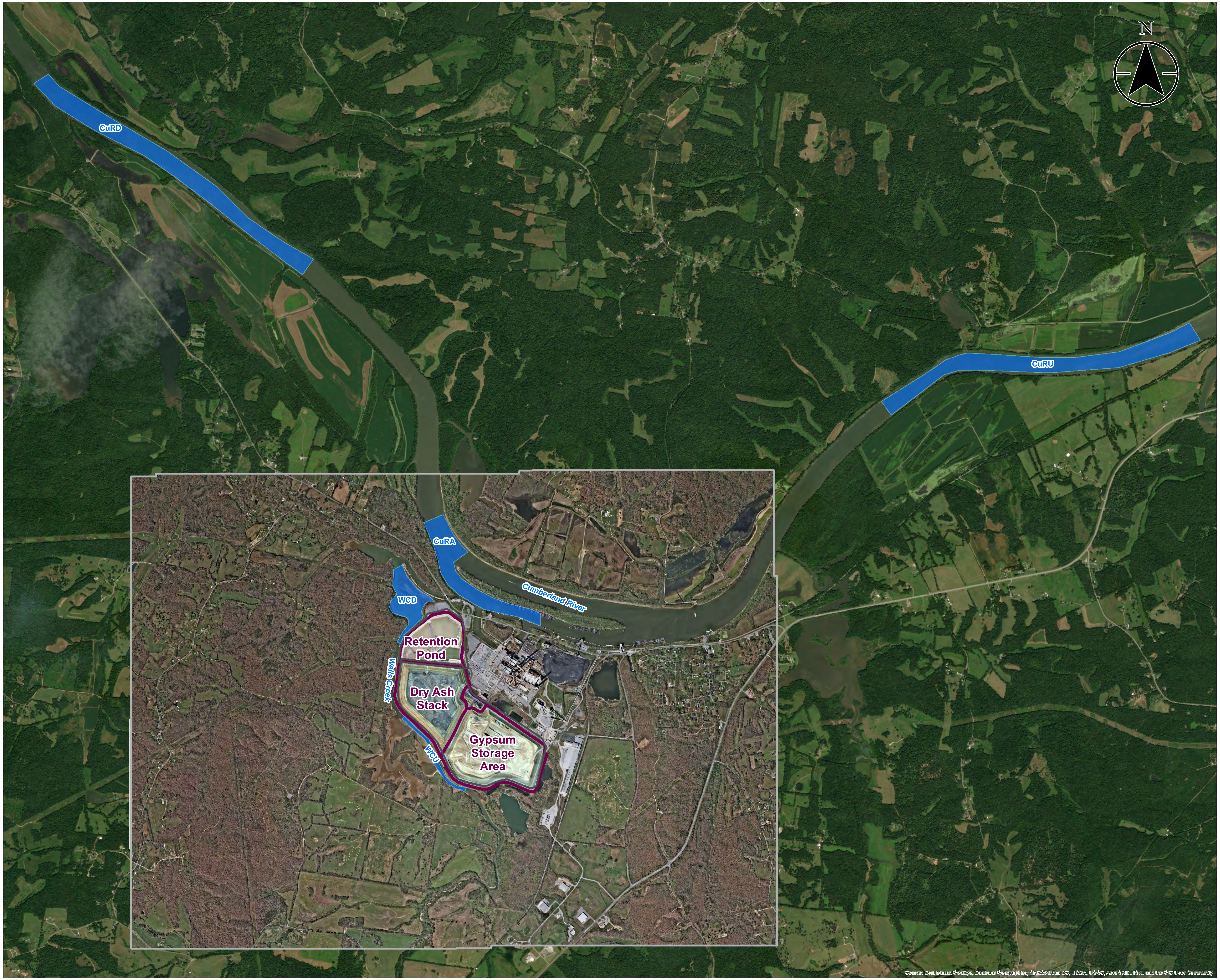


Exhibit No.
A.3

Title
Mayfly Sampling Reaches

Client/Project
Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location
Stewart County, Tennessee

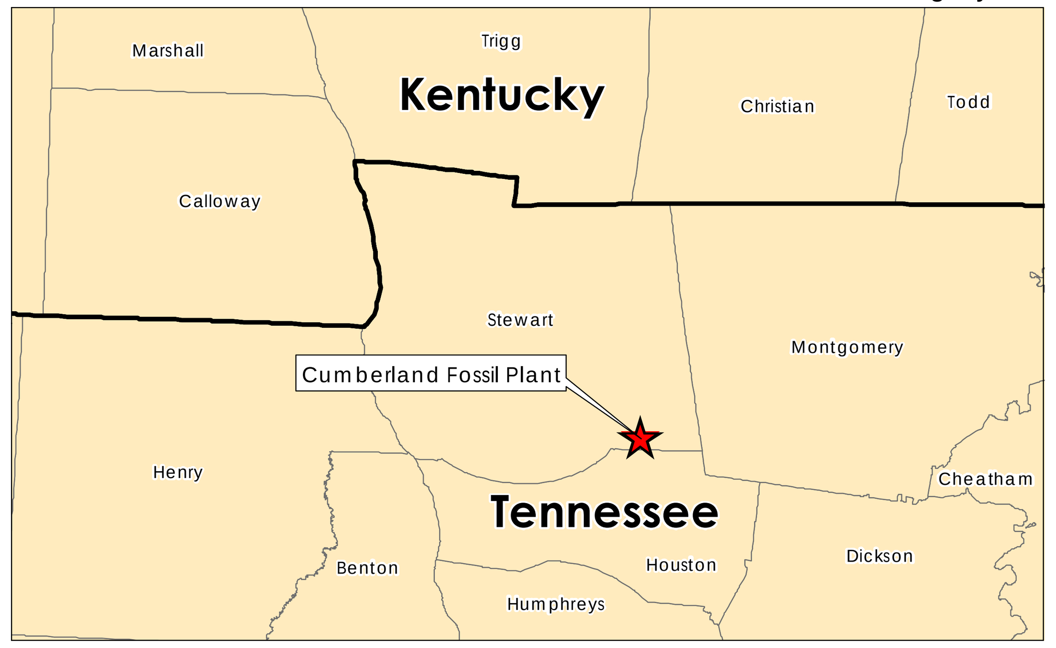
175568209
Prepared by LMB on 2021-08-25
Technical Review by AT on 2021-08-25

0 1,500 3,000 4,500 6,000 Feet
1:18,000 (At original document size of 22x34)

Legend

- Mayfly Sampling Locations
  - *CuRU – Cumberland River Upstream*
  - *CuRA – Cumberland River Adjacent*
  - *CuRD – Cumberland River Downstream*
  - *WCU – Wells Creek Upstream*
  - *WCD – Wells Creek Downstream*
- CCR Unit Area (Approximate)
- 2017 Imagery Boundary
- 2019 Imagery Boundary

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; and Esri World Imagery



Stantec TVA

APPENDIX B - TABLES

TABLE B.1 – Sediment Sampling Locations
Cumberland Fossil Plant

Transect Location ID	Description
SED-CuR01	Cumberland River Upstream of CUF Plant (Background)
SED-CuR02	Cumberland River Upstream of CUF Plant (Background)
SED-CuR03	Cumberland River Upstream of CUF Plant (Background)
SED-CuR04	Cumberland River downstream of the ash pond discharge and the cooling water discharge channel
SED-CuR05	Cumberland River downstream of the ash pond discharge and the cooling water discharge channel
SED-CuR06	Cumberland River downstream of the ash pond discharge and the cooling water discharge channel
SED-CuR07	Cumberland River downstream of the ash pond discharge and the cooling water discharge channel
SED-DC01	Cooling water discharge channel
SED-WC01	Wells Creek Upstream of CUF Plant (Background)
SEC-WC02	Wells Creek Upstream of CUF Plant (Background)
SED-WC03	Wells Creek Upstream of CUF Plant (Background)
SED-WC04	Wells Creek and adjacent low-lying area at location of 1997 dike breach and seep
SED-WC05	Wells Creek and adjacent low-lying area at location of 1997 dike breach and seep
SED-WC06	Low-lying area adjacent to Wells Creek main channel – may have been affected by 1997 dike breach
SED-WC07	Wells Creek at area of interest
SED-WC08	Wells Creek at historic seep location
SED-WC09	Wells Creek adjacent to location where dike crosses the pre-construction Wells Creek alignment
SED-WC10	Wells Creek adjacent to ash pond
SED-UT01	Unnamed Tributary upstream of known historical seeps (Background)
SED-UT01.5[1]	Unnamed Tributary single-point location at the approximate midpoint between transects SED-UT01 and SED-UT02
SED-UT02	Unnamed Tributary to Wells Creek at historic seep location
SED-UT03	Unnamed Tributary to Wells Creek downstream of historic seep location
SED-UT04	Unnamed Tributary to Wells Creek at historic seep location
SED-UT05	Unnamed Tributary to Wells Creek downstream of historic seep location
SED-PO01	Embayment/pond at northeast corner of TVA property

Notes:
ID Identification

1. SED-UT01.5 was not proposed in the Benthic SAP.

TABLE B.2 – Benthic Invertebrate Community Sampling Locations
Cumberland Fossil Plant

Transect Location ID	Description
MAC-CuR01	Cumberland River Upstream of CUF Plant (Background)
MAC-CuR02	Cumberland River downstream of the ash pond discharge and the cooling water discharge channel
MAC-CuR03	Cumberland River downstream of the confluence with Wells Creek
MAC-CuR04*	Cumberland River Upstream of CUF Plant, Cumberland River Mile 106.6 (Background)
MAC-CuR05*	Cumberland River Downstream of CUF Plant, Cumberland River Mile 102.2
MAC-WC01	Wells Creek Upstream of CUF Plant (Background)
MAC-WC02	Wells Creek downstream from unnamed tributary
MAC-WC03	Wells Creek upstream from 1997 dike breach and historic seep location
MAC-WC04	Wells Creek downstream from 1997 dike breach and historic seep location
MAC-WC05	Wells Creek upstream from area of interest and historic seep location
MAC-WC06	Wells Creek downstream from area of interest and historic seep location

Notes:

ID Identification

* Historical benthic invertebrate community sampling location.

TABLE B.3 – Mayfly Sampling Reaches
Cumberland Fossil Plant

Sample Reach ID	Description
CuRU	Cumberland River Upstream of CUF Plant (Background)
CuRA	Cumberland River Adjacent to CUF Plant
CuRD	Cumberland River Downstream of CUF Plant
WCU	Wells Creek Upstream reach adjacent to CUF Plant
WCD	Wells Creek Downstream reach adjacent to CUF Plant

Notes:

ID Identification

TABLE B.4 – Corresponding Environmental Sampling Locations
Cumberland Fossil Plant

<table>
<tr><th colspan="5">Corresponding Sampling Locations</th></tr>
<tr><th>Surface Stream</th><th>Sediment</th><th>Benthic Community</th><th>Mayfly</th><th>Fish Tissue</th></tr>
<tr><td>STR-CuR01</td><td>–</td><td>MAC-CuR04</td><td>CuRU</td><td>CuRU</td></tr>
<tr><td>STR-CuR02</td><td>SED-CuR01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-CuR03</td><td>SED-CuR03</td><td>MAC-CuR01</td><td>–</td><td>–</td></tr>
<tr><td>–</td><td>SED-CuR04</td><td>MAC-CuR02</td><td rowspan="4">CuRA</td><td rowspan="4">CuRA</td></tr>
<tr><td>STR-CuR04</td><td>SED-CuR05</td><td>–</td></tr>
<tr><td>–</td><td>SED-CuR06</td><td>MAC-CuR03</td></tr>
<tr><td>STR-CuR05</td><td>SED-CuR07</td><td></td></tr>
<tr><td>STR-CuR06</td><td>–</td><td>MAC-CuR05</td><td>–</td><td>–</td></tr>
<tr><td>STR-CuR07</td><td>–</td><td>–</td><td>CuRD</td><td>CuRD</td></tr>
<tr><td>STR-DC01</td><td>SED-DC01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC01</td><td>SED-WC01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC02</td><td>SED-WC02</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC03</td><td>SED-WC03</td><td>MAC-WC01</td><td></td><td></td></tr>
<tr><td>–</td><td>–</td><td>MAC-WC03</td><td rowspan="5">WCU</td><td rowspan="5">WCU</td></tr>
<tr><td>STR-WC04</td><td>SED-WC04</td><td>–</td></tr>
<tr><td>STR-WC05</td><td>SED-WC05</td><td>–</td></tr>
<tr><td>–</td><td>–</td><td>MAC-WC04</td></tr>
<tr><td>STR-WC06</td><td>SED-WC06</td><td>–</td></tr>
<tr><td>–</td><td>–</td><td>MAC-WC05</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC07</td><td>SED-WC07</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC08</td><td>SED-WC08</td><td>MAC-WC06</td><td>–</td><td>–</td></tr>
<tr><td>STR-WC09</td><td>SED-WC09</td><td>–</td><td rowspan="2">WCD</td><td rowspan="2">WCD</td></tr>
<tr><td>STR-WC10</td><td>SED-WC10</td><td>–</td></tr>
<tr><td>STR-UT01</td><td>SED-UT01</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT02</td><td>SED-UT02</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT03</td><td>SED-UT03</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT04</td><td>SED-UT04</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>STR-UT05</td><td>SED-UT05</td><td>–</td><td>–</td><td>–</td></tr>
<tr><td>–</td><td>SED-PO01</td><td>–</td><td>–</td><td>–</td></tr>
</table>

Notes:

– Not applicable

TABLE B.5 – Summary of Sediment Samples
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Station ID[1]	Sample ID	Parent Sample ID	Sample Type[2]	% Ash	Total Metals	Total Mercury	Anions	pH (Laboratory)	Radium-226, Radium-228, Radium-226+228
					Analysis Type					
SED-CuR01	LB	CUF-SED-CUR01-CORLB-0.0/0.5-20181011		N	x	x	x	x	x	x
	CC	CUF-SED-CUR01-CORCC-0.0/0.5-20181011		N	x	x	x	x	x	x
	RB	CUF-SED-CUR01-CORRB-0.0/0.5-20181011		N	x	x	x	x	x	x
	RB	CUF-SED-CUR01-CORRB-0.5/1.4-20181011		N	x					
SED-CuR02	CC	CUF-SED-CUR02-CORCC-0.0/0.5-20181011		N	x	x	x	x	x	x
	RB	CUF-SED-CUR02-CORRB-0.0/0.5-20181011		N	x	x	x	x	x	x
SED-CuR03	LB	CUF-SED-CUR03-CORLB-0.0/0.5-20181010		N	x	x	x	x	x	x
	LB	CUF-SED-CUR03-CORLB-0.5/5.0-20181010		N	x					
	RB	CUF-SED-CUR03-CORRB-0.0/0.5-20181010		N	x	x	x	x	x	x
	RB	CUF-SED-CUR03-CORRB-0.5/2.1-20181010		N	x					
	RB	CUF-SED-CUR03-CORRB-2.1/2.6-20181010		N	x					
	RB	CUF-SED-CUR03-CORRB-2.6/3.1-20181010		N	x					
SED-CuR04	LB	CUF-SED-CUR04-CORLB-0.0/0.5-20181010		N	x	x	x	x	x	x
	LB	CUF-SED-CUR04-CORLB-0.5/2.1-20181010		N	x					
	LB	CUF-SED-CUR04-DUP01-20181010	CUF-SED-CuR04-CORLB-0.5/2.1-20181010	FD	x					
	LB	CUF-SED-CUR04-CORLB-2.1/2.9-20181010		N	x					
	CC	CUF-SED-CUR04-CORCC-0.0/0.5-20181010		N	x	x	x	x	x	x
	RB	CUF-SED-CUR04-CORRB-0.0/0.5-20181010		N	x	x	x	x	x	x
	RB	CUF-SED-CUR04-CORRB-0.5/1.3-20181010		N	x					
SED-CuR05	LB	CUF-SED-CUR05-CORLB-0.0/0.5-20181009		N	x	x	x	x	x	x
	LB	CUF-SED-CUR05-CORLB-0.5/2.0-20181009		N	x					
	LB	CUF-SED-CUR05-CORLB-2.0/4.7-20181009		N	x					
	CC	CUF-SED-CUR05-CORCC-0.0/0.5-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-CUR05-CORRB-0.0/0.5-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-CUR05-CORRB-0.5/1.6-20181009		N	x					
SED-CuR06	LB	CUF-SED-CUR06-CORLB-0.0/0.5-20181009		N	x	x	x	x	x	x
	LB	CUF-SED-CUR06-CORLB-0.5/6.0-20181009		N	x					
	CC	CUF-SED-CUR06-CORCC-0.0/0.5-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-CUR06-CORRB-0.0/0.5-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-CUR06-CORRB-0.5/1.7-20181009		N	x					
SED-CuR07	LB	CUF-SED-CUR07-CORLB-0.0/0.5-20181008		N	x	x	x	x	x	x
	LB	CUF-SED-CUR07-DUP01-20181008	CUF-SED-CuR07-CORLB-0.0/0.5-20181008	FD	x	x	x	x	x	x
	LB	CUF-SED-CUR07-CORLB-0.5/4.3-20181008		N	x					
	CC	CUF-SED-CUR07-CORCC-0.0/0.5-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-CUR07-CORRB-0.0/0.5-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-CUR07-CORRB-0.5/3.4-20181009		N	x					
	RB	CUF-SED-CUR07-CORRB-3.4/4.8-20181009		N	x					
	RB	CUF-SED-CUR07-CORRB-4.8/5.7-20181009		N	x					

See notes on last page.

TABLE B.5 – Summary of Sediment Samples
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Station ID[1]	Sample ID	Parent Sample ID	Sample Type[2]	% Ash	Total Metals	Total Mercury	Anions	pH (Laboratory)	Radium-226, Radium-228, Radium-226+228
					Analysis Type					
SED-DC01	LB	CUF-SED-DC01-CORLB-0.0/0.5-20181009		N	x	x	x	x	x	x
	LB	CUF-SED-DC01-CORLB-0.5/1.9-20181009		N	x					
	CC	CUF-SED-DC01-CORCC-0.0/0.5-20181009		N	x	x	x	x	x	x
	CC	CUF-SED-DC01-CORCC-0.5/1.0-20181009		N	x					
	RB	CUF-SED-DC01-CORRB-0.0/0.5-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-DC01-CORRB-0.5/2.2-20181009		N	x	x	x	x	x	x
	RB	CUF-SED-DC01-CORRB-2.2/5.6-20181009		N	x					
	RB	CUF-SED-DC01-CORRB-5.6/6.0-20181009		N	x					
SED-WC01	LB	CUF-SED-WC01-CORLB-0.0/0.5-20181018		N	x	x	x	x	x	x
	LB	CUF-SED-WC01-CORLB-0.5/3.8-20181018		N	x					
	CC	CUF-SED-WC01-CORCC-2.2/3.0-20181018		N	x					
	RB	CUF-SED-WC01-CORRB-0.0/0.5-20181018		N	x	x	x	x	x	x
	RB	CUF-SED-WC01-CORRB-0.5/2.4-20181018		N	x					
	RB	CUF-SED-WC01-CORRB-2.4/4.5-20181018		N	x					
SED-WC02	LB	CUF-SED-WC02-CORLB-0.0/0.5-20181017		N	x	x	x	x	x	x
	LB	CUF-SED-WC02-CORLB-0.5/2.5-20181017		N	x					
	LB	CUF-SED-WC02-CORLB-2.5/4.6-20181017		N	x					
	CC	CUF-SED-WC02-CORCC-0.0/0.5-20181017		N	x	x	x	x	x	x
	CC	CUF-SED-WC02-DUP01-20181017	CUF-SED-WC02-CORCC-0.0/0.5-20181017	FD	x	x	x	x	x	x
	RB	CUF-SED-WC02-CORRB-0.0/0.5-20181017		N	x	x	x	x	x	x
	RB	CUF-SED-WC02-CORRB-0.5/2.3-20181017		N	x					
SED-WC03	LB	CUF-SED-WC03-CORLB-0.0/0.5-20181017		N	x	x	x	x	x	x
	LB	CUF-SED-WC03-CORLB-0.5/3.3-20181017		N	x					
	LB	CUF-SED-WC03-CORLB-3.3/4.7-20181017		N	x					
	CC	CUF-SED-WC03-CORCC-0.0/0.5-20181017		N	x	x	x	x	x	x
	CC	CUF-SED-WC03-CORCC-1.0/2.1-20181017		N	x					
	CC	CUF-SED-WC03-CORCC-2.1/3.2-20181017		N	x					
	CC	CUF-SED-WC03-CORCC-3.2/5.4-20181017		N	x					
	RB	CUF-SED-WC03-CORRB-0.0/0.5-20181017		N	x	x	x	x	x	x
	RB	CUF-SED-WC03-CORRB-0.5/3.8-20181017		N	x					
SED-WC04	LB	CUF-SED-WC04-CORLB-0.0/0.5-20181016		N	x	x	x	x	x	x
	LB	CUF-SED-WC04-CORLB-0.5/2.4-20181016		N	x					
	CC	CUF-SED-WC04-CORCC-0.0/0.5-20181016		N	x	x	x	x	x	x
	CC	CUF-SED-WC04-CORCC-0.5/1.9-20181016		N	x					
	RB	CUF-SED-WC04-CORRB-0.0/0.5-20181016		N	x	x	x	x	x	x
	RB	CUF-SED-WC04-CORRB-0.5/2.0-20181016		N	x					
	RB	CUF-SED-WC04-CORRB-2.0/2.9-20181016		N	x					

See notes on last page.

TABLE B.5 – Summary of Sediment Samples
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

					Analysis Type					
Location ID	Station ID[1]	Sample ID	Parent Sample ID	Sample Type[2]	% Ash	Total Metals	Total Mercury	Anions	pH (Laboratory)	Radium-226, Radium-228, Radium-226+228
SED-WC05	LB	CUF-SED-WC05-CORLB-0.0/0.5-20181016		N[3]	x	x	x	x	x	x
	LB	CUF-SED-WC05-CORLB-0.5/1.5-20181016		N	x					
	LB	CUF-SED-WC05-DUP01-20181016	CUF-SED-WC05-CORLB-0.5/1.5-20181016	FD	x	x	x	x	x	x
	LB	CUF-SED-WC05-CORLB-1.5/2.8-20181016		N	x					
	CC	CUF-SED-WC05-CORCC-0.0/0.5-20181016		N[3]	x	x	x	x	x	x
	RB	CUF-SED-WC05-CORRB-0.0/0.5-20181016		N[3]	x	x	x	x	x	x
	RB	CUF-SED-WC05-CORRB-0.5/0.9-20181016		N	x					
	RB	CUF-SED-WC05-CORRB-0.9/4.6-20181016		N	x					
SED-WC06	LB	CUF-SED-WC06-CORLB-0.0/0.5-20181016		N[3]	x	x	x	x	x	x
	CC	CUF-SED-WC06-CORCC-0.0/0.5-20181016		N[3]	x	x	x	x	x	x
	CC	CUF-SED-WC06-CORCC-0.5/1.3-20181016		N	x					
	CC	CUF-SED-WC06-CORCC-1.3/2.7-20181016		N	x					
	RB	CUF-SED-WC06-CORRB-0.0/0.5-20181016		N[3]	x	x	x	x	x	x
SED-WC07	LB	CUF-SED-WC07-CORLB-0.0/0.5-20181011		N	x	x	x	x	x	x
	CC	CUF-SED-WC07-CORCC-0.0/0.5-20181011		N	x	x	x	x	x	x
	RB	CUF-SED-WC07-CORRB-0.0/0.5-20181011		N	x	x	x	x	x	x
SED-WC08	LB	CUF-SED-WC08-CORLB-0.0/0.5-20181011		N	x	x	x	x	x	x
	CC	CUF-SED-WC08-CORCC-0.0/0.5-20181011		N	x	x	x	x	x	x
	RB	CUF-SED-WC08-CORRB-0.0/0.5-20181011		N	x	x	x	x	x	x
SED-WC09	CC	CUF-SED-WC09-CORCC-0.0/0.5-20181011		N	x	x	x	x	x	x
	CC	CUF-SED-WC09-CORCC-0.0/0.5-20191205		N		x	x	x	x	x
	RB	CUF-SED-WC09-CORRB-0.0/0.5-20181011		N	x	x	x	x	x	x
SED-WC10	LB	CUF-SED-WC10-CORLB-0.0/0.5-20181011		N	x	x	x	x	x	x
	LB	CUF-SED-WC10-CORLB-0.5/3.0-20181011		N	x					
	LB	CUF-SED-WC10-CORLB-3.0/3.5-20181011		N	x					
	CC	CUF-SED-WC10-CORCC-0.0/0.5-20181011		N	x	x	x	x	x	x
	CC	CUF-SED-WC10-CORCC-0.5/1.9-20181011		N	x					
	RB	CUF-SED-WC10-CORRB-0.0/0.5-20181011		N	x	x	x	x	x	x
SED-UT01	LB	CUF-SED-UT01-CORLB-0.0/0.5-20190821		N	x	x	x	x	x	x
	CC	CUF-SED-UT01-CORCC-0.0/0.5-20190821		N	x	x	x	x	x	x
	RB	CUF-SED-UT01-CORRB-0.0/0.5-20190821		N	x	x	x	x	x	x
	RB	CUF-SED-UT01-DUP01-20190821	CUF-SED-UT01-CORRB-0.0/0.5-20190821	FD	x	x	x	x	x	x
SED-UT01.5[4]	CC	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821		N	x	x	x	x	x	x
SED-UT02	CC	CUF-SED-UT02-CORCC-0.0/0.5-20190821		N	x	x	x	x	x	x
	RB	CUF-SED-UT02-CORRB-0.0/0.5-20190821		N	x	x	x	x	x	x
	RB	CUF-SED-UT02-CORRB-0.5/2.0-20190821		N	x	x	x	x	x	x

See notes on last page.

TABLE B.5 – Summary of Sediment Samples
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Station ID[1]	Sample ID	Parent Sample ID	Sample Type[2]	% Ash	Total Metals	Total Mercury	Anions	pH (Laboratory)	Radium-226, Radium-228, Radium-226+228
					Analysis Type					
SED-UT03	LB	CUF-SED-UT03-CORLB-0.0/0.5-20190821		N	x	x	x	x	x	x
	CC	CUF-SED-UT03-CORCC-0.0/0.5-20190821		N	x	x	x	x	x	x
	CC	CUF-SED-UT03-CORCC-0.5/1.0-20190821		N	x	x	x	x	x	x
SED-UT04	LB	CUF-SED-UT04-CORLB-0.0/0.5-20181017		N	x	x	x	x	x	x
	LB	CUF-SED-UT04-CORLB-0.5/2.7-20181017		N	x					
	LB	CUF-SED-UT04-CORLB-2.7/3.5-20181017		N	x					
	CC	CUF-SED-UT04-CORCC-0.0/0.5-20181017		N	x	x	x	x	x	x
	CC	CUF-SED-UT04-CORCC-0.5/3.2-20181017		N	x					
	RB	CUF-SED-UT04-CORRB-0.0/0.5-20181017		N	x	x	x	x	x	x
	RB	CUF-SED-UT04-CORRB-0.5/3.1-20181017		N	x					
SED-UT05	LB	CUF-SED-UT05-CORLB-0.0/0.5-20181017		N	x	x	x	x	x	x
	CC	CUF-SED-UT05-CORCC-0.0/0.5-20181017		N	x	x	x	x	x	x
	RB	CUF-SED-UT05-CORRB-0.0/0.5-20181017		N	x	x	x	x	x	x
SED-PO01	LB	CUF-SED-PO01-CORLB-0.0/0.5-20181018		N	x	x	x	x	x	
	CC	CUF-SED-PO01-CORCC-0.0/0.5-20181018		N	x	x	x	x	x	
	CC	CUF-SED-PO01-CORCC-0.5/1.4-20181018		N	x	x	x	x	x	
	RB	CUF-SED-PO01-CORRB-0.0/0.5-20181018		N	x	x	x	x	x	
	RB	CUF-SED-PO01-CORRB-0.5/1.3-20181018		N	x					
	RB	CUF-SED-PO01-CORRB-1.3/2.3-20181018		N	x					
	RB	CUF-SED-PO01-DUP01-20181018	CUF-SED-PO01-CORRB-1.3/2.3-20181018	FD	x					

Notes:

% Ash	Polarized Light Microscopy (PLM)
Total Metals	SW-846 6020A
Total Mercury	SW-846 7471B
Anions	SW-846 9056A
pH (laboratory)	SW-846 9045D
Radium-226, Radium-228, Radium-226+228	SW-846 901.1
ID	Identification

1. Station ID: LB=Left Bank, CC=Center Channel, RB=Right Bank (left bank and right bank determined with a downstream-facing orientation)
2. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate
3. Civil & Environmental Consultants, Inc. (CEC) obtained split samples from surficial sediments collected at each station on transects SED-WC06 and SED-WC05.
4. Location SED-UT01.5 was not proposed in the Benthic SAP.

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-CuR01-LB	10/11/2018	16.4	Vibecore	0.8	No Sample	–	1	Core approximately 0.4 ft of fines and 0.4 ft of dense clay/parent material. Insufficient depositional sediments to form a sample. Core discarded.
			Ponar	–	CUF-SED-CUR01-CORLB-0.0/0.5-20181011	0.0 – 0.5	2	Brown fines with fragments of hardpan clay
SED-CuR01-CC	10/11/2018	24.1	Vibecore	–	No Sample	–	N/A	Two Vibecore deployments. No substrate obtained.
			Ponar	–	CUF-SED-CUR01-CORCC-0.0/0.5-20181011	0.0 – 0.5	N/A	Fines, gravel and sand. Five Ponar deployments. Two yielded substrate.
SED-CuR01-RB	10/11/2018	11.2	Vibecore	1.4	CUF-SED-CUR01-CORRB-0.0/0.5-20181011	0.0 – 0.5	4	Core uniform; mix of fines, sand and detritus
					CUF-SED-CUR01-CORRB-0.5/1.4-20181011	0.5 – 1.4		
SED-CuR02-LB	10/11/2018	18.0 - 29.4	Vibecore	–	No Sample	–	N/A	Three Vibecore deployments. No depositional sediments obtained.
			Ponar	–	No Sample	–	N/A	Several Ponar deployments. No depositional sediments obtained.
SED-CuR02-CC	10/11/2018	20.5	Vibecore	–	No Sample	–	N/A	Three Vibecore deployments. No substrate obtained.
			Ponar	–	CUF-SED-CUR02-CORCC-0.0/0.5-20181011	0.0 – 0.5	6	Unconsolidated brown fines
SED-CuR02-RB	10/11/2018	6.6	Vibecore	–	No Sample	–	N/A	Three Vibecore deployments. Shallow layer (approximately 2 inches) of fines insufficient to form a sample. No sample generated.
			Ponar	–	CUF-SED-CUR02-CORRB-0.0/0.5-20181011	0.0 – 0.5	7	Brown fines
SED-CuR03-LB	10/10/2018	13.0	Vibecore	5.0	CUF-SED-CUR03-CORLB-0.0/0.5-20181010	0.0 – 0.5	8 – 9	Gray fines. Core color and texture extremely uniform.
					CUF-SED-CUR03-CORLB-0.5/5.0-20181010	0.5 – 5.0		
SED-CuR03-CC	10/10/2018	35.0	Vibecore	–	No Sample	–	N/A	Three Vibecore deployments. No depositional sediments obtained.
			Ponar	–	No Sample	–	N/A	Three Ponar deployments. No depositional sediments obtained. Five additional Ponar deployments in area of CUR03-CC on 10/11/2018, and no depositional sediments obtained.
SED-CuR03-RB	10/10/2018	15.0	Vibecore	3.1	CUF-SED-CUR03-CORRB-0.0/0.5-20181010	0.0 – 0.5	11 – 12	Approximately 90% sand
					CUF-SED-CUR03-CORRB-0.5/2.1-20181010	0.5 – 2.1		
					CUF-SED-CUR03-CORRB-2.1/2.6-20181010	2.1 – 2.6		Approximately 80% fines
					CUF-SED-CUR03-CORRB-2.6/3.1-20181010	2.6 – 3.1		Mix of sand, fines and detritus
SED-CuR04-LB	10/10/2018	16.3	Vibecore	2.9	CUF-SED-CUR04-CORLB-0.0/0.5-20181010	0.0 – 0.5	13 – 14	Gray-brown fines, uniform in color and texture
					CUF-SED-CUR04-CORLB-0.5/2.1-20181010	0.5 – 2.1		
					CUF-SED-CUR04-DUP01-20181010	0.5 – 2.1		
					CUF-SED-CUR04-CORLB-2.1/2.9-20181010	2.1 – 2.9		Mix of sand and fines

See notes on last page.

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-CuR04-CC	10/10/2018	N/A	Vibecore	–	No Sample			Three Vibecore deployments. No depositional sediments obtained.
			Ponar	–	CUF-SED-CUR04-CORCC-0.0/0.5-20181010	0.0 – 0.5	N/A	Five Ponar deployments. Three yielded no substrate. Two yielded small mass of fines and gravel.
SED-CuR04-RB	10/10/2018	15	Vibecore	1.5	CUF-SED-CUR04-CORRB-0.0/0.5-20181010	0.0 – 0.5	16 – 17	Shallow surface layer of brown fines overlaying mix of gray-brown fines and sand
					CUF-SED-CUR04-CORRB-0.5/1.3-20181010	0.5 – 1.3		Gray-brown fines with some sand
					–	1.3 – 1.5		Parent material
SED-CuR05-LB	10/9/2018	14.8	Vibecore	4.7	CUF-SED-CUR05-CORLB-0.0/0.5-20181009	0.0 – 0.5	18 – 19	Gray-brown fines, similar in texture and density
					CUF-SED-CUR05-CORLB-0.5/2.0-20181009	0.5 – 2.0		
					CUF-SED-CUR05-CORLB-2.0/4.7-20181009	2.0 – 4.7		Gray-brown fines and sand
SED-CuR05-CC	10/9/2018	39.9	Vibecore	–	No Sample	–	N/A	Two Vibecore deployments. No depositional sediments obtained.
			Ponar	–	CUF-SED-CUR05-CORCC-0.0/0.5-20181009	0.0 – 0.5	N/A	Two Ponar deployments. First Ponar yielded minimal substrate composed of fines and gravel. Second Ponar yielded only slightly more substrate composed of fines, gravel, and whole leaves. Fines retained.
SED-CuR05-RB	10/9/2018	25.0	Vibecore	1.6	CUF-SED-CUR05-CORRB-0.0/0.5-20181009	0.0 – 0.5	21 – 22	Sand with fines and detritus
					CUF-SED-CUR05-CORRB-0.5/1.6-20181009	0.5 – 1.6		
SED-CuR06-LB	10/9/2018	16.3	Vibecore	6.0	CUF-SED-CUR06-CORLB-0.0/0.5-20181009	0.0 – 0.5	23 – 24	Gray-brown fines, uniform in color and texture
					CUF-SED-CUR06-CORLB-0.5/6.0-20181009	0.5 – 6.0		
SED-CuR06-CC	10/9/2018	36.8	Vibecore	–	No Sample	–	N/A	Three Vibecore deployments. No substrate obtained.
			Ponar	–	CUF-SED-CUR06-CORCC-0.0/0.5-20181009	0.0 – 0.5	N/A	Shallow layer of unconsolidated fines
SED-CuR06-RB	10/9/2018	19.0	Vibecore	1.7	CUF-SED-CUR06-CORRB-0.0/0.5-20181009	0.0 – 0.5	26 – 27	Brown fines
					CUF-SED-CUR06-CORRB-0.5/1.7-20181009	0.5 – 1.7		Gray-brown fines
SED-CuR07-LB	10/8/2018	15.6	Vibecore	4.3	CUF-SED-CUR07-CORLB-0.0/0.5-20181008	0.0 – 0.5	28	Dense fines, uniform in color and texture
					CUF-SED-CUR07-DUP01-20181008	0.0 – 0.5		
					CUF-SED-CUR07-CORLB-0.5/4.3-20181008	0.5 – 4.3		
SED-CuR07-CC	10/9/2018	42.0	Vibecore	–	No Sample	–	N/A	Three Vibecore deployments. No depositional sediments obtained.
			Ponar	–	CUF-SED-CUR07-CORCC-0.0/0.5-20181009	0.0 – 0.5	29	Gray-brown fines

See notes on last page.

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-CuR07-RB	10/9/2018	23.0	Vibecore	6.0	CUF-SED-CUR07-CORRB-0.0/0.5-20181009	0.0 – 0.5	30 – 31	Brown fines
					CUF-SED-CUR07-CORRB-0.5/3.4-20181009	0.5 – 3.4		Gray-brown fines; more dense than surficial sediments
					CUF-SED-CUR07-CORRB-3.4/4.8-20181009	3.4 – 4.8		Gray-brown fines and sand
					CUF-SED-CUR07-CORRB-4.8/5.7-20181009	4.8 – 5.7		Gray-brown fines with appreciable amount of detritus
					–	5.7 – 6.0		Parent material
SED-DC01-LB	10/9/2018	18.0	Vibecore	1.9	CUF-SED-DC01-CORLB-0.0/0.5-20181009	0.0 – 0.5	32	Mix of sand and fines
					CUF-SED-DC01-CORLB-0.5/1.9-20181009	0.5 – 1.9		Fines with some sand
SED-DC01-CC	10/9/2018	21.1	Vibecore	1.0	CUF-SED-DC01-CORCC-0.0/0.5-20181009	0.0 – 0.5	33	Sand, fines, and *Corbicula* shell
					CUF-SED-DC01-CORCC-0.5/1.0-20181009	0.5 – 1.0		Mix of sand and fines
SED-DC01-RB	10/9/2018	11.5	Vibecore	6.0			34 – 36	Core uniform gray-brown with varying proportions of sand and fines
					CUF-SED-DC01-CORRB-0.0/0.5-20181009	0.0 – 0.5		Fines (silts/clays) mixed with fine- and coarse-grained sands
					CUF-SED-DC01-CORRB-0.5/2.2-20181009	0.5 – 2.2		Fines (silts/clays) mixed with fine-grained sand
					CUF-SED-DC01-CORRB-2.2/5.6-20181009	2.2 – 5.6		Fines and coarse-grained sand
					CUF-SED-DC01-CORRB-5.6/6.0-20181009	5.6 – 6.0		Fines
SED-WC01-LB	10/18/2018	2.4	Vibecore	4.0	CUF-SED-WC01-CORLB-0.0/0.5-20181018	0.0 – 0.5	37 – 39	Uniform light-brown fines
					CUF-SED-WC01-CORLB-0.5/3.8-20181018	0.5 – 3.8		
					–	3.8 – 4.0		Sand; discarded
SED-WC01-CC	10/18/2018	1.4	Vibecore	3.0	–	0.0 – 1.5	40 – 42	Gravel and sand; discarded
					–	1.5 – 2.2		Gravel and sand with some fines; discarded
					CUF-SED-WC01-CORCC-2.2/3.0-20181018	2.2 – 3.0		Gray-brown fines
SED-WC01-RB	10/18/2018	1.5	Vibecore	4.5	CUF-SED-WC01-CORRB-0.0/0.5-20181018	0.0 – 0.5	43 – 46	Sand
					CUF-SED-WC01-CORRB-0.5/2.4-20181018	0.5 – 2.4		
					CUF-SED-WC01-CORRB-2.4/4.5-20181018	2.4 – 4.5		Brown fines
SED-WC02-LB	10/17/2018	2.9	Vibecore	4.6	CUF-SED-WC02-CORLB-0.0/0.5-20181017	0.0 – 0.5	47 – 49	Gray-brown fines
					CUF-SED-WC02-CORLB-0.5/2.5-20181017	0.5 – 2.5		
					CUF-SED-WC02-CORLB-2.5/4.6-20181017	2.5 – 4.6		Gray-brown fines; more consolidated than upper portion of core

See notes on last page.

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-WC02-CC	10/17/2018	3.2	Ponar	–	CUF-SED-WC02-CORCC-0.0/0.5-20181017	0.0 – 0.5	N/A	Mix of gray-brown fines and sand
					CUF-SED-WC02-DUP01-20181017	0.0 – 0.5		
SED-WC02-RB	10/17/2018	4.0	Vibecore	2.3	CUF-SED-WC02-CORRB-0.0/0.5-20181017	0.0 – 0.5	51 – 53	Shallow surface layer of brown fines overlaying core of uniform brown/gray-brown fines
					CUF-SED-WC02-CORRB-0.5/2.3-20181017	0.5 – 2.3		
SED-WC03-LB	10/17/2018	2.0	Vibecore	4.7	CUF-SED-WC03-CORLB-0.0/0.5-20181017	0.0 – 0.5	54 – 56	Gray-brown fines with a high proportion of sand.
					CUF-SED-WC03-CORLB-0.5/3.3-20181017	0.5 – 3.3		Gray-brown fines and sand; transitioning to lower proportions of sand with increasing depth within the core
					CUF-SED-WC03-CORLB-3.3/4.7-20181017	3.3 – 4.7		Gray-brown fines and sand
SED-WC03-CC	10/17/2018	2.3	Vibecore	5.4			57 – 59	Core delineated based on variations in the proportions of silt and sand.
					CUF-SED-WC03-CORCC-0.0/0.5-20181017	0.0 – 0.5		High proportion of sand with some fines
					CUF-SED-WC03-CORCC-1.0/2.1-20181017	1.0 – 2.1		Predominately fines
					CUF-SED-WC03-CORCC-2.1/3.2-20181017	2.1 – 3.2		Predominately sand
					CUF-SED-WC03-CORCC-3.2/5.4-20181017	3.2 – 5.4		Predominately fines
SED-WC03-RB	10/17/2018	2.0	Vibecore	3.8	CUF-SED-WC03-CORRB-0.0/0.5-20181017	0.0 – 0.5	60 – 62	Gray-brown fines. Core uniform in appearance and texture.
					CUF-SED-WC03-CORRB-0.5/3.8-20181017	0.5 – 3.8		
SED-WC04-LB	10/16/2018	1.7	Vibecore	3.1	CUF-SED-WC04-CORLB-0.0/0.5-20181016	0.0 – 0.5	63 – 65	Gray fines
					CUF-SED-WC04-CORLB-0.5/2.4-20181016	0.5 – 2.4		Gray-brown fines
					–	2.4 – 3.1		Parent material
SED-WC04-CC	10/16/2018	2.5	Vibecore	3.9	CUF-SED-WC04-CORCC-0.0/0.5-20181016	0.0 – 0.5	66 – 67	Black fines
					CUF-SED-WC04-CORCC-0.5/1.9-20181016	0.5 – 1.9		Black fines transitioning to brown fines mottled with black
					–	1.9 – 3.9		Parent material
SED-WC04-RB	10/16/2018	5.1	Vibecore	2.9	CUF-SED-WC04-CORRB-0.0/0.5-20181016	0.0 – 0.5	68 – 70	Gray-brown fines
					CUF-SED-WC04-CORRB-0.5/2.0-20181016	0.5 – 2.0		Gray-brown fines
					CUF-SED-WC04-CORRB-2.0/2.9-20181016	2.0 – 2.9		Gray-brown fines mottled with black
SED-WC05-LB	10/16/2018	2.5	Vibecore	2.8	CUF-SED-WC05-CORLB-0.0/0.5-20181016	0.0 – 0.5	71 – 73	Brown fines
					CUF-SED-WC05-CORLB-0.5/1.5-20181016	0.5 – 1.5		Brown fines
					CUF-SED-WC05-DUP01-20181016	0.5 – 1.5		Brown fines
					CUF-SED-WC05-CORLB-1.5/2.8-20181016	1.5 – 2.8		Gray to gray-brown fines mottled with black

See notes on last page.

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-WC05-CC	10/16/2018	1.5	Vibecore	1.9	CUF-SED-WC05-CORCC-0.0/0.5-20181016	0.0 – 0.5	74 – 76	Mix of gray-brown fines and orange clay. Appearance of parent material.
					–	0.5 – 1.9		Parent material
SED-WC05-RB	10/16/2018	3.5	Vibecore	4.6	CUF-SED-WC05-CORRB-0.0/0.5-20181016	0.0 – 0.5	77 – 79	Gray-brown fines
					CUF-SED-WC05-CORRB-0.5/0.9-20181016	0.5 – 0.9		Gray-brown fines
					CUF-SED-WC05-CORRB-0.9/4.6-20181016	0.9 – 4.6		Gray-brown fines
SED-WC06-LB	10/16/2018	1.7	Vibecore	1.3	–	–	80 – 82	Approximately 0.2 ft of gray-brown fines overlaying dense clay/parent material. Insufficient depositional sediments to form a sample. Core discarded.
			Ponar	–	CUF-SED-WC06-CORLB-0.0/0.5-20181016	0.0 – 0.5	N/A	Deployed Ponar to obtain sufficient sample volume
SED-WC06-CC	10/16/2018	2.5	Vibecore	3.7	CUF-SED-WC06-CORCC-0.0/0.5-20181016	0.0 – 0.5	84 – 86	Gray-brown fines
					CUF-SED-WC06-CORCC-0.5/1.3-20181016	0.5 – 1.3		Gray-brown fines
					CUF-SED-WC06-CORCC-1.3/2.7-20181016	1.3 – 2.7		Gray fines
					–	2.7 – 3.7		Parent material
SED-WC06-RB	10/16/2018	5.0	Vibecore	0.8	–	–	87 – 88	Approximately 0.3 ft of brown fines overlaying dense clay/parent material. Insufficient depositional sediments to form a sample. Core discarded.
			Ponar	–	CUF-SED-WC06-CORRB-0.0/0.5-20181016	0.0 – 0.5	89	Brown fines
SED-WC07-LB	10/11/2018	4.8	Ponar	–	CUF-SED-WC07-CORLB-0.0/0.5-20181011	0.0 – 0.5	N/A	Brown fines
SED-WC07-CC	10/11/2018	5.8	Ponar	–	CUF-SED-WC07-CORCC-0.0/0.5-20181011	0.0 – 0.5	91	Brown fines
SED-WC07-RB	10/11/2018	3.0	Ponar	–	CUF-SED-WC07-CORRB-0.0/0.5-20181011	0.0 – 0.5	N/A	Brown fines
SED-WC08-LB	10/11/2018	6.0	Ponar	–	CUF-SED-WC08-CORLB-0.0/0.5-20181011	0.0 – 0.5	N/A	Brown fines
SED-WC08-CC	10/11/2018	5.3	Ponar	–	CUF-SED-WC08-CORCC-0.0/0.5-20181011	0.0 – 0.5	N/A	Brown fines
SED-WC08-RB	10/11/2018	6.1	Ponar	–	CUF-SED-WC08-CORRB-0.0/0.5-20181011	0.0 – 0.5	N/A	Brown fines
SED-WC09-LB	10/11/2018	N/A	Ponar	–	No Sample	–	96	Substrate shallow layer of fines, detritus, mollusk shell, and rock. Four Ponar deployments. Insufficient depositional sediments to form a sample.
SED-WC09-CC	10/11/2018	6.8	Vibecore	0.6	–	–	97	Fines overlaying gravel and mollusk shell. Two Vibecore deployments. Insufficient depositional sediments to form a sample.
			Ponar	–	CUF-SED-WC09-CORCC-0.0/0.5-20181011	0.0 – 0.5	N/A	Fines, gravel and mollusk shell
	12/5/2019	9.6	Ponar	–	CUF-SED-WC09-CORCC-0.0/0.5-20191205	0.0 – 0.5	N/A	Brown fines
SED-WC09-RB	10/11/2018	2.0	Ponar	–	CUF-SED-WC09-CORRB-0.0/0.5-20181011	0.0 – 0.5	N/A	Brown fines
SED-WC10-LB	10/11/2018	4.0	Vibecore	3.5	CUF-SED-WC10-CORLB-0.0/0.5-20181011	0.0 – 0.5	101 – 102	Gray-brown fines. Core uniform in color and texture. Core sectioned at 3.0 ft.
					CUF-SED-WC10-CORLB-0.5/3.0-20181011	0.5 – 3.0		
					CUF-SED-WC10-CORLB-3.0/3.5-20181011	3.0 – 3.5		

See notes on last page.

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-WC10-CC	10/11/2018	<1.0	Vibecore	1.9	CUF-SED-WC10-CORCC-0.0/0.5-20181011	0.0 – 0.5	103 – 106	Surface layer (0.25 ft) of unconsolidated, brown fines overlaying gray-brown fines uniform in color and texture.
					CUF-SED-WC10-CORCC-0.5/1.9-20181011	0.5 – 1.9		
SED-WC10-RB	10/11/2018	<1.0	Vibecore	1.3	CUF-SED-WC10-CORRB-0.0/0.5-20181011	0.0 – 0.5	107 – 110	Brown fines
					–	0.5 – 1.3		Parent material
SED-UT01-LB	8/21/2019	1.7	Vibecore	1.15/0.75*			111 – 112	*Core contained 1.15 ft of material. Upper 0.4 ft of core (aqueous organic matter) discarded, and core depth (0.75 ft) determined from the remaining substrates.
					CUF-SED-UT01-CORLB-0.0/0.5-20190821	0.0 – 0.5		Gray-brown fines
					–	0.5 – 0.75		Parent material
SED-UT01-CC	8/21/2019	<1.0	Vibecore	1.25/0.75*			113 – 115	*Core contained 1.25 ft of material. Upper 0.5 ft of core (aqueous organic matter) discarded, and core depth (0.75 ft) determined from the remaining substrates.
					CUF-SED-UT01-CORCC-0.0/0.5-20190821	0.0 – 0.5		Gray fines
					–	0.5-1.75		Parent material
SED-UT01-RB	8/21/2019	<3	Vibecore	2.0/1.5*			116 – 117	*Core contained 2.0 ft of material. Upper 0.5 ft of core (aqueous organic matter) discarded, and core depth (1.5 ft) determined from the remaining substrates.
					CUF-SED-UT01-CORRB-0.0/0.5-20190821	0.0 – 0.5		
					CUF-SED-UT01-DUP01-20190821			Gray-brown fines and black organic matter
					–	0.7 – 1.5		Parent material
SED-UT01.5-CC1	8/21/2019	3.0	Vibecore	1.5 / 1.1*			118 – 119	*Core contained 1.5 ft of material. Upper 0.4 ft of core (aqueous organic matter) discarded, and core depth (1.1 ft) determined from the remaining substrates.
					CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	0.0 – 0.5		Gray fines
					–	0.5 – 0.8		Particulate organic matter, detritus and gravel mixed with fines; discarded.
					–	0.8 – 1.1		Parent material
SED-UT02-LB	8/21/2019	<1	Vibecore	0.9	No Sample	–	122, 124 – 126	Black, particulate organic matter overlaying parent material. Organic matter likely duckweed in various stages of decay. No depositional silts or clays obtained. Deployed Vibecore several times and collected organics or encountered rocky substrate. Rip-rap visible in sample area.
SED-UT02-CC	8/21/2019	<3	Vibecore	1.45 / 0.75*			127 – 128	*Core contained 1.45 ft of material. Upper 0.7 ft of core (aqueous organic matter) discarded, and core depth (0.75 ft) determined from the remaining substrates.
					CUF-SED-UT02-CORCC-0.0/0.5-20190821	0.0 – 0.5		Gray-brown fines
					–	0.0 – 0.75		Parent material

See notes on last page.

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-UT02-RB (Core 1)	8/21/2019	4.0	Vibecore	0.75	No Sample	–	129 – 131 (Core 1)	Composed primarily of organics. Core discarded.
SED-UT02-RB (Core 2)	8/21/2019	4.0	Vibecore	2.3/2.0*			132 – 135 (Core 2)	*Core contained 2.3 ft of material. Upper 0.3 ft of core (aqueous organic matter) discarded, and core depth (2.0 ft) determined from the remaining substrates.
					CUF-SED-UT02-CORRB-0.0/0.5-20190821	0.0 – 0.5		Fines with organics mixed
					CUF-SED-UT02-CORRB-0.5/2.0-20190821	0.5 – 2.0		Gray-brown fines with lower 0.3 ft fines mixed with gravel.
SED-UT03-LB	8/21/2019	N/A	Vibecore	1.75 / 0.75*			136 – 138	*Core contained 1.75 ft of material. Upper 1.0 ft of core (aqueous organic matter) discarded, and core depth (0.75 ft) determined from the remaining substrates.
					CUF-SED-UT03-CORLB-0.0/0.5-20190821	0.0 – 0.5		Brown fines mixed with some organic matter
					–	0.5 – 0.75		Parent material
SED-UT03-CC	8/21/2019	6.4	Vibecore	1.65 / 1.4*			139 – 141	*Core contained 1.65 ft of material. Upper 0.25 ft of core (aqueous organic matter) discarded, and core depth (1.4 ft) determined from the remaining substrates.
					CUF-SED-UT03-CORCC-0.0/0.5-20190821	0.0 – 0.5		Gray fines with limestone gravel.
					CUF-SED-UT03-CORCC-0.5/1.0-20190821	0.5 – 1.0		Gray fines with a few large gravel
					–	1.0 - 1.4		Parent material
SED-UT03-RB	8/21/2019	4 – 6	Vibecore	–	No Sample	–	N/A	Rocky substrate. No depositional sediments obtained. One Vibecore deployment, and probed substrate using a measuring staff; encountered rocky substrate.
SED-UT04-LB	10/17/2018	1.5	Vibecore	4.2 / 3.5*			144 – 146	*Core contained 4.2 ft of material. Upper 0.7 ft of core (aqueous organic matter) discarded, and core depth (3.5 ft) determined from the remaining substrates.
					CUF-SED-UT04-CORLB-0.0/0.5-20181017	0.0 – 0.5		Brown fines mixed with dark particulate organic matter
					CUF-SED-UT04-CORLB-0.5/2.7-20181017	0.5 – 2.7		
					CUF-SED-UT04-CORLB-2.7/3.5-20181017	2.7 – 3.5		Lower 0.8 ft of core brown fines, possibly parent material but moderately soft, not consolidated.
SED-UT04-CC	10/17/2018	3.5	Vibecore	3.6	CUF-SED-UT04-CORCC-0.0/0.5-20181017	0.0 – 0.5	147 – 148	Brown fines mixed with dark particulate organic matter.
					CUF-SED-UT04-CORCC-0.5/3.2-20181017	0.5 – 3.2		
					–	3.2 – 3.6		Parent material
SED-UT04-RB	10/17/2018	3.0	Vibecore	3.1	CUF-SED-UT04-CORRB-0.0/0.5-20181017	0.0 – 0.5	149 – 151	Brown fines mixed with dark particulate organic matter
					CUF-SED-UT04-CORRB-0.5/3.1-20181017	0.5 – 3.1		

TABLE B.6 – Sediment Sampling Field Data
Cumberland Fossil Plant
October 2018, August 21, 2019, and December 5, 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-UT05-LB	10/17/2018	1.2	Vibecore	1.2 / 1.0*			152 – 153	*Core contained 1.2 ft of material. Upper 0.2 ft of core (aqueous organic matter) discarded, and core depth (1.0 ft) determined from the remaining substrates.
					CUF-SED-UT05-CORLB-0.0/0.5-20181017	0.0 – 0.5		Gray-brown fines
					–	0.5 – 1.0		Parent material
SED-UT05-CC	10/17/2018	0.5	Vibecore	0.9	CUF-SED-UT05-CORCC-0.0/0.5-20181017	0.0 – 0.5	154	Gray-brown fines mixed with dark particulate organic matter.
SED-UT05-RB	10/17/2018	0.2	Vibecore	1.0	CUF-SED-UT05-CORRB-0.0/0.5-20181017	0.0 – 0.5	155 – 157	Gray fines about mid-core. Strata of dark, unconsolidated, particulate organic matter above and below the silt/clay stratum. First core, which was discarded, had same layering.
SED-PO01-LB	10/18/2018	<6	Vibecore	1.24	CUF-SED-PO01-CORLB-0.0/0.5-20181018	0.0 – 0.5	158	Fines 0.0 to 0.9 ft. Retained surficial (0.0-0.5) sediments.
					–	0.9 – 1.24		Parent material
SED-PO01-CC	10/18/2018	<6	Vibecore	1.75	CUF-SED-PO01-CORCC-0.0/0.5-20181018	0.0 – 0.5	159	Dark brown fines mixed with organic matter
					CUF-SED-PO01-CORCC-0.5/1.4-20181018	0.5 – 1.4		Brown fines; more consolidated than surficial sediments
					–	1.4 – 1.75		Parent material
SED-PO01-RB	10/18/2018	<6	Vibecore	2.3	CUF-SED-PO01-CORRB-0.0/0.5-20181018	0.0 – 0.5	160 – 161	Dark brown fines mixed with organic matter
					CUF-SED-PO01-CORRB-0.5/1.3-20181018	0.5 – 1.3		
					CUF-SED-PO01-CORRB-1.3/2.3-20181018	1.3 – 2.3		Light-brown fines; more consolidated than upper strata
					CUF-SED-PO01-DUP01-20181018	1.3 – 2.3		

Notes:

–	not applicable
ft	feet
N/A	not available

1. See Photographic Logs of Sediment Samples, Attachment C.1 in Appendix C.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-CuR01-LB	SED-CuR01-CC	SED-CuR01-RB		SED-CuR02-CC	SED-CuR02-RB	SED-CuR03-LB		SED-CuR03-RB		
Sample Date		**11-Oct 2018**	**11-Oct 2018**	**11-Oct 2018**		**11-Oct 2018**	**11-Oct 2018**	**10-Oct 2018**		**10-Oct 2018**		
Sample ID		**CUF-SED-CUR01-CORLB-0.0/0.5-20181011**	**CUF-SED-CUR01-CORCC-0.0/0.5-20181011**	**CUF-SED-CUR01-CORRB-0.0/0.5-20181011**	**CUF-SED-CUR01-CORRB-0.5/1.4-20181011**	**CUF-SED-CUR02-CORCC-0.0/0.5-20181011**	**CUF-SED-CUR02-CORRB-0.0/0.5-20181011**	**CUF-SED-CUR03-CORLB-0.0/0.5-20181010**	**CUF-SED-CUR03-CORLB-0.5/5.0-20181010**	**CUF-SED-CUR03-CORRB-0.0/0.5-20181010**	**CUF-SED-CUR03-CORRB-0.5/2.1-20181010**	**CUF-SED-CUR03-CORRB-2.1/2.6-20181010**
Sample Depth (ft)		**0.0 – 0.5**	**0.0 – 0.5**	**0.0 – 0.5**	**0.5 – 1.4**	**0.0 – 0.5**	**0.0 – 0.5**	**0.0 – 0.5**	**0.5 – 5.0**	**0.0 – 0.5**	**0.5 – 2.1**	**2.1 – 2.6**
Sample Type[1]		**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**	**N**
Level of Review[2, 3]		**Validated**	**Validated**	**Validated**	**Final-Verified**	**Validated**	**Validated**	**Validated**	**Final-Verified**	**Validated**	**Final-Verified**	**Final-Verified**
	Units											
PLM												
% ASH	%	1	<1	<1	<1	<1	<1	1	<1	<1	2	1
Total Metals												
Antimony	mg/kg	0.223 J	0.120 J	0.197 J	–	0.241 J	0.214 J	0.209 J	–	0.103 J	–	–
Arsenic	mg/kg	4.34	2.99	4.17	–	5.38 J	4.32	4.22	–	2.74	–	–
Barium	mg/kg	82.7	30.5	65.4	–	85.2 J	70.4	65.7	–	26.2	–	–
Beryllium	mg/kg	0.846	0.396	0.663	–	0.832 J	0.691	0.670	–	0.353	–	–
Boron	mg/kg	2.69 J	1.67 J	2.67 J	–	3.00 J	2.33 J	2.23 J	–	1.09 J	–	–
Cadmium	mg/kg	0.387	0.257	0.581	–	0.856 J	0.578	0.385	–	0.196	–	–
Calcium	mg/kg	5790	8090	5780	–	5310 J	5280	6520	–	9900	–	–
Chromium	mg/kg	11.4	9.34	10.3	–	12.6 J	11.1	10.9	–	7.14	–	–
Cobalt	mg/kg	7.99	3.73	7.04	–	8.37 J	7.33	7.06	–	3.44	–	–
Copper	mg/kg	9.45	3.03	8.36	–	10.6 J	8.40	8.02	–	2.32	–	–
Lead	mg/kg	14.2	8.37	12.1	–	16.1 J	12.7	12.8	–	6.53	–	–
Lithium	mg/kg	10.6 J	3.73 J	7.51 J	–	10.9 J	8.72 J	7.45 J	–	2.75 J	–	–
Mercury	mg/kg	0.0565 J	<0.0430	<0.0542	–	0.0588 UJ	<0.0525	<0.0468	–	<0.0398	–	–
Molybdenum	mg/kg	1.12	0.779 J	0.690 J	–	0.936 J	0.729 J	0.757	–	0.488 U*	–	–
Nickel	mg/kg	12.8	6.03	10.7	–	14.0 J	11.5	10.4	–	5.21	–	–
Selenium	mg/kg	0.411	0.239 J	0.467	–	0.544 J	0.475	0.509	–	0.274 J	–	–
Silver	mg/kg	0.0443 J	0.0254 J	0.0434 J	–	0.0510 J	0.0496 J	0.0451 J	–	0.0214 J	–	–
Strontium	mg/kg	25.2	19.3	20.7	–	25.9 J	19.8	21.7	–	22.0	–	–
Thallium	mg/kg	0.210	0.210	0.133	–	0.181 J	0.133	0.139	–	0.0561 J	–	–
Vanadium	mg/kg	16.0	6.89	12.0	–	15.4 J	13.4	13.6	–	5.50	–	–
Zinc	mg/kg	52.4	36.9	52.6	–	110 J	63.7	49.6	–	25.2	–	–
Anions												
Chloride	mg/kg	<12.2	<10.4	<12.9	–	14.4 UJ	<12.4	<10.9	–	<9.39	–	–
Fluoride	mg/kg	<1.40	<1.19	<1.47	–	1.65 UJ	<1.41	<1.25	–	<1.07	–	–
Sulfate	mg/kg	89.4 J	29.8 U*	156 J	–	43.8 U*	70.1 J	134 J	–	14.2 U*	–	–
Radiological												
Radium-226	pCi/g	1.05 +/-(0.229) J	0.427 +/-(0.126) J	1.44 +/-(0.323) J	–	1.20 +/-(0.255) J	1.15 +/-(0.259) J	0.989 +/-(0.277) J	–	0.449 +/-(0.132) J	–	–
Radium-228	pCi/g	1.02 +/-(0.272)	0.306 +/-(0.170)	1.17 +/-(0.300)	–	1.26 +/-(0.330)	1.07 +/-(0.282)	0.875 +/-(0.317)	–	0.0881 +/-(0.250) U	–	–
Radium-226+228	pCi/g	2.07 +/-(0.356) J	0.733 +/-(0.212) J	2.61 +/-(0.441) J	–	2.46 +/-(0.417) J	2.22 +/-(0.383) J	1.86 +/-(0.421) J	–	0.537 +/-(0.283) J	–	–
General Chemistry												
pH (lab)	SU	7.4	7.4	6.9	–	7.5	7.0	6.7	–	7.2	–	–

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-CuR03-RB	SED-CuR04-LB				SED-CuR04-CC	SED-CuR04-RB		SED-CuR05-LB		
Sample Date		10-Oct 2018	10-Oct 2018				10-Oct 2018	10-Oct 2018		09-Oct 2018		
Sample ID		CUF-SED-CUR03-CORRB-2.6/3.1-20181010	CUF-SED-CUR04-CORLB-0.0/0.5-20181010	CUF-SED-CUR04-CORLB-0.5/2.1-20181010	CUF-SED-CUR04-DUP01-20181010	CUF-SED-CUR04-CORLB-2.1/2.9-20181010	CUF-SED-CUR04-CORCC-0.0/0.5-20181010	CUF-SED-CUR04-CORRB-0.0/0.5-20181010	CUF-SED-CUR04-CORRB-0.5/1.3-20181010	CUF-SED-CUR05-CORLB-0.0/0.5-20181009	CUF-SED-CUR05-CORLB-0.5/2.0-20181009	CUF-SED-CUR05-CORLB-2.0/4.7-20181009
Sample Depth (ft)		2.6 – 3.1	0.0 – 0.5	0.5 – 2.1	0.5 – 2.1	2.1 – 2.9	0.0 – 0.5	0.0 – 0.5	0.5 – 1.3	0.0 – 0.5	0.5 – 2.0	2.0 – 4.7
Sample Type[1]		N	N	N	FD	N	N	N	N	N	N	N
Level of Review[2, 3]	Units	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Final-Verified	Validated	Final-Verified	Final-Verified
PLM												
% ASH	%	1	1	<1	<1	1	3	<1	<1	<1	<1	1
Total Metals												
Antimony	mg/kg	–	0.186 J	–	–	–	0.178 J	0.104 J	–	0.198 J	–	–
Arsenic	mg/kg	–	3.88	–	–	–	3.18	2.72	–	4.03	–	–
Barium	mg/kg	–	64.6	–	–	–	39.4	35.6	–	66.3	–	–
Beryllium	mg/kg	–	0.647	–	–	–	0.489	0.380	–	0.608	–	–
Boron	mg/kg	–	2.95 J	–	–	–	3.62 J	1.70 J	–	2.38 J	–	–
Cadmium	mg/kg	–	0.526	–	–	–	0.382	0.192	–	0.501	–	–
Calcium	mg/kg	–	6810	–	–	–	6200	7830	–	7540	–	–
Chromium	mg/kg	–	10.6	–	–	–	8.31	7.68	–	10.1	–	–
Cobalt	mg/kg	–	7.12	–	–	–	4.58	4.17	–	6.91	–	–
Copper	mg/kg	–	9.00	–	–	–	5.56	4.26	–	9.33	–	–
Lead	mg/kg	–	12.7	–	–	–	9.23	8.02	–	12.7	–	–
Lithium	mg/kg	–	7.97 J	–	–	–	5.11 J	4.50 J	–	6.92 J	–	–
Mercury	mg/kg	–	<0.0491	–	–	–	<0.0439	<0.0411	–	<0.0461	–	–
Molybdenum	mg/kg	–	1.15	–	–	–	0.647	0.482 J	–	0.825 U*	–	–
Nickel	mg/kg	–	11.1	–	–	–	7.64	6.93	–	10.2	–	–
Selenium	mg/kg	–	0.414	–	–	–	0.288 J	0.184 J	–	0.495	–	–
Silver	mg/kg	–	0.0504 J	–	–	–	0.0313 J	0.0321 J	–	0.0708	–	–
Strontium	mg/kg	–	23.1	–	–	–	17.2	19.5	–	23.4	–	–
Thallium	mg/kg	–	0.206	–	–	–	0.0988	0.0787	–	0.127	–	–
Vanadium	mg/kg	–	12.7	–	–	–	7.95	7.25	–	11.6	–	–
Zinc	mg/kg	–	55.7	–	–	–	40.2	28.3	–	51.5	–	–
Anions												
Chloride	mg/kg	–	<11.4	–	–	–	<10.1	<9.87	–	10.9 UR	–	–
Fluoride	mg/kg	–	1.33 U*	–	–	–	<1.16	<1.13	–	1.34 U*	–	–
Sulfate	mg/kg	–	127 J	–	–	–	103 J	33.8 J	–	43.0 J	–	–
Radiological												
Radium-226	pCi/g	–	1.21 +/-(0.247) J	–	–	–	0.912 +/-(0.231) J	0.687 +/-(0.155)	–	1.16 +/-(0.287)	–	–
Radium-228	pCi/g	–	0.906 +/-(0.214)	–	–	–	0.495 +/-(0.203)	0.639 +/-(0.170)	–	0.954 +/-(0.400)	–	–
Radium-226+228	pCi/g	–	2.12 +/-(0.327) J	–	–	–	1.41 +/-(0.308) J	1.33 +/-(0.230)	–	2.11 +/-(0.492)	–	–
General Chemistry												
pH (lab)	SU	–	7.0	–	–	–	7.1	7.1	–	6.8	–	–

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-CuR05-CC	SED-CuR05-RB		SED-CuR06-LB		SED-CuR06-CC	SED-CuR06-RB		SED-CuR07-LB		
Sample Date		09-Oct 2018	09-Oct 2018		09-Oct 2018		09-Oct 2018	09-Oct 2018		08-Oct 2018		
Sample ID		CUF-SED-CUR05-CORCC-0.0/0.5-20181009	CUF-SED-CUR05-CORRB-0.0/0.5-20181009	CUF-SED-CUR05-CORRB-0.5/1.6-20181009	CUF-SED-CUR06-CORLB-0.0/0.5-20181009	CUF-SED-CUR06-CORLB-0.5/6.0-20181009	CUF-SED-CUR06-CORCC-0.0/0.5-20181009	CUF-SED-CUR06-CORRB-0.0/0.5-20181009	CUF-SED-CUR06-CORRB-0.5/1.7-20181009	CUF-SED-CUR07-CORLB-0.0/0.5-20181008	CUF-SED-CUR07-DUP01-20181008	CUF-SED-CUR07-CORLB-0.5/4.3-20181008
Sample Depth (ft)		0.0 – 0.5	0.0 – 0.5	0.5 – 1.6	0.0 – 0.5	0.5 – 6.0	0.0 – 0.5	0.0 – 0.5	0.5 – 1.7	0.0 – 0.5	0.0 – 0.5	0.5 – 4.3
Sample Type[1]		N	N	N	N	N	N	N	N	N	FD	N
Level of Review[2, 3]	Units	Validated	Validated	Final-Verified	Validated	Final-Verified	Validated	Validated	Final-Verified	Validated	Validated	Final-Verified
PLM												
% ASH	%	<1	<1	<1	1	2	<1	<1	3	2	<1	2
Total Metals												
Antimony	mg/kg	0.186 J	0.394 J	–	0.220 J	–	0.193 J	0.327 J	–	0.357 J	0.324 J	–
Arsenic	mg/kg	5.45	3.83	–	4.51	–	5.32	6.08	–	6.04	6.24	–
Barium	mg/kg	60.8	57.2	–	85.4	–	68.6	81.6	–	115	119	–
Beryllium	mg/kg	0.663	0.572	–	0.743	–	0.678	0.774	–	0.951	0.970	–
Boron	mg/kg	2.39 J	2.34 J	–	2.60 J	–	4.76 J	2.56 J	–	2.97 J	2.96 J	–
Cadmium	mg/kg	0.540	0.409	–	0.750	–	0.600	0.509	–	0.571	0.556	–
Calcium	mg/kg	6770	7210	–	5470	–	6980	5340	–	5920	6200	–
Chromium	mg/kg	11.0	9.38	–	11.3	–	12.0	12.7	–	17.6	18.4	–
Cobalt	mg/kg	7.63	5.87	–	7.87	–	7.45	8.83	–	10.5	10.6	–
Copper	mg/kg	8.36	6.99	–	11.6	–	11.4	12.5	–	13.5	13.9	–
Lead	mg/kg	11.8	10.8	–	15.0	–	12.9	19.7	–	27.1	27.6	–
Lithium	mg/kg	7.10 J	6.41 J	–	8.19 J	–	7.78 J	7.83 J	–	9.76 J	10.5 J	–
Mercury	mg/kg	<0.0482	<0.0438	–	0.0488 J	–	<0.0505	0.0702 J	–	0.0609 J	0.0682 J	–
Molybdenum	mg/kg	0.890 U*	1.12	–	0.990 U*	–	0.873 U*	1.34	–	1.96	1.51	–
Nickel	mg/kg	11.5	9.21	–	12.1	–	11.5	12.3	–	16.0	16.9	–
Selenium	mg/kg	0.456	0.364 J	–	0.567	–	0.441	0.573	–	0.695	0.704	–
Silver	mg/kg	0.0432 J	0.0438 J	–	0.0721 J	–	0.0540 J	0.155	–	0.324	0.321	–
Strontium	mg/kg	22.3	22.2	–	21.1	–	28.6	22.0	–	26.2	27.5	–
Thallium	mg/kg	0.134	0.196	–	0.158	–	0.141	0.164	–	0.293	0.230	–
Vanadium	mg/kg	11.8	10.8	–	14.5	–	12.9	16.5	–	20.5	20.7	–
Zinc	mg/kg	57.8	48.2	–	70.9	–	61.4	57.6	–	76.6	78.1	–
Anions												
Chloride	mg/kg	11.1 UR	10.4 UR	–	10.7 UR	–	26.6 U*	11.3 UR	–	10.5 UR	10.7 UR	–
Fluoride	mg/kg	1.27 UR	1.19 UR	–	1.65 U*	–	1.36 UR	1.76 U*	–	2.10 U*	2.04 U*	–
Sulfate	mg/kg	65.7 J	70.5 J	–	82.7 J	–	219 J	144 J	–	38.1 U*	33.4 U*	–
Radiological												
Radium-226	pCi/g	0.807 +/-(0.232)	1.06 +/-(0.236)	–	1.30 +/-(0.338)	–	1.05 +/-(0.270)	1.20 +/-(0.250)	–	1.64 +/-(0.358)	1.27 +/-(0.260) J	–
Radium-228	pCi/g	0.926 +/-(0.395)	0.955 +/-(0.292)	–	1.20 +/-(0.287)	–	0.841 +/-(0.323)	1.15 +/-(0.277)	–	1.44 +/-(0.369)	1.33 +/-(0.297)	–
Radium-226+228	pCi/g	1.73 +/-(0.458)	2.02 +/-(0.375)	–	2.50 +/-(0.443)	–	1.89 +/-(0.421)	2.35 +/-(0.373)	–	3.08 +/-(0.514)	2.60 +/-(0.395) J	–
General Chemistry												
pH (lab)	SU	7.1	6.9	–	6.9	–	7.1	6.9	–	6.9	7.0	–

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-CuR07-CC	SED-CuR07-RB				SED-DC01-LB		SED-DC01-CC		SED-DC01-RB	
Sample Date		09-Oct 2018	09-Oct 2018				09-Oct 2018		09-Oct 2018		09-Oct 2018	09-Oct 2018
Sample ID		CUF-SED-CUR07-CORCC-0.0/0.5-20181009	CUF-SED-CUR07-CORRB-0.0/0.5-20181009	CUF-SED-CUR07-CORRB-0.5/3.4-20181009	CUF-SED-CUR07-CORRB-3.4/4.8-20181009	CUF-SED-CUR07-CORRB-4.8/5.7-20181009	CUF-SED-DC01-CORLB-0.0/0.5-20181009	CUF-SED-DC01-CORLB-0.5/1.9-20181009	CUF-SED-DC01-CORCC-0.0/0.5-20181009	CUF-SED-DC01-CORCC-0.5/1.0-20181009	CUF-SED-DC01-CORRB-0.0/0.5-20181009	CUF-SED-DC01-CORRB-0.5/2.2-20181009
Sample Depth (ft)		0.0 – 0.5	0.0 – 0.5	0.5 – 3.4	3.4 – 4.8	4.8 – 5.7	0.0 – 0.5	0.5 – 1.9	0.0 – 0.5	0.5 – 1.0	0.0 – 0.5	0.5 – 2.2
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	N
Level of Review[2, 3]		Validated	Validated	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Validated
	Units											
PLM												
% ASH	%	<1	<1	<1	1	1	2	<1	<1	3	<1	1
Total Metals												
Antimony	mg/kg	0.214 J	0.184 J	–	–	–	0.401 J	–	0.335 J	–	0.261 J	0.292 J
Arsenic	mg/kg	4.30	3.65	–	–	–	5.54	–	5.22	–	3.62	4.50
Barium	mg/kg	72.8	60.3	–	–	–	119	–	63.2	–	49.8	64.3
Beryllium	mg/kg	0.706	0.588	–	–	–	0.637	–	0.578	–	0.509	0.675
Boron	mg/kg	2.40 J	2.08 J	–	–	–	4.34 J	–	5.36	–	5.91	7.75
Cadmium	mg/kg	0.604	0.620	–	–	–	0.419	–	0.355	–	0.300	0.524
Calcium	mg/kg	5750	6120	–	–	–	24900	–	51200	–	11200	10700
Chromium	mg/kg	11.7	10.4	–	–	–	11.7	–	10.0	–	10.3	13.6
Cobalt	mg/kg	7.44	6.87	–	–	–	7.04	–	5.68	–	5.53	7.12
Copper	mg/kg	11.2	9.89	–	–	–	10.4	–	8.79	–	8.64	11.9
Lead	mg/kg	14.4	12.3	–	–	–	20.7	–	14.1	–	19.5	20.5
Lithium	mg/kg	7.98 J	6.65 J	–	–	–	6.06 J	–	5.33 J	–	5.25 J	6.73 J
Mercury	mg/kg	<0.0513	0.0602 J	–	–	–	0.0619 J	–	<0.0426	–	<0.0415	0.0604 J
Molybdenum	mg/kg	0.900 U*	0.852 U*	–	–	–	1.63	–	2.32	–	1.02	1.10
Nickel	mg/kg	11.8	10.4	–	–	–	12.5	–	8.98	–	8.92	11.6
Selenium	mg/kg	0.492	0.468	–	–	–	0.518	–	0.437	–	0.350	0.443
Silver	mg/kg	0.0515 J	0.0674 J	–	–	–	0.111	–	0.0868	–	0.0661 J	0.146
Strontium	mg/kg	20.8	20.2	–	–	–	53.6	–	44.9	–	26.0	28.6
Thallium	mg/kg	0.153	0.134	–	–	–	0.237	–	0.156	–	0.121	0.153
Vanadium	mg/kg	13.9	11.6	–	–	–	11.1	–	11.9	–	9.20	11.8
Zinc	mg/kg	58.7	58.2	–	–	–	56.4	–	44.7	–	47.4	72.7
Anions												
Chloride	mg/kg	12.1 UR	10.6 UR	–	–	–	9.82 UR	–	9.87 UR	–	9.77 UR	9.71 UR
Fluoride	mg/kg	1.42 U*	1.39 U*	–	–	–	1.40 U*	–	1.30 U*	–	1.12 UR	1.57 U*
Sulfate	mg/kg	106 J	116 J	–	–	–	36.8 J	–	54.2 J	–	20.4 U*	10.6 U*
Radiological												
Radium-226	pCi/g	1.05 +/-(0.227)	1.32 +/-(0.289)	–	–	–	0.873 +/-(0.198) J	–	1.26 +/-(0.276) J	–	1.04 +/-(0.252) J	0.864 +/-(0.239) J
Radium-228	pCi/g	1.06 +/-(0.266)	1.16 +/-(0.319)	–	–	–	0.520 +/-(0.171)	–	0.726 +/-(0.370)	–	0.327 +/-(0.213) U	0.204 +/-(0.307) U
Radium-226+228	pCi/g	2.11 +/-(0.350)	2.48 +/-(0.430)	–	–	–	1.39 +/-(0.262) J	–	1.99 +/-(0.462) J	–	1.37 +/-(0.330) J	1.07 +/-(0.389) J
General Chemistry												
pH (lab)	SU	6.9	6.8	–	–	–	7.1	–	7.1	–	7.2	7.0

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-DC01-RB		SED-WC01-LB		SED-WC01-CC	SED-WC01-RB			SED-WC02-LB		
Sample Date		09-Oct 2018	09-Oct 2018	18-Oct 2018	18-Oct 2018	18-Oct 2018	18-Oct 2018			17-Oct 2018		
Sample ID		CUF-SED-DC01-CORRB-2.2/5.6-20181009	CUF-SED-DC01-CORRB-5.6/6.0-20181009	CUF-SED-WC01-CORLB-0.0/0.5-20181018	CUF-SED-WC01-CORLB-0.5/3.8-20181018	CUF-SED-WC01-CORCC-2.2/3.0-20181018	CUF-SED-WC01-CORRB-0.0/0.5-20181018	CUF-SED-WC01-CORRB-0.5/2.4-20181018	CUF-SED-WC01-CORRB-2.4/4.5-20181018	CUF-SED-WC02-CORLB-0.0/0.5-20181017	CUF-SED-WC02-CORLB-0.5/2.5-20181017	CUF-SED-WC02-CORLB-2.5/4.6-20181017
Sample Depth (ft)		2.2 – 5.6	5.6 – 6.0	0.0 – 0.5	0.5 – 3.8	2.2 – 3.0	0.0 – 0.5	0.5 – 2.4	2.4 – 4.5	0.0 – 0.5	0.5 – 2.5	2.5 – 4.6
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	N
Level of Review[2, 3]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM												
% ASH	%	1	1	2	1	2	1	<1	1	2	<1	3
Total Metals												
Antimony	mg/kg	–	–	0.198 J	–	–	0.133 J	–	–	0.154 J	–	–
Arsenic	mg/kg	–	–	3.29 J	–	–	2.82 J	–	–	2.56 J	–	–
Barium	mg/kg	–	–	56.3	–	–	19.8	–	–	30.8	–	–
Beryllium	mg/kg	–	–	0.588	–	–	0.465	–	–	0.454	–	–
Boron	mg/kg	–	–	1.12 J	–	–	0.663 J	–	–	1.01 J	–	–
Cadmium	mg/kg	–	–	0.390	–	–	0.259	–	–	0.409	–	–
Calcium	mg/kg	–	–	1750	–	–	667	–	–	2740	–	–
Chromium	mg/kg	–	–	16.5 J	–	–	30.9 J	–	–	18.9 J	–	–
Cobalt	mg/kg	–	–	9.96	–	–	6.50	–	–	5.87	–	–
Copper	mg/kg	–	–	8.85	–	–	2.87	–	–	5.14	–	–
Lead	mg/kg	–	–	13.7	–	–	5.02	–	–	7.20	–	–
Lithium	mg/kg	–	–	3.44 J	–	–	1.12 J	–	–	2.56 J	–	–
Mercury	mg/kg	–	–	0.0641 J	–	–	<0.0429	–	–	<0.0419	–	–
Molybdenum	mg/kg	–	–	0.610	–	–	0.423	–	–	0.444	–	–
Nickel	mg/kg	–	–	12.1	–	–	8.58	–	–	9.03	–	–
Selenium	mg/kg	–	–	0.430	–	–	0.164 J	–	–	0.294 J	–	–
Silver	mg/kg	–	–	0.0677	–	–	0.141	–	–	0.0997	–	–
Strontium	mg/kg	–	–	6.92	–	–	2.56	–	–	7.15	–	–
Thallium	mg/kg	–	–	0.136	–	–	0.0606 J	–	–	0.0973	–	–
Vanadium	mg/kg	–	–	22.8	–	–	15.4	–	–	14.3	–	–
Zinc	mg/kg	–	–	49.0 J	–	–	32.3 J	–	–	36.2 J	–	–
Anions												
Chloride	mg/kg	–	–	<9.43	–	–	<10.3	–	–	<9.79	–	–
Fluoride	mg/kg	–	–	1.08 UJ	–	–	1.17 UJ	–	–	1.18 U*	–	–
Sulfate	mg/kg	–	–	12.3 U*	–	–	43.1	–	–	15.6 U*	–	–
Radiological												
Radium-226	pCi/g	–	–	1.12 +/-(0.330) J	–	–	0.401 +/-(0.177) J	–	–	0.799 +/-(0.223) J	–	–
Radium-228	pCi/g	–	–	1.12 +/-(0.458)	–	–	0.122 +/-(0.258) U	–	–	0.515 +/-(0.255)	–	–
Radium-226+228	pCi/g	–	–	2.24 +/-(0.565) J	–	–	0.523 +/-(0.313) J	–	–	1.31 +/-(0.339) J	–	–
General Chemistry												
pH (lab)	SU	–	–	7.1	–	–	7.3	–	–	7.1	–	–

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-WC02-CC		SED-WC02-RB		SED-WC03-LB			SED-WC03-CC			
Sample Date		17-Oct 2018		17-Oct 2018		17-Oct 2018			17-Oct 2018			
Sample ID		CUF-SED-WC02-CORCC-0.0/0.5-20181017	CUF-SED-WC02-DUP01-20181017	CUF-SED-WC02-CORRB-0.0/0.5-20181017	CUF-SED-WC02-CORRB-0.5/2.3-20181017	CUF-SED-WC03-CORLB-0.0/0.5-20181017	CUF-SED-WC03-CORLB-0.5/3.3-20181017	CUF-SED-WC03-CORLB-3.3/4.7-20181017	CUF-SED-WC03-CORCC-0.0/0.5-20181017	CUF-SED-WC03-CORCC-1.0/2.1-20181017	CUF-SED-WC03-CORCC-2.1/3.2-20181017	CUF-SED-WC03-CORCC-3.2/5.4-20181017
Sample Depth (ft)		0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.5 – 2.3	0.0 – 0.5	0.5 – 3.3	3.3 – 4.7	0.0 – 0.5	1.0 – 2.1	2.1 – 3.2	3.2 – 5.4
Sample Type[1]		N	FD	N	N	N	N	N	N	N	N	N
Level of Review[2, 3]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM												
% ASH	%	1	1	<1	1	1	1	1	<1	2	<1	1
Total Metals												
Antimony	mg/kg	0.158 J	0.170 J	0.190 J	–	0.159 J	–	–	0.192 J	–	–	–
Arsenic	mg/kg	2.53 J	2.93 J	3.05 J	–	2.68 J	–	–	3.36 J	–	–	–
Barium	mg/kg	30.2	35.6	47.1	–	34.7	–	–	42.5	–	–	–
Beryllium	mg/kg	0.455	0.527	0.569	–	0.446	–	–	0.595	–	–	–
Boron	mg/kg	1.25 J	1.44 J	1.45 J	–	1.32 J	–	–	1.59 J	–	–	–
Cadmium	mg/kg	0.406	0.465	0.433	–	0.425	–	–	0.528	–	–	–
Calcium	mg/kg	3950	4460	4640	–	4160	–	–	4780	–	–	–
Chromium	mg/kg	17.6 J	21.4 J	15.7 J	–	18.5 J	–	–	20.7 J	–	–	–
Cobalt	mg/kg	6.64	7.80	8.70	–	7.45	–	–	8.54	–	–	–
Copper	mg/kg	5.72	6.59	11.5	–	6.52	–	–	7.92	–	–	–
Lead	mg/kg	7.03	8.65	12.6	–	8.22	–	–	10.2	–	–	–
Lithium	mg/kg	2.82 J	3.36 J	4.13 J	–	3.01 J	–	–	3.62 J	–	–	–
Mercury	mg/kg	<0.0475	0.0491 J	0.0621 J	–	<0.0453	–	–	0.0487 J	–	–	–
Molybdenum	mg/kg	0.422	0.500	0.507	–	0.435	–	–	0.518	–	–	–
Nickel	mg/kg	9.70	11.9	12.5	–	10.7	–	–	12.6	–	–	–
Selenium	mg/kg	0.307 J	0.400	0.486	–	0.371	–	–	0.364 J	–	–	–
Silver	mg/kg	0.0801	0.106	0.133	–	0.0851	–	–	0.0978	–	–	–
Strontium	mg/kg	8.74	10.9	10.9	–	9.30	–	–	10.7	–	–	–
Thallium	mg/kg	0.104	0.123	0.141	–	0.116	–	–	0.131	–	–	–
Vanadium	mg/kg	15.1	18.0	20.3	–	16.7	–	–	20.2	–	–	–
Zinc	mg/kg	38.8 J	46.5 J	51.4 J	–	43.6 J	–	–	51.2 J	–	–	–
Anions												
Chloride	mg/kg	<11.5	<11.8	<10.7	–	<10.7	–	–	22.5 U*	–	–	–
Fluoride	mg/kg	1.40 U*	1.37 U*	1.58 U*	–	1.22 U*	–	–	1.36 U*	–	–	–
Sulfate	mg/kg	15.1 U*	24.6 U*	37.8	–	14.8 U*	–	–	21.5 U*	–	–	–
Radiological												
Radium-226	pCi/g	0.802 +/-(0.234) J	0.911 +/-(0.303) J	1.27 +/-(0.292) J	–	0.731 +/-(0.237) J	–	–	0.694 +/-(0.229) J	–	–	–
Radium-228	pCi/g	0.536 +/-(0.236)	0.504 +/-(0.431) U	1.01 +/-(0.252)	–	0.653 +/-(0.308)	–	–	0.560 +/-(0.357)	–	–	–
Radium-226+228	pCi/g	1.34 +/-(0.332) J	1.42 +/-(0.527) J	2.28 +/-(0.386) J	–	1.38 +/-(0.389) J	–	–	1.25 +/-(0.424) J	–	–	–
General Chemistry												
pH (lab)	SU	7.1	7.2	7.3	–	7.2	–	–	7.2	–	–	–

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-WC03-RB		SED-WC04-LB		SED-WC04-CC		SED-WC04-RB			SED-WC05-LB
Sample Date		17-Oct 2018		16-Oct 2018		16-Oct 2018	16-Oct 2018	16-Oct 2018			16-Oct 2018
Sample ID		CUF-SED-WC03-CORRB-0.0/0.5-20181017	CUF-SED-WC03-CORRB-0.5/3.8-20181017	CUF-SED-WC04-CORLB-0.0/0.5-20181016	CUF-SED-WC04-CORLB-0.5/2.4-20181016	CUF-SED-WC04-CORCC-0.0/0.5-20181016	CUF-SED-WC04-CORCC-0.5/1.9-20181016	CUF-SED-WC04-CORRB-0.0/0.5-20181016	CUF-SED-WC04-CORRB-0.5/2.0-20181016	CUF-SED-WC04-CORRB-2.0/2.9-20181016	CUF-SED-WC05-CORLB-0.0/0.5-20181016
Sample Depth (ft)		0.0 – 0.5	0.5 – 3.8	0.0 – 0.5	0.5 – 2.4	0.0 – 0.5	0.5 – 1.9	0.0 – 0.5	0.5 – 2.0	2.0 – 2.9	0.0 – 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	N
Level of Review[2, 3]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM											
% ASH	%	2	<1	<1	<1	3	<1	<1	4	2	<1
Total Metals											
Antimony	mg/kg	0.215 J	–	0.216 J	–	0.230 J	–	0.199 J	–	–	0.247 J
Arsenic	mg/kg	3.78 J	–	3.69 J	–	4.21 J	–	3.89 J	–	–	3.58 J
Barium	mg/kg	57.8	–	63.1	–	75.1	–	58.8	–	–	63.2
Beryllium	mg/kg	0.684	–	0.805	–	0.776	–	0.750	–	–	0.761
Boron	mg/kg	2.37 J	–	3.30 J	–	18.6	–	3.58 J	–	–	3.62 J
Cadmium	mg/kg	0.533	–	0.665	–	0.520	–	0.707	–	–	0.727
Calcium	mg/kg	5950	–	14500	–	4680	–	10300	–	–	10200
Chromium	mg/kg	17.8 J	–	18.9 J	–	16.7 J	–	19.5 J	–	–	18.4 J
Cobalt	mg/kg	9.64	–	11.2	–	11.4	–	9.68	–	–	10.7
Copper	mg/kg	9.59	–	11.7	–	9.83	–	10.7	–	–	11.4
Lead	mg/kg	11.8	–	13.5	–	13.4	–	12.2	–	–	13.2
Lithium	mg/kg	4.58 J	–	5.63 J	–	5.70 J	–	5.68 J	–	–	5.69 J
Mercury	mg/kg	0.0599 J	–	0.0713 J	–	0.0619 J	–	0.0731 J	–	–	0.0696 J
Molybdenum	mg/kg	0.584	–	0.553	–	0.664	–	0.591	–	–	0.612
Nickel	mg/kg	14.1	–	17.0	–	15.1	–	15.8	–	–	16.3
Selenium	mg/kg	0.587	–	0.535	–	0.434	–	0.475	–	–	0.564
Silver	mg/kg	0.0611 J	–	0.0668 J	–	0.0588 J	–	0.0677 J	–	–	0.0645 J
Strontium	mg/kg	12.7	–	21.5	–	11.9	–	18.8	–	–	17.6
Thallium	mg/kg	0.154	–	0.183	–	0.189	–	0.181	–	–	0.181
Vanadium	mg/kg	23.1	–	25.4	–	25.8	–	24.1	–	–	24.7
Zinc	mg/kg	57.4 J	–	72.6 J	–	55.2 J	–	67.0 J	–	–	71.2 J
Anions											
Chloride	mg/kg	90.5	–	17.9 U*	–	395	–	63.6	–	–	<11.7
Fluoride	mg/kg	1.59 U*	–	1.59 U*	–	1.91 U*	–	1.82 U*	–	–	1.57 U*
Sulfate	mg/kg	60.1	–	51.1	–	568	–	120	–	–	63.4
Radiological											
Radium-226	pCi/g	0.980 +/-(0.318) J	–	1.13 +/-(0.324) J	–	1.21 +/-(0.256)	–	1.19 +/-(0.361) J	–	–	1.28 +/-(0.292) J
Radium-228	pCi/g	0.643 +/-(0.359) U	–	1.08 +/-(0.514)	–	0.960 +/-(0.279)	–	1.65 +/-(0.417)	–	–	1.22 +/-(0.349)
Radium-226+228	pCi/g	1.62 +/-(0.480) J	–	2.21 +/-(0.608) J	–	2.17 +/-(0.379)	–	2.84 +/-(0.552) J	–	–	2.50 +/-(0.455) J
General Chemistry											
pH (lab)	SU	7.0	–	7.3	–	7.1	–	7.1	–	–	7.4

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-WC05-LB			SED-WC05-CC	SED-WC05-RB			SED-WC06-LB	SED-WC06-CC		
Sample Date		16-Oct 2018			16-Oct 2018	16-Oct 2018			16-Oct 2018	16-Oct 2018		
Sample ID		CUF-SED-WC05-CORLB-0.5/1.5-20181016	CUF-SED-WC05-DUP01-20181016	CUF-SED-WC05-CORLB-1.5/2.8-20181016	CUF-SED-WC05-CORCC-0.0/0.5-20181016	CUF-SED-WC05-CORRB-0.0/0.5-20181016	CUF-SED-WC05-CORRB-0.5/0.9-20181016	CUF-SED-WC05-CORRB-0.9/4.6-20181016	CUF-SED-WC06-CORLB-0.0/0.5-20181016	CUF-SED-WC06-CORCC-0.0/0.5-20181016	CUF-SED-WC06-CORCC-0.5/1.3-20181016	CUF-SED-WC06-CORCC-1.3/2.7-20181016
Sample Depth (ft)		0.5 – 1.5	0.5 – 1.5	1.5 – 2.8	0.0 – 0.5	0.0 – 0.5	0.5 – 0.9	0.9 – 4.6	0.0 – 0.5	0.0 – 0.5	0.5 – 1.3	1.3 – 2.7
Sample Type[1]		N	FD	N	N	N	N	N	N	N	N	N
Level of Review[2, 3]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM												
% ASH	%	<1	<1	2	<1	3	2	<1	<1	<1	2	<1
Total Metals												
Antimony	mg/kg	–	0.239 J	–	0.203 J	0.239 J	–	–	0.225 J	0.185 J	–	–
Arsenic	mg/kg	–	4.16 J	–	2.80	3.19	–	–	2.67 J	2.33	–	–
Barium	mg/kg	–	61.5	–	50.9	49.4	–	–	73.9 J	57.5	–	–
Beryllium	mg/kg	–	0.806	–	0.667	0.698	–	–	0.806 J	0.695	–	–
Boron	mg/kg	–	3.16 J	–	5.62 J	2.91 J	–	–	2.86 J	2.12 J	–	–
Cadmium	mg/kg	–	0.674	–	0.736	0.589	–	–	0.566 J	0.542	–	–
Calcium	mg/kg	–	6400	–	9530	7530	–	–	3380 J	8670	–	–
Chromium	mg/kg	–	17.8 J	–	11.7	13.0	–	–	12.9 J	10.9	–	–
Cobalt	mg/kg	–	10.4	–	6.82	7.71	–	–	8.84 J	7.70	–	–
Copper	mg/kg	–	11.6	–	9.26	8.27	–	–	9.42 J	7.80	–	–
Lead	mg/kg	–	14.1	–	11.6	12.2	–	–	13.7 J	12.3	–	–
Lithium	mg/kg	–	5.44 J	–	4.30 J	4.08 J	–	–	6.52 J	4.97 J	–	–
Mercury	mg/kg	–	0.0798 J	–	0.0633 J	0.0665 J	–	–	0.0737 J	0.0675 J	–	–
Molybdenum	mg/kg	–	0.579	–	0.353 J	0.458	–	–	0.554 J	0.360 J	–	–
Nickel	mg/kg	–	16.3	–	9.73	10.2	–	–	11.3 J	9.47	–	–
Selenium	mg/kg	–	0.652	–	0.529	0.547	–	–	0.540 J	0.468	–	–
Silver	mg/kg	–	0.0721 J	–	0.0499 J	0.0559 J	–	–	0.0506 J	0.0583 J	–	–
Strontium	mg/kg	–	13.5	–	14.2	12.7	–	–	11.9 J	14.2	–	–
Thallium	mg/kg	–	0.177	–	0.142	0.156	–	–	0.202 J	0.176	–	–
Vanadium	mg/kg	–	24.3	–	14.2	14.7	–	–	17.2 J	14.4	–	–
Zinc	mg/kg	–	69.1 J	–	46.6	47.0	–	–	51.0 J	44.4	–	–
Anions												
Chloride	mg/kg	–	13.0 U*	–	19.5 U*	<12.6	–	–	14.3 UJ	<11.0	–	–
Fluoride	mg/kg	–	1.88 U*	–	1.47 U*	1.64 U*	–	–	1.63 UJ	1.43 U*	–	–
Sulfate	mg/kg	–	25.9 U*	–	61.3	66.7	–	–	32.6 J	80.7	–	–
Radiological												
Radium-226	pCi/g	–	1.23 +/-(0.277) J	–	0.923 +/-(0.346) J	0.745 +/-(0.265) J	–	–	1.06 +/-(0.346) J	1.18 +/-(0.320) J	–	–
Radium-228	pCi/g	–	1.52 +/-(0.324)	–	1.36 +/-(0.623)	1.10 +/-(0.336)	–	–	0.932 +/-(0.480)	1.32 +/-(0.358)	–	–
Radium-226+228	pCi/g	–	2.75 +/-(0.426) J	–	2.28 +/-(0.713) J	1.85 +/-(0.428) J	–	–	1.99 +/-(0.592) J	2.50 +/-(0.480) J	–	–
General Chemistry												
pH (lab)	SU	–	7.6	–	7.7	7.0	–	–	7.1	7.6	–	–

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-WC06-RB	SED-WC07-LB	SED-WC07-CC	SED-WC07-RB	SED-WC08-LB	SED-WC08-CC	SED-WC08-RB	SED-WC09-CC		SED-WC09-RB	SED-WC10-LB
Sample Date		16-Oct 2018	11-Oct 2018	11-Oct 2018	11-Oct 2018	11-Oct 2018	11-Oct 2018	11-Oct 2018	11-Oct 2018	05-Dec 2019	11-Oct 2018	11-Oct 2018
Sample ID		CUF-SED-WC06-CORRB-0.0/0.5-20181016	CUF-SED-WC07-CORLB-0.0/0.5-20181011	CUF-SED-WC07-CORCC-0.0/0.5-20181011	CUF-SED-WC07-CORRB-0.0/0.5-20181011	CUF-SED-WC08-CORLB-0.0/0.5-20181011	CUF-SED-WC08-CORCC-0.0/0.5-20181011	CUF-SED-WC08-CORRB-0.0/0.5-20181011	CUF-SED-WC09-CORCC-0.0/0.5-20181011	CUF-SED-WC09-CORCC-0.0/0.5-20191205	CUF-SED-WC09-CORRB-0.0/0.5-20181011	CUF-SED-WC10-CORLB-0.0/0.5-20181011
Sample Depth (ft)		0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	N
Level of Review[2, 3]	Units	Final-Verified	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Final-Verified	Validated	Validated
PLM												
% ASH	%	3	<1	2	<1	<1	<1	<1	<1	–	<1	<1
Total Metals												
Antimony	mg/kg	0.249 J	0.277 J	0.273 J	0.262 J	0.274 J	0.445 J	0.293 J	1.48 J	0.238 J	0.271 J	0.235 J
Arsenic	mg/kg	3.62	4.25 J	4.41 J	4.14 J	5.56 J	9.10 J	7.61 J	29.7 J	4.69 J	4.22 J	3.61
Barium	mg/kg	68.3	82.8 J	84.2 J	77.7 J	97.7 J	96.3 J	101 J	101 J	70.2 J	76.9 J	66.8
Beryllium	mg/kg	0.927	0.992 J	0.997 J	0.927 J	1.05 J	1.36 J	1.07 J	1.52 J	0.730 J	0.869 J	0.770
Boron	mg/kg	2.73 J	3.79 J	3.81 J	4.55 J	4.35 J	9.63 J	7.99 J	12.8 J	8.95 J	6.23 J	3.08 J
Cadmium	mg/kg	0.597	0.649 J	0.621 J	0.631 J	0.587 J	0.702 J	0.676 J	0.541 J	0.479 J	0.623 J	0.557
Calcium	mg/kg	6980	12700 J	11900 J	11700 J	14300 J	12700 J	13600 J	17700 J	10200 J	11900 J	15200
Chromium	mg/kg	13.4	16.2 J	16.0 J	14.8 J	17.4 J	24.4 J	17.5 J	29.6 J	11.9 J	14.4 J	12.3
Cobalt	mg/kg	9.63	10.4 J	9.81 J	9.57 J	10.4 J	14.3 J	11.7 J	14.2 J	7.95 J	9.41 J	7.63
Copper	mg/kg	9.11	12.2 J	11.5 J	11.0 J	13.8 J	14.0 J	13.9 J	16.3 J	7.99 J	10.5 J	9.62
Lead	mg/kg	14.7	15.6 J	15.5 J	14.8 J	16.4 J	20.1 J	17.9 J	29.0 J	11.2 J	14.6 J	12.4
Lithium	mg/kg	6.81 J	7.71 J	7.99 J	6.87 J	8.93 J	8.46 J	8.74 J	10.0 J	5.47 J	7.35 J	6.74 J
Mercury	mg/kg	0.0541 J	0.0816 J	0.0782 J	0.0782 J	0.0768 J	0.0715 UJ	0.0684 UJ	0.0634 UJ	0.0661 J	0.0704 UJ	0.0730 J
Molybdenum	mg/kg	0.528	0.682 J	0.622 J	0.602 J	0.652 J	1.32 J	0.881 J	29.9 J	0.810 J	0.827 J	0.652 J
Nickel	mg/kg	11.9	14.6 J	13.8 J	12.7 J	15.0 J	18.5 J	16.0 J	16.7 J	11.2 J	13.2 J	11.0
Selenium	mg/kg	0.581	0.641 J	0.613 J	0.609 J	0.683 J	1.41 J	0.598 J	1.62 J	1.81 J	0.657 J	0.558
Silver	mg/kg	0.0397 J	0.0549 J	0.0535 J	0.0612 J	0.0561 J	0.0618 J	0.0576 J	0.0526 J	0.0399 J	0.0529 J	0.0370 J
Strontium	mg/kg	13.3	25.1 J	20.9 J	20.5 J	25.4 J	22.2 J	29.6 J	43.0 J	17.6 J	18.6 J	20.6
Thallium	mg/kg	0.192	0.208 J	0.206 J	0.208 J	0.222 J	0.227 J	0.225 J	0.278 J	0.197 J	0.222 J	0.213
Vanadium	mg/kg	19.2	20.2 J	20.6 J	18.9 J	22.0 J	27.0 J	22.7 J	50.9 J	16.6 J	19.6 J	17.0
Zinc	mg/kg	51.9	64.2 J	63.1 J	58.5 J	66.2 J	79.6 J	68.8 J	65.2 J	50.8 J	59.1 J	52.3
Anions												
Chloride	mg/kg	<12.6	15.2 UR	15.4 UR	27.9 U*	15.6 UR	72.6 J	41.6 U*	78.0 J	103 J	89.5 J	<13.5
Fluoride	mg/kg	1.73 U*	1.79 U*	1.75 UR	1.86 UR	2.00 U*	1.92 UR	1.87 UR	1.69 UJ	1.59 UJ	1.89 UJ	2.49 U*
Sulfate	mg/kg	97.2	212 J	211 J	205 J	249 J	309 J	265 J	67.2 J	71.1 J	87.6 J	579 J
Radiological												
Radium-226	pCi/g	1.25 +/-(0.379) J	1.27 +/-(0.387)	1.46 +/-(0.316)	1.96 +/-(0.452)	1.68 +/-(0.339)	2.45 +/-(0.478) J	1.68 +/-(0.342) J	2.01 +/-(0.430) J	–	1.56 +/-(0.329) J	1.81 +/-(0.378) J
Radium-228	pCi/g	2.03 +/-(0.484)	1.42 +/-(0.437)	1.63 +/-(0.399)	1.54 +/-(0.396)	1.35 +/-(0.421)	1.70 +/-(0.521)	1.48 +/-(0.433)	1.35 +/-(0.298)	–	1.34 +/-(0.341)	1.65 +/-(0.448)
Radium-226+228	pCi/g	3.28 +/-(0.615) J	2.69 +/-(0.584)	3.09 +/-(0.509)	3.50 +/-(0.601)	3.03 +/-(0.541)	4.15 +/-(0.707) J	3.16 +/-(0.552) J	3.36 +/-(0.523) J	–	2.90 +/-(0.474) J	3.46 +/-(0.586) J
General Chemistry												
pH (lab)	SU	7.2	7.1	7.0	7.0	7.0	6.9	7.1	6.9	7.3	6.7	6.8

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-WC10-LB		SED-WC10-CC		SED-WC10-RB	SED-UT01-LB	SED-UT01-CC	SED-UT01-RB		SED-UT01.5-CC	SED-UT02-CC
Sample Date		11-Oct 2018		11-Oct 2018		11-Oct 2018	21-Aug 2019	21-Aug 2019	21-Aug 2019		21-Aug 2019	21-Aug 2019
Sample ID		CUF-SED-WC10-CORLB-0.5/3.0-20181011	CUF-SED-WC10-CORLB-3.0/3.5-20181011	CUF-SED-WC10-CORCC-0.0/0.5-20181011	CUF-SED-WC10-CORCC-0.5/1.9-20181011	CUF-SED-WC10-CORRB-0.0/0.5-20181011	CUF-SED-UT01-CORLB-0.0/0.5-20190821	CUF-SED-UT01-CORCC-0.0/0.5-20190821	CUF-SED-UT01-CORRB-0.0/0.5-20190821	CUF-SED-UT01-DUP01-20190821	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	CUF-SED-UT02-CORCC-0.0/0.5-20190821
Sample Depth (ft)		0.5 – 3.0	3.0 – 3.5	0.0 – 0.5	0.5 – 1.9	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	FD	N	N
Level of Review[2, 3]	Units	Final-Verified	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM												
% ASH	%	<1	1	1	<1	<1	27	29	21	29	30	41
Total Metals												
Antimony	mg/kg	–	–	0.285 J	–	0.282 J	0.296 J	0.243 J	0.247 J	0.284 J	0.279 J	0.389 J
Arsenic	mg/kg	–	–	5.43	–	4.09	7.26 J	5.97 J	8.40 J	8.75 J	8.36 J	12.3 J
Barium	mg/kg	–	–	69.4	–	71.5	140 J	188 J	188 J	190 J	183 J	448 J
Beryllium	mg/kg	–	–	0.884	–	0.984	0.952 J	1.06 J	1.10 J	1.05 J	0.993 J	0.972 J
Boron	mg/kg	–	–	3.88 J	–	3.40 J	37.4 J	54.8 J	81.9 J	91.0 J	71.4 J	60.6 J
Cadmium	mg/kg	–	–	0.561	–	0.702	0.328 J	0.308 J	0.301 J	0.300 J	0.363 J	0.418 J
Calcium	mg/kg	–	–	16000	–	13400	82400 J	59500 J	39600 J	30900 J	107000 J	42500 J
Chromium	mg/kg	–	–	14.9	–	15.2	14.1 J	13.3 J	14.8 J	13.5 J	13.6 J	12.0 J
Cobalt	mg/kg	–	–	12.0	–	11.5	9.04 J	9.43 J	13.1 J	13.4 J	12.3 J	16.3 J
Copper	mg/kg	–	–	10.1	–	11.3	13.6 J	12.4 J	12.3 J	10.5 J	12.8 J	15.6 J
Lead	mg/kg	–	–	16.0	–	18.0	15.7 J	17.9 J	19.7 J	19.3 J	16.2 J	15.1 J
Lithium	mg/kg	–	–	7.10 J	–	7.56 J	10.2 J	8.32 J	7.19 J	6.08 J	9.19 J	7.08 J
Mercury	mg/kg	–	–	0.0649 J	–	0.0586 J	0.0681 J	0.0535 J	0.0490 J	0.0417 J	0.0682 J	0.0466 J
Molybdenum	mg/kg	–	–	1.56	–	0.930 J	72.5 J	73.6 J	173 J	208 J	209 J	839 J
Nickel	mg/kg	–	–	12.9	–	14.2	18.2 J	15.4 J	14.5 J	12.2 J	17.2 J	12.7 J
Selenium	mg/kg	–	–	0.632	–	0.753	1.75 J	1.57 J	1.65 J	1.33 J	2.51 J	2.56 J
Silver	mg/kg	–	–	0.0485 J	–	0.0520 J	0.0457 J	0.0451 J	0.0570 J	0.0383 J	0.0496 UJ	0.0438 J
Strontium	mg/kg	–	–	24.9	–	21.4	116 J	78.0 J	58.1 J	44.3 J	130 J	53.0 J
Thallium	mg/kg	–	–	0.243	–	0.257	0.410 J	0.390 J	0.378 J	0.321 J	0.460 J	0.432 J
Vanadium	mg/kg	–	–	18.1	–	20.0	23.7 J	24.9 J	26.1 J	25.4 J	26.9 J	33.9 J
Zinc	mg/kg	–	–	52.7	–	57.4	76.9 J	54.5 J	51.0 J	43.7 J	63.3 J	47.5 J
Anions												
Chloride	mg/kg	–	–	<12.6	–	<13.2	107 J	202 J	622 J	647 J	266 J	254 J
Fluoride	mg/kg	–	–	<1.44	–	<1.51	4.84 J	4.63 J	3.75 J	3.91 J	5.58 J	4.71 J
Sulfate	mg/kg	–	–	397 J	–	273 J	1440 J	2460 J	2150 J	3340 J	2730 J	2240 J
Radiological												
Radium-226	pCi/g	–	–	1.54 +/-(0.343) J	–	1.53 +/-(0.367) J	1.25 +/-(0.350)	1.58 +/-(0.414)	1.40 +/-(0.331)	1.08 +/-(0.317)	0.632 +/-(0.383)	1.08 +/-(0.435)
Radium-228	pCi/g	–	–	0.532 +/-(0.183) U	–	1.03 +/-(0.557)	1.06 +/-(0.341)	1.54 +/-(0.515)	1.02 +/-(0.479)	1.25 +/-(0.307)	0.597 +/-(0.727) U	0.840 +/-(0.579) U
Radium-226+228	pCi/g	–	–	2.07 +/-(0.389) J	–	2.56 +/-(0.667) J	2.31 +/-(0.489)	3.12 +/-(0.661)	2.42 +/-(0.582)	2.33 +/-(0.441)	1.23 +/-(0.822) J	1.92 +/-(0.724) J
General Chemistry												
pH (lab)	SU	–	–	6.9	–	7.1	7.4	7.4	7.4	7.2	7.3	7.2

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-UT02-RB		SED-UT03-LB	SED-UT03-CC		SED-UT04-LB			SED-UT04-CC		SED-UT04-RB
Sample Date		21-Aug 2019		21-Aug 2019	21-Aug 2019		17-Oct 2018			17-Oct 2018		17-Oct 2018
Sample ID		CUF-SED-UT02-CORRB-0.0/0.5-20190821	CUF-SED-UT02-CORRB-0.5/2.0-20190821	CUF-SED-UT03-CORLB-0.0/0.5-20190821	CUF-SED-UT03-CORCC-0.0/0.5-20190821	CUF-SED-UT03-CORCC-0.5/1.0-20190821	CUF-SED-UT04-CORLB-0.0/0.5-20181017	CUF-SED-UT04-CORLB-0.5/2.7-20181017	CUF-SED-UT04-CORLB-2.7/3.5-20181017	CUF-SED-UT04-CORCC-0.0/0.5-20181017	CUF-SED-UT04-CORCC-0.5/3.2-20181017	CUF-SED-UT04-CORRB-0.0/0.5-20181017
Sample Depth (ft)		0.0 – 0.5	0.5 – 2.0	0.0 – 0.5	0.0 – 0.5	0.5 – 1.0	0.0 – 0.5	0.5 – 2.7	2.7 – 3.5	0.0 – 0.5	0.5 – 3.2	0.0 – 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	N
Level of Review[2, 3]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM												
% ASH	%	29	10	22	22	32	1	<1	<1	2	<1	2
Total Metals												
Antimony	mg/kg	0.249	0.260 J	0.277 J	0.295	0.174	0.156 J	–	–	0.118 J	–	0.209 J
Arsenic	mg/kg	5.56	7.99 J	3.01 J	6.28	4.21	3.56 J	–	–	5.14 J	–	5.78 J
Barium	mg/kg	119	195 J	95.0 J	43.3	46.8	54.1 J	–	–	61.1 J	–	54.0
Beryllium	mg/kg	1.12	1.04 J	0.765 J	0.984	0.763	0.655 J	–	–	0.718 J	–	0.699
Boron	mg/kg	47.0	66.6 J	204 J	20.3	15.6	17.1 J	–	–	14.6 J	–	17.5
Cadmium	mg/kg	0.241	0.392 J	0.139 J	0.168	0.186	0.322 J	–	–	0.539 J	–	0.308
Calcium	mg/kg	45600	36100 J	44600 J	61100	96200	13200 J	–	–	17800 J	–	15100
Chromium	mg/kg	13.7	13.9 J	11.0 J	21.8	10.2	15.2 J	–	–	13.6 J	–	16.5 J
Cobalt	mg/kg	10.4	10.2 J	7.10 J	8.44	7.92	7.57 J	–	–	13.0 J	–	7.96
Copper	mg/kg	11.0	11.0 J	9.79 J	9.06	6.98	10.6 J	–	–	11.7 J	–	11.9
Lead	mg/kg	19.5	12.7 J	12.5 J	13.9	11.9	8.99 J	–	–	10.8 J	–	10.4
Lithium	mg/kg	6.97	8.27 J	9.15 J	5.14	5.99	8.35 J	–	–	6.14 J	–	7.83 J
Mercury	mg/kg	0.0320	0.0544 J	0.0413 J	0.0225 J	0.0293 J	0.0596 UJ	–	–	0.0602 UJ	–	<0.0600
Molybdenum	mg/kg	170	237 J	78.8 J	54.3	23.8	8.20 J	–	–	13.2 J	–	16.1
Nickel	mg/kg	12.1	14.1 J	10.1 J	9.52	9.10	13.2 J	–	–	13.2 J	–	14.7
Selenium	mg/kg	0.980	1.43 J	1.53 J	0.827	0.308 J	0.650 J	–	–	0.727 J	–	0.517 J
Silver	mg/kg	0.0821 J	0.0503 UJ	0.0713 UJ	0.0430 J	0.0380 J	0.0530 J	–	–	0.0418 J	–	0.0407 J
Strontium	mg/kg	38.5	46.3 J	59.8 J	43.2	85.8	24.5 J	–	–	29.6 J	–	25.9
Thallium	mg/kg	0.310	0.323 J	0.451 J	0.303	0.203	0.212 J	–	–	0.208 J	–	0.221
Vanadium	mg/kg	24.1	33.3 J	26.8 J	21.3	17.0	21.1 J	–	–	22.1 J	–	26.8
Zinc	mg/kg	41.6	50.1 J	34.7 J	26.1	30.8	49.1 J	–	–	47.7 J	–	50.4 J
Anions												
Chloride	mg/kg	386	12.6 UR	580 J	41.0	36.3 J	116 J	–	–	102 J	–	105
Fluoride	mg/kg	4.62 J	2.21 UR	6.69 J	2.53 J	2.06 J	3.21 U*	–	–	3.31 U*	–	3.24 U*
Sulfate	mg/kg	1960 J	43.3 J	2180 J	340 J	1980 J	153 J	–	–	224 J	–	148
Radiological												
Radium-226	pCi/g	0.178 +/-(0.619) U	0.607 +/-(0.431)	0.654 +/-(0.395)	0.838 +/-(0.188)	0.822 +/-(0.292)	1.14 +/-(0.302) J	–	–	0.811 +/-(0.405) J	–	1.35 +/-(0.338) J
Radium-228	pCi/g	1.60 +/-(0.439)	0.622 +/-(0.654) U	0.634 +/-(0.627) U	0.737 +/-(0.320)	1.11 +/-(0.318)	0.998 +/-(0.301)	–	–	1.61 +/-(0.514)	–	1.69 +/-(0.438)
Radium-226+228	pCi/g	1.78 +/-(0.759) J	1.23 +/-(0.783) J	1.29 +/-(0.741) J	1.58 +/-(0.371)	1.93 +/-(0.432)	2.14 +/-(0.426) J	–	–	2.42 +/-(0.654) J	–	3.04 +/-(0.553) J
General Chemistry												
pH (lab)	SU	7.2	7.3	7.5	7.4	7.2	7.2	–	–	7.3	–	7.3

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Sample Location		SED-UT04-RB	SED-UT05-LB	SED-UT05-CC	SED-UT05-RB	SED-PO01-LB	SED-PO01-CC		SED-PO01-RB			
Sample Date		17-Oct 2018	17-Oct 2018	17-Oct 2018	17-Oct 2018	18-Oct 2018	18-Oct 2018		18-Oct 2018			
Sample ID		CUF-SED-UT04-CORRB-0.5/3.1-20181017	CUF-SED-UT05-CORLB-0.0/0.5-20181017	CUF-SED-UT05-CORCC-0.0/0.5-20181017	CUF-SED-UT05-CORRB-0.0/0.5-20181017	CUF-SED-PO01-CORLB-0.0/0.5-20181018	CUF-SED-PO01-CORCC-0.0/0.5-20181018	CUF-SED-PO01-CORCC-0.5/1.4-20181018	CUF-SED-PO01-CORRB-0.0/0.5-20181018	CUF-SED-PO01-CORRB-0.5/1.3-20181018	CUF-SED-PO01-CORRB-1.3/2.3-20181018	CUF-SED-PO01-DUP01-20181018
Sample Depth (ft)		0.5 – 3.1	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.0 – 0.5	0.5 – 1.4	0.0 – 0.5	0.5 – 1.3	1.3 – 2.3	1.3 – 2.3
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	FD
Level of Review[2, 3]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM												
% ASH	%	<1	11	5	4	3	1	<1	1	1	1	2
Total Metals												
Antimony	mg/kg	–	0.300 J	0.180 J	0.132 J	0.251 J	0.185 J	0.232 J	0.125 J	–	–	–
Arsenic	mg/kg	–	4.34 J	5.75 J	3.23 J	8.01 J	5.48	7.23	3.95	–	–	–
Barium	mg/kg	–	52.1	55.7 J	63.0 J	80.4 J	67.7	81.9	38.9	–	–	–
Beryllium	mg/kg	–	1.07	0.747 J	0.494 J	0.914 J	0.653	0.752	0.380	–	–	–
Boron	mg/kg	–	15.7	20.8 J	28.2 J	4.62 J	3.91 J	3.16 J	4.85 J	–	–	–
Cadmium	mg/kg	–	0.483	0.493 J	0.312 J	0.430 J	0.332	0.333	0.220	–	–	–
Calcium	mg/kg	–	7780	39500 J	68400 J	16400 J	14400 J	5820 J	15400 J	–	–	–
Chromium	mg/kg	–	18.9 J	18.4 J	13.7 J	18.5 J	14.7 J	15.8 J	9.32 J	–	–	–
Cobalt	mg/kg	–	10.3	10.2 J	6.81 J	14.0 J	9.61	10.2	7.15	–	–	–
Copper	mg/kg	–	11.3	12.1 J	9.44 J	15.7 J	13.7	15.1	8.51	–	–	–
Lead	mg/kg	–	14.1	12.1 J	8.47 J	18.3 J	13.8	17.0	8.53	–	–	–
Lithium	mg/kg	–	6.96 J	7.48 J	6.58 J	8.77 J	7.50 J	7.48 J	3.80 J	–	–	–
Mercury	mg/kg	–	<0.0547	0.0744 UJ	0.0613 UJ	0.0693 J	0.0656 J	0.0654 J	0.0479 J	–	–	–
Molybdenum	mg/kg	–	29.4	35.1 J	12.9 J	1.18 J	0.844	1.05	0.515	–	–	–
Nickel	mg/kg	–	16.8	16.2 J	11.9 J	19.5 J	15.2	16.2	9.69	–	–	–
Selenium	mg/kg	–	0.576	0.861 J	0.813 J	0.648 J	0.431 J	0.506	0.514	–	–	–
Silver	mg/kg	–	0.0672 J	0.0595 J	0.0462 J	0.0632 J	0.0591 J	0.0699 J	0.0343 J	–	–	–
Strontium	mg/kg	–	18.8	48.8 J	76.8 J	34.7 J	31.8	24.4	22.8	–	–	–
Thallium	mg/kg	–	0.238	0.249 J	0.199 J	0.283 J	0.228	0.222	0.154	–	–	–
Vanadium	mg/kg	–	29.8	26.6 J	19.4 J	28.6 J	21.7	24.8	15.7	–	–	–
Zinc	mg/kg	–	57.5 J	61.0 J	48.1 J	64.6 J	54.9	53.9	34.7	–	–	–
Anions												
Chloride	mg/kg	–	74.1	100 J	169 J	47.0 J	43.5	26.6	25.9	–	–	–
Fluoride	mg/kg	–	3.70 U*	4.30 U*	3.08 U*	2.44 U*	1.77 U*	2.45 U*	1.28 UJ	–	–	–
Sulfate	mg/kg	–	425	632 J	636 J	196 J	1050	43.5	426	–	–	–
Radiological												
Radium-226	pCi/g	–	0.899 +/-(0.276) J	0.896 +/-(0.339) J	0.937 +/-(0.300) J	–	–	–	–	–	–	–
Radium-228	pCi/g	–	1.20 +/-(0.536)	1.09 +/-(0.552)	1.51 +/-(0.371)	–	–	–	–	–	–	–
Radium-226+228	pCi/g	–	2.10 +/-(0.603) J	1.99 +/-(0.648) J	2.45 +/-(0.477) J	–	–	–	–	–	–	–
General Chemistry												
pH (lab)	SU	–	7.4	7.3	7.1	7.0	7.2	7.2	7.1	–	–	–

See notes on last page.

TABLE B.7 – Sediment Analytical Results
Cumberland Fossil Plant
October 2018, and August 21 and December 5, 2019

Notes:

<	analyte was not detected at a concentration greater than the Method Detection Limit
–	parameter not analyzed / not available
%	percent
ft	feet
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
mg/kg	milligrams per kilogram
pCi/g	picoCurie per gram
PLM	Polarized Light Microscopy - analysis for % ash
SU	Standard Unit
U	not detected
U*	this result should be considered "not-detected" because it was detected in an associated field or laboratory blank at a similar level
UJ	this compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation
UR	unreliable reporting or detection limit; compound may or may not be present in sample

1. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate
2. Level of review is defined in the Quality Assurance Project Plan.
3. Level of review for % ash samples is Final-Verified
4. Non-detect (ND) results reported by RJ Lee Group for percent (%) ash expressed as <1 in table.

TABLE B.8 – Benthic Invertebrate Community Field Data
Cumberland Fossil Plant
September 2018

Transect ID	Station ID	Sample Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[1]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	HP Clay
MAC-CuR01	1	9/17/2018	CUF-MAC-CUR01-BEN01-20180917	PO	9.3	80	80	10	10	–	–	–	–	–
MAC-CuR01	2	9/17/2018	CUF-MAC-CUR01-BEN02-20180917	PO	38.5	100	90	10	–	–	–	–	–	–
MAC-CuR01	3	9/17/2018	CUF-MAC-CUR01-BEN03-20180917	PO	36.5	50	80	10	–	5	5	–	–	–
MAC-CuR01	4	9/17/2018	CUF-MAC-CUR01-BEN04-20180917	PO	29.2	90	98	2	–	–	–	–	–	–
MAC-CuR01	5	9/17/2018	CUF-MAC-CUR01-BEN05-20180917	PO	18.2	80	–	1	97	2	–	–	–	–
MAC-CuR02	1	9/17/2018	CUF-MAC-CUR02-BEN01-20180917	PO	16.8	50	–	19	80	1	–	–	–	–
MAC-CuR02	2	9/17/2018	CUF-MAC-CUR02-BEN02-20180917	PO	36.9	60	–	15	80	3	2	–	–	–
MAC-CuR02	3	9/17/2018	CUF-MAC-CUR02-BEN03-20180917	PO	43.1	60	30	5	50	–	15	–	–	–
MAC-CuR02	4	9/17/2018	CUF-MAC-CUR02-BEN04-20180917	PO	35.0	80	–	1	98	1	–	–	–	–
MAC-CuR02	5	9/17/2018	CUF-MAC-CUR02-BEN05-20180917	PO	14.5	50	–	1	99	–	–	–	–	–
MAC-CuR03	1	9/17/2018	CUF-MAC-CUR03-BEN01-20180917	PO	5.3	90	97	1	–	1	1	–	–	–
MAC-CuR03	2	9/17/2018	CUF-MAC-CUR03-BEN02-20180917	PO	36.2	80	98	2	–	–	–	–	–	–
MAC-CuR03	3	9/17/2018	CUF-MAC-CUR03-BEN03-20180917	PO	35.1	50	95	3	–	–	2	–	–	–
MAC-CuR03	4	9/17/2018	CUF-MAC-CUR03-BEN04-20180917	PO	34.2	80	97	3	–	–	–	–	–	–
MAC-CuR03	5	9/17/2018	CUF-MAC-CUR03-BEN05-20180917	PO	7.9	50	49	2	49	–	–	–	–	–
MAC-CuR04	1	9/18/2018	CUF-MAC-CUR04-BEN01-20180918	PO	17.9	50	80	5	–	–	–	–	–	15
MAC-CuR04	2	9/18/2018	CUF-MAC-CUR04-BEN02-20180918	PO	38.0	50	80	–	–	10	10	–	–	–
MAC-CuR04	3	9/18/2018	CUF-MAC-CUR04-BEN03-20180918	PO	38.7	60	8	1	90	–	1	–	–	–
MAC-CuR04	4	9/18/2018	CUF-MAC-CUR04-BEN04-20180918	PO	40.6	60	80	3	15	–	2	–	–	–
MAC-CuR04	5	9/18/2018	CUF-MAC-CUR04-BEN05-20180918	PO	20.1	90	85	2	–	–	3	–	–	10
MAC-CuR05	1	9/18/2018	CUF-MAC-CUR05-BEN01-20180918	PO	6.2	65	40	–	–	–	–	–	–	60
MAC-CuR05	2	9/18/2018	CUF-MAC-CUR05-BEN02-20180918	PO	29.7	100	98	2	–	–	–	–	–	–
MAC-CuR05	3	9/18/2018	CUF-MAC-CUR05-BEN03-20180918	PO	32.9	50	97	–	–	1	2	–	–	–
MAC-CuR05	4	9/18/2018	CUF-MAC-CUR05-BEN04-20180918	PO	33.8	70	75	5	20	–	–	–	–	–
MAC-CuR05	5	9/18/2018	CUF-MAC-CUR05-BEN05-20180918	PO	15.9	60	83	2	–	–	5	–	–	10
MAC-WC01	1	9/17/2018	CUF-MAC-WC01-BEN01-20180917	PO	3.6	50	90	10	–	–	–	–	–	–
MAC-WC01	2	9/17/2018	CUF-MAC-WC01-BEN02-20180917	PO	4.2	50	92	6	2	–	–	–	–	–
MAC-WC01	3	9/17/2018	CUF-MAC-WC01-BEN03-20180917	PO	4.2	40	85	5	10	–	–	–	–	–
MAC-WC01	4	9/17/2018	CUF-MAC-WC01-BEN04-20180917	PO	3.9	75	70	10	20	–	–	–	–	–
MAC-WC01	5	9/17/2018	CUF-MAC-WC01-BEN05-20180917	PO	3.4	70	70	5	25	–	–	–	–	–

See notes on last page.

TABLE B.8 – Benthic Invertebrate Community Field Data
Cumberland Fossil Plant
September 2018

Transect ID	Station ID	Sample Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[1]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	HP Clay
MAC-WC02	1	9/17/2018	CUF-MAC-WC02-BEN01-20180917	PO	3.5	60	70	25	5	–	–	–	–	–
MAC-WC02	2	9/17/2018	CUF-MAC-WC02-BEN02-20180917	PO	4.7	30	60	25	15	–	–	–	–	–
MAC-WC02	3	9/17/2018	CUF-MAC-WC02-BEN03-20180917	PO	4.8	15	60	20	15	–	5	–	–	–
MAC-WC02	4	9/17/2018	CUF-MAC-WC02-BEN04-20180917	PO	5.0	50	75	20	5	–	–	–	–	–
MAC-WC02	5	9/17/2018	CUF-MAC-WC02-BEN05-20180917	PO	3.5	60	90	10	–	–	–	–	–	–
MAC-WC03	1	9/17/2018	CUF-MAC-WC03-BEN01-20180917	PO	4.5	50	95	5	–	–	–	–	–	–
MAC-WC03	2	9/17/2018	CUF-MAC-WC03-BEN02-20180917	PO	4.5	50	95	5	–	–	–	–	–	–
MAC-WC03	3	9/17/2018	CUF-MAC-WC03-BEN03-20180917	PO	5.3	70	97	3	–	–	–	–	–	–
MAC-WC03	4	9/17/2018	CUF-MAC-WC03-BEN04-20180917	PO	6.7	80	97	3	–	–	–	–	–	–
MAC-WC03	5	9/17/2018	CUF-MAC-WC03-BEN05-20180917	PO	4.8	60	20	65	–	–	–	–	15	–
MAC-WC04	1	9/18/2018	CUF-MAC-WC04-BEN01-20180918	PO	4.0	20	60	40	–	–	–	–	–	–
MAC-WC04	2	9/18/2018	CUF-MAC-WC04-BEN02-20180918	PO	4.1	20	75	20	–	–	–	–	5	–
MAC-WC04	3	9/18/2018	CUF-MAC-WC04-BEN03-20180918	PO	4.0	90	60	40	–	–	–	–	–	–
MAC-WC04	4	9/18/2018	CUF-MAC-WC04-BEN04-20180918	PO	4.7	90	93	7	–	–	–	–	–	–
MAC-WC04	5	9/18/2018	CUF-MAC-WC04-BEN05-20180918	PO	4.7	95	96	4	–	–	–	–	–	–
MAC-WC05	1	9/18/2018	CUF-MAC-WC05-BEN01-20180918	PO	7.2	5	5	–	10	10	25	50	–	–
MAC-WC05	2	9/18/2018	CUF-MAC-WC05-BEN02-20180918	PO	7.2	15	15	–	20	10	50	–	5	–
MAC-WC05	3	9/18/2018	CUF-MAC-WC05-BEN03-20180918	PO	6.2	5	50	–	20	–	30	–	–	–
MAC-WC05	4	9/18/2018	CUF-MAC-WC05-BEN04-20180918	PO	6.2	40	70	–	–	10	20	–	–	–
MAC-WC05	5	9/18/2018	CUF-MAC-WC05-BEN05-20180918	PO	6.5	10	–	–	–	–	–	100	–	–
MAC-WC06	1	9/18/2018	CUF-MAC-WC06-BEN01-20180918	PO	5.8	30	–	–	–	10	10	–	–	80
MAC-WC06	2	9/18/2018	CUF-MAC-WC06-BEN02-20180918	PO	7.3	60	60	–	–	–	30	–	–	10
MAC-WC06	3	9/18/2018	CUF-MAC-WC06-BEN03-20180918	PO	7.1	50	60	–	–	20	20	–	–	–
MAC-WC06	4	9/18/2018	CUF-MAC-WC06-BEN04-20180918	PO	6.1	30	–	10	–	15	15	–	–	60
MAC-WC06	5	9/18/2018	CUF-MAC-WC06-BEN05-20180918	PO	5.0	60	80	15	–	5	–	–	–	–

Notes:

–	Not applicable
% Dredge Full	Estimate of the volume of dredge filled with substrate
HP Clay	Hardpan Clay
PO	Ponar Dredge
ID	Identification

1. Visual assessment of substrate composition conducted in the field.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Cumberland River																									Wells Creek									
Transect ID	MAC-CuR01					MAC-CuR02					MAC-CuR03					MAC-CuR04					MAC-CuR05					MAC-WC01					MAC-WC02				
Collection Date	9/17/2018					9/17/2018					9/17/2018					9/18/2018					9/18/2018					9/17/2018					9/17/2018				
Station ID[1]	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Gear	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
Taxa	Number of Organisms																																		
ANNELIDA																																			
HIRUDINEA											1																								
Glossiphoniidae																																			
Actinobdella inequiannulata						2			1										1						1										
Helobdella elongata		2				1	3	3			2															1									
Helobdella sp.	2																																		
Helobdella stagnalis													1																						
OLIGOCHAETA																																			
TUBIFICIDA																																			
Naididae																																			
Aulodrilus pigueti			12					9						9						1												1			
Branchiodrilus hortensis																																			
Branchiura sowerbyi																										1						3			4
Bratislavia unidentata							5										1																		
Dero digitata																												9				4			
Dero sp.							5																					3							
Haemonais waldvogeli																																			
Limnodrilus cervix	5			2	7	3		9	1	1				6	3		1			1		1	1			6	12	3	13	18	6	3		13	20
Limnodrilus hoffmeisteri	5		1	3	1		19				1		6		1	2	2		6	1										3					
Limnodrilus sp.																																1			
Naidinae																																			
Nais pardalis																																			
Nais sp.																																			
Pristina sp.															1																				
Stylaria lacustris			1																																
Tubificinae w/ hair chaetae	5	3		1		3	19					6	3	3	1					1						3	5			3	11	2		10	
Tubificinae w/out hair chaetae	84	48	5	10	7	53	47	70	14	1	3	114	46	41	12	1	5	1	28	23	2	9	2		10	15	39	45	72	25	71	24		29	55
INSECTA																																			
COLEOPTERA																																			
Elmidae																																			
Dubiraphia sp.																										1					1		1		
DIPTERA																																			
Ceratopogonidae	3	1		4				1	3		1	4		4		1				23		1	1		20	14				2	7			14	5
Palpomyia-Bezzia gp.																																			
Chaoboridae																																			
Chaoborus punctipennis		1							1														1												
Chaoborus sp.			2																																
Chironomidae																																			
Ablabesmyia annulata												1		1						4		1													
Ablabesmyia janta																					1					1	1								
Ablabesmyia mallochi																																			
Ablabesmyia sp.											1									1															
Axarus sp.											1										6				3										
Chironomus sp.																											2	5	4	2	5	4		4	

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Cumberland River																									Wells Creek									
Transect ID	MAC-CuR01					MAC-CuR02					MAC-CuR03					MAC-CuR04					MAC-CuR05					MAC-WC01					MAC-WC02				
Collection Date	9/17/2018					9/17/2018					9/17/2018					9/18/2018					9/18/2018					9/17/2018					9/17/2018				
Station ID[1]	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Gear	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
Taxa	**Number of Organisms**																																		
INSECTA (continued)																																			
Chironomidae (continued)																																			
Cladopelma sp.																											2				1				
Cladotanytarsus sp.																												4						2	
Coelotanypus sp.	3	26	12	32		14	9	4	12		1	43	10	6	2	1	19	4	29	10	2	16	14	24	13	3					4			2	7
Cryptochironomus sp.	5	1	2	2	1	12		6			1		2		1		2		1	3	2			1			1	1	3		1	6	1		1
Dicrotendipes neomodestus			1																1		6														
Dicrotendipes sp.																																			
Einfeldia natchitocheae																												1			13	12		4	3
Epoicocladius sp.												1										1													
Glyptotendipes sp.																1																			
Harnischia sp.												1																							
Microchironomus sp.				1																						3	2	3	1	3	14	4		6	1
Microtendipes pedellus gp.																																			
Parachironomus frequens																																			
Paralauterborniella nigrohalteralis																											1	2	2	1				2	
Paratendipes albimanus/duplicatus																																			
Phaenopsectra obediens																																			
Polypedilum beckae																																			
Polypedilum flavum																			1																
Polypedilum scalaenum gp.	3					8			1						3	1		2									2	6	6	2	13	12	1	8	
Polypedilum sp.																														1					
Procladius sp.	4		1	2		2		2				3		1				1	1						2	1	2	1	2	3	1	1		1	
Rheotanytarsus exiguus gp.																																1			
Stictochironomus caffrarius	4	2		2		2						4							1	2				2											
Tanypodinae		1																																	
Tanypus concavus								1																1		1	3				3			1	5
Tanytarsus sp.	1																								3	1	3	11	1	3	23	45		31	6
EPHEMEROPTERA																																			
Ephemeridae																																			
Hexagenia sp. <10mm													1	1									1				1	1							
Hexagenia sp. >10mm								1			1	3								2		8													
Leptohyphidae																																			
Tricorythodes sp.																																			
ODONATA																																			
Gomphidae																																			
Stylurus sp.																				1															
TRICHOPTERA																																			
Hydroptilidae																																			
Hydroptila sp.																																			
Orthotrichia sp.											1																								
Leptoceridae																																			
Oecetis sp.							1		1		2	1				1	1		1		7														
Polycentropodidae						1																													
Cyrnellus fraternus																			1		1				1										

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Cumberland River																									Wells Creek									
Transect ID	MAC-CuR01					MAC-CuR02					MAC-CuR03					MAC-CuR04					MAC-CuR05					MAC-WC01					MAC-WC02				
Collection Date	9/17/2018					9/17/2018					9/17/2018					9/18/2018					9/18/2018					9/17/2018					9/17/2018				
Station ID[1]	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Gear	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
Taxa	**Number of Organisms**																																		
MOLLUSCA																																			
BIVALVIA																																			
Unionidae																																			
Quadrula pustulosa																			1																
Corbiculidae																																			
Corbicula fluminea <10mm			1		2	5	1	1	2	5	2	1	5	2	1	1	1	7		2	10	4			1										
Corbicula fluminea >10mm								1			1																								
Sphaeriidae		3				2						4														29	6	3						11	
Musculium transversum			1		1	1	2	5			8					2	7	2	1	23		69	1												
Pisidium sp.																	1																		
GASTROPODA																																			
Viviparidae																																			
Viviparus georgianus																	1																		
Ancylidae																																			
Ferrissia rivularis																																			
Planorbidae																																			
Gyraulus parvus															1																				
Menetus dilatatus																																			
Hydrobiidae											1																								
Amnicola limosa		5			4	3	1			1						2		1			16			1				2					2	3	2
Birgella subglobosa																	1																		
Somatogyrus sp.	1																					1													
Pleuroceridae																																			
Elimia sp.																																			
Lithasia armigera						1	1										1																		
Pleurocera canaliculata							3	1	1														1												
Pleurocera canaliculata excuratum						3											1		1																
NEMATODA																														3					
PLATYHELMINTHES																																			
Planariidae																																			
Girardia tigrina		1	1																3																
ARACHNIDA																																			
Trombidiformes																																			
Arrenuridae																																			
Arrenurus sp.																																			
krendowskiidae																																			
Krendowskia sp.																																		1	
Limnesiidae																																			
Limnesia sp.												2								1						2							1	1	
Unionicolidae																																			
Unionicola sp.											1																								

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Cumberland River																									Wells Creek									
Transect ID	MAC-CuR01					MAC-CuR02					MAC-CuR03					MAC-CuR04					MAC-CuR05					MAC-WC01					MAC-WC02				
Collection Date	9/17/2018					9/17/2018					9/17/2018					9/18/2018					9/18/2018					9/17/2018					9/17/2018				
Station ID[1]	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Gear	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
Taxa	Number of Organisms																																		
CRUSTACEA																																			
AMPHIPODA																																			
Gammaridae																																			
Gammarus sp.		1	1	1				1			1	1		2								11													
ISOPODA																																			
Asellidae																																			
Lirceus sp.																																			
CYCLOPOIDA																																			
Cyclopidae																																			
Mesocyclops edax		1												1																					
OSTRACODA																																			
PODOCOPIDA																																			
Candonidae																																			
Candona sp.		1					1						5	1	2	1			1		1													11	

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Wells Creek																			
Transect ID	MAC-WC03					MAC-WC04					MAC-WC05					MAC-WC06				
Collection Date	9/17/2018					9/18/2018					9/18/2018					9/18/2018				
Station ID[1]	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Gear	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
Taxa	Number of Organisms																			
ANNELIDA																				
HIRUDINEA									1										1	
Glossiphoniidae															7		1			
Actinobdella inequiannulata			1	1																
Helobdella elongata								8	5									2		
Helobdella sp.																			1	
Helobdella stagnalis					10										1					
OLIGOCHAETA																				
TUBIFICIDA																				
Naididae																				
Aulodrilus pigueti						3						4	2	2			41	1	1	
Branchiodrilus hortensis					6															
Branchiura sowerbyi																				
Bratislavia unidentata											10	8	1	1	174	1		19	1	19
Dero digitata		2				9	2	30		1	1				32			1	1	
Dero sp.											1				16	2		2	5	10
Haemonais waldvogeli					3															
Limnodrilus cervix		2			9	9		17	10	11		12		1			10	2	3	19
Limnodrilus hoffmeisteri												4		2				1	2	10
Limnodrilus sp.																				
Naidinae											3				16					10
Nais pardalis															79			2	6	
Nais sp.														1						
Pristina sp.																				
Stylaria lacustris																				
Tubificinae w/ hair chaetae					15						2									
Tubificinae w/out hair chaetae		6			33	33	14	57	16	10	7	51	15	19		3	155	11	10	126
INSECTA																				
COLEOPTERA																				
Elmidae																				
Dubiraphia sp.	1								1											5
DIPTERA																				
Ceratopogonidae	2	3		5		1	2		1					5	4	1	17			27
Palpomyia-Bezzia gp.																				5
Chaoboridae																				
Chaoborus punctipennis																				
Chaoborus sp.																				
Chironomidae																				
Ablabesmyia annulata	4	1							3	1										
Ablabesmyia janta															11					
Ablabesmyia mallochi					2															
Ablabesmyia sp.																				
Axarus sp.																				
Chironomus sp.	1			1		1						1								

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Wells Creek																			
Transect ID	MAC-WC03					MAC-WC04					MAC-WC05					MAC-WC06				
Collection Date	9/17/2018					9/18/2018					9/18/2018					9/18/2018				
Station ID[1]	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Gear	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
Taxa	**Number of Organisms**																			
INSECTA (continued)																				
Chironomidae (continued)																				
Cladopelma sp.																				
Cladotanytarsus sp.																				
Coelotanypus sp.	2	2		2		11	8	4	13	17	3	8	15	19		8	51	43	3	30
Cryptochironomus sp.								1			1	1		1						
Dicrotendipes neomodestus											7	2		1	192	2	3	6	8	23
Dicrotendipes sp.															11				1	
Einfeldia natchitocheae						4	3	2			1									
Epoicocladius sp.																				
Glyptotendipes sp.	1				2			1							21			1		7
Harnischia sp.																				
Microchironomus sp.		1				8		1	7		1	2			28					
Microtendipes pedellus gp.														2	43					
Parachironomus frequens																				5
Paralauterborniella nigrohalteralis																				
Paratendipes albimanus/duplicatus					1															
Phaenopsectra obediens					1															
Polypedilum beckae															4					
Polypedilum flavum																				
Polypedilum scalaenum gp.																				
Polypedilum sp.																				
Procladius sp.						4	2	4			1	2								
Rheotanytarsus exiguus gp.																				
Stictochironomus caffrarius																		1		
Tanypodinae																				
Tanypus concavus						1	2		3	1		4	2	4			9	1	3	
Tanytarsus sp.	3				2	14	29	12	32			4		5	43		5	1		17
EPHEMEROPTERA																				
Ephemeridae																				
Hexagenia sp. <10mm	2									2										
Hexagenia sp. >10mm	2	1								1										
Leptohyphidae																				
Tricorythodes sp.																	1			
ODONATA																				
Gomphidae																				
Stylurus sp.																				
TRICHOPTERA																				
Hydroptilidae																				
Hydroptila sp.																	1			
Orthotrichia sp.															4			1		
Leptoceridae																				
Oecetis sp.						1													1	3
Polycentropodidae																				
Cyrnellus fraternus															93				1	

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Wells Creek																			
Transect ID	**MAC-WC03**					**MAC-WC04**					**MAC-WC05**					**MAC-WC06**				
Collection Date	**9/17/2018**					**9/18/2018**					**9/18/2018**					**9/18/2018**				
Station ID[1]	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**
Gear	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**
Taxa	**Number of Organisms**																			
MOLLUSCA																				
BIVALVIA																				
Unionidae								1												
Quadrula pustulosa																				
Corbiculidae																				
Corbicula fluminea <10mm																				
Corbicula fluminea >10mm																				
Sphaeriidae	108	60	3	20	1	3	7			6			2	6			7			3
Musculium transversum	5	9		2															1	
Pisidium sp.																				
GASTROPODA																				
Viviparidae																				
Viviparus georgianus																				
Ancylidae																				
Ferrissia rivularis															4					
Planorbidae																				
Gyraulus parvus																				
Menetus dilatatus															4					
Hydrobiidae																				
Amnicola limosa			1			1	2	1					1				1			
Birgella subglobosa																				
Somatogyrus sp.												1								7
Pleuroceridae																				
Elimia sp.																1				
Lithasia armigera																				
Pleurocera canaliculata												2							2	
Pleurocera canaliculata excuratum											2			15			6	5	1	37
NEMATODA						3											1			
PLATYHELMINTHES																				
Planariidae																				
Girardia tigrina																				
ARACHNIDA																				
Trombidiformes																				
Arrenuridae																				
Arrenurus sp.		1																		2
krendowskiidae																				
Krendowskia sp.																				
Limnesiidae																				
Limnesia sp.	1	1									22	21	13	25		2	7	9		2
Unionicolidae																				
Unionicola sp.																				

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Cumberland Fossil Plant
September 2018

River	Wells Creek																			
Transect ID	MAC-WC03					MAC-WC04					MAC-WC05					MAC-WC06				
Collection Date	9/17/2018					9/18/2018					9/18/2018					9/18/2018				
Station ID[1]	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Gear	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
Taxa	Number of Organisms																			
CRUSTACEA																				
AMPHIPODA																				
Gammaridae																				
Gammarus sp.																				
ISOPODA																				
Asellidae																				
Lirceus sp.					1															
CYCLOPOIDA																				
Cyclopidae																				
Mesocyclops edax																				
OSTRACODA																	1			
PODOCOPIDA																				
Candonidae																				
Candona sp.																				

Notes:

PO Ponar Dredge (Wildco™)
ID Identification

Station IDs 1 through 5 correspond with approximately 5, 25, 50, 75, and 95 percent across the channel, respectively, from left bank to right bank. “Left bank” and “right bank” were determined with a downstream-facing orientation.

TABLE B.10 – Summary of Mayfly Samples
Cumberland Fossil Plant
June 2018, and June and July 2019

Sampling Reach	Composite Type	Sample ID[1]	Parent Sample ID	Sample Type[2]	Sample Date	Laboratory Analysis Total Metals	Total Mercury	% Moisture
Cumberland River Upstream (CuRU)	Adult Male Imago	CUF-MFA-CURU-20180623		N	6/23/2018	x	x	x
		CUF-MFA-CURU-20190703		N	7/3/2019	x	x	x
		CUF-MFA-DUP02-20190703	CUF-MFA-CURU-20190703	FD	7/3/2019	x	x	x
	Nymph Depurated	CUF-MFP-CURU-20180606		N	6/6/2018	x	x	x
		CUF-MFP-CURU-20190605		N	6/5/2019	x	x	x
		CUF-MFP-DUP01-20190605	CUF-MFP-CURU-20190605	FD	6/5/2019	x	x	x
	Nymph Non-Depurated	CUF-MFN-CURU-20180607		N	6/7/2018	x	x	x
		CUF-MFN-CURU-20190605		N	6/5/2019	x	x	x
Cumberland River Adjacent (CuRA)	Adult Male Imago	CUF-MFA-CURA-20180622		N	6/22/2018	x	x	x
		CUF-MFA-CURA-20190703		N	7/3/2019	x	x	x
	Nymph Depurated	CUF-MFP-CURA-20180607		N	6/7/2018	x	x	x
		CUF-MFP-CURA-20190604		N	6/4/2019	x	x	x
	Nymph Non-Depurated	CUF-MFN-CURA-20180605		N	6/5/2018	x	x	x
		CUF-MFN-CURA-20190604		N	6/4/2019	x	x	x
Cumberland River Downstream (CuRD)	Adult Male Imago	CUF-MFA-CURD-20180619		N	6/19/2018	x	x	x
		CUF-MFA-CURD-20190703		N	7/3/2019	x	x	x
	Nymph Depurated	CUF-MFP-CURD-20190604		N	6/4/2019	x	x	x
		CUF-MFP-CURD-20180606		N	6/6/2018	x	x	x
	Nymph Non-Depurated	CUF-MFN-CURD-20180607		N	6/7/2018	x	x	x
		CUF-MFN-CURD-20190604		N	6/4/2019	x	x	x
		CUF-MFN-DUP01-20190604	CUF-MFN-CURD-20190604	FD	6/4/2019	x	x	x
Wells Creek Upstream (WCU)	Adult Male Imago	CUF-MFA-WCU-20180622		N	6/22/2018	x	x	x
	Nymph Depurated	CUF-MFP-WCU-20180606		N	6/6/2018	x	x	x
		CUF-MFP-WCU-20190604		N	6/4/2019	x	x	x
	Nymph Non-Depurated	CUF-MFN-WCU-20180605		N	6/5/2018	x	x	x
		CUF-MFN-WCU-20190603		N	6/3/2019	x	x	x
Wells Creek Downstream (WCD)	Adult Male Imago	CUF-MFA-WCD-20180622		N	6/22/2018	x	x	x
		CUF-MFA-WCD-20190703		N	7/3/2019	x	x	x
		CUF-MFA-DUP01-20190703	CUF-MFA-WCD-20190703	FD	7/3/2019	x	x	x
	Nymph Depurated	CUF-MFP-WCD-20180606		N	6/6/2018	x	x	x
		CUF-MFP-WCD-20190603		N	6/3/2019	x	x	x
	Nymph Non-Depurated	CUF-MFN-WCD-20180605		N	6/5/2018	x	x	x
		CUF-MFN-WCD-20190603		N	6/3/2019	x	x	x

Notes:

Total Metals	SW-846 Method 6020A
Total Mercury	SW-846 Method 7473
% Moisture	ASTM D2974-87
ID	Identifier

1. Sample Nomenclature
   Sample Naming Convention for Mayfly Samples: Plant Acronym - Matrix Acronym - Sampling Reach Identifier - yyyymmdd
   Sample Naming Convention for Duplicate Samples: Plant Acronym - Matrix Acronym - Duplicate Number - yyyymmdd
   Matrix Acronym: MFN=Mayfly Nymph Non-Depurated, MFP=Mayfly Nymph Purged (Depurated), MFA=Mayfly Adult
2. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate

TABLE B.11 – Mayfly Analytical Results
Cumberland Fossil Plant
June 2018, and June and July 2019

Location		CUF-CURU						
Sample Date		07-Jun 2018	05-Jun 2019	06-Jun 2018	05-Jun 2019	05-Jun 2019	23-Jun 2018	03-Jul 2019
Sample ID		CUF-MFN-CURU-20180607	CUF-MFN-CURU-20190605	CUF-MFP-CURU-20180606	CUF-MFP-CURU-20190605	CUF-MFP-DUP01-20190605	CUF-MFA-CURU-20180623	CUF-MFA-CURU-20190703
Sample Type[1]		N	N	N	N	FD	N	N
Parent Sample ID						CUF-MFP-CURU-20190605		
Level of Review[2]		Validated	Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified
	Units							
Percent Moisture								
% Moisture	%	78.7	80.4	80.5	84	82.6	70.2	73.4
Total Metals								
Antimony	mg/kg	<0.032	<0.020	<0.016	<0.019	<0.019	<0.015	<0.020
Arsenic	mg/kg	0.63	0.54	0.13 J	0.10	0.072 J	<0.056	<0.029
Barium	mg/kg	8.7	7.2	1.8	0.91	0.64	0.13	0.16
Beryllium	mg/kg	<0.066	0.038 J	<0.064	<0.031	<0.031	<0.061	<0.032
Boron	mg/kg	<1.4	0.67 UJ	<1.4	0.65 UJ	0.65 UJ	<1.3	0.68 UJ
Cadmium	mg/kg	0.34	0.46	0.39	0.24 J	0.45 J	0.21	0.22
Calcium	mg/kg	627 J	546	356 J	361	327	224 J	295
Chromium	mg/kg	1.6 U*	1.1	0.30 U*	0.12 J	<0.082	0.16 UJ	0.12 J
Cobalt	mg/kg	1.3	0.96	0.57	0.29	0.47	0.29	0.41
Copper	mg/kg	2.7	2.7	2.3	2.5	2.2	7.9	7.5
Lead	mg/kg	1.4	1.1	0.21	0.095	0.045 J	<0.024	<0.029
Lithium	mg/kg	0.78	0.70	0.11 J	0.037 J	<0.020	<0.039	<0.021
Mercury	mg/kg	0.011 U*	0.014 U*	0.0057 U*	<0.0070	0.0079 U*	0.026 U*	0.023 U*
Molybdenum	mg/kg	0.17 U*	0.16	0.15 U*	0.13	0.12	0.10 U*	0.12
Nickel	mg/kg	1.5	1.2	0.28 U*	0.14	0.096 J	<0.076	<0.040
Selenium	mg/kg	0.58	0.50	0.47	0.40	0.38	0.90	0.65
Silver	mg/kg	<0.022	0.013 J	<0.022	<0.010	<0.010	<0.021	<0.011
Strontium	mg/kg	2.2	2.0	0.98 J	0.76	0.70	0.30 J	0.33 J
Thallium	mg/kg	0.015 J	<0.012	<0.013	<0.012	<0.012	<0.012	<0.013
Vanadium	mg/kg	2.3	1.6	0.34	0.14	0.073 J	<0.061	<0.032
Zinc	mg/kg	42.9 J	53.7 J	43.2 J	45.0 J	62.2 J	25.4 J	31.5 J

See notes on last page.

TABLE B.11 – Mayfly Analytical Results
Cumberland Fossil Plant
June 2018, and June and July 2019

Location		CUF-CURU	CUF-CURA					
Sample Date		03-Jul 2019	05-Jun 2018	04-Jun 2019	07-Jun 2018	04-Jun 2019	22-Jun 2018	03-Jul 2019
Sample ID		CUF-MFA-DUP02-20190703	CUF-MFN-CURA-20180605	CUF-MFN-CURA-20190604	CUF-MFP-CURA-20180607	CUF-MFP-CURA-20190604	CUF-MFA-CURA-20180622	CUF-MFA-CURA-20190703
Sample Type[1]		FD	N	N	N	N	N	N
Parent Sample ID		CUF-MFA-CURU-20190703						
Level of Review[2]		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified
	Units							
Percent Moisture								
% Moisture	%	75.1	81.0	80.6	83.3	82.1	72.3	72.8
Total Metals								
Antimony	mg/kg	<0.019	0.032 J	<0.020	<0.030	<0.021	<0.016	<0.019
Arsenic	mg/kg	<0.027	0.87	0.70	0.090 J	0.15	<0.057	<0.027
Barium	mg/kg	0.11	11.4	8.2	0.89	1.4	0.20	0.13
Beryllium	mg/kg	<0.030	0.082 J	0.037 J	<0.061	<0.032	<0.063	<0.030
Boron	mg/kg	0.63 UJ	<1.4	0.66 UJ	<1.3	0.68 UJ	<1.3	0.63 UJ
Cadmium	mg/kg	0.17	0.34	0.10	0.95	0.13	0.25	0.22
Calcium	mg/kg	225	912 J	664	457 J	348	296 J	207
Chromium	mg/kg	0.13 J	2.0 U*	1.0	0.16 UJ	0.098 J	0.17 UJ	<0.080
Cobalt	mg/kg	0.38	1.4	0.78	0.63	0.26	0.34	0.21
Copper	mg/kg	7.8	4.0	3.2	2.2	2.5	8.0	8.0
Lead	mg/kg	<0.027	1.8	1.1	0.032 J	0.086 J	<0.025	<0.027
Lithium	mg/kg	<0.019	1.2	0.58	<0.039	0.027 J	<0.040	<0.019
Mercury	mg/kg	0.028 U*	0.0091 U*	0.012 U*	0.0038 U*	0.0090 U*	0.026 U*	0.019 U*
Molybdenum	mg/kg	0.10 J	0.29	0.28	0.14 U*	0.19	0.12 U*	0.098 J
Nickel	mg/kg	<0.037	2.0	1.2	0.12 U*	0.14	<0.078	<0.037
Selenium	mg/kg	0.50	0.67	0.86	0.42	0.63	0.75	0.81
Silver	mg/kg	0.010 J	<0.022	<0.011	<0.021	<0.011	<0.021	<0.010
Strontium	mg/kg	0.21 J	3.1	2.1	1.2	0.83	0.39 J	0.19 J
Thallium	mg/kg	<0.012	0.020 J	<0.012	<0.012	<0.013	<0.012	<0.012
Vanadium	mg/kg	<0.030	3.0	1.6	<0.062	0.11	<0.063	<0.030
Zinc	mg/kg	25.4 J	56.6 J	55.6 J	74.5 J	48.5 J	27.6 J	26.2 J

See notes on last page.

TABLE B.11 – Mayfly Analytical Results
Cumberland Fossil Plant
June 2018, and June and July 2019

Location		CUF-CURD						
Sample Date		07-Jun 2018	04-Jun 2019	04-Jun 2019	06-Jun 2018	04-Jun 2019	19-Jun 2018	03-Jul 2019
Sample ID		CUF-MFN-CURD-20180607	CUF-MFN-CURD-20190604	CUF-MFN-DUP01-20190604	CUF-MFP-CURD-20180606	CUF-MFP-CURD-20190604	CUF-MFA-CURD-20180619	CUF-MFA-CURD-20190703
Sample Type[1]		N	N	FD	N	N	N	N
Parent Sample ID				CUF-MFN-CURD-20190604				
Level of Review[2]		Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Validated	Final-Verified
	Units							
Percent Moisture								
% Moisture	%	79.7	80.8	80.3	84.2	83.8	74.4	73.3
Total Metals								
Antimony	mg/kg	0.027 J	<0.019	0.023 J	<0.016	<0.020	<0.016	<0.021
Arsenic	mg/kg	0.76	0.54	0.61	0.092 J	0.085 J	<0.060	<0.030
Barium	mg/kg	9.8	7.7	8.6	0.95	0.69	0.14	0.13
Beryllium	mg/kg	<0.063	0.041 J	0.046 J	<0.065	<0.032	<0.065	<0.033
Boron	mg/kg	<1.3	0.63 UJ	0.68 UJ	<1.4	0.68 UJ	<1.4	0.70 UJ
Cadmium	mg/kg	0.22	0.24	0.38	0.31	0.36	0.28	0.22
Calcium	mg/kg	757 J	637	601	377 J	291	260 J	225
Chromium	mg/kg	1.5 U*	1.1	1.3	0.17 UJ	0.088 J	0.17 UJ	<0.088
Cobalt	mg/kg	1.0	0.91	1.0	0.28	0.43	0.25	0.22
Copper	mg/kg	3.1	3.1	3.3	2.2	2.6	6.8	7.5
Lead	mg/kg	1.3	1.2	1.4	0.076 J	0.072 J	<0.026	<0.030
Lithium	mg/kg	0.90	0.76	0.85	<0.041	0.027 J	<0.042	<0.021
Mercury	mg/kg	0.014 U*	0.012 U*	0.016 U*	<0.0031	0.0086 U*	0.019 U*	0.022 U*
Molybdenum	mg/kg	0.23	0.20	0.18	0.14 U*	0.13	0.11 U*	0.094 J
Nickel	mg/kg	1.5	1.2	1.4	0.15 U*	0.13 J	<0.081	<0.041
Selenium	mg/kg	0.74	0.63	0.57	0.58	0.37	0.72	0.79
Silver	mg/kg	<0.021	<0.010	<0.011	<0.022	<0.011	<0.022	<0.011
Strontium	mg/kg	2.6	2.0	2.1	0.98 J	0.65	0.36 J	0.23 J
Thallium	mg/kg	0.019 J	<0.012	<0.013	<0.013	<0.013	<0.013	<0.013
Vanadium	mg/kg	2.2	1.7	2.0	0.088 J	0.099 J	<0.066	<0.033
Zinc	mg/kg	41.9 J	53.6 J	46.8 J	39.0 J	48.0 J	26.0 J	24.5 J

See notes on last page.

TABLE B.11 – Mayfly Analytical Results
Cumberland Fossil Plant
June 2018, and June and July 2019

Location		CUF-WCU					CUF-WCD	
Sample Date		05-Jun 2018	03-Jun 2019	06-Jun 2018	04-Jun 2019	22-Jun 2018	05-Jun 2018	03-Jun 2019
Sample ID		CUF-MFN-WCU-20180605	CUF-MFN-WCU-20190603	CUF-MFP-WCU-20180606	CUF-MFP-WCU-20190604	CUF-MFA-WCU-20180622	CUF-MFN-WCD-20180605	CUF-MFN-WCD-20190603
Sample Type[1]		N	N	N	N	N	N	N
Parent Sample ID								
Level of Review[2]		Validated	Final-Verified	Validated	Final-Verified	Validated	Validated	Final-Verified
	Units							
Percent Moisture								
% Moisture	%	78.0	80.2	81.5	85.0	68.6	81.2	81.5
Total Metals								
Antimony	mg/kg	<0.032	0.026 J	<0.016	<0.020	<0.016	<0.033	<0.019
Arsenic	mg/kg	0.57	0.66	0.10 J	0.11	<0.059	0.80	0.67
Barium	mg/kg	8.4	10.0	1.1	0.65	0.19	10.0	8.8
Beryllium	mg/kg	<0.064	0.075 J	<0.064	<0.031	<0.065	0.088 J	0.050 J
Boron	mg/kg	<1.4	0.74 J	<1.3	0.65 UJ	<1.4	<1.4	0.64 UJ
Cadmium	mg/kg	0.18 J	0.13 J	0.12 J	0.17	0.17 J	0.15 J	0.13 J
Calcium	mg/kg	872 J	1240	450 J	391	388 J	1250 J	1320
Chromium	mg/kg	1.6 U*	1.8	0.17 UJ	0.085 J	0.17 UJ	1.9 U*	1.4
Cobalt	mg/kg	1.2	1.2	0.45	0.37	0.45	1.1	0.93
Copper	mg/kg	2.8	2.4	1.9	1.6	8.0	2.6	2.4
Lead	mg/kg	1.2	1.4	0.073 J	0.036 J	<0.026	1.2	1.1
Lithium	mg/kg	0.55	0.70	<0.041	<0.020	<0.041	0.77	0.63
Mercury	mg/kg	0.025 U*	0.016 U*	0.011 U*	0.0077 U*	0.045	0.0034 U*	0.018 U*
Molybdenum	mg/kg	0.21 J	0.18 J	0.16 U*	0.11	0.14 U*	0.16 U*	0.14 J
Nickel	mg/kg	1.5	1.7	0.19 U*	0.13	<0.081	1.7	1.4
Selenium	mg/kg	0.78	0.54	0.60	0.35	0.98	0.58	0.47
Silver	mg/kg	<0.022	<0.021	<0.022	<0.010	<0.022	<0.022	<0.020
Strontium	mg/kg	2.0	2.3	0.93 J	0.87	<0.32	2.4	2.5
Thallium	mg/kg	<0.013	<0.012	<0.013	<0.012	<0.013	0.015 J	<0.012
Vanadium	mg/kg	2.3	2.6	0.12 J	0.067 J	<0.066	2.7	2.1
Zinc	mg/kg	36.7 J	33.4 J	34.7 J	33.4 J	32.9 J	30.6 J	30.2 J

See notes on last page.

TABLE B.11 – Mayfly Analytical Results
Cumberland Fossil Plant
June 2018, and June and July 2019

Location		CUF-WCD				
Sample Date		06-Jun 2018	03-Jun 2019	03-Jul 2019	22-Jun 2018	03-Jul 2019
Sample ID		CUF-MFP-WCD-20180606	CUF-MFP-WCD-20190603	CUF-MFA-DUP01-20190703	CUF-MFA-WCD-20180622	CUF-MFA-WCD-20190703
Sample Type[1]		N	N	FD	N	N
Parent Sample ID				CUF-MFA-WCD-20190703		
Level of Review[2]		Validated	Final-Verified	Final-Verified	Validated	Final-Verified
	Units					
Percent Moisture						
% Moisture	%	84.8	85.6	73.1	72.5	72.5
Total Metals						
Antimony	mg/kg	<0.016	<0.019	<0.019	<0.016	<0.021
Arsenic	mg/kg	0.10 J	0.10	<0.027	<0.058	0.063 J
Barium	mg/kg	0.99	0.79	0.097	0.14	0.14
Beryllium	mg/kg	<0.066	<0.031	<0.030	<0.064	<0.033
Boron	mg/kg	<1.4	0.65 UJ	0.63 UJ	<1.3	6.1 J
Cadmium	mg/kg	0.11 J	0.10	0.047 J	0.071 J	0.059 J
Calcium	mg/kg	414 J	462	265	246 J	281
Chromium	mg/kg	0.18 UJ	<0.082	<0.080	0.17 UJ	<0.088
Cobalt	mg/kg	0.29	0.20	0.19	0.23	0.20
Copper	mg/kg	1.9	1.5	7.3	7.7	7.8
Lead	mg/kg	0.064 J	0.034 J	<0.027	<0.025	<0.030
Lithium	mg/kg	<0.042	<0.020	<0.019	<0.040	<0.021
Mercury	mg/kg	<0.0029	<0.0072	0.019 U*	0.017 U*	0.016 U*
Molybdenum	mg/kg	0.13 U*	0.11	0.091 J	0.098 U*	0.086 J
Nickel	mg/kg	0.17 U*	0.13	<0.037	<0.079	<0.041
Selenium	mg/kg	0.48	0.36	0.60	0.96	0.63
Silver	mg/kg	<0.022	<0.010	<0.010	<0.021	<0.011
Strontium	mg/kg	0.79 J	1.0	0.19 J	<0.31	0.70
Thallium	mg/kg	<0.013	<0.012	<0.012	<0.012	<0.013
Vanadium	mg/kg	0.12 J	0.072 J	<0.030	<0.064	<0.033
Zinc	mg/kg	32.5 J	32.2 J	26.6 J	29.7 J	26.0 J

Notes:

<	analyte was not detected at a concentration greater than the Method Detection Limit
%	percent
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
mg/kg	milligrams per kilogram
U*	this result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	this compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation

1. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate
2. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX C – PHOTOGRAPHIC LOGS

APPENDIX C.1

Photographic Logs Of Sediment Samples

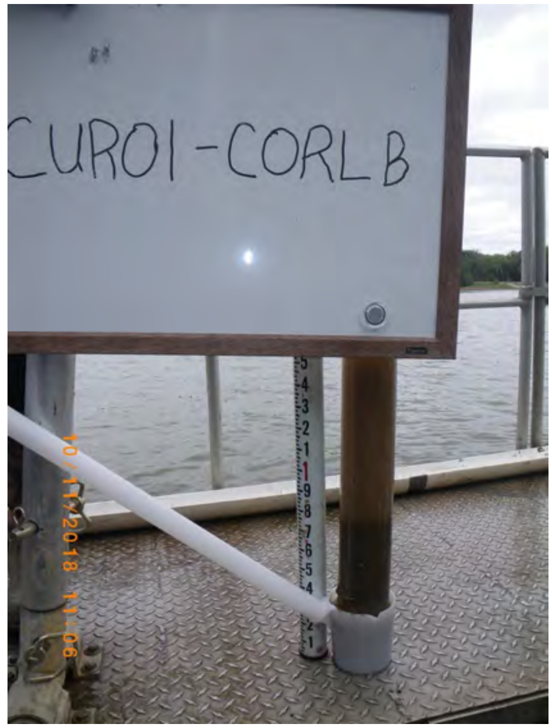
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 1

Photo Location: SED-CuR01-LB

Survey Date: 10/11/2018

Comments: Core depth 0.8 feet. Insufficient depositional sediments to form a sample.



Photograph ID: 2

Photo Location: SED-CuR01-LB

Survey Date: 10/11/2018

Comments: Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 3

Photo Location:
SED-CuR01-CC

Survey Date:
10/11/2018

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available. Vibecore deployments did not obtain substrate.

PHOTOGRAPH NOT AVAILABLE

Photograph ID: 4

Photo Location:
SED-CuR01-RB

Survey Date:
10/11/2018

Comments:
Core depth 1.4 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.4.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 5 **Photo Location:** SED-CuR02-LB **Survey Date:** 10/11/2018 **Comments:** Several Vibecore and Ponar deployments. No depositional sediments obtained. Photo not available.	PHOTOGRAPH NOT AVAILABLE
Photograph ID: 6 **Photo Location:** SED-CuR02-CC **Survey Date:** 10/11/2018 **Comments:** Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Vibecore deployments did not obtain substrate.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 7 **Photo Location:** SED-CuR02-RB **Survey Date:** 10/11/2018 **Comments:** Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Vibecore deployments yielded insufficient depositional sediments to form a sample.	
Photograph ID: 8 **Photo Location:** SED-CuR03-LB **Survey Date:** 10/10/2018 **Comments:** Core depth 5.0 feet. Sample intervals (feet): 0.0-0.5 and 0.5-5.0.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 9

Photo Location:
SED-CuR03-LB

Survey Date:
10/10/2018

Comments:
Core depth 5.0 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-5.0.

Photograph ID: 10

Photo Location:
SED-CuR03-CC

Survey Date:
10/10/2018

Comments:
Several Vibecore and Ponar deployments. No depositional sediments obtained. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 11

Photo Location: SED-CuR03-RB

Survey Date: 10/10/2018

Comments: Core depth 3.1 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.1, 2.1-2.6, and 2.6-3.1

Photograph ID: 12

Photo Location: SED-CuR03-RB

Survey Date: 10/10/2018

Comments: Core depth 3.1 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.1, 2.1-2.6, and 2.6-3.1

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 13

Photo Location: SED-CuR04-LB

Survey Date: 10/10/2018

Comments: Core depth 2.9 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.1, and 2.1-2.9.

Photograph ID: 14

Photo Location: SED-CuR04-LB

Survey Date: 10/10/2018

Comments: Core depth 2.9 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.1, and 2.1-2.9.

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 15

Photo Location:
SED-CuR04-CC

Survey Date:
10/10/2018

Comments:
Surficial (0.0-0.5 feet) sediment sample generated from a composite of two Ponar grabs. Photo not available. Vibecore deployments yielded insufficient recovery to form a sample.

PHOTOGRAPH NOT AVAILABLE

Photograph ID: 16

Photo Location:
SED-CuR04-RB

Survey Date:
10/10/2018

Comments:
Core depth 1.5 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.3. Parent material 1.3-1.5 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 17

Photo Location:
SED-CuR04-RB

Survey Date:
10/10/2018

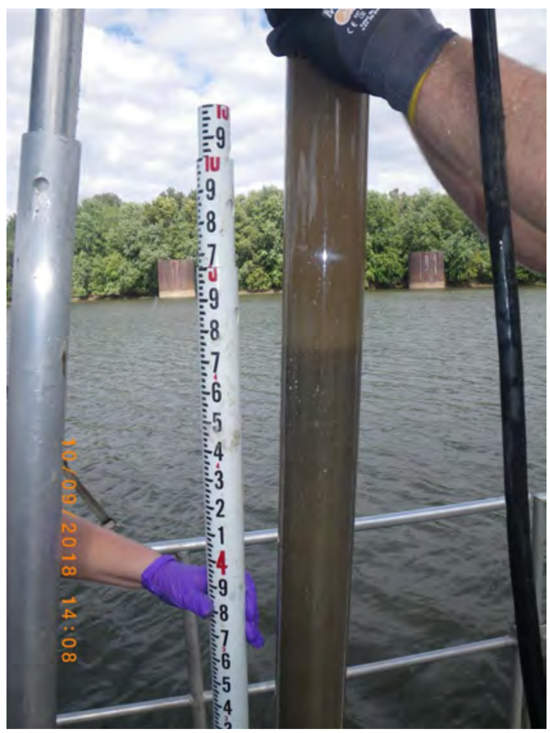
Comments:
Core depth 1.5 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.3. Parent material 1.3-1.5 feet.

Photograph ID: 18

Photo Location:
SED-CuR05-LB

Survey Date:
10/9/2018

Comments:
Core depth 4.7 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.0, and 2.0-4.7.



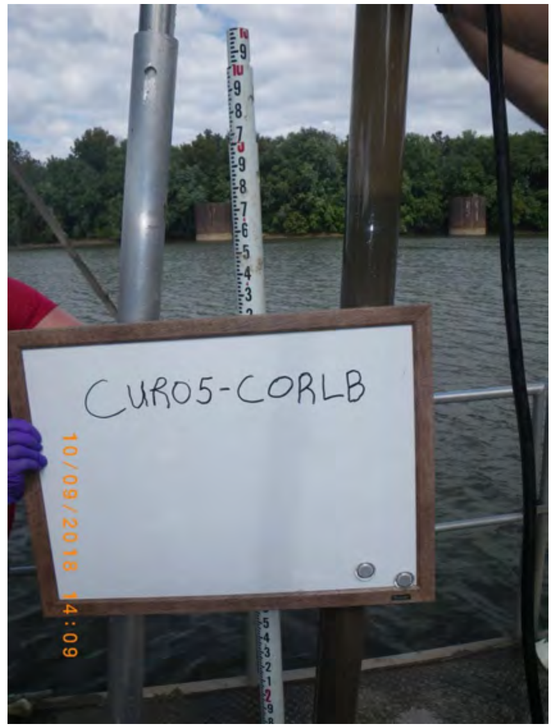
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 19

Photo Location: SED-CuR05-LB

Survey Date: 10/9/2018

Comments: Core depth 4.7 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.0, and 2.0-4.7.



Photograph ID: 20

Photo Location: SED-CuR05-CC

Survey Date: 10/9/2018

Comments: Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available. Vibecore deployments did not obtain substrate.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 21

Photo Location:
SED-CuR05-RB

Survey Date:
10/9/2018

Comments:
Core depth 1.6 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-1.6.

Photograph ID: 22

Photo Location:
SED-CuR05-RB

Survey Date:
10/9/2018

Comments:
Core depth 1.6 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-1.6.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 23 **Photo Location:** SED-CuR06-LB **Survey Date:** 10/9/2018 **Comments:** Core depth 6.0 feet. Sample intervals (feet): 0.0-0.5 and 0.5-6.0.	
Photograph ID: 24 **Photo Location:** SED-CuR06-LB **Survey Date:** 10/9/2018 **Comments:** Core depth 6.0 feet. Sample intervals (feet): 0.0-0.5 and 0.5-6.0.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 25 **Photo Location:** SED-CuR06-CC **Survey Date:** 10/9/2018 **Comments:** Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available. Vibecore deployments did not obtain substrate.	PHOTOGRAPH NOT AVAILABLE
Photograph ID: 26 **Photo Location:** SED-CuR06-RB **Survey Date:** 10/9/2018 **Comments:** Core depth 1.7 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.7.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 27 **Photo Location:** SED-CuR06-RB **Survey Date:** 10/9/2018 **Comments:** Core depth 1.7 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.7.	
Photograph ID: 28 **Photo Location:** SED-CuR07-LB **Survey Date:** 10/8/2018 **Comments:** Core depth 4.3 feet. Sample intervals (feet): 0.0-0.5 and 0.5-4.3.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 29

Photo Location:
SED-CuR07-CC

Survey Date:
10/9/2018

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Vibecore deployments yielded insufficient recovery to form a sample.

Photograph ID: 30

Photo Location:
SED-CuR07-RB

Survey Date:
10/9/2018

Comments:
Core depth 6.0 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.4, 3.4-4.8, and 4.8-5.7. Parent material 5.7-6.0 feet.

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 31

Photo Location:
SED-CuR07-RB

Survey Date:
10/9/2018

Comments:
Core depth 6.0 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.4, 3.4-4.8, and 4.8-5.7. Parent material 5.7-6.0 feet.

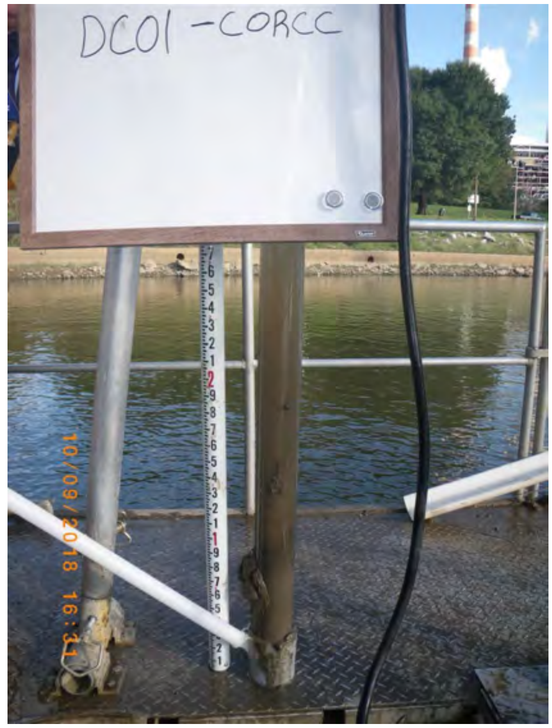
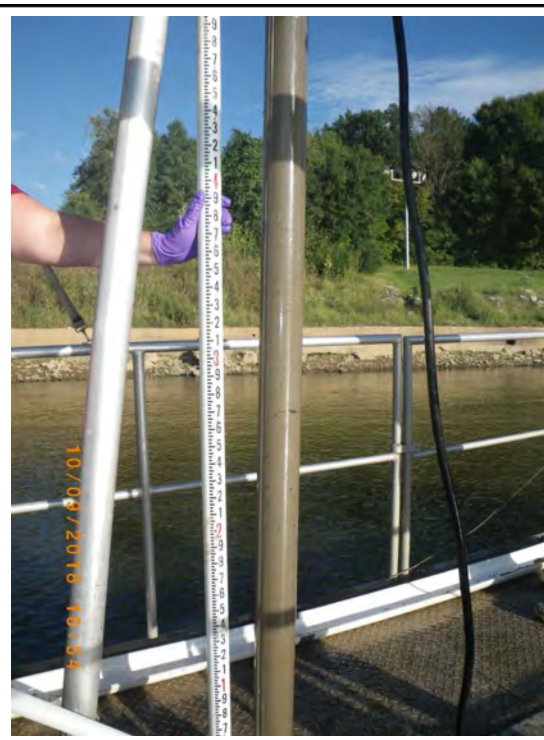
Photograph ID: 32

Photo Location:
SED-DC01-LB

Survey Date:
10/9/2018

Comments:
Core depth 1.9 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.9.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 33 **Photo Location:** SED-DC01-CC **Survey Date:** 10/9/2018 **Comments:** Core depth 1.0 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.0.	
Photograph ID: 34 **Photo Location:** SED-DC01-RB **Survey Date:** 10/9/2018 **Comments:** Core depth 6.0 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.2, 2.2-5.6, and 5.6-6.0.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 35 **Photo Location:** SED-DC01-RB **Survey Date:** 10/9/2018 **Comments:** Core depth 6.0 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.2, 2.2-5.6, and 5.6-6.0.	
Photograph ID: 36 **Photo Location:** SED-DC01-RB **Survey Date:** 10/9/2018 **Comments:** Core depth 6.0 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.2, 2.2-5.6, and 5.6-6.0.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 37

Photo Location:
SED-WC01-LB

Survey Date:
10/18/2018

Comments:
Core depth 4.0 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-3.8.
Discarded lower stratum (3.8-4.0 feet) composed of sand.

Photograph ID: 38

Photo Location:
SED-WC01-LB

Survey Date:
10/18/2018

Comments:
Core depth 4.0 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-3.8.
Discarded lower stratum (3.8-4.0 feet) composed of sand.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 39

Photo Location: SED-WC01-LB

Survey Date: 10/18/2018

Comments: Core depth 4.0 feet. Sample intervals (feet): 0.0-0.5 and 0.5-3.8. Discarded lower stratum (3.8-4.0 feet) composed of sand.

Photograph ID: 40

Photo Location: SED-WC01-CC

Survey Date: 10/18/2018

Comments: Core depth 3.0 feet. Sample interval (feet): 2.2-3.0. Upper portion of core (0.0-2.2) composed mostly of gravel and sand.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 41 **Photo Location:** SED-WC01-CC **Survey Date:** 10/18/2018 **Comments:** Core depth 3.0 feet. Sample interval (feet): 2.2-3.0. Upper portion of core (0.0-2.2) composed mostly of gravel and sand.	
Photograph ID: 42 **Photo Location:** SED-WC01-CC **Survey Date:** 10/18/2018 **Comments:** Core depth 3.0 feet. Sample interval (feet): 2.2-3.0. Upper portion of core (0.0-2.2) composed mostly of gravel and sand.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 43

Photo Location: SED-WC01-RB

Survey Date: 10/18/2018

Comments: Core depth 4.5 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.4, and 2.4-4.5.

Photograph ID: 44

Photo Location: SED-WC01-RB

Survey Date: 10/18/2018

Comments: Core depth 4.5 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.4, and 2.4-4.5.

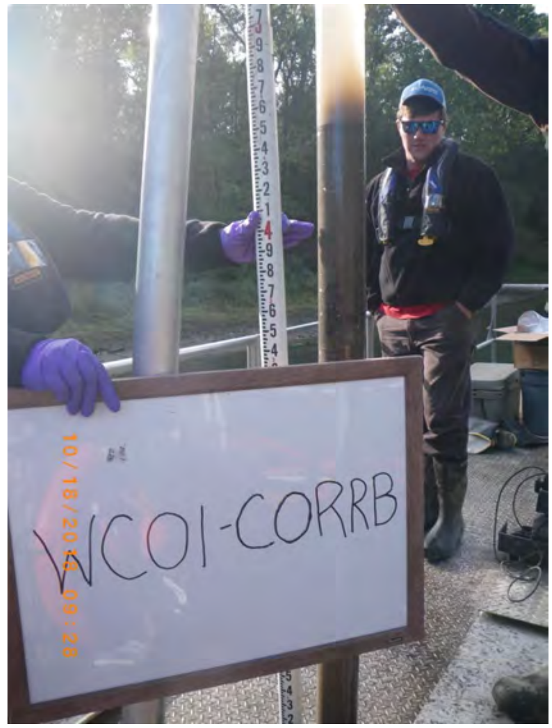
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 45

Photo Location: SED-WC01-RB

Survey Date: 10/18/2018

Comments: Core depth 4.5 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.4, and 2.4-4.5.



Photograph ID: 46

Photo Location: SED-WC01-RB

Survey Date: 10/18/2018

Comments: Core depth 4.5 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.4, and 2.4-4.5.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 47

Photo Location:
SED-WC02-LB

Survey Date:
10/17/2018

Comments:
Core depth 4.6 feet.
Sample intervals (feet):
0.0-0.5, 0.5-2.5, and
2.5-4.6.

Photograph ID: 48

Photo Location:
SED-WC02-LB

Survey Date:
10/17/2018

Comments:
Core depth 4.6 feet.
Sample intervals (feet):
0.0-0.5, 0.5-2.5, and
2.5-4.6.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 49

Photo Location: SED-WC02-LB

Survey Date: 10/17/2018

Comments: Core depth 4.6 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.5, and 2.5-4.6.

Photograph ID: 50

Photo Location: SED-WC02-CC

Survey Date: 10/17/2018

Comments: Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 51

Photo Location: SED-WC02-RB

Survey Date: 10/17/2018

Comments: Core depth 2.3 feet. Sample intervals (feet): 0.0-0.5 and 0.5-2.3.

Photograph ID: 52

Photo Location: SED-WC02-RB

Survey Date: 10/17/2018

Comments: Core depth 2.3 feet. Sample intervals (feet): 0.0-0.5 and 0.5-2.3.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 53

Photo Location:
SED-WC02-RB

Survey Date:
10/17/2018

Comments:
Core depth 2.3 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-2.3.

Photograph ID: 54

Photo Location:
SED-WC03-LB

Survey Date:
10/17/2018

Comments:
Core depth 4.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-3.3, and
3.3-4.7.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 55

Photo Location: SED-WC03-LB

Survey Date: 10/17/2018

Comments: Core depth 4.7 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.3, and 3.3-4.7.

Photograph ID: 56

Photo Location: SED-WC03-LB

Survey Date: 10/17/2018

Comments: Core depth 4.7 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.3, and 3.3-4.7.

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 57

Photo Location:
SED-WC03-CC

Survey Date:
10/17/2018

Comments:
Core depth 5.4 feet.
Sample intervals (feet):
0.0-0.5, 1.0-2.1, 2.1-3.2,
and 3.2-5.4.

Photograph ID: 58

Photo Location:
SED-WC03-CC

Survey Date:
10/17/2018

Comments:
Core depth 5.4 feet.
Sample intervals (feet):
0.0-0.5, 1.0-2.1, 2.1-3.2
and 3.2-5.4.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 59

Photo Location: SED-WC03-CC

Survey Date: 10/17/2018

Comments: Core depth 5.4 feet. Sample intervals (feet): 0.0-0.5, 1.0-2.1, 2.1-3.2, and 3.2-5.4.

Photograph ID: 60

Photo Location: SED-WC03-RB

Survey Date: 10/17/2018

Comments: Core depth 3.8 feet. Sample intervals (feet): 0.0-0.5 and 0.5-3.8.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 61

Photo Location:
SED-WC03-RB

Survey Date:
10/17/2018

Comments:
Core depth 3.8 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-3.8.

Photograph ID: 62

Photo Location:
SED-WC03-RB

Survey Date:
10/17/2018

Comments:
Core depth 3.8 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-3.8.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 63

Photo Location: SED-WC04-LB

Survey Date: 10/16/2018

Comments: Core depth 3.1 feet. Sample intervals (feet): 0.0-0.5 and 0.5-2.4. Parent material 2.4-3.1 feet.

Photograph ID: 64

Photo Location: SED-WC04-LB

Survey Date: 10/16/2018

Comments: Core depth 3.1 feet. Sample intervals (feet): 0.0-0.5 and 0.5-2.4. Parent material 2.4-3.1 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 65

Photo Location:
SED-WC04-LB

Survey Date:
10/16/2018

Comments:
Core depth 3.1 feet. Sample intervals (feet): 0.0-0.5 and 0.5-2.4. Parent material 2.4-3.1 feet.

Photograph ID: 66

Photo Location:
SED-WC04-CC

Survey Date:
10/16/2018

Comments:
Core depth 3.9 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.9. Parent material 1.9-3.9 feet.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 67

Photo Location: SED-WC04-CC

Survey Date: 10/16/2018

Comments: Core depth 3.9 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.9. Parent material 1.9-3.9 feet.

Photograph ID: 68

Photo Location: SED-WC04-RB

Survey Date: 10/16/2018

Comments: Core depth 2.9 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.0, and 2.0-2.9.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 69

Photo Location:
SED-WC04-RB

Survey Date:
10/16/2018

Comments:
Core depth 2.9 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.0 and 2.0-2.9.

Photograph ID: 70

Photo Location:
SED-WC04-RB

Survey Date:
10/16/2018

Comments:
Core depth 2.9 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.0, and 2.0-2.9.

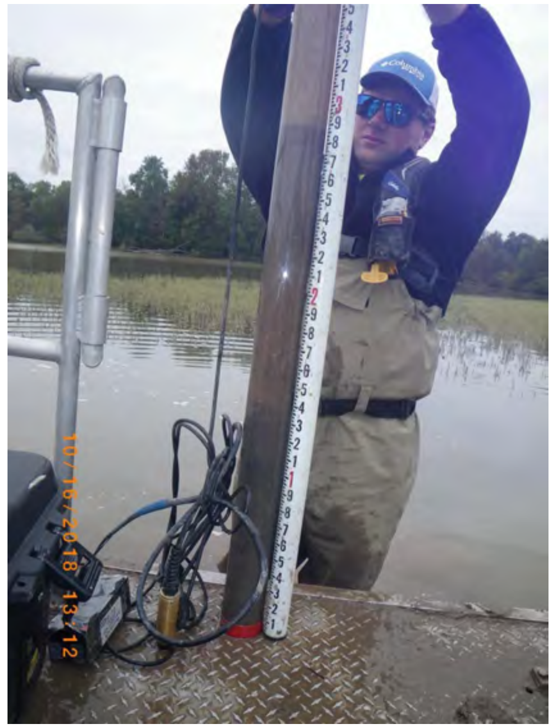
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 71

Photo Location:
SED-WC05-LB

Survey Date:
10/16/2018

Comments:
Core depth 2.8 feet.
Sample intervals (feet):
0.0-0.5, 0.5-1.5, and
1.5-2.8.



Photograph ID: 72

Photo Location:
SED-WC05-LB

Survey Date:
10/16/2018

Comments:
Core depth 2.8 feet.
Sample intervals (feet):
0.0-0.5, 0.5-1.5, and
1.5-2.8.

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 73

Photo Location: SED-WC05-LB

Survey Date: 10/16/2018

Comments: Core depth 2.8 feet. Sample intervals (feet): 0.0-0.5, 0.5-1.5, and 1.5-2.8.

Photograph ID: 74

Photo Location: SED-WC05-CC

Survey Date: 10/16/2018

Comments: Core depth 1.9 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.9 feet.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 75 **Photo Location:** SED-WC05-CC **Survey Date:** 10/16/2018 **Comments:** Core depth 1.9 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.9 feet.	
Photograph ID: 76 **Photo Location:** SED-WC05-CC **Survey Date:** 10/16/2018 **Comments:** Core depth 1.9 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.9 feet.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 77

Photo Location:
SED-WC05-RB

Survey Date:
10/16/2018

Comments:
Core depth 4.6 feet.
Sample intervals (feet):
0.0-0.5, 0.5-0.9, and
0.9-4.6.

Photograph ID: 78

Photo Location:
SED-WC05-RB

Survey Date:
10/16/2018

Comments:
Core depth 4.6 feet.
Sample intervals (feet):
0.0-0.5, 0.5-0.9, and
0.9-4.6.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 79

Photo Location: SED-WC05-RB

Survey Date: 10/16/2018

Comments: Core depth 4.6 feet. Sample intervals (feet): 0.0-0.5, 0.5-0.9, and 0.9-4.6.

Photograph ID: 80

Photo Location: SED-WC06-LB

Survey Date: 10/16/2018

Comments: Core depth 1.3 feet. Insufficient depositional sediments to form a sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 81

Photo Location:
SED-WC06-LB

Survey Date:
10/16/2018

Comments:
Core depth 1.3 feet. Insufficient depositional sediments to form a sample.

Photograph ID: 82

Photo Location:
SED-WC06-LB

Survey Date:
10/16/2018

Comments:
Core depth 1.3 feet. Insufficient depositional sediments to form a sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 83

Photo Location: SED-WC06-LB

Survey Date: 10/16/2018

Comments: Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Photograph ID: 84

Photo Location: SED-WC06-CC

Survey Date: 10/16/2018

Comments: Core depth 3.7 feet. Sample intervals (feet): 0.0-0.5, 0.5-1.3, and 1.3-2.7. Parent material 2.7-3.7 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 85

Photo Location:
SED-WC06-CC

Survey Date:
10/16/2018

Comments:
Core depth 3.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-1.3, and
1.3-2.7. Parent material
2.7-3.7 feet.

Photograph ID: 86

Photo Location:
SED-WC06-CC

Survey Date:
10/16/2018

Comments:
Core depth 3.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-1.3, and
1.3-2.7. Parent material
2.7-3.7 feet.

Tennessee Valley Authority

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 87 **Photo Location:** SED-WC06-RB **Survey Date:** 10/16/2018 **Comments:** Core depth 0.8 feet. Insufficient depositional sediments to form a sample.	
Photograph ID: 88 **Photo Location:** SED-WC06-RB **Survey Date:** 10/16/2018 **Comments:** Core depth 0.8 feet. Insufficient depositional sediments to form a sample.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 89

Photo Location:
SED-WC06-RB

Survey Date:
10/16/2018

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 90

Photo Location:
SED-WC07-LB

Survey Date:
10/11/2018

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 91

Photo Location:
SED-WC07-CC

Survey Date:
10/11/2018

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 92

Photo Location:
SED-WC07-RB

Survey Date:
10/11/2018

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 93	PHOTOGRAPH NOT AVAILABLE
Photo Location: SED-WC08-LB	
Survey Date: 10/11/2018	
Comments: Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.	
Photograph ID: 94	PHOTOGRAPH NOT AVAILABLE
Photo Location: SED-WC08-CC	
Survey Date: 10/11/2018	
Comments: Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 95

Photo Location: SED-WC08-RB

Survey Date: 10/11/2018

Comments: Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Photograph ID: 96

Photo Location: SED-WC09-LB

Survey Date: 10/11/2018

Comments: Ponar grab. Insufficient depositional sediments to form a sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 97

Photo Location:
SED-WC09-CC

Survey Date:
10/11/2018

Comments:
Core depth 0.6 feet. Insufficient depositional sediments to form a sample. (Location ID shown on whiteboard should be WC09-CORCC.)

Photograph ID: 98

Photo Location:
SED-WC09-CC

Survey Date:
10/11/2018

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 99 **Photo Location:** SED-WC09-CC **Survey Date:** 12/6/2018 **Comments:** Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.	PHOTOGRAPH NOT AVAILABLE
Photograph ID: 100 **Photo Location:** SED-WC09-RB **Survey Date:** 10/11/2018 **Comments:** Ponar grab. Surficial (0.0-0.5 feet) sediment sample. Photo not available.	PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 101

Photo Location: SED-WC10-LB

Survey Date: 10/11/2018

Comments: Core depth 3.5 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.0, and 3.0-3.5.

Photograph ID: 102

Photo Location: SED-WC10-LB

Survey Date: 10/11/2018

Comments: Core depth 3.5 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.0, and 3.0-3.5.

TVA Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 103

Photo Location:
SED-WC10-CC

Survey Date:
10/11/2018

Comments:
Core depth 1.9 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.9 feet.

Photograph ID: 104

Photo Location:
SED-WC10-CC

Survey Date:
10/11/2018

Comments:
Core depth 1.9 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.9 feet.

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 105 **Photo Location:** SED-WC10-CC **Survey Date:** 10/11/2018 **Comments:** Core depth 1.9 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.9 feet.	
Photograph ID: 106 **Photo Location:** SED-WC10-CC **Survey Date:** 10/11/2018 **Comments:** Core depth 1.9 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.9 feet.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 107

Photo Location:
SED-WC10-RB

Survey Date:
10/11/2018

Comments:
Transect SED-WC10 from right bank to left bank

Photograph ID: 108

Photo Location:
SED-WC10-RB

Survey Date:
10/11/2018

Comments:
Core depth 1.3 feet.
Sample interval (feet):
0.0-0.5. Parent material
0.5-1.3 feet.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 109 **Photo Location:** SED-WC10-RB **Survey Date:** 10/11/2018 **Comments:** Core depth 1.3 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.3 feet.	
Photograph ID: 110 **Photo Location:** SED-WC10-RB **Survey Date:** 10/11/2018 **Comments:** Core depth 1.3 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.3 feet.	

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 111

Photo Location:
SED-UT01-LB

Survey Date:
8/21/2019

Comments:
Core depth 1.15 feet. Upper 0.4 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

Photograph ID: 112

Photo Location:
SED-UT01-LB

Survey Date:
8/21/2019

Comments:
Core depth 1.15 feet. Upper 0.4 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

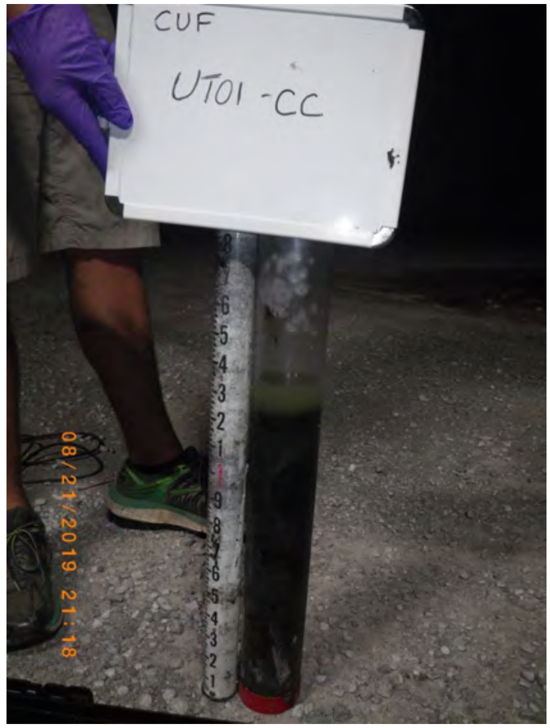
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 113

Photo Location: SED-UT01-CC

Survey Date: 8/21/2019

Comments: Core depth 1.25 feet. Upper 0.5 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.



Photograph ID: 114

Photo Location: SED-UT01-CC

Survey Date: 8/21/2019

Comments: Core depth 1.25 feet. Upper 0.5 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 115

Photo Location:
SED-UT01-CC

Survey Date:
8/21/2019

Comments:
Core depth 1.25 feet. Upper 0.5 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

Photograph ID: 116

Photo Location:
SED-UT01-RB

Survey Date:
8/21/2019

Comments:
Core depth 2.0 feet. Upper 0.5 feet of core (aqueous organic matter) discarded, and core depth (1.5 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.7-1.5 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 117

Photo Location: SED-UT01-RB

Survey Date: 8/21/2019

Comments: Core depth 2.0 feet. Upper 0.5 feet of core (aqueous organic matter) discarded, and core depth (1.5 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.7-1.5 feet.

Photograph ID: 118

Photo Location: SED-UT01.5-CC

Survey Date: 8/21/2019

Comments: Core depth 1.5 feet. Upper 0.4 feet of core (aqueous organic matter) discarded, and core depth (1.1 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.8-1.1. Station UT01-RM was not proposed in the SAP. This station was later assigned ID UT01.5-CC to represent its approximate location relative to UT01 and UT02.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 119

Photo Location: SED-UT01.5-CC

Survey Date: 8/21/2019

Comments: Core depth 1.5 feet. Upper 0.4 feet of core (aqueous organic matter) discarded, and core depth (1.1 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.8-1.1. Station UT01-RM was not proposed in the SAP. This station was later assigned ID UT01.5-CC to represent its approximate location relative to UT01 and UT02.

Photograph ID: 120

Photo Location: Site Photo - Transects SED-UT02 and SED-UT03

Survey Date: 8/21/2019

Comments: Pool on the Wells Creek unnamed tributary containing transects UT02 and UT03

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 121

Photo Location: Site Photo - Transect SED-UT02

Survey Date: 8/21/2019

Comments: Transect SED-UT02 from left bank to right bank

Photograph ID: 122

Photo Location: SED-UT02-LB

Survey Date: 8/21/2019

Comments: Core collected at SED-UT02-LB containing organic material. Core not retained.

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 123

Photo Location:
Site Photo - SED-UT02-LB

Survey Date:
8/21/2019

Comments:
SED-UT02-LB sample area

Photograph ID: 124

Photo Location:
SED-UT02-LB

Survey Date:
8/21/2019

Comments:
Core depth 0.9 feet. Organic matter and parent material. Core discarded. No sample generated.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 125

Photo Location: SED-UT02-LB

Survey Date: 8/21/2019

Comments: Core depth 0.9 feet. Organic matter and parent material. Core discarded. No sample generated.

Photograph ID: 126

Photo Location: SED-UT02-LB

Survey Date: 8/21/2019

Comments: Core depth 0.9 feet. Organic matter and parent material. Core discarded. No sample generated.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 127

Photo Location: SED-UT02-CC

Survey Date: 8/21/2019

Comments: Core depth 1.45 feet. Upper 0.7 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

Photograph ID: 128

Photo Location: SED-UT02-CC

Survey Date: 8/21/2019

Comments: Core depth 1.45 feet. Upper 0.7 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

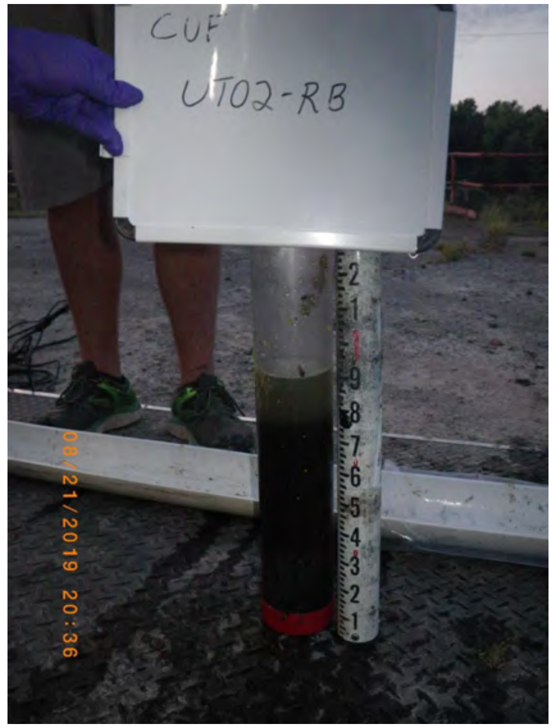
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 129

Photo Location:
SED-UT02-RB

Survey Date:
8/21/2019

Comments:
Core 1: Core depth 0.75 feet. Core composed mostly of organic material. Core discarded.



Photograph ID: 130

Photo Location:
SED-UT02-RB

Survey Date:
8/21/2019

Comments:
Core 1: Core depth 0.75 feet. Core composed mostly of organic material. Core discarded.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 131

Photo Location: SED-UT02-RB

Survey Date: 8/21/2019

Comments: Core 1: Core depth 0.75 feet. Core composed mostly of organic material. Core discarded.

Photograph ID: 132

Photo Location: SED-UT02-RB

Survey Date: 8/21/2019

Comments: Core 2: Core depth 2.3 feet. Upper 0.3 feet of core (aqueous organic matter) discarded, and core depth (2.0 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-2.0.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 133 **Photo Location:** SED-UT02-RB **Survey Date:** 8/21/2019 **Comments:** Core 2: Core depth 2.3 feet. Upper 0.3 feet of core (aqueous organic matter) discarded, and core depth (2.0 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-2.0.	
Photograph ID: 134 **Photo Location:** SED-UT02-RB **Survey Date:** 8/21/2019 **Comments:** Core 2: Core depth 2.3 feet. Upper 0.3 feet of core (aqueous organic matter) discarded, and core depth (2.0 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-2.0.	

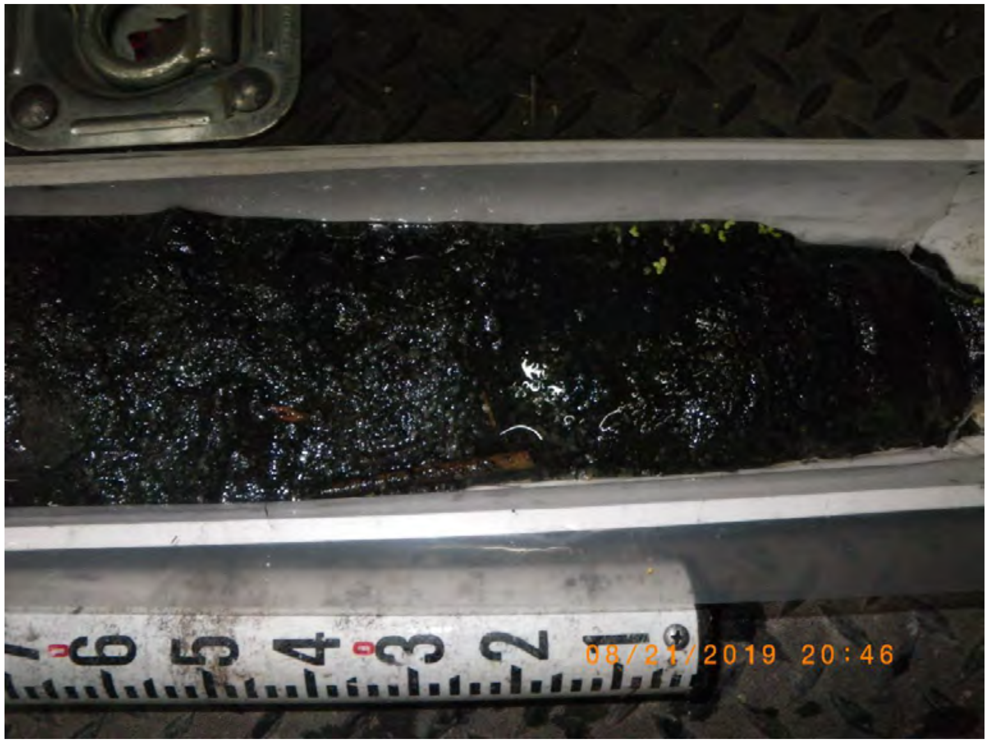
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 135

Photo Location: SED-UT02-RB

Survey Date: 8/21/2019

Comments: Core 2: Core depth 2.3 feet. Upper 0.3 feet of core (aqueous organic matter) discarded, and core depth (2.0 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-2.0.



Photograph ID: 136

Photo Location: SED-UT03-LB

Survey Date: 8/21/2019

Comments: Core depth 1.75 feet. Upper 1.0 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 137

Photo Location: SED-UT03-LB

Survey Date: 8/21/2019

Comments: Core depth 1.75 feet. Upper 1.0 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

Photograph ID: 138

Photo Location: SED-UT03-LB

Survey Date: 8/21/2019

Comments: Core depth 1.75 feet. Upper 1.0 feet of core (aqueous organic matter) discarded, and core depth (0.75 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.75 feet.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 139

Photo Location: SED-UT03-CC

Survey Date: 8/21/2019

Comments: Core depth 1.65 feet. Upper 0.25 feet of core (aqueous organic matter) discarded, and core depth (1.4 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-1.0. Parent material 1.0-1.4 feet.

Photograph ID: 140

Photo Location: SED-UT03-CC

Survey Date: 8/21/2019

Comments: Core depth 1.65 feet. Upper 0.25 feet of core (aqueous organic matter) discarded, and core depth (1.4 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-1.0. Parent material 1.0-1.4 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 141

Photo Location:
SED-UT03-CC

Survey Date:
8/21/2019

Comments:
Core depth 1.65 feet. Upper 0.25 feet of core (aqueous organic matter) discarded, and core depth (1.4 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-1.0. Parent material 1.0-1.4 feet.

Photograph ID: 142

Photo Location:
SED-UT03-RB

Survey Date:
8/21/2019

Comments:
Hard/rock substrate. No depositional sediments obtained. No sample generated.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 143

Photo Location: Site Photo - Transects UT04 and UT05

Survey Date: 10/17/2018

Comments: Pool on the Wells Creek unnamed tributary containing transects UT04 and UT05.

Photograph ID: 144

Photo Location: SED-UT04-LB

Survey Date: 10/17/2018

Comments: Core depth 4.2 feet. Upper 0.7 feet of core (aqueous organic matter) discarded, and core depth (3.5 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5, 0.5-2.7, and 2.7-3.5.

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 145

Photo Location: SED-UT04-LB

Survey Date: 10/17/2018

Comments: Core depth 4.2 feet. Upper 0.7 feet of core (aqueous organic matter) discarded, and core depth (3.5 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5, 0.5-2.7, and 2.7-3.5.

Photograph ID: 146

Photo Location: SED-UT04-LB

Survey Date: 10/17/2018

Comments: Core depth 4.2 feet. Upper 0.7 feet of core (aqueous organic matter) discarded, and core depth (3.5 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5, 0.5-2.7, and 2.7-3.5.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 147

Photo Location:
SED-UT04-CC

Survey Date:
10/17/2018

Comments:
Core depth 3.6 feet. Sample intervals (feet): 0.0-0.5 and 0.5-3.2. Parent material 3.2-3.6 feet.

Photograph ID: 148

Photo Location:
SED-UT04-CC

Survey Date:
10/17/2018

Comments:
Core depth 3.6 feet. Sample intervals (feet): 0.0-0.5 and 0.5-3.2. Parent material 3.2-3.6 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 149

Photo Location:
SED-UT04-RB

Survey Date:
10/17/2018

Comments:
Core depth 3.1 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-3.1.

Photograph ID: 150

Photo Location:
SED-UT04-RB

Survey Date:
10/17/2018

Comments:
Core depth 3.1 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-3.1.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 151

Photo Location:
SED-UT04-RB

Survey Date:
10/17/2018

Comments:
Core depth 3.1 feet. Sample intervals (feet): 0.0-0.5 and 0.5-3.1.

Photograph ID: 152

Photo Location:
SED-UT05-LB

Survey Date:
10/17/2018

Comments:
Core depth 1.2 feet. Upper 0.2 feet of core (aqueous organic matter) discarded, and core depth (1.0 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.0 feet.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 153

Photo Location: SED-UT05-LB

Survey Date: 10/17/2018

Comments: Core depth 1.2 feet. Upper 0.2 feet of core (aqueous organic matter) discarded, and core depth (1.0 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Parent material 0.5-1.0 feet.

Photograph ID: 154

Photo Location: SED-UT05-CC

Survey Date: 10/17/2018

Comments: Core depth 0.9 feet. Sample interval (feet): 0.0-0.5. Lower portion of core (0.5-0.9 feet) discarded.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 155

Photo Location: SED-UT05-RB

Survey Date: 10/17/2018

Comments: Core depth 1.0 feet. Sample interval (feet): 0.0-0.5. Discarded strata of dark, unconsolidated, fine particulate organic matter above and below the silt/clay stratum.

Photograph ID: 156

Photo Location: SED-UT05-RB

Survey Date: 10/17/2018

Comments: Core depth 1.0 feet. Sample interval (feet): 0.0-0.5. Discarded strata of dark, unconsolidated, fine particulate organic matter above and below the silt/clay stratum.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 157

Photo Location:
SED-UT05-RB

Survey Date:
10/17/2018

Comments:
Core depth 1.0 feet. Sample interval (feet): 0.0-0.5. Discarded strata of dark, unconsolidated, fine particulate organic matter above and below the silt/clay stratum.

Photograph ID: 158

Photo Location:
SED-PO01-LB

Survey Date:
10/18/2018

Comments:
Core depth 1.24 feet. Sample interval (feet): 0.0-0.5. Parent material 0.9-1.24 feet. (Location ID shown on whiteboard should be PO01-CORLB.)

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 159 **Photo Location:** SED-PO01-CC **Survey Date:** 10/18/2018 **Comments:** Core depth 1.75 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.4. Parent material 1.4-1.75 feet. (Location ID shown on whiteboard should be PO01-CORCC.)	
Photograph ID: 160 **Photo Location:** SED-PO01-RB **Survey Date:** 10/18/2018 **Comments:** Core depth 2.3 feet. Sample intervals (feet): 0.0-0.5, 0.5-1.3, and 1.3-2.3.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 161

Photo Location:
SED-PO01-RB

Survey Date:
10/18/2018

Comments:
Core depth 2.3 feet. Sample intervals (feet): 0.0-0.5, 0.5-1.3, and 1.3-2.3. (Location ID shown on whiteboard should be PO01-CORRB.)

APPENDIX C.2

Photographic Logs of Benthic Invertebrate Community Substrate Samples

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 1

Photo Location: MAC-CUR01-BEN01

Survey Date: 9/17/2018

Sample ID: CUF-MAC-CUR01-BEN01-20180917

Comments: Post-washdown

Photograph ID: 2

Photo Location: MAC-CUR01-BEN02

Survey Date: 9/17/2018

Sample ID: CUF-MAC-CUR01-BEN02-20180917

Comments: Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 3

Photo Location: MAC-CUR01-BEN03

Survey Date: 9/17/2018

Sample ID: CUF-MAC-CUR01-BEN03-20180917

Comments: Post-washdown

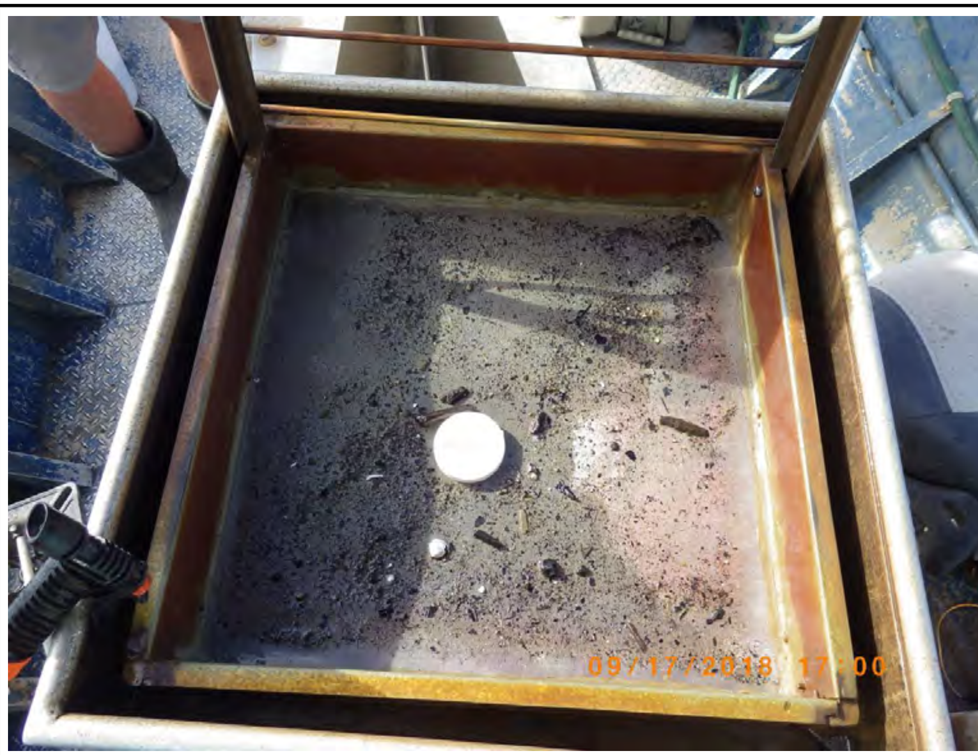
Photograph ID: 4

Photo Location: MAC-CUR01-BEN04

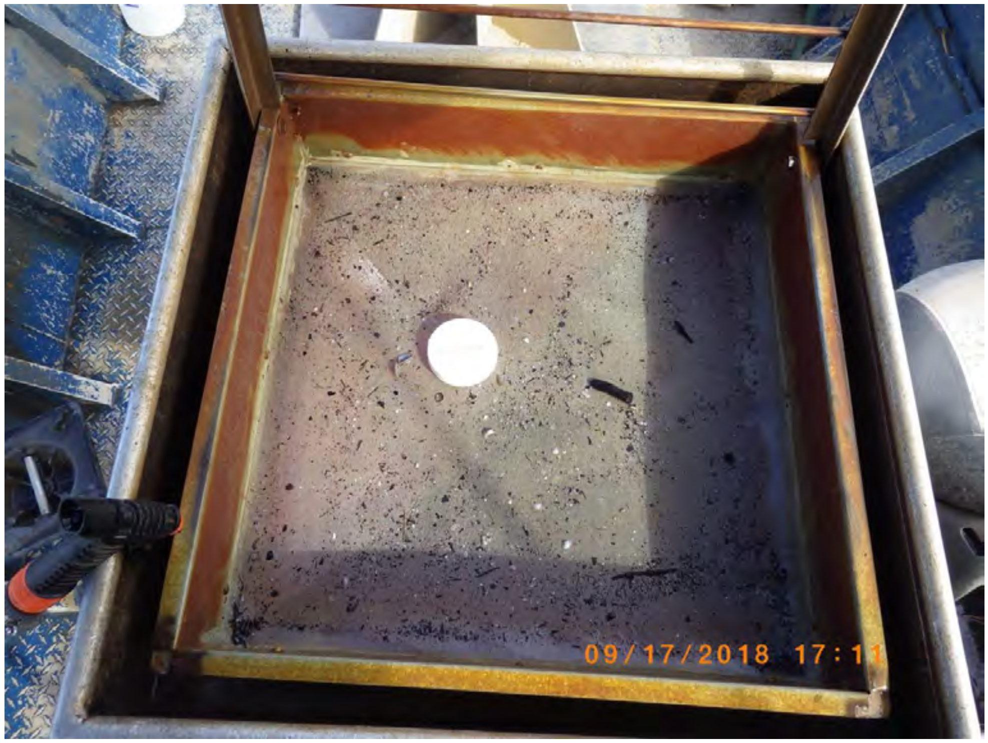
Survey Date: 9/17/2018

Sample ID: CUF-MAC-CUR01-BEN04-20180917

Comments: Post-washdown



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

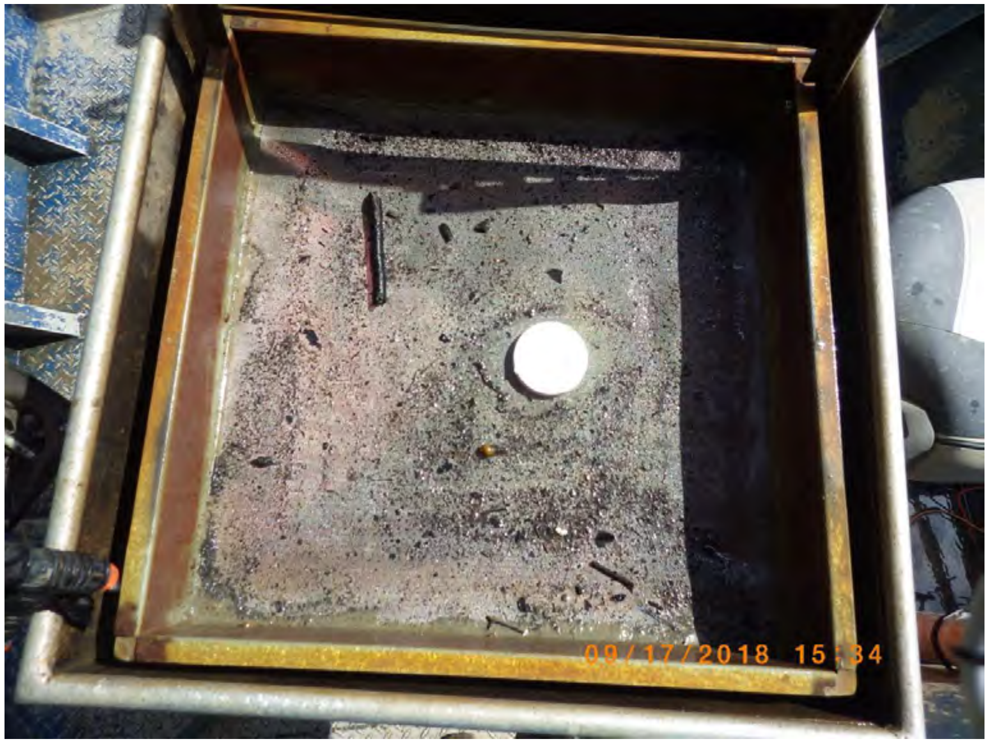
Photograph ID: 5 **Photo Location:** MAC-CUR01-BEN05 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR01-BEN05-20180917 **Comments:** Post-washdown	
Photograph ID: 6 **Photo Location:** MAC-CUR02-BEN01 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR02-BEN01-20180917 **Comments:** Post-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

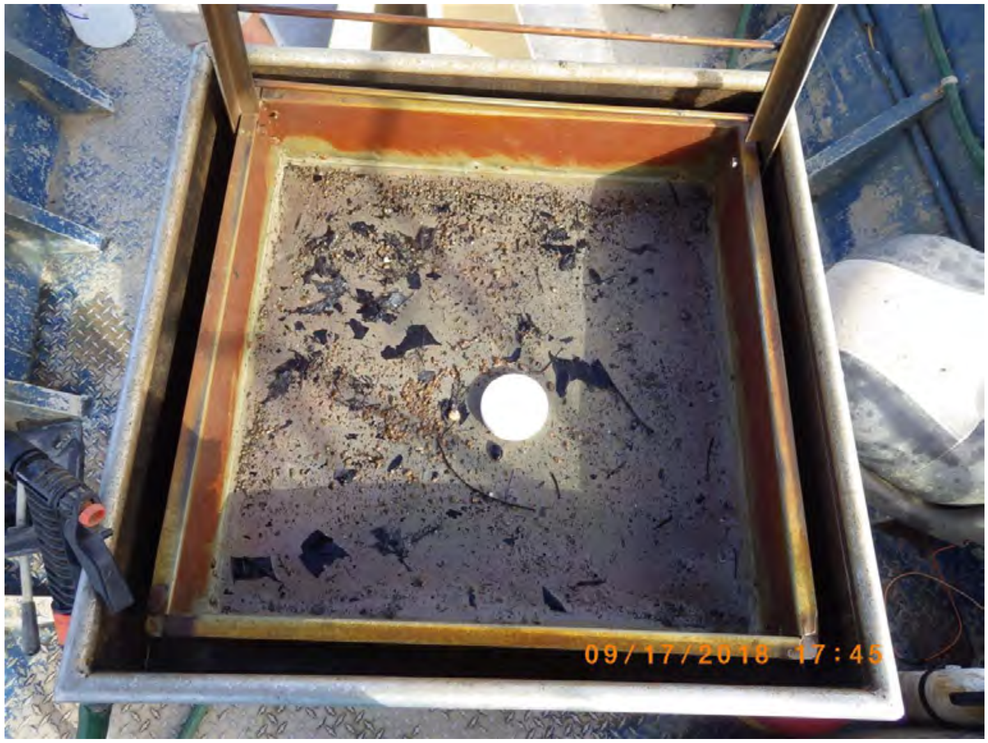
Photograph ID: 7	PHOTOGRAPH NOT AVAILABLE
Photo Location: MAC-CUR02-BEN02	
Survey Date: 9/17/2018	
Sample ID: CUF-MAC-CUR02-BEN02-20180917	
Comments: Photograph of MAC-CUR01-BEN02 is not available	

Photograph ID: 8	
Photo Location: MAC-CUR02-BEN03	
Survey Date: 9/17/2018	
Sample ID: CUF-MAC-CUR02-BEN03-20180917	
Comments: Post-washdown	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 9 **Photo Location:** MAC-CUR02-BEN04 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR02-BEN04-20180917 **Comments:** Post-washdown	
Photograph ID: 10 **Photo Location:** MAC-CUR02-BEN05 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR02-BEN05-20180917 **Comments:** Post-washdown	

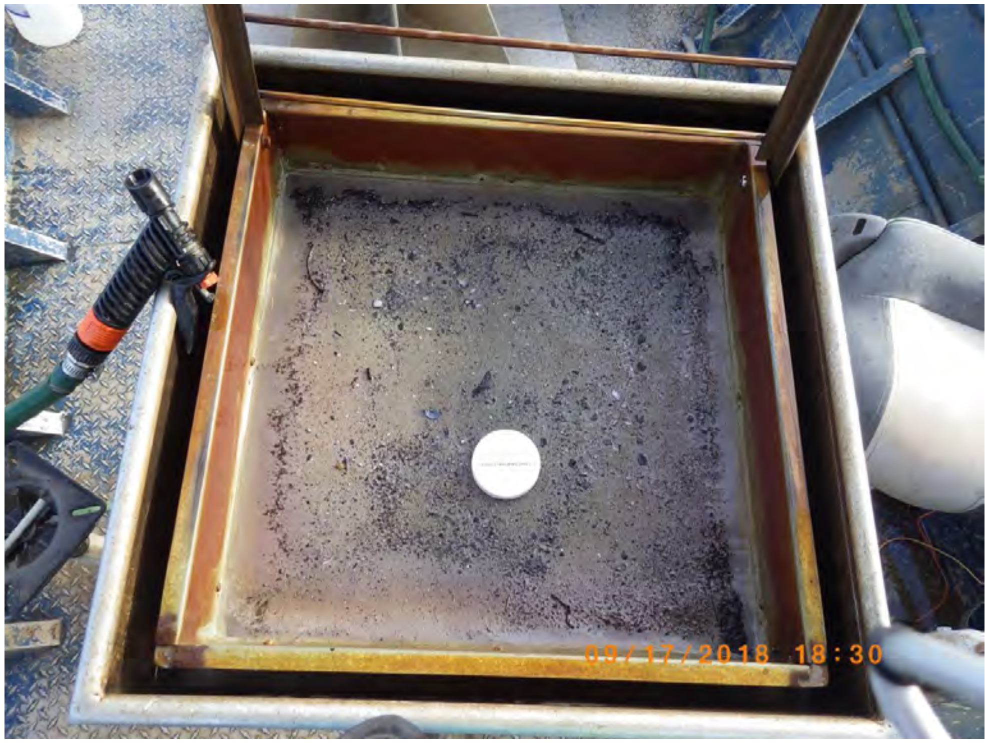
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 11 **Photo Location:** MAC-CUR03-BEN01 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR03-BEN01-20180917 **Comments:** Post-washdown	
Photograph ID: 12 **Photo Location:** MAC-CUR03-BEN02 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR03-BEN02-20180917 **Comments:** Post-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 13 **Photo Location:** MAC-CUR03-BEN03 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR03-BEN03-20180917 **Comments:** Post-washdown	
Photograph ID: 14 **Photo Location:** MAC-CUR03-BEN04 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR03-BEN04-20180917 **Comments:** Post-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 15 **Photo Location:** MAC-CUR03-BEN05 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-CUR03-BEN05-20180917 **Comments:** Post-washdown	
Photograph ID: 16 **Photo Location:** MAC-CUR04-BEN01 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-CUR04-BEN01-20180918 **Comments:** Post-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 17

Photo Location: MAC-CUR04-BEN02

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR04-BEN02-20180918

Comments: Post-washdown

Photograph ID: 18

Photo Location: MAC-CUR04-BEN03

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR04-BEN03-20180918

Comments: Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 19

Photo Location:
MAC-CUR04-BEN04

Survey Date:
9/18/2018

Sample ID:
CUF-MAC-CUR04-BEN04-20180918

Comments:
Post-washdown

Photograph ID: 20

Photo Location:
MAC-CUR04-BEN04

Survey Date:
9/18/2018

Sample ID:
CUF-MAC-CUR04-BEN04-20180918

Comments:
Mussel: Quadrula pustulosa

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 21

Photo Location: MAC-CUR04-BEN04

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR04-BEN04-20180918

Comments: Mussel: Quadrula pustulosa

Photograph ID: 22

Photo Location: MAC-CUR04-BEN05

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR04-BEN05-20180918

Comments: Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 23

Photo Location: MAC-CUR05-BEN01

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR05-BEN01-20180918

Comments: Post-washdown

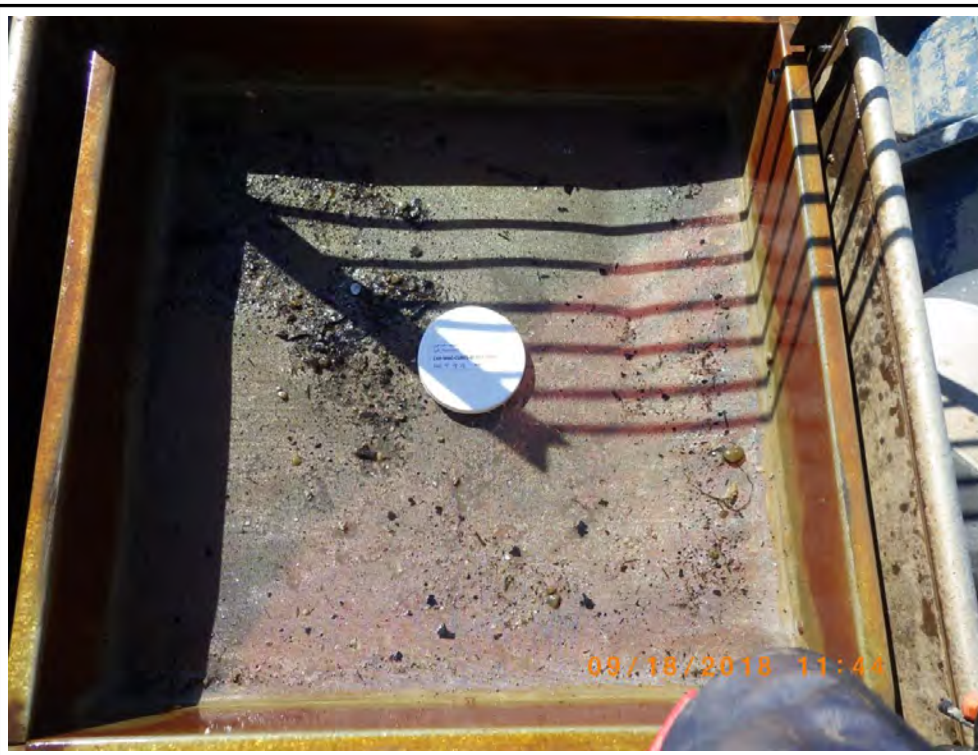
Photograph ID: 24

Photo Location: MAC-CUR05-BEN02

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR05-BEN02-20180918

Comments: Post-washdown



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 25

Photo Location: MAC-CUR05-BEN03

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR05-BEN03-20180918

Comments: Post-washdown

Photograph ID: 26

Photo Location: MAC-CUR05-BEN04

Survey Date: 9/18/2018

Sample ID: CUF-MAC-CUR05-BEN04-20180918

Comments: Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 27 **Photo Location:** MAC-CUR05-BEN05 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-CUR05-BEN05-20180918 **Comments:** Post-washdown	
Photograph ID: 28 **Photo Location:** MAC-WC01-BEN01 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC01-BEN01-20180917 **Comments:** Photograph of MAC-WC01-BEN01 is not available	PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 29 **Photo Location:** MAC-WC01-BEN02 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC01-BEN02-20180917 **Comments:** Photograph of MAC-WC01-BEN02 is not available	PHOTOGRAPH NOT AVAILABLE
Photograph ID: 30 **Photo Location:** MAC-WC01-BEN03 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC01-BEN03-20180917 **Comments:** Pre-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 31

Photo Location: MAC-WC01-BEN03

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC01-BEN03-20180917

Comments: Post-washdown

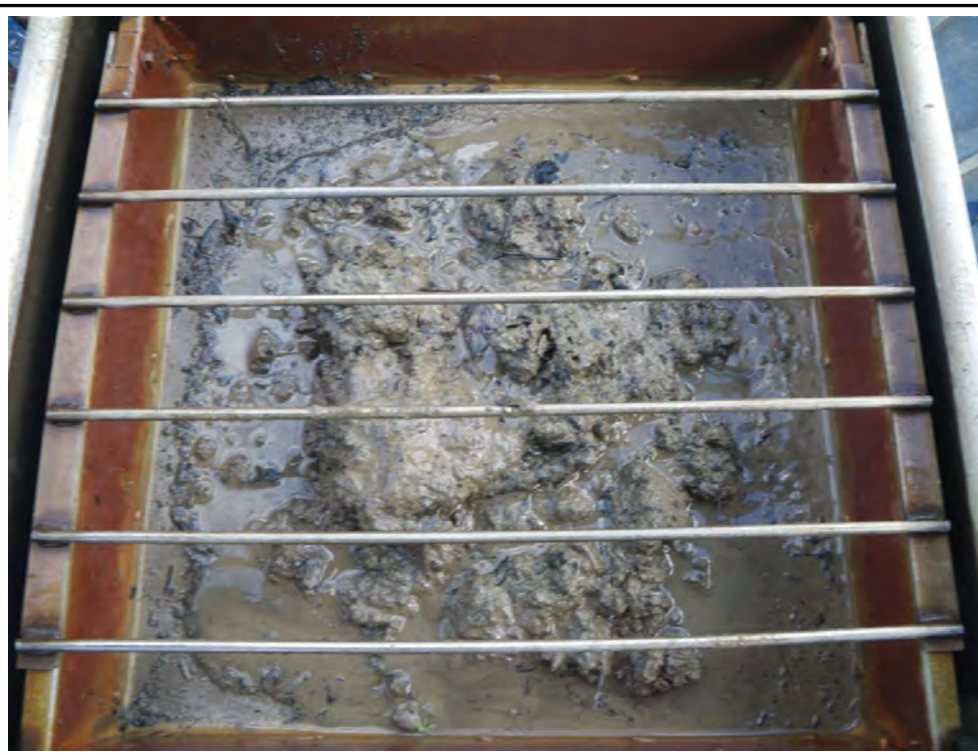
Photograph ID: 32

Photo Location: MAC-WC01-BEN04

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC01-BEN04-20180917

Comments: Pre-washdown



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 33

Photo Location: MAC-WC01-BEN04

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC01-BEN04-20180917

Comments: Post-washdown

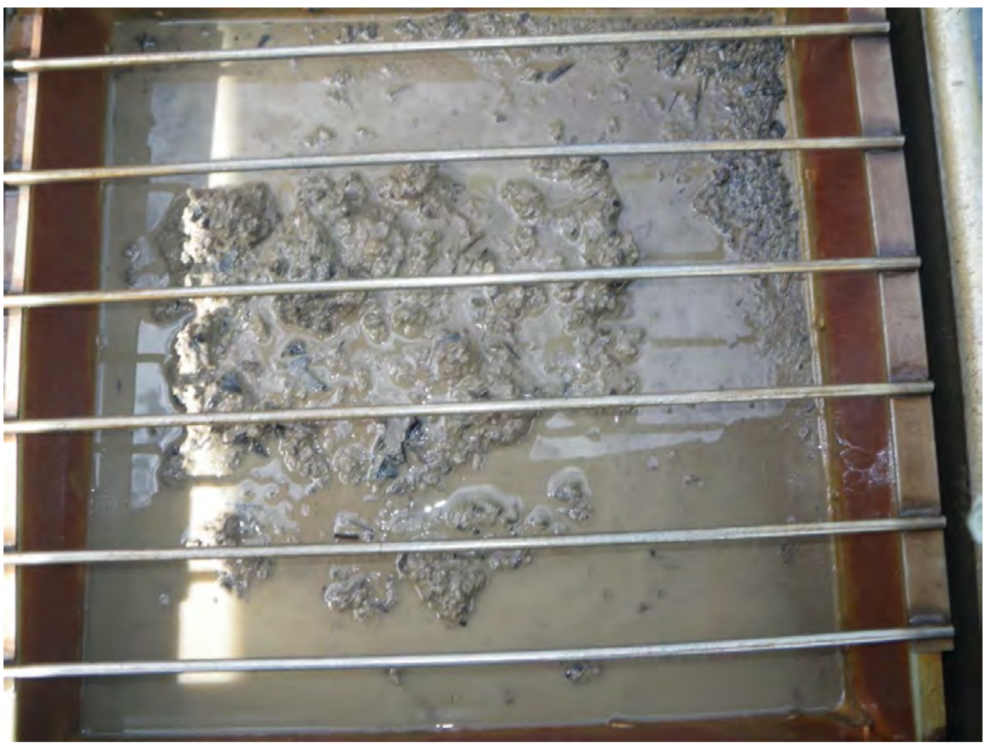
Photograph ID: 34

Photo Location: MAC-WC01-BEN05

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC01-BEN05-20180917

Comments: Pre-washdown



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 35 **Photo Location:** MAC-WC01-BEN05 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC01-BEN05-20180917 **Comments:** Post-washdown	
Photograph ID: 36 **Photo Location:** MAC-WC02-BEN01 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC02-BEN01-20180917 **Comments:** Post-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 37 **Photo Location:** MAC-WC02-BEN02 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC02-BEN02-20180917 **Comments:** Pre-washdown	
Photograph ID: 38 **Photo Location:** MAC-WC02-BEN02 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC02-BEN02-20180917 **Comments:** Post-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 39 **Photo Location:** MAC-WC02-BEN03 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC02-BEN03-20180917 **Comments:** Pre-washdown	
Photograph ID: 40 **Photo Location:** MAC-WC02-BEN04 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC02-BEN04-20180917 **Comments:** Pre-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 41

Photo Location: MAC-WC02-BEN04

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC02-BEN04-20180917

Comments: Post-washdown

Photograph ID: 42

Photo Location: MAC-WC02-BEN05

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC02-BEN05-20180917

Comments: Post-washdown

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

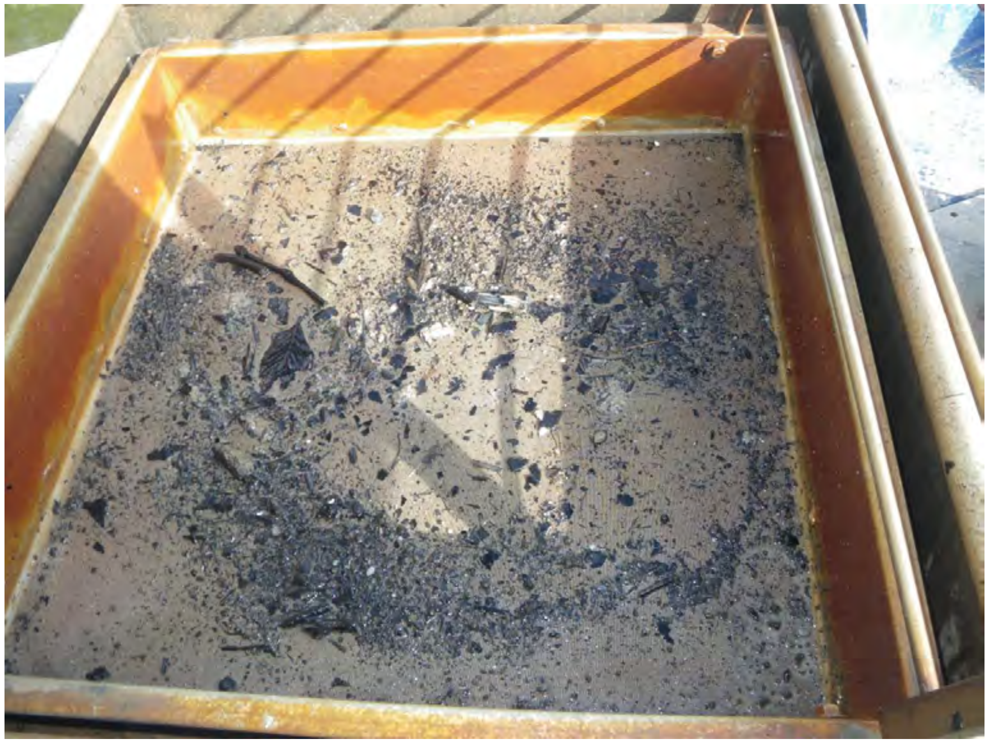
Photograph ID: 43

Photo Location: MAC-WC03-BEN01

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC03-BEN01-20180917

Comments: Post-washdown



Photograph ID: 44

Photo Location: MAC-WC03-BEN02

Survey Date: 9/17/2018

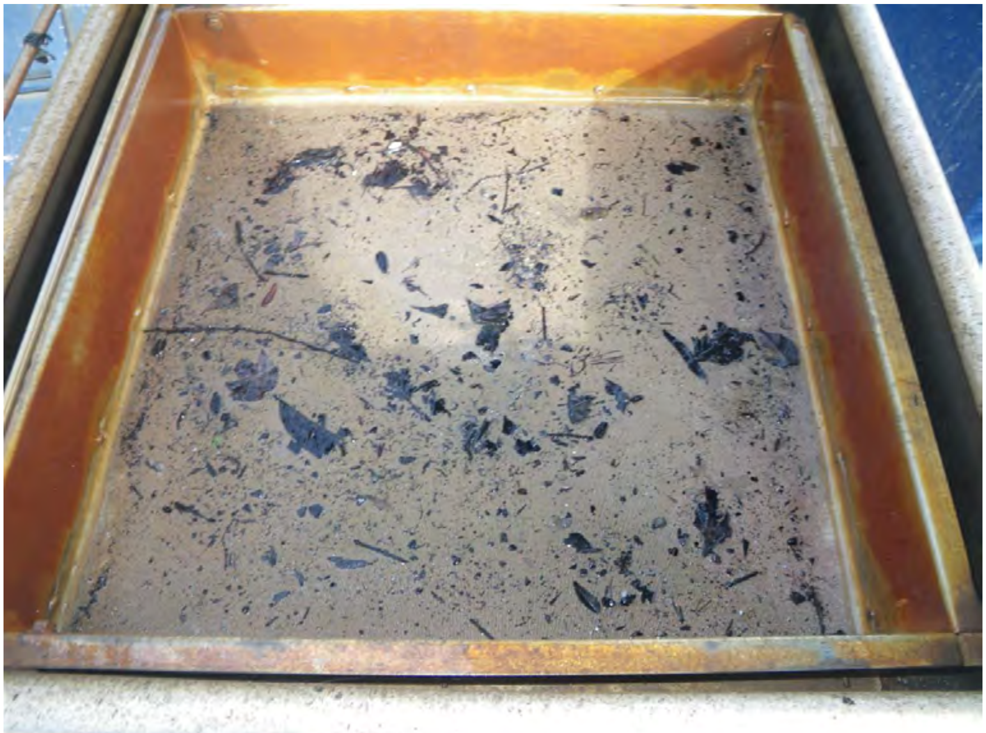
Sample ID: CUF-MAC-WC03-BEN02-20180917

Comments: Pre-washdown

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 45 **Photo Location:** MAC-WC03-BEN02 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC03-BEN02-20180917 **Comments:** Post-washdown	
Photograph ID: 46 **Photo Location:** MAC-WC03-BEN03 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC03-BEN03-20180917 **Comments:** Pre-washdown	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 47 **Photo Location:** MAC-WC03-BEN03 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC03-BEN03-20180917 **Comments:** Post-washdown	
Photograph ID: 48 **Photo Location:** MAC-WC03-BEN04 **Survey Date:** 9/17/2018 **Sample ID:** CUF-MAC-WC03-BEN04-20180917 **Comments:** Pre-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 49

Photo Location: MAC-WC03-BEN04

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC03-BEN04-20180917

Comments: Post-washdown

Photograph ID: 50

Photo Location: MAC-WC03-BEN05

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC03-BEN05-20180917

Comments: Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 51

Photo Location: MAC-WC03-BEN05

Survey Date: 9/17/2018

Sample ID: CUF-MAC-WC03-BEN05-20180917

Comments: Post-washdown

Photograph ID: 52

Photo Location: MAC-WC04-BEN01

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC04-BEN01-20180918

Comments: Pre-washdown

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 53 **Photo Location:** MAC-WC04-BEN01 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC04-BEN01-20180918 **Comments:** Post-washdown	
Photograph ID: 54 **Photo Location:** MAC-WC04-BEN02 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC04-BEN02-20180918 **Comments:** Pre-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 55

Photo Location: MAC-WC04-BEN02

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC04-BEN02-20180918

Comments: Post-washdown

Photograph ID: 56

Photo Location: MAC-WC04-BEN03

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC04-BEN03-20180918

Comments: Pre-washdown

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 57	
Photo Location: MAC-WC04-BEN03	
Survey Date: 9/18/2018	
Sample ID: CUF-MAC-WC04-BEN03-20180918	
Comments: Post-washdown	
Photograph ID: 58	
Photo Location: MAC-WC04-BEN04	
Survey Date: 9/18/2018	
Sample ID: CUF-MAC-WC04-BEN04-20180918	
Comments: Pre-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 59 **Photo Location:** MAC-WC04-BEN04 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC04-BEN04-20180918 **Comments:** Post-washdown	
Photograph ID: 60 **Photo Location:** MAC-WC04-BEN05 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC04-BEN05-20180918 **Comments:** Pre-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 61

Photo Location: MAC-WC04-BEN05

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC04-BEN05-20180918

Comments: Post-washdown

Photograph ID: 62

Photo Location: MAC-WC05-BEN01

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC05-BEN01-20180918

Comments: Pre-washdown

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 63

Photo Location:
MAC-WC05-BEN01

Survey Date:
9/18/2018

Sample ID:
CUF-MAC-WC05-BEN01-20180918

Comments:
Post-washdown

Photograph ID: 64

Photo Location:
MAC-WC05-BEN02

Survey Date:
9/18/2018

Sample ID:
CUF-MAC-WC05-BEN02-20180918

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 65

Photo Location: MAC-WC05-BEN02

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC05-BEN02-20180918

Comments: Post-washdown

Photograph ID: 66

Photo Location: MAC-WC05-BEN03

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC05-BEN03-20180918

Comments: Pre-washdown

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 67 **Photo Location:** MAC-WC05-BEN03 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC05-BEN03-20180918 **Comments:** Post-washdown	
Photograph ID: 68 **Photo Location:** MAC-WC05-BEN04 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC05-BEN04-20180918 **Comments:** Pre-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 69

Photo Location: MAC-WC05-BEN04

Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC05-BEN04-20180918

Comments: Post-washdown

Photograph ID: 70

Photo Location: MAC-WC05-BEN05

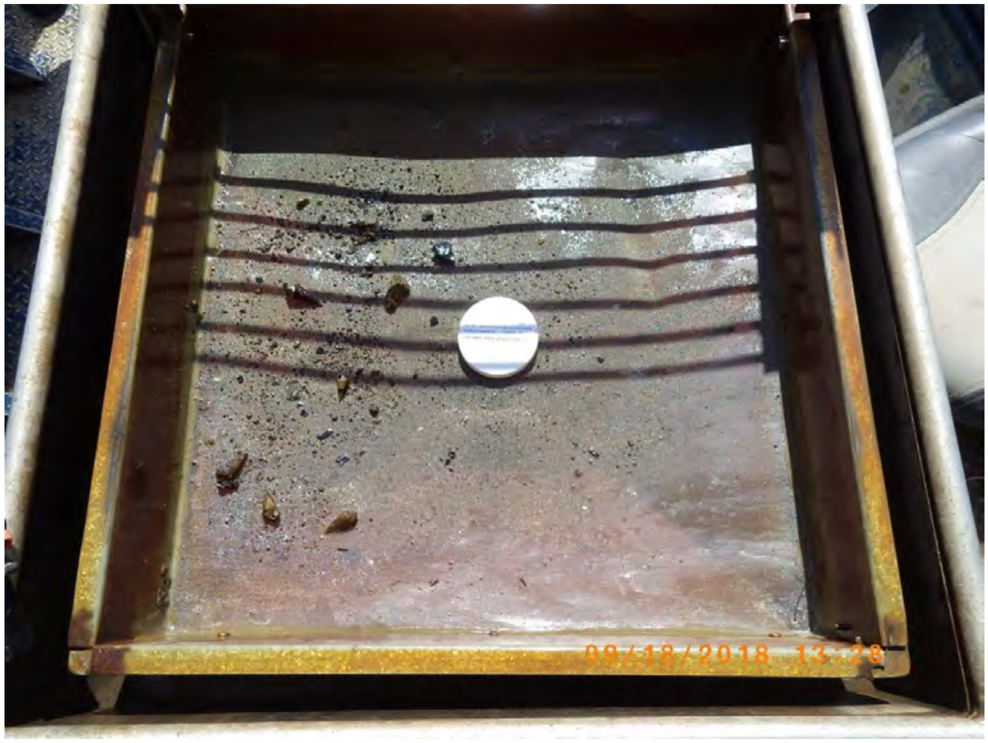
Survey Date: 9/18/2018

Sample ID: CUF-MAC-WC05-BEN05-20180918

Comments: Photograph of MAC-WC05-BEN05 is not available

PHOTOGRAPH NOT AVAILABLE

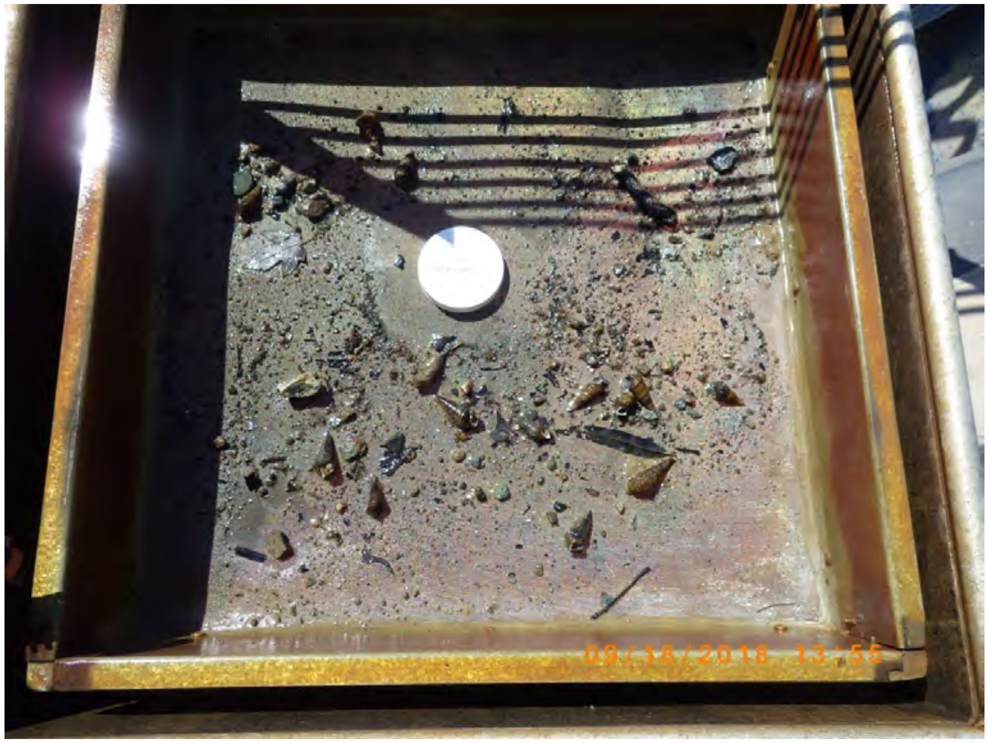
Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 71 **Photo Location:** MAC-WC06-BEN01 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC06-BEN01-20180918 **Comments:** Post-washdown	
Photograph ID: 72 **Photo Location:** MAC-WC06-BEN02 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC06-BEN02-20180918 **Comments:** Post-washdown	

TVA Tennessee Valley Authority

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Cumberland City, Tennessee

Photograph ID: 73 **Photo Location:** MAC-WC06-BEN03 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC06-BEN03-20180918 **Comments:** Post-washdown	
Photograph ID: 74 **Photo Location:** MAC-WC06-BEN04 **Survey Date:** 9/18/2018 **Sample ID:** CUF-MAC-WC06-BEN04-20180918 **Comments:** Post-washdown	

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Cumberland City, Tennessee**

Photograph ID: 75

Photo Location:
MAC-WC06-BEN05

Survey Date:
9/18/2018

Sample ID:
CUF-MAC-WC06-BEN05-20180918

Comments:
Post-washdown

APPENDIX J.5

BENTHIC AND SURFACE STREAM SAMPLING AND ANALYSIS REPORT ADDENDUM

Cumberland Fossil Plant - Benthic and Surface Stream Sampling and Analysis Report Addendum

TDEC Commissioner's Order:
Environmental Investigation Plan
Cumberland Fossil Plant
Cumberland City, Tennessee

December 14, 2022

TVA TENNESSEE VALLEY AUTHORITY

Prepared by:

Tennessee Valley Authority

Revision Record

Revision	Description	Date
0	Submittal to TDEC	December 14, 2022

Table of Contents

Abbreviations

CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257, five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04, and strontium
CEC	Civil & Environmental Consultants, Inc.
CFR	Code of Federal Regulations
COC	Chain-of-Custody
CUF Plant	Cumberland Fossil Plant
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
EnvStds	Environmental Standards, Inc.
GPS	Global Positioning System
IDW	Investigation Derived Waste
ORP	Oxidation-Reduction Potential
PLM	Polarized Light Microscopy
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
RJ Lee	RJ Lee Group, Inc.
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
SOP	Standard Operating Procedure
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) has prepared this sampling and analysis report (SAR) to document the completion of activities related to Phase 2 of the benthic and surface stream investigation at TVA's Cumberland Fossil Plant (CUF Plant) in Cumberland City, Tennessee.

The purpose of this supplemental investigation is to further characterize sediment and surface stream chemistry in the unnamed tributary adjacent to the CUF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

During Phase I of the benthic investigation, ash content in sediment samples collected from the two upstream-most impoundments on the unnamed tributary to Wells Creek (herein referred to as the 'Unnamed Tributary') was above the 20 percent ash Phase 2 trigger level. In accordance with the Benthic Sampling and Analysis Plan (SAP) (Stantec Consulting Services Inc. [Stantec] 2018a), the retained sediment samples collected from deeper strata within these upper reaches of the Unnamed Tributary were analyzed for constituents related to Coal Combustion Residuals (CCR), and the Phase 2 Benthic and Surface Stream SAPs – Addendum 1 (Stantec 2021) was prepared.

The purpose of this SAR is to document the work performed and to present the information and data collected during the execution of Phase 2 sampling as outlined in the Benthic and Surface Stream SAPs – Addendum 1 (Stantec 2021). This SAR is not intended to provide conclusions or evaluate results. The scope of the benthic and surface stream investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the CUF Plant. The evaluation of the Phase 2 sampling results will consider other aspects of the environmental investigation, as well as data collected under other State and/or CCR programs. The results of this evaluation will be presented in the Environmental Assessment Report (EAR).

The benthic and surface stream investigation activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order:

- *Benthic Sampling and Analysis Plan* (Stantec 2018a)
- *Surface Stream Sampling and Analysis Plan* (Stantec 2018b)
- *Benthic and Surface Stream Sampling and Analysis Plans – Addendum I* (Stantec 2021)
- *Environmental Investigation Plan (EIP)* (Stantec 2018c)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. [EnvStds] 2018).

The benthic and surface stream investigation was implemented in accordance with TVA- and TDEC-approved Programmatic and Project-specific changes. Variations in scope and procedures from those outlined in the SAPs and occurring during field activities due to field conditions and programmatic updates are referenced in Section 3.6.

Sediment sampling was conducted the week of June 21, 2021, and on July 29, 2021. Surface Stream sampling was conducted the week of June 21, 2021. TVA personnel performed the sample collection and processing activities. Laboratory analysis of CCR-related constituents in sediments and surface water was performed by Eurofins TestAmerica, Inc. (TestAmerica) Pittsburgh, Pennsylvania, and St. Louis, Missouri (radium samples only). RJ Lee Group, Inc. (RJ Lee) in Monroeville, Pennsylvania, analyzed sediments for percent ash. Additional Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by EnvStds under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The objective of the Phase 2 investigation conducted pursuant to Benthic and Surface Stream SAPs – Addendum 1 was to further characterize sediment and surface stream chemistry in the Unnamed Tributary adjacent to the CUF Plant property to evaluate whether CCR constituents have migrated into that water body.

The Phase 2 approach for the benthic and surface stream investigation was to:

- Verify and document sampling locations using global positioning system (GPS) coordinates
- Collect sediment samples for chemical analyses and analysis of percentage ash
- Collect field measurements of water quality parameters and surface stream samples for chemical analyses.

The scope of work for Phase 2 of the benthic and surface stream investigation consisted of collecting samples of sediments and surface water from two transects and eight single-point locations in the Unnamed Tributary and one transect location in Wells Creek. This report describes the activities related to the sampling events performed to complete Phase 2.

3.0 FIELD ACTIVITIES

Sediment sampling under Phase 2 of the benthic scope of work was conducted the week of June 21, 2021, and on July 29, 2021. Surface stream sampling was conducted under the surface stream scope of work the week of June 21, 2021.

TVA performed the benthic and surface stream investigation sample collection activities based on guidance and specifications listed in TVA's Technical Instructions (TIs) and Standard Operating Procedures (SOPs), the SAPs, and the QAPP, except as noted in the Variations section of this report (Section 3.6). As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under contract with TVA. In addition, Civil & Environmental Consultants, Inc. (CEC), on behalf of TDEC, accompanied TVA during sediment and surface stream sampling on June 23 and 24, 2021. CEC obtained split samples from surficial sediments collected from each station on transect SED-WC03.5 and from stations SED-UT01.5-LB and SED-UT01.5-CC. CEC also obtained a surface stream split sample from each station on transects STR-WC03.5 and STR-UT01.5.

During the benthic and surface stream investigation, TVA:

- Verified and documented sampling locations using the GPS
- Collected sediment samples from four transects and seven single-point locations
- Collected surface stream samples from three transects and seven single-point locations
- Collected sediment quality control (QC) samples, including two sediment matrix spike/matrix spike duplicate/lab duplicates, two field duplicates, four field banks, and six equipment blanks
- Collected surface stream QC samples, including one surface stream matrix spike/matrix spike duplicate/lab duplicates, two field duplicates, three field banks, one equipment blank, and one filter blank
- Shipped the sediment samples to TestAmerica and RJ Lee
- Shipped the surface stream samples to TestAmerica.

Details on each activity are presented in the sections below.

3.1 SAMPLING LOCATIONS

The sediment and surface stream sampling locations and the TDEC Order CCR units at the CUF Plant are shown on Exhibits A.1 and A.2 (Appendix A). Table B.1 (Appendix B) provides a summary of the sampling locations.

Sediment and surface stream sampling locations consisted of transects and single-point locations. Sample transects extended across the width of the stream perpendicular to the direction of flow. Along each transect, attempts were made to collect samples at center channel, left bank, and right bank stations. “Left bank” and “right bank” were determined with a downstream-facing orientation. At single-point locations, samples were collected from the approximate center of the channel.

Sediment

Sediment sampling was conducted at three transects and seven single-point locations in the Unnamed Tributary and one transect in Wells Creek under Phase 2 of the benthic investigation scope of work (Exhibit A.1). In total, sediment samples were obtained from 19 stations; the 17 stations proposed in the SAP and two additional stations (SED-UT01-LB and SED-UT01-RB). Additional information regarding the samples collected is provided in Section 3.6.1, Variations in Scope.

Surface Stream

Surface Stream sampling was conducted at two transects and seven single-point locations in the Unnamed Tributary and one transect in Wells Creek as shown on Exhibit A.2. In total, surface stream samples were obtained from 16 stations; 14 of the 17 stations proposed in the SAP, plus two additional stations (STR-UT01-LB and STR-UT01-RB). Depending on water depth at a station, surface or mid-depth samples were collected. Surface stream samples collected during this investigation are summarized in Table B.5 in Appendix B. Additional information regarding the samples collected is provided in Section 3.6.1, Variations in Scope.

3.2 DOCUMENTATION

TVA maintained field documentation in accordance with TVA TI ENV-TI-05.80.03, *Field Record Keeping* and the QAPP. Field activities were recorded in field logbooks. Health and safety forms were completed in accordance with TVA health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

TVA used program-specific field forms and field logbooks to record field observations and data for specific activities. Field forms used during the benthic and surface stream investigation included:

- *Field Standardization of Instruments Form*
- *Water Quality Data Field Sheet*
- *Chain-of-Custody (COC).*

3.2.1.1 Field Logbook

TVA field sampling personnel recorded field activities, observations, and supporting information (e.g., GPS coordinates, sample collection depths) in field logbooks to chronologically document the activities and progress of the field program. Deviations from the SAPs, TIs, SOPs, or QAPP were documented in the field logbooks.

3.2.1.2 Field Standardization of Instruments Form

TVA field sampling personnel performed daily calibrations of multi-parameter sondes and documented the results on TVA Form 30035, *Field Standardization of Instruments*. The form documents temperature verification and calibration results for dissolved oxygen, pH, specific conductance, turbidity, and oxidation-reduction potential (ORP), and verifies that the field instrument used was operating within acceptance criteria. Additional information on equipment calibration is provided in Section 3.2.2.

3.2.1.3 Water Quality Data Field Sheet

TVA field sampling personnel electronically logged the field parameters measured by the multi-parameter sondes using Hydrolab™ Surveyor 4a data loggers. Field measurements also were recorded on the *Water Quality Data Field Sheet*.

3.2.1.4 Chain-of-Custody Form

TVA personnel completed *Laboratory COCs*, listing each sediment and surface stream sample. Information applicable to each sample matrix (i.e., sample identification, sample location, sample depth, type of sample, sample date and time, and/or analyses requested) and the sample custody record were recorded on the *COCs*. The Field Team Leader or designee reviewed the *COCs* for completeness and correctness, and a QC check was performed for samples in each cooler comparing sample IDs to those on the corresponding *COC*. *COCs* were completed in accordance with ENV-TI-05.80.02*, Sample Labeling and Custody*.

3.2.2 Equipment Calibration

Field instruments used to measure water quality parameters were calibrated each day prior to use as specified by the Surface Stream SAP, QAPP, and TVA TI ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde*. Post-sampling verifications of field instrument calibrations were performed to evaluate whether instruments remained within acceptance criteria throughout the event. Temperature readings were verified using a calibrated National Institute of Standards and Technology-traceable thermometer. Barometric pressures were determined using a portable barometer calibrated using National Weather Service barometric pressure readings at Lovell Field (KCHA) in Chattanooga, Tennessee. Additional details regarding equipment calibration were recorded on a *Field Standardization of Instruments Form*, as described in Section 3.2.1.2.

3.2.3 Photographs

Photographs of the sediment samples were taken during the benthic investigation and are provided in Appendix C.

3.3 SAMPLING METHODS

The following sections present data collection and sampling procedures used in the benthic investigation.

3.3.1 Sediment Sampling

Sediment samples were collected in accordance with ENV-TI-05.80.50, *Soil and Sediment Sampling* and ENV-TI-05.80.04, *Field Sampling Quality Control*. The analytical samples collected, including field duplicates, are listed in Table B.2 (Appendix B). Split samples collected by CEC during this investigation are also identified in Table B.2.

At each station, when possible, a VibeCore™ sampler with attached decontaminated polycarbonate core tube was advanced until refusal. Upon retrieval, the core was inspected and distinct horizons identified based on color, texture, and other visual characteristics.

A sediment sample was collected from the upper six inches of each sediment core. For each distinct horizon identified below six inches, the sediment was portioned and homogenized to create a representative sample. Samples were not collected for deeper sediment-free native soil (i.e., parent material) if recovered.

At locations where sediment sample collection using the VibeCore™ sampler was not successful due to limited depositional sediments or other site conditions, surficial sediments were collected using a decontaminated Wildco™ Petite Ponar Dredge or new, certified clean scoops.

The use of a dredge sampler was limited to Wells Creek. A dredge sampler was not practical in the Unnamed Tributary due to the appreciable depth of the organic material overlaying the sediments (depositional silts and clays). However, because substrates on the upstream-most transect (SED-UT0.5) in the Unnamed Tributary were exposed (not inundated with water), this allowed for sediments to be collected using scoops and/or a Vibecore™ sampler. Each sediment scoop sample comprised the contents of several scoops collected within an approximately one square foot area. Descriptions of the sediment samples collected, including the sediment core lengths and depths of horizon changes, if applicable, are provided in Table B.3.

The polycarbonate core tubes were decontaminated and sealed individually in a plastic sleeve prior to mobilizing to the field. Core tubes were replaced between sampling stations. Each sediment core sample was discharged on to a half-round PVC pipe enclosed in a new plastic sleeve and each sediment horizon was transferred to a decontaminated plastic bowl for homogenization. For surficial sediments collected using the dredge sampler, the surface water was slowly decanted from the dredge and the sediment grabs were deposited directly into a decontaminated plastic bowl and homogenized. For surficial sediments collected using a scoop, the sediments were deposited directly into clean, resealable plastic bags, labeled, and maintained in a cooler with ice until processed; these sediments were homogenized in the plastic bags or transferred to a decontaminated plastic bowl and homogenized. Decontamination of sampling equipment was conducted in accordance with TVA, ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*.

Sediments were homogenized using new, certified clean scoops. To the extent practicable, twigs, roots, leaves, rocks, and miscellaneous debris were removed. Scoops were treated as single-use and were discarded after each sample was processed. Homogenized sediments were transferred to laboratory-supplied sample containers. Samples were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* Field sampling personnel secured caps on each container, attached a custody seal across the caps, and placed samples in coolers; samples for metals and anions were maintained in ice. Field sampling personnel wore new, clean nitrile gloves when handling sample containers and sampling equipment that could potentially come in contact with sediment samples, and when collecting and handling samples at each station.

Collected sediment samples were analyzed for the presence of ash (percent ash) by polarized light microscopy (PLM) and the CCR-related constituents listed in Appendices III and IV of Title 40 of the Code of Federal Regulations (CFR) Part 257 (40 CFR 257) and strontium. In addition, in order to maintain continuity with other TDEC environmental programs, five inorganic constituents (copper, nickel, silver, vanadium, and zinc) listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV also were analyzed. The combined federal CCR Appendices III and IV constituents, strontium, and TDEC Appendix I inorganic constituents are hereafter referred to as “CCR Parameters” for this investigation.

Laboratory analysis of CCR Parameters was performed by TestAmerica in Pittsburgh, Pennsylvania and St. Louis, Missouri (radium samples only). RJ Lee in Monroeville, Pennsylvania performed PLM analysis to determine percent ash. Sediment analytical data are presented in Table B.4

3.3.2 Surface Stream Sampling

The following sections present data collection and sampling procedures used in the surface stream investigation.

3.3.3 Surface Stream Field Measurements

A Hydrolab™ DS5X multi-parameter sonde was used to record conventional water quality parameters at each sample station in accordance with the Surface Stream SAP and ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde*. Sample stations were shallow (<2 meters); therefore, the water quality parameters were measured at the surface and/or mid-depth of the water column, as applicable, at each sample station. These parameters included:

- Temperature (degrees Celsius)
- Dissolved Oxygen (milligrams per liter)
- Specific Conductance (microsiemens per centimeter)
- ORP (millivolts)
- pH (Standard Units)
- Turbidity (Nephelometric Turbidity Units).

3.3.4 Surface Stream Analytical Samples

Surface stream samples were collected using peristaltic pumps equipped with dedicated, certified clean tubing for each sample. Discrete samples were collected in accordance with ENV-TI-05.80.40, *Surface Water Sampling*. Analytical samples, including field duplicates, were collected from surface stream stations as shown in Table B.5 in Appendix B. Split samples collected by CEC during this investigation are also identified in Table B.5.

Laboratory-provided, pre-preserved sample containers were filled directly from the pump discharge line. Field sampling personnel wore new, clean nitrile gloves when handling sample containers and did not touch the interior of containers or container caps. New gloves were used when collecting and handling samples at each station. When filling sample bottles, care was taken to avoid overfilling and diluting preservatives. Sample containers were filled in thirds. Sample containers for radium analysis were filled and capped first, before filling additional bottles. Next, sample containers for total suspended solids, total dissolved solids, and anions were filled and capped, then sample containers for total metals and dissolved metals were filled and capped individually. Dissolved metals samples were filtered during sample collection at each location by attaching a new, certified clean high-capacity inline 0.45-micron filter to the pump discharge line. These filters were treated as single-use filters and were discarded after each sample collection.

Samples were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* Field sampling personnel secured caps on each sample container, attached a signed and dated custody seal across the cap, and placed the samples in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with TVA ENV-TI-05.80.04, *Field Sampling Quality Control.*

Surface stream samples were analyzed for the CCR Parameters minus strontium. The surface stream analytical data are presented in Table B.7.

3.4 INVESTIGATION DERIVED WASTE

Investigation derived waste (IDW) generated during the benthic and surface stream investigation included:

- Disposable personal protective equipment (PPE)
- Decontamination fluids
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*; the CUF Plant-specific waste management plan; and local, state, and federal regulations. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite or at another TVA facility.

3.5 SAMPLE SHIPMENT

Samples were packed, transported, and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. Sediment and surface stream samples to be analyzed for the CCR Parameters were shipped via a commercial courier to Pittsburgh, Pennsylvania, and St. Louis, Missouri (radium samples only). Sediment samples to be analyzed for percent ash by PLM were shipped to RJ Lee located in Monroeville, Pennsylvania. TestAmerica and RJ Lee submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

The proposed scope and procedures for the benthic and surface stream investigation were outlined in the SAP, QAPP, and applicable TVA TIs and SOPs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for the benthic and surface stream investigation at the CUF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Surficial sediment samples were collected at two additional stations (SED-UT01-LB and SED-UT01-RB) in the Unnamed Tributary that were not proposed in the SAP. During the June sampling event, it was not possible to navigate to transect UT0.5 in a canoe. Therefore, sediment samples were collected from the upstream-most navigable areas at left bank, center channel, and right bank stations. The collected samples were initially assigned transect location ID SED-UT0.5. However, after further review, the transect location ID for these samples was revised to SED-UT01. During the subsequent sampling event in July, field sampling personnel waded the Unnamed Tributary to reach the proposed UT0.5 transect location and collected sediments at the left bank, center channel, and right bank stations. Consequently, the three sediment samples collected from each transect (SED-UT0.5 and SED-UT01) were submitted for analysis.

- Surface stream samples could not be collected on transect UT0.5 because the transect was not inundated with water. Additionally, water depths were too shallow to ensure that representative samples could be collected across the Unnamed Tributary in line with the proposed location for UT01-CC. Therefore, transect STR-UT01 was established approximately 80 feet further downstream, and surface stream samples were collected at the center channel station, as proposed in the SAP, and at the left bank and right bank stations.

- Samples for radium analysis were not obtained from the sediment cores collected at stations SED-UT0.5-RB, SED-UT01-CC, and SED-UT01.5-RB due to insufficient sample volumes. The stratum of depositional sediments in the cores collected at SED-UT0.5-RB and SED-UT01-CC contained a considerable amount of detritus/organic matter, which was removed to the extent practicable. The core collected at SED-UT01.5-RB contain only a thin stratum (2.5 inches) of depositional sediments.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- The number of matrix spike and matrix spike duplicate samples collected in the field did not meet requirements of the SAP for all analytes. However, the laboratory analyzed all analytes per the SAP/QAPP and met the data quality objective.
- Photographs were not available for the following surficial sediment samples that were analyzed: SED-UT01.5-CC and SED-UT03.25-CC.

4.0 SUMMARY

The data presented in this report are from the Phase 2 supplemental sediment and surface stream investigation sampling at the CUF Plant. The scope of work during this investigation included Phase 2 sediment sampling at four transects and seven single-point locations (19 individual stations), and surface stream sampling at three transects and seven single-point locations (16 individual stations). Sediment and surface stream sampling locations are summarized in Table B.1, and depicted on Exhibits A.1 and A.2, respectively.

A summary of sediment samples collected, including field duplicates, is presented in Table B.2. Sediment field data are presented in Table B.3. Sediment analytical data for CCR Parameters and percent ash are presented in Table B.4. Analytical data were reported by TestAmerica and RJ Lee, and data verification or validation was performed by EnvStds.

A summary of surface stream samples collected, including field duplicates, is presented in Table B.5. Surface stream field data are presented in Table B.6. Surface stream analytical data for CCR Parameters are presented in Table B.7. Analytical data were reported by TestAmerica, and data verification or validation was performed by EnvStds.

TVA has completed the Phase 2 supplemental investigation to further characterize sediment and surface stream water quality in the Unnamed Tributary and immediately downstream of its confluence with Wells Creek. The complete dataset from the Phase 2 benthic and surface stream investigation will be evaluated along with data collected under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This evaluation will be provided in the EAR Revision 1.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Cumberland Fossil Plant Environment Investigation. Revision 2.* Prepared for Tennessee Valley Authority. January 2018.

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Stantec. 2018b. *Surface Stream Sampling and Analysis Plan, Cumberland Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. January 26, 2018.

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TVA, ENV-TI-05.80.04, *Field Sampling Quality Control*.

TVA, ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*.

TVA, ENV-TI-05.80.06, *Handling and Shipping of Samples*.

TVA, ENV-TI-05.80.40, *Surface Water Sampling*.

TVA, ENV-TI-05.80.46, *Field Measurement Using a Multi-Parameter Sonde*.

TVA. ENV-TI-05.80.50, *Soil and Sediment Sampling.*

APPENDIX A - EXHIBITS

Exhibit No.
A.1

Title
Supplemental Sediment Sampling Locations - June/July 2021

Client/Project
Tennessee Valley Authority
Cumberland Fossil Plant

Project Location
Stewart County, Tennessee

175568209
Prepared by MB on 2022-11-22
Technical Review by JC on 2022-11-22

0 125 250 375 500 Feet
1:1,500 (At original document size of 22x34)

Legend

- Sediment Sampling Locations
- Sediment Sampling Locations - Transects
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Bing Imagery

Stantec TVA

Exhibit No.

A.2

Title

Supplemental Surface Stream Sampling Locations - June 2021

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant

Project Location

Stewart County, Tennessee

175568209

Prepared by MB on 2022-11-16
Technical Review by JC on 2022-11-16

0 125 250 375 500 Feet

1:1,500 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- CCR Unit Area (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Bing Imagery

Stantec

TVA

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APPENDIX B - TABLES

TABLE B.1 – Sediment and Surface Stream Sampling Locations
Cumberland Fossil Plant
June and July 2021

Location ID			Sample Locations		
			Proposed	Actual	
Sediment	Surface Stream	Description of Proposed Sampling Locations	Sediment and Surface Stream	Sediment	Surface Stream
SED-UT0.5	STR-UT0.5	Transect in Unnamed Tributary upstream of UT01 location	3	3	0
SED-UT01	STR-UT01	Resample of UT01 individual center channel location in Unnamed Tributary	1	3	3
SED-UT01.5	STR-UT01.5	Transect in Unnamed Tributary between UT01 and UT02	3	3	3
SED-UT02	STR-UT02	Resample of UT02 individual center channel location in Unnamed Tributary	1	1	1
SED-UT03	STR-UT03	Resample of UT03 individual center channel location in Unnamed Tributary	1	1	1
SED-UT03.25	STR-UT03.25	Individual center channel location in Unnamed Tributary between UT03 and UT04	1	1	1
SED-UT03.5	STR-UT03.5	Individual center channel location in Unnamed Tributary between UT03 and UT04	1	1	1
SED-UT03.75	STR-UT03.75	Individual center channel location in Unnamed Tributary between UT03 and UT04	1	1	1
SED-UT04	STR-UT04	Resample of UT04 individual center channel location in Unnamed Tributary	1	1	1
SED-UT05	STR-UT05	Resample of UT05 individual center channel location in Unnamed Tributary	1	1	1
SED-WC03.5	STR-WC03.5	Transect in Wells Creek downstream of Unnamed Tributary	3	3	3
		Total	17	19	16

Notes:

ID Identification

TABLE B.2 – Summary of Sediment Samples
Cumberland Fossil Plant
June and July 2021

				Analysis Type					
Location ID	**Station ID**	**Sample ID**	**Sample Type**	**% Ash**	**Total Metals**	**Total Mercury**	**Radium-226, Radium-228, Radium-226+228**	**Anions**	**pH (laboratory)**
SED-UT0.5	LB	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	Normal Environmental Sample	X	X	X	X	X	X
	CC	CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	Normal Environmental Sample	X	X	X	X	X	X
	CC	CUF-SED-UT0.5-DUP01-20210729	Field Duplicate Sample	X	X	X	X	X	X
	RB	CUF-SED-UT0.5-CORRB-0.0/0.5-20210729	Normal Environmental Sample	X	X	X		X	X
SED-UT01	LB	CUF-SED-UT01-CORLB-0.0/0.5-20210625	Normal Environmental Sample	X	X	X	X	X	X
	CC	CUF-SED-UT01-CORCC-0.0/0.4-20210625	Normal Environmental Sample	X	X	X		X	X
	RB	CUF-SED-UT01-CORRB-0.0/0.5-20210625	Normal Environmental Sample	X	X	X	X	X	X
SED-UT01.5	LB	CUF-SED-UT01.5-CORLB-0.0/0.5-20210623	Normal Environmental Sample/Split Sample	X	X	X	X	X	X
	CC	CUF-SED-UT01.5-CORCC-0.0/0.5-20210623	Normal Environmental Sample/Split Sample	X	X	X	X	X	X
	RB	CUF-SED-UT01.5-CORRB-0.0/0.2-20210625	Normal Environmental Sample	X	X	X		X	X
SED-UT02	RB	CUF-SED-UT02-CORRB-0.0/0.5-20210625	Normal Environmental Sample	X	X	X	X	X	X
SED-UT03	RB	CUF-SED-UT03-CORRB-0.0/0.5-20210625	Normal Environmental Sample	X	X	X	X	X	X
SED-UT03.25	CC	CUF-SED-UT03.25-CORCC-0.0/0.5-20210624	Normal Environmental Sample	X	X	X	X	X	X
SED-UT03.5	CC	CUF-SED-UT03.5-CORCC-0.0/0.7-20210624	Normal Environmental Sample	X	X	X	X	X	X
SED-UT03.75	CC	CUF-SED-UT03.75-CORCC-0.0/0.5-20210624	Normal Environmental Sample	X	X	X	X	X	X
	CC	CUF-SED-UT03.75-CORCC-0.5/1.0-20210624	Normal Environmental Sample	X	X	X	X	X	X
SED-UT04	CC	CUF-SED-UT04-CORCC-0.0/0.5-20210624	Normal Environmental Sample	X	X	X	X	X	X
	CC	CUF-SED-UT04-CORCC-0.5/2.6-20210624	Normal Environmental Sample	X	X	X	X	X	X
SED-UT05	CC	CUF-SED-UT05-CORCC-0.0/0.5-20210624	Normal Environmental Sample	X	X	X	X	X	X
SED-WC03.5	LB	CUF-SED-WC03.5-CORLB-0.0/0.5-20210624	Normal Environmental Sample/Split Sample	X	X	X	X	X	X
	LB	CUF-SED-WC03.5-DUP01-20210624	Field Duplicate Sample	X	X	X	X	X	X
	CC	CUF-SED-WC03.5-CORCC-0.0/0.5-20210624	Normal Environmental Sample/Split Sample	X	X	X	X	X	X
	RB	CUF-SED-WC03.5-CORRB-0.0/0.7-20210624	Normal Environmental Sample/Split Sample	X	X	X	X	X	X

Notes:

% Ash	Polarized Light Microscopy (PLM)
Total Metals	SW-846 6020A
Total Mercury	SW-846 7471B
Anions	SW-846 9056A
Radium-226	EPA 901.1
Radium-228	EPA 901.1
Radium-226+228	EPA 901.1
pH (laboratory)	SW-846 9045D
ID	Identification

1. Station ID: LB=Left Bank, CC=Center Channel, RB=Right Bank (left bank and right bank determined with a downstream-facing orientation)
2. Field and laboratory quality control sample results except for field duplicates are not included in report tables but were used for data validation.
3. Civil & Environmental, Inc. (CEC) obtained split samples from surficial sediments collected at SED-UT01.5-LB and SED-UT01.5-CC and at each station on transect SED-WC03.5.

TABLE B.3 – Sediment Sampling Field Data
Cumberland Fossil Plant
June and July 2021

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID	Sediment/Sampling Description
								Substrate on transect UT0.5 exposed. Surface layer of organic matter removed, and sediment stratum (0.0-0.3 ft) sampled using a scoop.
SED-UT0.5-LB	7/29/2021	0.0	Scoop	–	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	0.0 - 0.3	1	Gray fines
SED-UT0.5-CC	7/29/2021				CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	0.0 - 0.4	2 - 5	Substrate on transect UT0.5 exposed. Sediment sample formed by compositing the surficial sediments obtained in a core sample and a scoop sample.
					CUF-SED-UT0.5-DUP01-20210729	0.0 - 0.4		
								*Core contained 1.0 ft of material. Upper 0.3 ft of core (organic matter) discarded, and core depth (0.7 ft) determined from the remaining substrates.
		0.0	Vibecore	1.0/0.7*	Composited	0.0 - 0.4		Dark gray fines with black mottling
					–	0.4 - 0.7		Parent material
		0.0	Scoop	–	Composited	0.0 - 0.4		Surface layer of organic matter removed, and sediment stratum (0.0-0.4 ft) sampled using a scoop.
SED-UT0.5-RB	7/29/2021	0.0	Vibecore	1.4	CUF-SED-UT0.5-CORRB-0.0/0.5-20210729	0.0 - 0.5	6 - 7	Gray fines mixed with detritus/organics. Detritus removed to the extent practicable. Substrate on transect UT0.5 was exposed. Surface layer of organic matter removed prior to collecting the core.
					–	0.5 - 1.4		Parent material
								*Core contained 1.6 ft of material. Upper 0.4 ft of core (aqueous organic matter) discarded, and core depth (1.2 ft) determined from the remaining substrates.
SED-UT01-LB	6/25/2021	1.0	Vibecore	1.6/1.2*	CUF-SED-UT01-CORLB-0.0/0.5-20210625	0.0 - 0.5	8	Dark gray fines
					–	0.5 - 1.2		Parent material
								*Core contained 1.7 ft of material. Upper 0.2 ft of core (aqueous organic matter) discarded, and core depth (1.5 ft) determined from the remaining substrates.
SED-UT01-CC	6/25/2021	1.0	Vibecore	1.7/1.5*	CUF-SED-UT01-CORCC-0.0/0.4-20210625	0.0 - 0.4	9	Dark gray fines, mixed with organics
					–	0.4 - 1.5		Parent material
								*Core contained 1.7 ft of material. Upper 0.4 ft of core (aqueous organic matter) discarded, and core depth (1.3 ft) determined from the remaining substrates.
SED-UT01-RB	6/25/2021	1.0	Vibecore	1.7/1.3*	CUF-SED-UT01-CORRB-0.0/0.5-20210625	0.0 - 0.5	10	Dark gray fines
					–	0.5 - 0.7		Gravel mixed with fines
					–	0.7 - 1.3		Parent material
SED-UT01.5-LB	6/23/2021	1.0	Vibecore	2.0	CUF-SED-UT01.5-CORLB-0.0/0.5-20210623	0.0 - 0.5	11	Dark brownish-black fines
					–	0.5 - 2.0		Parent material

TABLE B.3 – Sediment Sampling Field Data
Cumberland Fossil Plant
June and July 2021

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID	Sediment/Sampling Description
SED-UT01.5-CC	6/23/2021	1.5	Vibecore	1.7/1.5*			N/A	*Core contained 1.7 ft of material. Upper 0.2 ft of core (organic matter) discarded, and core depth (1.5 ft) determined from the remaining substrates.
					CUF-SED-UT01.5-CORCC-0.0/0.5-20210623	0.0 - 0.5		Dark brownish-black fines
					–	0.5 - 1.5		Parent material
SED-UT01.5-RB	6/23/2021	1.5	Vibecore	1.0	No Sample	–	N/A	Core approximately 0.5 ft of organics and 0.5 ft parent material. Insufficient depositional sediments to form a sample.
SED-UT01.5-RB	6/25/2021	N/A	Vibecore	1.0/0.8*			13	*Core contained 1.0 ft of material. Upper 0.2 ft of core (aqueous organic matter) discarded, and core depth (0.8 ft) determined from the remaining substrates.
					CUF-SED-UT01.5-CORRB-0.0/0.2-20210625	0.0 - 0.2		Dark gray fines
					–	0.2 - 0.8		Parent material
SED-UT02-RB	6/25/2021				CUF-SED-UT02-CORRB-0.0/0.5-20210625		14 - 17	Two adjacent cores collected at the edge of a small, shallow inflow. Surficial sediments of 0.0-0.5 ft and 0.0-0.4 ft composited to form the sample.
		0.0	Vibecore	0.9/0.5*	Composited	0.0 - 0.5		Surficial (0.0-0.5) sediment sample, black fines. *Upper 0.4 ft of core (brown and black organics) discarded, and core depth (0.5 ft) determined from the remaining substrates.
		0.0	Vibecore	1.0/0.8*	Composited	0.0 - 0.4		Surficial (0.0-0.4 ft) sediment sample, dark gray fines with black mottling. *Upper 0.2 ft of core (brown and black organics) discarded, and core depth (0.8 ft) determined from the remaining substrates. Lower 0.4 ft of core parent material.
SED-UT03-RB	6/25/2021	1.0	Vibecore	2.1/0.8*			18 - 21	*Core contained 2.1 ft of material. Upper 1.3 ft of core (black organic matter with some gravel) discarded, and core depth (0.8 ft) determined from the remaining substrates.
					CUF-SED-UT03-CORRB-0.0/0.5-20210625	0.0 - 0.5		Dark gray fines
					–	0.5 - 0.8		Parent material
SED-UT03.25-CC	6/24/2021	2.0	Vibecore	1.7/1.5*			N/A	*Core contained 1.7 ft of material. Upper 0.2 ft of core (aqueous organic matter) discarded, and core depth (1.5 ft) determined from the remaining substrates.
					CUF-SED-UT03.25-CORCC-0.0/0.5-20210624	0.0 - 0.5		Dark gray fines
					–	0.5 - 1.5		Parent material
SED-UT03.5-CC	6/24/2021	2.5	Vibecore	1.2/1.1*			23 - 24	*Core depth 1.2 ft. Surface layer (0.1 ft) of aqueous organic matter discharged over core; organics removed prior to collecting sediment sample. Core depth 1.1 ft.
					CUF-SED-UT03.5-CORCC-0.0/0.7-20210624	0.0 - 0.7		Dark gray fines
					–	0.7 - 1.1		Parent material

TABLE B.3 – Sediment Sampling Field Data
Cumberland Fossil Plant
June and July 2021

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizons (ft)	Photograph ID	Sediment/Sampling Description
SED-UT03.75-CC	6/24/2021	3.0	Vibecore	1.4/1.2*			25	*Core contained 1.4 ft of material. Upper 0.2 ft of core (aqueous organic matter) discarded, and core depth (1.2 ft) determined from the remaining substrates.
					CUF-SED-UT03.75-CORCC-0.0/0.5-20210624	0.0 - 0.5		Gray fines
					CUF-SED-UT03.75-CORCC-0.5/1.0-20210624	0.5 - 1.0		Gray fines
					–	1.0 - 1.2		Gravel mixed with fines
SED-UT04-CC	6/24/2021	1.5	Vibecore	2.6			26	Thin surface layer (<0.05 ft) of organics discarded.
					CUF-SED-UT04-CORCC-0.0/0.5-20210624	0.0 - 0.5		Fines, black and gray mottling; black after homogenization. Less dense than remainder of core.
					CUF-SED-UT04-CORCC-0.5/2.6-20210624	0.5 - 2.6		Black fines with gray mottling
SED-UT05-CC	6/24/2021	1.0	Vibecore	1.2/1.1*			27	*Core contained 1.2 ft of material. Upper 0.1 ft of core (aqueous organic matter) discarded, and core depth (1.1 ft) determined from the remaining substrates.
					CUF-SED-UT05-CORCC-0.0/0.5-20210624	0.0 - 0.5		Brownish-gray fines
					–	0.5 - 1.1		Parent material
SED-WC03.5-LB	6/24/2021	1.6	Vibecore	1.8	–	–	28	Mostly parent material. No sample generated.
			Ponar	–	CUF-SED-WC03.5-CORLB-0.0/0.5-20210624	0.0 - 0.5		Brown fines with some detritus. Composite of two Ponar grabs.
					CUF-SED-WC03.5-DUP01-20210624	0.0 - 0.5		
SED-WC03.5-CC	6/24/2021	4.2	Vibecore	–	–	–	29	Two Vibecore deployments. No sample.
			Ponar	–	CUF-SED-WC03.5-CORCC-0.0/0.5-20210624	0.0 - 0.5		Light-brown surface layer of fines, overlaying brownish-black to black fines with some sand. Composite of two Ponar grabs.
SED-WC03.5-RB	6/24/2021	4.6	Vibecore	1.8	CUF-SED-WC03.5-CORRB-0.0/0.7-20210624	0.0 - 0.7	30	Unconsolidated brown surface layer of fines, overlaying brownish-gray fines with black mottling.
					–	0.7 - 1.8		Parent material

Notes:

–	not applicable
ft	feet
N/A	not available

1. See Photographic Logs of Sediment Samples, Attachment C.1 in Appendix C.
2. Fines = alluvial silts and clays

TABLE B.4 – Sediment Analytical Results
Cumberland Fossil Plant
June and July 2021

Sample Location		UT0.5				UT01		
Sample Date		29-Jul-21	29-Jul-21	29-Jul-21	29-Jul-21	25-Jun-21	25-Jun-21	25-Jun-21
Sample ID		CUF-SED-UT0.5-CORCC-0.0/0.4-20210729	CUF-SED-UT0.5-DUP01-20210729	CUF-SED-UT0.5-CORLB-0.0/0.3-20210729	CUF-SED-UT0.5-CORRB-0.0/0.5-20210729	CUF-SED-UT01-CORCC-0.0/0.4-20210625	CUF-SED-UT01-CORLB-0.0/0.5-20210625	CUF-SED-UT01-CORRB-0.0/0.5-20210625
Parent Sample ID			CUF-SED-UT0.5-CORCC-0.0/0.4-20210729					
Sample Depth		0 - 0.4 ft	0 - 0.4 ft	0 - 0.3 ft	0 - 0.5 ft	0 - 0.4 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM								
% ASH	%	25 J	39 J	40	24	11	7	10
Total Metals								
Antimony	mg/kg	0.206 J	0.210 J	0.212 J	0.329 J	0.192 J	0.264 J	0.515 J
Arsenic	mg/kg	8.25 J	8.40 J	10.3 J	12.7 J	5.29 J	6.03 J	14.9 J
Barium	mg/kg	167 J	172 J	159 J	348 J	157 J	200 J	618 J
Beryllium	mg/kg	0.987 J	1.06 J	1.04 J	1.17 J	0.806 J	0.867 J	1.12 J
Boron	mg/kg	44.9 J	48.5 J	33.0 J	176 J	47.1 J	30.4 J	78.6 J
Cadmium	mg/kg	0.302 J	0.340 J	0.410 J	0.508 J	0.342 J	0.224 J	0.439 J
Calcium	mg/kg	73,100 J	69,600 J	67,200 J	44,300 J	83,800 J	48,800 J	50,300 J
Chromium	mg/kg	14.5 J	15.2 J	15.6 J	17.1 J	13.4 J	14.8 J	19.4 J
Cobalt	mg/kg	10.1 J	10.4 J	11.9 J	14.2 J	9.08 J	9.19 J	17.2 J
Copper	mg/kg	13.8 J	13.8 J	14.7 J	15.0 J	10.6 J	11.0 J	14.7 J
Lead	mg/kg	14.6 J	14.9 J	14.8 J	17.8 J	12.1 J	13.4 J	19.0 J
Lithium	mg/kg	12.0 J	11.6 J	11.1 J	9.78 J	9.36 J	10.2 J	12.0 J
Mercury	mg/kg	0.0599 J	0.0717 J	0.0804 J	0.0699 J	0.0531 J	0.0437 J	0.0675 J
Molybdenum	mg/kg	105 J	107 J	218 J	1,090 J	90.8 J	126 J	571 J
Nickel	mg/kg	21.2 J	21.1 J	20.6 J	20.0 J	15.5 J	15.7 J	21.0 J
Selenium	mg/kg	1.02 J	1.14 J	1.47 J	1.73 J	1.40 J	0.850 J	1.84 J
Silver	mg/kg	0.0362 J	0.0381 J	0.0347 UJ	0.0391 J	0.0368 UJ	0.0394 J	0.0476 UJ
Strontium	mg/kg	132 J	128 J	117 J	87.0 J	121 J	79.1 J	100 J
Thallium	mg/kg	0.413 J	0.438 J	0.406 J	0.561 J	0.396 J	0.353 J	0.711 J
Vanadium	mg/kg	26.4 J	27.4 J	28.5 J	36.4 J	25.9 J	25.7 J	39.5 J
Zinc	mg/kg	80.6 J	80.8 J	77.0 J	85.1 J	57.4 J	55.7 J	91.5 J
Radiological Parameters								
Radium-226	pCi/g	1.17 +/-(0.342)J	1.73 +/-(0.577)J	1.13 +/-(0.385)J	-	-	1.68 +/-(0.374)J	2.41 +/-(0.509)J
Radium-228	pCi/g	1.47 +/-(0.415)	0.902 +/-(0.798)UJ	1.35 +/-(0.479)J	-	-	1.75 +/-(0.457)J	1.06 +/-(0.698)J
Radium-226+228	pCi/g	2.64 +/-(0.538)J	2.63 +/-(0.985)J	2.48 +/-(0.615)J	-	-	3.43 +/-(0.591)J	3.47 +/-(0.864)J
Anions								
Chloride	mg/kg	95.6 J	103 J	50.8 J	307 J	225 J	42.7 J	1,050 J
Fluoride	mg/kg	4.29 J	4.18 J	7.79 J	4.69 J	4.09 J	6.49 J	4.53 J
Sulfate	mg/kg	2,660 J	2,430 J	1,460 J	18,600 J	2,350 J	1,130 J	3,300 J
General Chemistry								
pH (lab)	SU	7.9	7.9	7.7	8.2	7.5	7.6	7.4

See notes on last page.

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TABLE B.4 – Sediment Analytical Results
Cumberland Fossil Plant
June and July 2021

Sample Location		UT01.5			UT02	UT03	UT03.25
Sample Date		23-Jun-21	23-Jun-21	25-Jun-21	25-Jun-21	25-Jun-21	24-Jun-21
Sample ID		CUF-SED-UT01.5-CORCC-0.0/0.5-20210623	CUF-SED-UT01.5-CORLB-0.0/0.5-20210623	CUF-SED-UT01.5-CORRB-0.0/0.2-20210625	CUF-SED-UT02-CORRB-0.0/0.5-20210625	CUF-SED-UT03-CORRB-0.0/0.5-20210625	CUF-SED-UT03.25-CORCC-0.0/0.5-20210624
Parent Sample ID							
Sample Depth		0 - 0.5 ft	0 - 0.5 ft	0 - 0.2 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM							
% ASH	%	6	6	7	7	8	5
Total Metals							
Antimony	mg/kg	0.223 J	0.260 J	0.248 J	0.236 J	0.182 J	0.108 J
Arsenic	mg/kg	8.56 J	6.63 J	7.62 J	7.61 J	6.39 J	3.50 J
Barium	mg/kg	184 J	265 J	231 J	216 J	168 J	90.6 J
Beryllium	mg/kg	0.796 J	1.09 J	1.14 J	0.912 J	0.789 J	0.458 J
Boron	mg/kg	56.8 J	27.9 J	63.7 J	76.8 J	40.5 J	23.8 U*
Cadmium	mg/kg	0.294 J	0.223 J	0.442 J	0.272 J	0.276 J	0.203 J
Calcium	mg/kg	56,100 J	40,100 J	89,600 J	50,600 J	65,000 J	112,000 J
Chromium	mg/kg	13.0 J	14.0 J	18.9 J	15.5 J	14.4 J	10.0 J
Cobalt	mg/kg	10.9 J	25.7 J	11.4 J	11.5 J	10.5 J	5.26 J
Copper	mg/kg	11.0 J	11.2 J	14.5 J	10.8 J	10.4 J	7.63 J
Lead	mg/kg	13.1 J	20.0 J	16.9 J	14.3 J	14.7 J	7.93 J
Lithium	mg/kg	8.12 J	7.15 J	13.0 J	10.1 J	8.89 J	6.99 J
Mercury	mg/kg	0.0588 J	0.0427 J	0.0821 J	0.0435 J	0.0458 J	0.0351 J
Molybdenum	mg/kg	317 J	46.9 J	209 J	380 J	141 J	42.0 J
Nickel	mg/kg	14.8 J	13.9 J	20.5 J	14.4 J	13.5 J	9.52 J
Selenium	mg/kg	1.41 J	0.734 J	1.96 J	1.51 J	0.662 J	0.691 J
Silver	mg/kg	0.0429 UJ	0.0446 J	0.0504 UJ	0.0383 J	0.0446 J	0.0339 UJ
Strontium	mg/kg	83.1 J	61.2 J	127 J	63.0 J	66.5 J	118 J
Thallium	mg/kg	0.383 J	0.261 J	0.550 J	0.369 J	0.313 J	0.343 J
Vanadium	mg/kg	25.7 J	32.7 J	33.5 J	34.6 J	25.3 J	14.8 J
Zinc	mg/kg	52.6 J	41.7 J	79.1 J	50.4 J	48.8 J	34.5 J
Radiological Parameters							
Radium-226	pCi/g	1.62 +/-(0.376)J	0.196 +/-(0.294)UJ	-	2.01 +/-(0.562)J	1.17 +/-(0.266)J	0.903 +/-(0.271)J
Radium-228	pCi/g	0.480 +/-(0.601)UJ	1.32 +/-(0.509)	-	0.593 +/-(0.593)UJ	0.903 +/-(0.320)J	0.684 +/-(0.384)
Radium-226+228	pCi/g	2.10 +/-(0.709)J	1.52 +/-(0.588)J	-	2.60 +/-(0.817)J	2.07 +/-(0.416)J	1.59 +/-(0.470)J
Anions							
Chloride	mg/kg	555 J	46.7 J	1,040 J	603 J	298 J	122 J
Fluoride	mg/kg	7.31 J	3.62 J	8.68 J	3.43 J	1.71 UJ	3.86 J
Sulfate	mg/kg	2,990 J	1,190 J	4,550 J	3,520 J	1,070 J	860 J
General Chemistry							
pH (lab)	SU	7.4	7.4	7.3	7.3	7.7	7.5

See notes on last page.

TABLE B.4 – Sediment Analytical Results
Cumberland Fossil Plant
June and July 2021

Sample Location		UT03.5	UT03.75		UT04		UT05
Sample Date		24-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21
Sample ID		CUF-SED-UT03.5-CORCC-0.0/0.7-20210624	CUF-SED-UT03.75-CORCC-0.0/0.5-20210624	CUF-SED-UT03.75-CORCC-0.5/1.0-20210624	CUF-SED-UT04-CORCC-0.0/0.5-20210624	CUF-SED-UT04-CORCC-0.5/2.6-20210624	CUF-SED-UT05-CORCC-0.0/0.5-20210624
Parent Sample ID							
Sample Depth		0 - 0.7 ft	0 - 0.5 ft	0.5 - 1 ft	0 - 0.5 ft	0.5 - 2.6 ft	0 - 0.5 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM							
% ASH	%	1	4	6	6	5	8
Total Metals							
Antimony	mg/kg	0.192 J	0.174 J	0.194 J	0.222 J	0.309 J	0.183 J
Arsenic	mg/kg	4.11 J	5.09 J	5.32	6.29 J	7.85	5.72 J
Barium	mg/kg	115 J	120 J	116 J	97.8 J	132 J	80.8 J
Beryllium	mg/kg	0.951 J	0.916 J	0.927	1.07 J	1.26	0.807 J
Boron	mg/kg	13.3 U*	24.7 U*	12.6 U*	18.1 U*	12.2 U*	24.4 U*
Cadmium	mg/kg	0.265 J	0.294 J	0.240	0.373 J	0.377	0.370 J
Calcium	mg/kg	61,500 J	92,700 J	47,100	18,500 J	16,700	71,100 J
Chromium	mg/kg	15.3 J	17.7 J	16.2	21.3 J	21.9	16.3 J
Cobalt	mg/kg	7.74 J	8.50 J	7.89	9.64 J	10.3	8.28 J
Copper	mg/kg	12.8 J	12.9 J	12.3	14.7 J	16.2	10.4 J
Lead	mg/kg	17.6 J	14.5 J	15.3	14.8 J	18.0	11.9 J
Lithium	mg/kg	12.4 J	14.6 J	15.2	15.4 J	16.4	10.9 J
Mercury	mg/kg	0.0433 J	0.0387 J	0.0410	0.0480 J	0.0642	0.0564 J
Molybdenum	mg/kg	7.82 J	34.7 J	10.4	22.8 J	6.38	34.2 J
Nickel	mg/kg	15.2 J	16.7 J	16.4	19.8 J	24.1	14.4 J
Selenium	mg/kg	0.377 J	0.692 J	0.339 J	0.482 J	0.340 J	0.825 J
Silver	mg/kg	0.0416 J	0.0400 J	0.0401 J	0.0461 J	0.0595 J	0.0430 J
Strontium	mg/kg	69.2 J	112 J	64.5	35.7 J	41.6	88.6 J
Thallium	mg/kg	0.347 J	0.424 J	0.390	0.373 J	0.386	0.293 J
Vanadium	mg/kg	23.4 J	25.8 J	26.1	33.7 J	35.3	23.0 J
Zinc	mg/kg	61.6 J	62.7 J	58.4	76.7 J	87.0	58.7 J
Radiological Parameters							
Radium-226	pCi/g	0.714 +/-(0.294)UJ	1.07 +/-(0.362)J	1.55 +/-(0.364)J	1.54 +/-(0.358)J	1.70 +/-(0.341)J	-0.312 +/-(0.622)UJ
Radium-228	pCi/g	1.17 +/-(0.410)	1.02 +/-(0.496)J	1.66 +/-(0.342)	1.49 +/-(0.471)	1.54 +/-(0.461)J	1.46 +/-(0.702)J
Radium-226+228	pCi/g	1.88 +/-(0.505)J	2.09 +/-(0.614)J	3.21 +/-(0.499)J	3.03 +/-(0.592)J	3.24 +/-(0.573)J	1.46 +/-(0.938)J
Anions							
Chloride	mg/kg	91.4 J	116 J	50.1	112 J	93.7	88.4 J
Fluoride	mg/kg	4.16 J	6.78 J	6.91	5.83 J	5.81	3.71 J
Sulfate	mg/kg	507 J	739 J	407	499 J	172	772 J
General Chemistry							
pH (lab)	SU	7.7	7.6	7.8	7.4	7.6	7.6

See notes on last page.

TABLE B.4 – Sediment Analytical Results
Cumberland Fossil Plant
June and July 2021

Sample Location		WC03.5			
Sample Date		24-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21
Sample ID		CUF-SED-WC03.5-CORCC-0.0/0.5-20210624	CUF-SED-WC03.5-CORLB-0.0/0.5-20210624	CUF-SED-WC03.5-DUP01-20210624	CUF-SED-WC03.5-CORRB-0.0/0.7-20210624
Parent Sample ID				CUF-SED-WC03.5-CORLB-0.0/0.5-20210624	
Sample Depth		0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.7 ft
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified
PLM					
% ASH	%	<1	<1	<1	<1
Total Metals					
Antimony	mg/kg	0.152 J	0.222 J	0.227 J	0.204 J
Arsenic	mg/kg	3.44	4.17 J	3.77	3.67
Barium	mg/kg	29.8 J	69.9 J	67.7 J	47.9 J
Beryllium	mg/kg	0.540	0.778 J	0.736	0.655
Boron	mg/kg	13.2 U*	4.77 U*	4.54 U*	21.7
Cadmium	mg/kg	0.404	0.646 J	0.581	0.493
Calcium	mg/kg	4,820	6,670 J	6,150	8,530
Chromium	mg/kg	16.2	14.8 J	14.7	14.4
Cobalt	mg/kg	6.40	8.47 J	8.18	8.33
Copper	mg/kg	5.32	9.22 J	8.86	8.19
Lead	mg/kg	8.66	12.7 J	11.9	11.8
Lithium	mg/kg	3.57	5.43 J	6.05	5.42
Mercury	mg/kg	0.0369	0.0515 J	0.0612	0.0445
Molybdenum	mg/kg	0.638	0.595 J	0.541	0.744
Nickel	mg/kg	9.74	13.7 J	13.8	12.2
Selenium	mg/kg	0.228 J	0.426 J	0.360 J	0.329 J
Silver	mg/kg	0.0858	0.0570 J	0.0552 J	0.0642 J
Strontium	mg/kg	9.55	14.7 J	14.4	15.1
Thallium	mg/kg	0.134	0.184 J	0.180	0.169
Vanadium	mg/kg	14.6	20.0 J	19.7	18.4
Zinc	mg/kg	43.4	62.7 J	61.4	54.9
Radiological Parameters					
Radium-226	pCi/g	1.29 +/-(0.300)	1.14 +/-(0.234)	1.51 +/-(0.330)	1.39 +/-(0.320)J
Radium-228	pCi/g	1.09 +/-(0.357)	1.05 +/-(0.325)J	0.317 +/-(0.533)UJ	0.945 +/-(0.396)
Radium-226+228	pCi/g	2.38 +/-(0.466)	2.19 +/-(0.400)J	1.83 +/-(0.627)J	2.34 +/-(0.509)J
Anions					
Chloride	mg/kg	184	7.82 UJ	<7.64	138
Fluoride	mg/kg	<1.10	1.36 UJ	<1.33	<1.17
Sulfate	mg/kg	343	26.0 J	20.0	665
General Chemistry					
pH (lab)	SU	7.3	7.2	7.2	7.5

Notes:
Please note that units have been converted automatically in this table, and significant figures may not have been maintained.

<0.03	analyte was not detected at a concentration greater than the laboratory reporting limit.
-	Parameter not analyzed / not available.
ft	feet
ID	identification
%	percent
J	quantitation is approximate due to limitations identified during data validation
mg/kg	milligrams per kilogram
pCi/g	picocuries per gram
PLM	polarized light microscopy
SU	standard unit
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation

1. Level of review is defined in the Quality Assurance Project Plan.

Stantec

TABLE B.5 – Summary of Surface Stream Samples
Cumberland Fossil Plant
June 2021

				Field Measurements						Analysis Type								
Location ID	**Station ID**	**Sample ID**	**Sample Type**	**Temp**	**pH**	**Sp. Cond.**	**DO**	**ORP**	**Turbidity**	**Total Metals**	**Total Mercury**	**Radium-226**	**Radium-228**	**Radium-226+228**	**Anions**	**Hardness**	**Total Dissolved Solids**	**Total Suspended Solids**
STR-UT01	LB	CUF-STR-UT01-LB-SUR-20210623	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	CC	CUF-STR-UT01-CC-SUR-20210623	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	RB	CUF-STR-UT01-RB-SUR-20210623	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	RB	CUF-STR-DUP01-20210623	Field Duplicate Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT01.5	LB	CUF-STR-UT01.5-LB-SUR-20210623	Normal Environmental Sample/Split Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	CC	CUF-STR-UT01.5-CC-SUR-20210623	Normal Environmental Sample/Split Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	RB	CUF-STR-UT01.5-RB-SUR-20210623	Normal Environmental Sample/Split Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT02	CC	CUF-STR-UT02-CC-SUR-20210623	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT03	CC	CUF-STR-UT03-CC-SUR-20210623	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT03.25	CC	CUF-STR-UT03.25-CC-SUR-20210622	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT03.5	CC	CUF-STR-UT03.5-CC-SUR-20210622	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT03.75	CC	CUF-STR-UT03.75-CC-SUR-20210622	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT04	CC	CUF-STR-UT04-CC-SUR-20210622	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-UT05	CC	CUF-STR-UT05-CC-SUR-20210622	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-WC03.5	LB	CUF-STR-WC03.5-LB-SUR-20210624	Normal Environmental Sample/Split Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	LB	CUF-STR-DUP01-20210624	Field Duplicate Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	CC	CUF-STR-WC03.5-CC-MID-20210624	Normal Environmental Sample/Split Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	RB	CUF-STR-WC03.5-RB-MID-20210624	Normal Environmental Sample/Split Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes:

Temp	Water Temperature
Sp. Cond.	Specific Conductance
DO	Dissolved Oxygen
ORP	Oxidation_Reduction Potential

Total and Dissolved Metals	SW-846 6020A
Total and Dissolved Mercury	SW-846 7470A
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
Anions	EPA 300.0/SW846 9056
Hardness	SM 2340B
Total Dissolved Solids	SM2540C
Total Suspended Solids	SM2540D
ID	Identification

1. Field and laboratory quality control sample results except for field duplicates are not included in report tables but were used for data validation.
2. Civil and Environmental Consultants, Inc. (CEC) obtained split samples from each station on transects STR-UT01.5 and STR-WC03.5.

TABLE B.6 – Surface Stream Sampling Field Data
Cumberland Fossil Plant
June 2021

Sampling Event	Station ID	Sample Date	Temperature	Specific Conductance	pH	DO	DO Saturation	Turbidity	ORP	Depth	Maximum Depth	Analytical Sample Depth (m)		
			°C	µS/cm	SU	mg/l	%	NTU	mV	m	m	SUR	MID	BOT
Unnamed Tributary June 2021	STR-UT01-LB	6/23/2021	31.60	1709	8.25	16.67	228.7	25.9	250	0.1	0.2	0.1	–	–
	STR-UT01-CC	6/23/2021	31.45	1709	8.26	14.03	192.0	22.5	235	0.1	0.16	0.1	–	–
	STR-UT01-RB	6/23/2021	32.43	1710	8.34	14.20	197.5	45.9	181	0.1	0.12	0.1	–	–
	STR-UT01.5-LB	6/23/2021	30.37	1694	8.38	17.32	232.7	31.4	234	0.1	0.15	0.1		
	STR-UT01.5-CC	6/23/2021	30.50	1698	8.57	21.32	287.0	24.2	174	0.1	0.45	0.2	–	–
	STR-UT01.5-CC	6/23/2021	25.75	1718	8.14	10.67	132.1	24.1	152	0.4				
	STR-UT01.5-RB	6/23/2021	30.78	1700	8.17	13.39	181.1	22.0	250	0.1	0.45	0.2	–	–
	STR-UT01.5-RB	6/23/2021	25.26	1740	7.56	4.93	60.5	18.9	239	0.4				
	STR-UT02-CC	6/23/2021	29.69	2029	7.48	4.60	61.1	7.7	336	0.1	<0.3	0.1	–	–
	STR-UT03-CC	6/23/2021	28.16	2066	7.41	3.95	51.1	9.0	332	0.1	<0.3	0.1	–	–
	STR-UT03.25-CC	6/22/2021	25.39	1499	7.30	3.30	41.1	18.7	63	0.3	0.5	0.25	–	–
	STR-UT03.25-CC	6/22/2021	24.37	1530	7.08	0.62	7.6	23.4	-21	0.5				
	STR-UT03.5-CC	6/22/2021	25.25	1494	7.63	7.50	93.1	8.8	183	0.3	0.6	0.3	–	–
	STR-UT03.5-CC	6/22/2021	24.53	1534	7.13	1.67	20.5	13.2	52	0.6				
	STR-UT03.75-CC	6/22/2021	25.07	1458	7.70	8.93	110.5	19.1	124	0.3	0.7	0.35	–	–
	STR-UT03.75-CC	6/22/2021	24.14	1475	6.96	1.39	16.9	59.9	46	0.7				
	STR-UT04-CC	6/22/2021	25.20	1446	7.19	5.70	70.7	8.4	337	0.2	0.3	0.15	–	–
	STR-UT05-CC	6/22/2021	25.93	1451	7.38	7.47	93.9	9.2	362	0.1	0.15	0.1	–	–
Wells Creek June 2021	STR-WC03.5-LB	6/24/2021	24.81	292.0	8.43	15.32	185.7	17.2	349	0.3	0.6	0.3	–	–
	STR-WC03.5-LB	6/24/2021	24.14	295.8	8.18	13.53	161.9	21.6	364	0.6				
	STR-WC03.5-CC	6/24/2021	24.75	294.3	8.38	14.14	171.2	9.4	331	0.3	1.37	–	0.7	–
	STR-WC03.5-CC	6/24/2021	23.36	297.6	8.02	11.75	136.0	13.6	348	0.6				
	STR-WC03.5-CC	6/24/2021	22.37	313.0	7.40	7.30	84.5	19.4	374	1.3				
	STR-WC03.5-RB	6/24/2021	25.16	295.0	8.31	13.68	166.9	10.5	322	0.3	1.6	–	0.8	–
	STR-WC03.5-RB	6/24/2021	23.55	296.0	8.14	12.21	144.5	11.3	336	0.7				
	STR-WC03.5-RB	6/24/2021	22.28	307.4	7.44	7.79	90.0	13.5	357	1.45				

Notes:

–	Not applicable	mg/L	milligrams per Liter
%	percent	µS/cm	microSiemens per centimeter
°C	degrees Celsius	mV	milliVolts
DO	Dissolved oxygen	NTU	Nephelometric Turbidity Units
ID	Identification	ORP	Oxidation-Reduction Potential
m	meter	SU	Standard Units

TABLE B.7 – Surface Stream Analytical Results
Cumberland Fossil Plant
June 2021

Sample Location		UT01				UT01.5			UT02	UT03	UT03.25
Sample Date		23-Jun-21	23-Jun-21	23-Jun-21	23-Jun-21	23-Jun-21	23-Jun-21	23-Jun-21	23-Jun-21	23-Jun-21	22-Jun-21
		UT01-CC	UT01-LB	UT01-RB	UT01-RB	UT01.5-CC	UT01.5-LB	UT01.5-RB	UT02-CC	UT03-CC	UT03.25-CC
Sample ID		CUF-STR-UT01-CC-SUR-20210623	CUF-STR-UT01-LB-SUR-20210623	CUF-STR-UT01-RB-SUR-20210623	CUF-STR-DUP01-20210623	CUF-STR-UT01.5-CC-SUR-20210623	CUF-STR-UT01.5-LB-SUR-20210623	CUF-STR-UT01.5-RB-SUR-20210623	CUF-STR-UT02-CC-SUR-20210623	CUF-STR-UT03-CC-SUR-20210623	CUF-STR-UT03.25-CC-SUR-20210622
Parent Sample ID					CUF-STR-UT01-RB-SUR-20210623						
Sample Depth		0.1 m	0.1 m	0.1 m	0.1 m	0.2 m	0.1 m	0.2 m	0.1 m	0.1 m	0.25 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.623 J	0.788 J	0.861 J	0.695 J	0.782 J	0.713 J	0.736 J	1.29	1.28 J	1.39
Barium	ug/L	96.1	96.2	99.1	99.9	98.4	101	97.5	95.8	90.4	67.2
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,480	4,280	4,600	4,550	4,390	4,310	4,820	8,530	8,000	3,930
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	352,000	350,000	355,000	360,000	344,000	355,000	341,000	405,000	398,000	282,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	0.332 J	0.360 J	0.248 J	0.268 J	0.259 J	0.412 J	0.257 J	0.568	0.429 J	0.192 J
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	782	808	829	810	946	965	837	944	767	187
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.132 U*	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	31,700	31,300	32,500	31,700	31,300	31,600	30,200	23,900	25,100	23,400
Manganese	ug/L	6,380	5,830	6,550	6,440	6,860	6,880	6,940	5,430	5,910	4,240
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	114	120	122	121	125	121	111	443	358	94.3
Nickel	ug/L	0.552 J	0.645 J	0.628 J	0.494 J	0.665 J	0.605 J	0.513 J	0.834 J	0.653 J	0.517 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	0.298 U*	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	6.71	5.32	1.14
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.702 J	0.666 J	0.592 J	0.627 J	0.714 J	0.850 J	0.598 J	1.05	1.03	1.05
Barium	ug/L	90.3	91.3	95.3	93.8	93.1	93.9	89.6	89.6	86.6	65.3
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,450	4,400	4,420	4,540	4,300	4,340	4,450	8,640	8,330	3,870
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	346,000	350,000	351,000	346,000	349,000	355,000	326,000	377,000	395,000	283,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	0.252 J	0.273 J	0.253 J	0.251 J	0.331 J	0.257 J	0.185 J	0.470 J	0.351 J	<0.134
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627
Iron	ug/L	265	40.4 J	32.8 J	31.1 J	617	536	68.7 U*	354	33.2 U*	57.1 U*
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	31,000	31,100	31,300	31,000	30,800	31,200	29,000	23,100	24,900	23,000
Manganese	ug/L	6,220	5,670	6,000	5,880	6,760	6,720	6,430	5,150	5,950	4,240
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	113	119	119	119	117	117	106	427	351	93.5
Nickel	ug/L	0.537 J	0.375 J	0.423 J	0.464 J	0.382 J	0.544 J	0.483 J	0.603 J	0.670 J	0.444 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	5.09	3.08	1.06
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters											
Radium-226	pCi/L	0.146 +/-(0.144)U	0.233 +/-(0.205)U	0.215 +/-(0.155)U	0.363 +/-(0.219)	0.204 +/-(0.186)U	0.162 +/-(0.199)U	0.246 +/-(0.234)U	0.221 +/-(0.128)	0.143 +/-(0.112)U	0.135 +/-(0.116)U
Radium-228	pCi/L	0.662 +/-(0.438)UJ	0.634 +/-(0.552)U	-0.0101 +/-(0.511)U	0.882 +/-(0.642)U	0.210 +/-(0.593)U	0.719 +/-(0.515)U	0.832 +/-(0.575)U	0.782 +/-(0.448)U*	0.232 +/-(0.391)U	0.204 +/-(0.384)U
Radium-226+228	pCi/L	0.809 +/-(0.461)UJ	0.868 +/-(0.589)U	0.215 +/-(0.534)U	1.25 +/-(0.678)J	0.414 +/-(0.621)U	0.881 +/-(0.552)U	1.08 +/-(0.621)U	1.00 +/-(0.466)J	0.374 +/-(0.407)U	0.339 +/-(0.401)U
Anions											
Chloride	mg/L	81.2	79.3 J	83.4 J	79.7 J	80.4 J	82.3 J	83.6	138	128	69.7
Fluoride	mg/L	0.152	0.149 J	0.147 J	0.139 J	0.145 J	0.164 J	0.136	0.149	0.121	0.134
Sulfate	mg/L	696	693 J	726 J	709 J	682 J	699 J	689	780	797	590
General Chemistry											
Hardness (as CaCO3)	mg/L	1,010	1,000	1,020	1,030	987	1,020	976	1,110	1,100	799
Total Dissolved Solids	mg/L	1,440	1,430 J	1,370 J	1,450 J	1,430 J	1,430 J	1,450	1,750	1,660	1,340
Total Suspended Solids	mg/L	22.4	23.3 J	36.3 J	38.8 J	19.5 J	34.7 J	19.0	7.20	6.43	50.0

See notes on last page.

TABLE B.7 – Surface Stream Analytical Results
Cumberland Fossil Plant
June 2021

Sample Location		UT03.5	UT03.75	UT04	UT05	WC03.5			
Sample Date		22-Jun-21	22-Jun-21	22-Jun-21	22-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21	24-Jun-21
		UT03.5-CC	UT03.75-CC	UT04-CC	UT05-CC	WC03.5-CC	WC03.5-LB	WC03.5-LB	WC03.5-RB
Sample ID		CUF-STR-UT03.5-CC-SUR-20210622	CUF-STR-UT03.75-CC-SUR-20210622	CUF-STR-UT04-CC-SUR-20210622	CUF-STR-UT05-CC-SUR-20210622	CUF-STR-WC03.5-CC-MID-20210624	CUF-STR-WC03.5-LB-SUR-20210624	CUF-STR-DUP01-20210624	CUF-STR-WC03.5-RB-MID-20210624
Parent Sample ID								CUF-STR-WC03.5-LB-SUR-20210624	
Sample Depth		0.3 m	0.35 m	0.15 m	0.1 m	0.7 m	0.3 m	0.3 m	0.8 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
Total Metals									
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.23	1.13	1.83	1.77	0.637 J	0.810 J	0.996 J	0.497 J
Barium	ug/L	70.5	65.8	57.6	55.1	37.2	37.1	39.8	36.4
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,050	4,080	3,650	3,570	45.5 U*	48.7 U*	123 U*	82.3 U*
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	283,000	288,000	273,000	278,000	55,200	54,900	54,200	55,000
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	0.183 J	0.225 J	0.168 J	0.156 J	0.324 J	0.448 J	0.592	0.337 J
Copper	ug/L	<0.627	2.91	<0.627	<0.627	0.739 J	0.634 J	<0.627	0.657 J
Iron	ug/L	167	143	186	129	171	405	435	269
Lead	ug/L	<0.128	0.152 U*	<0.128	<0.128	0.295 U*	0.449 U*	0.564 U*	0.248 U*
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	23,200	23,800	22,300	22,400	4,210	4,060	4,410	4,380
Manganese	ug/L	4,730	4,110	2,820	2,800	96.9	101	112	92.2
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	98.2	87.5	60.7	59.1	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.587 J	0.717 J	0.683 J	0.463 J	<0.336	0.365 J	0.473 J	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.556 U*	<0.148
Vanadium	ug/L	1.14	1.08	1.15	1.14	1.21	1.71	1.83	1.12
Zinc	ug/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals									
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.853 J	1.01	1.40 J	1.35	0.552 J	0.673 J	0.609 J	0.663 J
Barium	ug/L	68.5	63.4	54.6	53.5	34.3	35.6	34.8	35.7
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,080	3,970	3,750	3,630	46.3 J	91.6 U*	87.5 U*	50.8 J
Cadmium	ug/L	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217	<0.217
Calcium	ug/L	275,000	282,000	274,000	268,000	56,600	54,200	54,600	55,900
Chromium	ug/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	<0.134	<0.134	<0.134	<0.134	0.170 J	0.172 J	0.163 J	0.260 J
Copper	ug/L	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	<0.627	0.658 J
Iron	ug/L	70.7	60.0	<19.5	<19.5	<19.5	<19.5	<19.5	123
Lead	ug/L	<0.128	3.21 J	<0.128	<0.128	<0.128	<0.128	<0.128	0.158 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	22,600	23,100	22,400	21,900	4,400	4,300	4,410	4,490
Manganese	ug/L	4,630	4,040	2,670	2,600	20.3	19.8	19.8	53.0
Mercury	ug/L	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130	<0.130
Molybdenum	ug/L	96.8	83.6	61.8	59.3	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.464 J	0.495 J	0.503 J	0.391 J	<0.336	<0.336	<0.336	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	0.454 U*	0.198 U*	<0.148
Vanadium	ug/L	1.17	<0.991	<0.991	<0.991	1.01	1.06	1.07	1.14
Zinc	ug/L	<3.22	3.42 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters									
Radium-226	pCi/L	0.130 +/-(0.110)U	0.288 +/-(0.261)U	0.0608 +/-(0.119)U	0.132 +/-(0.144)U	0.0779 +/-(0.104)U	0.125 +/-(0.107)U	0.0519 +/-(0.0957)U	0.0963 +/-(0.105)U
Radium-228	pCi/L	0.561 +/-(0.441)U	1.28 +/-(0.608)U*	0.841 +/-(0.471)U*	0.966 +/-(0.434)U*	0.678 +/-(0.392)U*	-0.0552 +/-(0.341)U	0.499 +/-(0.387)U	0.656 +/-(0.390)U*
Radium-226+228	pCi/L	0.691 +/-(0.455)U	1.57 +/-(0.662)U*	0.902 +/-(0.486)U*	1.10 +/-(0.457)U*	0.756 +/-(0.406)U*	0.125 +/-(0.357)U	0.551 +/-(0.399)U	0.752 +/-(0.404)U*
Anions									
Chloride	mg/L	65.9	66.3	67.7 J	67.2 J	5.30 J	5.24	5.27	5.39
Fluoride	mg/L	0.118	0.123	0.124 J	0.130 J	0.0497 J	0.0546 J	0.0493 J	0.0509 J
Sulfate	mg/L	578	539	543 J	524 J	7.88 J	7.35	7.45	8.04
General Chemistry									
Hardness (as CaCO3)	mg/L	801	818	773	787	155	154	154	155
Total Dissolved Solids	mg/L	1,150	1,120	1,170 J	1,170 J	181 J	162	170	178
Total Suspended Solids	mg/L	49.5	66.5	53.5 J	8.80 J	13.7 J	32.4 J	63.6 J	11.2

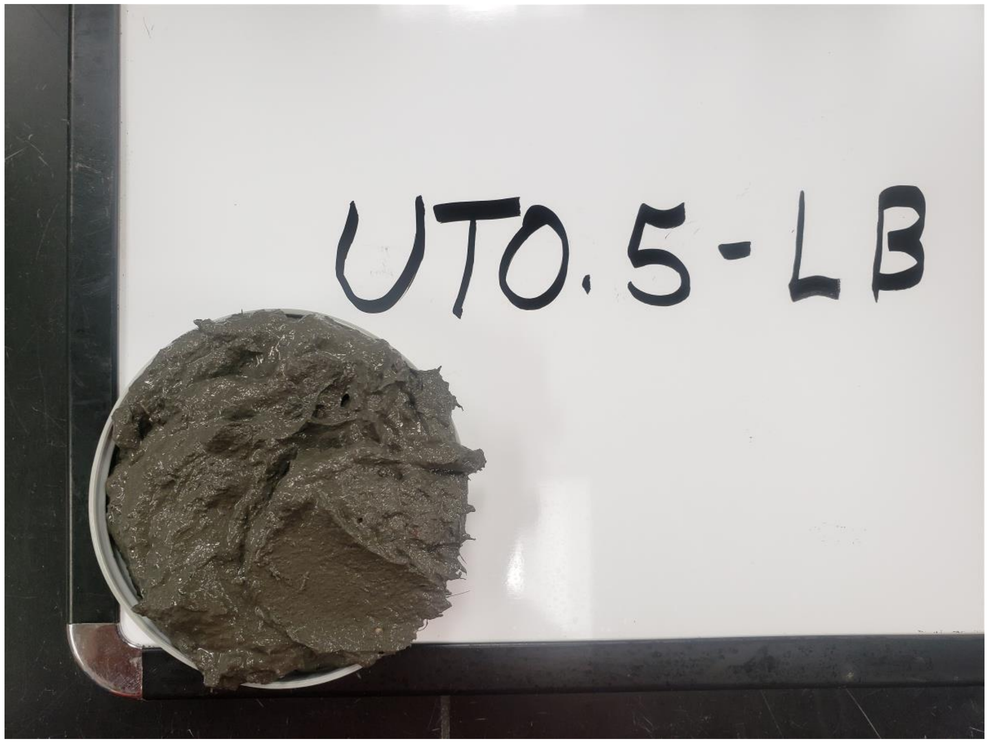
Notes:
Please note that units have been converted automatically in this table, and significant figures may not have been maintained.

<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
m	meter
mg/L	milligrams per Liter
pCi/L	picocuries per Liter
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
ug/L	micrograms per Liter
UJ	compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.

1. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX C – PHOTOGRAPHIC LOGS

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Stewart County, Tennessee

Photograph ID: 1 **Photo Location:** SED-UT0.5-LB **Survey Date:** 7/29/2021 **Comments:** Surficial (0.0-0.3 feet) sediment sample collected using a scoop. Photo of aliquot from homogenized sample.	
Photograph ID: 2 **Photo Location:** SED-UT0.5-CC **Survey Date:** 7/29/2021 **Comments:** Site photo. Facing upstream from access point. SED-UT0.5-CC in background.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

Photograph ID: 3

Photo Location:
SED-UT0.5-CC

Survey Date:
7/29/2021

Comments:
Site photo. Facing downstream from SED-UT0.5-CC.

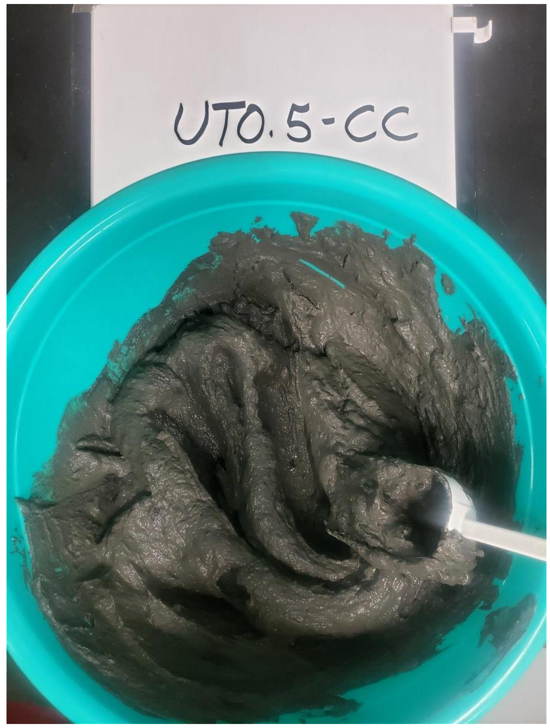
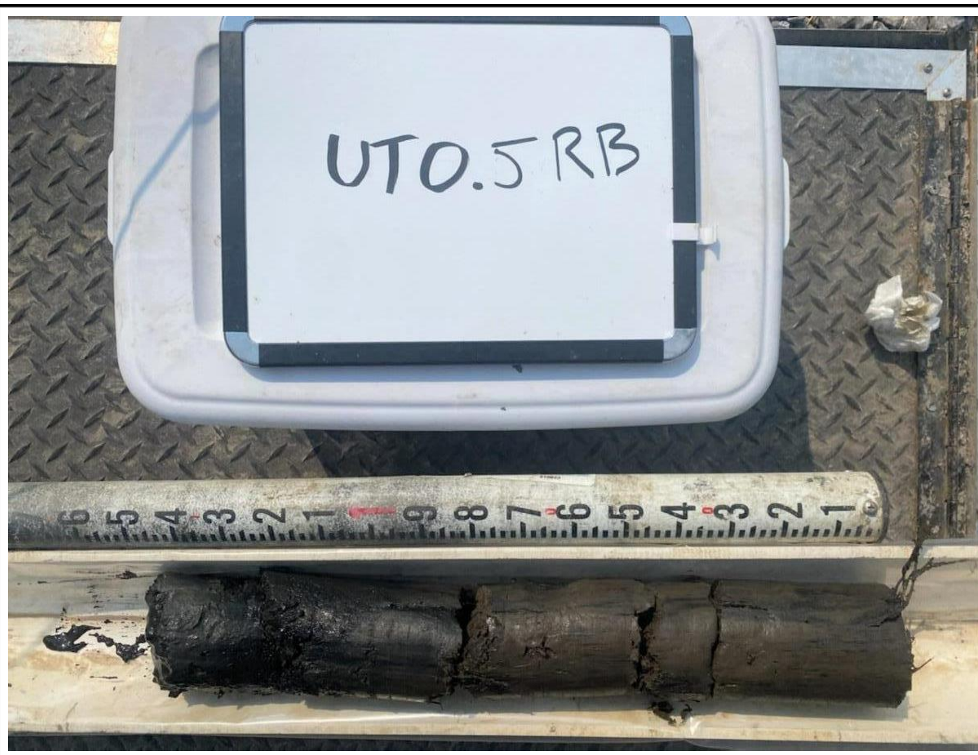
Photograph ID: 4

Photo Location:
SED-UT0.5-CC

Survey Date:
7/29/2021

Comments:
Core depth 1.0 feet. Upper 0.3 feet of core (organic matter) discarded, and core depth (0.7 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.4. Lower 0.3 feet of core parent material.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Stewart County, Tennessee

Photograph ID: 5 **Photo Location:** SED-UT0.5-CC **Survey Date:** 7/29/2021 **Comments:** Composite of surficial sediments (0.0-0.4 feet) obtained from a core sample and a scoop sample.	
Photograph ID: 6 **Photo Location:** SED-UT0.5-RB **Survey Date:** 7/29/2021 **Comments:** Core depth 1.4 feet. Sample interval (feet): 0.0-0.5 (photo: 1.4-0.9). Lower 0.9 feet of core parent material.	

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Stewart County, Tennessee

Photograph ID: 7

Photo Location:
SED-UT0.5-RB

Survey Date:
7/29/2021

Comments:
Parent material

Photograph ID: 8

Photo Location:
SED-UT01-LB

Survey Date:
6/25/2021

Comments:
Core depth 1.6 feet. Upper 0.4 feet (photo: 1.6-1.2) of core (aqueous organic matter) discarded, and core depth (1.2 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5 (photo: 1.2-0.7). Lower 0.7 feet of core parent material.

Note: Sample was reassigned transect location ID UT01.

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Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

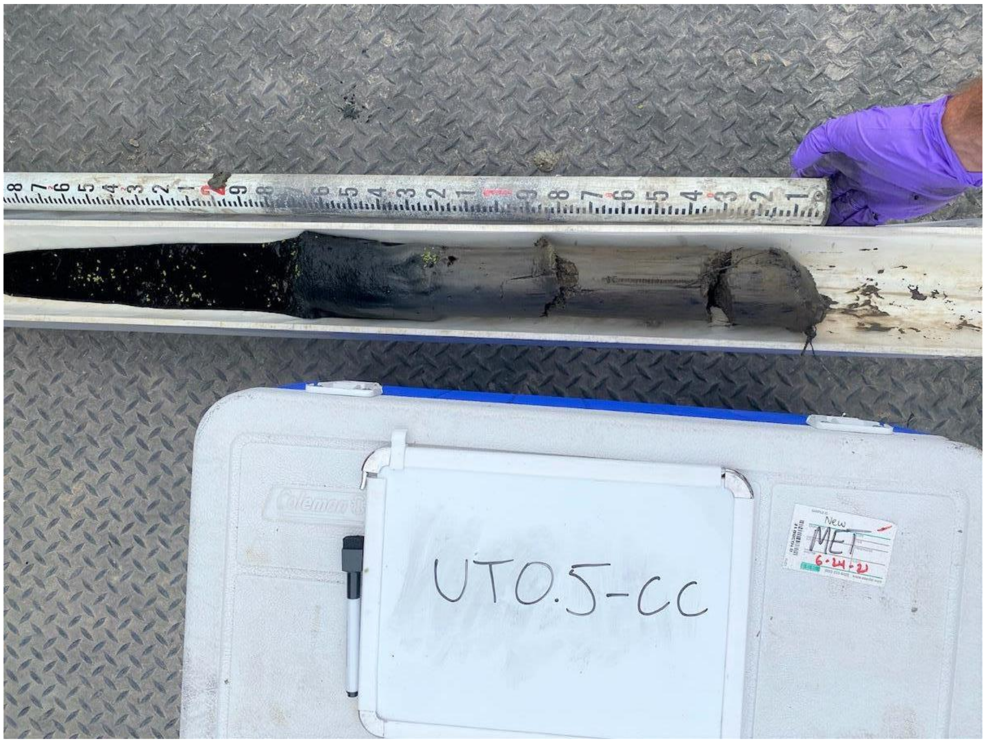
Photograph ID: 9

Photo Location: SED-UT01-CC

Survey Date: 6/25/2021

Comments: Core depth 1.7 feet. Upper 0.2 feet (photo: 1.7-1.5) of core (aqueous organic matter) discarded, and core depth (1.5 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.4 (photo: 1.5-1.1). Lower 1.1 feet of core parent material.

Note: Sample was reassigned transect location ID UT01.



Photograph ID: 10

Photo Location: SED-UT01-RB

Survey Date: 6/25/2021

Comments: Core depth 1.7 feet. Upper 0.4 feet (1.7-1.3) of core (aqueous organic matter) discarded, and core depth (1.3 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5 (photo: 1.3-0.8). Lower 0.8 feet of core, gravel mixed with fines overlaying parent material.

Note: Sample was reassigned transect location ID UT01.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

Photograph ID: 11

Photo Location:
SED-UT01.5-LB

Survey Date:
6/23/2021

Comments:
Core depth 2.0 feet. Sample interval (feet): 0.0-0.5. Lower 1.5 feet of core parent material.

Photograph ID: 12

Photo Location:
SED-UT01.5-CC

Survey Date:
6/23/2021

Comments:
Photo not available. Core depth 1.7 feet. Upper 0.2 feet of core (organic matter) discarded, and core depth (1.5 ft) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Lower 1.0 feet of core parent material.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

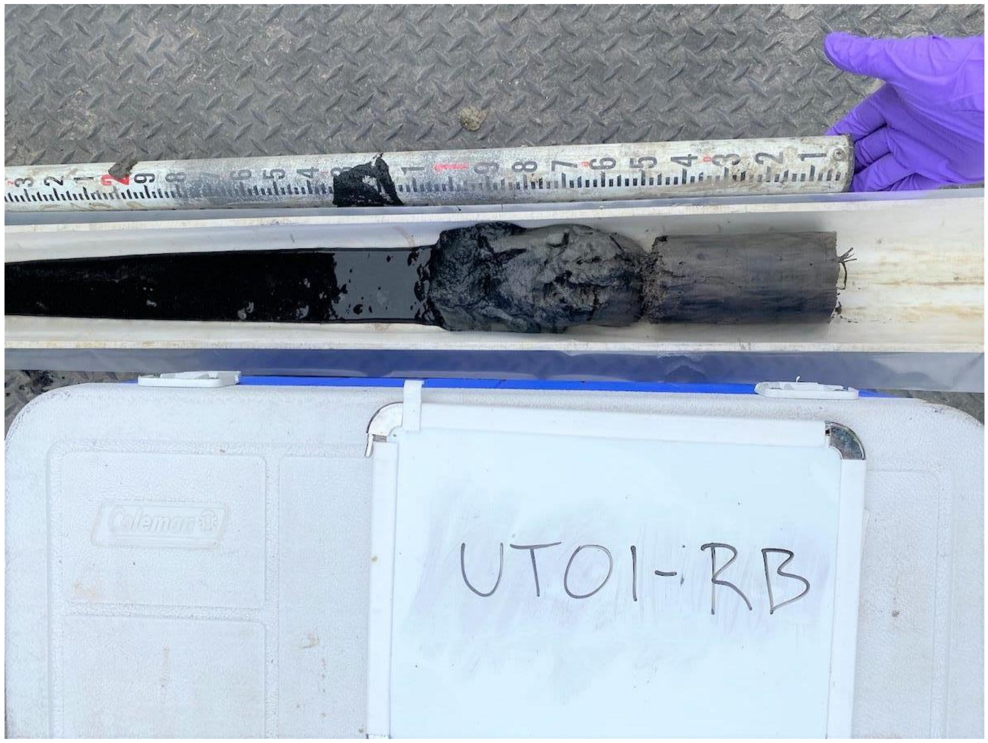
Photograph ID: 13

Photo Location: SED-UT01.5-RB

Survey Date: 6/25/2021

Comments: Core depth 1.0 feet. Upper 0.2 feet (photo: 1.0-0.8) of core (aqueous organic matter) discarded, and core depth (0.8 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.2 (photo: 0.8-0.6). Lower 0.6 feet of core parent material.

Note: Location ID shown on whiteboard should be UT01.5-RB.

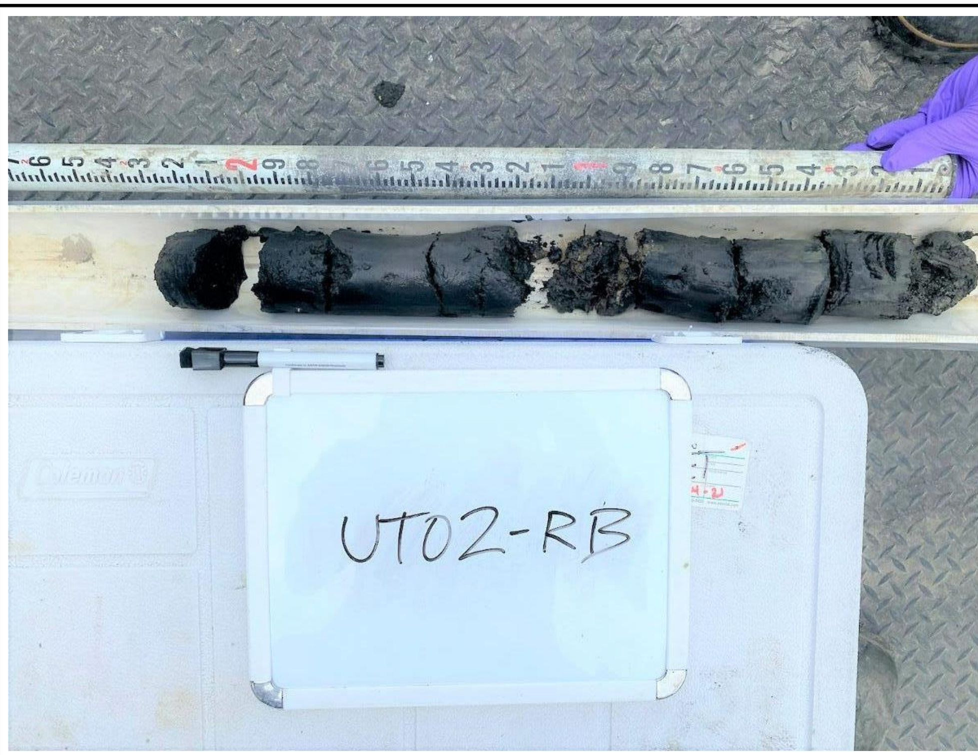


Photograph ID: 14

Photo Location: SED-UT02-RB

Survey Date: 6/25/2021

Comments: Collected two adjacent cores. Core depths 0.9 and 1.0 feet. Upper 0.4 and 0.2 feet of cores organic material. Surficial (0.0-0.5 and 0.0-0.4 feet) sediments composited to form the sample. Core of 1.0 feet contained 0.4 feet of parent material.



Stantec **Photographic Log**

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

Photograph ID: 15

Photo Location:
SED-UT02-RB

Survey Date:
6/25/2021

Comments:
Surficial (0.0-0.4 and 0.0-0.5 feet) sediment composite.

Photograph ID: 16

Photo Location:
SED-UT02-RB

Survey Date:
6/25/2021

Comments:
Site photo. Photo from mid-pond, facing upstream. SED-UT02-RB in background.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

Photograph ID: 17

Photo Location: SED-UT02-RB

Survey Date: 6/25/2021

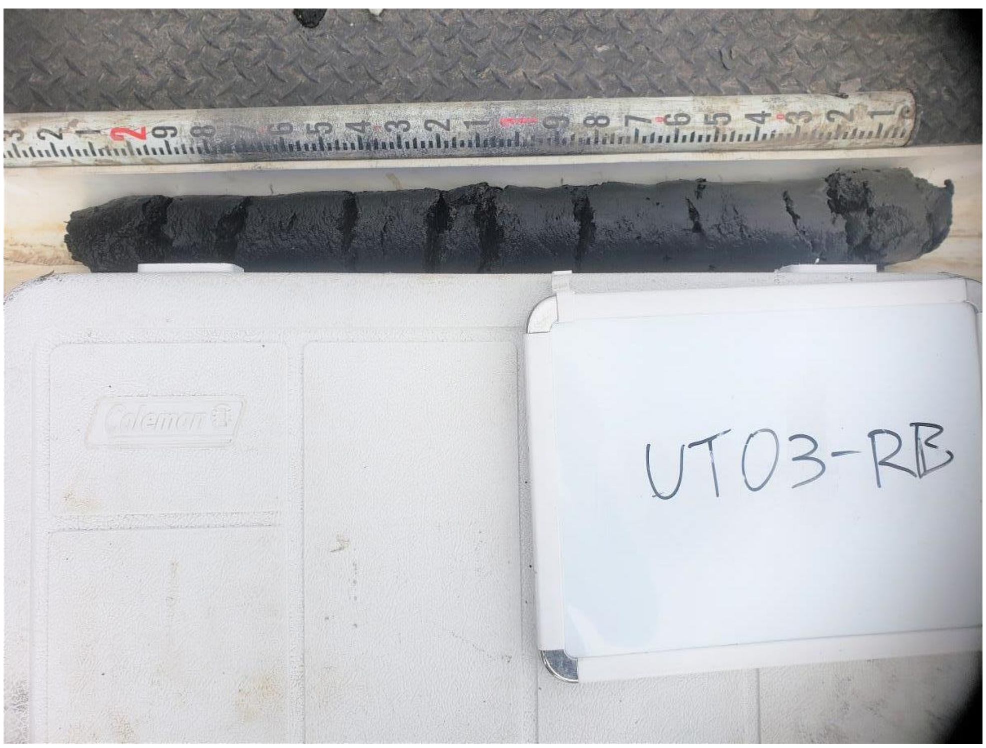
Comments: Site photo. SED-UT02-RB sample area.

Photograph ID: 18

Photo Location: SED-UT03-RB

Survey Date: 6/25/2021

Comments: Core depth 2.1 feet. Upper 1.3 feet of core (organics with some gravel) discarded, and core depth (0.8 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Lower 0.3 feet of core parent material.



Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Stewart County, Tennessee

Photograph ID: 19

Photo Location:
SED-UT03-RB

Survey Date:
6/25/2021

Comments:
Upper 1.3 feet of core organics with some gravel.

Photograph ID: 20

Photo Location:
SED-UT03-RB

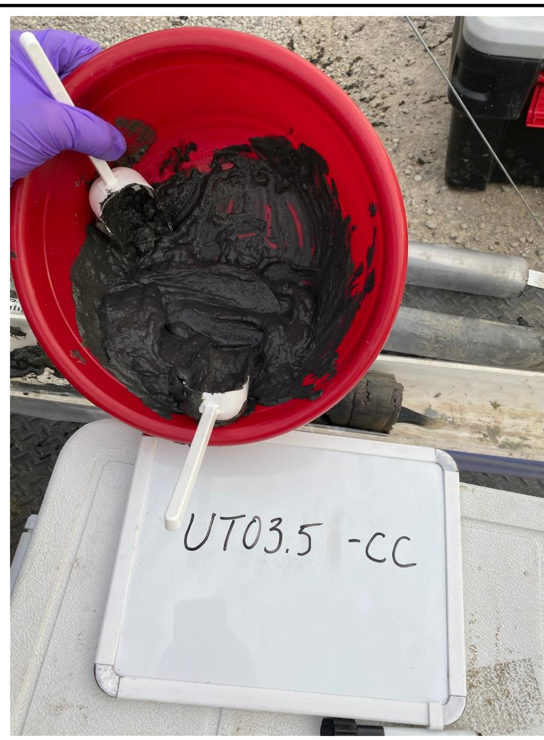
Survey Date:
6/25/2021

Comments:
Site photo. SED-UT03-RB sample area; facing upstream.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

Photograph ID: 21 **Photo Location:** SED-UT03-RB **Survey Date:** 6/25/2021 **Comments:** Site photo. Photo from mid-pond, facing dowstream. SED-UT03-RB in background.	
Photograph ID: 22 **Photo Location:** SED-UT03.25-CC **Survey Date:** 6/24/2021 **Comments:** Photo not available. Core depth 1.7 feet. Upper 0.2 feet of core (aqueous organic matter) discarded, and core depth (1.5 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Lower 1.0 feet of core parent material.	PHOTOGRAPH NOT AVAILABLE

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Stewart County, Tennessee

Photograph ID: 23 **Photo Location:** SED-UT03.5-CC **Survey Date:** 6/24/2021 **Comments:** Core depth 1.2 feet. Surface layer (0.1 feet) of aqueous organic material discharged over core; organics removed prior to collecting sediment sample. Sample interval (feet): 0.0-0.7. Lower 0.4 feet of core parent material.	
Photograph ID: 24 **Photo Location:** SED-UT03.5-CC **Survey Date:** 6/24/2021 **Comments:** Sample during homogenization.	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

Photograph ID: 25

Photo Location:
SED-UT03.75-CC

Survey Date:
6/24/2021

Comments:
Core depth 1.4 feet. Upper 0.2 feet (1.4-1.2) of core (aqueous organic matter) discarded, and core depth (1.2 feet) determined from the remaining substrates. Sample intervals (feet): 0.0-0.5 and 0.5-1.0. Lower 0.2 feet of core gravel mixed with fines.

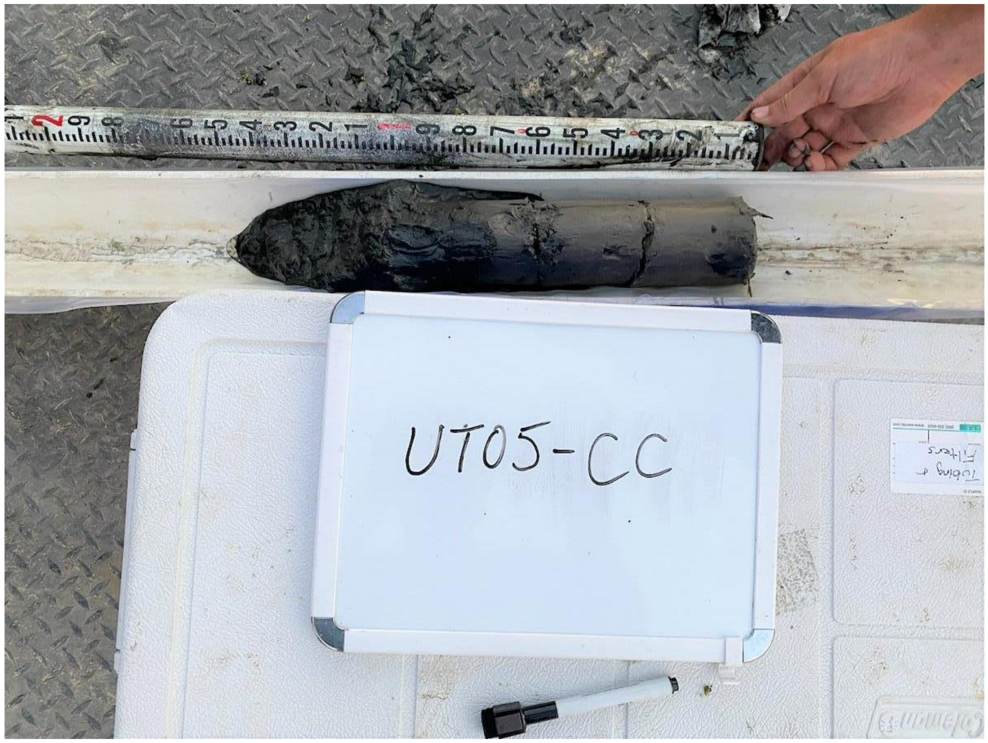
Photograph ID: 26

Photo Location:
SED-UT04-CC

Survey Date:
6/24/2021

Comments:
Core depth 2.6 feet. Sample intervals (feet): 0.0-0.5 and 0.5-2.6.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Cumberland Fossil (CUF) Plant	Site Location:	Stewart County, Tennessee

Photograph ID: 27 **Photo Location:** SED-UT05-CC **Survey Date:** 6/24/2021 **Comments:** Core depth 1.2 feet. Upper 0.1 feet (photo: 1.2-1.1) of core (aqueous organic matter) discarded, and core depth (1.1 feet) determined from the remaining substrates. Sample interval (feet): 0.0-0.5. Lower 0.6 feet of core parent material.	
Photograph ID: 28 **Photo Location:** SED-WC03.5-LB **Survey Date:** 6/24/2021 **Comments:** Composite of two Ponar grabs. Surficial (0.0-0.5 feet) sediment sample.	

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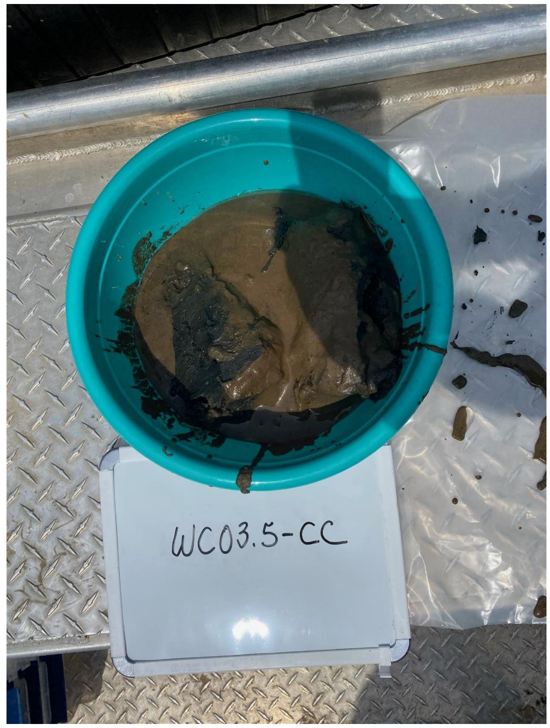
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Cumberland Fossil (CUF) Plant**	**Site Location:**	**Stewart County, Tennessee**

Photograph ID: 29 **Photo Location:** SED-WC03.5-CC **Survey Date:** 6/24/2021 **Comments:** Composite of two Ponar grabs. Surficial (0.0-0.5 feet) sediment sample.	
Photograph ID: 30 **Photo Location:** SED-WC03.5-RB **Survey Date:** 6/24/2021 **Comments:** Core depth 1.8 feet. Sample interval (feet): 0.0-0.7. Lower 1.1 feet of core parent material	

APPENDIX J.6

TECHNICAL EVALUATION OF FISH TISSUE DATA

TENNESSEE
VALLEY
AUTHORITY

Appendix J.6 - Technical Evaluation of Fish Tissue Data

Cumberland Fossil Plant
Cumberland City, Tennessee
Tennessee Valley Authority

TVA

Title and Approval Page

Title of Document: Appendix J.6 – Technical Evaluation of Fish Tissue Data
Cumberland Fossil Plant
Tennessee Valley Authority
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TVA

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2	August 14, 2023	Addresses May 16, 2023 TDEC Review Comments and Issued for TDEC

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Acronyms and Abbreviations

ATL	Alternative Thermal Limit
BIP	Balanced Indigenous Population
CBR	Critical Body Residue
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five organic constituents included in Appendix I of Tennessee Rule 0400-11-01.04
CFR	Code of Federal Regulations
CUF Plant	Cumberland Fossil Plant
CWA	Clean Water Act
EAR	Environmental Assessment Report
EI	Environmental Investigation
EIP	Environmental Investigation Plan
ESV	Ecological Screening Values
LOAEL	Lowest Observed Adverse Effects Level
NOAEL	No Observed Adverse Effects Level
NPDES	National Pollutant Discharge Elimination System
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
REH	Reservoir Ecological Health
RFAI	Reservoir Fish Assemblage Index
SAP	Sample and Analysis Plan
SAR	Sampling and Analysis Report
SFI	Sport Fishing Index
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TVA	Tennessee Valley Authority
USEPA	US Environmental Protection Agency

Chapter 1 Introduction

The Tennessee Valley Authority (TVA) has prepared this technical evaluation appendix to summarize historical fish studies and recent fish tissue sampling data at TVA's Cumberland Fossil Plant (CUF Plant) in Cumberland City, Tennessee. Since the 1970s, various fishery studies have been conducted in Barkley Reservoir in the vicinity of the CUF Plant, including fish population studies, sport fish surveys, impingement and entrainment monitoring, and fish tissue collection. This technical appendix provides a detailed evaluation of those studies and their supporting data for the Environmental Assessment Report (EAR) to fulfill the requirements for the Tennessee Department of Environment and Conservation-issued Commissioner's Order No. OGC15-0177 (TDEC Order) Program (TDEC 2015).

Chapter 2 Fish Tissue Investigation

The purpose of the fish tissue investigation was to characterize concentrations of Coal Combustion Residuals (CCR)-related constituents in fish tissue in the vicinity of the CCR management units at the CUF Plant.

For this investigation, TVA reviewed available historical fishery study data from streams and rivers adjacent to the CUF Plant. The primary focus of the recent TDEC Order Environmental Investigation (EI) was to collect and analyze fish tissue samples from upstream reference locations for comparison to samples collected in the immediate vicinity and downstream of the CUF Plant CCR management units and to provide data to evaluate potential bioaccumulation of CCR-related constituents.

The following chapters summarize the previous studies and present overall fish tissue investigation and evaluation findings based on data obtained during previous studies and the EI for the CUF Plant.

2.1 Historical Studies

Historically, TVA has conducted biological assessments by periodically monitoring aquatic communities (fish and benthic invertebrates) near the CUF Plant to evaluate their status upstream and downstream of the plant's thermal discharge. This monitoring is conducted in support of continuance of the CUF Plant Alternative Thermal Limit (ATL) site discharge National Pollutant Discharge Elimination System (NPDES) permit for the facility (NPDES Permit No. TN0005789; [TDEC 2018]). Renewal of the permit is based on successful demonstration, in accordance with Section 316(a) [1] of the federal Clean Water Act (CWA), that a balanced indigenous population (BIP[2]) of fish and wildlife is present and being maintained in the Cumberland River (Barkley Reservoir) downstream of the plant. The primary focus of the biological assessments conducted by TVA in accordance with the CWA consists of analyzing data to characterize the compositions of fish and benthic invertebrate communities upstream and downstream of the CUF Plant. Benthic invertebrate community information is provided in Appendix J.3.

Historical fish population assessments were completed in the mid-1970s, 1980s, and annually from 2001-2003, 2005 and 2007-2019, as detailed in Chapters 2.1.1 and 2.1.2 below. Additionally, fish impingement monitoring and entrainment studies were conducted as described in Chapters 2.1.3 and 2.1.4. Historical studies also included fish tissue collection and analysis as presented in Chapter 2.1.5. The historical fish tissue data were limited, so a more comprehensive collection and analyses of fish and associated fish tissue were conducted as part of the TDEC Order EI, as described in Chapter 2.2. The results and discussion of the fish tissue sample data are presented in Chapter 3.0.

2.1.1 FISH POPULATION MONITORING

In 1970, TVA initiated a fishery monitoring program in Barkley Reservoir to provide baseline data for use in evaluating potential impact of the CUF Plant operation on the fish community and to document the presence of unique species

[1] Section 316(a) of the CWA authorizes ATLs for the control of the thermal component of a point source discharge so long as the NPDES permit ATLs assure the protection of a BIP of aquatic life.
[2] 40 C.F.R. § 125.71(c) (2021).

inhabiting the Cumberland River in the vicinity of the plant (TVA 1977). This baseline data program was initiated prior to the 1973 completion of the CUF Plant (TVA 1983).

From 1973 through 1976, TVA conducted biological studies to evaluate potential aquatic environmental effects of thermal discharge at the CUF Plant. These evaluations were performed to support establishment of the initial and subsequent ATL requests for site discharge and to demonstrate compliance with Section 316(a) of the CWA (TVA 1977). These studies were conducted in general accordance with the United States Environmental Protection Agency's (USEPA) Interagency Section 316(a) technical guidance manual (USEPA 1977) and included a more intensive fish investigation on Barkley Reservoir (1974 and 1976) and sampling of the aquatic community (1973 to 1975). Hydrothermal modeling results, water quality, and other factors also were evaluated.

The 1970s study findings (inclusive of benthic invertebrate data; refer to Chapter 2.1.2 of the CUF Plant Appendix J.3) were interpreted initially by USEPA and subsequently by TDEC as evidence of a BIP downstream of the CUF Plant and supported TDEC's decisions to continue the ATL in the facility's subsequent NPDES permit renewals (TVA 2019a). In 1981, TVA modified the fish population sample design to include additional sample locations on Barkley Reservoir. This modification was implemented in 1982 (TVA 1984). Results of the 1980 through 1983 fish community monitoring are reported in TVA (1981,1982, 1983, and 1984). Section 316(a) fish community monitoring was not performed between 1983 and 2001.

In 2001, TVA and TDEC reached an agreement whereby results of TVA's Reservoir Ecological Health (REH) monitoring program became the accepted study design for measuring the presence and maintenance of a BIP to support Section 316(a)-based ATLs and subsequent NPDES permit renewals (TVA 2019a). The REH Monitoring program was designed to measure ecological health and water quality on a reservoir-wide basis. The study design at the time (starting in 2001) was based on measuring biotic integrity using multi-metric community structure assessment techniques that focused on comparing fish communities upstream and downstream of the CUF Plant during autumn (TVA 2019a). Fish communities are used to evaluate ecological conditions because of their importance in the aquatic food web and because fish life cycles are long enough to integrate conditions over time. A component of the REH fish monitoring program was based on measuring biotic integrity using a multi-metric approach to data evaluation for fish communities known as the Reservoir Fish Assemblage Index (RFAI)[3] (TVA 2017a). With the inclusion of benthic invertebrate sampling in 2008, the RFAI data were then supplemented with the Reservoir Benthic Index data to demonstrate a BIP in support of continuance of the ATL at the CUF Plant.

In 2007, seasonal fish assessments (winter, spring, summer, and autumn) were initiated in response to regional drought conditions (TVA 2017b). In 2009 and 2010, there was increasing regulatory interest at the federal level in having NPDES permit applicants update studies supporting ATLs and to better focus study design on the regulatory definition of a BIP as provided in 40 Code of Federal Regulations (CFR) Section 125.73. Up until 2009, BIP determinations for the Cumberland River/Barkley Reservoir focused on the fish community (measured using holistic multi-metric techniques). However, beginning in 2009, supplemental information on communities such as planktonic organisms, macroinvertebrates, aquatic vegetation, and wildlife was added to help inform the decision-making process with regard to the determination of a BIP. Physical habitats and the zone of passage for fish were also evaluated for effects on BIP. Accordingly, TVA developed

[3] RFAI has been tested on TVA and other reservoirs and published in peer-reviewed literature (Jennings et al. 1995; Hickman and McDonough 1996; McDonough and Hickman 1999).

study plans incorporating sampling locations closer to its power plants and included these more traditional comparative analysis techniques in addition to the long-used multi-metric assessment techniques.

Under the study design initiated in 2001 and conducted through 2018, two sampling reaches, one upstream and one downstream of the thermal discharge, were selected to evaluate the effect of the CUF Plant's thermal discharge on fish communities in the Cumberland River (Barkley Reservoir) (TVA 2017b). Fish were identified by species, counted, and examined for anomalies such as disease, deformations, parasites, or hybridization. The resulting data were evaluated using RFAI methodology[4], which uses 12 fish community metrics from four general categories, as detailed in TVA (2017b).

TVA uses two approaches in analyzing RFAI results to determine maintenance of a BIP (TVA 2019a). One is "absolute" in that it compares the RFAI scores and individual metrics to predetermined values. The other is "relative" in that it compares RFAI scores attained downstream to the upstream control site for determining if operation of the plant has had impacts on the resident fish community. The "absolute" approach is based on Jennings et al. (1995) who suggested that favorable comparisons of the attained RFAI score from the potential impact zone to a predetermined criterion can be used to identify the presence of normal community structure and function, and hence existence of a BIP (TVA 2019a). TVA's multi-metric RFAI attempts to address characteristics of a BIP in a holistic manner by measuring 12 population metrics, scoring each metric by comparison to expectations of healthy populations in the region, and summing the individual metric scores to arrive at an overall RFAI score and ecological health rating. The maximum RFAI score attainable is 60 which is considered "Excellent". It has generally been accepted by EPA and TDEC that an RFAI rating of "Fair" or better in the thermally affected area can be considered demonstration of a BIP, particularly where RFAI scores for unaffected upstream areas are similar. RFAI scoring and species tables for the previously collected samples are reported in TVA (2005, 2008, 2010, 2011, 2012, 2013, 2015a, 2015b, 2016b, 2017a, 2017b, 2019a, and 2019b). RFAI annual and seasonal index scores indicate consistent and balanced indigenous fish populations (with minor seasonal variations) between upstream and downstream transects over a 12-year period, as shown on Exhibits J.6-1 and J.6-2.

Data collected from the historical fish population monitoring events were used solely to determine maintenance of a BIP and did not include collecting fish tissue. However, evaluation of these historical data served as the foundation to support the TDEC Order EI activities summarized in Chapter 2.2 and in the CUF Plant EAR Chapter 7.1.3.

2.1.2 Sport Fish Surveys

In 1995, TVA biologists and state fishery resource agencies in the Tennessee River Valley developed the Sport Fishing Index (SFI) to quantify sport fishing quality for individual sport fish species (Hickman 2000). The sport fish surveys used the calculated SFI to:

- Provide the public with information that will assist them in selecting locations that have the best potential for a successful fishing experience for the species they prefer, and
- Provide TVA and state biologists with a reference point and subsequent measure of the quality of that fishery over time.

[4] RFAI methodology addresses the definitional elements of a BIP and is a component of the REH monitoring program (refer to EAR Chapter 7.1.3).

The sport fish surveys were typically performed in the spring, but not every TVA reservoir was surveyed each year. The surveys included electrofishing to collect data on fish abundance, species distribution, length, weight, relative stock density, and proportional stock density (TVA 2006). Data were collected on habitat type to determine the multi-metric Shoreline Aquatic Habitat Index, which measures existing fish habitat quality (TVA 2011).

The SFI incorporates measurements of quantity (fish species population) and quality aspects of potential for angler success. TVA reported SFI findings on its website for use by anglers and other members of the public (TVA 2019b).

The SFI and sport fish surveys were discontinued in approximately 2009 and on mainstream Tennessee River reservoirs in 2014, with the exception of the Watts Bar Reservoir, which was last surveyed in 2017.

2.1.3 Fish Impingement Monitoring

Between 1974 and 1976, TVA conducted fish impingement[5] investigations at the CUF Plant to evaluate the effects of the plant's cooling water intake on the aquatic community (TVA 1977).

Between February 2005 and February 2007, TVA conducted impingement monitoring at the CUF Plant to assess the effects of impingement on the aquatic community of Barkley Reservoir (TVA 2007). Because the CUF Plant must comply with the Tennessee Water Quality Act and the federal CWA, TVA was required by Section 316(b) of the CWA to demonstrate that the condenser cooling water withdrawal at the CUF Plant had no significant impact on the aquatic community. TVA conducted impingement monitoring at the CUF Plant in 2005 through 2007in response to the 2004 USEPA rule for implementing Section 316(b), and in accordance with a Proposal for Information Collection submitted to the TDEC in 2005. The 2004 EPA impingement monitoring rule subsequently was suspended in 2007.

Data collected from the fish impingement monitoring did not include collecting fish tissue for analysis of CCR Parameters (defined for this investigation in Chapter 3.1 below). However, evaluation of these historical data served as a foundation to support the TDEC Order EI activities summarized below in Chapter 2.2 and in the CUF Plant EAR Chapter 7.1.3.

2.1.4 Fish Entrainment Monitoring

Between 1974 and 1976, TVA conducted fish entrainment[6] studies at the CUF Plant to evaluate the effects of the plant's cooling water intake on the aquatic community (TVA 1977). The studies were conducted in accordance with the NPDES permit issued in mid-1976.

In 2014, the USEPA issued a final Section 316(b) rule for existing power generating and industrial facilities. As a result, TVA was required to provide a minimum two-year entrainment characterization study at the CUF Plant because it withdraws more than 125 million gallons of cooling water per day (TVA 2017c). Between March 2013 and February 2015, TVA collected fish samples at the CUF Plant to determine the numbers and taxonomic identities of fish eggs and larvae entrained by the CUF Plant water intake.

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[5] Impingement is a component of Section 316(b) of the CWA and refers to an adverse environmental impact (i.e., death or injury) in which aquatic organisms are pinned (or impinged) against a screen or other parts of a cooling water intake structure.

[6] Entrainment is defined in Section 316(b) of the CWA as an adverse environmental impact (i.e., death or injury) in which aquatic organisms are drawn (or entrained) into cooling water systems and subjected to thermal, physical or chemical stresses.

Data collected from the historical fish entrainment study did not include collecting fish tissue for analysis of CCR Parameters (see Chapter 3.1 below). However, the evaluation of these historical data served as a foundation to support the TDEC Order investigation activities summarized in Chapter 2.2 below and in the CUF Plant EAR Chapter 7.1.3.

2.1.5 Fish Tissue Monitoring

In 2016, TVA collected fish tissue samples along with surface stream samples (refer to Appendix J.1) from the Cumberland River in support of its request to TDEC and the USEPA for approval of alternative technology-based effluent limitations for selenium and nitrate/nitrite at locations upstream of the CUF Plant (TVA 2016a).

2.1.6 Historical Fishery Study Conclusions

A summary of the conclusions from the historical fishery studies described in the previous sections is provided below.

Fish Population Monitoring. Key findings from the 1970s fish population monitoring studies include (TVA 2019a):

- Fish species occurrence and abundance data indicated no significant impacts
- Diversity of fish and biomass for harvestable fish was high in all sample areas
- Gonadal inspections indicated the thermal discharge was not adversely impacting fish reproduction
- Thermal discharge resulted in no discernible increase in parasitism, no detrimental changes in length-weight relationships, and no impacts on growth characteristics
- Thermal blockage of fish movement was not observed.

Overall, the 2000s fish community sampling events and RFAI results (Exhibits J.6-1 and J.6-2 for select years of this period) showed that the total numbers of fish species and fish abundance during the summer season have increased at both upstream and downstream sample locations since the period of reduced flows and drought that occurred in 2007 (TVA 2017a). Additionally, over the years of investigation the numbers of species and abundance of fish during autumn have been similar upstream and downstream of the CUF Plant. Furthermore, evaluation of fish community metrics from the most recent sampling (autumn 2019) indicates that the fish community within the thermally affected reach downstream has exhibited a trend of continued improvement, and that the fish community structure in the thermally affected reach was similar to that in the unaffected reach upstream (TVA 2019a). Therefore, in the context of USEPA's interpretation of the regulatory definition of a BIP, TVA maintains that a BIP is currently being demonstrated in Barkley Reservoir.

Fish Impingement Monitoring. Results of the 1970s and 2000s impingement monitoring, used in conjunction with the RFAI results, show that impingement at the CUF Plant does not adversely impact the fish community of Barkley Reservoir (TVA 1977 and 2007).

Fish Entrainment Studies. The 1970s and 2000s entrainment studies indicate no significant adverse environmental impact resulted from entrainment of fish eggs and larvae in the CUF Plant intake (TVA 1977a and TVA 2017c). The entrainment studies demonstrate that variability in the occurrence, abundance, and spatial-temporal distribution of larval fish in Barkley Reservoir near the CUF Plant (TVA 2017c) are common. This variability can translate into significant fluctuation in the entrainment rates associated with CUF Plant operation. Life history aspects and dynamics of drifting larvae and fluctuation in reservoir flow past the CUF Plant were significant factors influencing variations observed in the entrainment estimates.

2016 Fish Tissue Collection. Species-specific composite samples (bluegill, redear, largemouth bass, and channel catfish) were prepared and comprised of ovary tissue and of fillet tissue, which were analyzed solely for selenium and percent moisture (TVA 2016a). The tissue sample results were below the USEPA fish tissue criteria for selenium.

2.2 TDEC Order Investigation Activities

The objectives of the TDEC Order fish tissue investigation were to collect fish tissue samples for laboratory analysis to assess whether fish adjacent to and downstream of the CUF Plant have higher tissue concentrations of CCR-related constituents than the same species of fish from upstream reference locations, and to provide data to be used in conjunction with sediment and mayfly sampling results to evaluate the bioaccumulation of these constituents. The information from the fish tissue investigation was used to help evaluate if CCR material and/or dissolved CCR constituents have migrated from the CCR management units and potentially impacted aquatic life.

TVA performed EI sample collection activities within the Cumberland River and Wells Creek in general accordance with the *Fish Tissue Sample and Analysis Plan (SAP)* (Stantec 2018), *Environmental Investigation Plan (EIP)* (TVA 2018), and *Quality Assurance Project Plan (QAPP)* (Environmental Standards 2018), including TVA- and TDEC-approved programmatic and project-specific changes that were made after approval of the EIP. Descriptions of sample location selection, collection methodology, analyses, and Quality Assurance/Quality Control (QA/QC) completed for the investigation are provided in the *Fish Tissue Sampling and Analysis Report (SAR)* included in Appendix J.7.

The scope of the EI sampling activities included collecting targeted fish samples identified in the *SAP* during April and May 2019 from three reaches on the Cumberland River and two reaches on Wells Creek. Exhibit J.6-3 shows the locations of the sampling reaches. The Cumberland River reaches were established upstream, adjacent, and downstream of the CUF Plant CCR management units, while both Wells Creek reaches were adjacent to the CCR management units. A total of 65 composite samples were collected (39 from the Cumberland River and 26 from Wells Creek), comprised of muscle, liver, and ovary samples for the gamefish species (bluegill, channel catfish, largemouth bass, and redear sunfish), and whole fish samples for the forage fish (shad), along with 19 duplicate samples (Table J.6-1).

Sixty-five (65) fish tissue samples (39 from the Cumberland River and 26 from Wells Creek) were also collected during April and May 2018, prior to implementation of the *SAP* under the TDEC Order; that sampling event was conducted in accordance with the *SAP*-defined protocols and procedures and the results supplement those of the TDEC Order. A comparison of the two sampling events is provided in Chapter 3.

Chapter 3 Results and Discussion

Fish tissue data from the EI were collected from five sample reaches in the Cumberland River and Wells Creek proximate to the CUF Plant, as described above. The results of the sample analyses and evaluation are discussed in the chapters below.

To aid in interpreting these data, TDEC approved acute and chronic ecological screening values (ESVs) for the EAR (Tables 1-2 through 1-5 and Appendix A.2) to evaluate whether identified CCR constituent concentrations in water and sediment samples may be indicative of potential impacts to aquatic life. For the fish tissue data, sampling results are compared to health-protective Critical Body Residue (CBR) values (Table 1-5), as described in Chapter 3.2.1 below.

The EAR screening levels are generic (not specific to an individual person or ecological receptor) and are protective of human and ecological health. Most screening levels are not regulatory standards and are conservatively based on published health studies. Concentrations above the screening level do not necessarily mean that an adverse health effect is occurring, but rather, that further evaluation is required in the Corrective Action/Risk Assessment Plan to determine if an unacceptable risk exists, and corrective action is required.

3.1 Analytical Results

The fish tissue samples were analyzed for the following CCR-related constituents, hereafter referred to collectively as “CCR Parameters” for the fish tissue investigation:

- Boron and calcium from 40 CFR Part 257 Appendix III
- 40 CFR Part 257 Appendix IV Constituents, excluding radium and fluoride
- Five inorganic constituents from Appendix I of TN Rule 0400-11-.04: copper, nickel, silver, vanadium, and zinc
- Strontium
- Percent moisture.

The results of the exploratory data analysis of the EI fish tissue data for the CUF Plant are presented in Appendix E.8.

3.2 Exploratory Data Analysis

Exploratory data analyses for the surface stream and sediment sample results identified CCR Parameters with concentrations above established ESVs, where the comparison to ESVs does not include statistically significant outliers identified as suitable for removal from further statistical analysis (see further discussion in Appendices E.5 and E.6, respectively). These constituents were also evaluated for the fish tissue sample results. In addition, mercury and selenium were further evaluated for fish tissue samples due to their known bioaccumulation potential. Following these criteria, fish tissue sampling results were reviewed for beryllium, mercury, and selenium in Wells Creek and mercury and selenium in Cumberland River.

A summary of fish tissue sampling results above ESVs, including beryllium, mercury, and selenium, identified in the exploratory data analysis for the Cumberland River and Wells Creek is provided in Table J.6-1.

3.2.1 Comparative Analysis

The CCR Parameters identified from the exploratory data analysis for careful evaluation in the fish tissue data (i.e., focused on constituents with surface water or sediment concentrations above established ESVs and bioaccumulative constituents, mercury, and selenium) were further evaluated by comparison to the CBR values for the specific fish tissues. Mercury and selenium concentrations were evaluated for fish tissues from the Cumberland River; beryllium, mercury, and selenium concentrations were evaluated for fish tissues from Wells Creek. CBR values are included in the ESVs provided in Table 1-4 and Appendix A.2.

Cumberland River

The comparative analysis chart for critical body residue values provided in Table J.6-2 includes both 2018 and 2019 fish tissue sampling events and demonstrates the relationships between the fish tissue constituent concentrations for mercury and selenium in the Cumberland River and the respective CBR values for whole fish and tissue types. The gray cells show areas where no applicable CBR value is available for a specific tissue type (e.g., there is no CBR value for mercury in ovaries). Green cells show where the constituent concentrations for a tissue type are below CBR No Observed Adverse Effects Levels (NOAELs). Yellow cells show where constituent concentrations for a tissue type are above NOAELs but below CBR Lowest Observed Adverse Effects Levels (LOAELs). Red cells indicate constituent concentrations that are above LOAELs.

In most cases, the gamefish (bluegill, channel catfish, largemouth, and redear sunfish) muscle and liver tissues had mercury concentrations higher than either the NOAEL or LOAEL, and selenium concentrations in liver tissues were higher than the NOAEL. However, both mercury and selenium at the upstream locations were higher or similar to the adjacent and downstream concentrations, suggesting no potential impacts from the CUF Plant CCR management units on fish tissue concentrations of mercury or selenium. A similar relationship, or lack thereof, was observed for mercury and selenium in forage fish; upstream concentrations for whole-fish composites of shad were approximately equal to the adjacent and downstream concentrations. Exhibit J.6-4 shows the CCR Parameter results that were higher than CBR values for each fish type, tissue type, and reach.

Wells Creek

The comparative analysis chart in Table J.6-3 includes both 2018 and 2019 fish tissue sampling events and demonstrates the relationships between the selected fish tissue constituent concentrations for beryllium, mercury, and selenium for the adjacent reaches in Wells Creek to the respective CBR values for whole fish and tissue.

Although river reach WCU is upstream of downstream river reach WCD, both Wells Creek reaches are adjacent to the CCR management units. Beryllium concentrations were below LOAELs in whole fish and were not detected in the other fish tissue types for which there are no applicable CBRs. Mercury concentrations in muscle tissue were greater than NOAELs for gamefish, and in whole fish samples of shad. Mercury concentrations were greater than LOAELs for liver tissues. Selenium concentrations were less than NOAELs for muscle, ovary, and whole fish tissues, but greater than NOAELs for gamefish liver tissue.

Results and Discussion

Due to the absence of an upstream fish tissue sampling reach for Wells Creek, fish tissue results could not be compared to a reference location. However, mercury and selenium concentrations were similar among the fish types and tissues in the Cumberland River and Wells Creek.

Chapter 4 Summary

Fish tissue samples collected during the EI from upstream, downstream, and adjacent reaches of the Cumberland River and from adjacent reaches in Wells Creek were evaluated for CCR Parameters that were identified based on surface stream and sediment sample results. CCR Parameter concentrations in Cumberland River sediment and surface stream samples were less than ESVs, suggesting no influence of CCR Parameters on fish tissue concentrations from CUF Plant CCR management units, as described in Appendices J.1 and J.3.

Mercury and selenium fish tissue concentrations were evaluated due to their bioaccumulative properties in fish, even though their concentrations in Cumberland River sediment and surface stream samples were less than the ESVs. Comparing these data to the CBR values, upstream fish tissue concentrations were similar or higher than the adjacent and downstream tissue concentration for both mercury and selenium, indicating there is no significant influence of the CCR management units on fish tissue concentrations in gamefish. A similar observation was made for whole fish samples of forage fishes, in which the adjacent and downstream concentrations for mercury and selenium were similar to upstream concentrations. For the 2018 and 2019 sampling events in both the Cumberland River and Wells Creek, mercury consistently had higher or equivalent concentrations to the CBR NOAELs for muscle, liver, and whole fish tissue samples, and selenium consistently had higher or equivalent concentrations to the CBR NOAELs for liver tissue samples; mercury concentrations were consistently shown to have higher or equivalent concentrations to the LOAELS for liver tissue samples.

Beryllium was evaluated in tissue samples from Wells Creek because its concentration was higher than the ESV in sediment samples. However, beryllium concentrations were below LOAELs in the whole fish samples and not detected in the other fish tissue types for which there are no applicable CBRs. Mercury and selenium fish tissue concentrations were evaluated in Wells Creek due to their bioaccumulative properties in fish, even though mercury and selenium concentrations were less than the ESVs in Wells Creek sediment and surface stream samples. The absence of an upstream fish tissue sampling reach for Wells Creek prohibits fish tissue comparisons between upstream, adjacent, and downstream reaches; however, the mercury and selenium concentrations were similar among the sampled fish types and tissues in the Cumberland River and Wells Creek, suggesting no potential impacts on fish tissue from the CUF Plant CCR management units.

An additional line of evidence of the health of the fish communities is that RFAI scores over a 12-year period indicate the presence of consistent, balanced, and reproducing indigenous fish populations in the Cumberland River, with only minor seasonal variations.

The fish tissue sampling results for both the Cumberland River and Wells Creek, together with the RFAI scores, illustrate a consistent, balanced indigenous fish population, and do not indicate potential impacts to fish tissue concentrations or the fish community related to the CUF Plant CCR management units.

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TABLES

TABLE J.6-1 : Fish Tissue Analytical Results
Cumberland Fossil Plant
April - May, 2018 and 2019

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Beryllium mg/kg	Mercury mg/kg	Selenium mg/kg
Bluegill	FH-CURA	9-May-18	CUF-FH-BG-CURA-F-20180509		Normal Environmental Sample	Validated	<0.031	0.12	0.39
		9-May-18	CUF-FH-BG-CURA-L-20180509		Normal Environmental Sample	Validated	<0.066	0.043 J	1.3
		9-May-18	CUF-FH-BG-CURA-O-20180509		Normal Environmental Sample	Validated	<0.062	0.0050 U*	1.1
		7-May-19	CUF-FH-BG-CURA-F-20190507		Normal Environmental Sample	Validated	<0.033	0.019 J	0.27
		7-May-19	CUF-FH-BG-CURA-L-20190507		Normal Environmental Sample	Validated	<0.033	0.030 J	1.1
		7-May-19	CUF-FH-BG-CURA-O-20190507		Normal Environmental Sample	Validated	<0.030	<0.0069	0.80
	FH-CURD	9-May-18	CUF-FH-BG-CURD-F-20180509		Normal Environmental Sample	Validated	<0.033	0.10	0.34
		9-May-18	CUF-FH-BG-CURD-L-20180509		Normal Environmental Sample	Validated	<0.066	0.048 J	1.4
		9-May-18	CUF-FH-BG-CURD-O-20180509		Normal Environmental Sample	Validated	<0.064	<0.0032	0.79
		8-May-19	CUF-FH-BG-CURD-F-20190508		Normal Environmental Sample	Validated	<0.031	0.13 J	0.32
		8-May-19	CUF-FH-BG-CURD-L-20190508		Normal Environmental Sample	Validated	<0.031	0.047 J	1.2
		8-May-19	CUF-FH-BG-CURD-O-20190508		Normal Environmental Sample	Validated	<0.033	0.0074 J	0.75
	FH-CURU	9-May-18	CUF-FH-BG-CURU-F-20180509		Normal Environmental Sample	Validated	<0.032	0.12	0.36
		9-May-18	CUF-FH-BG-CURU-L-20180509		Normal Environmental Sample	Validated	<0.066	0.054 J	1.0
		9-May-18	CUF-FH-BG-CURU-O-20180509		Normal Environmental Sample	Validated	<0.066	0.0043 U*	0.87
		29-Apr-19	CUF-FH-BG-CURU-F-20190429		Normal Environmental Sample	Validated	<0.033	0.091 J	0.31
		29-Apr-19	CUF-FH-BG-F-DUP01-20190429	CUF-FH-BG-CURU-F-20190429	Field Duplicate Sample	Validated	<0.031	0.095 J	0.32
		29-Apr-19	CUF-FH-BG-CURU-L-20190429		Normal Environmental Sample	Validated	<0.031	0.042 J	1.2
		29-Apr-19	CUF-FH-BG-L-DUP01-20190429	CUF-FH-BG-CURU-L-20190429	Field Duplicate Sample	Validated	<0.030	0.047 J	1.4
		29-Apr-19	CUF-FH-BG-CURU-O-20190429		Normal Environmental Sample	Validated	<0.031	<0.0070	0.91
		29-Apr-19	CUF-FH-BG-O-DUP01-20190429	CUF-FH-BG-CURU-O-20190429	Field Duplicate Sample	Validated	<0.031	<0.0074	0.96
	FH-WCD	1-May-19	CUF-FH-BG-WCD-F-20190501		Normal Environmental Sample	Validated	<0.032	0.13 J	0.35
		1-May-19	CUF-FH-BG-F-DUP02-20190501	CUF-FH-BG-WCD-F-20190501	Field Duplicate Sample	Final-Verified	<0.033	0.032 J	0.42
		1-May-19	CUF-FH-BG-WCD-L-20190501		Normal Environmental Sample	Validated	<0.031	0.048 J	1.2
		1-May-19	CUF-FH-BG-L-DUP02-20190501	CUF-FH-BG-WCD-L-20190501	Field Duplicate Sample	Validated	<0.031	0.050 J	1.5
		1-May-19	CUF-FH-BG-WCD-O-20190501		Normal Environmental Sample	Validated	<0.031	<0.0073	0.82
		1-May-19	CUF-FH-BG-O-DUP02-20190501	CUF-FH-BG-WCD-O-20190501	Field Duplicate Sample	Validated	<0.030	<0.0075	0.90
		10-May-18	CUF-FH-BG-WCD-F-20180510		Normal Environmental Sample	Validated	<0.032	0.092	0.41
		10-May-18	CUF-FH-BG-WCD-L-20180510		Normal Environmental Sample	Validated	<0.065	0.070 J	1.1
		10-May-18	CUF-FH-BG-WCD-O-20180510		Normal Environmental Sample	Validated	<0.062	0.0038 U*	0.72
	FH-WCU	8-May-19	CUF-FH-BG-WCU-F-20190508		Normal Environmental Sample	Validated	<0.031	0.15 J	0.33
		8-May-19	CUF-FH-BG-WCU-L-20190508		Normal Environmental Sample	Validated	<0.031	0.066 J	1.2
		8-May-19	CUF-FH-BG-WCU-O-20190508		Normal Environmental Sample	Validated	<0.031	0.0085 J	0.78
		8-May-18	CUF-FH-BG-WCU-F-20180508		Normal Environmental Sample	Validated	<0.031	0.082	0.41
		8-May-18	CUF-FH-BG-WCU-L-20180508		Normal Environmental Sample	Validated	<0.065	0.055 J	1.3
		8-May-18	CUF-FH-BG-WCU-O-20180508		Normal Environmental Sample	Validated	<0.064	<0.0030	1.0

See notes on last page.

TABLE J.6-1 : Fish Tissue Analytical Results
Cumberland Fossil Plant
April - May, 2018 and 2019

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Beryllium mg/kg	Mercury mg/kg	Selenium mg/kg
Channel Catfish	FH-CURA	9-May-18	CUF-FH-CC-CURA-F-20180509		Normal Environmental Sample	Validated	<0.033	0.18 J	0.17
		9-May-18	CUF-FH-CC-CURA-L-20180509		Normal Environmental Sample	Validated	<0.066	0.33	1.0
		9-May-18	CUF-FH-CC-CURA-O-20180509		Normal Environmental Sample	Validated	<0.066	0.0031 U*	1.0
		20-May-19	CUF-FH-CC-CURA-F-20190520		Normal Environmental Sample	Final-Verified	<0.033	0.088 J	0.22
		20-May-19	CUF-FH-CC-CURA-L-20190520		Normal Environmental Sample	Final-Verified	<0.032	0.18 J	0.97
		20-May-19	CUF-FH-CC-CURA-O-20190520		Normal Environmental Sample	Final-Verified	<0.031	<0.0075	1.1
	FH-CURD	9-May-18	CUF-FH-CC-CURD-F-20180509		Normal Environmental Sample	Validated	<0.033	0.088	0.21
		9-May-18	CUF-FH-CC-CURD-L-20180509		Normal Environmental Sample	Validated	<0.066	0.16 J	1.1
		9-May-18	CUF-FH-CC-CURD-O-20180509		Normal Environmental Sample	Validated	<0.066	<0.0032	1.2
		30-Apr-19	CUF-FH-CC-CURD-F-20190430		Normal Environmental Sample	Final-Verified	<0.033	0.046 J	0.18
		30-Apr-19	CUF-FH-CC-F-DUP01-20190430	CUF-FH-CC-CURD-F-20190430	Field Duplicate Sample	Final-Verified	<0.032	0.12 J	0.17 J
		30-Apr-19	CUF-FH-CC-CURD-L-20190430		Normal Environmental Sample	Final-Verified	<0.031	0.30 J	1.2 J
		30-Apr-19	CUF-FH-CC-L-DUP01-20190430	CUF-FH-CC-CURD-L-20190430	Field Duplicate Sample	Final-Verified	<0.031	0.18 J	0.81 J
		30-Apr-19	CUF-FH-CC-CURD-O-20190430		Normal Environmental Sample	Final-Verified	<0.031	<0.0073	1.1
		30-Apr-19	CUF-FH-CC-O-DUP01-20190430	CUF-FH-CC-CURD-O-20190430	Field Duplicate Sample	Final-Verified	<0.033	<0.0074	1.0
	FH-CURU	2-May-18	CUF-FH-CC-CURU-F-20180502		Normal Environmental Sample	Validated	<0.032	0.12	0.23
		2-May-18	CUF-FH-CC-CURU-L-20180502		Normal Environmental Sample	Validated	<0.065	0.24	1.5
		2-May-18	CUF-FH-CC-CURU-O-20180502		Normal Environmental Sample	Validated	<0.064	<0.0030	1.2
		7-May-19	CUF-FH-CC-CURU-F-20190507		Normal Environmental Sample	Final-Verified	<0.032	0.11 J	0.17
		7-May-19	CUF-FH-CC-CURU-L-20190507		Normal Environmental Sample	Final-Verified	<0.030	0.19 J	1.1
		7-May-19	CUF-FH-CC-CURU-O-20190507		Normal Environmental Sample	Final-Verified	<0.031	<0.0072	1.1
	FH-WCD	1-May-19	CUF-FH-CC-WCD-F-20190501		Normal Environmental Sample	Final-Verified	<0.031	0.11 J	0.26
		1-May-19	CUF-FH-CC-WCD-L-20190501		Normal Environmental Sample	Final-Verified	<0.031	0.19 J	1.6
		1-May-19	CUF-FH-CC-WCD-O-20190501		Normal Environmental Sample	Final-Verified	<0.032	<0.0074	1.4
		10-Apr-18	CUF-FH-CC-WCD-F-20180410		Normal Environmental Sample	Validated	<0.033	0.16 J	0.34
		10-Apr-18	CUF-FH-CC-WCD-L-20180410		Normal Environmental Sample	Validated	<0.065	0.32	1.9
		10-Apr-18	CUF-FH-CC-WCD-O-20180410		Normal Environmental Sample	Validated	<0.064	0.0033 U*	1.0
	FH-WCU	8-May-19	CUF-FH-CC-WCU-F-20190508		Normal Environmental Sample	Final-Verified	<0.033	0.11 J	0.21
		8-May-19	CUF-FH-CC-WCU-L-20190508		Normal Environmental Sample	Final-Verified	<0.031	0.12 J	1.8
		8-May-19	CUF-FH-CC-WCU-O-20190508		Normal Environmental Sample	Final-Verified	<0.033	<0.0072	1.6
		10-Apr-18	CUF-FH-CC-WCU-F-20180410		Normal Environmental Sample	Validated	<0.033	0.18 J	0.22
		10-Apr-18	CUF-FH-CC-WCU-L-20180410		Normal Environmental Sample	Validated	<0.066	0.38	1.5
		10-Apr-18	CUF-FH-CC-WCU-O-20180410		Normal Environmental Sample	Validated	<0.063	<0.0031	1.4

See notes on last page.

TABLE J.6-1 : Fish Tissue Analytical Results
Cumberland Fossil Plant
April - May, 2018 and 2019

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Beryllium mg/kg	Mercury mg/kg	Selenium mg/kg
Largemouth Bass	FH-CURA	10-Apr-18	CUF-FH-LB-CURA-F-20180410		Normal Environmental Sample	Validated	<0.031	0.25	0.33
		10-Apr-18	CUF-FH-LB-CURA-L-20180410		Normal Environmental Sample	Validated	<0.066	0.10 J	1.2
		10-Apr-18	CUF-FH-LB-CURA-O-20180410		Normal Environmental Sample	Validated	<0.065	0.0044 U*	0.87
		30-Apr-19	CUF-FH-LB-CURA-F-20190430		Normal Environmental Sample	Final-Verified	<0.032	0.33 J	0.28
		30-Apr-19	CUF-FH-LB-CURA-L-20190430		Normal Environmental Sample	Final-Verified	<0.031	0.13 J	1.1
		30-Apr-19	CUF-FH-LB-CURA-O-20190430		Normal Environmental Sample	Final-Verified	<0.032	0.025 J	0.82
	FH-CURD	10-Apr-18	CUF-FH-LB-CURD-F-20180410		Normal Environmental Sample	Validated	<0.033	0.24	0.32
		10-Apr-18	CUF-FH-LB-CURD-L-20180410		Normal Environmental Sample	Validated	<0.064	0.096 J	1.0
		10-Apr-18	CUF-FH-LB-CURD-O-20180410		Normal Environmental Sample	Validated	<0.065	0.0059 U*	0.86
		24-Apr-19	CUF-FH-LB-CURD-F-20190424		Normal Environmental Sample	Final-Verified	<0.033	0.33 J	0.28
		24-Apr-19	CUF-FH-LB-CURD-L-20190424		Normal Environmental Sample	Final-Verified	<0.030	0.11 J	1.1
		24-Apr-19	CUF-FH-LB-CURD-O-20190424		Normal Environmental Sample	Final-Verified	<0.033	0.019 J	0.72
	FH-CURU	9-May-18	CUF-FH-LB-CURU-F-20180509		Normal Environmental Sample	Validated	<0.031	0.27	0.26
		9-May-18	CUF-FH-LB-CURU-L-20180509		Normal Environmental Sample	Validated	<0.066	0.13 J	1.4
		9-May-18	CUF-FH-LB-CURU-O-20180509		Normal Environmental Sample	Validated	<0.066	0.013 U*	0.94
		24-Apr-19	CUF-FH-LB-CURU-F-20190424		Normal Environmental Sample	Final-Verified	<0.030	0.41 J	0.30
		24-Apr-19	CUF-FH-LB-CURU-L-20190424		Normal Environmental Sample	Final-Verified	<0.031	0.18 J	1.2
		24-Apr-19	CUF-FH-LB-CURU-O-20190424		Normal Environmental Sample	Final-Verified	<0.030	0.033 J	0.88
	FH-WCD	15-Apr-19	CUF-FH-LB-WCD-F-20190415		Normal Environmental Sample	Final-Verified	<0.033	0.31 J	0.33
		15-Apr-19	CUF-FH-LB-WCD-L-20190415		Normal Environmental Sample	Final-Verified	<0.032	0.13 J	1.2
		15-Apr-19	CUF-FH-LB-WCD-O-20190415		Normal Environmental Sample	Final-Verified	<0.030	0.016 J	0.91
		10-Apr-18	CUF-FH-LB-WCD-F-20180410		Normal Environmental Sample	Validated	<0.033	0.24	0.32
		10-Apr-18	CUF-FH-LB-WCD-L-20180410		Normal Environmental Sample	Validated	<0.065	0.090 J	1.0
		10-Apr-18	CUF-FH-LB-WCD-O-20180410		Normal Environmental Sample	Validated	<0.064	0.0055 U*	0.86
	FH-WCU	23-Apr-19	CUF-FH-LB-WCU-F-20190423		Normal Environmental Sample	Final-Verified	<0.031	0.65 J	0.35
		16-Apr-19	CUF-FH-LB-F-DUP01-20190416	CUF-FH-LB-WCU-F-20190423	Field Duplicate Sample	Final-Verified	<0.032	0.51 J	0.29
		23-Apr-19	CUF-FH-LB-WCU-L-20190423		Normal Environmental Sample	Final-Verified	<0.030	0.39 J	1.8
		16-Apr-19	CUF-FH-LB-L-DUP01-20190416	CUF-FH-LB-WCU-L-20190423	Field Duplicate Sample	Final-Verified	<0.032	0.24 J	1.4
		23-Apr-19	CUF-FH-LB-WCU-O-20190423		Normal Environmental Sample	Final-Verified	<0.031	0.040 J	1.4
		16-Apr-19	CUF-FH-LB-O-DUP01-20190416	CUF-FH-LB-WCU-O-20190423	Field Duplicate Sample	Final-Verified	<0.032	0.032 J	1.0
		10-Apr-18	CUF-FH-LB-WCU-F-20180410		Normal Environmental Sample	Validated	<0.032	0.32	0.30
		10-Apr-18	CUF-FH-LB-WCU-L-20180410		Normal Environmental Sample	Validated	<0.064	0.14 J	1.1
		10-Apr-18	CUF-FH-LB-WCU-O-20180410		Normal Environmental Sample	Validated	<0.066	0.0091 U*	0.81

See notes on last page.

TABLE J.6-1 : Fish Tissue Analytical Results
Cumberland Fossil Plant
April - May, 2018 and 2019

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Beryllium mg/kg	Mercury mg/kg	Selenium mg/kg
Redear Sunfish	FH-CURA	1-May-18	CUF-FH-RS-CURA-F-20180501		Normal Environmental Sample	Validated	<0.031	0.14	0.55
		1-May-18	CUF-FH-RS-CURA-L-20180501		Normal Environmental Sample	Validated	<0.066	0.070 J	2.1
		1-May-18	CUF-FH-RS-CURA-O-20180501		Normal Environmental Sample	Validated	<0.064	0.0052 U*	1.5
		29-Apr-19	CUF-FH-RS-CURA-F-20190429		Normal Environmental Sample	Final-Verified	<0.030	0.089 J	0.45
		29-Apr-19	CUF-FH-RS-CURA-L-20190429		Normal Environmental Sample	Final-Verified	<0.031	0.038 J	1.3
		29-Apr-19	CUF-FH-RS-CURA-O-20190429		Normal Environmental Sample	Final-Verified	<0.031	<0.0075	1.2
	FH-CURD	9-May-18	CUF-FH-RS-CURD-F-20180509		Normal Environmental Sample	Validated	<0.032	0.084	0.38
		9-May-18	CUF-FH-RS-CURD-L-20180509		Normal Environmental Sample	Validated	<0.065	0.054 J	1.6
		9-May-18	CUF-FH-RS-CURD-O-20180509		Normal Environmental Sample	Validated	<0.064	<0.0031	0.77
		29-Apr-19	CUF-FH-RS-CURD-F-20190429		Normal Environmental Sample	Final-Verified	<0.032	0.12 J	0.42
		29-Apr-19	CUF-FH-RS-CURD-L-20190429		Normal Environmental Sample	Final-Verified	<0.032	0.046 J	1.5
		29-Apr-19	CUF-FH-RS-CURD-O-20190429		Normal Environmental Sample	Final-Verified	<0.030	<0.0071	0.89
	FH-CURU	2-May-18	CUF-FH-RS-CURU-F-20180502		Normal Environmental Sample	Validated	<0.033	0.11	0.49
		2-May-18	CUF-FH-RS-CURU-L-20180502		Normal Environmental Sample	Validated	<0.065	0.062 J	1.7
		2-May-18	CUF-FH-RS-CURU-O-20180502		Normal Environmental Sample	Validated	<0.066	0.0037 U*	0.89
		29-Apr-19	CUF-FH-RS-CURU-F-20190429		Normal Environmental Sample	Final-Verified	<0.030	0.11 J	0.49
		24-Apr-19	CUF-FH-RS-F-DUP01-20190424	CUF-FH-RS-CURU-F-20190429	Field Duplicate Sample	Final-Verified	<0.033	0.095 J	0.50
		29-Apr-19	CUF-FH-RS-CURU-L-20190429		Normal Environmental Sample	Final-Verified	<0.032	0.063 J	1.4
		24-Apr-19	CUF-FH-RS-L-DUP01-20190424	CUF-FH-RS-CURU-L-20190429	Field Duplicate Sample	Final-Verified	<0.032	0.060 J	1.6
		29-Apr-19	CUF-FH-RS-CURU-O-20190429		Normal Environmental Sample	Final-Verified	<0.031	<0.0071	1.1
		24-Apr-19	CUF-FH-RS-O-DUP01-20190424	CUF-FH-RS-CURU-O-20190429	Field Duplicate Sample	Final-Verified	<0.032	<0.0070	1.0
	FH-WCD	1-May-19	CUF-FH-RS-WCD-F-20190501		Normal Environmental Sample	Final-Verified	<0.033	0.012 J	0.52
		1-May-19	CUF-FH-RS-F-DUP02-20190501	CUF-FH-RS-WCD-F-20190501	Field Duplicate Sample	Final-Verified	<0.031	0.11 J	0.50
		1-May-19	CUF-FH-RS-WCD-L-20190501		Normal Environmental Sample	Final-Verified	<0.033	0.067 J	1.6
		1-May-19	CUF-FH-RS-L-DUP02-20190501	CUF-FH-RS-WCD-L-20190501	Field Duplicate Sample	Final-Verified	<0.031	0.069 J	1.5
		1-May-19	CUF-FH-RS-WCD-O-20190501		Normal Environmental Sample	Final-Verified	<0.032	<0.0070	0.95
		1-May-19	CUF-FH-RS-O-DUP02-20190501	CUF-FH-RS-WCD-O-20190501	Field Duplicate Sample	Final-Verified	<0.032	<0.0075	0.95
		10-May-18	CUF-FH-RS-WCD-F-20180510		Normal Environmental Sample	Validated	<0.033	0.12	0.69
		10-May-18	CUF-FH-RS-WCD-L-20180510		Normal Environmental Sample	Validated	<0.066	0.12 J	2.4
		10-May-18	CUF-FH-RS-WCD-O-20180510		Normal Environmental Sample	Validated	<0.065	0.0054 U*	1.0
	FH-WCU	30-Apr-19	CUF-FH-RS-WCU-F-20190430		Normal Environmental Sample	Final-Verified	<0.030	0.099 J	0.50
		30-Apr-19	CUF-FH-RS-WCU-L-20190430		Normal Environmental Sample	Final-Verified	<0.033	0.041 J	1.4
		30-Apr-19	CUF-FH-RS-WCU-O-20190430		Normal Environmental Sample	Final-Verified	<0.031	<0.0075	1.1
		1-May-18	CUF-FH-RS-WCU-F-20180501		Normal Environmental Sample	Validated	<0.032	0.16 J	0.56
		1-May-18	CUF-FH-RS-WCU-L-20180501		Normal Environmental Sample	Validated	<0.064	0.078 J	2.1
		1-May-18	CUF-FH-RS-WCU-O-20180501		Normal Environmental Sample	Validated	<0.065	<0.0031	1.1

See notes on last page.

TABLE J.6-1 : Fish Tissue Analytical Results
Cumberland Fossil Plant
April - May, 2018 and 2019

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Beryllium mg/kg	Mercury mg/kg	Selenium mg/kg
Gizzard Shad	FH-CURA	10-Apr-18	CUF-FH-SH-CURA-WF-20180410		Normal Environmental Sample	Validated	<0.033	0.015 U*	0.39
		24-Apr-19	CUF-FH-SH-CURA-WF-20190424		Normal Environmental Sample	Final-Verified	<0.031	0.016 J	0.45
		24-Apr-19	CUF-FH-SH-WF-DUP01-20190424	CUF-FH-SH-CURA-WF-20190424	Field Duplicate Sample	Final-Verified	<0.033	0.020 J	0.47
	FH-CURD	10-Apr-18	CUF-FH-SH-CURD-WF-20180410		Normal Environmental Sample	Validated	<0.17	0.019 U*	<0.25
		24-Apr-19	CUF-FH-SH-CURD-WF-20190424		Normal Environmental Sample	Final-Verified	<0.032	0.020 J	0.44
	FH-CURU	17-Apr-18	CUF-FH-SH-CURU-WF-20180417		Normal Environmental Sample	Validated	<0.032	0.014 U*	0.35
		24-Apr-19	CUF-FH-SH-CURU-WF-20190424		Normal Environmental Sample	Final-Verified	<0.033	0.016 J	0.42
	FH-WCD	23-Apr-19	CUF-FH-SH-WCD-WF-20190423		Normal Environmental Sample	Final-Verified	<0.032	0.018 J	0.43
		10-Apr-18	CUF-FH-SH-WCD-WF-20180410		Normal Environmental Sample	Validated	<0.032	0.020 U*	0.41
	FH-WCU	23-Apr-19	CUF-FH-SH-WCU-WF-20190423		Normal Environmental Sample	Final-Verified	<0.032	0.020 J	0.49
		10-Apr-18	CUF-FH-SH-WCU-WF-20180410		Normal Environmental Sample	Validated	<0.032	0.018 U*	0.51

		Beryllium	Mercury	Selenium
Whole Body Fish Tissue	NOAEL	5.13	0.006	8.5
	LOAEL	51.3	0.06	8.5
Liver Tissue	NOAEL	NA	0.0009	0.524
	LOAEL	NA	0.009	5.24
Muscle Tissue	NOAEL	NA	0.08	11.3
	LOAEL	NA	0.8	11.3
Ovary Tissue	NOAEL	NA	NA	15.1
	LOAEL	NA	NA	15.1

Legend:

Concentration > CBR NOAEL
Concentration > CBR LOAEL

Notes:

15.2	measured concentration did not exceed the indicated standard
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
CBR	Critical body residue
ID	identification
LOAEL	lowest observed adverse effect level
NA	Not applicable
NOAEL	no-observable adverse effect level
n/v	No standard/guideline value.
J	quantitation is approximate due to limitations identified during data validation
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
%	percent
mg/kg	milligrams per kilogram

1. Level of review is defined in the Quality Assurance Project Plan.
2. Fish tissue sampling results were evaluated using Critical Body Residue (CBR) values for the CCR parameters detected above ESVs in surface stream water and sediment samples (see Section 4.3). Also, due to their potential for bioaccumulation, mercury and selenium were included in this evaluation for water bodies sampled for fish tissue. Based on this approach, beryllium, mercury and selenium results in Wells Creek and mercury and selenium results in the Cumberland River are presented above.

Table J.6-2 Critical Body Residue Value Analysis – Cumberland River

Year[1]	Constituent Type	Constituent	Sample Location	Gradient	Sample Concentration (mg/kg ww)*												
					Muscle				Liver				Ovary				Whole Fish
					BG	CC	LB	RS	BG	CC	LB	RS	BG	CC	LB	RS	SH
2018	CCR Rule Appendix IV	Mercury	CURU	Upstream	0.12	0.12	0.27	0.11	0.054	0.24	0.13	0.062	<0.0043	<0.003	<0.013	<0.0037	<0.014
			CURA	Adjacent	0.12	0.18	0.25	0.14	0.043	0.33	0.1	0.07	<0.005	<0.0031	<0.0044	<0.0052	<0.015
			CURD	Downstream	0.1	0.088	0.24	0.084	0.048	0.16	0.096	0.054	<0.0032	<0.0032	<0.0059	<0.0031	<0.019
		Selenium[2]	CURU	Upstream	2.1	1.2	1.5	2.7	1	1.5	1.4	1.7	2.7	3	3	2.7	1.5
			CURA	Adjacent	2.2	0.86	1.8	3	1.3	1	1.2	2.1	3.2	2.4	2.6	4.2	2
			CURD	Downstream	1.9	1	1.7	2	1.4	1.1	1	1.6	2.5	2.9	2.6	2.3	<1.1
2019	CCR Rule Appendix IV	Mercury	CURU	Upstream	0.091	0.11	0.41	0.11	0.042	0.19	0.18	0.063	<0.007	<0.0072	0.033	<0.0071	0.016
			CURA	Adjacent	0.019	0.088	0.33	0.089	0.03	0.18	0.13	0.038	<0.0069	<0.0075	0.025	<0.0075	0.016
			CURD	Downstream	0.13	0.046	0.33	0.12	0.047	0.3	0.11	0.046	0.0074	<0.0073	0.019	<0.0071	0.02
		Selenium[2]	CURU	Upstream	1.8	0.85	1.7	2.7	1.2	1.1	1.2	1.4	2.8	2.8	2.8	3.3	1.8
			CURA	Adjacent	1.5	1.1	1.5	2.4	1.1	0.97	1.1	1.3	2.4	2.6	2.5	3.4	2.3
			CURD	Downstream	1.8	0.87	1.5	2.3	1.2	1.2	1.1	1.5	2.4	2.7	2.2	2.7	2

	Critical Body Residue Values							
	Muscle Tissue		Liver Tissue		Ovary Tissue		Whole Body	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Mercury	0.08	0.8	0.0009	0.009	NA	NA	0.006	0.06
Selenium	11.3	11.3	0.524	5.24	15.1	15.1	8.5	8.5

Legend
No applicable CBR
Concentration < CBR NOAEL
Concentration > CBR NOAEL
Concentration > CBR LOAEL

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

CBR – critical body residue

LOAEL – Lowest Observed Adverse Effect Level

NOAEL - No Observed Adverse Effect Level

mg/kg – milligram per kilogram

ww – wet weight

" - " - Not applicable

TDEC – Tennessee Department of Environment and Conservation

CURU – Cumberland River Upstream

CURA – Cumberland River Adjacent

CURD – Cumberland River Downstream

BG – Bluegill, CC – Channel Catfish, LB – Largemouth Bass,

SB – Smallmouth Bass, RS – Redear Sunfish, SH – Shad

1. The 2018 fish tissue sampling event was conducted outside the scope of the TDEC Order Environmental Investigation in accordance with the Fish Tissue Sampling and Analysis Plan, and the data are considered supplemental to the Environmental Investigation.
2. Selenium concentrations reported as mg/kg ww for liver tissue and mg/kg dry weight (dw) for whole body, muscle, and ovary to permit direct comparison to the selenium critical body residues for these tissues.

Table J.6-3 Critical Body Residue Value Analysis – Wells Creek

Year[1]	Constituent Type	Constituent	Sample Location	Gradient	Sample Concentration (mg/kg ww)*												
					Muscle				Liver				Ovary				Whole Fish
					BG	CC	LB	RS	BG	CC	LB	RS	BG	CC	LB	RS	SH
2018	CCR Rule Appendix IV	Beryllium	WCU	Adjacent	<0.031	<0.033	<0.032	<0.032	<0.065	<0.066	<0.064	<0.064	<0.064	<0.063	<0.066	<0.065	<0.032
			WCD	Adjacent	<0.032	<0.033	<0.033	<0.033	<0.065	<0.065	<0.065	<0.066	<0.062	<0.064	<0.064	<0.065	<0.032
		Mercury	WCU	Adjacent	0.082	0.18	0.32	0.16	0.055	0.38	0.14	0.078	<0.003	<0.0031	<0.0091	<0.0031	<0.018
			WCD	Adjacent	0.092	0.16	0.24	0.12	0.07	0.32	0.09	0.12	<0.0038	<0.0033	<0.0055	<0.0054	<0.02
		Selenium[2]	WCU	Adjacent	2.2	1	1.5	3.1	1.3	1.5	1.1	2.1	2.9	3.6	2.5	3.4	2.3
			WCD	Adjacent	2.4	1.5	1.7	3.9	1.1	1.9	1	2.4	2.3	2.6	2.6	3.3	2
2019	CCR Rule Appendix IV	Beryllium	WCU	Adjacent	<0.031	<0.033	<0.031	<0.03	<0.031	<0.031	<0.03	<0.033	<0.031	<0.033	<0.031	<0.031	<0.032
			WCD	Adjacent	<0.032	<0.031	<0.033	<0.033	<0.031	<0.031	<0.032	<0.033	<0.031	<0.032	<0.03	<0.032	<0.032
		Mercury	WCU	Adjacent	0.15	0.11	0.65	0.099	0.066	0.12	0.39	0.041	0.0085	<0.0072	0.04	<0.0075	0.02
			WCD	Adjacent	0.13	0.11	0.31	0.012	0.048	0.19	0.13	0.067	<0.0073	<0.0074	0.016	<0.007	0.018
		Selenium[2]	WCU	Adjacent	1.8	0.99	1.8	2.8	1.2	1.8	1.8	1.4	2.3	4.1	4.3	3.4	2.2
			WCD	Adjacent	2	1.1	1.8	2.9	1.2	1.6	1.2	1.6	2.6	3.6	2.8	3.1	2.1

	Critical Body Residue Values							
	Muscle Tissue		Liver Tissue		Ovary Tissue		Whole Body	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Beryllium	NA	NA	NA	NA	NA	NA	5.13	51.3
Mercury	0.08	0.8	0.0009	0.009	NA	NA	0.006	0.06
Selenium	11.3	11.3	0.524	5.24	15.1	15.1	8.5	8.5

Legend
No applicable CBR
Concentration < CBR NOAEL
Concentration > CBR NOAEL
Concentration > CBR LOAEL

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

CBR – critical body residue

LOAEL – Lowest Observed Adverse Effect Level

NOAEL - No Observed Adverse Effect Level

mg/kg – milligram per kilogram

ww – wet weight

" - " - Not applicable

TDEC – Tennessee Department of Environment and Conservation

WCU – Wells Creek Upstream

WCD – Wells Creek Downstream

BG – Bluegill, CC – Channel Catfish, LB – Largemouth Bass,
SB – Smallmouth Bass, RS – Redear Sunfish, SH – Shad

1. The 2018 fish tissue sampling event was conducted outside the scope of the TDEC Order Environmental Investigation in accordance with the Fish Tissue Sampling and Analysis Plan, and the data are considered supplemental to the Environmental Investigation.
2. Selenium concentrations reported as mg/kg ww for liver tissue and mg/kg dry weight (dw) for whole body, muscle, and ovary to permit direct comparison to the selenium critical body residues for these tissues.

EXHIBITS

Exhibit J.6-1 Reservoir Fish Assemblage Annual Index

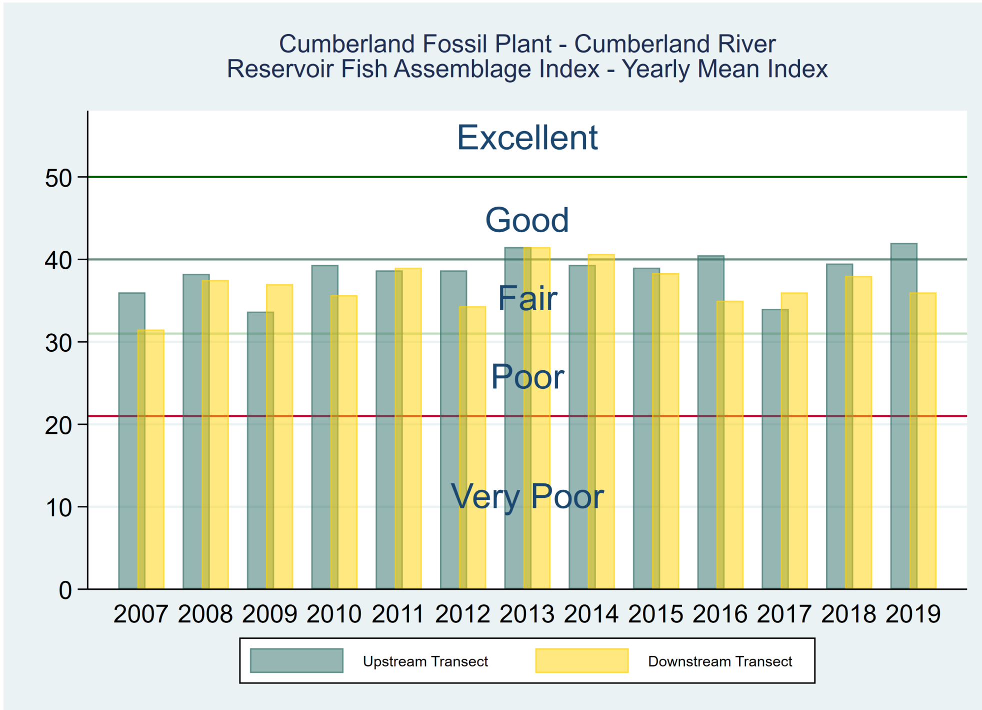
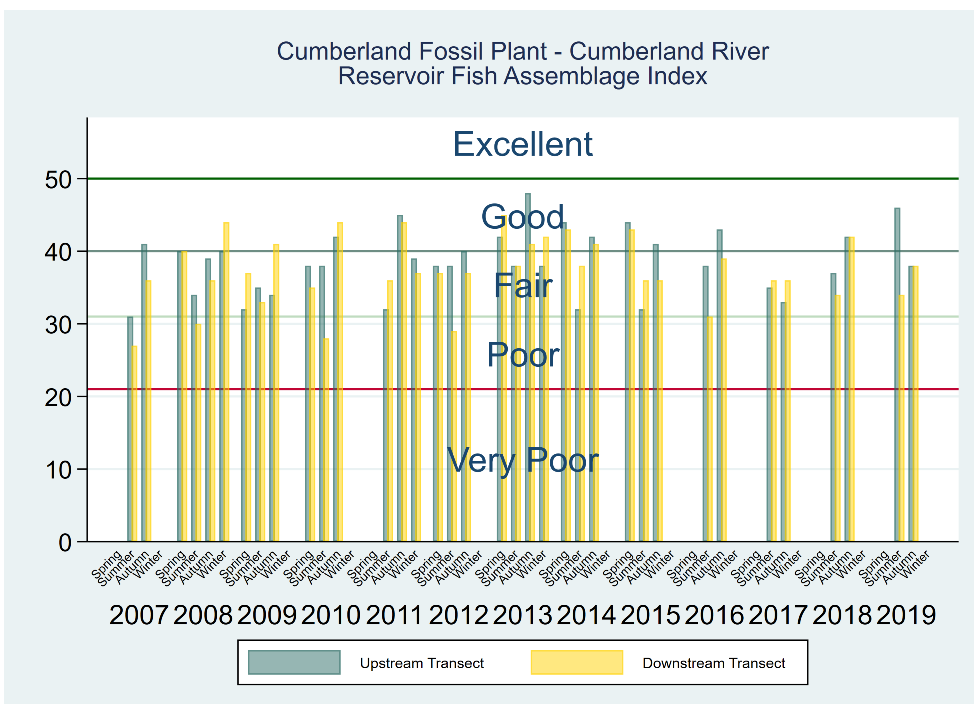


Exhibit J.6-2 Reservoir Fish Assemblage Seasonal Index



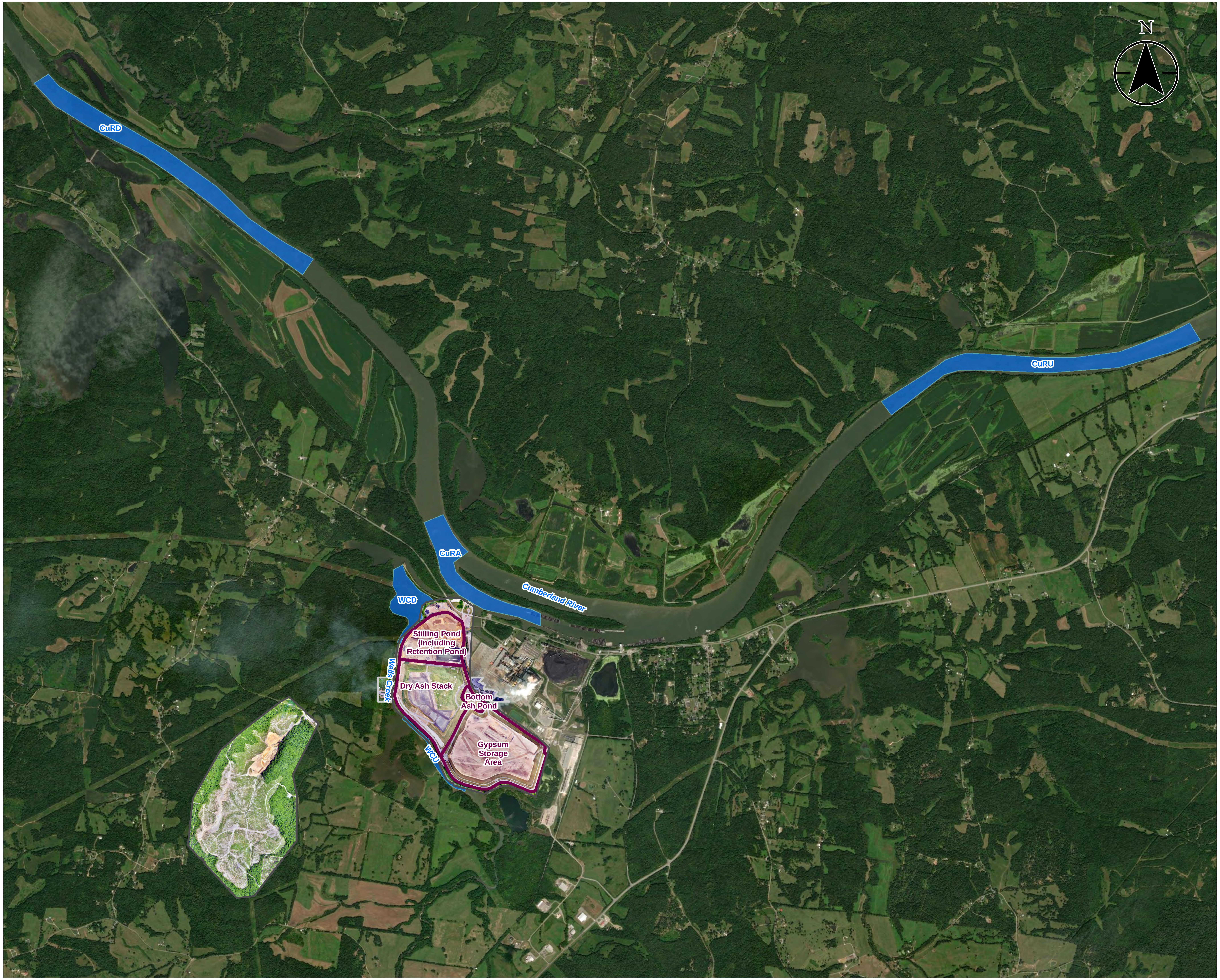


Exhibit No.

J.6-3

Title

Fish Tissue Sampling Reaches

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location

175568209

Stewart County, Tennessee

Prepared by DMB on 2022-12-02
Technical Review by CA on 2022-12-02

0 1,500 3,000 4,500 6,000 Feet

1:18,000 (At original document size of 22x34)

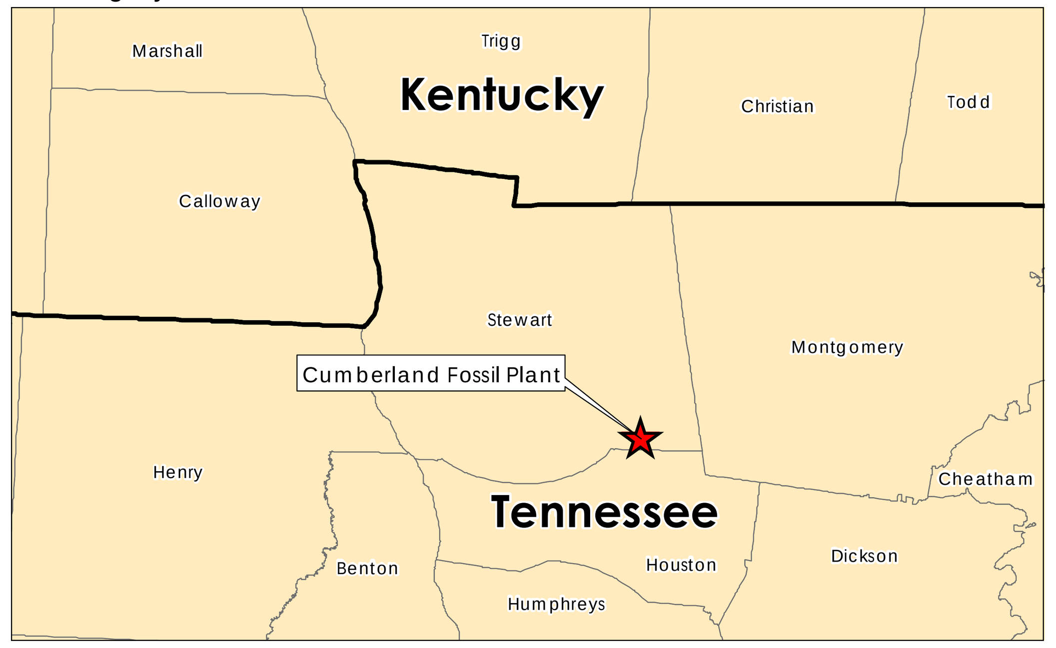
Legend

- Fish Sampling Reaches
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)

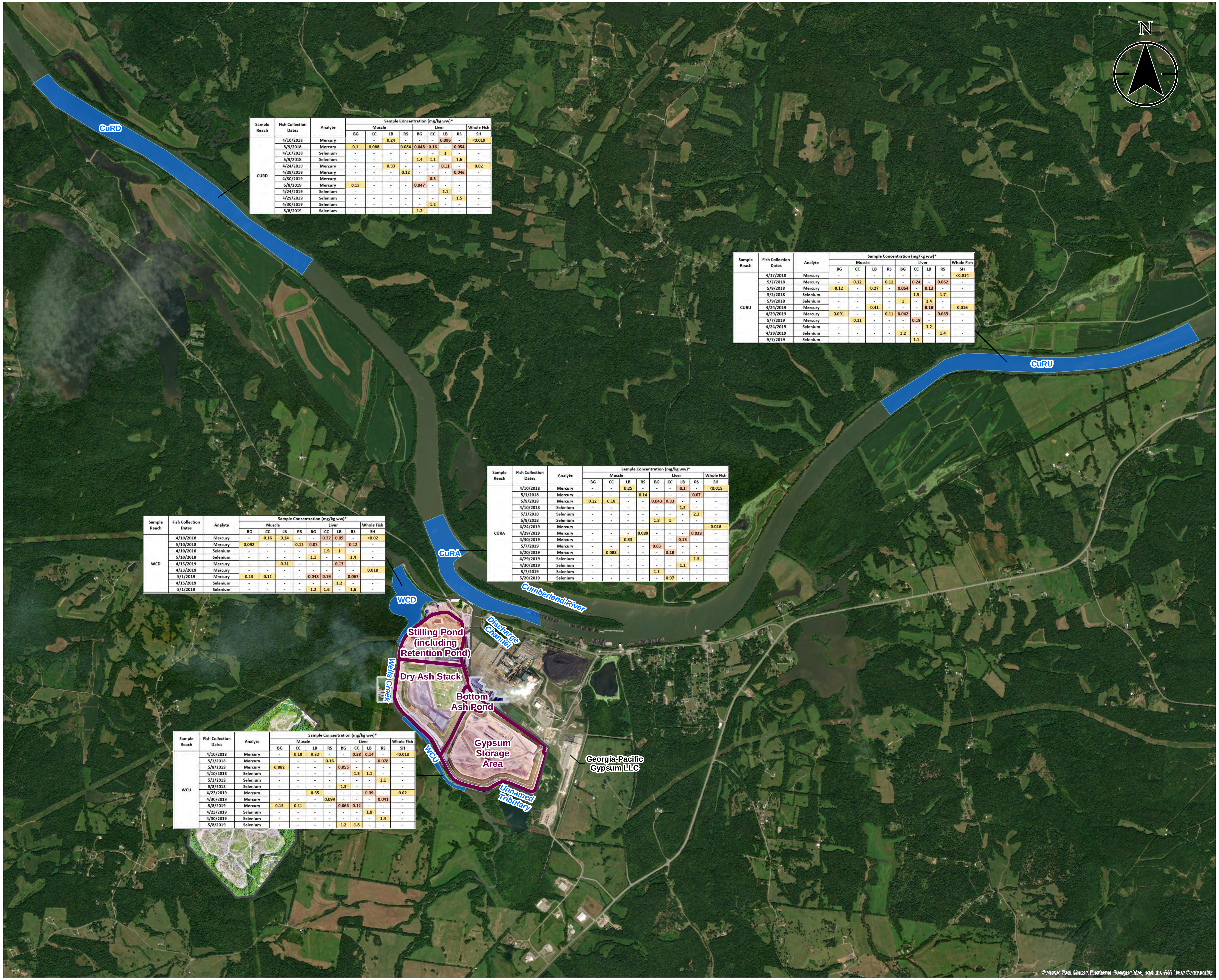
Abbreviations:
CuR = Cumberland River
WC = Wells Creek
U = Upstream
A = Adjacent
D = Downstream

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022) and Esri World Imagery



Stantec TVA



Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
CURD	4/10/2018	Mercury	-	-	0.24	-	-	-	0.096	-	<0.019
	5/9/2018	Mercury	0.1	0.088	-	0.084	0.048	0.16	-	0.054	-
	4/10/2018	Selenium	-	-	-	-	-	-	1	-	-
	5/9/2018	Selenium	-	-	-	-	1.4	1.1	-	1.6	-
	4/24/2019	Mercury	-	-	0.33	-	-	-	0.11	-	0.02
	4/29/2019	Mercury	-	-	-	0.12	-	-	-	0.046	-
	4/30/2019	Mercury	-	-	-	-	-	0.3	-	-	-
	5/8/2019	Mercury	0.13	-	-	-	0.047	-	-	-	-
	4/24/2019	Selenium	-	-	-	-	-	-	1.1	-	-
	4/29/2019	Selenium	-	-	-	-	-	-	-	1.5	-
	4/30/2019	Selenium	-	-	-	-	-	1.2	-	-	-
	5/8/2019	Selenium	-	-	-	-	1.2	-	-	-	-

Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
CURU	4/17/2018	Mercury	-	-	-	-	-	-	-	-	<0.014
	5/2/2018	Mercury	-	0.12	-	0.11	-	0.24	-	0.062	-
	5/9/2018	Mercury	0.12	-	0.27	-	0.054	-	0.13	-	-
	5/2/2018	Selenium	-	-	-	-	-	1.5	-	1.7	-
	5/9/2018	Selenium	-	-	-	-	1	-	1.4	-	-
	4/24/2019	Mercury	-	-	0.41	-	-	-	0.18	-	0.016
	4/29/2019	Mercury	0.091	-	-	0.11	0.042	-	-	0.063	-
	5/7/2019	Mercury		0.11	-	-	-	0.19	-	-	-
	4/24/2019	Selenium	-	-	-	-	-	-	1.2	-	-
	4/29/2019	Selenium	-	-	-	-	1.2	-	-	1.4	-
	5/7/2019	Selenium	-	-	-	-	-	1.1	-	-	-

Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
CURA	4/10/2018	Mercury	-	-	0.25	-	-	-	0.1	-	<0.015
	5/1/2018	Mercury	-	-	-	0.14	-	-	-	0.07	-
	5/9/2018	Mercury	0.12	0.18	-	-	0.043	0.33	-	-	-
	4/10/2018	Selenium	-	-	-	-	-	-	1.2	-	-
	5/1/2018	Selenium	-	-	-	-	-	-	-	2.1	-
	5/9/2018	Selenium	-	-	-	-	1.3	1	-	-	-
	4/24/2019	Mercury	-	-	-	-	-	-	-	-	0.016
	4/29/2019	Mercury	-	-	-	0.089	-	-	-	0.038	-
	4/30/2019	Mercury	-	-	0.33	-	-	-	0.13	-	-
	5/7/2019	Mercury	-	-	-	-	0.03	-	-	-	-
	5/20/2019	Mercury	-	0.088	-	-	-	0.18	-	-	-
	4/29/2019	Selenium	-	-	-	-	-	-	-	1.3	-
	4/30/2019	Selenium	-	-	-	-	-	-	1.1	-	-
	5/7/2019	Selenium	-	-	-	-	1.1	-	-	-	-
	5/20/2019	Selenium	-	-	-	-	-	0.97	-	-	-

Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
WCD	4/10/2018	Mercury	-	0.16	0.24	-	-	0.32	0.09	-	<0.02
	5/10/2018	Mercury	0.092	-	-	0.12	0.07	-	-	0.12	-
	4/10/2018	Selenium	-	-	-	-	-	1.9	1	-	-
	5/10/2018	Selenium	-	-	-	-	1.1	-	-	2.4	-
	4/15/2019	Mercury	-	-	0.31	-	-	-	0.13	-	-
	4/23/2019	Mercury	-	-	-	-	-	-	-	-	0.018
	5/1/2019	Mercury	0.13	0.11	-	-	0.048	0.19	-	0.067	-
	4/15/2019	Selenium	-	-	-	-	-	-	1.2	-	-
	5/1/2019	Selenium	-	-	-	-	1.2	1.6	-	1.6	-

Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
WCU	4/10/2018	Mercury	-	0.18	0.32	-	-	0.38	0.14	-	<0.018
	5/1/2018	Mercury	-	-	-	0.16	-	-	-	0.078	-
	5/8/2018	Mercury	0.082	-	-	-	0.055	-	-	-	-
	4/10/2018	Selenium	-	-	-	-	-	1.5	1.1	-	-
	5/1/2018	Selenium	-	-	-	-	-	-	-	2.1	-
	5/8/2018	Selenium	-	-	-	-	1.3	-	-	-	-
	4/23/2019	Mercury	-	-	0.65	-	-	-	0.39	-	0.02
	4/30/2019	Mercury	-	-	-	0.099	-	-	-	0.041	-
	5/8/2019	Mercury	0.15	0.11	-	-	0.066	0.12	-	-	-
	4/23/2019	Selenium	-	-	-	-	-	-	1.8	-	-
	4/30/2019	Selenium	-	-	-	-	-	-	-	1.4	-
	5/8/2019	Selenium	-	-	-	-	1.2	1.8	-	-	-

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Exhibit No.
J.6-4

Title

Fish Tissue Sampling Results Equal to or Above Critical Body Residue Values

Client/Project

Tennessee Valley Authority
Cumberland Fossil Plant (CUF) TDEC Order

Project Location 175568209
Stewart County, Tennessee
Prepared by DMB on 2022-12-02
Technical Review by CA on 2022-12-02

0 1,500 3,000 4,500 6,000 Feet
1:18,000 (At original document size of 22x34)

Legend

- Fish Sampling Reaches
- 2021 Imagery Boundary
- 2022 Imagery Boundary
- CCR Unit Area (Approximate)
- Concentration > CBR NOAEL
- Concentration > CBR LOAEL

Abbreviations:

BG Bluegill
CC Channel Catfish
LB Largemouth Bass
RS Redear Sunfish
SH Shad

CuR = Cumberland River
WC = Wells Creek
U = Upstream
A = Adjacent
D = Downstream

CBR - Critical Body Residue
NOAEL - No Observed Adverse Effects Value
LOAEL - Lowest Observed Adverse Effects Value

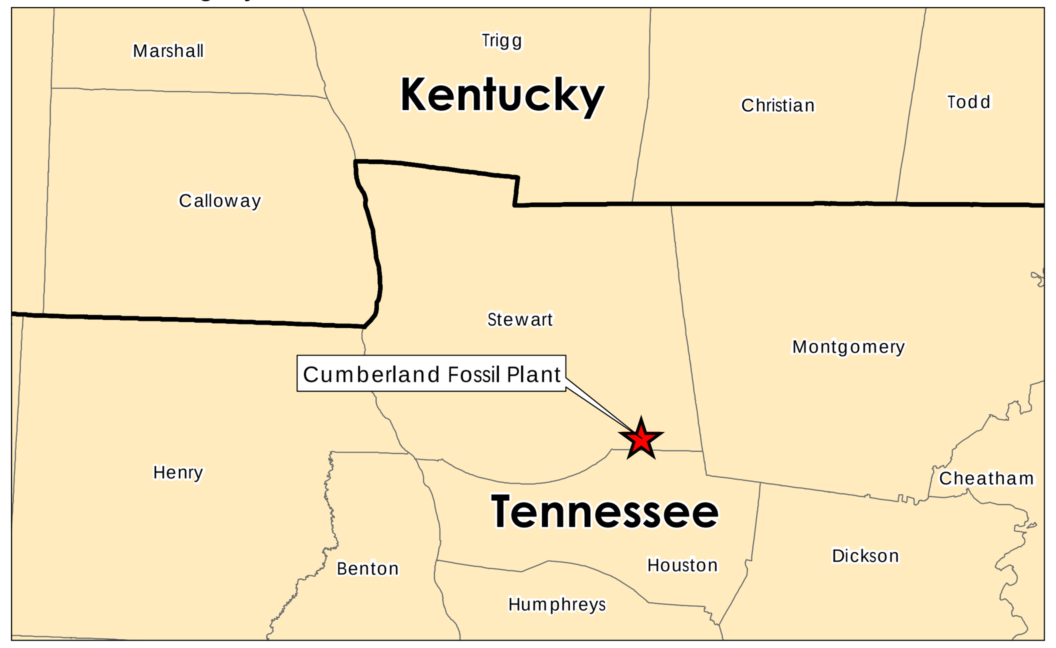
* Selenium concentrations reported as mg/kg wet weight (ww) for liver tissue and mg/kg dry weight for whole body, muscle, and ovary samples to permit direct comparison to the selenium CBRs for these tissues.

	Critical Body Residue Values							
	Whole Body Fish Tissue		Liver Tissue		Muscle Tissue		Ovary Tissue	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Mercury	0.006	0.06	0.0009	0.009	0.08	0.8	NA	NA
Selenium	8.5	8.5	0.524	5.24	11.3	11.3	15.1	15.1

CBR NOAEL and LOAEL values are provided in Table 1-5 and Appendix A.2

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (5/21/2021 and 5/12/2022) and Esri World Imagery



Stantec TVA

APPENDIX J.7

FISH TISSUE SAMPLING AND ANALYSIS REPORT

Cumberland Fossil Plant - Fish Tissue Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Cumberland Fossil Plant
Cumberland City, Tennessee

October 15, 2021

TVA TENNESSEE VALLEY AUTHORITY

Prepared by:

Tennessee Valley Authority

Revision Record

Revision	Description	Date
0	Submittal to TDEC	October 15, 2021

Table of Contents

LIST OF APPENDICES

Abbreviations

^{o}C	degrees Celsius
CCR	Coal Combustion Residuals
CCR Parameters	Boron and calcium (40 CFR 257 Appendix III); 40 CFR Part 257 Appendix IV Constituents, excluding radium and fluoride; five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04; strontium and percent moisture
CFR	Code of Federal Regulations
COC	Chain-of-Custody
CUF Plant	Cumberland Fossil Plant
CuRM	Cumberland River Mile
DI	Deionized
EAR	Environmental Assessment Report
EIP	Environmental Investigation Plan
EnvStds	Environmental Standards, Inc.
EPA	United States Environmental Protection Agency
GPS	Global Positioning System
ID	Identification
IDW	Investigation Derived Waste
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
SOP	Standard Operating Procedure
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
TI	Technical Instruction
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) has prepared this sampling and analysis report (SAR) to document completion of activities related to the fish tissue investigation at TVA's Cumberland Fossil Plant (CUF Plant) in Cumberland City, Tennessee.

The purpose of the fish tissue investigation was to characterize concentrations of constituents related to coal combustion residuals (CCR) in fish in the vicinity of the CUF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work performed and to present the information and data collected during the execution of the Fish Tissue Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluate results. The scope of the fish tissue investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the CUF Plant. The evaluation of the results will consider other aspects of the environmental investigation, as well as data collected under other State and/or CCR programs, and will be presented in the Environmental Assessment Report (EAR).

Fish tissue investigation activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order:

- *Fish Tissue SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 2018).

The fish tissue investigation was implemented in accordance with TVA- and TDEC-approved Programmatic and Project-specific changes. Variations in scope and procedures from those outlined in the Fish Tissue SAP and occurring during field activities due to field conditions and programmatic updates are referenced in Section 3.6.

Fish tissue investigation field activities under the TDEC-approved Fish Tissue SAP scope of work were performed during April and May 2019, when the targeted fish species were reproductivity mature. To supplement the fish tissue investigation, additional samples of fish tissues were collected in April and May 2018. Although the 2018 sampling was completed prior to TDEC's approval of the final Fish Tissue SAP, it was conducted in accordance with the subsequently approved methods, applicable Technical Instructions (TIs) and Standard Operating Procedures (SOPs), and incorporated the same species of fish, types of samples, and sampling reaches identified in the final SAP. TVA personnel performed all field work activities, including fish tissue resections. TVA shipped the 2018 and 2019 fish tissue samples to the analytical laboratory in January 2019 and August 2019, respectively. Laboratory analysis of constituents was performed by Pace Analytical in Green Bay, Wisconsin. Additional Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The primary objective of the investigation conducted pursuant to the Fish Tissue SAP is to assess whether fish in the immediate vicinity and downstream of the CUF Plant have higher tissue concentrations of CCR-related constituents than fish from an upstream reference location. To assist in the evaluation, samples of fish tissues also were collected in 2018, prior to TDEC's approval of the final Fish Tissue SAP. The assessment of tissue concentrations will be discussed in the EAR. The SAR documents completion of the activities related to the fish tissue investigation at the CUF Plant. The approach for the fish tissue investigation was to:

- Collect fish from five sampling reaches located on the Cumberland River and Wells Creek upstream of, adjacent to, and downstream of the CCR units
- Collect five species of fish representing different trophic levels from each of the sampling reaches
- Prepare fish tissue samples from the collected fish species for analysis of CCR-related constituents.

The scope of work for the fish tissue investigation consisted of the following tasks:

- Obtaining a Tennessee Wildlife Resources Agency (TWRA) Scientific Collection Permit and coordinating with that agency during field sampling activities
- Verifying the fish collection sampling reaches using the global positioning system (GPS), and identifying access locations
- Collecting fish species using boat-mounted electro-shocking (electrofishing) and/or gill netting
- Processing the collected fish to prepare tissue samples for laboratory analysis by resection, compositing tissue samples as specified in the SAP, and submitting the samples to the laboratory for analysis.

3.0 FIELD ACTIVITIES

Fish tissue investigation field activities were initially conducted in April and May 2018 prior to TDEC's approval of the final Fish Tissue SAP. Additional fish tissue sampling under the TDEC-approved Fish Tissue SAP scope of work was subsequently conducted in April and May 2019.

TVA performed fish collections and fish tissue processing activities based on guidance and specifications listed in TVA's TIs, SOPs, the SAP, the QAPP, and United States Environmental Protection Agency (EPA) *Guidance for Assessing Chemical Contaminants Data for Use in Fish Advisories* (EPA 2000), except as noted in the Variations section of this report. As part of TVA's commitment to generate representative and reliable data, data validation and/or verification of laboratory analytical results were performed by EnvStds under direct contract with TVA. EnvStds also conducted audits of field activities and tissue resections, and provided quality reviews of field documentation.

During the fish tissue investigation, TVA:

- Coordinated activities with TWRA as required by the Scientific Collection Permit
- Verified sampling reaches using GPS coordinates
- Collected the five targeted species of fish from each of five sampling reaches in 2018 and in 2019, including one sampling reach upstream of the CCR units, three adjacent to the CCR units, and one downstream of the CCR units
- Conveyed whole fish collected during field sampling efforts to TVA's Chickamauga Power Service Center in Chattanooga, Tennessee for processing
- Resected fillet, egg/ovary, and liver tissues from bluegill, channel catfish, largemouth bass, and redear sunfish; and generated samples of composited tissues by species, tissue type, and sample reach
- Generated whole fish composite samples of gizzard shad with gut content by sample reach
- Collected quality control (QC) samples including 19 field duplicates and 16 equipment blanks
- Shipped fish tissue samples via commercial courier service to Pace Analytical for analysis.

Details on each activity are presented in the sections below.

3.1 Sampling Locations

Five sampling reaches were selected for the collection of fish and associated fish tissues. These areas represent background and onsite conditions and coincide with the mayfly sampling areas (Stantec 2018c). The sampling reaches and the TDEC Order CCR units at the CUF Plant are shown on Exhibit A.1 in Appendix A. Tables B.1 and B.2, in Appendix B, provide a summary of the sampling reaches and the fish tissue samples collected, respectively.

Three sampling reaches were located adjacent to the CCR units; one on the mainstream of the Cumberland River (CuRA) and two on Wells Creek (WCD and WCU). CuRA extended approximately one river mile (Cumberland River Mile (CuRM) 102.3 to 103.3) and only included the south side of the island located immediately adjacent to the CUF Plant. The downstream Wells Creek reach (WCD) started at Wells Creek Mile 0.5 and extended upstream to creek mile 1.0. The upstream Wells Creek reach (WCU) was located between creek mile 1.5 and 2.0.

Two additional reaches were located on the Cumberland River. The downstream-most sampling reach, CuRD, extended approximately 2.0 river miles (CuRM 98.5 to 100.5) and originated approximately 2.4 river miles downstream from the CUF Plant. The upstream reference reach, CuRU, originated approximately 2.5 river miles upstream from the CUF Plant and extended upstream approximately 2.0 river miles (CuRM 106.0 to 108.0).

3.2 Documentation

TVA maintained field documentation in accordance with TVA TI ENV-TI-05.80.03, *Field Record Keeping* and the QAPP. Field activities were recorded in field logbooks. Health and safety forms were completed in accordance with TVA health and safety requirements. Additional information regarding field documentation is provided below.

3.2.1 Field Forms

TVA used program-specific field forms and field logbooks to record field observations and data for specific activities. Field forms used during the fish tissue investigation included:

- *TVA Biota Field Chain-of-Custody (COC)*
- *Analytical Laboratory COC*
- *Weekly Balance Check.*

3.2.1.1 Field Logbook

TVA field sampling personnel recorded field activities, observations, and supporting information (e.g., number and species of fish retained) in field logbooks to chronologically document the field program. Deviations from the SAP, TIs, SOPs, or QAPP were documented in the field logbooks.

3.2.1.2 TVA Biota Field Chain-of-Custody

TVA field sampling personnel completed Biota Field *COCs* to document the fish retained during the fish tissue investigation field activities. The Biota Field *COC* documents the field collection team, sampling location, collection date and time, and the number of each fish species collected and transported to the TVA Chickamauga Power Service Center, Chattanooga, Tennessee.

3.2.1.3 Analytical Laboratory Chain-of-Custody

TVA personnel completed Analytical Laboratory *COCs*, listing each fish tissue sample. The sample identification (ID), sample location, type of sample, sample date and time, analysis requested, and the sample custody record were recorded on the *COCs*. The Fish Tissue Investigation Lead reviewed the *COCs* for completeness, and a QC check of samples in each cooler compared to sample IDs on the corresponding *COC* was conducted. *COCs* were completed in general accordance with *ENV-TI-05.80.02: Sample Labeling and Custody*.

3.2.1.4 Weekly Balance Check

Balances used to weigh fish and resected fish tissues were checked weekly for accuracy using check weights.

3.3 Sampling Methods

The following sections present data collection and sampling procedures used in the fish tissue investigation.

3.3.1 Fish Collection

Fish collection occurred during April and May of 2018 and 2019, when fish were reproductively mature and developing their gonads. In order to collect female fish with mature ovaries, fish of each species were collected during their respective spawning seasons, which necessitated multiple mobilizations to the CUF Plant.

As specified in the SAP, five species of fish representing different trophic levels were selected for analysis, including four species of gamefish — largemouth bass, *Micropterus salmoides* (top carnivore), bluegill, *Lepomis macrochirus* (invertivore), redear sunfish, *Lepomis microlophus* (bottom feeding invertivore), and channel catfish, *Ictalurus punctatus* (bottom feeding omnivore) — and one species of forage fish — gizzard shad, *Dorosoma cepedianum* (planktivore).

Fish were collected using boat electrofishing (TVA-KIF-SOP-33, *Standard Operating Procedure for: Fish Sampling Using Boat-Mounted Electroshocker*). Electroshocking produced sufficient numbers of fish to meet investigation objectives without using gill nets. Fish species targeted for analysis were retained in aerated live wells until completion of a sampling effort within a sampling reach. At the completion of a sampling effort, fish were sorted based on species, size (total length), and a visual assessment of female egg development stage. Fish retained for further evaluation were double-bagged separately by species and sample reach. Bags containing fish were labeled with facility name, site ID, date of collection, and collector's initials and placed in coolers with wet ice; ensuring ice completely covered the fish. Fish were stored in separate coolers for each sampling reach and two custody seals were applied to each cooler. Field sampling personnel wore new, clean nitrile gloves when handling fish.

TVA personnel transported whole fish from the field to the TVA Chickamauga Power Service Center, Chattanooga, Tennessee for processing. TVA used TVA form 21230, *Biota Field Sampling Form*, for sample custody. Bags containing fish were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.*

3.3.2 Fish Processing and Sample Analysis

TVA personnel performed fish tissue processing activities at the TVA Chickamauga Power Service Center. Fish were processed and tissue samples frozen within 48 hours of collection. Individual fish received for processing were inspected carefully to ensure that they were not compromised in any way (i.e., mutilated by the collection gear or not properly preserved during shipment). Fish also were observed for abnormalities, such as scoliosis, blind eye, parasites, fungus, or lesions and the abnormalities recorded. Table B.3, in Appendix B, provides the measurements and observations made on each fish during processing.

Gamefish were processed into muscle (skinless, boneless fillet), ovary, and liver tissues, and the tissues were combined to form six-fish composite samples for each tissue type by species and sampling reach. Total length, weight, and sex were recorded for each fish, and the weight of each resected tissue was recorded. Personnel wore new, clean nitrile gloves when handling and processing fish. Fish were rinsed with deionized (DI) water prior to tissue resection and each resected tissue was rinsed with DI water prior to being placed in a labeled plastic bag and frozen. Tissue samples were maintained at or below −20 degrees Celsius (^{O}C) in secure freezers at the TVA Chickamauga Power Service Center.

Each gamefish produced two fillet samples, a right and left fillet. Female fish with mature ovaries produced two ovary samples. Livers from largemouth bass and channel catfish were proportioned into two samples. Due to limited mass, livers from bluegill and redear sunfish were retained whole, producing one sample from each fish. One fillet, ovary, and liver sample from each fish was allocated to a composite sample for analytical analysis. Remaining fillet, ovary, and liver tissues were retained as individual samples and archived frozen for potential future analysis, if needed.

Whole fish composite samples of 13 to 15 gizzard shad also were obtained from each sampling reach. Shad were measured (total length), rinsed with DI water, and composited. The whole fish composites, with gut content, were weighed, placed in labeled plastic bags, and maintained in secure freezers at or below −20^{O}C.

In addition, one or two co-located samples were collected from each sampling reach in 2019. Co-located samples were additional six-fish composites of fillets, ovaries, and liver tissues of one of the targeted gamefish species or an additional whole fish composite of gizzard shad. These samples were prepared as field duplicates and submitted to the analytical laboratory for analysis. Field duplicates were collected in accordance with the SAP and ENV-TI-05.80.04, *Field Sampling Quality Control.*

Except as noted in the Variations section of this report, fish used to generate composited tissue samples met the following criteria:

- Were of the same species
- Met legal requirements of harvestable size, if applicable

- Were of similar size so that the smallest individual in a composite was no less than 75 percent of the total length of the largest individual
- Were consistent with EPA guidance (EPA 2000) that the same number of gamefish were used in each composite sample
- Individuals of the same species were collected as close to the same time as possible.

Fish tissue samples were analyzed for the following CCR-related constituents, hereafter referred to collectively as “CCR Parameters” for the fish tissue investigation:

- Boron and calcium from Title 40 of the Code of Federal Regulations (CFR) Part 257 (40 CFR 257) Appendix III
- 40 CFR 257 Appendix IV Constituents, excluding radium and fluoride
- Five inorganic constituents from Appendix I of TN Rule 0400-11-.04: copper, nickel, silver, vanadium, and zinc
- Strontium
- Percent moisture.

The five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with other TDEC environmental programs. As specified in the SAP, the fish tissue analysis did not include dissolved oxygen, chloride, fluoride, pH, sulfate, or total dissolved solids (which are on the federal CCR Appendices III and IV constituents lists) because those constituents are not relevant to analyses of animal tissues.

3.3.3 Equipment Decontamination Procedures

Decontamination was performed for fish tissue sampling and processing equipment in accordance with TVA TI ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination* and EPA *Guidance for Assessing Chemical Contaminants Data for Use in Fish Advisories* (EPA 2000).

Prior to field mobilizations, dip nets used to retrieve fish during boat electrofishing were washed in a Liquinox^{TM} solution, rinsed with tap water and then with DI water, allowed to dry, and placed in plastic bags. During field collections, a clean dip net was used for each sampling reach. Additionally, coolers for transporting fish were washed with a Liquinox^{TM} solution and rinsed with tap water. Live wells also were drained, then flushed and refilled with surface water from the sampling reach prior to the start of fish collections.

Utensils used for tissue resections were decontaminated between a change in species or sampling reach. Tissue resections were done on cutting boards covered with heavy duty aluminum foil that was changed after each fish. A clean sheet of aluminum foil was placed on scales to weigh each fish or resected tissue. Equipment blanks were collected in accordance with ENV-TI-05.80.04, *Field Sampling Quality Control.*

3.4 Investigation Derived Waste

Investigation derived waste (IDW) generated during the fish tissue investigation included:

- Fish remains
- Personal protective equipment (PPE)
- Decontamination fluids
- General trash.

IDW was handled in accordance with ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*, the CUF Plant-specific waste management plan, and local, state, and federal regulations. Fish remains were frozen and disposed of in a general trash dumpster at the TVA Chickamauga Power Service Center. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite or at another TVA facility.

3.5 Sample Shipment

Samples were packed, transported, and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. Samples were shipped overnight on dry ice via a commercial courier to Pace Analytical, in Green Bay, Wisconsin. Pace Analytical submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 Variations

The proposed scope and procedures for the fish tissue investigation were outlined in the SAP, QAPP, applicable TVA TIs, and SOPs as detailed in the sections above. Variations in scope or procedures discussed with TDEC and/or TVA, changes based on field conditions, or additional field sampling performed to complete the scope of work in the SAP are described in the following sections. As discussed below, these variations do not impact the overall usability and representativeness of the dataset provided in this SAR for the fish tissue investigation at the CUF Plant.

3.6.1 Variations in Scope

There were no variations in scope during the fish tissue investigation.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- Ten of 12 bluegill liver composites consisted of 6.0 to 7.7 grams of tissue instead of the eight grams specified in the SAP. However, six grams of tissue is sufficient to allow analysis of the CCR Parameters and percent moisture. As detailed in the sections above, due to limited mass, livers from bluegill were retained whole and allocated to a single composite sample submitted for analysis. Additionally, using the selection criteria presented in Section 3.3.2 in conjunction with the preference for collecting females with developed eggs, the composited tissue samples were limited to six fish.

- The Fish Tissue SAP specified that fish used in composite samples must meet the legal requirements of harvestable length or weight. The minimum length limit for largemouth bass harvested from Barkley Reservoir was 381 millimeters (15 inches) (TWRA 2019). Two of the six largemouth bass used to form the composited tissue samples for the Wells Creek Downstream (WCD) sampling reach measured 374 millimeters (14.7 inches). The length of these fish was within 18 percent of the largest individual, and this minimal departure from the harvestable size limit does not affect the representativeness of the results. The other largemouth bass observed in the WCD sampling reach during field collections did not meet the minimum length limit.
- The Fish Tissue SAP specified collecting an equipment blank each day of fish tissue sample processing. In practice, 36 equipment blanks were collected during 18 of the 26 days that fish from the CUF Plant were processed. The number of equipment blanks collected met the data quality objectives of having sufficient equipment blanks to assess decontamination procedures and to evaluate sample data usability during the data validation/verification process performed by EnvStds.

4.0 SUMMARY

The data presented in this report are from the fish tissue investigation sampling at the CUF Plant. The scope of work during this investigation included collecting five targeted species of fish from each of five sampling reaches and processing fish tissue to prepare samples for analysis of CCR Parameters. Fish tissue investigation field activities under the TDEC-approved Fish Tissue SAP scope of work were performed during April and May 2019. Additional samples of fish tissues were collected in April and May 2018. Although this sampling was completed prior to TDEC's approval of the final Fish Tissue SAP, it incorporated the same species of fish, types of samples, and sampling reaches.

Fish tissue sampling reaches are provided in Table B.1 and depicted on Exhibit A.1. A summary of the samples collected, including field duplicate samples, is presented in Table B.2. Fish measurements and observations are presented in Table B.3. Analytical data for CCR Parameters are presented in Table B.4. Analytical data were reported by Pace Analytical, and data verification or validation was performed by EnvStds.

TVA has completed the fish tissue investigation at the CUF Plant in Cumberland City, Tennessee, in accordance with the Fish Tissue SAP as documented herein. The data collected during this investigation are usable for reporting and evaluation in the EAR and meet the objectives of the TDEC Order EIP. The complete dataset from this investigation will be evaluated along with data collected under other TDEC Order SAPs, as well as data collected under other State and CCR programs. This evaluation will be provided in the EAR.

5.0 REFERENCES

Environmental Standards, Inc. 2018. *Quality Assurance Project Plan for the Tennessee Valley Authority Cumberland Fossil Plant Environment Investigation. Revision 2.* Prepared for Tennessee Valley Authority. January 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Fish Tissue Sampling and Analysis Plan (SAP), Cumberland Fossil Plant.* Revision 3.5. Prepared for Tennessee Valley Authority. April 19, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Cumberland Fossil Plant*. Revision 3 Final. Prepared for Tennessee Valley Authority. January 25, 2018.

Stantec. 2018c. *Benthic Sampling and Analysis Plan (SAP), Cumberland Fossil Plant.* Revision 3 Final. Prepared for Tennessee Valley Authority. June 25, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

Tennessee Valley Authority (TVA). ENV-TI-05.80.02, *Sample Labeling and Custody*.

TVA, ENV-TI-05.80.03, *Field Record Keeping*.

TVA, ENV-TI-05.80.04, *Field Sampling Quality Control*.

TVA, ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*.

TVA, ENV-TI-05.80.06, *Handling and Shipping of Samples*.

TVA, TVA-KIF-SOP-33, *Standard Operating Procedure for: Fish Sampling Using Boat-Mounted Electroshocker*.

Tennessee Wildlife Resources Agency (TWRA). 2019. *Tennessee Fishing Guide, 2019-2020*.

United States Environmental Protection Agency (EPA). 2000. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories, Volume 1, Fish Sampling and Analysis, Third Edition.* EPA-823-B-00-007. November.

APPENDIX A - EXHIBIT

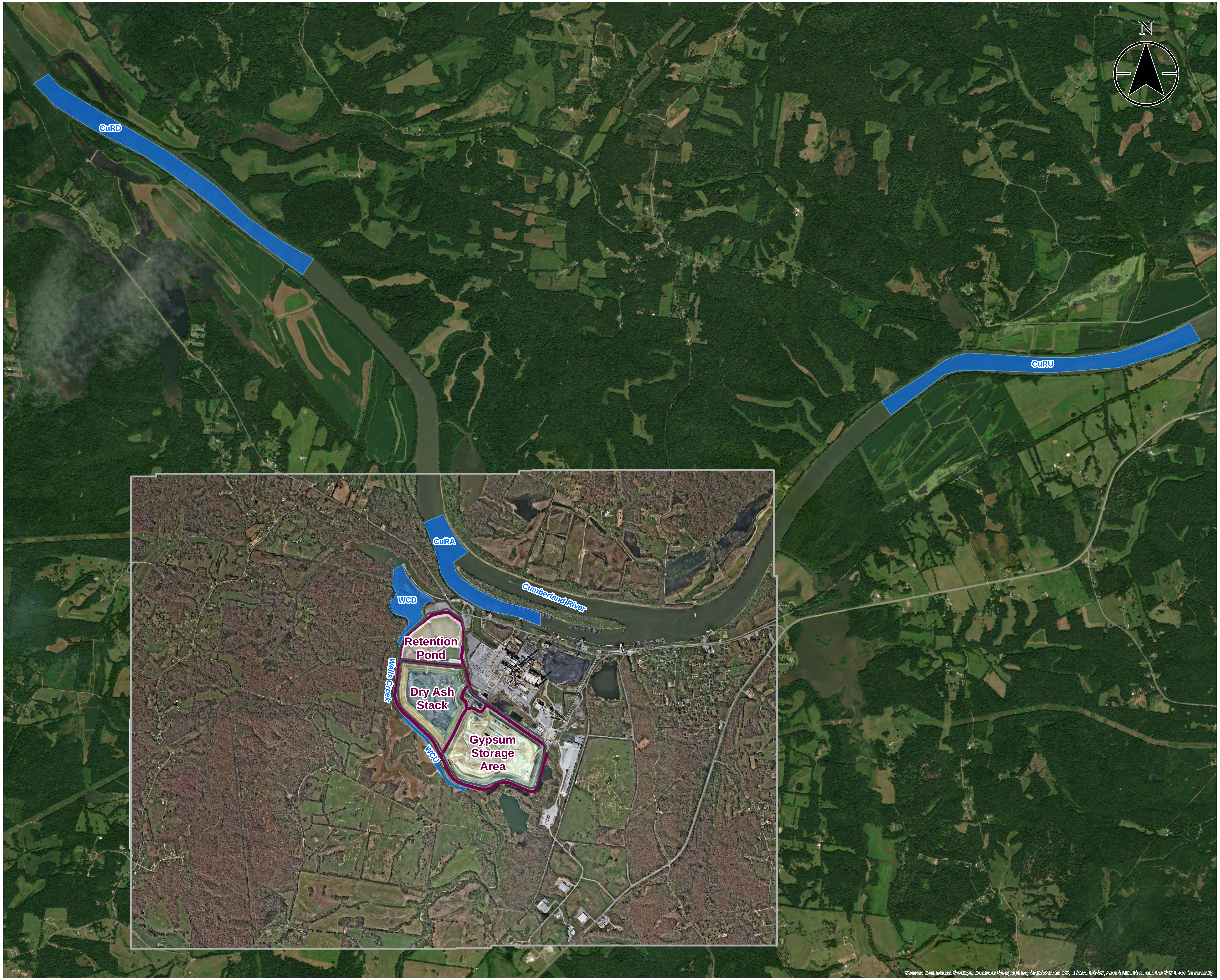


Exhibit No.

A.1

Title

Fish Tissue Sampling Reaches

Client/Project

Tennessee Valley Authority
Cumberland Fossil (CUF) Plant TDEC Order

Project Location

Stewart County, Tennessee

175568209
Prepared by LMB on 2021-08-25
Technical Review by AT on 2021-08-25

0 1,500 3,000 4,500 6,000 Feet

1:18,000 (At original document size of 22x34)

Legend

Fish Sample Locations

CuRU – Cumberland River Upstream
CuRA – Cumberland River Adjacent
CuRD – Cumberland River Downstream
WCU – Wells Creek Upstream
WCD – Wells Creek Downstream

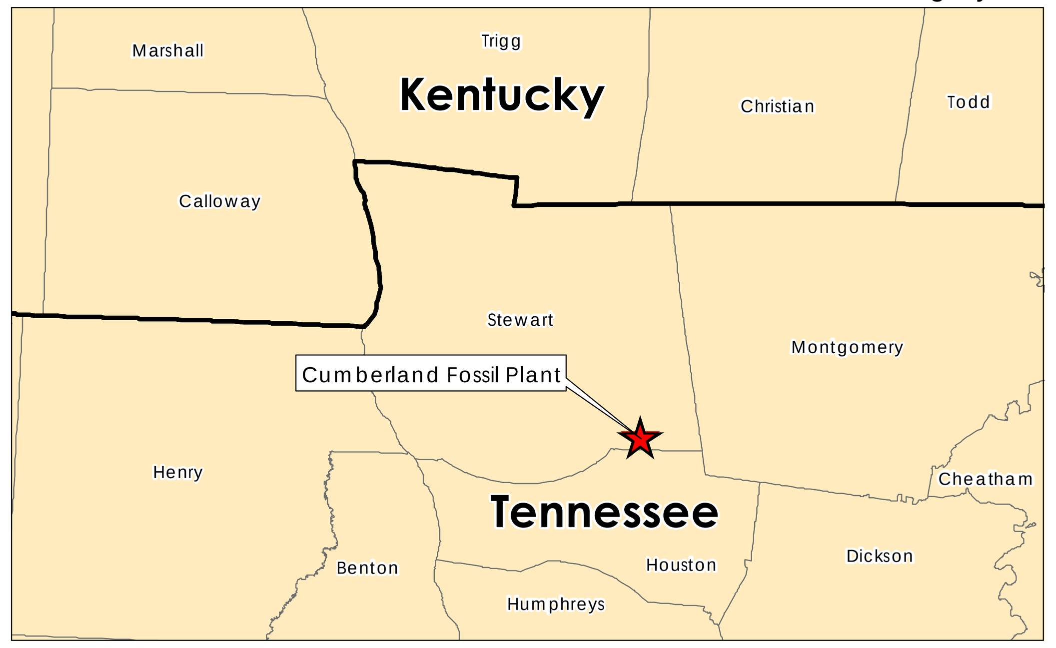
CCR Unit Area (Approximate)

2017 Imagery Boundary

2019 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by Tuck Mapping (c. 2017); 2019 Imagery provided by TVA and is dated 3/6/2019 and 12/11/2019; and Esri World Imagery



Stantec TVA

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APPENDIX B - TABLES

TABLE B.1 – Fish Tissue Sampling Reaches
Cumberland Fossil Plant

Sampling Reach ID	Sampling Reach Name[1]	Sampling Reach Location[2]			
		Approximate River Miles (extent)		Latitude	Longitude
CuRU	Cumberland River Upstream	CuRM 106.0 – 108.0 (2.0)	Downstream	36.414996	-87.614013
			Upstream	36.421908	-87.580305
CuRA	Cumberland River Adjacent	CuRM 102.3 – 103.3 (1.0)	Downstream	36.404709	-87.663758
			Upstream	36.395527	-87.651931
CuRD	Cumberland River Downstream	CuRM 98.5 – 100.5 (2.0)	Downstream	36.442574	-87.707251
			Upstream	36.426126	-87.677823
WCU	Wells Creek Upstream (adjacent)	Wells Creek Mile 1.5 – 2.0 (0.5)	Downstream	36.386656	-87.666284
			Upstream	36.380897	-87.660828
WCD	Wells Creek Downstream (adjacent)	Wells Creek Mile 0.5 – 1.0 (0.5)	Downstream	36.399582	-87.667311
			Upstream	36.393273	-87.666959

Notes:

ID Identification
CuRM Cumberland River Mile

1. Upstream, Adjacent, and Downstream of the Cumberland Fossil Plant
2. The coordinates provide the approximate upstream to downstream extent of each sampling reach presented on Exhibit A.1 in Appendix A.

TABLE B.2 – Summary of Fish Tissue Samples
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Fish Species	Sample ID (Fillet)[1]	Sample Type[2]	Number of fish: Sex: Male	Female	Tissue Composite: Fillet	Liver	Ovary	Whole Fish	Length (mm): Min	Max	Collection Date Range: Initial	Final	Analysis Type: Total Metals	Total Mercury	% Moisture
Cumberland River Upstream (CURU)	Bluegill	CUF-FH-BG-CURU-F-20180509	N	–	6	6	6	6	–	134	149	5/9/2018	5/15/2018	x	x	x
		CUF-FH-BG-CURU-F-20190429	N	–	6	6	6	6	–	145	160	4/29/2019	5/1/2019	x	x	x
		CUF-FH-BG-F-DUP01-20190429	FD	–	6	6	6	6	–	145	162	4/29/2019	5/1/2019	x	x	x
	Channel Catfish	CUF-FH-CC-CURU-F-20180502	N	–	6	6	6	6	–	412	491	5/2/2018	5/22/2018	x	x	x
		CUF-FH-CC-CURU-F-20190507	N	–	6	6	6	4	–	393	482	5/7/2019	5/22/2019	x	x	x
	Largemouth Bass	CUF-FH-LB-CURU-F-20180509	N	–	6	6	6	6	–	382	440	5/9/2018	5/22/2018	x	x	x
		CUF-FH-LB-CURU-F-20190424	N	–	6	6	6	6	–	414	517	4/24/2019	5/7/2019	x	x	x
	Redear Sunfish	CUF-FH-RS-CURU-F-20180502	N	–	6	6	6	6	–	180	216	5/2/2018	5/15/2018	x	x	x
		CUF-FH-RS-CURU-F-20190429	N	–	6	6	6	6	–	171	196	4/29/2019	5/1/2019	x	x	x
		CUF-FH-RS-F-DUP01-20190424	FD	–	6	6	6	6	–	171	191	4/24/2019	5/1/2019	x	x	x
	Gizzard Shad	CUF-FH-SH-CURU-WF-20180417	N	–	–	–	–	–	15	190	200	4/17/2018	4/17/2018	x	x	x
		CUF-FH-SH-CURU-WF-20190424	N	–	–	–	–	–	13	180	210	4/24/2019	4/24/2019	x	x	x
Cumberland River Adjacent (CURA)	Bluegill	CUF-FH-BG-CURA-F-20180509	N	–	6	6	6	6	–	131	168	5/9/2018	5/23/2018	x	x	x
		CUF-FH-BG-CURA-F-20190507	N	–	6	6	6	6	–	135	160	5/7/2019	5/7/2019	x	x	x
	Channel Catfish	CUF-FH-CC-CURA-F-20180509	N	–	6	6	6	6	–	423	511	5/9/2018	5/23/2018	x	x	x
		CUF-FH-CC-CURA-F-20190520	N	–	6	6	6	6	–	371	428	5/20/2019	5/22/2019	x	x	x
	Largemouth Bass	CUF-FH-LB-CURA-F-20180410	N	1	5	6	6	5	–	383	457	4/10/2018	5/9/2018	x	x	x
		CUF-FH-LB-CURA-F-20190430	N	–	6	6	6	6	–	420	523	4/30/2019	5/7/2019	x	x	x
	Redear Sunfish	CUF-FH-RS-CURA-F-20180501	N	1	5	6	6	4	–	157	191	5/1/2018	5/23/2018	x	x	x
		CUF-FH-RS-CURA-F-20190429	N	–	6	6	6	6	–	168	198	4/29/2019	4/30/2019	x	x	x
	Gizzard Shad	CUF-FH-SH-CURA-WF-20180410	N	–	–	–	–	–	15	190	210	4/10/2018	4/10/2018	x	x	x
		CUF-FH-SH-CURA-WF-20190424	N	–	–	–	–	–	15	180	220	4/24/2019	4/24/2019	x	x	x
		CUF-FH-SH-WF-DUP01-20190424	FD	–	–	–	–	–	15	180	220	4/24/2019	4/24/2019	x	x	x
Cumberland River Downstream (CURD)	Bluegill	CUF-FH-BG-CURD-F-20180509	N	–	6	6	6	6	–	133	156	5/9/2018	5/22/2018	x	x	x
		CUF-FH-BG-CURD-F-20190508	N	–	6	6	6	6	–	133	152	5/8/2019	5/21/2019	x	x	x
	Channel Catfish	CUF-FH-CC-CURD-F-20180509	N	–	6	6	6	6	–	435	524	5/9/2018	5/22/2018	x	x	x
		CUF-FH-CC-CURD-F-20190430	N	–	6	6	6	6	–	411	477	4/30/2019	5/21/2019	x	x	x
		CUF-FH-CC-F-DUP01-20190430	FD	–	6	6	6	6	–	396	480	4/30/2019	5/21/2019	x	x	x
	Largemouth Bass	CUF-FH-LB-CURD-F-20180410	N	–	6	6	6	6	–	382	455	4/10/2018	5/1/2018	x	x	x
		CUF-FH-LB-CURD-F-20190424	N	1	5	6	6	5	–	384	507	4/24/2019	5/8/2019	x	x	x
	Redear Sunfish	CUF-FH-RS-CURD-F-20180509	N	–	6	6	6	6	–	176	225	5/9/2018	5/9/2018	x	x	x
		CUF-FH-RS-CURD-F-20190429	N	–	6	6	6	6	–	172	205	4/29/2019	5/8/2019	x	x	x
	Gizzard Shad	CUF-FH-SH-CURD-WF-20180410	N	–	–	–	–	–	15	190	210	4/10/2018	4/10/2018	x	x	x
		CUF-FH-SH-CURD-WF-20190424	N	–	–	–	–	–	15	180	220	4/24/2019	4/24/2019	x	x	x

See notes on last page.

TABLE B.2 – Summary of Fish Tissue Samples
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Fish Species	Sample ID (Fillet)[1]	Sample Type[2]	Number of fish: Sex Male	Sex Female	Tissue Composite Fillet	Liver	Ovary	Whole Fish	Length (mm) Min	Max	Collection Date Range Initial	Final	Analysis Type: Total Metals	Total Mercury	% Moisture
Wells Creek Upstream (WCU)	Bluegill	CUF-FH-BG-WCU-F-20180508	N	–	6	6	6	6	–	131	150	5/8/2018	5/10/2018	x	x	x
		CUF-FH-BG-WCU-F-20190508	N	–	6	6	6	6	–	131	161	5/8/2019	5/8/2019	x	x	x
	Channel Catfish	CUF-FH-CC-WCU-F-20180410	N	1	5	6	6	3	–	407	524	4/10/2018	4/17/2018	x	x	x
		CUF-FH-CC-WCU-F-20190508	N	1	5	6	6	4	–	390	463	5/8/2019	5/21/2019	x	x	x
	Largemouth Bass	CUF-FH-LB-WCU-F-20180410	N	–	6	6	6	6	–	423	449	4/10/2018	4/10/2018	x	x	x
		CUF-FH-LB-WCU-F-20190423	N	–	6	6	6	6	–	424	545	4/23/2019	5/8/2019	x	x	x
		CUF-FH-LB-F-DUP01-20190416	FD	–	6	6	6	4	–	407	489	4/16/2019	5/8/2019	x	x	x
	Redear Sunfish	CUF-FH-RS-WCU-F-20180501	N	–	6	6	6	6	–	180	223	5/1/2018	5/15/2018	x	x	x
		CUF-FH-RS-WCU-F-20190430	N	–	6	6	6	6	–	176	206	4/30/2019	5/8/2019	x	x	x
	Gizzard Shad	CUF-FH-SH-WCU-WF-20180410	N	–	–	–	–	–	15	170	190	4/10/2018	4/10/2018	x	x	x
		CUF-FH-SH-WCU-WF-20190423	N	–	–	–	–	–	14	175	220	4/23/2019	4/23/2019	x	x	x
Wells Creek Downstream (WCD)	Bluegill	CUF-FH-BG-WCD-F-20180510	N	–	6	6	6	6	–	134	146	5/10/2018	5/15/2018	x	x	x
		CUF-FH-BG-WCD-F-20190501	N	–	6	6	6	6	–	130	145	5/1/2019	5/1/2019	x	x	x
		CUF-FH-BG-F-DUP02-20190501	FD	–	6	6	6	6	–	126	145	5/1/2019	5/1/2019	x	x	x
	Channel Catfish	CUF-FH-CC-WCD-F-20180410	N	–	6	6	6	2	–	420	509	4/10/2018	5/10/2018	x	x	x
		CUF-FH-CC-WCD-F-20190501	N	–	6	6	6	2	–	387	512	5/1/2019	5/21/2019	x	x	x
	Largemouth Bass	CUF-FH-LB-WCD-F-20180410	N	–	6	6	6	6	–	374	455	4/10/2018	5/8/2018	x	x	x
		CUF-FH-LB-WCD-F-20190415	N	–	6	6	6	6	–	382	489	4/15/2019	4/23/2019	x	x	x
	Redear Sunfish	CUF-FH-RS-WCD-F-20180510	N	–	6	6	6	6	–	164	189	5/10/2018	5/15/2018	x	x	x
		CUF-FH-RS-WCD-F-20190501	N	–	6	6	6	6	–	173	207	5/1/2019	5/1/2019	x	x	x
		CUF-FH-RS-F-DUP02-20190501	FD	–	6	6	6	6	–	159	210	5/1/2019	5/1/2019	x	x	x
	Gizzard Shad	CUF-FH-SH-WCD-WF-20180410	N	–	–	–	–	–	15	180	215	4/10/2018	4/10/2018	x	x	x
		CUF-FH-SH-WCD-WF-20190423	N	–	–	–	–	–	13	175	220	4/23/2019	4/23/2019	x	x	x

Notes:

Total Metals	SW-846 Method 6020A
Total Mercury	SW-846 Method 7473
% Moisture	ASTM D2974-87
–	measurement or observation not applicable
mm	millimeter

1. Sample IDs provided are for Fillets.
   Sample Naming Convention for Normal Environmental Samples: Plant Acronym - Matrix Acronym - Species Acronym - Sampling Reach Identifier - Tissue Identifier - yyyymmdd
   Sample Naming Convention for Duplicate Samples: Plant Acronym - Matrix Acronym - Species Acronym - Tissue Identifier - Duplicate Number - yyyymmdd
   Species Acronym: BG=Bluegill, CC=Channel Catfish, LB=Largemouth Bass, RS=Redear Sunfish, SH=Shad
   Tissue Identifier: F=Fillet, O=Ovary, L=Liver, WF=Whole Fish
   Sample date (yyyymmdd) is the earliest collection date among the fish contributing to a composite.
2. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate Sample

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Tissue Weights[4,5,6]: Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Cumberland River Upstream (CuRU)	Bluegill	CUF-FH-BG-CURU-F-20180509 CUF-FH-BG-CURU-O-20180509 CUF-FH-BG-CURU-L-20180509	5/9/2018	147	74.6	F	8.3	10.2	2.7	1.5	4.2	–	–	1.2	none
			5/9/2018	149	77.5	F	13.2	13.1	2.7	1.4	4.1	–	–	1.5	none
			5/9/2018	141	56.7	F	7.1	7.5	1.9	1.5	3.4	–	–	1.4	none
			5/15/2018	139	60.7	F	8.7	8.6	3.4	3.6	7.0	–	–	0.9	none
			5/15/2018	134	57.7	F	8.2	8.7	2.6	1.7	4.3	–	–	1.2	none
			5/15/2018	142	68.3	F	11.0	11.3	2.5	2.3	4.8	–	–	1.3	none
		CUF-FH-BG-CURU-F-20190429 CUF-FH-BG-CURU-O-20190429 CUF-FH-BG-CURU-L-20190429	4/29/2019	160	95.7	F	15.0	16.5	3.8	3.2	7.0	–	–	1.4	none
			4/29/2019	160	94.1	F	13.6	14.2	6.4	5.1	11.5	–	–	2.2	none
			4/29/2019	155	85.7	F	13.9	14.8	3.7	3.0	6.7	–	–	1.4	none
			5/1/2019	145	74.2	F	11.0	11.3	4.8	4.7	9.5	–	–	1.2	none
			5/1/2019	150	79.1	F	12.4	10.7	5.1	5.1	10.2	–	–	1.5	none
			5/1/2019	148	73.6	F	11.9	12.6	4.7	2.9	7.6	–	–	1.5	none
		CUF-FH-BG-F-DUP01-20190429 CUF-FH-BG-O-DUP01-20190429 CUF-FH-BG-L-DUP01-20190429	4/29/2019	151	87.8	F	12.8	12.9	4.8	3.4	8.2	–	–	1.1	none
			4/29/2019	155	79.5	F	11.0	11.3	4.2	3.6	7.8	–	–	1.6	none
			4/29/2019	150	75.7	F	11.1	11.9	3.8	2.5	6.3	–	–	0.7	none
			5/1/2019	162	102.3	F	14.4	14.4	5.0	4.4	9.4	–	–	1.4	none
			5/1/2019	155	91.2	F	11.9	12.8	5.5	5.6	11.1	–	–	2.0	none
			5/1/2019	145	68.7	F	9.2	9.0	4.5	4.1	8.6	–	–	0.9	none
Cumberland River Adjacent (CuRA)	Bluegill	CUF-FH-BG-CURA-F-20180509 CUF-FH-BG-CURA-O-20180509 CUF-FH-BG-CURA-L-20180509	5/9/2018	148	76.7	F	8.5	11.0	3.8	4.4	8.2	–	–	1.4	none
			5/9/2018	131	54.3	F	8.4	8.7	2.6	2.9	5.5	–	–	1.1	none
			5/9/2018	168	109.2	F	14.7	14.0	2.8	3.9	6.7	–	–	2.3	none
			5/16/2018	133	55.0	F	8.6	9.3	1.9	1.6	3.5	–	–	1.0	none
			5/23/2018	146	72.4	F	11.1	11.1	2.6	3.6	6.2	–	–	1.5	none
			5/23/2018	144	61.6	F	8.6	8.9	2.7	2.2	4.9	–	–	1.0	none
		CUF-FH-BG-CURA-F-20190507 CUF-FH-BG-CURA-O-20190507 CUF-FH-BG-CURA-L-20190507	5/7/2019	160	94.1	F	12.4	13.1	3.6	3.1	6.7	–	–	1.8	none
			5/7/2019	151	77.2	F	11.7	11.0	3.4	2.1	5.5	–	–	1.0	none
			5/7/2019	144	64.3	F	9.6	10.2	3.0	2.2	5.2	–	–	1.3	none
			5/7/2019	147	69.5	F	10.5	10.8	3.1	2.4	5.5	–	–	1.0	none
			5/7/2019	140	62.6	F	10.0	10.3	2.3	2.6	4.9	–	–	0.9	none
			5/7/2019	135	59.4	F	10.4	9.6	3.2	1.5	4.7	–	–	0.7	none
Cumberland RiverDownstream (CuRD)	Bluegill	CUF-FH-BG-CURD-F-20180509 CUF-FH-BG-CURD-O-20180509 CUF-FH-BG-CURD-L-20180509	5/9/2018	142	74.4	F	12.4	12.5	2.9	3.5	6.4	–	–	1.2	none
			5/9/2018	147	81.5	F	13.2	15.3	2.9	3.9	6.8	–	–	1.2	none
			5/9/2018	133	56.9	F	7.9	7.5	4.1	4.2	8.3	–	–	1.1	none
			5/9/2018	134	56.4	F	7.8	6.2	2.9	1.8	4.7	–	–	1.4	none
			5/22/2018	156	85.3	F	10.1	10.0	4.6	4.6	9.2	–	–	0.9	none
			5/22/2018	153	70.2	F	9.5	10.4	2.9	3.4	6.3	–	–	0.9	none
		CUF-FH-BG-CURD-F-20190508 CUF-FH-BG-CURD-O-20190508 CUF-FH-BG-CURD-L-20190508	5/8/2019	142	61.0	F	8.7	9.2	2.8	2.3	5.1	–	–	1.7	none
			5/8/2019	133	48.2	F	7.0	7.0	2.6	1.7	4.3	–	–	0.8	none
			5/8/2019	141	52.5	F	7.9	8.4	2.2	1.6	3.8	–	–	1.2	none
			5/13/2019	152	93.9	F	14.7	13.4	2.9	1.8	4.7	–	–	1.5	none
			5/21/2019	138	61.6	F	9.1	9.5	1.9	1.2	3.1	–	–	1.1	none
			5/21/2019	143	60.3	F	9.7	10.2	2.3	2.2	4.5	–	–	1.0	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

							Tissue Weights[4,5,6]								
Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Wells Creek Upstream (WCU)	Bluegill	CUF-FH-BG-WCU-F-20180508 CUF-FH-BG-WCU-O-20180508 CUF-FH-BG-WCU-L-20180508	5/8/2018	141	62.0	F	7.0	8.3	3.3	3.9	7.2	–	–	1.2	none
			5/8/2018	150	88.0	F	13.8	13.9	4.1	4.4	8.5	–	–	1.6	none
			5/8/2018	147	70.0	F	13.4	12.6	3.0	4.9	7.9	–	–	1.1	none
			5/8/2018	141	60.0	F	10.6	10.7	2.3	2.0	4.3	–	–	1.2	none
			5/8/2018	139	57.5	F	7.9	8.9	2.3	2.0	4.3	–	–	0.9	none
			5/10/2018	131	48.5	F	8.2	7.4	1.5	1.4	2.9	–	–	1.5	none
		CUF-FH-BG-WCU-F-20190508 CUF-FH-BG-WCU-O-20190508 CUF-FH-BG-WCU-L-20190508	5/8/2019	161	94.0	F	14.1	14.3	3.3	3.0	6.3	–	–	1.3	none
			5/8/2019	151	70.7	F	11.1	10.9	3.0	2.4	5.4	–	–	1.3	none
			5/8/2019	142	63.2	F	9.6	10.2	3.3	1.8	5.1	–	–	1.0	none
			5/8/2019	139	52.2	F	7.8	6.9	4.1	3.1	7.2	–	–	0.6	none
			5/8/2019	133	50.6	F	8.1	8.0	2.5	1.9	4.4	–	–	0.8	none
			5/8/2019	131	53.7	F	7.0	6.6	2.3	1.9	4.2	–	–	1.1	none
Wells Creek Downstream (WCD)	Bluegill	CUF-FH-BG-WCD-F-20180510 CUF-FH-BG-WCD-O-20180510 CUF-FH-BG-WCD-L-20180510	5/10/2018	134	55.3	F	7.5	7.8	2.6	2.8	5.4	–	–	0.9	none
			5/10/2018	136	58.1	F	6.7	7.7	2.4	3.0	5.4	–	–	1.0	none
			5/15/2018	134	51.5	F	7.4	8.0	2.3	1.4	3.7	–	–	1.3	none
			5/15/2018	146	79.0	F	11.8	13.3	2.4	3.5	5.9	–	–	1.4	none
			5/15/2018	135	54.6	F	8.9	8.3	2.4	2.7	5.1	–	–	1.1	none
			5/15/2018	136	53.1	F	7.0	8.0	1.8	1.6	3.4	–	–	0.7	none
		CUF-FH-BG-WCD-F-20190501 CUF-FH-BG-WCD-O-20190501 CUF-FH-BG-WCD-L-20190501	5/1/2019	145	68.1	F	9.0	9.6	3.6	3.3	6.9	–	–	1.1	none
			5/1/2019	137	57.6	F	9.5	10.4	3.2	1.9	5.1	–	–	1.0	none
			5/1/2019	141	67.6	F	9.3	10.0	3.2	2.7	5.9	–	–	1.2	none
			5/1/2019	140	57.5	F	9.3	8.9	1.8	1.3	3.1	–	–	1.1	none
			5/1/2019	137	52.2	F	6.9	6.7	3.5	2.5	6.0	–	–	1.1	none
			5/1/2019	130	48.2	F	7.5	7.2	1.8	1.7	3.5	–	–	0.8	none
		CUF-FH-BG-F-DUP02-20190501 CUF-FH-BG-O-DUP02-20190501 CUF-FH-BG-L-DUP02-20190501	5/1/2019	144	68.1	F	8.9	9.3	4.3	4.0	8.3	–	–	1.4	none
			5/1/2019	145	64.0	F	9.1	9.2	3.7	3.2	6.9	–	–	1.0	none
			5/1/2019	138	60.2	F	7.9	8.5	4.2	2.2	6.4	–	–	0.9	none
			5/1/2019	133	48.5	F	7.0	7.2	4.8	2.8	7.6	–	–	0.7	none
			5/1/2019	135	53.6	F	7.1	7.4	3.6	2.6	6.2	–	–	1.2	none
			5/1/2019	126	42.1	F	7.1	6.5	3.3	2.1	5.4	–	–	0.8	none
Cumberland River Upstream (CuRU)	Channel Catfish	CUF-FH-CC-CURU-F-20180502 CUF-FH-CC-CURU-O-20180502 CUF-FH-CC-CURU-L-20180502	5/2/2018	455	958	F	140.4	163.6	23.8	29.6	53.4	16.0	15.4	31.4	none
			5/9/2018	491	1172	F	233.1	228.5	27.6	25.9	53.5	11.4	11.7	23.1	none
			5/9/2018	447	892	F	132.8	129.2	45.6	48.3	93.9	10.7	11.4	22.1	none
			5/22/2018	432	798	F	124.9	129.7	56.0	54.6	110.6	6.2	5.7	11.9	none
			5/22/2018	471	1036	F	147.2	155.3	76.7	80.0	156.7	7.7	9.5	17.2	none
			5/22/2018	412	682	F	96.8	92.2	69.8	66.7	136.5	4.9	4.4	9.3	none
		CUF-FH-CC-CURU-F-20190507 CUF-FH-CC-CURU-O-20190507 CUF-FH-CC-CURU-L-20190507	5/7/2019	482	1044	F	164.7	165.5	U	U	U	8.3	9.2	17.5	none
			5/14/2019	428	704	F	130.9	119.0	U	U	U	10.1	5.0	15.1	none
			5/14/2019	420	842	F	90.9	89.9	81.6	78.4	160.0	8.8	8.6	17.4	none
			5/14/2019	393	572	F	86.1	96.2	48.6	47.2	95.8	3.8	4.9	8.7	none
			5/22/2019	436	902	F	143.6	146.2	81.2	69.0	150.2	9.5	9.1	18.6	none
			5/22/2019	396	728	F	100.4	95.8	55.4	48.2	103.6	7.6	8.1	15.7	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Tissue Weights[4,5,6] Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Cumberland River Adjacent (CuRA)	Channel Catfish	CUF-FH-CC-CURA-F-20180509 CUF-FH-CC-CURA-O-20180509 CUF-FH-CC-CURA-L-20180509	5/9/2018	511	1648	F	309.3	300.1	89.5	100.1	189.6	24.6	18.5	43.1	none
			5/9/2018	423	860	F	146.1	136.0	75.8	75.2	151.0	6.2	6.6	12.8	none
			5/16/2018	506	1652	F	263.3	258.4	111.2	112.2	223.4	14.3	22.0	36.3	none
			5/23/2018	434	898	F	142.4	146.0	76.2	77.7	153.9	7.1	5.5	12.6	none
			5/23/2018	425	794	F	104.3	134.4	50.8	54.7	105.5	7.2	9.0	16.2	none
			5/23/2018	467	1000	F	149.3	149.0	89.0	89.8	178.8	5.9	6.7	12.6	none
		CUF-FH-CC-CURA-F-20190520 CUF-FH-CC-CURA-O-20190520 CUF-FH-CC-CURA-L-20190520	5/20/2019	371	536	F	97.3	88.5	41.6	33.9	75.5	4.9	5.0	9.9	none
			5/20/2019	423	842	F	130.3	127.8	46.4	42.5	88.9	7.9	7.6	15.5	none
			5/20/2019	402	668	F	90.7	87.5	41.6	41.7	83.3	7.1	6.7	13.8	none
			5/21/2019	394	572	F	87.4	79.1	19.7	21.9	41.6	5.7	6.5	12.2	none
			5/21/2019	373	534	F	78.4	81.6	35.4	35.2	70.6	7.7	4.7	12.4	none
			5/22/2019	428	690	F	97.1	92.0	62.9	59.1	122.0	4.2	3.9	8.1	none
Cumberland River Downstream (CuRD)	Channel Catfish	CUF-FH-CC-CURD-F-20180509 CUF-FH-CC-CURD-O-20180509 CUF-FH-CC-CURD-L-20180509	5/9/2018	441	894	F	153.4	157.9	59.7	67.6	127.3	10.9	10.7	21.6	none
			5/9/2018	460	1112	F	186.4	185.1	72.0	73.9	145.9	13.0	13.9	26.9	none
			5/9/2018	524	1504	F	275.1	255.1	72.7	74.6	147.3	17.0	14.0	31.0	none
			5/22/2018	484	1610	F	241.6	252.1	149.5	157.1	306.6	10.2	11.1	21.3	none
			5/22/2018	451	866	F	122.3	116.2	72.1	67.7	139.8	4.8	5.6	10.4	none
			5/22/2018	435	806	F	103.3	108.5	54.8	55.7	110.5	7.2	9.7	16.9	none
		CUF-FH-CC-CURD-F-20190430 CUF-FH-CC-CURD-O-20190430 CUF-FH-CC-CURD-L-20190430	4/30/2019	477	1164	F	190.1	181.4	77.5	80.3	157.8	12.3	12.7	25.0	none
			5/7/2019	418	812	F	107.9	99.0	48.1	47.9	96.0	10.1	9.9	20.0	none
			5/8/2019	470	1090	F	141.8	154.6	70.0	66.3	136.3	13.0	9.3	22.3	none
			5/8/2019	465	1028	F	167.8	162.8	66.5	66.5	133.0	9.1	7.5	16.6	none
			5/21/2019	420	776	F	117.5	110.9	59.1	58.2	117.3	7.5	8.2	15.7	none
			5/21/2019	411	638	F	97.5	100.3	56.9	51.9	108.8	5.1	3.5	8.6	none
		CUF-FH-CC-F-DUP01-20190430 CUF-FH-CC-O-DUP01-20190430 CUF-FH-CC-L-DUP01-20190430	4/30/2019	480	1164	F	182.2	180.8	77.5	74.4	151.9	13.1	12.9	26.0	none
			5/8/2019	430	808	F	111.0	106.3	62.6	41.7	104.3	10.0	7.3	17.3	none
			5/8/2019	457	888	F	136.4	131.7	62.2	59.2	121.4	11.1	8.7	19.8	none
			5/13/2019	396	588	F	96.9	94.6	40.3	44.1	84.4	5.2	4.5	9.7	none
			5/21/2019	419	740	F	104.2	104.0	74.0	65.8	139.8	7.8	6.3	14.1	none
			5/21/2019	419	712	F	100.7	94.7	71.3	67.7	139.0	6.1	5.7	11.8	none
Wells Creek Upstream (WCU)	Channel Catfish	CUF-FH-CC-WCU-F-20180410 CUF-FH-CC-WCU-O-20180410 CUF-FH-CC-WCU-L-20180410	4/10/2018	455	822	F	143.3	145.0	31.9	28.7	60.6	9.6	7.7	17.3	none
			4/10/2018	524	1502	F	311.1	295.4	U	U	U	20.8	24.8	45.6	none
			4/10/2018	503	1109	M	194.8	196.5	–	–	–	8.5	10.8	19.3	none
			4/10/2018	428	780	F	126.4	129.2	24.0	25.0	49.0	14.2	13.0	27.2	none
			4/10/2018	496	1112	F	206.6	194.7	U	U	U	10.5	15.0	25.5	none
			4/17/2018	407	677	F	104.3	104.1	53.8	55.2	109.0	10.6	10.1	20.7	none
		CUF-FH-CC-WCU-F-20190508 CUF-FH-CC-WCU-O-20190508 CUF-FH-CC-WCU-L-20190508	5/8/2019	399	642	F	98.9	93.7	35.3	31.2	66.5	7.2	6.8	14.0	none
			5/20/2019	445	1036	M	204.3	194.9	–	–	–	8.8	5.8	14.6	none
			5/21/2019	390	620	F	97.8	104.3	21.2	21.7	42.9	9.3	6.6	15.9	none
			5/21/2019	460	866	F	102.3	107.2	71.8	73.2	145.0	6.2	5.8	12.0	none
			5/21/2019	463	1028	F	149.9	144.0	67.4	69.3	136.7	13.9	11.1	25.0	none
			5/21/2019	391	596	F	118.9	117.6	U	U	U	5.9	4.5	10.4	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Tissue Weights[4,5,6] Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Wells Creek Downstream (WCD)	Channel Catfish	CUF-FH-CC-WCD-F-20180410 CUF-FH-CC-WCD-O-20180410 CUF-FH-CC-WCD-L-20180410	4/10/2018	444	874	F	158.5	162.0	U	U	U	9.4	6.7	16.1	none
			4/10/2018	420	788	F	129.9	138.3	U	U	U	12.1	12.5	24.6	none
			4/10/2018	460	1006	F	191.5	191.5	U	U	U	13.9	14.1	28.0	none
			5/8/2018	430	858	F	123.5	122.6	56.6	54.1	110.7	6.7	7.6	14.3	none
			5/8/2018	439	928	F	164.9	167.9	U	U	U	10.5	11.3	21.8	none
			5/10/2018	509	1597	F	273.1	278.0	102.0	113.4	215.4	13.2	13.5	26.7	none
		CUF-FH-CC-WCD-F-20190501 CUF-FH-CC-WCD-O-20190501 CUF-FH-CC-WCD-L-20190501	5/1/2019	512	1378	F	237.4	240.0	59.7	58.1	117.8	14.3	13.1	27.4	none
			5/1/2019	435	836	F	148.9	152.3	U	U	U	6.8	6.4	13.2	none
			5/8/2019	441	732	F	130.4	120.1	U	U	U	7.9	7.1	15.0	none
			5/14/2019	388	604	F	104.6	95.6	36.3	32.7	69.0	7.1	5.7	12.8	none
			5/21/2019	387	510	F	95.9	92.3	U	U	U	2.8	3.0	5.8	none
			5/21/2019	434	536	F	70.5	74.3	U	U	U	5.0	4.0	9.0	none
Cumberland River Upstream (CuRU)	Largemouth Bass	CUF-FH-LB-CURU-F-20180509 CUF-FH-LB-CURU-O-20180509 CUF-FH-LB-CURU-L-20180509	5/9/2018	440	1176	F	211.9	197.8	22.2	24.2	46.4	7.8	7.6	15.4	none
			5/9/2018	400	1018	F	186.2	180.5	15.5	14.9	30.4	5.8	7.4	13.2	none
			5/9/2018	411	990	F	154.1	159.6	24.6	24.4	49.0	5.5	5.7	11.2	none
			5/15/2018	425	1190	F	224.5	206.6	25.2	28.1	53.3	7.8	12.2	20.0	none
			5/15/2018	429	1182	F	172.9	181.1	22.1	28.0	50.1	9.8	9.4	19.2	none
			5/22/2018	382	938	F	166.9	165.9	20.0	25.8	45.8	4.7	6.5	11.2	none
		CUF-FH-LB-CURU-F-20190424 CUF-FH-LB-CURU-O-20190424 CUF-FH-LB-CURU-L-20190424	4/24/2019	480	2080	F	378.9	347.8	56.6	56.1	112.7	17.7	14.8	32.5	none
			4/29/2019	517	2406	F	401.8	400.2	54.6	44.0	98.6	26.4	23.1	49.5	none
			4/29/2019	448	1026	F	177.5	173.9	26.5	24.1	50.6	12.5	8.5	21.0	none
			5/1/2019	414	1040	F	178.8	182.0	31.2	28.6	59.8	10.5	5.8	16.3	none
			5/1/2019	430	1442	F	261.8	247.3	34.2	27.9	62.1	11.4	9.6	21.0	none
			5/7/2019	482	1990	F	367.9	342.6	52.5	41.8	94.3	19.5	18.6	38.1	none
Cumberland River Adjacent (CuRA)	Largemouth Bass	CUF-FH-LB-CURA-F-20180410 CUF-FH-LB-CURA-O-20180410 CUF-FH-LB-CURA-L-20180410	4/10/2018	383	888	F	148.2	136.9	38.7	28.2	66.9	9.6	6.4	16.0	none
			4/10/2018	453	1674	F	275.5	219.0	74.8	74.1	148.9	10.3	10.9	21.2	none
			4/10/2018	455	1654	F	316.5	298.6	54.0	62.9	116.9	9.2	14.0	23.2	none
			4/10/2018	413	1098	M	187.6	181.4	–	–	–	8.5	5.8	14.3	none
			5/9/2018	438	1470	F	283.9	262.9	35.2	34.3	69.5	13.2	9.2	22.4	none
			5/9/2018	457	1586	F	285.6	278.0	31.1	35.4	66.5	13.6	10.2	23.8	none
		CUF-FH-LB-CURA-F-20190430 CUF-FH-LB-CURA-O-20190430 CUF-FH-LB-CURA-L-20190430	4/30/2019	498	1950	F	347.7	355.5	38.1	35.8	73.9	14.0	9.9	23.9	none
			5/7/2019	420	1062	F	192.2	185.8	17.0	17.1	34.1	5.0	5.8	10.8	none
			5/7/2019	508	2112	F	383.0	366.3	38.7	29.1	67.8	12.0	11.2	23.2	none
			5/7/2019	431	1334	F	241.7	236.7	20.4	15.9	36.3	8.0	5.1	13.1	none
			5/7/2019	523	2124	F	364.8	372.3	31.2	30.0	61.2	19.2	10.3	29.5	none
			5/7/2019	424	978	F	157.8	158.2	12.8	13.7	26.5	7.7	5.7	13.4	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

							Tissue Weights[4,5,6]								
Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Cumberland River Downstream (CuRD)	Largemouth Bass	CUF-FH-LB-CURD-F-20180410 CUF-FH-LB-CURD-O-20180410 CUF-FH-LB-CURD-L-20180410	4/10/2018	382	932	F	134.9	141.8	49.7	43.1	92.8	10.1	6.7	16.8	none
			4/10/2018	391	1184	F	199.7	182.9	30.0	31.8	61.8	11.8	7.0	18.8	none
			4/10/2018	455	1602	F	236.3	227.6	70.6	57.2	127.8	14.3	11.7	26.0	none
			4/10/2018	408	1120	F	216.2	204.5	31.2	33.3	64.5	9.2	6.8	16.0	none
			4/10/2018	446	1758	F	302.6	282.5	59.9	54.3	114.2	15.7	15.9	31.6	none
			5/1/2018	408	1054	F	187.8	205.5	20.1	18.6	38.7	10.6	11.5	22.1	none
		CUF-FH-LB-CURD-F-20190424 CUF-FH-LB-CURD-O-20190424 CUF-FH-LB-CURD-L-20190424	4/24/2019	507	2550	M	475.9	443.2	–	–	–	13.7	12.6	26.3	none
			4/29/2019	430	1244	F	207.2	203.5	21.9	23.6	45.5	10.6	6.1	16.7	none
			4/29/2019	384	806	F	136.5	132.4	21.8	20.7	42.5	4.8	4.7	9.5	none
			4/30/2019	505	2418	F	427.4	414.5	78.4	70.8	149.2	21.0	19.3	40.3	none
			5/8/2019	483	1808	F	293.7	305.8	37.3	30.6	67.9	21.5	13.5	35.0	none
			5/8/2019	388	854	F	141.9	128.5	14.0	11.6	25.6	2.5	3.9	6.4	none
Wells Creek Upstream (WCU)	Largemouth Bass	CUF-FH-LB-WCU-F-20180410 CUF-FH-LB-WCU-O-20180410 CUF-FH-LB-WCU-L-20180410	4/10/2018	432	1210	F	182.0	169.1	28.9	31.5	60.4	6.3	6.4	12.7	none
			4/10/2018	423	1474	F	250.6	242.9	57.5	59.8	117.3	10.1	9.2	19.3	none
			4/10/2018	449	1528	F	273.2	273.9	71.1	64.1	135.2	12.5	12.9	25.4	none
			4/10/2018	444	1506	F	260.8	272.9	60.9	50.8	111.7	16.6	10.4	27.0	none
			4/10/2018	426	1456	F	258.3	267.4	65.1	55.4	120.5	11.4	15.0	26.4	none
			4/10/2018	428	1508	F	287.5	275.8	74.9	82.3	157.2	14.0	11.4	25.4	none
		CUF-FH-LB-WCU-F-20190423 CUF-FH-LB-WCU-O-20190423 CUF-FH-LB-WCU-L-20190423	4/23/2019	523	2476	F	378.3	371.5	83.5	97.6	181.1	22.6	14.3	36.9	none
			4/23/2019	545	2652	F	434.1	433.1	58.6	39.9	98.5	19.4	13.3	32.7	none
			4/23/2019	424	1180	F	221.2	219.3	17.4	17.9	35.3	9.2	5.9	15.1	none
			5/8/2019	436	1430	F	228.3	229.8	31.7	33.3	65.0	9.9	10.7	20.6	none
			5/8/2019	493	2066	F	366.2	375.4	51.5	48.5	100.0	23.6	18.1	41.7	none
			5/8/2019	490	1888	F	318.0	306.4	43.0	41.4	84.4	15.8	12.4	28.2	none
		CUF-FH-LB-F-DUP01-20190416 CUF-FH-LB-O-DUP01-20190416 CUF-FH-LB-L-DUP01-20190416	4/16/2019	407	1176	F	209.4	197.7	32.7	31.6	64.3	11.8	9.9	21.7	none
			4/23/2019	415	1076	F	206.0	195.1	29.2	28.0	57.2	9.8	7.1	16.9	none
			4/30/2019	415	1124	F	183.2	174.5	U	U	U	8.5	5.2	13.7	none
			5/8/2019	476	2016	F	321.1	324.1	42.2	37.5	79.7	22.1	14.6	36.7	none
			5/8/2019	489	2016	F	295.8	322.9	36.7	34.0	70.7	18.2	17.1	35.3	none
			5/8/2019	418	1244	F	204.7	212.5	U	U	U	9.8	7.1	16.9	none
Wells Creek Downstream (WCD)	Largemouth Bass	CUF-FH-LB-WCD-F-20180410 CUF-FH-LB-WCD-O-20180410 CUF-FH-LB-WCD-L-20180410	4/10/2018	374	764	F	130.1	123.8	38.4	40.0	78.4	5.3	4.4	9.7	none
			4/10/2018	436	1584	F	278.9	256.7	47.6	55.8	103.4	15.5	13.9	29.4	none
			4/10/2018	374	884	F	178.1	163.9	28.5	29.0	57.5	5.8	7.3	13.1	none
			5/1/2018	401	1146	F	208.7	207.1	30.3	32.8	63.1	10.4	9.3	19.7	none
			5/1/2018	455	1529	F	288.5	254.9	29.2	27.8	57.0	10.8	14.0	24.8	none
			5/8/2018	412	1166	F	212.3	219.2	31.0	40.5	71.5	7.8	9.8	17.6	none
		CUF-FH-LB-WCD-F-20190415 CUF-FH-LB-WCD-O-20190415 CUF-FH-LB-WCD-L-20190415	4/15/2019	457	1522	F	250.5	264.6	34.7	37.9	72.6	15.6	9.8	25.4	none
			4/15/2019	382	988	F	155.2	166.8	29.1	30.0	59.1	9.8	6.7	16.5	none
			4/16/2019	422	1338	F	214.0	205.7	45.9	43.4	89.3	11.9	12.0	23.9	none
			4/16/2019	475	1266	F	158.0	159.5	34.5	37.0	71.5	9.1	8.1	17.2	none
			4/23/2019	489	2058	F	371.1	371.1	55.4	59.0	114.4	17.5	17.3	34.8	none
			4/23/2019	465	2000	F	355.1	351.6	45.9	39.9	85.8	19.7	14.8	34.5	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Tissue Weights[4,5,6]: Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Cumberland River Upstream (CuRU)	Redear Sunfish	CUF-FH-RS-CURU-F-20180502 CUF-FH-RS-CURU-O-20180502 CUF-FH-RS-CURU-L-20180502	5/2/2018	193	144.0	F	15.5	17.2	6.3	7.0	13.3	–	–	3.3	none
			5/9/2018	216	216.6	F	39.6	40.6	5.4	6.8	12.2	–	–	3.9	none
			5/9/2018	196	150.1	F	24.7	23.0	4.2	5.6	9.8	–	–	2.7	none
			5/15/2018	193	146.1	F	21.7	21.5	7.9	8.6	16.5	–	–	2.1	none
			5/15/2018	180	123.2	F	17.7	18.1	4.6	4.7	9.3	–	–	1.5	none
			5/15/2018	196	158.7	F	21.8	21.9	4.7	7.2	11.9	–	–	2.8	none
		CUF-FH-RS-CURU-F-20190429 CUF-FH-RS-CURU-O-20190429 CUF-FH-RS-CURU-L-20190429	4/29/2019	193	160.5	F	22.8	23.6	7.9	7.1	15.0	–	–	3.0	none
			4/29/2019	176	130.1	F	19.7	20.9	7.7	6.7	14.4	–	–	2.5	none
			4/29/2019	182	125.7	F	21.4	20.1	9.1	6.0	15.1	–	–	2.2	none
			4/29/2019	171	95.1	F	12.3	13.9	5.7	3.8	9.5	–	–	1.4	none
			5/1/2019	196	187.2	F	26.2	27.6	16.3	13.5	29.8	–	–	2.9	none
			5/1/2019	176	117.0	F	16.4	17.0	5.7	3.9	9.6	–	–	1.9	none
		CUF-FH-RS-F-DUP01-20190424 CUF-FH-RS-O-DUP01-20190424 CUF-FH-RS-L-DUP01-20190424	4/24/2019	177	128.2	F	18.2	16.2	8.4	6.9	15.3	–	–	2.4	none
			4/29/2019	191	148.2	F	23.1	21.5	9.8	7.6	17.4	–	–	2.4	none
			4/29/2019	177	121.7	F	19.4	20.4	7.6	7.6	15.2	–	–	2.0	none
			5/1/2019	183	132.9	F	19.8	20.0	11.5	10.6	22.1	–	–	1.9	none
			5/1/2019	186	141.4	F	20.7	19.9	9.9	11.6	21.5	–	–	1.7	none
			5/1/2019	171	101.7	F	15.9	16.4	7.2	6.8	14.0	–	–	1.3	none
Cumberland River Adjacent (CuRA)	Redear Sunfish	CUF-FH-RS-CURA-F-20180501 CUF-FH-RS-CURA-O-20180501 CUF-FH-RS-CURA-L-20180501	5/1/2018	191	122.0	F	15.3	13.8	4.4	4.5	8.9	–	–	3.6	none
			5/9/2018	161	95.6	F	15.1	14.6	3.7	4.1	7.8	–	–	1.4	none
			5/9/2018	157	75.1	F	13.1	13.6	2.2	2.1	4.3	–	–	0.8	none
			5/23/2018	178	107.7	F	13.1	13.6	2.8	2.3	5.1	–	–	1.1	none
			5/23/2018	160	85.3	F	15.2	16.3	U	U	U	–	–	1.0	none
			5/23/2018	173	107.2	M	15.3	14.9	–	–	–	–	–	1.2	none
		CUF-FH-RS-CURA-F-20190429 CUF-FH-RS-CURA-O-20190429 CUF-FH-RS-CURA-L-20190429	4/29/2019	195	176.9	F	30.0	29.9	11.3	8.3	19.6	–	–	3.1	none
			4/29/2019	179	127.8	F	19.8	19.5	6.3	5.8	12.1	–	–	2.6	none
			4/29/2019	174	120.6	F	20.0	20.9	6.1	4.8	10.9	–	–	2.6	none
			4/29/2019	198	148.3	F	25.2	24.3	5.3	4.7	10.0	–	–	2.5	none
			4/29/2019	168	116.5	F	17.5	18.6	8.2	6.9	15.1	–	–	2.1	none
			4/30/2019	195	148.3	F	22.4	22.9	10.0	6.2	16.2	–	–	3.2	none
Cumberland River Downstream (CuRD)	Redear Sunfish	CUF-FH-RS-CURD-F-20180509 CUF-FH-RS-CURD-O-20180509 CUF-FH-RS-CURD-L-20180509	5/9/2018	208	203.6	F	30.8	27.6	8.1	11.0	19.1	–	–	3.0	none
			5/9/2018	200	188.0	F	29.5	29.7	11.6	10.2	21.8	–	–	2.9	none
			5/9/2018	224	298.1	F	48.1	46.4	15.5	18.2	33.7	–	–	6.5	none
			5/9/2018	225	221.6	F	29.5	30.2	6.5	9.0	15.5	–	–	4.3	none
			5/9/2018	176	102.0	F	13.0	12.7	4.6	5.6	10.2	–	–	1.1	none
			5/9/2018	216	167.3	F	23.5	22.6	6.3	6.9	13.2	–	–	2.0	none
		CUF-FH-RS-CURD-F-20190429 CUF-FH-RS-CURD-O-20190429 CUF-FH-RS-CURD-L-20190429	4/29/2019	205	192.6	F	27.3	25.3	9.4	6.4	15.8	–	–	3.1	none
			4/29/2019	198	152.7	F	19.6	19.8	7.9	6.0	13.9	–	–	2.2	none
			4/29/2019	204	168.1	F	24.4	23.8	8.9	7.3	16.2	–	–	2.4	none
			5/7/2019	203	201.4	F	28.0	27.6	12.2	17.4	29.6	–	–	3.9	none
			5/8/2019	180	115.9	F	16.5	18.6	4.2	4.1	8.3	–	–	2.1	none
			5/8/2019	172	132.7	F	16.3	16.6	4.9	4.8	9.7	–	–	1.6	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Tissue Weights[4,5,6] Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Wells Creek Upstream (WCU)	Redear Sunfish	CUF-FH-RS-WCU-F-20180501 CUF-FH-RS-WCU-O-20180501 CUF-FH-RS-WCU-L-20180501	5/1/2018	223	226.0	F	33.9	34.8	8.1	8.7	16.8	–	–	6.7	none
			5/1/2018	222	202.0	F	30.5	28.9	6.6	10.1	16.7	–	–	6.5	none
			5/8/2018	215	188.0	F	24.2	23.0	5.8	6.1	11.9	–	–	3.3	none
			5/10/2018	192	138.2	F	22.0	20.0	5.8	6.7	12.5	–	–	2.3	none
			5/15/2018	180	118.1	F	16.8	16.8	4.9	4.2	9.1	–	–	1.8	none
			5/15/2018	189	135.3	F	19.9	19.4	5.2	5.2	10.4	–	–	1.4	none
		CUF-FH-RS-WCU-F-20190430 CUF-FH-RS-WCU-O-20190430 CUF-FH-RS-WCU-L-20190430	4/30/2019	190	146.2	F	17.1	16.3	7.9	5.7	13.6	–	–	2.3	none
			4/30/2019	184	136.9	F	20.4	22.0	5.2	3.5	8.7	–	–	2.8	none
			4/30/2019	192	156.3	F	25.3	26.7	9.0	6.7	15.7	–	–	3.2	none
			4/30/2019	176	128.1	F	17.3	17.8	3.0	4.1	7.1	–	–	2.8	none
			5/8/2019	206	196.3	F	28.3	28.0	11.4	9.4	20.8	–	–	3.3	none
			5/8/2019	187	143.7	F	20.3	22.0	8.4	8.3	16.7	–	–	1.9	none
Wells Creek Downstream (WCD)	Redear Sunfish	CUF-FH-RS-WCD-F-20180510 CUF-FH-RS-WCD-O-20180510 CUF-FH-RS-WCD-L-20180510	5/10/2018	168	96.0	F	14.7	17.3	2.0	2.9	4.9	–	–	2.0	none
			5/10/2018	165	96.3	F	14.7	13.2	2.9	3.0	5.9	–	–	1.9	none
			5/15/2018	188	135.3	F	19.8	19.9	4.2	2.4	6.6	–	–	2.6	none
			5/15/2018	189	134.2	F	19.4	18.7	3.7	5.2	8.9	–	–	1.8	none
			5/15/2018	174	100.4	F	14.7	15.7	2.4	2.5	4.9	–	–	1.5	none
			5/15/2018	164	95.3	F	14.7	15.3	1.9	2.2	4.1	–	–	1.4	none
		CUF-FH-RS-WCD-F-20190501 CUF-FH-RS-WCD-O-20190501 CUF-FH-RS-WCD-L-20190501	5/1/2019	173	118.5	F	16.6	15.4	9.5	7.0	16.5	–	–	1.7	none
			5/1/2019	191	149.6	F	22.5	20.8	12.7	7.6	20.3	–	–	2.3	none
			5/1/2019	202	179.9	F	30.2	27.6	9.9	8.7	18.6	–	–	3.0	none
			5/1/2019	193	139.1	F	18.4	18.0	8.4	6.5	14.9	–	–	2.1	none
			5/1/2019	204	176.6	F	25.1	27.7	8.5	7.5	16.0	–	–	2.2	none
			5/1/2019	207	204.6	F	25.5	26.2	13.6	16.0	29.6	–	–	2.5	none
		CUF-FH-RS-F-DUP02-20190501 CUF-FH-RS-O-DUP02-20190501 CUF-FH-RS-L-DUP02-20190501	5/1/2019	190	146.8	F	19.8	20.7	10.4	6.8	17.2	–	–	2.1	none
			5/1/2019	189	136.1	F	19.6	19.6	7.7	9.0	16.7	–	–	1.9	none
			5/1/2019	183	130.1	F	20.1	20.0	8.9	6.3	15.2	–	–	1.9	none
			5/1/2019	180	105.2	F	16.4	18.1	4.2	3.8	8.0	–	–	1.8	none
			5/1/2019	210	202.4	F	25.1	26.3	13.4	11.0	24.4	–	–	2.4	none
			5/1/2019	159	85.7	F	11.4	11.3	6.4	5.8	12.2	–	–	1.2	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Cumberland Fossil Plant
April and May, 2018 and 2019

Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Tissue Weights[4,5,6] Left Fillet Lab (g)	Right Fillet Archive (g)	Ovary Lab (g)	Ovary Archive (g)	Ovary Total (g)	Liver Lab (g)	Liver Archive (g)	Liver Total (g)	Abnormality[7]
Cumberland River Upstream (CuRU)	Gizzard Shad	CUF-FH-SH-CURU-WF-20180417	4/17/2018	190-200 (15)	988	–	–	–	–	–	–	–	–	–	none
		CUF-FH-SH-CURU-WF-20190424	4/24/2019	180-210 (13)	1086	–	–	–	–	–	–	–	–	–	none
Cumberland River Adjacent (CuRA)	Gizzard Shad	CUF-FH-SH-CURA-WF-20180410	4/10/2018	190-210 (15)	921	–	–	–	–	–	–	–	–	–	none
		CUF-FH-SH-CURA-WF-20190424	4/24/2019	180-220 (15)	1210	–	–	–	–	–	–	–	–	–	none
		CUF-FH-SH-WF-DUP01-20190424	4/24/2019	180-220 (15)	1250	–	–	–	–	–	–	–	–	–	none
Cumberland River Downstream (CuRD)	Gizzard Shad	CUF-FH-SH-CURD-WF-20180410	4/10/2018	190-210 (15)	959	–	–	–	–	–	–	–	–	–	none
		CUF-FH-SH-CURD-WF-20190424	4/24/2019	180-220 (15)	1138	–	–	–	–	–	–	–	–	–	none
Wells Creek Upstream (WCU)	Gizzard Shad	CUF-FH-SH-WCU-WF-20180410	4/10/2018	180-215 (15)	1120	–	–	–	–	–	–	–	–	–	none
		CUF-FH-SH-WCU-WF-20190423	4/23/2019	175-220 (14)	1186	–	–	–	–	–	–	–	–	–	none
Wells Creek Downstream (WCD)	Gizzard Shad	CUF-FH-SH-WCD-WF-20180410	4/10/2018	170-190 (15)	683	–	–	–	–	–	–	–	–	–	none
		CUF-FH-SH-WCD-WF-20190423	4/23/2019	175-220 (13)	1120	–	–	–	–	–	–	–	–	–	none

Notes:

–	measurement or observation not applicable
g	gram
mm	millimeter
U	eggs/ovaries were underdevelop or the fish had spawned

1. Sample Naming Convention
   Sample Naming Convention for Normal Samples (N): Plant Acronym - Matrix Acronym - Species Acronym - Sampling Reach Identifier - Tissue Identifier - yyyymmdd
   Sample Naming Convention for Field Duplicate Samples (FD): Plant Acronym - Matrix Acronym - Species Acronym - Tissue Identifier - Duplicate Number - yyyymmdd
   Species Acronym: BG=Bluegill, CC=Channel Catfish, LB=Largemouth Bass, RS=Redear Sunfish, SH=Shad
   Tissue Identifier: F=Fillet, O=Ovary, L=Liver, WF=Whole Fish
   Sample date (yyyymmdd) is the earliest collection date among the fish contributing to a composite.
2. Fish length for gizzard shad is the range (minimum and maximum) in total length for fish included in a composite sample. The parenthetical number denotes the number of fish included in a composite sample.
3. Fish weight for gizzard shad is the total weight of the fish composite sample.
4. Tissues denoted as Lab were allocated to a composite sample for analytical analysis.
5. Tissues denoted as Archive were retained as individual samples and archived for potential future analysis, if needed.
6. Livers from bluegill and redear sunfish were retained whole and allocated to a composite sample for analytical analysis.
7. Fish were observed for abnormalities, such as scoliosis, blind eye, parasites, fungus, or lesions.

TABLE B.4 – Fish Tissue Analytical Results
Cumberland Fossil Plant
April and May, 2018 and 2019

Species	Sampling Reach ID[1]	Sample Date[2]	Sample ID	Parent Sample ID	Sample Type[3]	Level of Review[4]	Moisture	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Vanadium	Zinc
							%	mg/kg wet weight																				
Bluegill	CURU	5/9/2018	CUF-FH-BG-CURU-F-20180509		N	Validated	82.6	<0.016	<0.029	<0.030	<0.032	<0.68	<0.014	249	0.086 UJ	0.0089 J	<0.28	<0.026	<0.020	0.12	<0.035	<0.040	0.36	<0.011	0.18 J	<0.013	<0.032	6.3
Bluegill	CURU	5/9/2018	CUF-FH-BG-CURU-L-20180509		N	Validated	78.9	<0.033	0.15 U*	<0.061	<0.066	<3.5	0.59	134 J	0.18 UJ	0.14 J	1.2 U*	<0.026	<0.10	0.054 J	0.11 J	<0.082	1.0	<0.022	<0.32	0.026 J	0.19 J	19.4
Bluegill	CURU	5/9/2018	CUF-FH-BG-CURU-O-20180509		N	Validated	67.8	<0.032	0.065 U*	0.13 U*	<0.066	<1.4	<0.028	171	<0.18	0.038 U*	1.2 U*	<0.026	<0.042	0.0043 U*	<0.071	<0.082	0.87	<0.022	<0.32	<0.013	<0.066	30.5
Bluegill	CURU	4/29/2019	CUF-FH-BG-CURU-F-20190429		N	Validated	81.3	<0.021	<0.030	0.048 J	<0.033	<0.69	<0.011	518 J	<0.088	<0.019	<0.28	<0.030	<0.021	0.091 J	<0.035	<0.041	0.31	<0.011	0.29 J	<0.013	<0.033	6.1
Bluegill	CURU	4/29/2019	CUF-FH-BG-CURU-L-20190429		N	Validated	77.5	<0.020	0.13	<0.029	<0.031	<0.66	0.47	178 J	<0.084	0.13	1.3	<0.028	<0.020	0.042 J	0.12	<0.039	1.2	<0.011	<0.15	0.026 J	0.30	20.6
Bluegill	CURU	4/29/2019	CUF-FH-BG-CURU-O-20190429		N	Validated	67.1	<0.019	0.041 J	0.11	<0.031	<0.65	<0.010	151 J	<0.082	0.025 J	1.1	<0.028	<0.020	<0.0070	0.045 J	<0.038	0.91	<0.010	0.18 J	<0.012	0.046 J	29.9
Bluegill	CURU	4/29/2019	CUF-FH-BG-F-DUP01-20190429	CUF-FH-BG-CURU-F-20190429	FD	Validated	81.1	<0.020	<0.029	0.050 J	<0.031	<0.66	<0.010	573 J	<0.084	<0.018	<0.27	<0.028	<0.020	0.095 J	<0.034	<0.039	0.32	<0.011	0.32 J	<0.012	<0.032	5.5
Bluegill	CURU	4/29/2019	CUF-FH-BG-L-DUP01-20190429	CUF-FH-BG-CURU-L-20190429	FD	Validated	77.6	<0.019	0.18	<0.028	<0.030	<0.64	0.67	169 J	<0.081	0.19	1.3	<0.027	<0.019	0.047 J	0.13	0.042 J	1.4	<0.010	<0.15	0.024 J	0.44	20.2
Bluegill	CURU	4/29/2019	CUF-FH-BG-O-DUP01-20190429	CUF-FH-BG-CURU-O-20190429	FD	Validated	67.4	<0.020	0.044 J	0.16	<0.031	<0.66	<0.010	142 J	<0.084	0.024 J	1.1	<0.028	<0.020	<0.0074	0.043 J	<0.039	0.96	<0.011	0.18 J	<0.012	0.034 J	28.7
Bluegill	CURA	5/9/2018	CUF-FH-BG-CURA-F-20180509		N	Validated	82.1	<0.015	<0.028	0.040 U*	<0.031	<0.65	<0.013	275	0.083 UJ	0.0090 J	<0.27	<0.024	<0.020	0.12	<0.033	0.042 J	0.39	<0.010	0.20 J	0.015 J	<0.031	7.1
Bluegill	CURA	5/9/2018	CUF-FH-BG-CURA-L-20180509		N	Validated	77.8	<0.032	0.15 U*	<0.061	<0.066	<3.5	0.73	222	0.18 UJ	0.11 J	1.5 U*	<0.026	<0.10	0.043 J	0.15 J	0.10 J	1.3	<0.022	<0.32	0.050 J	0.35	21.0
Bluegill	CURA	5/9/2018	CUF-FH-BG-CURA-O-20180509		N	Validated	66.1	<0.030	<0.056	0.20 U*	<0.062	<1.3	<0.026	153 J	<0.17	0.036 U*	1.1 U*	<0.024	<0.039	0.0050 U*	<0.067	<0.077	1.1	<0.021	<0.30	<0.012	<0.062	30.5
Bluegill	CURA	5/7/2019	CUF-FH-BG-CURA-F-20190507		N	Validated	82.0	<0.021	0.046 J	<0.030	<0.033	<0.69	<0.011	390 J	<0.088	<0.019	0.33 J	<0.030	<0.021	0.019 J	<0.036	<0.041	0.27	<0.011	0.29 J	<0.013	<0.033	6.9
Bluegill	CURA	5/7/2019	CUF-FH-BG-CURA-L-20190507		N	Validated	79.9	<0.021	0.15	<0.031	<0.033	<0.70	0.47	96.9 J	<0.088	0.12	1.2	<0.030	<0.021	0.030 J	0.14	0.047 J	1.1	<0.011	<0.16	<0.013	0.26	20.7
Bluegill	CURA	5/7/2019	CUF-FH-BG-CURA-O-20190507		N	Validated	67.4	<0.019	0.053 J	0.16	<0.030	<0.64	<0.010	161 J	<0.081	0.030 J	0.93	<0.027	<0.019	<0.0069	0.060 J	<0.038	0.80	<0.010	0.25 J	<0.012	0.045 J	31.3
Bluegill	CURD	5/9/2018	CUF-FH-BG-CURD-F-20180509		N	Validated	82.0	<0.016	<0.030	0.046 U*	<0.033	<0.69	<0.014	380	0.088 UJ	<0.0082	<0.28	<0.026	<0.021	0.10	<0.036	<0.041	0.34	<0.011	0.31 J	<0.013	<0.033	7.0
Bluegill	CURD	5/9/2018	CUF-FH-BG-CURD-L-20180509		N	Validated	78.0	<0.032	0.17 U*	<0.061	<0.066	<3.5	0.36	131 J	0.18 UJ	0.13 J	1.8 U*	<0.026	<0.10	0.048 J	0.14 J	<0.082	1.4	<0.022	<0.32	0.023 J	0.19 J	23.8
Bluegill	CURD	5/9/2018	CUF-FH-BG-CURD-O-20180509		N	Validated	68.1	0.034 U*	0.081 U*	0.15 U*	<0.064	<1.3	0.049 U*	211	<0.17	0.072 U*	1.1 U*	<0.025	<0.040	<0.0032	0.084 U*	<0.079	0.79	0.023 U*	0.35 J	<0.013	<0.064	28.2
Bluegill	CURD	5/8/2019	CUF-FH-BG-CURD-F-20190508		N	Validated	82.1	<0.020	<0.029	0.059 J	<0.031	<0.66	<0.010	472 J	<0.084	<0.018	<0.27	<0.028	<0.020	0.13 J	<0.034	<0.039	0.32	<0.011	0.31 J	<0.012	<0.032	6.2
Bluegill	CURD	5/8/2019	CUF-FH-BG-CURD-L-20190508		N	Validated	77.8	<0.020	0.14	<0.029	<0.031	<0.66	0.52	157 J	<0.084	0.11	1.3	<0.028	<0.020	0.047 J	0.12	<0.039	1.2	<0.011	<0.15	0.016 J	0.22	20.3
Bluegill	CURD	5/8/2019	CUF-FH-BG-CURD-O-20190508		N	Validated	69.1	<0.021	0.048 J	0.15	<0.033	<0.69	<0.011	154 J	<0.088	0.024 J	0.93 J	<0.030	<0.021	0.0074 J	0.045 J	<0.041	0.75	<0.011	0.24 J	<0.013	<0.033	32.0
Bluegill	WCU	5/8/2018	CUF-FH-BG-WCU-F-20180508		N	Validated	81.7	<0.015	<0.028	0.046 U*	<0.031	<0.65	<0.013	363	0.082 UJ	<0.0076	<0.26	<0.024	<0.020	0.082	<0.033	0.043 J	0.41	<0.010	0.27 J	<0.012	<0.031	6.6
Bluegill	WCU	5/8/2018	CUF-FH-BG-WCU-L-20180508		N	Validated	76.6	<0.032	0.20 U*	<0.060	<0.065	<3.4	0.35	212	0.17 UJ	0.12 J	1.5 U*	<0.026	<0.10	0.055 J	0.16 J	<0.080	1.3	<0.022	<0.31	0.039 J	0.25	22.4
Bluegill	WCU	5/8/2018	CUF-FH-BG-WCU-O-20180508		N	Validated	66.0	<0.031	<0.058	0.32 U*	<0.064	<1.3	<0.027	143 J	<0.17	0.046 U*	1.1 U*	<0.025	<0.041	<0.0030	0.10 U*	<0.079	1.0	<0.022	<0.31	<0.013	<0.064	30.7
Bluegill	WCU	5/8/2019	CUF-FH-BG-WCU-F-20190508		N	Validated	81.4	<0.020	<0.028	0.039 J	<0.031	<0.65	<0.010	559 J	<0.083	<0.018	<0.27	<0.028	<0.020	0.15 J	<0.033	<0.038	0.33	<0.010	0.34 J	<0.012	<0.031	5.9
Bluegill	WCU	5/8/2019	CUF-FH-BG-WCU-L-20190508		N	Validated	78.6	<0.020	0.19	<0.029	<0.031	<0.66	0.41	106 J	<0.083	0.14	1.3	<0.028	<0.020	0.066 J	0.15	<0.039	1.2	<0.011	<0.15	0.018 J	0.15	21.6
Bluegill	WCU	5/8/2019	CUF-FH-BG-WCU-O-20190508		N	Validated	70.2	<0.019	0.068 J	0.13	<0.031	<0.64	<0.010	169 J	<0.082	0.026 J	0.84 J	<0.028	<0.020	0.0085 J	0.045 J	<0.038	0.78	<0.010	0.21 J	<0.012	<0.031	28.2
Bluegill	WCD	5/10/2018	CUF-FH-BG-WCD-F-20180510		N	Validated	82.8	<0.016	<0.029	0.12 U*	<0.032	<0.67	<0.014	770	0.085 UJ	<0.0079	0.44 U*	<0.025	<0.020	0.092	<0.034	0.10 J	0.41	<0.011	0.65	<0.012	<0.032	7.1
Bluegill	WCD	5/10/2018	CUF-FH-BG-WCD-L-20180510		N	Validated	77.9	<0.032	0.16 U*	<0.060	<0.065	<3.4	0.45	229	0.17 UJ	0.12 J	1.3 U*	<0.026	<0.10	0.070 J	0.14 J	0.11 J	1.1	<0.022	<0.31	0.024 J	0.22	20.3
Bluegill	WCD	5/10/2018	CUF-FH-BG-WCD-O-20180510		N	Validated	68.5	<0.030	<0.056	0.18 U*	<0.062	<1.3	<0.026	219	<0.16	0.036 U*	0.99 U*	<0.024	<0.039	0.0038 U*	<0.067	<0.076	0.72	<0.021	0.33 J	<0.012	<0.062	28.8
Bluegill	WCD	5/1/2019	CUF-FH-BG-WCD-F-20190501		N	Validated	81.6	<0.020	<0.029	<0.029	<0.032	<0.67	<0.011	385 J	<0.085	<0.018	<0.27	<0.029	<0.020	0.13 J	<0.034	<0.039	0.35	<0.011	0.28 J	<0.012	<0.032	7.5
Bluegill	WCD	5/1/2019	CUF-FH-BG-WCD-L-20190501		N	Validated	78.5	<0.020	0.099	0.094	<0.031	<0.65	0.36	183 J	<0.083	0.11	1.4	<0.028	<0.020	0.048 J	0.12	0.040 J	1.2	<0.010	<0.15	0.017 J	0.30	20.1
Bluegill	WCD	5/1/2019	CUF-FH-BG-WCD-O-20190501		N	Validated	69.7	<0.019	0.046 J	0.15	<0.031	<0.65	<0.010	147 J	<0.082	0.021 J	0.98	<0.028	<0.020	<0.0073	0.054 J	<0.038	0.82	<0.010	0.26 J	<0.012	0.036 J	28.2
Bluegill	WCD	5/1/2019	CUF-FH-BG-F-DUP02-20190501	CUF-FH-BG-WCD-F-20190501	FD	Final-Verified	82.3	<0.021	0.093 J	<0.030	<0.033	<0.69	0.024 J	177 J	<0.088	<0.019	0.54 J	<0.030	<0.021	0.032 J	<0.036	<0.041	0.42	<0.011	<0.16	<0.013	<0.033	7.3 J
Bluegill	WCD	5/1/2019	CUF-FH-BG-L-DUP02-20190501	CUF-FH-BG-WCD-L-20190501	FD	Validated	77.1	<0.020	0.14	0.042 J	<0.031	<0.66	0.37	129 J	<0.084	0.17	1.5	<0.028	<0.020	0.050 J	0.16	<0.039	1.5	<0.011	<0.15	0.024 J	0.38	24.5
Bluegill	WCD	5/1/2019	CUF-FH-BG-O-DUP02-20190501	CUF-FH-BG-WCD-O-20190501	FD	Validated	68.9	<0.019	0.060 J	0.17	<0.030	<0.64	<0.010	157 J	<0.081	0.034 J	0.94	<0.028	<0.020	<0.0075	0.048 J	<0.038	0.90	<0.010	0.24 J	<0.012	0.035 J	27.5

See notes on last page.

TABLE B.4 – Fish Tissue Analytical Results
Cumberland Fossil Plant
April and May, 2018 and 2019

Species	Sampling Reach ID[1]	Sample Date[2]	Sample ID	Parent Sample ID	Sample Type[3]	Level of Review[4]	Moisture	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Vanadium	Zinc
							%	Analysis (mg/kg wet weight)																				
Channel Catfish	CURU	5/2/2018	CUF-FH-CC-CURU-F-20180502		N	Validated	80.1	<0.016	<0.029	<0.030	<0.032	<0.68	<0.014	74.1 J	0.086 UJ	0.0094 J	0.28 U*	<0.026	<0.020	0.12	<0.035	<0.040	0.23	<0.011	<0.16	<0.013	<0.032	5.6
			CUF-FH-CC-CURU-L-20180502		N	Validated	79.5	<0.032	<0.060	<0.060	<0.065	<3.4	0.44	<50.2	0.17 UJ	0.070 J	5.0	0.058 J	<0.10	0.24	0.17 J	<0.081	1.5	<0.022	<0.32	0.019 J	0.66	23.8
			CUF-FH-CC-CURU-O-20180502		N	Validated	60.1	<0.031	<0.058	0.21 U*	<0.064	<1.3	<0.027	873	<0.17	0.034 U*	1.5 U*	<0.025	<0.040	<0.0030	<0.069	<0.079	1.2	<0.021	1.1	<0.012	<0.064	45.6
		5/7/2019	CUF-FH-CC-CURU-F-20190507		N	Final-Verified	79.6	<0.021	<0.030	<0.030	<0.032	<0.68	<0.011	99.7	<0.087	<0.019	0.39 J	<0.029	<0.021	0.11 J	<0.035	0.087 J	0.17	0.011 UJ	<0.16	<0.013	<0.033	5.7
			CUF-FH-CC-CURU-L-20190507		N	Final-Verified	80.8	<0.019	<0.028	<0.028	<0.030	<0.64	0.35	47.0 J	<0.081	0.053 J	2.6	0.053 J	<0.019	0.19 J	0.15	<0.038	1.1	0.010 UJ	<0.15	<0.012	0.54	22.6
			CUF-FH-CC-CURU-O-20190507		N	Final-Verified	57.1	<0.020	<0.029	0.18	<0.031	<0.66	<0.010	832	<0.084	0.022 J	1.2	<0.028	<0.020	<0.0072	<0.034	<0.039	1.1	0.011 UJ	1.0	<0.012	<0.032	36.7
	CURA	5/9/2018	CUF-FH-CC-CURA-F-20180509		N	Validated	80.3	<0.016	<0.030	<0.030	<0.033	<0.69	<0.014	552	0.087 UJ	0.0081 J	0.32 U*	<0.026	<0.021	0.18 J	<0.035	0.055 J	0.17	<0.011	0.36 J	<0.013	<0.033	6.3
			CUF-FH-CC-CURA-L-20180509		N	Validated	80.1	<0.033	<0.060	1.5	<0.066	<3.5	0.14 U*	57.3 J	0.18 UJ	0.047 J	2.0 U*	0.040 J	<0.10	0.33	0.15 J	<0.082	1.0	<0.022	<0.32	<0.013	0.51	20.7
			CUF-FH-CC-CURA-O-20180509		N	Validated	57.9	<0.033	<0.060	0.18 U*	<0.066	<1.4	<0.028	947	<0.18	0.025 U*	1.2 U*	<0.026	<0.042	0.0031 U*	<0.072	<0.082	1.0	<0.022	1.1	<0.013	<0.067	40.5
		5/20/2019	CUF-FH-CC-CURA-F-20190520		N	Final-Verified	81.6	<0.021	<0.030	<0.030	<0.033	<0.69	<0.011	106 J	<0.084	<0.019	<0.28	<0.030	<0.021	0.088 J	<0.035	<0.041	0.22	<0.011	<0.16	<0.013	<0.033	6.3
			CUF-FH-CC-CURA-L-20190520		N	Final-Verified	80.7	<0.020	<0.029	<0.030	<0.032	<0.67	0.24	62.6 J	<0.086	0.035 J	1.9	0.042 J	<0.021	0.18 J	0.17	<0.040	0.97	0.011 UJ	<0.16	<0.013	0.56	22.4
			CUF-FH-CC-CURA-O-20190520		N	Final-Verified	59.0	<0.020	<0.028	0.16	<0.031	<0.65	<0.010	879	<0.082	0.023 J	1.2	<0.028	<0.020	<0.0075	<0.033	<0.038	1.1	0.010 UJ	0.99	<0.012	<0.031	39.4
	CURD	5/9/2018	CUF-FH-CC-CURD-F-20180509		N	Validated	79.4	<0.016	<0.030	<0.031	<0.033	<0.70	<0.014	70.9 J	0.088 UJ	0.010 J	0.30 U*	<0.026	<0.021	0.088	<0.036	<0.041	0.21	<0.011	<0.16	<0.013	<0.033	6.1
			CUF-FH-CC-CURD-L-20180509		N	Validated	80.1	<0.032	<0.060	<0.061	<0.066	<3.5	0.17 U*	187	0.18 UJ	0.054 J	2.8	0.038 J	<0.10	0.16 J	0.14 J	<0.082	1.1	<0.022	<0.32	0.019 J	0.47	20.5
			CUF-FH-CC-CURD-O-20180509		N	Validated	59.3	<0.032	<0.060	0.17 U*	<0.066	<1.4	<0.028	892	<0.18	0.034 U*	1.4 U*	<0.026	<0.042	<0.0032	<0.071	<0.082	1.2	<0.022	1.2	<0.013	<0.066	40.6
		4/30/2019	CUF-FH-CC-CURD-F-20190430		N	Final-Verified	80.9	<0.021	0.044 J	<0.030	<0.033	<0.69	0.027 J	66.6 J	<0.088	<0.019	0.54 J	<0.030	<0.021	0.046 J	<0.036	<0.041	0.18	0.011 UJ	<0.16	<0.013	<0.033	5.7
			CUF-FH-CC-CURD-L-20190430		N	Final-Verified	81.0	<0.019	<0.028	<0.028	<0.031	<0.65	0.29	52.6 J	<0.082	0.069 J	1.8	0.056 J	<0.020	0.30 J	0.22	<0.038	1.2 J	0.010 UJ	<0.15	<0.012	0.66 J	20.7
			CUF-FH-CC-CURD-O-20190430		N	Final-Verified	58.3	<0.020	<0.029	0.20	<0.031	<0.66	<0.010	936	<0.084	0.031 J	1.2	<0.028	<0.020	<0.0073	<0.034	<0.039	1.1	0.011 UJ	1.1	<0.012	<0.032	38.3
		4/30/2019	CUF-FH-CC-F-DUP01-20190430	CUF-FH-CC-CURD-F-20190430	FD	Final-Verified	80.5	<0.021	<0.030	<0.030	<0.032	<0.68	<0.011	145	<0.087	<0.019	<0.28	<0.029	<0.021	0.12 J	<0.035	0.048 J	0.17 J	0.011 UJ	<0.16	<0.013	<0.033	6.2
			CUF-FH-CC-L-DUP01-20190430	CUF-FH-CC-CURD-L-20190430	FD	Final-Verified	81.3	<0.020	<0.028	<0.029	<0.031	<0.66	0.19	49.1 J	<0.083	0.041 J	1.6	0.038 J	<0.020	0.18 J	0.085 J	<0.039	0.81 J	0.011 UJ	<0.15	<0.012	0.44 J	20.4
			CUF-FH-CC-O-DUP01-20190430	CUF-FH-CC-CURD-O-20190430	FD	Final-Verified	59.1	<0.021	<0.030	0.17	<0.033	<0.69	<0.011	899	<0.088	<0.019	1.2	<0.030	<0.021	<0.0074	<0.036	<0.041	1.0	0.011 UJ	1.1	<0.013	<0.033	38.7
	WCU	4/10/2018	CUF-FH-CC-WCU-F-20180410		N	Validated	78.7	<0.016	<0.030	<0.030	<0.033	<0.69	<0.014	247	0.087 UJ	<0.0081	0.34 U*	<0.026	<0.021	0.18 J	<0.035	<0.040	0.22	<0.011	0.22 J	<0.013	<0.033	7.0
			CUF-FH-CC-WCU-L-20180410		N	Validated	79.1	<0.032	<0.060	<0.061	<0.066	<3.5	0.31	62.8 J	0.18 UJ	0.037 J	3.5	0.047 J	<0.10	0.38	0.13 J	<0.082	1.5	<0.022	<0.32	0.040 J	0.53	25.8
			CUF-FH-CC-WCU-O-20180410		N	Validated	61.1	<0.031	<0.058	0.23 U*	<0.063	<1.3	<0.027	939	<0.17	0.025 U*	1.2 U*	<0.025	<0.040	<0.0031	<0.069	<0.079	1.4	<0.021	1.2	<0.012	<0.064	50.8
		5/8/2019	CUF-FH-CC-WCU-F-20190508		N	Final-Verified	80.0	<0.021	<0.030	<0.031	<0.033	<0.70	<0.011	74.4 J	<0.088	<0.019	<0.28	<0.030	<0.021	0.11 J	<0.036	<0.041	0.21	0.011 UJ	<0.16	<0.013	<0.033	5.8
			CUF-FH-CC-WCU-L-20190508		N	Final-Verified	80.4	<0.020	<0.029	<0.029	<0.031	<0.66	0.45	47.2 J	<0.084	0.089 J	2.0	0.062 J	<0.020	0.12 J	0.17	<0.039	1.8	0.011 UJ	<0.15	0.013 J	0.72	24.9
			CUF-FH-CC-WCU-O-20190508		N	Final-Verified	59.8	<0.021	<0.030	0.18	<0.033	<0.69	<0.011	916	<0.087	0.061 J	1.2	<0.030	<0.021	<0.0072	<0.035	<0.040	1.6	0.011 UJ	1.2	<0.013	<0.033	39.5
	WCD	4/10/2018	CUF-FH-CC-WCD-F-20180410		N	Validated	77.3	<0.016	<0.030	<0.030	<0.033	<0.70	<0.014	62.2 J	0.088 UJ	<0.0082	0.46 U*	<0.026	<0.021	0.16 J	<0.036	0.085 J	0.34	<0.011	<0.16	<0.013	<0.033	6.0
			CUF-FH-CC-WCD-L-20180410		N	Validated	78.7	<0.032	<0.059	<0.060	<0.065	<3.4	0.25	51.5 J	0.17 UJ	0.038 J	3.8	0.032 J	<0.10	0.32	0.15 J	<0.080	1.9	<0.022	<0.31	0.032 J	0.46	24.2
			CUF-FH-CC-WCD-O-20180410		N	Validated	60.8	<0.032	<0.059	0.22 U*	<0.064	<1.4	<0.027	804	<0.17	0.021 U*	1.1 U*	<0.025	<0.041	0.0033 U*	<0.070	<0.080	1.0	<0.022	1.2	<0.013	<0.065	40.5
		5/1/2019	CUF-FH-CC-WCD-F-20190501		N	Final-Verified	80.4	<0.020	0.032 J	<0.029	<0.031	<0.66	<0.010	91.4	<0.084	<0.018	<0.27	<0.028	<0.020	0.11 J	<0.034	<0.039	0.26	0.011 UJ	<0.15	<0.012	<0.032	5.4
			CUF-FH-CC-WCD-L-20190501		N	Final-Verified	80.5	<0.020	<0.029	<0.029	<0.031	<0.66	0.45	61.6 J	<0.084	0.058 J	2.2	0.067 J	<0.020	0.19 J	0.17	<0.039	1.6	0.011 UJ	<0.15	<0.012	0.54	24.5
			CUF-FH-CC-WCD-O-20190501		N	Final-Verified	59.0	<0.021	<0.030	0.25	<0.032	<0.68	<0.011	883	<0.087	0.022 J	6.4	<0.029	<0.021	<0.0074	<0.035	<0.040	1.4	0.011 UJ	1.1	<0.013	<0.033	46.1

See notes on last page.

TABLE B.4 – Fish Tissue Analytical Results
Cumberland Fossil Plant
April and May, 2018 and 2019

Species	Sampling Reach ID[1]	Sample Date[2]	Sample ID	Parent Sample ID	Sample Type[3]	Level of Review[4]	Moisture	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Vanadium	Zinc
							%	mg/kg wet weight																				
Largemouth Bass	CURU	5/9/2018	CUF-FH-LB-CURU-F-20180509		N	Validated	82.8	<0.015	0.070 U*	<0.029	<0.031	<0.66	<0.013	125	0.084 UJ	<0.0077	<0.27	<0.025	<0.020	0.27	<0.034	<0.039	0.26	<0.011	<0.15	<0.012	<0.031	3.8 J
Largemouth Bass	CURU	5/9/2018	CUF-FH-LB-CURU-L-20180509		N	Validated	79.6	<0.033	0.21 U*	<0.061	<0.066	<1.4	0.62	95.7 J	0.18 UJ	0.11 J	2.5 U*	<0.026	<0.042	0.13 J	0.16 J	<0.082	1.4	<0.022	<0.32	0.042 J	0.13 J	20.2
Largemouth Bass	CURU	5/9/2018	CUF-FH-LB-CURU-O-20180509		N	Validated	68.5	<0.032	0.15 U*	<0.061	<0.066	<1.4	<0.028	181	<0.18	0.064 U*	1.3 U*	<0.026	<0.042	0.013 U*	0.071 U*	0.12 J	0.94	<0.022	<0.32	<0.013	<0.066	35.7
Largemouth Bass	CURU	4/24/2019	CUF-FH-LB-CURU-F-20190424		N	Final-Verified	82.2	<0.019	0.061 J	<0.028	<0.030	<0.64	<0.010	989 J	<0.088	<0.017	<0.26	<0.027	<0.019	0.41 J	<0.033	<0.038	0.30	<0.010	0.78	<0.012	<0.030	4.2 J
Largemouth Bass	CURU	4/24/2019	CUF-FH-LB-CURU-L-20190424		N	Final-Verified	80.7	<0.020	0.18	<0.029	<0.031	<0.66	0.39	128 J	<0.086	0.071 J	1.3	<0.028	<0.020	0.18 J	0.16	<0.039	1.2	<0.011	<0.15	0.026 J	0.11	20.2
Largemouth Bass	CURU	4/24/2019	CUF-FH-LB-CURU-O-20190424		N	Final-Verified	69.7	<0.019	0.13	<0.028	<0.030	<0.64	<0.010	109 J	<0.088	0.051 J	0.98	<0.027	<0.019	0.033 J	<0.033	<0.038	0.88	<0.010	<0.15	<0.012	<0.030	32.0
Largemouth Bass	CURA	4/10/2018	CUF-FH-LB-CURA-F-20180410		N	Validated	81.4	<0.015	0.088 U*	<0.029	<0.031	<0.65	<0.013	187	0.083 UJ	<0.0077	<0.27	<0.024	<0.020	0.25	<0.033	<0.038	0.33	<0.010	<0.15	<0.012	<0.031	3.6 J
Largemouth Bass	CURA	4/10/2018	CUF-FH-LB-CURA-L-20180410		N	Validated	79.8	<0.032	0.22 U*	<0.061	<0.066	<1.4	0.75	118 J	0.18 UJ	0.087 J	1.8 U*	<0.026	<0.042	0.10 J	0.16 J	<0.082	1.2	<0.022	<0.32	0.051 J	0.11 J	20.8
Largemouth Bass	CURA	4/10/2018	CUF-FH-LB-CURA-O-20180410		N	Validated	66.6	<0.032	0.12 U*	<0.060	<0.065	<1.4	<0.028	111 J	<0.17	0.038 U*	1.2 U*	<0.026	<0.041	0.0044 U*	<0.070	<0.081	0.87	<0.022	<0.32	<0.013	<0.065	31.0
Largemouth Bass	CURA	4/30/2019	CUF-FH-LB-CURA-F-20190430		N	Final-Verified	82.2	<0.020	0.093 J	<0.030	<0.032	<0.67	<0.011	161 J	<0.084	<0.018	<0.27	<0.029	<0.020	0.33 J	<0.035	<0.040	0.28	<0.011	<0.16	<0.013	<0.032	3.6 J
Largemouth Bass	CURA	4/30/2019	CUF-FH-LB-CURA-L-20190430		N	Final-Verified	81.2	<0.020	0.15	<0.029	<0.031	<0.65	0.41	113 J	<0.084	0.098	2.4	<0.028	<0.020	0.13 J	0.17	<0.039	1.1	<0.010	<0.15	0.014 J	0.17	26.8
Largemouth Bass	CURA	4/30/2019	CUF-FH-LB-CURA-O-20190430		N	Final-Verified	72.2	<0.020	0.15	<0.030	<0.032	<0.67	<0.011	92.5 J	<0.086	0.061 J	1.0	<0.029	<0.020	0.025 J	<0.035	<0.040	0.82	<0.011	<0.16	<0.013	<0.032	38.1
Largemouth Bass	CURD	4/10/2018	CUF-FH-LB-CURD-F-20180410		N	Validated	81.2	<0.016	0.10 U*	<0.030	<0.033	<0.69	<0.014	364	0.087 UJ	<0.0081	<0.28	<0.026	<0.021	0.24	<0.035	<0.040	0.32	<0.011	0.24 J	<0.013	<0.033	4.3 J
Largemouth Bass	CURD	4/10/2018	CUF-FH-LB-CURD-L-20180410		N	Validated	79.3	<0.032	0.24 U*	<0.059	<0.064	<3.4	0.19 U*	81.5 J	0.17 UJ	0.045 J	1.7 U*	<0.025	<0.10	0.096 J	0.14 J	<0.079	1.0	<0.022	<0.31	0.045 J	0.067 J	19.8
Largemouth Bass	CURD	4/10/2018	CUF-FH-LB-CURD-O-20180410		N	Validated	67.4	<0.032	0.13 U*	<0.060	<0.065	<1.4	<0.028	106 J	<0.17	0.031 U*	1.3 U*	<0.026	<0.041	0.0059 U*	<0.070	<0.080	0.86	<0.022	<0.31	<0.013	<0.065	30.1
Largemouth Bass	CURD	4/24/2019	CUF-FH-LB-CURD-F-20190424		N	Final-Verified	82.0	<0.021	0.076 J	<0.030	<0.033	<0.69	<0.011	151 J	<0.085	<0.019	<0.28	<0.029	<0.021	0.33 J	<0.035	<0.040	0.28	<0.011	<0.16	<0.013	<0.033	3.7 J
Largemouth Bass	CURD	4/24/2019	CUF-FH-LB-CURD-L-20190424		N	Final-Verified	81.1	<0.019	0.16	<0.028	<0.030	<0.63	0.29	99.6 J	<0.081	0.057 J	1.4	<0.027	<0.019	0.11 J	0.16	<0.037	1.1	<0.010	<0.15	<0.012	0.093 J	22.9
Largemouth Bass	CURD	4/24/2019	CUF-FH-LB-CURD-O-20190424		N	Final-Verified	72.6	<0.021	0.12	<0.030	<0.033	<0.69	<0.011	119 J	<0.085	0.031 J	1.4	<0.030	<0.021	0.019 J	<0.035	<0.041	0.72	<0.011	<0.16	<0.013	<0.033	33.1
Largemouth Bass	WCU	4/10/2018	CUF-FH-LB-WCU-F-20180410		N	Validated	80.6	<0.016	0.080 U*	<0.030	<0.032	<0.68	<0.014	216	0.086 UJ	<0.0080	<0.28	<0.025	<0.020	0.32	<0.035	<0.040	0.30	<0.011	<0.16	<0.013	<0.032	3.8 J
Largemouth Bass	WCU	4/10/2018	CUF-FH-LB-WCU-L-20180410		N	Validated	79.2	<0.032	0.23 U*	<0.059	<0.064	<1.4	0.23 U*	95.7 J	0.17 UJ	0.067 J	4.4	<0.025	<0.041	0.14 J	0.15 J	<0.080	1.1	<0.022	<0.31	0.040 J	0.095 J	21.5
Largemouth Bass	WCU	4/10/2018	CUF-FH-LB-WCU-O-20180410		N	Validated	67.4	<0.032	0.15 U*	<0.061	<0.066	<1.4	<0.028	112 J	<0.18	0.033 U*	1.2 U*	<0.026	<0.042	0.0091 U*	<0.071	<0.081	0.81	<0.022	<0.32	<0.013	<0.066	28.8
Largemouth Bass	WCU	4/23/2019	CUF-FH-LB-WCU-F-20190423		N	Final-Verified	81.0	<0.020	0.068 J	<0.029	<0.031	<0.66	<0.010	118 J	<0.088	<0.018	<0.27	<0.028	<0.020	0.65 J	<0.034	<0.039	0.35	<0.011	<0.15	<0.012	<0.031	3.9 J
Largemouth Bass	WCU	4/23/2019	CUF-FH-LB-WCU-L-20190423		N	Final-Verified	79.7	<0.019	0.18	<0.028	<0.030	<0.63	0.55	68.2 J	<0.083	0.081 J	1.4	<0.027	<0.019	0.39 J	0.17	<0.037	1.8	<0.010	<0.15	0.027 J	0.19	22.0
Largemouth Bass	WCU	4/23/2019	CUF-FH-LB-WCU-O-20190423		N	Final-Verified	68.8	<0.020	0.15	<0.029	<0.031	<0.66	<0.010	169 J	<0.084	0.037 J	1.2	<0.028	<0.020	0.040 J	<0.034	<0.039	1.4	<0.011	0.16 J	<0.012	<0.031	35.5
Largemouth Bass	WCU	4/16/2019	CUF-FH-LB-F-DUP01-20190416	CUF-FH-LB-WCU-F-20190423	FD	Final-Verified	81.7	<0.021	0.095 J	<0.030	<0.032	<0.68	<0.011	128 J	<0.088	<0.019	<0.28	<0.029	<0.021	0.51 J	<0.035	<0.040	0.29	<0.011	<0.16	<0.013	<0.033	4.1 J
Largemouth Bass	WCU	4/16/2019	CUF-FH-LB-L-DUP01-20190416	CUF-FH-LB-WCU-L-20190423	FD	Final-Verified	81.9	<0.020	0.18	<0.030	<0.032	<0.68	0.57	120 J	<0.088	0.075 J	2.9	<0.029	<0.021	0.24 J	0.15	<0.040	1.4	<0.011	<0.16	0.017 J	0.16	22.7
Largemouth Bass	WCU	4/16/2019	CUF-FH-LB-O-DUP01-20190416	CUF-FH-LB-WCU-O-20190423	FD	Final-Verified	70.3	<0.020	0.19	<0.030	<0.032	<0.68	<0.011	112 J	<0.087	0.038 J	1.4	<0.029	<0.021	0.032 J	<0.035	<0.040	1.0	<0.011	<0.16	<0.013	<0.032	42.2
Largemouth Bass	WCD	4/10/2018	CUF-FH-LB-WCD-F-20180410		N	Validated	81.7	<0.016	0.10 U*	0.041 U*	<0.033	<0.69	<0.014	192	0.088 UJ	<0.0081	0.36 U*	<0.026	<0.021	0.24	<0.036	<0.041	0.32	<0.011	<0.16	<0.013	<0.033	4.0 J
Largemouth Bass	WCD	4/10/2018	CUF-FH-LB-WCD-L-20180410		N	Validated	79.1	<0.032	0.22 U*	<0.060	<0.065	<1.4	0.15 U*	67.0 J	0.17 UJ	0.058 J	1.5 U*	<0.026	<0.041	0.090 J	0.15 J	<0.080	1.0	<0.022	<0.31	0.050 J	0.067 J	19.6
Largemouth Bass	WCD	4/10/2018	CUF-FH-LB-WCD-O-20180410		N	Validated	67.3	<0.032	0.14 U*	<0.059	<0.064	<1.4	<0.027	120 J	<0.17	0.043 U*	1.3 U*	<0.025	<0.041	0.0055 U*	<0.069	<0.080	0.86	<0.022	<0.31	<0.013	<0.065	31.0
Largemouth Bass	WCD	4/15/2019	CUF-FH-LB-WCD-F-20190415		N	Final-Verified	81.1	<0.021	0.092 J	<0.030	<0.033	<0.70	<0.011	283 J	<0.083	<0.019	<0.28	<0.030	<0.021	0.31 J	<0.036	<0.041	0.33	<0.011	0.17 J	<0.013	<0.033	4.5
Largemouth Bass	WCD	4/15/2019	CUF-FH-LB-WCD-L-20190415		N	Final-Verified	80.1	<0.020	0.21	<0.030	<0.032	<0.68	0.30	93.8 J	<0.081	0.065 J	1.6	<0.029	<0.021	0.13 J	0.17	<0.040	1.2	<0.011	<0.16	0.025 J	0.12	22.2
Largemouth Bass	WCD	4/15/2019	CUF-FH-LB-WCD-O-20190415		N	Final-Verified	70.2	<0.019	0.17	<0.028	<0.030	<0.64	<0.010	110 J	<0.088	0.040 J	1.2	<0.028	<0.019	0.016 J	<0.033	<0.038	0.91	<0.010	0.15 J	<0.012	<0.031	32.0

See notes on last page.

TABLE B.4 – Fish Tissue Analytical Results
Cumberland Fossil Plant
April and May, 2018 and 2019

Species	Sampling Reach ID[1]	Sample Date[2]	Sample ID	Parent Sample ID	Sample Type[3]	Level of Review[4]	Moisture	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Vanadium	Zinc
							%	mg/kg wet weight																				
Redear Sunfish	CURU	5/2/2018	CUF-FH-RS-CURU-F-20180502		N	Validated	81.7	<0.016	0.054 U*	<0.030	<0.033	<0.69	<0.014	135	0.088 UJ	<0.0081	0.39 U*	<0.026	<0.021	0.11	<0.036	0.061 J	0.49	<0.011	<0.16	<0.013	<0.033	6.8
			CUF-FH-RS-CURU-L-20180502		N	Validated	79.0	<0.032	0.27 U*	<0.060	<0.065	<1.4	0.36	60.9 J	0.17 UJ	0.14 J	1.1 U*	<0.026	<0.041	0.062 J	0.13 J	<0.081	1.7	<0.022	<0.32	0.019 J	0.51	19.8
			CUF-FH-RS-CURU-O-20180502		N	Validated	67.1	<0.032	0.11 U*	0.095 U*	<0.066	<1.4	<0.028	169	<0.18	0.021 U*	0.73 U*	<0.026	<0.042	0.0037 U*	<0.071	<0.082	0.89	<0.022	<0.32	<0.013	<0.066	29.6
		4/29/2019	CUF-FH-RS-CURU-F-20190429		N	Final-Verified	81.1	<0.019	0.049 J	<0.028	<0.030	<0.64	<0.010	187 J	<0.081	<0.017	<0.26	<0.028	<0.020	0.11 J	<0.033	<0.038	0.49	0.010 UJ	<0.15	<0.012	<0.031	6.2
			CUF-FH-RS-CURU-L-20190429		N	Final-Verified	80.1	<0.020	0.28	<0.030	<0.032	<0.67	0.56 J	50.6 J	<0.086	0.13	1.1	<0.029	<0.021	0.063 J	0.14	<0.040	1.4	<0.011	<0.16	0.019 J	0.49	18.6
			CUF-FH-RS-CURU-O-20190429		N	Final-Verified	68.2	<0.019	0.099	0.12	<0.031	<0.65	<0.010	151 J	<0.082	0.025 J	0.93	<0.028	<0.020	<0.0071	0.049 J	<0.038	1.1	<0.010	0.21 J	<0.012	0.033 J	31.5
		4/24/2019	CUF-FH-RS-F-DUP01-20190424	CUF-FH-RS-CURU-F-20190429	FD	Final-Verified	82.0	<0.021	0.072 J	0.031 J	<0.033	<0.70	<0.011	504 J	<0.088	<0.019	<0.28	<0.030	<0.021	0.095 J	<0.036	<0.041	0.50	<0.011	0.20 J	<0.013	<0.033	7.2
			CUF-FH-RS-L-DUP01-20190424	CUF-FH-RS-CURU-L-20190429	FD	Final-Verified	80.5	<0.021	0.29	<0.030	<0.032	<0.68	0.35 J	62.9 J	<0.086	0.12	1.1	<0.029	<0.021	0.060 J	0.13	<0.040	1.6	0.011 J	<0.16	0.023 J	0.42	20.2
			CUF-FH-RS-O-DUP01-20190424	CUF-FH-RS-CURU-O-20190429	FD	Final-Verified	68.3	<0.020	0.12	0.13	<0.032	<0.67	<0.011	176 J	<0.085	0.025 J	0.83 J	<0.029	<0.021	<0.0070	<0.035	<0.040	1.0	<0.011	0.20 J	<0.013	<0.032	27.7
	CURA	5/1/2018	CUF-FH-RS-CURA-F-20180501		N	Validated	81.6	<0.015	0.061 U*	<0.028	<0.031	<0.64	<0.013	270	0.082 UJ	<0.0076	<0.26	<0.024	<0.019	0.14	<0.033	0.043 J	0.55	<0.010	<0.15	<0.012	<0.031	7.0
			CUF-FH-RS-CURA-L-20180501		N	Validated	77.3	<0.032	0.30	<0.061	<0.066	<1.4	0.33	101 J	0.18 UJ	0.19 J	1.4 U*	<0.026	<0.042	0.070 J	0.18 J	<0.082	2.1	<0.022	<0.32	0.027 J	0.37	21.3
			CUF-FH-RS-CURA-O-20180501		N	Validated	64.2	<0.032	0.066 U*	0.21 U*	<0.064	<1.4	<0.027	175	<0.17	0.027 U*	1.2 U*	<0.025	<0.041	0.0052 U*	<0.069	<0.080	1.5	<0.022	<0.31	<0.013	<0.064	34.4
		4/29/2019	CUF-FH-RS-CURA-F-20190429		N	Final-Verified	81.0	<0.019	0.073 J	<0.028	<0.030	<0.64	<0.010	201	<0.081	<0.017	0.29 J	<0.028	<0.020	0.089 J	<0.033	0.062 J	0.45	0.010 UJ	<0.15	<0.012	<0.031	6.3
			CUF-FH-RS-CURA-L-20190429		N	Final-Verified	80.4	<0.019	0.36	<0.028	<0.031	<0.64	0.22	61.9 J	0.58	0.17	1.4	<0.028	<0.020	0.038 J	0.17	0.32	1.3	<0.010	<0.15	0.013 J	0.42	20.4
			CUF-FH-RS-CURA-O-20190429		N	Final-Verified	65.8	<0.019	0.16	0.12	<0.031	<0.65	<0.010	164 J	<0.082	0.030 J	0.92	<0.028	<0.020	<0.0075	0.044 J	<0.038	1.2	<0.010	0.23 J	<0.012	0.033 J	34.5
	CURD	5/9/2018	CUF-FH-RS-CURD-F-20180509		N	Validated	81.4	<0.016	0.10 U*	<0.030	<0.032	<0.68	<0.014	290	0.086 UJ	<0.0080	<0.28	<0.025	<0.020	0.084	<0.035	0.32	0.38	<0.011	0.19 J	<0.013	<0.032	6.6
			CUF-FH-RS-CURD-L-20180509		N	Validated	79.1	<0.032	0.55	<0.060	<0.065	<1.4	0.21 U*	93.7 J	0.17 UJ	0.12 J	1.8 U*	<0.026	<0.041	0.054 J	0.20 J	<0.081	1.6	<0.022	<0.32	0.018 J	0.76	20.4
			CUF-FH-RS-CURD-O-20180509		N	Validated	66.8	<0.032	0.30	0.13 U*	<0.064	<1.4	<0.027	145 J	<0.17	0.019 U*	1.1 U*	<0.025	<0.041	<0.0031	<0.070	<0.080	0.77	<0.022	<0.31	<0.013	0.067 U*	29.9
		4/29/2019	CUF-FH-RS-CURD-F-20190429		N	Final-Verified	82.0	<0.021	0.085 J	0.057 J	<0.032	<0.68	<0.011	956	<0.087	0.019 U	<0.28	<0.029	<0.021	0.12 J	<0.035	<0.040	0.42	0.011 UJ	0.61	<0.013	<0.033	8.3
			CUF-FH-RS-CURD-L-20190429		N	Final-Verified	81.6	<0.021	0.51	<0.030	<0.032	<0.68	0.28	83.0 J	<0.087	0.12	1.2	<0.029	<0.021	0.046 J	0.14	<0.040	1.5	<0.011	<0.16	0.020 J	0.73	18.1
			CUF-FH-RS-CURD-O-20190429		N	Final-Verified	68.6	<0.019	0.21	0.12	<0.030	<0.63	<0.0099	133 J	<0.080	0.028 J	0.85 J	<0.027	<0.019	<0.0071	0.048 J	<0.037	0.89	<0.010	0.21 J	<0.012	0.032 J	30.5
	WCU	5/1/2018	CUF-FH-RS-WCU-F-20180501		N	Validated	81.9	<0.016	0.056 U*	0.045 U*	<0.032	<0.68	<0.014	461	0.087 UJ	<0.0080	<0.28	<0.026	<0.021	0.16 J	<0.035	0.041 J	0.56	<0.011	0.32 J	<0.013	<0.033	6.4
			CUF-FH-RS-WCU-L-20180501		N	Validated	79.9	<0.031	0.32	<0.059	<0.064	<1.3	0.28	72.3 J	0.17 UJ	0.13 J	1.1 U*	<0.025	<0.041	0.078 J	0.14 J	<0.079	2.1	<0.022	<0.31	0.020 J	0.46	18.7
			CUF-FH-RS-WCU-O-20180501		N	Validated	68.0	<0.032	0.10 U*	0.11 U*	<0.065	<1.4	<0.027	208	<0.17	0.028 U*	0.78 U*	<0.026	<0.041	<0.0031	<0.070	<0.080	1.1	<0.022	<0.31	<0.013	<0.065	30.8
		4/30/2019	CUF-FH-RS-WCU-F-20190430		N	Final-Verified	82.5	<0.019	0.095	<0.028	<0.030	<0.64	<0.010	224 J	<0.081	<0.017	<0.26	<0.027	<0.019	0.099 J	<0.033	<0.037	0.50	<0.010	<0.15	<0.012	<0.030	6.8
			CUF-FH-RS-WCU-L-20190430		N	Final-Verified	80.7	<0.021	0.44	<0.030	<0.033	<0.69	0.23	69.1 J	<0.087	0.12	1.2	<0.030	<0.021	0.041 J	0.15	<0.041	1.4	<0.011	<0.16	0.022 J	0.50	20.3
			CUF-FH-RS-WCU-O-20190430		N	Final-Verified	66.2	<0.020	0.30	0.15	<0.031	<0.65	<0.010	182 J	<0.083	0.033 J	0.94	<0.028	<0.020	<0.0075	0.048 J	<0.038	1.1	<0.010	0.31 J	<0.012	0.049 J	35.7
	WCD	5/10/2018	CUF-FH-RS-WCD-F-20180510		N	Validated	82.3	<0.016	0.075 U*	0.14 U*	<0.033	<0.69	<0.014	1350	0.088 UJ	<0.0082	<0.28	<0.026	<0.021	0.12	<0.036	<0.041	0.69	<0.011	0.91	<0.013	<0.033	8.0
			CUF-FH-RS-WCD-L-20180510		N	Validated	78.4	<0.032	0.28	0.066 U*	<0.066	<1.4	0.46	97.9 J	0.18 UJ	0.15 J	1.3 U*	<0.026	<0.042	0.12 J	0.15 J	<0.082	2.4	<0.022	<0.32	0.025 J	0.58	21.5
			CUF-FH-RS-WCD-O-20180510		N	Validated	69.5	<0.032	0.081 U*	0.11 U*	<0.065	<1.4	<0.028	200	<0.17	0.043 U*	0.68 U*	<0.026	<0.041	0.0054 U*	0.071 U*	<0.081	1.0	<0.022	<0.32	<0.013	0.080 U*	39.5
		5/1/2019	CUF-FH-RS-WCD-F-20190501		N	Final-Verified	82.2	<0.021	0.15	<0.031	<0.033	<0.70	0.013 J	251 J	<0.088	<0.019	0.47 J	<0.030	<0.021	0.012 J	<0.036	<0.041	0.52	<0.011	<0.16	<0.013	<0.033	7.0
			CUF-FH-RS-WCD-L-20190501		N	Final-Verified	80.0	<0.021	0.38	<0.030	<0.033	<0.69	0.56 J	73.3 J	<0.087	0.13	1.3	<0.029	<0.021	0.067 J	0.14	<0.040	1.6	<0.011	<0.16	0.024 J	0.59	21.3
			CUF-FH-RS-WCD-O-20190501		N	Final-Verified	68.3	<0.020	0.23	0.13	<0.032	<0.68	<0.011	152 J	<0.086	0.023 J	0.79 J	<0.029	<0.021	<0.0070	0.041 J	<0.040	0.95	<0.011	0.23 J	<0.013	0.033 J	27.5
		5/1/2019	CUF-FH-RS-F-DUP02-20190501	CUF-FH-RS-WCD-F-20190501	FD	Final-Verified	82.4	<0.020	0.11	<0.029	<0.031	<0.66	<0.010	236 J	<0.084	<0.018	0.34 J	<0.028	<0.020	0.11 J	<0.034	<0.039	0.50	<0.011	<0.15	<0.012	<0.032	7.9
			CUF-FH-RS-L-DUP02-20190501	CUF-FH-RS-WCD-L-20190501	FD	Final-Verified	79.4	<0.020	0.50	<0.029	<0.031	<0.66	0.23 J	97.2 J	<0.084	0.12	1.3	<0.028	<0.020	0.069 J	0.15	<0.039	1.5	<0.011	<0.15	0.022 J	0.48	20.6
			CUF-FH-RS-O-DUP02-20190501	CUF-FH-RS-WCD-O-20190501	FD	Final-Verified	69.3	<0.020	0.29	0.15	<0.032	<0.68	<0.011	146 J	<0.086	0.024 J	0.78 J	<0.029	<0.021	<0.0075	0.064 J	<0.040	0.95	<0.011	0.23 J	<0.013	0.045 J	28.3

See notes on last page.

TABLE B.4 – Fish Tissue Analytical Results
Cumberland Fossil Plant
April and May, 2018 and 2019

Species	Sampling Reach ID[1]	Sample Date[2]	Sample ID	Parent Sample ID	Sample Type[3]	Level of Review[4]	Moisture (%)	Antimony	Arsenic	Barium	Beryllium	Boron	Cadmium	Calcium	Chromium	Cobalt	Copper	Lead	Lithium	Mercury	Molybdenum	Nickel	Selenium	Silver	Strontium	Thallium	Vanadium	Zinc
							%	mg/kg wet weight																				
Gizzard Shad	CURU	4/17/2018	CUF-FH-SH-CURU-WF-20180417		N	Validated	77.2	<0.016	0.23 U*	3.8	<0.032	<0.68	0.054 U*	11300	0.47 J	0.21	0.89 U*	0.32	0.12	0.014 U*	0.047 J	0.32	0.35	<0.011	7.0	<0.013	0.36	17.1
Gizzard Shad	CURU	4/24/2019	CUF-FH-SH-CURU-WF-20190424		N	Final-Verified	75.4	<0.021	0.24	4.5	<0.033	<0.69	0.037 J	17900	0.42	0.13	1.0	0.22	0.092 J	0.016 J	0.049 J	0.23	0.42	<0.011	11.6 J	<0.013	0.30	19.1
Gizzard Shad	CURA	4/10/2018	CUF-FH-SH-CURA-WF-20180410		N	Validated	80.0	<0.016	0.19 U*	2.2	<0.033	<0.69	0.054 U*	9640	0.32 J	0.12	0.86 U*	0.13	0.066 J	0.015 U*	0.049 J	0.92	0.39	<0.011	5.6	0.018 U*	0.17	18.3
Gizzard Shad	CURA	4/24/2019	CUF-FH-SH-CURA-WF-20190424		N	Final-Verified	76.5	<0.019	0.19	3.3	<0.031	<0.64	0.033 J	10300 J	0.63	0.14	1.1	0.22	0.10	0.016 J	0.048 J	0.26	0.45	<0.010	6.9	<0.012	0.30	18.8
Gizzard Shad	CURA	4/24/2019	CUF-FH-SH-WF-DUP01-20190424	CUF-FH-SH-CURA-WF-20190424	FD	Final-Verified	75.3	<0.021	0.18	3.8	<0.033	<0.70	0.028 J	12700	0.56	0.13	0.90 J	0.20	0.11	0.020 J	0.091 J	0.21	0.47	<0.011	7.9 J	<0.013	0.31	17.8
Gizzard Shad	CURD	4/10/2018	CUF-FH-SH-CURD-WF-20180410		N	Validated	78.0	<0.016	0.15 U*	3.0	<0.17	<3.5	0.051 U*	12100	0.44 UJ	0.082 J	<1.4	0.12	<0.10	0.019 U*	0.038 J	<0.21	<0.25	<0.011	7.8	<0.013	<0.17	17.9 J
Gizzard Shad	CURD	4/24/2019	CUF-FH-SH-CURD-WF-20190424		N	Final-Verified	77.7	<0.020	0.23	4.8	<0.032	<0.67	0.032 J	11900 J	0.73	0.22	0.94	0.34	0.19	0.020 J	0.062 J	0.39	0.44	<0.011	7.9	<0.012	0.54	19.1
Gizzard Shad	WCU	4/10/2018	CUF-FH-SH-WCU-WF-20180410		N	Validated	77.9	<0.016	0.31	5.9	<0.032	<0.68	0.067 U*	14100	1.0 J	0.36	1.2 U*	0.48	0.17	0.018 U*	0.065 J	0.54	0.51	<0.011	8.5	<0.013	0.76	19.6
Gizzard Shad	WCU	4/23/2019	CUF-FH-SH-WCU-WF-20190423		N	Final-Verified	74.1	<0.021	0.27	5.1	<0.032	<0.68	0.044 J	9230	0.90	0.29	0.96	0.39	0.19	0.020 J	0.053 J	0.47	0.49	<0.011	5.8 J	<0.013	0.65	17.6
Gizzard Shad	WCD	4/10/2018	CUF-FH-SH-WCD-WF-20180410		N	Validated	79.2	<0.016	0.31	5.7	<0.032	<0.67	0.063 U*	7810	1.0 J	0.44	1.2 U*	0.49	0.23	0.020 U*	0.060 J	0.92	0.41	<0.011	4.9	0.015 U*	0.85	16.9
Gizzard Shad	WCD	4/23/2019	CUF-FH-SH-WCD-WF-20190423		N	Final-Verified	75.9	<0.020	0.26	6.0	<0.032	<0.67	0.026 J	11900	0.94	0.29	1.4	0.34	0.17	0.018 J	0.054 J	0.42	0.43	<0.011	7.7 J	<0.012	0.63	17.3

Notes:

<	analyte was not detected at a concentration greater than the Method Detection Limit
%	percent
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
mg/kg	milligrams per kilogram
U*	this result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
UJ	this compound was not detected, but the reporting limit should be considered estimated due to a bias identified during data validation

1. Sampling Reach ID: CURU=Cumberland River Upstream, CURA=Cumberland River Adjacent, CURD=Cumberland River Downstream, WCU=Wells Creek Upstream, and WCD=Wells Creek Downstream. Sampling reaches are shown on Exhibit A.1 in Appendix A. Table B.1, in Appendix B, provides a summary of the sampling reaches.
2. Sample Date is the earliest collection date among the fish contributing to a composite.
3. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate Sample
4. Level of review is defined in the Quality Assurance Project Plan