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

Watts Bar Fossil Plant

Spring City, Tennessee

Tennessee Valley Authority

TVA

Title and Approval Page

Title of Document: Appendix J.1 – Technical Evaluation of Surface Stream Data
Watts Bar Fossil Plant
Tennessee Valley Authority
Spring City, Tennessee

Prepared By: Tennessee Valley Authority

Effective Date: March 31, 2024 Revision: 1

TVA Compliance Point of Contact — Date: 3/25/24

TVA Technical Point of Contact — Date: 3/25/24

TVA Limnologist, Fisheries & Aquatic Monitoring — Date: 3/25/2024

QA Oversight Manager — Date: 3/17/2024

TVA

Revision Log

Revision	Date	Description
0	November 7, 2023	Submittal to TDEC
1	March 31, 2024	Addresses January 31, 2024 TDEC Review Comments and Issued for TDEC

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Acronyms and Abbreviations

CARA	Corrective Action/Risk Assessment
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
CFR	Code of Federal Regulations
EAR	Environmental Assessment Report
EI	Environmental Investigation
EIP	Environmental Investigation Plan
ESV	Ecological Screening Value
NPDES	National Pollution Discharge Elimination System
%	Percent
RRI	Reservoir Release Improvement
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
TN	Tennessee
TVA	Tennessee Valley Authority
WBF Plant	Watts Bar Fossil Plant
WBN Plant	Watts Bar Nuclear Plant

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 Watts Bar Fossil Plant (WBF Plant) in Spring 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 (TDEC) 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 WBF Plant. For this investigation, TVA reviewed historical and current/ongoing surface stream studies conducted in the Tennessee River adjacent to the WBF Plant and performed a surface stream investigation as part of the TDEC Order Environmental Investigation (EI).

The following sections 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 WBF Plant.

2.1 Historical Studies

The WBF Plant was constructed on the western bank of the Tennessee River, within the upper part of the Chickamauga Reservoir. The site is immediately downstream of Watts Bar Dam and Watts Bar Reservoir. TDEC's assessment and reporting on the quality of surface waters throughout this area characterizes conditions within the Chickamauga Reservoir as fully supportive of designated uses, while water quality within the upstream Watts Bar Reservoir has been characterized as impaired due to polychlorinated biphenyls and dissolved oxygen (TDEC 2022).

Watts Bar Nuclear Plant (WBN Plant) pre-operational aquatic monitoring was conducted between 1973 and 1985 (two sample periods, 1973 to 1977 and 1982 to 1985) and operational aquatic monitoring conducted in 1996 and 1997 included trace metals, solids (suspended and dissolved), turbidity, phosphorous and other parameters in addition to general water quality measurements (e.g., temperature, dissolved oxygen) (TVA 1996 and 1998a). Surface stream monitoring for general water quality parameters has been conducted near the WBF site under TVA's Reservoir Release Improvement (RRI) program established in 1991, after the WBF Plant became inactive. No specific sampling to evaluate potential CCR contamination was performed under the RRI program.

Historically, TVA has conducted biological assessments by periodically monitoring aquatic communities (fish and benthic invertebrates) and water quality near the WBF Plant site and the adjacent WBN Plant (Figure 1-2) to evaluate their status upstream and downstream of the WBN Plant thermal discharge. Although performed in support of WBN operations, the results are also useful in assessing potential impacts from the former WBF site. Non-radiological pre- and post-operational biomonitoring was conducted for the WBN Plant from 1973-1979, 1982-1985, and 1996-1997 (TVA 1980a, 1980b, 1986, 1997b, and 1998b). Juvenile and adult fish communities, entrainment of fish eggs and larvae, fish impingement, tailwater fishery creel survey, benthic invertebrate communities, native mussel fauna, and various water quality parameters were monitored to detect and evaluate significant effects from the WBN Plant during its first two years of operation (TVA 1998b). An expanded suite of water quality parameters was measured during the 1973 to 1977 WBN pre-operational period including trace metals, color, solids (suspended and dissolved), turbidity, phosphorous, fecal coliform, and major ions in addition to general water quality measurements (e.g., temperature, dissolved oxygen). Approximately 70 trace metals samples were collected at TRM 527.4 downstream from the WBN Plant water intake and the WBF Plant site. Results of these samples included only a single lead concentration measurement above National Primary and Secondary Drinking Water Standards. Based on these results, water quality in the Chickamauga Reservoir was determined to be "excellent" with respect to drinking water standards published at the time of the report (TVA 1980a). Further, water quality in the vicinity of the WBN Plant was found to be generally satisfactory with regard to aquatic life use and an aeration system installed in the Watts Bar Reservoir forebay in 1996 resulted in higher dissolved oxygen and reduced summer and fall stratification (TVA 1998b). TVA concluded that the first two years of WBN operation had not impacted water quality in the Chickamauga Reservoir.

From 1990 to present, TVA has conducted surface stream water quality surveys on the Chickamauga and Watts Bar Reservoirs in conjunction with the Reservoir Ecological Health (REH) program (formerly known as the Vital Signs program). The water quality analyses were generally collected and analyzed for physical (i.e., pH, temperature, conductivity, depth measurements, etc.) and chemical characteristics (i.e., dissolved oxygen, total phosphorus, ammonia-nitrogen, nitrate+nitrite-nitrogen, and organic nitrogen, etc.) (TVA 1992, 1993, 1994, 1995, 1996, 1997a, 1998a, 1999, 2001, 2002, 2003, 2004, 2005, and 2006). *In situ* water quality measurements (temperature, conductivity, dissolved oxygen, and pH) were also collected under the biological monitoring program for the WBN Plant discharge beginning in 2010 (TVA 2011, 2012, 2013, 2014, and 2016).

The historical surface stream studies did not include analyses for CCR Constituents in 40 Code of Federal Regulations (CFR) 257, Appendices III and IV and the five inorganic constituents listed Appendix I of Tennessee Rule 0400-11-01-.04 (CCR Parameters) for assessment of potential impacts to surface stream water quality in relation to WBF Plant CCR management units. However, the historical data from the studies were used to support the TDEC Order investigation summarized in Chapter 7 of the EAR.

2.2 Current and Ongoing Monitoring

TVA is currently conducting ongoing monitoring of surface stream water quality in the Tennessee River at the WBN Plant intake in accordance with National Pollutant Discharge Elimination System (NPDES) Permit TN0020168 (TDEC 2022). Whole Effluent Toxicity testing is currently being conducted for Outfalls OSN 101, 102 and 113 twice per year at each outfall under the NPDES permit.

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 WBF 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), 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.

The scope of work for the surface stream investigation included the collection of surface water samples for laboratory analysis and measurement of field parameters along seven sample transects in the Tennessee River proximal to the WBF Plant. 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 as shown in Exhibit J.1-1. Depending on water depth at a station/sampling point, surface, mid-depth, and/or epibenthic (within 0.5 meters of the streambed) samples were collected. The sampling events were conducted in July 2019 and November 2019 as shown on Exhibits J.1-1 and J.1-2.

2.4 Results and Discussion

2.4.1 Field Parameters

Concurrent with surface stream sample collection for laboratory analysis and pursuant to the *Surface Stream SAP*, corresponding *in situ* water quality parameters were measured within the Tennessee River 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 existing water quality conditions within the Tennessee River 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 WBF Plant CCR management units was performed during two monitoring events conducted in July 2019 and November 2019, as described in the SAR (Appendix J.2). Samples were collected from the Tennessee River at representative locations upstream, adjacent, and downstream of the WBF Plant CCR management units with upstream locations representing unimpacted control conditions. As shown in Exhibits J.1-1 and J.1-2, surface stream samples were collected along seven transects in the Tennessee River. The table below summarizes the number of samples collected within representative zones upstream of, adjacent to, and downstream of the WBF Plant CCR management units.

Waterbody	Total Number of Samples Collected (2019)		
	Upstream (Control)	Adjacent	Downstream
Tennessee River	34	46	33

During the investigation, 113 primary samples were collected and analyzed from the Tennessee River. Including eight duplicates, a total of 121 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, therefore Phase 2 surface stream sampling was not required.

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) were used 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), and which were applied to the surface stream sampling results for the Tennessee River.

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 (CARA) Plan to determine if an unacceptable risk exists and corrective action is required.

Statistical evaluation of the EI surface stream data for the WBF 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 exploratory data analysis showed that CCR Parameter concentrations in the Tennessee River were consistently below the EAR screening levels for human health. They were also consistently below chronic and acute ESVs across sampling transects. These results demonstrate that no surface stream water quality impacts from WBF Plant operations or related to CCR management units were identified during the EI. A summary of the surface stream analytical results for the 2019 sampling events is presented in Table J.1-1.

2.5 Summary

The exploratory data analysis found that CCR Parameter concentrations were below EAR human health screening levels and acute and chronic ESVs in the Tennessee River. Potential impacts from CCR materials associated with WBF Plant CCR management units are not evident and neither water quality nor associated biological communities within these systems appear to be affected (see Appendices J.3 and J.5).

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TABLES

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location Sample Date Sample ID Parent Sample ID Sample Depth Sample Type Level of Review	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels Tennessee River (Hardness = 75 mg/L) Chronic	Acute	TR01 10-Jul-19 WBF-STR-TR01-CC-SUR-20190710 0.5 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-CC-MID-20190710 2 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-CC-BOT-20190710 3.7 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-LB-SUR-20190710 0.5 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-LB-MID-20190710 2 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-LB-BOT-20190710 3.5 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-RB-SUR-20190710 0.5 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-RB-MID-20190710 1.8 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR01-RB-BOT-20190710 3.2 ft Normal Environmental Sample 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	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.561 J	0.494 J	0.552 J	0.549 J	0.578 J	0.613 J	0.764 J	0.769 J	0.731 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	28.8	28.0	28.0	29.5	28.6	28.9	28.4	28.7	28.8
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
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	<30.3
Cadmium	ug/L	5[A]	0.628[B]	1.44[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	21,700	21,600	21,000	22,000	21,100	21,600	23,100	23,100	22,600
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	2.31 U*	<1.53	2.74 U*	<1.53	<1.53	2.24 U*	2.43 U*	1.60 U*	1.61 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.113 J	0.127 J	0.109 J	0.134 J	0.128 J	0.146 J	0.178 J	0.163 J	0.139 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	0.811 J	0.755 J	0.801 J	1.02 J	0.802 J	0.846 J	1.25 J	1.07 J	0.948 J
Iron	ug/L	n/v	n/v	n/v	113	125	121	126	170	149	132	126	140
Lead	ug/L	5[A]	2.21[B]	56.6[C]	<0.128	<0.128	<0.128	0.135 J	0.149 J	0.155 J	0.199 J	0.149 J	0.151 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	5.82	4.06 J	4.74 J
Magnesium	ug/L	n/v	n/v	n/v	6,180	5,910	5,960	6,230	6,090	6,090	5,920	5,990	5,830
Manganese	ug/L	n/v	n/v	n/v	91.6	90.7	89.2	97.0	102	103	89.3	90.0	87.6
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	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	<0.312	<0.312	<0.312	0.453 J	<0.312	<0.312	<0.312	<0.312	<0.312
Selenium	ug/L	50[A]	3.1[B]	20[C]	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	2.31[C]	<0.121	<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]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	27[B]	79[C]	1.50 U*	1.02 U*	1.33 U*	0.995 U*	1.28 U*	1.54 U*	2.04 U*	1.59 U*	1.64 U*
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	3.68 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
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	0.408 U*
Arsenic	ug/L	10[A]	150[D]	340[E]	0.500 J	0.528 J	0.651 J	0.466 J	0.418 J	0.473 J	0.647 J	0.674 J	0.907 J
Barium	ug/L	2,000[A]	n/v	n/v	27.2	27.0	27.8	27.1	27.7	26.3	26.6	27.0	27.4
Beryllium	ug/L	4[A]	n/v	n/v	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.504 J
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	36.0 J
Cadmium	ug/L	5[A]	0.579[D]	1.38[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	21,400	21,900	21,600	22,200	22,100	21,900	22,600	22,900	23,600
Chromium	ug/L	100[A]	58.6[D]	450[E]	<1.53	1.86 U*	3.10 U*	<1.53	<1.53	2.02 U*	<1.53	<1.53	2.24 U*
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	0.0930 J	<0.0750	<0.0750	<0.0750	0.0860 J	0.0800 J	0.169 J
Copper	ug/L	1,300[A]	7[D]	10.2[E]	<0.627	<0.627	0.894 J	<0.627	<0.627	<0.627	1.03 J	0.742 J	0.973 J
Iron	ug/L	n/v	n/v	n/v	46.0 J	<14.1	119	<14.1	29.2 J	<14.1	<14.1	<14.1	<14.1
Lead	ug/L	5[A]	1.84[D]	47.2[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	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	3.92 J	3.77 J	6.64
Magnesium	ug/L	n/v	n/v	n/v	5,890	6,120	6,160	6,250	6,080	6,240	5,870	5,950	6,170
Manganese	ug/L	n/v	n/v	n/v	44.1	6.14	54.3	2.95 J	26.4	2.36 J	7.90	7.43	7.50
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	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.312	<0.312	0.325 J	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312
Selenium	ug/L	50[A]	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	1.96[E]	<0.121	<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	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.163 J
Vanadium	ug/L	86[A]	n/v	n/v	<0.899	1.02	1.75	<0.899	<0.899	1.18	1.45	1.40	2.09
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<3.22	<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	-0.0452 +/-(0.0709)UJ	0.0438 +/-(0.0741)UJ	-0.00187 +/-(0.0876)UJ	-0.0411 +/-(0.0707)UJ	0.0446 +/-(0.0945)UJ	-0.00392 +/-(0.0659)UJ	0.104 +/-(0.0861)UJ	0.0548 +/-(0.0742)UJ	-0.0709 +/-(0.0527)UJ
Radium-228	pCi/L	n/v	n/v	n/v	0.168 +/-(0.219)U	0.108 +/-(0.218)U	0.0479 +/-(0.245)U	0.124 +/-(0.246)U	0.0497 +/-(0.205)U	-0.205 +/-(0.198)U	0.386 +/-(0.334)U	0.255 +/-(0.315)U	0.194 +/-(0.248)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.168 +/-(0.230)UJ	0.152 +/-(0.230)UJ	0.0479 +/-(0.260)UJ	0.124 +/-(0.256)UJ	0.0943 +/-(0.226)UJ	0.000 +/-(0.209)UJ	0.490 +/-(0.345)UJ	0.309 +/-(0.324)UJ	0.194 +/-(0.254)UJ
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	4.08	4.12	4.10	4.06	4.10	4.08	4.12	4.15	4.10
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0570 J	0.0547 J	0.0545 J	0.0547 J	0.0549 J	0.0564 J	0.0566 J	0.0556 J	0.0566 J
Sulfate	mg/L	250[A]	n/v	n/v	8.27	8.23	8.19	8.26	8.22	8.32	8.35	8.36	8.37
General Chemistry													
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	101	92.0 J	86.0 J	101	100	92.0	103	94.0 J	104
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.00	3.90	4.10	4.50	4.70	4.90	3.80	4.30	4.40
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	79.6	78.3	77.0	80.7	77.8	79.1	82.1	82.5	80.4

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location					TR01							
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19
Sample ID					WBF-STR-TR01-CC-SUR-20191106	WBF-STR-TR01-CC-MID-20191106	WBF-STR-TR01-CC-BOT-20191106	WBF-STR-TR01-LB-SUR-20191106	WBF-STR-TR01-LB-MID-20191106	WBF-STR-TR01-LB-BOT-20191106	WBF-STR-TR01-RB-SUR-20191106	WBF-STR-TR01-RB-BOT-20191106
Parent Sample ID												
Sample Depth					0.5 ft	1.9 ft	2.8 ft	0.5 ft	1.8 ft	3.1 ft	0.5 ft	2.3 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
Level of Review	Units		Tennessee River (Hardness = 75 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}	<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}	0.505 J	0.603 J	0.491 J	0.498 J	0.462 J	0.538 J	0.596 J	0.551 J
Barium	ug/L	$2{,}000^{A}$	220^{B}	$2{,}000^{C}$	25.6	29.7	30.6	26.8	28.2	27.4	30.0	29.6
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	<0.182	0.292 J	0.201 J	<0.182	0.339 J	0.289 J	0.195 J	0.431 J
Boron	ug/L	$4{,}000^{A}$	$7{,}200^{B}$	$34{,}000^{C}$	<38.6	42.4 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5^{A}	0.628^{B}	1.44^{C}	<0.125	0.141 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	$116{,}000^{B}$	n/v	22,000	21,100	21,100	22,500	22,900	22,500	20,900	20,900
Chromium	ug/L	100^{A}	68.1^{B}	$1{,}425^{C}$	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.118 J	0.167 J	0.138 J	0.211 J	0.165 J	0.131 J	0.117 J	0.0990 J
Copper	ug/L	$1{,}300^{A}$	7.3^{B}	10.7^{C}	1.08 J	1.42 J	0.904 J	1.46 J	1.48 J	1.18 J	0.887 J	1.08 J
Iron	ug/L	n/v	n/v	n/v	83.0	177	203	84.1	81.8	88.2	186	184
Lead	ug/L	5^{A}	2.21^{B}	56.6^{C}	0.154 J	0.177 J	<0.128	0.149 J	0.310 J	0.154 J	<0.128	<0.128
Lithium	ug/L	40^{A}	440^{B}	910^{C}	<3.39	5.40	3.71 J	<3.39	<3.39	<3.39	<3.39	3.57 J
Magnesium	ug/L	n/v	n/v	n/v	6,650	5,850	5,900	6,800	7,030	6,890	5,850	5,880
Manganese	ug/L	n/v	n/v	n/v	46.4	49.2	51.0	47.5	48.2	47.8	47.3	47.6
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
Molybdenum	ug/L	100^{A}	800^{B}	$7{,}200^{C}$	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100^{A}	40.9^{B}	368^{C}	1.30 U*	0.434 U*	0.449 U*	1.15 U*	1.23 U*	1.56 U*	0.447 U*	0.468 U*
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
Silver	ug/L	100^{A}	n/v	2.31^{C}	<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	0.381 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	1.00	1.14	1.01	1.02	1.19	1.25	1.13	1.03
Zinc	ug/L	$2{,}000^{A}$	93.9^{B}	93.9^{C}	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
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
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	0.430 J	0.589 J	0.801 J	0.518 J	0.437 J	0.547 J	0.543 J	0.570 J
Barium	ug/L	$2{,}000^{A}$	n/v	n/v	25.4	27.3	26.2	25.0	26.3	26.2	27.1	27.6
Beryllium	ug/L	4^{A}	n/v	n/v	0.258 J	0.289 J	0.190 J	0.182 J	0.208 J	<0.182	<0.182	<0.182
Boron	ug/L	$4{,}000^{A}$	n/v	n/v	<38.6	41.0 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5^{A}	0.579^{D}	1.38^{E}	<0.125	<0.125	0.170 J	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	22,100	21,400	20,900	22,100	23,000	22,400	21,600	21,200
Chromium	ug/L	100^{A}	58.6^{D}	450^{E}	<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	<0.0750	<0.0750	0.0810 J	<0.0750	0.0910 J	0.109 J	<0.0750	<0.0750
Copper	ug/L	$1{,}300^{A}$	7^{D}	10.2^{E}	0.699 J	2.41	2.19	1.13 J	1.23 J	0.731 J	1.95 J	2.26
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5^{A}	1.84^{D}	47.2^{E}	<0.128	0.288 J	0.203 J	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40^{A}	n/v	n/v	<3.39	5.68	4.23 J	<3.39	<3.39	<3.39	<3.39	3.48 J
Magnesium	ug/L	n/v	n/v	n/v	6,660	5,850	5,670	6,760	7,070	6,790	5,910	5,810
Manganese	ug/L	n/v	n/v	n/v	2.88 J	1.93 J	1.72 J	2.86 J	3.09 J	9.33	5.06	2.69 J
Mercury	ug/L	2^{A}	0.77^{D}	1.4^{E}	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100^{A}	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100^{A}	40.8^{D}	367^{E}	1.15 U*	<0.336	0.391 U*	1.01 U*	1.17 U*	1.11 U*	<0.336	<0.336
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
Silver	ug/L	100^{A}	n/v	1.96^{E}	<0.177	0.268 J	0.211 J	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2^{A}	n/v	n/v	<0.148	0.319 J	0.177 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86^{A}	n/v	n/v	<0.991	<0.991	<0.991	<0.991	1.17	1.13	<0.991	<0.991
Zinc	ug/L	$2{,}000^{A}$	92.6^{D}	91.8^{E}	<3.22	<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	-0.0147 +/-(0.0681)U	0.00158 +/-(0.0742)U	-0.0601 +/-(0.0691)U	-0.0600 +/-(0.0641)U	-0.0621 +/-(0.0653)U	0.0487 +/-(0.0721)U	-0.0703 +/-(0.0640)U	0.0479 +/-(0.0977)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.162 +/-(0.513)U	0.599 +/-(0.340)U*	0.121 +/-(0.347)U	-0.0664 +/-(0.351)U	-0.00454 +/-(0.237)U	0.0458 +/-(0.309)U	0.309 +/-(0.331)U	-0.170 +/-(0.333)U
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	0.000 +/-(0.518)U	0.601 +/-(0.348)U*	0.121 +/-(0.354)U	0.000 +/-(0.357)U	0.000 +/-(0.246)U	0.0944 +/-(0.317)U	0.309 +/-(0.337)U	0.0479 +/-(0.347)U
Anions												
Chloride	mg/L	250^{A}	230^{B}	860^{C}	6.12	6.04	6.09	6.09	30.4	30.3	6.08	6.09
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.0560 J	0.0606 J	0.0612 J	0.0614 J	0.326 J	0.311 J	0.0573 J	0.0535 J
Sulfate	mg/L	250^{A}	n/v	n/v	11.0	11.0	11.2	10.7	56.4	54.8	10.7	10.8
General Chemistry												
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	85.0	98.0	91.0	87.0	82.0	84.0	92.0	90.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.60	5.00	4.80	4.90	5.00	5.00	5.00	5.50
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	82.2	76.8	77.1	84.3	86.1	84.6	76.2	76.5

See notes on last page.

Stantec

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location Sample Date Sample ID Parent Sample ID Sample Depth Sample Type Level of Review	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels Tennessee River (Hardness = 75 mg/L) Chronic	Acute	TR02 9-Jul-19 WBF-STR-TR02-CC-SUR-20190709 0.5 ft Normal Environmental Sample Final-Verified	TR02 9-Jul-19 WBF-STR-TR02-CC-MID-20190709 2.1 ft Normal Environmental Sample Final-Verified	TR02 9-Jul-19 WBF-STR-TR02-CC-BOT-20190709 4.25 ft Normal Environmental Sample Final-Verified	TR02 9-Jul-19 WBF-STR-TR02-LB-SUR-20190709 0.5 ft Normal Environmental Sample Final-Verified	TR02 9-Jul-19 WBF-STR-DUP02-20190709 WBF-STR-TR02-LB-SUR-20190709 0.5 ft Field Duplicate Sample Final-Verified	TR02 9-Jul-19 WBF-STR-TR02-LB-MID-20190709 2.9 ft Normal Environmental Sample Final-Verified	TR02 9-Jul-19 WBF-STR-TR02-LB-BOT-20190709 5.8 ft Normal Environmental Sample 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	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.641 J	0.734 J	0.620 J	0.615 J	0.546 J	0.666 J	0.551 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	28.7	28.7	30.4	29.6	28.3	29.1	30.3
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	<30.3	31.7 J	30.3 UJ	169 J	<30.3	<30.3
Cadmium	ug/L	5[A]	0.628[B]	1.44[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	23,000	23,000	23,900	24,000	22,400	22,800	23,900
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	2.07 U*	2.30 U*	<1.53	<1.53	<1.53	1.76 U*	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.137 J	0.141 J	0.147 J	0.110 J	0.108 J	0.143 J	0.152 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	1.08 J	1.12 J	0.967 J	0.932 J	2.06	1.12 J	0.901 J
Iron	ug/L	n/v	n/v	n/v	158	160	126	97.7	106	189	137
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.179 J	0.177 J	0.175 J	0.141 J	0.143 J	0.152 J	0.184 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.14	<3.14	<3.14	<3.14	4.58 J	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	5,830	5,920	6,110	6,060	5,800	5,790	6,100
Manganese	ug/L	n/v	n/v	n/v	94.5	97.4	101	79.2	72.6	92.1	103
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.398 J	0.388 J	<0.312	<0.312	0.327 J	0.376 J	<0.312
Selenium	ug/L	50[A]	3.1[B]	20[C]	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	2.31[C]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	6[B]	54[C]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	27[B]	79[C]	1.51 U*	1.90 U*	1.10 U*	1.15 U*	1.19 U*	1.37 U*	1.08 U*
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	<3.22	<3.22	<3.22	3.22 UJ	<3.22
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
Arsenic	ug/L	10[A]	150[D]	340[E]	0.588 U*	0.613 U*	0.563 U*	0.507 U*	0.522 U*	0.567 U*	0.498 U*
Barium	ug/L	2,000[A]	n/v	n/v	26.6	28.6	28.3	27.3	27.7	27.4	27.3
Beryllium	ug/L	4[A]	n/v	n/v	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	33.4 J	<30.3	30.3 UJ	144 J	<30.3	<30.3
Cadmium	ug/L	5[A]	0.579[D]	1.38[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	22,700	24,100	23,700	23,200	23,200	23,600	23,300
Chromium	ug/L	100[A]	58.6[D]	450[E]	1.71 U*	1.85 U*	<1.53	<1.53	1.75 U*	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	0.0750 J	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	0.801 U*	0.959 U*	0.826 U*	0.774 U*	2.22 U*	--[2]	0.760 U*
Iron	ug/L	n/v	n/v	n/v	<14.1	27.5 J	<14.1	<14.1	<14.1	<14.1	<14.1
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<0.128	<0.128	<0.128	<0.128	<0.128	1.03	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<3.14	<3.14	<3.14	<3.14	4.19 J	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	5,810	6,100	6,050	5,900	6,010	6,000	5,920
Manganese	ug/L	n/v	n/v	n/v	14.2	15.7	15.7	12.2	11.9	8.36	12.8
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
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	0.333 J	<0.312	<0.312	<0.312	0.322 J	0.331 J	<0.312
Selenium	ug/L	50[A]	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	1.96[E]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	n/v	n/v	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	n/v	n/v	1.38 U*	1.49 U*	0.983 U*	<0.899	1.29 U*	1.05 U*	<0.899
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<3.22	<3.22	<3.22	<3.22	14.8 J	<3.22
Radiological Parameters											
Radium-226	pCi/L	n/v	n/v	n/v	-0.0313 +/-(0.0435)U	0.0455 +/-(0.0666)U	-0.0213 +/-(0.0601)U	0.00470 +/-(0.0518)U	-0.0227 +/-(0.0557)U	-0.0206 +/-(0.0523)U	0.000 +/-(0.0568)U
Radium-228	pCi/L	n/v	n/v	n/v	0.142 +/-(0.239)U	0.0898 +/-(0.228)U	0.115 +/-(0.234)U	0.183 +/-(0.270)U	0.259 +/-(0.288)U	0.357 +/-(0.255)U	0.205 +/-(0.250)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.142 +/-(0.243)U	0.135 +/-(0.238)U	0.115 +/-(0.242)U	0.187 +/-(0.275)U	0.259 +/-(0.293)U	0.357 +/-(0.260)U	0.205 +/-(0.256)U
Anions											
Chloride	mg/L	250[A]	230[B]	860[C]	4.06	4.11	4.10	4.09	4.10	4.09	4.93
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0545 J	0.0598 J	0.0574 J	0.0533 J	0.0584 J	0.0529 J	0.0576 J
Sulfate	mg/L	250[A]	n/v	n/v	8.40	8.46	8.30	8.24	8.32	8.29	13.5
General Chemistry											
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	93.0	97.0	103	92.0	103	129	113
Total Suspended Solids	mg/L	n/v	n/v	n/v	3.90	4.30	3.80	2.80	3.20	4.40	4.90
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	81.5	81.8	84.8	84.8	79.9	80.9	84.8

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location Sample Date Sample ID Parent Sample ID Sample Depth Sample Type Level of Review	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels Tennessee River (Hardness = 75 mg/L) Chronic	Ecological Surface Water Screening Levels Tennessee River (Hardness = 75 mg/L) Acute	TR02 9-Jul-19 WBF-STR-TR02-RB-SUR-20190709 0.5 ft Normal Environmental Sample Final-Verified	TR02 9-Jul-19 WBF-STR-DUP01-20190709 WBF-STR-TR02-RB-SUR-20190709 0.5 ft Field Duplicate Sample Final-Verified	TR02 9-Jul-19 WBF-STR-TR02-RB-MID-20190709 2.05 ft Normal Environmental Sample Final-Verified	TR02 9-Jul-19 WBF-STR-TR02-RB-BOT-20190709 4.1 ft Normal Environmental Sample Final-Verified	TR02 6-Nov-19 WBF-STR-TR02-CC-SUR-20191106 0.5 ft Normal Environmental Sample Final-Verified	TR02 6-Nov-19 WBF-STR-DUP02-20191106 WBF-STR-TR02-CC-SUR-20191106 0.5 ft Field Duplicate Sample Final-Verified	TR02 6-Nov-19 WBF-STR-TR02-CC-MID-20191106 2.1 ft Normal Environmental Sample Final-Verified	TR02 6-Nov-19 WBF-STR-TR02-CC-BOT-20191106 3.8 ft Normal Environmental Sample 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	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.773 J	0.629 J	0.605 J	0.794 J	0.611 J	0.544 J	0.672 J	0.489 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	28.5	30.4	27.9	27.8	27.9	28.5	26.3	27.4
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.155	<0.155	<0.155	<0.155	0.315 J	0.309 J	0.293 J	0.330 J
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.628[B]	1.44[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	22,700	24,400	23,000	22,400	22,300	22,100	20,900	22,700
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	1.85 U*	<1.53	<1.53	1.67 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.174 J	0.133 J	0.135 J	0.124 J	0.216 J	0.192 J	0.148 J	0.147 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	1.04 J	1.33 J	1.12 J	1.11 J	1.12 J	1.32 J	1.22 J	1.05 J
Iron	ug/L	n/v	n/v	n/v	160	140	132	150	76.4	77.7	76.7	73.8
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.184 J	0.173 J	0.170 J	0.175 J	0.142 J	0.138 J	0.151 J	0.133 J
Lithium	ug/L	40[A]	440[B]	910[C]	3.91 J	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	6,000	6,170	5,830	5,760	6,880	6,710	6,320	6,980
Manganese	ug/L	n/v	n/v	n/v	91.6	96.7	91.1	87.2	45.8	45.4	42.4	45.6
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	0.613 J
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.317 J	<0.312	0.366 J	0.386 J	1.14 U*	1.28 U*	1.09 U*	1.07 U*
Selenium	ug/L	50[A]	3.1[B]	20[C]	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	2.31[C]	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148	0.505 J
Vanadium	ug/L	86[A]	27[B]	79[C]	1.83 U*	1.19 U*	1.27 U*	1.67 U*	1.40	1.13	1.01	1.17
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	<3.22	3.48 J	<3.22	<3.22	<3.22	<3.22
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
Arsenic	ug/L	10[A]	150[D]	340[E]	0.591 U*	0.606 U*	0.556 U*	0.648 U*	0.592 J	0.516 J	0.562 J	0.613 J
Barium	ug/L	2,000[A]	n/v	n/v	27.2	28.1	26.7	26.5	25.7	27.2	26.8	26.2
Beryllium	ug/L	4[A]	n/v	n/v	<0.155	<0.155	<0.155	<0.155	0.233 J	0.321 J	0.285 J	0.266 J
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.579[D]	1.38[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	22,700	23,600	23,200	22,900	22,200	21,900	22,100	22,400
Chromium	ug/L	100[A]	58.6[D]	450[E]	<1.53	1.57 U*	1.53 U*	1.97 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	<0.0750	<0.0750	0.0830 J	<0.0750	<0.0750	0.115 J
Copper	ug/L	1,300[A]	7[D]	10.2[E]	1.27 U*	1.53 U*	0.760 U*	0.980 U*	1.01 J	1.03 J	0.927 J	0.818 J
Iron	ug/L	n/v	n/v	n/v	<14.1	17.7 J	<14.1	15.9 J	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.84[D]	47.2[E]	0.131 U*	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	3.38 J	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	6,010	6,000	5,890	5,830	6,910	6,640	6,710	6,900
Manganese	ug/L	n/v	n/v	n/v	9.94	10.1	9.27	12.2	2.94 J	2.69 J	2.63 J	2.73 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.312	<0.312	<0.312	0.341 J	1.14 U*	1.23 U*	1.14 U*	1.42 U*
Selenium	ug/L	50[A]	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.96[E]	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148	0.211 J
Vanadium	ug/L	86[A]	n/v	n/v	1.45 U*	1.18 U*	1.50 U*	1.80 U*	1.06	1.08	1.07	1.15
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	4.90 J	<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	-0.101 +/-(0.0505)U	-0.0451 +/-(0.0664)U	0.0159 +/-(0.0584)U	-0.0435 +/-(0.0692)U	-0.00596 +/-(0.0683)U	-0.0825 +/-(0.0689)U	-0.0443 +/-(0.0754)U	-0.0641 +/-(0.0680)U
Radium-228	pCi/L	n/v	n/v	n/v	0.353 +/-(0.232)	0.241 +/-(0.266)U	0.0692 +/-(0.223)U	0.406 +/-(0.285)U	0.203 +/-(0.250)U	0.483 +/-(0.326)U	-0.00876 +/-(0.264)U	-0.0497 +/-(0.270)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.353 +/-(0.237)J	0.241 +/-(0.274)U	0.0851 +/-(0.231)U	0.406 +/-(0.293)U	0.203 +/-(0.259)U	0.483 +/-(0.333)U	0.000 +/-(0.275)U	0.000 +/-(0.278)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	4.03	4.08	4.02	3.99	6.32	6.09	6.39	6.25
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0530 J	0.0569 J	0.0575 J	0.0546 J	0.0714 J	0.0553 J	0.0697 J	0.0676 J
Sulfate	mg/L	250[A]	n/v	n/v	8.29	8.40	8.18	8.17	10.9	10.6	10.8	10.6
General Chemistry												
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	92.0 J	116 J	86.0	98.0	106	91.0	85.0	101
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.30 J	3.20 J	4.00	4.30	4.90	4.30	4.60	4.60
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	81.3	86.5	81.6	79.6	84.0	82.7	78.1	85.5

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location Sample Date Sample ID Parent Sample ID Sample Depth Sample Type Level of Review	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels Tennessee River (Hardness = 75 mg/L) Chronic	Acute	TR02 6-Nov-19 WBF-STR-TR02-LB-SUR-20191106 0.5 ft Normal Environmental Sample Final-Verified	TR02 6-Nov-19 WBF-STR-TR02-LB-MID-20191106 2.6 ft Normal Environmental Sample Final-Verified	TR02 6-Nov-19 WBF-STR-TR02-LB-BOT-20191106 4.7 ft Normal Environmental Sample Final-Verified	TR02 6-Nov-19 WBF-STR-TR02-RB-SUR-20191106 0.5 ft Normal Environmental Sample Final-Verified	TR02 6-Nov-19 WBF-STR-TR02-RB-BOT-20191106 1.5 ft Normal Environmental Sample Final-Verified	TR03 9-Jul-19 WBF-STR-TR03-CC-SUR-20190709 0.5 ft Normal Environmental Sample Final-Verified	TR03 9-Jul-19 WBF-STR-TR03-CC-MID-20190709 2.9 ft Normal Environmental Sample Final-Verified	TR03 9-Jul-19 WBF-STR-TR03-CC-BOT-20190709 5.8 ft Normal Environmental Sample 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	<0.378	<0.378
Arsenic	ug/L	10^{A}	150^{B}	340^{C}	0.921 J	0.587 J	0.737 J	0.717 J	0.669 J	0.533 J	0.608 J	0.654 J
Barium	ug/L	$2,000^{A}$	220^{B}	$2,000^{C}$	26.9	27.6	29.5	28.6	28.2	27.2	28.9	28.1
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	0.300 J	0.267 J	0.281 J	<0.182	0.277 J	<0.155	<0.155	<0.155
Boron	ug/L	$4,000^{A}$	$7,200^{B}$	$34,000^{C}$	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5^{A}	0.628^{B}	1.44^{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	21,800	22,000	22,300	22,700	22,000	21,800	22,400	22,400
Chromium	ug/L	100^{A}	68.1^{B}	$1,425^{C}$	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	1.67 U*	2.29 U*
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.210 J	0.146 J	0.206 J	0.118 J	0.233 J	0.148 J	0.137 J	0.150 J
Copper	ug/L	$1,300^{A}$	7.3^{B}	10.7^{C}	1.24 J	0.978 J	1.05 J	0.741 J	1.19 J	1.13 J	1.19 J	1.20 J
Iron	ug/L	n/v	n/v	n/v	78.3	76.8	139	154	85.5	176	161	169
Lead	ug/L	5^{A}	2.21^{B}	56.6^{C}	0.202 J	0.162 J	0.160 J	0.155 J	0.156 J	0.180 J	0.375 J	0.240 J
Lithium	ug/L	40^{A}	440^{B}	910^{C}	<3.39	<3.39	<3.39	3.84 J	<3.39	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	6,770	6,700	6,830	6,940	6,830	5,630	5,760	5,750
Manganese	ug/L	n/v	n/v	n/v	47.6	48.1	49.6	45.3	46.0	90.6	92.1	94.2
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
Molybdenum	ug/L	100^{A}	800^{B}	$7,200^{C}$	<0.610	<0.610	<0.610	<0.610	0.659 J	<0.610	<0.610	<0.610
Nickel	ug/L	100^{A}	40.9^{B}	368^{C}	1.45 U*	1.18 U*	1.23 U*	0.599 U*	1.18 U*	0.458 J	0.348 J	0.543 J
Selenium	ug/L	50^{A}	3.1^{B}	20^{C}	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100^{A}	n/v	2.31^{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	0.451 J	<0.128	<0.128	<0.128
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	1.38	1.10	1.38	1.38	1.22	1.36 U*	1.57 U*	1.71 U*
Zinc	ug/L	$2,000^{A}$	93.9^{B}	93.9^{C}	3.64 J	<3.22	<3.22	<3.22	<3.22	3.37 J	3.41 J	7.23
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
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	0.451 J	0.587 J	0.534 J	0.450 J	0.645 J	0.581 U*	0.606 U*	0.512 U*
Barium	ug/L	$2,000^{A}$	n/v	n/v	26.0	26.9	26.4	25.2	26.3	26.3	24.1	26.6
Beryllium	ug/L	4^{A}	n/v	n/v	0.209 J	0.194 J	0.230 J	<0.182	0.259 J	<0.155	<0.155	<0.155
Boron	ug/L	$4,000^{A}$	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5^{A}	0.579^{D}	1.38^{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	22,200	22,100	21,800	22,200	22,400	22,800	20,700	23,200
Chromium	ug/L	100^{A}	58.6^{D}	450^{E}	<1.53	<1.53	<1.53	<1.53	<1.53	1.88 U*	2.47 U*	<1.53
Cobalt	ug/L	6^{A}	n/v	n/v	0.0960 J	<0.0750	0.0940 J	<0.0750	0.100 J	<0.0750	<0.0750	<0.0750
Copper	ug/L	$1,300^{A}$	7^{D}	10.2^{E}	1.28 J	<0.627	1.00 J	0.952 J	0.881 J	1.09 U*	0.961 U*	0.897 U*
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	18.4 J	<14.1	<14.1
Lead	ug/L	5^{A}	1.84^{D}	47.2^{E}	<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	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	6,880	6,700	6,570	6,780	6,900	5,830	5,350	5,950
Manganese	ug/L	n/v	n/v	n/v	3.41 J	3.10 J	3.25 J	3.90 J	4.27 J	9.98	8.71	10.3
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
Molybdenum	ug/L	100^{A}	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100^{A}	40.8^{D}	367^{E}	1.12 U*	0.944 U*	0.919 U*	1.05 U*	1.12 U*	0.343 J	<0.312	<0.312
Selenium	ug/L	50^{A}	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100^{A}	n/v	1.96^{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	0.209 J	<0.128	<0.128	<0.128
Vanadium	ug/L	86^{A}	n/v	n/v	1.08	<0.991	<0.991	1.16	1.21	1.60 U*	1.88 U*	1.11 U*
Zinc	ug/L	$2,000^{A}$	92.6^{D}	91.8^{E}	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	4.46 J
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	0.0343 +/-(0.0845)U	-0.0288 +/-(0.0737)U	-0.0117 +/-(0.0749)U	0.0490 +/-(0.0633)U	-0.0429 +/-(0.0513)U	0.0319 +/-(0.0418)U	-0.00627 +/-(0.0295)U	0.0379 +/-(0.0404)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.131 +/-(0.243)U	0.171 +/-(0.328)U	-0.326 +/-(0.319)U	0.641 +/-(0.351)	-0.0626 +/-(0.266)U	0.278 +/-(0.245)U	0.315 +/-(0.265)U	-0.0474 +/-(0.242)U
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	0.0343 +/-(0.257)U	0.171 +/-(0.336)U	0.000 +/-(0.328)U	0.690 +/-(0.357)J	0.000 +/-(0.271)U	0.310 +/-(0.249)U	0.315 +/-(0.267)U	0.0379 +/-(0.245)U
Anions												
Chloride	mg/L	250^{A}	230^{B}	860^{C}	5.83	6.10	6.08	6.14	6.37	4.02	4.10	4.08
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.0516 J	0.0552 J	0.0569 J	0.0784 J	0.0795 J	0.0554 J	0.0538 J	0.0569 J
Sulfate	mg/L	250^{A}	n/v	n/v	10.3	11.0	10.9	10.5	11.2	8.20	8.38	8.27
General Chemistry												
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	96.0	97.0	93.0	85.0	87.0	100	94.0	94.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.40	4.90	5.30	4.50	4.50	4.10	4.60	4.70
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	82.2	82.6	83.8	85.2	83.2	77.7	79.7	79.6

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location					TR03								
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		9-Jul-19	9-Jul-19	9-Jul-19	9-Jul-19	9-Jul-19	9-Jul-19	6-Nov-19	6-Nov-19	6-Nov-19
Sample ID					WBF-STR-TR03-LB-SUR-20190709	WBF-STR-TR03-LB-MID-20190709	WBF-STR-TR03-LB-BOT-20190709	WBF-STR-TR03-RB-SUR-20190709	WBF-STR-TR03-RB-MID-20190709	WBF-STR-TR03-RB-BOT-20190709	WBF-STR-TR03-CC-SUR-20191106	WBF-STR-TR03-CC-MID-20191106	WBF-STR-TR03-CC-BOT-20191106
Parent Sample ID													
Sample Depth					0.5 ft	1.9 ft	3.75 ft	0.5 ft	2.05 ft	4.1 ft	0.5 ft	2 ft	3.5 ft
Sample Type			Tennessee River (Hardness = 75 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}	<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}	0.553 J	0.715 J	0.637 J	0.727 J	0.758 J	0.697 J	0.565 J	0.514 J	0.539 J
Barium	ug/L	$2,000^{A}$	220^{B}	$2,000^{C}$	27.7	28.0	28.3	29.0	29.3	29.1	26.8	26.0	28.5
Beryllium	ug/L	4^{A}	11^{B}	93^{C}	<0.155	<0.155	<0.155	0.218 J	<0.155	<0.155	0.300 J	0.238 J	0.270 J
Boron	ug/L	$4,000^{A}$	$7,200^{B}$	$34,000^{C}$	37.7 J	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	ug/L	5^{A}	0.628^{B}	1.44^{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	23,100	23,000	22,700	22,900	23,300	22,900	23,000	22,100	22,300
Chromium	ug/L	100^{A}	68.1^{B}	$1,425^{C}$	<1.53	2.15 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6^{A}	19^{B}	120^{C}	0.131 J	0.136 J	0.153 J	0.172 J	0.171 J	0.161 J	0.172 J	0.100 J	0.170 J
Copper	ug/L	$1,300^{A}$	7.3^{B}	10.7^{C}	1.21 J	1.73 J	1.09 J	1.47 J	1.31 J	1.06 J	1.25 J	1.09 J	1.18 J
Iron	ug/L	n/v	n/v	n/v	133	145	172	133	156	154	87.6	73.4	69.1
Lead	ug/L	5^{A}	2.21^{B}	56.6^{C}	0.334 J	0.173 J	0.311 J	0.176 J	0.159 J	0.163 J	0.133 J	0.140 J	0.135 J
Lithium	ug/L	40^{A}	440^{B}	910^{C}	3.43 J	4.78 J	<3.14	4.41 J	3.53 J	3.33 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,870	5,890	5,770	6,000	6,190	5,940	7,120	6,650	6,910
Manganese	ug/L	n/v	n/v	n/v	93.2	95.1	96.6	78.1	85.2	85.7	46.3	45.0	44.9
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	<0.610	<0.610	<0.610
Nickel	ug/L	100^{A}	40.9^{B}	368^{C}	<0.312	<0.312	0.609 J	<0.312	<0.312	<0.312	1.26 U*	0.913 U*	1.53 U*
Selenium	ug/L	50^{A}	3.1^{B}	20^{C}	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	2.31^{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}	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.160 J	<0.148	<0.148
Vanadium	ug/L	86^{A}	27^{B}	79^{C}	1.05 U*	1.79 U*	1.56 U*	1.65 U*	1.56 U*	1.56 U*	1.33	1.06	1.45
Zinc	ug/L	$2,000^{A}$	93.9^{B}	93.9^{C}	<3.22	4.44 J	6.66	3.77 J	3.33 J	<3.22	<3.22	<3.22	<3.22
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	<0.378
Arsenic	ug/L	10^{A}	150^{D}	340^{E}	0.573 U*	0.631 U*	0.539 U*	0.768 U*	0.709 U*	0.708 U*	0.563 J	0.433 J	0.471 J
Barium	ug/L	$2,000^{A}$	n/v	n/v	26.5	26.9	25.1	29.6	26.8	26.4	25.3	24.6	25.8
Beryllium	ug/L	4^{A}	n/v	n/v	<0.155	<0.155	<0.155	0.170 U*	<0.155	<0.155	0.321 J	0.291 J	0.303 J
Boron	ug/L	$4,000^{A}$	n/v	n/v	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	ug/L	5^{A}	0.579^{D}	1.38^{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	23,100	23,200	21,900	24,800	23,000	23,000	22,100	22,000	22,200
Chromium	ug/L	100^{A}	58.6^{D}	450^{E}	<1.53	1.72 U*	<1.53	1.83 U*	1.55 U*	1.84 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	6^{A}	n/v	n/v	<0.0750	<0.0750	<0.0750	0.0960 J	0.0870 J	0.0900 J	0.143 J	<0.0750	0.0930 J
Copper	ug/L	$1,300^{A}$	7^{D}	10.2^{E}	1.44 U*	1.39 U*	0.985 U*	1.30 U*	0.913 U*	1.30 U*	1.17 J	0.873 J	0.930 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}	1.84^{D}	47.2^{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	3.15 J	<3.14	<3.14	5.20	4.17 J	4.27 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,900	5,950	5,640	6,520	6,110	5,980	6,860	6,740	6,950
Manganese	ug/L	n/v	n/v	n/v	9.99	6.43	7.71	6.73	5.81	5.94	7.25	3.35 J	3.21 J
Mercury	ug/L	2^{A}	0.77^{D}	1.4^{E}	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<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	<0.610	<0.610	<0.610
Nickel	ug/L	100^{A}	40.8^{D}	367^{E}	<0.312	<0.312	0.431 J	<0.312	<0.312	<0.312	1.38 U*	1.64 U*	1.31 U*
Selenium	ug/L	50^{A}	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100^{A}	n/v	1.96^{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	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	ug/L	86^{A}	n/v	n/v	0.961 U*	1.31 U*	1.25 U*	1.85 U*	1.54 U*	1.70 U*	1.47	1.32	1.35
Zinc	ug/L	$2,000^{A}$	92.6^{D}	91.8^{E}	<3.22	<3.22	<3.22	<3.22	5.65	<3.22	<3.22	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.00146 +/-(0.0553)U	0.0497 +/-(0.0704)U	-0.000764 +/-(0.0532)U	0.0462 +/-(0.0438)U	0.0554 +/-(0.0662)U	0.0480 +/-(0.0656)U	-0.0677 +/-(0.0652)U	-0.0315 +/-(0.0831)U	0.00247 +/-(0.0791)U
Radium-228	pCi/L	n/v	n/v	n/v	0.115 +/-(0.213)U	0.139 +/-(0.238)U	0.263 +/-(0.259)U	0.143 +/-(0.231)U	0.0926 +/-(0.237)U	0.0606 +/-(0.221)U	0.328 +/-(0.397)U	0.228 +/-(0.456)U	0.231 +/-(0.317)U
Radium-226+228	pCi/L	5^{A}	3^{B}	3^{C}	0.117 +/-(0.220)U	0.188 +/-(0.248)U	0.263 +/-(0.264)U	0.189 +/-(0.235)U	0.148 +/-(0.246)U	0.109 +/-(0.231)U	0.328 +/-(0.402)U	0.228 +/-(0.464)U	0.234 +/-(0.327)U
Anions													
Chloride	mg/L	250^{A}	230^{B}	860^{C}	4.09	4.08	4.07	4.21	4.11	4.09	6.45	6.29	6.62
Fluoride	mg/L	4.0^{A}	2.7^{B}	9.8^{C}	0.0565 J	0.0605 J	0.0568 J	0.0584 J	0.0535 J	0.0562 J	0.0739 J	0.0729 J	0.0739 J
Sulfate	mg/L	250^{A}	n/v	n/v	8.43	8.45	8.33	8.62	8.44	8.29	11.0	10.7	11.1
General Chemistry													
Total Dissolved Solids	mg/L	500^{A}	n/v	n/v	103	95.0	96.0	113	110	104	123	120	94.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.20	4.40	4.60	4.20	4.60	4.20	4.30	4.50	4.50
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	81.8	81.7	80.4	81.9	83.8	81.6	86.7	82.5	84.1

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location					TR03						TR04		
Sample Date					6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	9-Jul-19	9-Jul-19	9-Jul-19
Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		WBF-STR-TR03-LB-SUR-20191106	WBF-STR-TR03-LB-MID-20191106	WBF-STR-TR03-LB-BOT-20191106	WBF-STR-TR03-RB-SUR-20191106	WBF-STR-TR03-RB-MID-20191106	WBF-STR-TR03-RB-BOT-20191106	WBF-STR-TR04-CC-SUR-20190709	WBF-STR-TR04-CC-MID-20190709	WBF-STR-TR04-CC-BOT-20190709
Parent Sample ID													
Sample Depth					0.5 ft	2 ft	3.5 ft	0.5 ft	2 ft	3 ft	0.5 ft	2 ft	4 ft
Sample Type			Tennessee River (Hardness = 75 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]	<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]	0.589 J	0.713 J	0.739 J	0.612 J	0.754 J	0.621 J	0.724 J	0.556 J	0.579 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	28.5	27.5	28.4	27.3	27.0	28.1	25.9	24.8	26.1
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	0.241 J	0.281 J	0.234 J	0.170 J	<0.155	<0.155
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]	0.628[B]	1.44[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	22,900	23,100	22,400	23,300	23,100	23,400	23,200	22,200	23,400
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	1.72 U*	1.75 U*	1.75 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.105 J	0.120 J	0.175 J	0.217 J	0.153 J	0.103 J	0.217 J	0.135 J	0.142 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	0.770 J	0.795 J	0.657 J	1.22 J	1.51 J	1.15 J	1.18 J	1.15 J	1.12 J
Iron	ug/L	n/v	n/v	n/v	153	86.3	137	99.6	76.9	74.6	172	142	159
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.148 J	<0.128	0.152 J	0.164 J	0.162 J	0.227 J	0.271 J	0.189 J	0.154 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	3.79 J	<3.39	<3.39	<3.39	3.18 J	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	7,080	7,140	6,820	7,300	7,260	7,170	5,080	4,880	5,170
Manganese	ug/L	n/v	n/v	n/v	49.3	49.1	49.6	42.6	41.3	41.5	91.6	87.3	93.6
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	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.664 U*	1.02 U*	0.680 U*	1.78 U*	1.86 U*	1.02 U*	0.516 J	0.408 J	0.452 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	2.31[C]	<0.177	<0.177	0.270 J	<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	0.221 J	<0.128	<0.128
Vanadium	ug/L	86[A]	27[B]	79[C]	1.49	1.29	1.33	1.68	1.61	1.42	1.61	1.55	1.56
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	<3.22	6.57	7.38	5.80	<3.22	3.47 J	<3.22
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	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.502 J	0.603 J	0.651 J	0.687 J	0.518 J	0.376 J	0.488 J	0.447 J	0.419 J
Barium	ug/L	2,000[A]	n/v	n/v	24.0	25.6	25.6	25.5	26.4	28.4	25.2	23.8	24.3
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	0.263 J	0.239 J	0.229 J	<0.182	<0.155	<0.155	<0.155
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]	0.579[D]	1.38[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	22,900	22,600	23,100	23,200	23,200	22,700	23,400	22,900	23,200
Chromium	ug/L	100[A]	58.6[D]	450[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	<0.0750	<0.0750	0.120 J	0.136 J	<0.0750	0.119 J	0.0870 J	<0.0750	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	<0.627	<0.627	0.912 J	1.07 J	1.01 J	0.908 J	0.906 J	0.902 J	0.727 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	23.4 J	42.9 J	<14.1	<14.1
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<0.128	<0.128	<0.128	<0.128	<0.128	0.184 J	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	3.48 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	7,040	7,000	7,170	7,150	7,170	6,920	5,150	4,970	5,060
Manganese	ug/L	n/v	n/v	n/v	2.07 J	1.93 J	4.47 J	3.46 J	3.12 J	25.5	37.4	10.4	10.3
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	0.703 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	0.824 U*	0.762 U*	1.11 U*	1.25 U*	1.40 U*	1.23 U*	<0.312	0.339 J	<0.312
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	1.96[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	0.457 J	<0.148	<0.148	<0.148	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	n/v	n/v	1.01	1.04	1.28	1.15	1.02	1.15	1.22	0.917 J	0.976 J
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<3.22	<3.22	<3.22	<3.22	4.51 J	<3.22	4.73 J	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.0125 +/-(0.0914)U	-0.00830 +/-(0.0635)U	-0.0728 +/-(0.0627)U	0.0267 +/-(0.0515)U	-0.0638 +/-(0.0576)U	-0.0471 +/-(0.0721)U	0.0829 +/-(0.0791)U	-0.0677 +/-(0.0503)U	0.0529 +/-(0.0557)U
Radium-228	pCi/L	n/v	n/v	n/v	0.355 +/-(0.344)U	-0.0593 +/-(0.294)U	-0.217 +/-(0.430)U	0.169 +/-(0.335)U	0.220 +/-(0.296)U	0.299 +/-(0.281)U	0.279 +/-(0.288)U	0.260 +/-(0.256)U	0.267 +/-(0.245)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.368 +/-(0.356)U	0.000 +/-(0.301)U	0.000 +/-(0.435)U	0.196 +/-(0.339)U	0.220 +/-(0.302)U	0.299 +/-(0.290)U	0.362 +/-(0.299)U	0.260 +/-(0.261)U	0.320 +/-(0.251)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	6.13	6.09	6.21	6.60	6.56	6.61	4.15	4.05	4.03
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0632 J	0.0690 J	0.0652 J	0.0824 J	0.0681 J	0.0670 J	0.0563 J	0.0566 J	0.0582 J
Sulfate	mg/L	250[A]	n/v	n/v	10.3	10.3	10.7	11.8	11.3	11.1	8.93	8.30	8.23
General Chemistry													
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	94.0	88.0	121	96.0	91.0	95.0	102	94.0	101
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.30	4.50	5.00	5.10	5.00	4.80	4.40	4.90	5.50
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	86.3	87.2	84.1	88.2	87.5	88.0	78.9	75.5	79.7

See notes on last page.

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Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location					TR04							
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		9-Jul-19	9-Jul-19	9-Jul-19	9-Jul-19	9-Jul-19	6-Nov-19	6-Nov-19	6-Nov-19
Sample ID					WBF-STR-TR04-LB-SUR-20190709	WBF-STR-TR04-LB-MID-20190709	WBF-STR-TR04-LB-BOT-20190709	WBF-STR-TR04-RB-SUR-20190709	WBF-STR-TR04-RB-BOT-20190709	WBF-STR-TR04-CC-SUR-20191106	WBF-STR-TR04-CC-MID-20191106	WBF-STR-TR04-CC-BOT-20191106
Parent Sample ID												
Sample Depth					0.5 ft	2 ft	4 ft	0.5 ft	1.5 ft	0.5 ft	2.5 ft	4.5 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		Tennessee River (Hardness = 75 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	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.551 J	0.610 J	0.589 J	0.530 J	0.530 J	0.762 J	0.682 J	0.769 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	25.8	46.6	28.6	27.5	27.1	28.3	29.4	28.9
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	123	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.628[B]	1.44[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	22,500	23,000	23,000	24,300	24,500	20,600	21,500	20,900
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	<1.53	1.73 U*	<1.53	1.81 U*	11.9	2.24	1.94 J	1.99 J
Cobalt	ug/L	6[A]	19[B]	120[C]	0.118 J	0.133 J	0.173 J	0.129 J	0.122 J	0.142 J	0.156 J	0.141 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	0.974 J	2.45	1.03 J	1.22 J	1.53 J	0.995 J	0.976 J	1.00 J
Iron	ug/L	n/v	n/v	n/v	140	185	189	133	215	171	179	183
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.153 J	0.188 J	0.185 J	0.139 J	0.172 J	0.181 J	0.202 J	0.172 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.14	4.06 J	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,060	5,970	5,920	5,120	5,200	5,880	6,160	5,940
Manganese	ug/L	n/v	n/v	n/v	86.1	91.2	99.7	81.2	88.6	43.8	46.3	44.6
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.382 J	0.495 J	0.387 U*	0.408 J	0.620 J	0.414 J	0.524 J	0.405 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	2.31[C]	<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]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.36	1.47	1.38	1.52	1.57	1.63	1.59	1.57
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	3.65 J	3.84 J	<3.22	<3.22	<3.22	<3.22	7.89
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
Arsenic	ug/L	10[A]	150[D]	340[E]	0.441 J	0.498 J	0.543 J	0.463 J	0.448 J	0.630 J	0.657 J	0.681 J
Barium	ug/L	2,000[A]	n/v	n/v	24.1	29.3	25.3	24.9	24.4	25.7	26.4	26.4
Beryllium	ug/L	4[A]	n/v	n/v	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	81.2	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.579[D]	1.38[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	22,900	23,200	22,700	24,500	24,000	20,700	21,200	21,100
Chromium	ug/L	100[A]	58.6[D]	450[E]	<1.53	1.73 U*	1.64 U*	5.20 U*	1.58 U*	1.78 J	2.10	2.06
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	0.706 J	2.20	0.796 J	1.02 J	0.808 J	0.704 U*	0.796 U*	0.750 U*
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	<14.1	31.1 J	<14.1	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<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	<3.14	3.49 J	3.55 J	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,030	6,020	5,760	5,100	5,050	5,930	6,090	6,060
Manganese	ug/L	n/v	n/v	n/v	7.99	8.53	10.8	9.25	6.50	1.91 J	<1.35	<1.35
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
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.312	0.383 J	<0.312	0.399 J	<0.312	<0.336	<0.336	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.96[E]	<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	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	<0.899	1.24	1.32	1.20	1.10	1.29	1.44	1.45
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<3.22	3.59 J	<3.22	<3.22	<3.22	<3.22	<3.22
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	0.0817 +/-(0.0664)U	-0.0569 +/-(0.0372)U	-0.0159 +/-(0.0639)U	0.0731 +/-(0.0618)U	0.0517 +/-(0.0732)U	0.0273 +/-(0.0878)U	-0.0348 +/-(0.0651)U	-0.0651 +/-(0.0627)U
Radium-228	pCi/L	n/v	n/v	n/v	0.304 +/-(0.244)U	0.455 +/-(0.345)U	0.529 +/-(0.301)	0.0317 +/-(0.308)U	0.465 +/-(0.293)	0.214 +/-(0.329)U	0.403 +/-(0.360)U	0.0209 +/-(0.275)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.385 +/-(0.253)U	0.455 +/-(0.347)U	0.529 +/-(0.308)J	0.105 +/-(0.314)U	0.517 +/-(0.302)J	0.242 +/-(0.341)U	0.403 +/-(0.366)U	0.0209 +/-(0.282)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	4.06	4.03	3.98	4.10	4.10	6.40	6.39	6.30
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0592 J	0.0539 J	0.0524 J	0.0573 J	0.0551 J	0.0602 J	0.0621 J	0.0586 J
Sulfate	mg/L	250[A]	n/v	n/v	8.32	8.33	8.16	8.52	8.48	11.3	11.3	11.1
General Chemistry												
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	107	98.0	100	95.0	109	111	118	116
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.40	4.60	4.60	3.70	4.70	4.60	4.00	4.90
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	77.1	82.0	82.9	81.8	82.7	75.8	79.1	76.7

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		TR04					TR05		
Sample Date					6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	10-Jul-19	10-Jul-19	10-Jul-19
Sample ID					WBF-STR-TR04-LB-SUR-20191106	WBF-STR-DUP01-20191106	WBF-STR-TR04-LB-BOT-20191106	WBF-STR-TR04-RB-MID-20191106	WBF-STR-DUP03-20191106	WBF-STR-TR05-CC-SUR-20190710	WBF-STR-TR05-CC-MID-20190710	WBF-STR-TR05-CC-BOT-20190710
Parent Sample ID						WBF-STR-TR04-LB-SUR-20191106			WBF-STR-TR04-RB-MID-20191106			
Sample Depth					0.5 ft	0.5 ft	2.9 ft	1 ft	1 ft	0.5 ft	3 ft	6 ft
Sample Type			Tennessee River (Hardness = 75 mg/L)		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review			Chronic	Acute	Validated	Validated	Validated	Validated	Validated	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	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.752 J	0.905 J	0.750 J	0.755 J	0.775 J	0.491 J	0.553 J	0.542 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	29.5	29.6	29.4	30.2	30.1	28.4	28.6	28.4
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	0.229 U*	<0.182	<0.182	<0.182	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	49.0 J	<38.6	<38.6	<38.6	116	55.9 J	48.2 J
Cadmium	ug/L	5[A]	0.628[B]	1.44[C]	<0.125	0.132 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	21,200	21,300	21,200	22,000	21,700	21,300	21,200	21,300
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	2.29	2.44	2.24	2.46	2.17	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.157 J	0.213 J	0.144 J	0.163 J	0.194 J	0.196 J	0.132 J	0.142 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	0.973 J	1.14 J	1.06 J	1.32 J	1.17 J	1.06 J	0.914 J	0.829 J
Iron	ug/L	n/v	n/v	n/v	200	183	190	221	235	108	139	156
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.222 J	0.319 J	0.210 J	0.229 J	0.299 J	0.135 J	0.141 J	0.150 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	6,070	6,080	5,960	6,270	6,130	6,050	6,090	6,070
Manganese	ug/L	n/v	n/v	n/v	48.4	47.0	48.0	50.3	49.3	79.1	92.4	96.4
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.368 J	0.510 J	0.392 J	0.449 J	0.483 J	<0.312	0.324 J	0.329 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	2.31[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	0.301 U*	<0.148	<0.148	<0.148	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	27[B]	79[C]	1.83	1.72	1.64	1.82	1.50	0.955 U*	1.23 U*	1.28 U*
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	<3.22	9.55	6.51	<3.22	<3.22	<3.22
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
Arsenic	ug/L	10[A]	150[D]	340[E]	0.614 J	0.700 J	0.701 J	0.844 J	0.748 J	0.504 J	0.483 J	0.569 J
Barium	ug/L	2,000[A]	n/v	n/v	26.4	26.4	25.8	27.9	27.5	25.9	27.0	28.2
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<38.6	47.3 J	<38.6	60.8 J	51.2 J	45.6 J
Cadmium	ug/L	5[A]	0.579[D]	1.38[E]	<0.125	<0.125	<0.125	0.130 J	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	21,400	21,000	20,600	22,400	21,800	20,500	20,800	21,300
Chromium	ug/L	100[A]	58.6[D]	450[E]	1.67 J	2.27	2.14	1.97 J	2.12	1.72 U*	<1.53	2.09 U*
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	0.0840 J	<0.0750	0.137 J	0.0760 J	<0.0750	0.0850 J	0.104 J
Copper	ug/L	1,300[A]	7[D]	10.2[E]	0.722 U*	0.857 U*	0.776 U*	1.46 U*	0.837 U*	0.744 J	<0.627	0.754 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<14.1	45.9 J	77.1
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<0.128	<0.128	<0.128	0.155 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	<3.39	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	6,080	6,040	5,870	6,310	6,240	5,940	6,050	6,060
Manganese	ug/L	n/v	n/v	n/v	1.73 J	2.46 J	1.75 J	4.31 J	4.07 J	4.93 J	39.8	55.3
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
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.336	<0.336	<0.336	0.377 J	<0.336	<0.312	<0.312	<0.312
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	1.96[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	0.155 U*	<0.148	0.280 U*	<0.148	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	n/v	n/v	1.34	1.36	1.45	1.30	1.40	1.01	1.02	1.46
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<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	-0.123 +/-(0.111)U	-0.0445 +/-(0.0647)U	0.0221 +/-(0.0960)U	-0.0358 +/-(0.0716)U	0.00469 +/-(0.0769)U	-0.0148 +/-(0.0594)UJ	0.0551 +/-(0.0807)UJ	0.0473 +/-(0.0683)UJ
Radium-228	pCi/L	n/v	n/v	n/v	-0.302 +/-(0.538)U	0.434 +/-(0.288)U	0.249 +/-(0.388)U	0.381 +/-(0.324)U	0.167 +/-(0.301)U	0.00650 +/-(0.238)U	0.343 +/-(0.303)U	0.290 +/-(0.266)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.000 +/-(0.549)U	0.434 +/-(0.295)U	0.271 +/-(0.400)U	0.381 +/-(0.332)U	0.172 +/-(0.311)U	0.00650 +/-(0.245)UJ	0.398 +/-(0.314)UJ	0.338 +/-(0.275)UJ
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	6.34	6.40	6.33	6.48	6.53	4.14	4.10	4.09
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0611 J	0.0529 J	0.0606 J	0.0618 J	0.0585 J	0.0553 J	0.0594 J	0.0553 J
Sulfate	mg/L	250[A]	n/v	n/v	11.3	11.2	11.0	11.5	11.6	8.32	8.18	8.19
General Chemistry												
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	137 J	112	93.0	103	105	100	98.0	106
Total Suspended Solids	mg/L	n/v	n/v	n/v	5.00	5.10	4.60	5.90	6.20	3.50	4.20	4.10
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	77.9	78.2	77.5	80.8	79.3	78.1	78.1	78.1

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		TR05							
Sample Date					10-Jul-19	10-Jul-19	10-Jul-19	10-Jul-19	10-Jul-19	6-Nov-19	6-Nov-19	6-Nov-19
Sample ID					WBF-STR-TR05-LB-SUR-20190710	WBF-STR-TR05-LB-MID-20190710	WBF-STR-TR05-LB-BOT-20190710	WBF-STR-TR05-RB-SUR-20190710	WBF-STR-DUP01-20190710	WBF-STR-TR05-CC-SUR-20191106	WBF-STR-TR05-CC-MID-20191106	WBF-STR-TR05-CC-BOT-20191106
Parent Sample ID									WBF-STR-TR05-RB-SUR-20190710			
Sample Depth					0.5 ft	2.1 ft	3.8 ft	0.6 ft	0.6 ft	0.5 ft	2.5 ft	4.9 ft
Sample Type			Tennessee River (Hardness = 75 mg/L)		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			Chronic	Acute	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated
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
Arsenic	ug/L	10[A]	150[B]	340[C]	0.625 J	0.786 J	0.621 J	0.759 J	0.563 J	0.639 J	0.603 J	0.927 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	28.8	29.5	28.3	29.1	27.5	27.0	27.3	29.6
Beryllium	ug/L	4[A]	11[B]	93[C]	0.162 U*	<0.155	<0.155	0.368 J	<0.155	0.320 U*	0.261 U*	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	168	<30.3	<30.3	34.5 J	<30.3	<38.6	<38.6	68.4 J
Cadmium	ug/L	5[A]	0.628[B]	1.44[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	23,600	22,900	22,700	23,100	21,800	23,200	23,200	21,700
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	<1.53	2.98 U*	1.67 U*	<1.53	<1.53	<1.53	<1.53	2.68
Cobalt	ug/L	6[A]	19[B]	120[C]	0.142 J	0.138 J	0.142 J	0.198 J	0.133 J	0.164 J	0.151 J	0.151 U*
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	1.10 J	1.26 J	1.01 J	1.08 J	1.38 J	1.17 J	1.35 J	1.48 U*
Iron	ug/L	n/v	n/v	n/v	126	162	152	141	157	81.9	80.0	122
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.210 J	0.190 J	0.188 J	0.213 J	0.319 J	<0.128	0.132 J	0.218 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<3.14	3.46 J	<3.14	4.89 J	<3.14	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,990	5,850	5,760	6,020	5,560	7,060	7,100	6,100
Manganese	ug/L	n/v	n/v	n/v	86.7	88.6	84.9	76.7	73.4	47.6	47.4	48.3
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	<0.312	0.323 J	<0.312	<0.312	0.316 J	1.41 U*	1.80 U*	0.419 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	2.31[C]	<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]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.08 U*	2.24 U*	1.48 U*	1.42 U*	1.45 U*	1.16	1.50	2.40
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	3.78 J	<3.22	<3.22	<3.22	<3.22	<3.22
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
Arsenic	ug/L	10[A]	150[D]	340[E]	0.504 J	0.563 J	0.610 J	0.703 J	0.549 J	0.626 J	0.575 J	0.734 J
Barium	ug/L	2,000[A]	n/v	n/v	24.5	27.1	24.9	27.7	27.8	26.4	25.8	26.0
Beryllium	ug/L	4[A]	n/v	n/v	<0.155	<0.155	<0.155	0.265 J	<0.155	<0.182	0.269 U*	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	<30.3	31.9 J	<30.3	<38.6	<38.6	48.1 J
Cadmium	ug/L	5[A]	0.579[D]	1.38[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	21,300	23,000	21,500	23,500	23,700	23,500	23,200	21,200
Chromium	ug/L	100[A]	58.6[D]	450[E]	<1.53	<1.53	2.84 U*	<1.53	1.84 U*	<1.53	1.79 J	1.86 J
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	<0.0750	0.0960 J	<0.0750	<0.0750	0.0880 J	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	1.14 J	0.891 J	0.914 J	0.830 J	0.825 J	0.855 U*	0.883 U*	0.929 U*
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	<14.1	<14.1	<14.1	46.9 J	25.5 J	<19.5
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<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	<3.14	<3.14	<3.14	4.78 J	<3.14	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,450	5,820	5,450	6,240	6,050	7,140	7,050	5,920
Manganese	ug/L	n/v	n/v	n/v	4.17 J	3.61 J	4.62 J	3.85 J	3.74 J	3.04 J	2.97 J	1.42 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.312	<0.312	<0.312	<0.312	<0.312	1.13 U*	1.75 U*	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.96[E]	<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	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.16	1.18	1.92	1.51	1.44	1.38	1.34	1.53
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<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	-0.0183 +/-(0.0698)UJ	0.0252 +/-(0.0654)UJ	-0.0589 +/-(0.0483)UJ	0.0750 +/-(0.0762)UJ	0.00898 +/-(0.0751)U	0.115 +/-(0.102)U	-0.0150 +/-(0.0698)U	0.0465 +/-(0.113)U
Radium-228	pCi/L	n/v	n/v	n/v	0.0624 +/-(0.260)U	0.0314 +/-(0.256)U	0.504 +/-(0.299)U*	0.252 +/-(0.326)U	0.0667 +/-(0.244)U	0.0737 +/-(0.337)U	0.132 +/-(0.264)U	0.208 +/-(0.471)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.0624 +/-(0.269)UJ	0.0566 +/-(0.264)UJ	0.504 +/-(0.303)U*	0.327 +/-(0.335)UJ	0.0756 +/-(0.255)U	0.189 +/-(0.352)U	0.132 +/-(0.273)U	0.255 +/-(0.484)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	4.27	4.10	4.15	4.15	4.73	6.41	6.36	6.35
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0568 J	0.0549 J	0.0592 J	0.0560 J	0.0728 J	0.0608 J	0.0603 J	0.0628 J
Sulfate	mg/L	250[A]	n/v	n/v	8.58	8.19	8.42	8.29	9.79	11.4	11.2	11.2
General Chemistry												
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	87.0	93.0	93.0	106	105	96.0	102	99.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.10	4.40	4.00	4.50 J	3.60 J	4.50	4.60	4.50
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	83.5	81.3	80.3	82.3	77.4	86.9	87.0	79.2

See notes on last page.

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Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location			Ecological Surface Water Screening Levels		TR05				TR06		
Sample Date		Human Health Surface Water Screening Levels			6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	9-Jul-19	9-Jul-19	9-Jul-19
Sample ID					WBF-STR-TR05-LB-SUR-20191106	WBF-STR-TR05-LB-BOT-20191106	WBF-STR-TR05-RB-SUR-20191106	WBF-STR-TR05-RB-BOT-20191106	WBF-STR-TR06-CC-SUR-20190709	WBF-STR-TR06-CC-MID-20190709	WBF-STR-TR06-CC-BOT-20190709
Parent Sample ID											
Sample Depth					0.5 ft	2.9 ft	0.5 ft	2.8 ft	0.5 ft	3.5 ft	7 ft
Sample Type			Tennessee River (Hardness = 75 mg/L)		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	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	0.585 J
Arsenic	ug/L	10[A]	150[B]	340[C]	0.865 J	0.789 J	0.607 J	0.599 J	0.550 J	0.493 J	0.678 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	30.0	29.8	28.9	29.2	26.4	25.6	26.9
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	43.7 J	38.8 J	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.628[B]	1.44[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	21,700	21,300	23,300	24,200	24,500	23,400	24,100
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	2.13	1.84 J	<1.53	<1.53	2.33 U*	<1.53	3.90 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.139 U*	0.146 U*	0.224 J	0.127 J	0.120 J	0.133 J	0.125 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	1.23 U*	1.15 U*	1.13 J	1.04 J	1.10 J	1.03 J	1.29 J
Iron	ug/L	n/v	n/v	n/v	93.0	101	88.9	97.4	131	132	152
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.192 U*	0.194 U*	0.181 J	0.175 J	0.164 J	0.167 J	0.180 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	3.59 J
Magnesium	ug/L	n/v	n/v	n/v	6,080	5,960	7,160	7,310	5,170	4,860	5,130
Manganese	ug/L	n/v	n/v	n/v	49.7	50.9	46.3	48.6	91.0	94.8	98.1
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.357 J	0.368 J	1.35 U*	1.36 U*	0.428 J	0.424 J	0.437 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	2.31[C]	<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	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	27[B]	79[C]	1.66	1.65	1.71	1.27	1.22	1.26	2.26
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	4.71 J	5.22	<3.22	<3.22	<3.22
Dissolved Metals											
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	0.378 J	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.796 J	0.779 J	0.637 J	0.701 J	0.545 J	0.473 J	0.486 J
Barium	ug/L	2,000[A]	n/v	n/v	26.0	27.3	26.8	26.7	24.0	24.6	25.1
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	0.250 U*	0.327 U*	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	n/v	n/v	39.5 J	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.579[D]	1.38[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	21,200	22,000	23,500	24,100	23,700	24,300	23,400
Chromium	ug/L	100[A]	58.6[D]	450[E]	2.07	1.99 J	<1.53	<1.53	2.22 U*	<1.53	1.67 U*
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	<0.0750	0.100 J	<0.0750	<0.0750	0.0850 J
Copper	ug/L	1,300[A]	7[D]	10.2[E]	1.02 U*	0.897 U*	1.09 U*	0.780 U*	0.878 J	1.73 J	0.891 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<14.1	22.1 J	58.4
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<3.39	<3.39	<3.39	<3.39	3.34 J	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	5,920	6,140	7,240	7,390	4,980	5,150	4,960
Manganese	ug/L	n/v	n/v	n/v	2.15 J	2.05 J	5.05	4.86 J	6.66	6.74	49.4
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
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.336	0.366 J	1.48 U*	1.28 U*	<0.312	0.374 J	0.342 J
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	1.96[E]	<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	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	n/v	n/v	1.56	1.61	1.38	1.29	1.48	<0.899	1.28
Zinc	ug/L	2,000[A]	92.6[D]	91.8[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	-0.0637 +/-(0.0765)U	-0.0136 +/-(0.128)U	-0.0421 +/-(0.0673)U	-0.0598 +/-(0.0751)U	0.0142 +/-(0.0561)U	-0.0291 +/-(0.0688)U	-0.0545 +/-(0.0567)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.132 +/-(0.268)U	0.674 +/-(0.644)U	0.370 +/-(0.490)U	0.160 +/-(0.419)U	0.353 +/-(0.283)U	0.587 +/-(0.337)	0.156 +/-(0.322)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.000 +/-(0.279)U	0.674 +/-(0.657)U	0.370 +/-(0.495)U	0.160 +/-(0.426)U	0.368 +/-(0.289)U	0.587 +/-(0.344)J	0.156 +/-(0.327)U
Anions											
Chloride	mg/L	250[A]	230[B]	860[C]	6.37	6.22	6.54	6.51	4.11	4.08	4.06
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0622 J	0.0587 J	0.0592 J	0.0619 J	0.0562 J	0.0590 J	0.0595 J
Sulfate	mg/L	250[A]	n/v	n/v	11.2	11.0	11.5	11.5	8.36	8.50	8.31
General Chemistry											
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	95.0	96.0	89.0	86.0	107	114	108
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.70	4.40	5.60	5.60	4.20	4.50	4.50
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	79.1	77.8	87.5	90.5	82.5	78.5	81.3

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location Sample Date Sample ID Parent Sample ID Sample Depth Sample Type Level of Review	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels Tennessee River (Hardness = 75 mg/L) Chronic	Acute	TR06 9-Jul-19 WBF-STR-TR06-LB-SUR-20190709 0.5 ft Normal Environmental Sample Final-Verified	9-Jul-19 WBF-STR-TR06-LB-MID-20190709 1.5 ft Normal Environmental Sample Final-Verified	9-Jul-19 WBF-STR-TR06-LB-BOT-20190709 2.5 ft Normal Environmental Sample Final-Verified	9-Jul-19 WBF-STR-TR06-RB-SUR-20190709 0.5 ft Normal Environmental Sample Final-Verified	9-Jul-19 WBF-STR-TR06-RB-MID-20190709 1.5 ft Normal Environmental Sample Final-Verified	9-Jul-19 WBF-STR-TR06-RB-BOT-20190709 2.7 ft Normal Environmental Sample Final-Verified	6-Nov-19 WBF-STR-TR06-CC-SUR-20191106 0.5 ft Normal Environmental Sample Validated	6-Nov-19 WBF-STR-TR06-CC-MID-20191106 2 ft Normal Environmental Sample Validated	6-Nov-19 WBF-STR-TR06-CC-BOT-20191106 4.2 ft Normal Environmental Sample Validated
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	0.559 J	0.425 J	<0.378	<0.378	0.394 J	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.540 J	0.707 J	0.583 J	0.482 J	0.620 J	0.621 J	0.691 J	0.632 J	0.549 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	27.4	26.2	26.8	26.4	27.2	27.3	29.8 J	29.3 J	29.1 J
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.155	0.164 U*	<0.155	<0.155	<0.155	<0.155	0.725 U*	0.673 U*	0.660 U*
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<30.3	39.5 U*	36.3 U*	<30.3	<30.3	<30.3	38.8 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.628[B]	1.44[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.152 J	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	23,400	23,400	24,100	24,400	24,700	24,200	21,400	21,400	21,200
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	<1.53	2.73 U*	2.07 U*	<1.53	1.94 U*	4.06 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.147 J	0.159 J	0.147 J	0.130 J	0.115 J	0.131 J	0.137 J	0.107 J	0.119 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	1.02 J	1.23 J	1.13 J	1.01 J	1.22 J	1.37 J	0.958 J	0.833 J	0.838 J
Iron	ug/L	n/v	n/v	n/v	178	171	165	125	137	158	177	179	177
Lead	ug/L	5[A]	2.21[B]	56.6[C]	0.170 J	0.244 J	0.206 J	0.159 J	0.147 J	0.179 J	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	440[B]	910[C]	<3.14	4.22 J	<3.14	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,230	5,000	5,120	5,120	5,160	5,140	5,960	5,910	5,950
Manganese	ug/L	n/v	n/v	n/v	95.3	95.6	96.9	88.4	90.7	88.9	47.5	46.9	46.2
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	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.429 J	0.423 J	0.432 J	0.446 J	0.421 J	0.439 J	<0.336	0.417 J	0.497 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	2.31[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]	<0.128	0.152 J	<0.128	<0.128	<0.128	<0.128	0.258 J	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.22	1.89	1.49	1.05	1.80	1.98	1.21	1.26	1.12
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	6.57	3.56 J	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<0.378	0.467 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.476 J	0.668 J	0.558 J	0.384 J	0.544 J	0.474 J	0.560 J	0.441 J	0.526 J
Barium	ug/L	2,000[A]	n/v	n/v	24.6	24.4	26.5	24.8	25.4	24.8	27.2	26.2	27.4
Beryllium	ug/L	4[A]	n/v	n/v	<0.155	0.244 U*	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	54.9 U*	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.579[D]	1.38[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	23,200	23,800	23,900	24,400	24,200	23,900	21,500	21,000	21,200
Chromium	ug/L	100[A]	58.6[D]	450[E]	<1.53	1.70 U*	1.56 U*	<1.53	<1.53	1.62 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	0.106 J	0.103 J	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	0.979 J	1.07 J	0.902 J	0.784 J	1.31 J	0.810 J	0.859 U*	0.860 U*	0.876 U*
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	87.1	<14.1	63.4	<14.1	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<0.128	0.138 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,160	5,140	5,100	5,090	5,110	5,000	5,900	5,830	5,880
Manganese	ug/L	n/v	n/v	n/v	5.08	4.76 J	58.6	4.40 J	4.91 J	4.14 J	1.58 J	1.58 J	1.48 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<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	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.312	0.400 J	0.348 J	<0.312	0.441 J	<0.312	0.345 J	<0.336	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.96[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	<0.128	0.226 J	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.09	1.29	1.19	1.05	1.46	1.14	<0.991	<0.991	<0.991
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<3.22	<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	-0.0349 +/-(0.0573)U	-0.0508 +/-(0.0660)U	0.0473 +/-(0.0688)U	0.0361 +/-(0.0608)U	-0.0414 +/-(0.0650)U	0.0164 +/-(0.0603)U	-0.00673 +/-(0.110)U	-0.0106 +/-(0.0813)U	-0.0731 +/-(0.0630)U
Radium-228	pCi/L	n/v	n/v	n/v	0.623 +/-(0.298)	0.133 +/-(0.275)U	0.0884 +/-(0.287)U	0.618 +/-(0.317)	0.231 +/-(0.285)U	0.0508 +/-(0.270)U	0.407 +/-(0.368)U	0.0370 +/-(0.309)U	0.0669 +/-(0.434)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.623 +/-(0.303)J	0.133 +/-(0.283)U	0.136 +/-(0.295)U	0.654 +/-(0.323)J	0.231 +/-(0.292)U	0.0672 +/-(0.277)U	0.407 +/-(0.384)U	0.0370 +/-(0.320)U	0.0669 +/-(0.439)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	4.06	4.08	4.04	4.14	4.08	4.11	6.08	6.16	6.08
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0579 J	0.0579 J	0.0580 J	0.0540 J	0.0529 J	0.0540 J	0.0576 U*	0.0578 U*	0.0602 U*
Sulfate	mg/L	250[A]	n/v	n/v	8.35	8.32	8.39	8.47	8.31	8.48	10.7	10.5	10.6
General Chemistry													
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	94.0	108	106	88.0	91.0	88.0	86.0	88.0	91.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.70	4.70	4.60	4.40	3.20	4.60	5.00	4.70	4.80
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	79.9	79.1	81.4	81.9	82.9	81.6	78.0	77.9	77.5

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location Sample Date Sample ID Parent Sample ID Sample Depth Sample Type Level of Review	Units	Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels Tennessee River (Hardness = 75 mg/L) Chronic	Acute	TR06 6-Nov-19 WBF-STR-TR06-LB-SUR-20191106 0.5 ft Normal Environmental Sample Validated	6-Nov-19 WBF-STR-TR06-LB-BOT-20191106 2.5 ft Normal Environmental Sample Validated	6-Nov-19 WBF-STR-TR06-RB-SUR-20191106 0.5 ft Normal Environmental Sample Validated	6-Nov-19 WBF-STR-TR06-RB-MID-20191106 2.5 ft Normal Environmental Sample Validated	6-Nov-19 WBF-STR-TR06-RB-BOT-20191106 5 ft Normal Environmental Sample Validated	TR07 10-Jul-19 WBF-STR-TR07-CC-SUR-20190710 0.5 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR07-CC-MID-20190710 4 ft Normal Environmental Sample Final-Verified	10-Jul-19 WBF-STR-TR07-CC-BOT-20190710 7.6 ft Normal Environmental Sample 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	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.593 J	0.603 J	0.569 J	0.614 J	0.732 J	0.454 J	0.497 J	0.445 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	29.5 J	30.6 J	29.1 J	27.9	28.4	24.7	24.3	27.0
Beryllium	ug/L	4[A]	11[B]	93[C]	0.325 U*	0.907 U*	0.615 U*	0.303 U*	0.325 U*	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	51.0 J	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.628[B]	1.44[C]	<0.125	0.153 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	20,700	21,300	21,100	22,500	23,100	22,500	21,400	23,700
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	6.61 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.142 J	0.187 J	0.116 J	0.147 J	0.181 J	0.0950 J	0.102 J	0.136 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	0.809 J	1.02 J	1.05 J	1.14 J	1.27 J	0.951 J	0.962 J	1.44 J
Iron	ug/L	n/v	n/v	n/v	255	238	158	75.6	90.3	96.1	142	198
Lead	ug/L	5[A]	2.21[B]	56.6[C]	<0.128	0.165 J	<0.128	0.154 J	0.224 J	<0.128	0.133 J	0.207 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	5,880	5,920	5,920	6,990	7,090	4,920	4,600	5,110
Manganese	ug/L	n/v	n/v	n/v	57.3	56.1	41.3	43.2	48.5	67.2	75.2	90.3
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.449 J	0.446 J	<0.336	1.48 U*	1.13 U*	0.369 J	0.380 J	0.506 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	2.31[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	0.437 J	<0.148	<0.148	<0.148	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	27[B]	79[C]	1.05	1.19	1.17	1.37	1.28	1.30 U*	1.40 U*	1.23 U*
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	<3.22	4.07 J	4.40 J	<3.22	<3.22	<3.22
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
Arsenic	ug/L	10[A]	150[D]	340[E]	0.540 J	0.543 J	0.497 J	0.515 J	0.567 J	0.454 J	0.450 J	0.480 J
Barium	ug/L	2,000[A]	n/v	n/v	27.6	28.1	27.6	27.1	26.5	22.9	21.6	23.4
Beryllium	ug/L	4[A]	n/v	n/v	0.210 U*	<0.182	0.192 U*	0.218 U*	<0.182	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.579[D]	1.38[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	21,400	21,200	21,300	21,000	22,400	22,500	20,600	22,700
Chromium	ug/L	100[A]	58.6[D]	450[E]	<1.53	<1.53	<1.53	<1.53	<1.53	2.28 U*	1.61 U*	1.78 U*
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	1.03 U*	0.898 U*	0.928 U*	0.834 U*	0.774 U*	0.826 J	0.892 J	0.835 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<14.1	<14.1	<14.1
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<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	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	5,840	5,900	5,950	5,840	6,840	4,800	4,460	4,740
Manganese	ug/L	n/v	n/v	n/v	3.11 J	2.64 J	<1.35	1.83 J	4.64 J	10.6	1.46 J	<1.35
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
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.336	<0.336	<0.336	<0.336	1.00 U*	<0.312	<0.312	<0.312
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	1.96[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	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	n/v	n/v	<0.991	<0.991	<0.991	<0.991	1.08	1.26	1.26	1.37
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<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	0.0182 +/-(0.0913)U	-0.0237 +/-(0.0838)U	-0.0371 +/-(0.0759)U	0.0129 +/-(0.0884)U	-0.0520 +/-(0.0755)U	-0.0337 +/-(0.0447)U	-0.0149 +/-(0.0499)U	-0.000814 +/-(0.0513)U
Radium-228	pCi/L	n/v	n/v	n/v	0.129 +/-(0.381)U	0.0759 +/-(0.351)U	-0.113 +/-(0.310)U	-0.0870 +/-(0.274)U	-0.194 +/-(0.359)U	0.811 +/-(0.310)U*	0.288 +/-(0.310)U	0.326 +/-(0.251)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.147 +/-(0.392)U	0.0759 +/-(0.361)U	0.000 +/-(0.319)U	0.0129 +/-(0.288)U	0.000 +/-(0.367)U	0.811 +/-(0.313)U*	0.288 +/-(0.314)U	0.326 +/-(0.256)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	5.14	6.21	6.24	6.41	6.41	4.84	4.74	4.73
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0515 U*	0.0579 U*	0.0576 U*	0.0599 U*	0.0622 U*	0.0696 J	0.0819 J	0.0720 J
Sulfate	mg/L	250[A]	n/v	n/v	8.44	10.8	10.7	10.9	11.2	9.82	9.95	9.83
General Chemistry												
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	94.0	79.0	92.0	97.0	88.0	90.0	80.0	87.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	8.20	7.10	5.60	5.30	6.20	3.20	3.80	4.60
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	75.9	77.5	77.0	84.9	86.9	76.5	72.4	80.3

See notes on last page.

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Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location					TR07						
Sample Date					10-Jul-19	10-Jul-19	10-Jul-19	10-Jul-19	10-Jul-19	10-Jul-19	10-Jul-19
Sample ID		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		WBF-STR-TR07-LB-SUR-20190710	WBF-STR-DUP02-20190710	WBF-STR-TR07-LB-MID-20190710	WBF-STR-TR07-LB-BOT-20190710	WBF-STR-TR07-RB-SUR-20190710	WBF-STR-TR07-RB-MID-20190710	WBF-STR-TR07-RB-BOT-20190710
Parent Sample ID						WBF-STR-TR07-LB-SUR-20190710					
Sample Depth					0.5 ft	0.5 ft	2 ft	3.5 ft	0.5 ft	2.1 ft	4 ft
Sample Type			Tennessee River (Hardness = 75 mg/L)		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		Chronic	Acute	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	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.487 J	0.487 J	0.515 J	0.689 J	0.576 J	0.598 J	0.536 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.5	27.8	27.4	30.5	29.5	30.1	26.3
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
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
Cadmium	ug/L	5[A]	0.628[B]	1.44[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	22,500	22,200	24,700	23,200	22,600	23,700	23,000
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	<1.53	<1.53	1.60 U*	2.31 U*	<1.53	1.67 U*	1.79 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.0910 J	0.117 J	0.130 J	0.160 J	0.122 J	0.134 J	0.116 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	0.912 J	0.838 J	1.04 J	1.20 J	1.01 J	1.10 J	1.10 J
Iron	ug/L	n/v	n/v	n/v	105	123	205	223	123	155	152
Lead	ug/L	5[A]	2.21[B]	56.6[C]	<0.128	<0.128	0.171 J	0.203 J	0.147 J	0.169 J	0.148 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	4,810	5,760	5,280	5,980	5,790	5,990	5,090
Manganese	ug/L	n/v	n/v	n/v	59.3	61.1	86.2	87.0	70.2	77.2	74.5
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.390 J	<0.312	0.445 J	0.444 J	<0.312	<0.312	0.394 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	2.31[C]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	6[B]	54[C]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	27[B]	79[C]	1.34 U*	1.05 U*	1.47 U*	2.09 U*	1.31 U*	1.69 U*	1.54 U*
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals											
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	0.633 U*	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.470 J	0.574 J	0.631 J	0.464 J	0.602 J	0.668 J	0.448 J
Barium	ug/L	2,000[A]	n/v	n/v	24.6	28.2	25.8	27.6	28.1	25.9	23.8
Beryllium	ug/L	4[A]	n/v	n/v	<0.155	<0.155	0.169 J	<0.155	<0.155	<0.155	<0.155
Boron	ug/L	4,000[A]	n/v	n/v	<30.3	<30.3	45.4 J	<30.3	<30.3	<30.3	<30.3
Cadmium	ug/L	5[A]	0.579[D]	1.38[E]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	24,000	23,800	24,700	23,400	23,100	22,000	23,200
Chromium	ug/L	100[A]	58.6[D]	450[E]	1.95 U*	1.78 U*	2.71 U*	<1.53	1.88 U*	2.55 U*	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	0.0880 J	<0.0750	0.0980 J	<0.0750	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	0.797 J	0.795 J	1.21 J	0.700 J	0.906 J	0.814 J	0.893 J
Iron	ug/L	n/v	n/v	n/v	<14.1	<14.1	<14.1	<14.1	53.6	<14.1	<14.1
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<3.14	<3.14	3.46 J	<3.14	<3.14	<3.14	<3.14
Magnesium	ug/L	n/v	n/v	n/v	5,180	6,110	5,300	5,990	5,880	5,580	5,060
Manganese	ug/L	n/v	n/v	n/v	4.36 J	4.72 J	3.19 J	2.52 J	33.7	2.26 J	2.28 J
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.312	<0.312	0.347 J	<0.312	<0.312	<0.312	<0.312
Selenium	ug/L	50[A]	n/v	n/v	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	ug/L	100[A]	n/v	1.96[E]	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	ug/L	2[A]	n/v	n/v	<0.128	<0.128	0.151 J	<0.128	<0.128	<0.128	<0.128
Vanadium	ug/L	86[A]	n/v	n/v	1.48	1.43	1.49	1.02	1.39	2.16	0.899 J
Zinc	ug/L	2,000[A]	92.6[D]	91.8[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	-0.00673 +/-(0.0589)U	0.0239 +/-(0.0795)U	0.0156 +/-(0.0608)U	-0.0721 +/-(0.0514)U	-0.0409 +/-(0.0556)UJ	0.0322 +/-(0.0647)UJ	0.0398 +/-(0.0704)U
Radium-228	pCi/L	n/v	n/v	n/v	0.269 +/-(0.287)U	0.249 +/-(0.255)U	-0.0105 +/-(0.222)U	0.224 +/-(0.298)U	-0.0372 +/-(0.273)U	0.331 +/-(0.282)U	0.365 +/-(0.242)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.269 +/-(0.293)U	0.273 +/-(0.267)U	0.0156 +/-(0.230)U	0.224 +/-(0.302)U	0.000 +/-(0.279)UJ	0.363 +/-(0.289)UJ	0.405 +/-(0.252)U
Anions											
Chloride	mg/L	250[A]	230[B]	860[C]	4.68	4.69	4.69	4.73	4.17	4.72	4.73
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0728 J	0.0766 J	0.0770 J	0.0718 J	0.0568 J	0.0749 J	0.0735 J
Sulfate	mg/L	250[A]	n/v	n/v	9.71	9.81	9.76	9.81	8.39	9.86	9.91
General Chemistry											
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	83.0 J	102 J	93.0	101	101	92.0	96.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	2.70 J	1.40 J	5.30	5.70	3.50	3.60	4.40
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	75.9	79.3	83.3	82.7	80.3	83.9	78.5

See notes on last page.

Table J.1-1 - Surface Stream Analytical Results - Tennessee River
Watts Bar Fossil Plant
July/November 2019

Sample Location					TR07							
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Water Screening Levels		6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19	6-Nov-19
Sample ID					WBF-STR-TR07-CC-SUR-20191106	WBF-STR-DUP04-20191106	WBF-STR-TR07-CC-MID-20191106	WBF-STR-TR07-CC-BOT-20191106	WBF-STR-TR07-LB-SUR-20191106	WBF-STR-TR07-LB-BOT-20191106	WBF-STR-TR07-RB-SUR-20191106	WBF-STR-TR07-RB-BOT-20191106
Parent Sample ID						WBF-STR-TR07-CC-SUR-20191106						
Sample Depth					0.5 ft	0.5 ft	3.5 ft	6.5 ft	0.5 ft	2 ft	0.5 ft	1.6 ft
Sample Type			Tennessee River (Hardness = 75 mg/L)		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		Chronic	Acute	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	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.578 J	0.478 J	0.596 J	0.583 J	0.625 J	0.564 J	0.553 J	0.888 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	29.6	27.7	28.8	29.1	29.3	29.7	30.7	31.1
Beryllium	ug/L	4[A]	11[B]	93[C]	0.623 J	0.258 J	0.359 J	0.459 J	0.485 J	0.532 J	0.543 J	0.846 J
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.628[B]	1.44[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	20,800	22,000	21,200	20,900	21,500	21,100	21,300	21,600
Chromium	ug/L	100[A]	68.1[B]	1,425[C]	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.0970 J	0.150 J	0.0880 J	0.0870 J	0.172 J	0.164 J	0.113 J	0.272 J
Copper	ug/L	1,300[A]	7.3[B]	10.7[C]	0.883 J	1.23 J	0.817 J	0.831 J	0.992 J	0.939 J	0.807 J	1.17 J
Iron	ug/L	n/v	n/v	n/v	160 J	73.4 J	171	183	274	323	228	303
Lead	ug/L	5[A]	2.21[B]	56.6[C]	<0.128	0.156 J	<0.128	<0.128	<0.128	0.128 J	<0.128	0.242 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	3.51 J
Magnesium	ug/L	n/v	n/v	n/v	5,860	6,760	5,790	5,840	5,890	5,860	5,910	6,150
Manganese	ug/L	n/v	n/v	n/v	44.8	44.7	46.0	46.7	53.8	56.9	48.5	55.6
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
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.9[B]	368[C]	0.399 U*	1.32 U*	0.364 U*	0.367 U*	0.432 U*	0.431 U*	0.437 U*	0.591 U*
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
Silver	ug/L	100[A]	n/v	2.31[C]	<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	<0.148	<0.148	<0.148	<0.148	0.210 J
Vanadium	ug/L	86[A]	27[B]	79[C]	<0.991	1.32	<0.991	1.08	1.17	1.26	1.10	1.25
Zinc	ug/L	2,000[A]	93.9[B]	93.9[C]	<3.22	<3.22	<3.22	<3.22	<3.22	3.77 J	3.80 J	<3.22
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
Arsenic	ug/L	10[A]	150[D]	340[E]	0.651 J	0.551 J	0.516 J	0.542 J	0.625 J	0.484 J	0.521 J	0.522 J
Barium	ug/L	2,000[A]	n/v	n/v	25.7	25.8	26.3	27.5	27.4	26.8	28.7	27.1
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	0.196 J	<0.182	<0.182	<0.182	<0.182	0.197 J	0.216 J
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.579[D]	1.38[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	20,800	22,300	21,200	21,400	21,500	20,800	21,400	21,400
Chromium	ug/L	100[A]	58.6[D]	450[E]	<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	<0.0750	0.0830 J	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	7[D]	10.2[E]	1.45 J	0.674 J	1.07 J	1.49 J	1.83 J	1.47 J	1.33 J	1.16 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.84[D]	47.2[E]	<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	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	5,740	6,740	5,830	5,860	5,860	5,810	5,930	6,000
Manganese	ug/L	n/v	n/v	n/v	<1.35	2.34 J	1.82 J	2.26 J	3.50 J	3.07 J	4.32 J	5.75
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
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	40.8[D]	367[E]	<0.336	0.913 U*	<0.336	<0.336	0.336 U*	<0.336	<0.336	<0.336
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
Silver	ug/L	100[A]	n/v	1.96[E]	<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
Vanadium	ug/L	86[A]	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	ug/L	2,000[A]	92.6[D]	91.8[E]	<3.22	<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	-0.0206 +/-(0.0728)U	0.0142 +/-(0.0660)U	0.0450 +/-(0.0917)U	-0.0177 +/-(0.0691)U	-0.108 +/-(0.0605)U	-0.0360 +/-(0.0737)U	-0.0551 +/-(0.0667)U	-0.0190 +/-(0.0747)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.0311 +/-(0.327)U	-0.212 +/-(0.315)U	0.422 +/-(0.334)U	0.335 +/-(0.363)U	0.0813 +/-(0.347)U	-0.416 +/-(0.282)U	0.195 +/-(0.446)U	0.370 +/-(0.385)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.000 +/-(0.335)U	0.0142 +/-(0.322)U	0.467 +/-(0.346)U	0.335 +/-(0.370)U	0.0813 +/-(0.352)U	0.000 +/-(0.291)U	0.195 +/-(0.451)U	0.370 +/-(0.392)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	6.09	6.17	6.12	6.10	6.09	6.08	6.14	6.02
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0604 J	0.0546 J	0.0618 J	0.0586 J	0.0543 J	0.0536 J	0.0523 J	0.0541 J
Sulfate	mg/L	250[A]	n/v	n/v	11.0	10.9	11.0	10.8	10.9	11.0	11.0	10.8
General Chemistry												
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	88.0	89.0	88.0	104	91.0	87.0	115	105
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.80	4.60	4.90	4.50	7.40	7.90	6.70	7.40
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	76.2	82.8	76.8	76.2	77.8	76.7	77.5	79.4

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	mg/L	milligrams per Liter
B	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 75 mg/L) Total Chronic	n/v	No standard/guideline value.
C	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 75 mg/L) Total Acute	pCi/L	picocuries per Liter
D	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 75 mg/L) Dissolved Chronic	J	quantitation is approximate due to limitations identified during data validation
E	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 75 mg/L) Dissolved Acute	U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
6.5[A]	Concentration is greater than or equal to the indicated standard.	UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
15.2	measured concentration did not exceed the indicated standard	ug/L	micrograms per Liter
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit		
ft	feet		
ID	Identification		

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).

Stantec

EXHIBITS

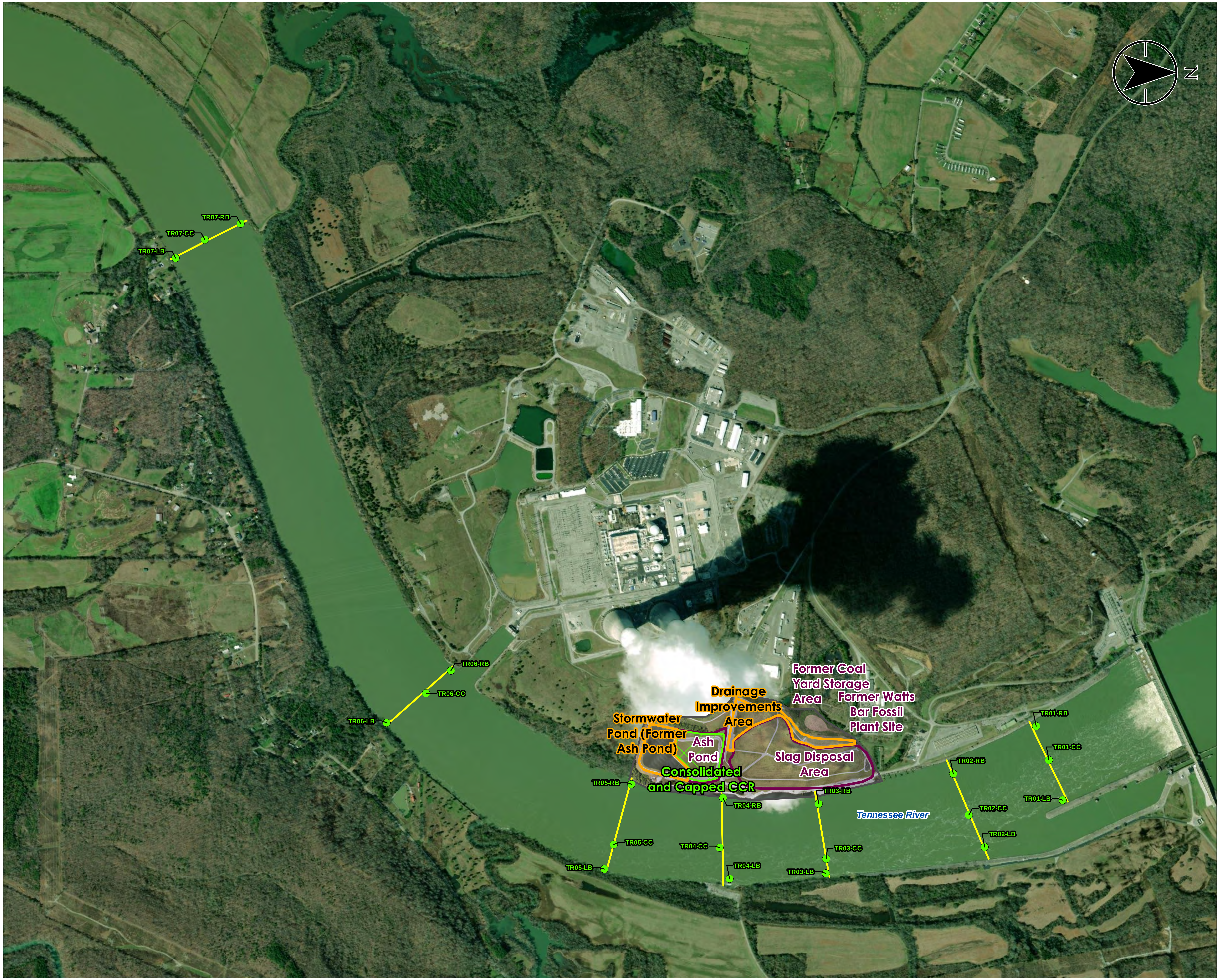


Exhibit No.

J.1-1

Title

Surface Stream Sampling Locations - July 2019

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by MB on 2022-06-13
Technical Review by CP on 2022-06-13

0 600 1,200 1,800 2,400 Feet

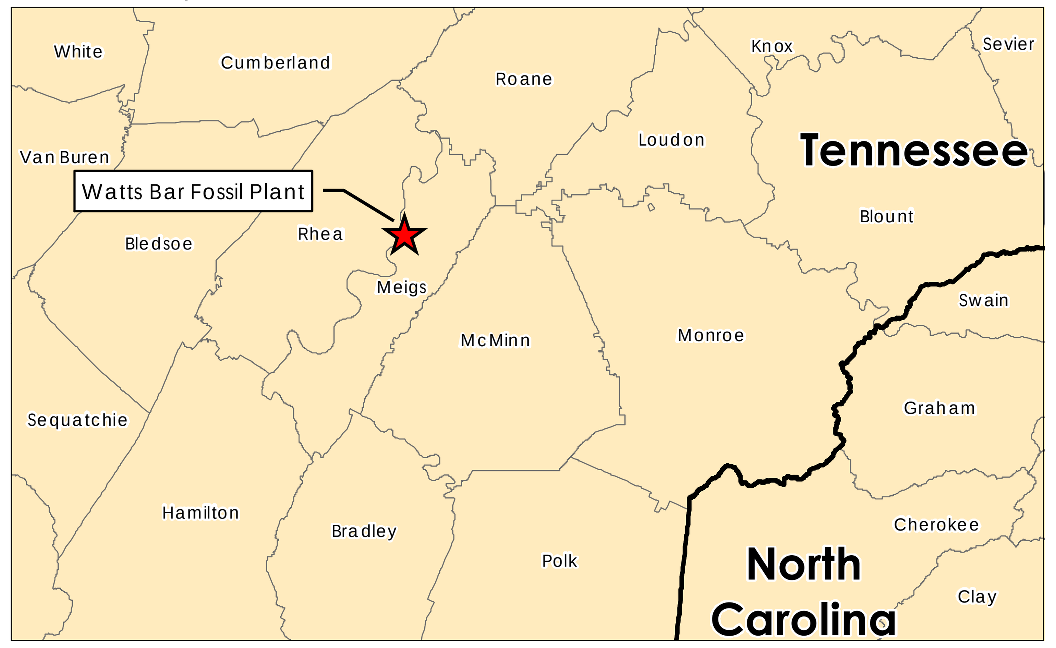
1:7,200 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations - Transects
- CCR Unit Area (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)
- 2018 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



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.

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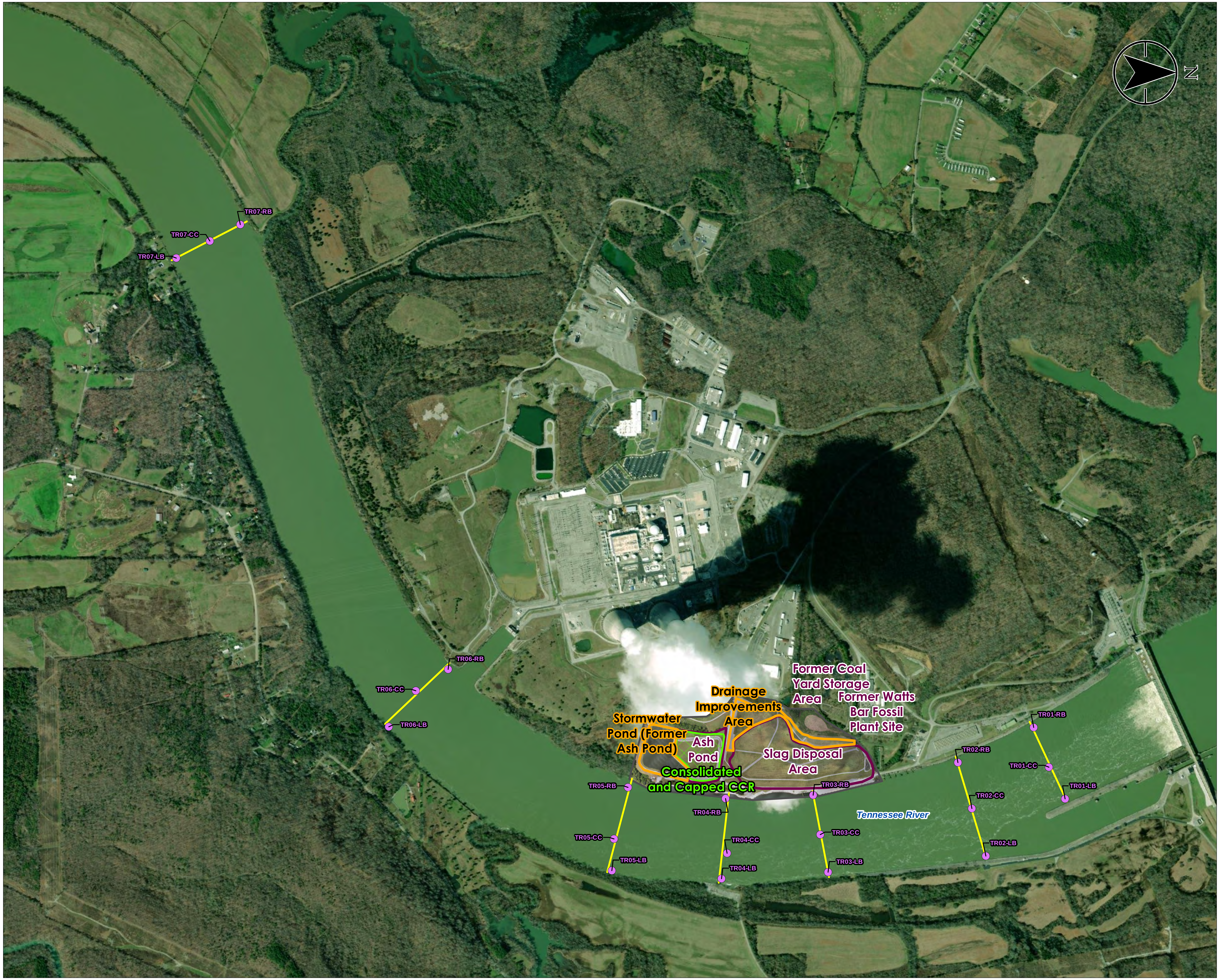


Exhibit No.

J.1-2

Title

Surface Stream Sampling Locations - November 2019

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by MB on 2022-06-13
Technical Review by CP on 2022-06-13

0 600 1,200 1,800 2,400 Feet

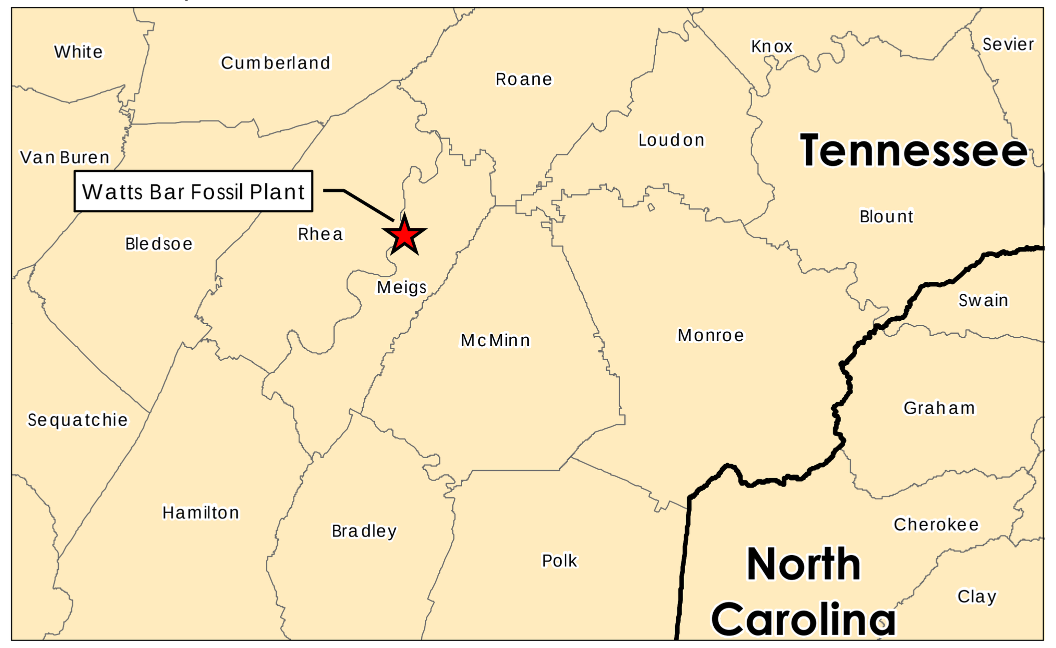
1:7,200 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations - Transects
- CCR Unit Area (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)
- 2018 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



Stantec TVA

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APPENDIX J.2

SURFACE STREAM SAMPLING AND ANALYSIS REPORT

Watts Bar Fossil Plant - Surface Stream Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Watts Bar Fossil Plant
Spring City, Tennessee

July 29, 2022

Prepared by:

Tennessee Valley Authority

TVA TENNESSEE VALLEY AUTHORITY

Revision Record

Revision	Description	Date
0	Submittal to TDEC	July 29, 2022

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
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
WBF Plant	Watts Bar Fossil Plant

1.0 INTRODUCTION

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

The purpose of the surface stream investigation was to collect stream samples to characterize surface stream water quality conditions in the vicinity of the WBF 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 Surface Stream Sampling and Analysis Plan (SAP) (Stantec Consulting Services Inc. [Stantec] 2018a). 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 WBF Plant. The evaluation of the results will consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs, and will be presented in the Environmental Assessment Report (EAR).

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 at the WBF Plant:

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

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 that occurred during field activities due to field conditions and programmatic updates are referenced in Section 3.6.

Surface stream investigation field activities were completed in two field mobilizations: the week of July 8, 2019, and the week of November 4, 2019. 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 EnvStds under direct contract to TVA.

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 adjacent to the WBF Plant property in response to the TDEC Order. The surface stream investigation included samples collected from locations upstream of, adjacent to, and downstream of the WBF 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 percent in one or more of the sediment samples collected in accordance with the WBF Plant Benthic SAP.

The scope of work for Phase 1 of the surface stream investigation consisted of sampling at seven transect locations (21 individual stations) during two different seasonal periods (one during summer pool, and one during winter pool). This SAR describes the activities related to sampling events performed in July and November 2019 to complete Phase 1, 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 not implemented since ash content was less than 20 percent in the sediment samples collected within the WBF Plant study area. Details of the sediment sampling activities are provided in the WBF Plant Benthic SAR.

3.0 FIELD ACTIVITIES

Surface stream investigation field activities were conducted during the weeks of July 8, 2019 and November 4, 2019. 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 July 9, 2019 and November 6, 2019. CEC obtained split samples from each station and sample depth on transect STR-TR04 in July, and on transect STR-TR05 in November.

During the surface stream investigation, TVA:

- Verified that stream conditions met the flow requirements specified in the SAP
- Verified and documented sampling locations using the GPS
- Collected surface stream analytical samples from the seven transects (21 stations) specified in the SAP during a summer and autumn sampling event
- Recorded field measurements of surface stream water quality parameters at the 21 stations during both sampling events
- Collected QC samples including six matrix spike/matrix spike duplicate/lab duplicates, eight field duplicates, and five each of field, equipment, and 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 seven transect locations under the surface stream investigation scope of work. The sampling locations and the TDEC Order CCR units at the WBF Plant are shown on Exhibits A.1 and A.2 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 Tennessee River: two upstream of the CCR units, three adjacent to the CCR units, and two downstream of the CCR units. These locations were selected to generally coincide with the sediment sampling locations (Stantec 2018b). Sample transects extended across the width of the river perpendicular to the direction of flow. Along each transect, samples were collected at center channel or thalweg (deepest point), left bank, and right bank stations. “Left bank” and “right bank” were determined with a downstream-facing orientation. In total, surface stream samples were collected at 21 stations. 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^{TM} Surveyor 4a data loggers. Field measurements 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*. *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 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.

3.3 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 was within the seasonal (summer and autumn) interquartile range (25^{th} to 75^{th} percentile) based on analysis of the mean daily flows for the Tennessee River at Watts Bar Dam during the period between 2004 through 2018. This period was selected based on TVA's implementation of new reservoir operations policies in 1990 and 2004 (TVA 1990 and TVA 2004, respectively).

3.3.2 Thermal Stratification

The water column in the Tennessee River was determined to be unstratified (mixed) during the July and November 2019 sampling events using temperature measurements on a depth gradient at each location, as described in the Surface Streams SAP.

3.3.3 Surface Stream Field Measurements

A Hydrolab^{TM} 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 each cap, and placed the samples in a cooler on ice within 15 minutes of collection. QC samples were collected in accordance with 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 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 WBF 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 WBF 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 the TestAmerica facility 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 WBF Plant.

3.6.1 Variations in Scope

Variations is scope are provided below.

- The Surface Stream SAP 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.

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 Surface Stream SAP for all analytes. However, the laboratory analyzed all analytes per the SAP/QAPP and met the data quality objective.
- 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 Tennessee River within the WBF 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 WBF Plant. The scope of work during this investigation included Phase 1 surface stream sampling at seven transect locations (21 individual stations) during two seasonal sampling events. A total of 121 surface stream samples, including eight field duplicates, were collected during the implementation of Phase 1 sampling the weeks of July 8, 2019 (summer pool) and November 4, 2019 (winter pool). Based on the results from the sediment sampling conducted pursuant to the Benthic SAP, Phase 2 surface stream sampling was determined unnecessary and was not performed.

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 the surface stream investigation at the WBF Plant in Spring City, Tennessee, in accordance with the Surface Stream SAP and TDEC-approved SAP modifications, 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 Watts Bar Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. November 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Surface Stream Sampling and Analysis Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

Stantec. 2018b. *Benthic Sampling and Analysis Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

Stantec. 2018c. *Environmental Investigation Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

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Tennessee Valley Authority (TVA). 1990. *Lake Improvement Plan, Tennessee River and Reservoir System Operation and Planning Review. Final Environmental Impact Statement*. (TVA/RDG/EQS-91/1.). December 1990.

TVA. 2004. *Reservoir Operations Study - Final Programmatic Environmental Impact Statement.* February 2004.

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

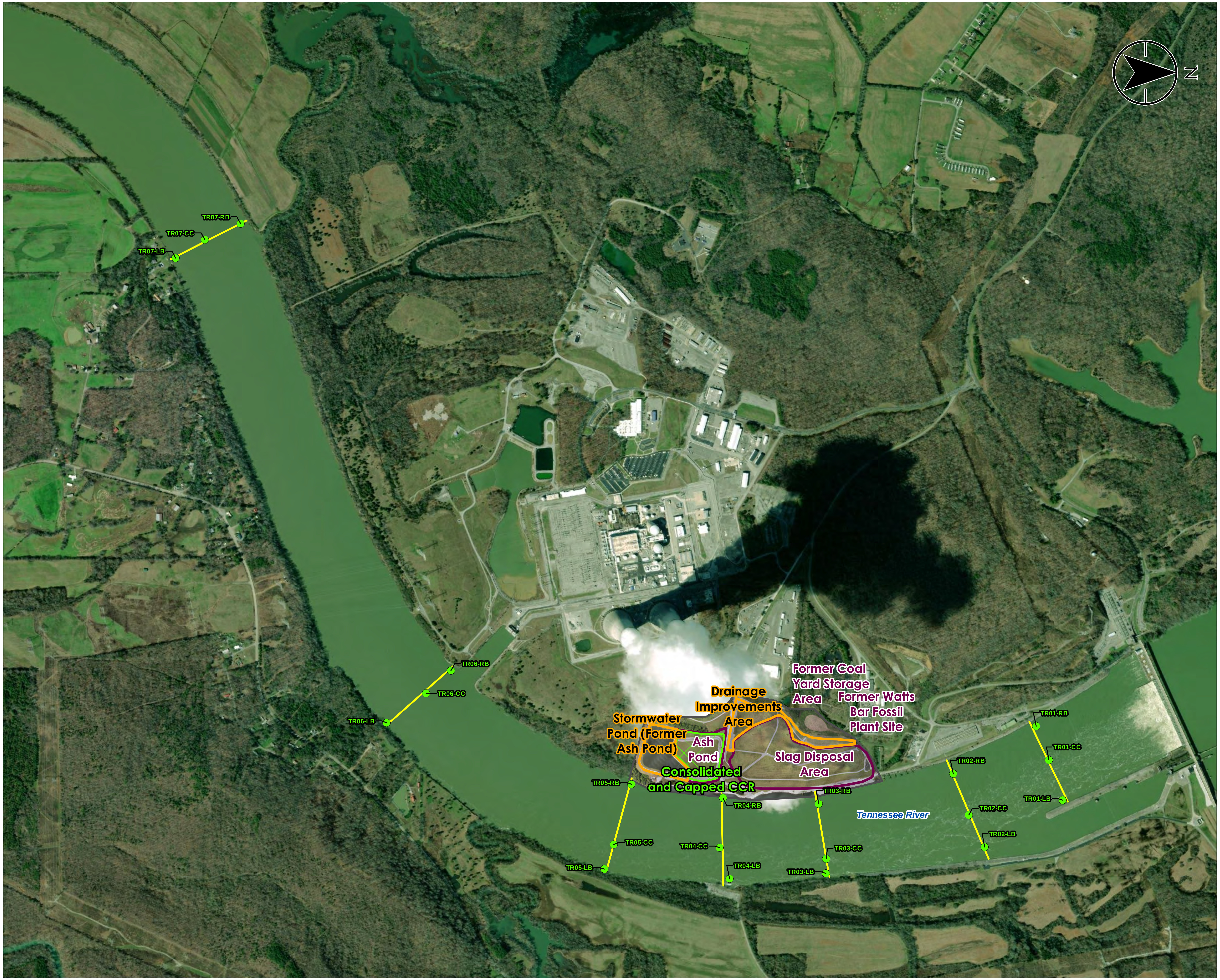


Exhibit No.

A.1

Title

Surface Stream Sampling Locations - July 2019

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by MB on 2022-06-13
Technical Review by CP on 2022-06-13

0 600 1,200 1,800 2,400 Feet

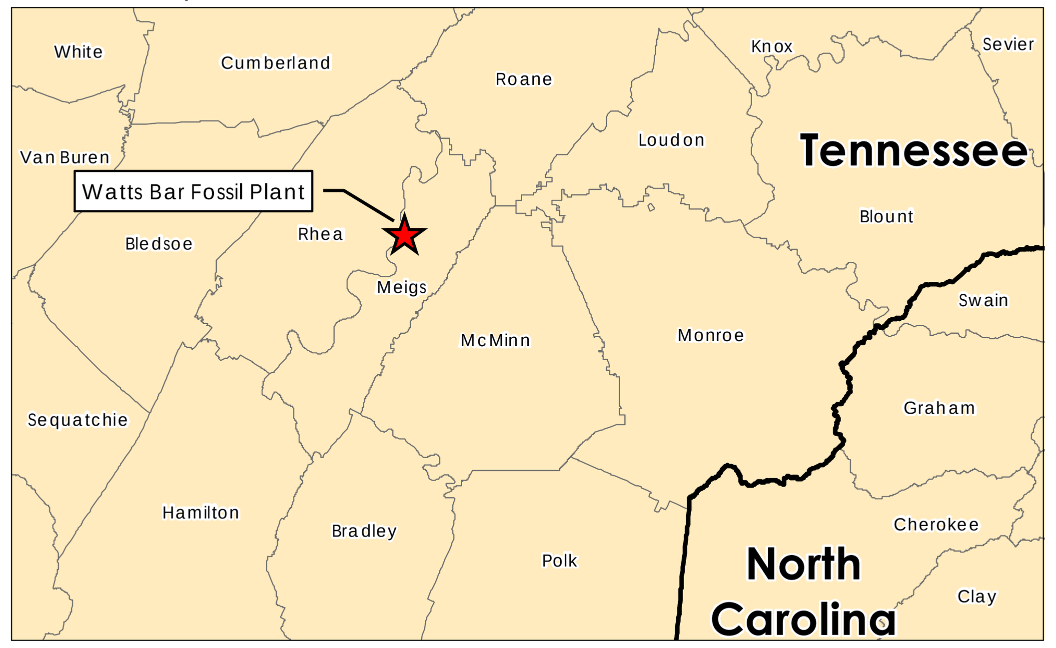
1:7,200 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations - Transects
- CCR Unit Area (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)
- 2018 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



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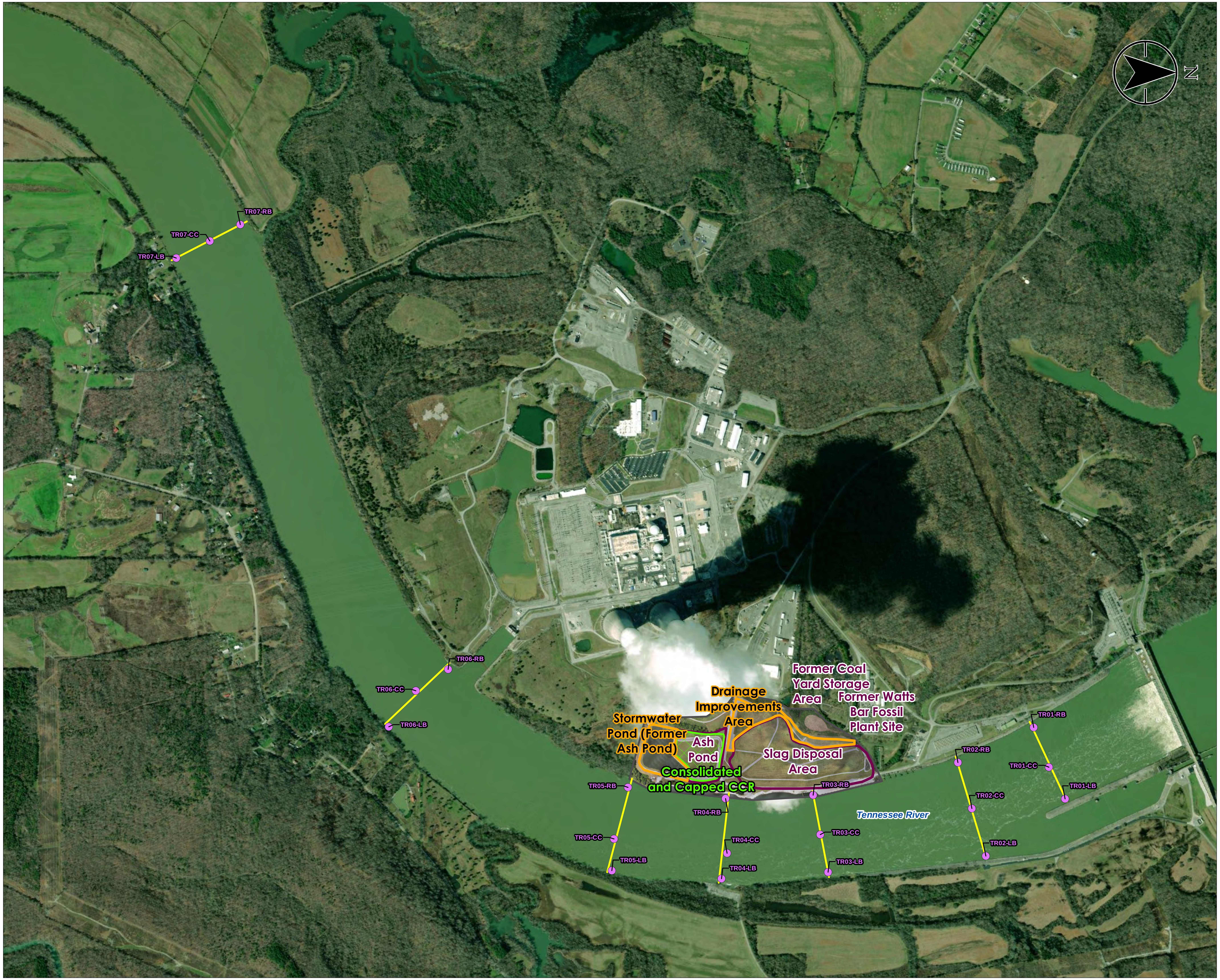


Exhibit No.

A.2

Title

Surface Stream Sampling Locations - November 2019

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by MB on 2022-06-13
Technical Review by CP on 2022-06-13

0 600 1,200 1,800 2,400 Feet

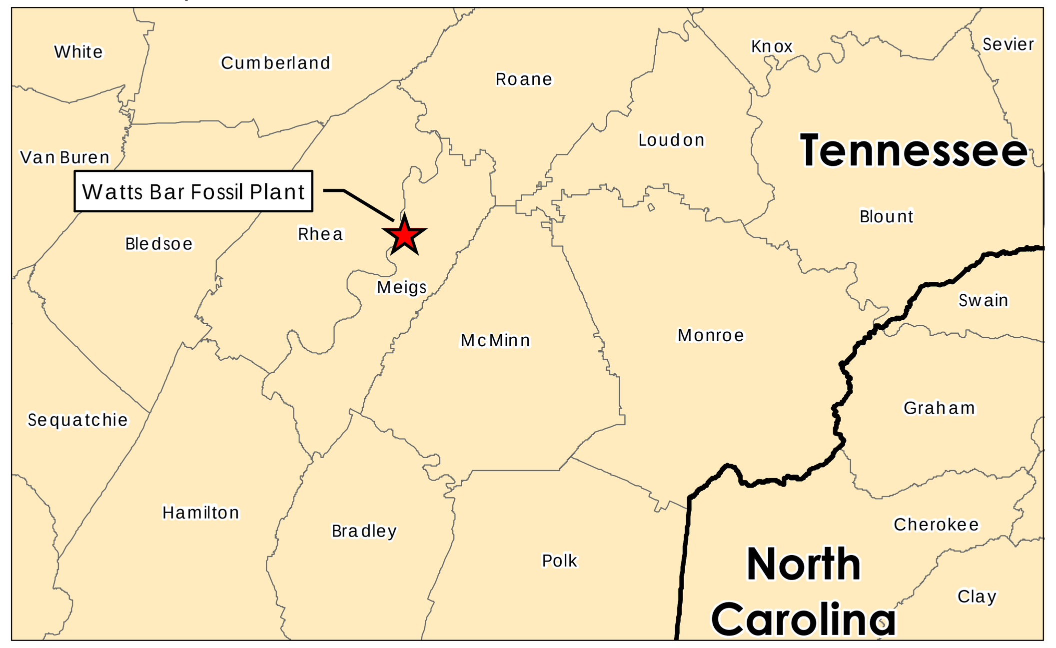
1:7,200 (At original document size of 22x34)

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations - Transects
- CCR Unit Area (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)
- 2018 Imagery Boundary

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



Stantec TVA

U:\TVA-EP\175668050_WBF_WorkPlans\gis\mxd\Env_SARS\WBF_SARS_ExhA2_SurfaceWater_Fall_November2019.mxd Revised: 2022-06-13 By: mbough

APPENDIX B - TABLES

TABLE B.1 – Surface Stream Sampling Locations
Watts Bar Fossil Plant

Transect Location ID	Description
STR-TR01	Tennessee River Upstream of the WBF Plant, and just downstream of the Watts Bar Dam - Background
STR-TR02	Tennessee River just upstream of the Slag Disposal Area/Historic Fly Ash Pond - Background
STR-TR03	Tennessee River adjacent to the Slag Disposal Area/Historic Fly Ash Pond
STR-TR04	Tennessee River Downstream of the Slag Disposal Area/Historic Fly Ash Pond, Upstream of the Ash Pond Area
STR-TR05	Tennessee River just downstream of the Ash Pond Area
STR-TR06	Tennessee River Downstream of the CCR Units
STR-TR07	Tennessee River Downstream of the WBF Plant

Notes:

ID Identification

TABLE B.2 – Corresponding Environmental Sampling Locations
Watts Bar Fossil Plant

Corresponding Sampling Locations				
Surface Stream	**Sediment**	**Benthic Community**	**Asiatic Clam**	**Fish Tissue**
–	–	MAC-TR01	TRU	TRU
–	–	MAC-TR02	–	–
STR-TR01	SED-TR01	–	–	–
STR-TR02	SED-TR02	MAC-TR03	TRA	TRA
STR-TR03	SED-TR03	MAC-TR04		
STR-TR04	SED-TR04	–		
STR-TR05	SED-TR05	MAC-TR05		
STR-TR06	SED-TR06	–		
–	–	MAC-TR06	–	–
STR-TR07	SED-TR07	MAC-TR07	–	–
–	–	–	TRD	TRD

Notes:

– Not applicable

TABLE B.3 – Summary of Surface Stream Samples
Watts Bar Fossil Plant
July and November 2019

				Field Measurements						Analysis										
Transect Location ID	Sample Date	Sample ID	Sample Type[1]	Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Total Metals	Dissolved Metals	Total Mercury	Dissolved Mercury	Anions	Radium-226	Radium-228	Radium-226+228	Hardness	Total Dissolved Solids	Total Suspended Solids
STR-TR01	10-Jul 2019	WBF-STR-TR01-LB-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-LB-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-LB-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-CC-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-CC-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-CC-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-RB-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-RB-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-RB-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	6-Nov 2019	WBF-STR-TR01-LB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-LB-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-LB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-CC-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-CC-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-CC-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-RB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR01-RB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR02	9-Jul 2019	WBF-STR-TR02-LB-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP02-20190709	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-LB-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-LB-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-CC-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-CC-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-CC-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-RB-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP01-20190709	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-RB-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-RB-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	6-Nov 2019	WBF-STR-TR02-LB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-LB-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-LB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-CC-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP02-20191106	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-CC-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-CC-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-RB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR02-RB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR03	9-Jul 2019	WBF-STR-TR03-LB-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-LB-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-LB-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-CC-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-CC-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-CC-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-RB-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-RB-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-RB-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	6-Nov 2019	WBF-STR-TR03-LB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-LB-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-LB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-CC-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-CC-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-CC-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-RB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-RB-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR03-RB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

See notes on last page.

TABLE B.3 – Summary of Surface Stream Samples
Watts Bar Fossil Plant
July and November 2019

				Field Measurements						Analysis										
Transect Location ID	Sample Date	Sample ID	Sample Type[1]	Temp	pH	Sp. Cond.	DO	ORP	Turbidity	Total Metals	Dissolved Metals	Total Mercury	Dissolved Mercury	Anions	Radium-226	Radium-228	Radium-226+228	Hardness	Total Dissolved Solids	Total Suspended Solids
STR-TR04	9-Jul 2019	WBF-STR-TR04-LB-SUR-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-LB-MID-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-LB-BOT-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-CC-SUR-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-CC-MID-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-CC-BOT-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-RB-SUR-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-RB-BOT-20190709	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	6-Nov 2019	WBF-STR-TR04-LB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP01-20191106	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-LB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-CC-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-CC-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-CC-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR04-RB-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP03-20191106	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
STR-TR05	10-Jul 2019	WBF-STR-TR05-LB-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-LB-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-LB-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-CC-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-CC-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-CC-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-RB-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP01-20190710	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
	6-Nov 2019	WBF-STR-TR05-LB-SUR-20191106	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-LB-BOT-20191106	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-CC-SUR-20191106	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-CC-MID-20191106	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-CC-BOT-20191106	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-RB-SUR-20191106	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR05-RB-BOT-20191106	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR06	9-Jul 2019	WBF-STR-TR06-LB-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-LB-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-LB-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-CC-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-CC-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-CC-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-RB-SUR-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-RB-MID-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-RB-BOT-20190709	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	6-Nov 2019	WBF-STR-TR06-LB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-LB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-CC-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-CC-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-CC-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-RB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-RB-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR06-RB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

See notes on last page.

TABLE B.3 – Summary of Surface Stream Samples
Watts Bar Fossil Plant
July and November 2019

				Field Measurements						Analysis										
Transect Location ID	**Sample Date**	**Sample ID**	**Sample Type[1]**	**Temp**	**pH**	**Sp. Cond.**	**DO**	**ORP**	**Turbidity**	**Total Metals**	**Dissolved Metals**	**Total Mercury**	**Dissolved Mercury**	**Anions**	**Radium-226**	**Radium-228**	**Radium-226+228**	**Hardness**	**Total Dissolved Solids**	**Total Suspended Solids**
STR-TR07	10-Jul 2019	WBF-STR-TR07-LB-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP02-20190710	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-LB-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-LB-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-CC-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-CC-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-CC-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-RB-SUR-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-RB-MID-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-RB-BOT-20190710	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	6-Nov 2019	WBF-STR-TR07-LB-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-LB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-CC-SUR-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-DUP04-20191106	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-CC-MID-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-CC-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-RB-BOT-20191106	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		WBF-STR-TR07-RB-SUR-20191106	Normal Environmental Sample	X	X	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
Anions	SW-846 9056A
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Radium-226+228	CALC
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) collected a split sample.

TABLE B.4 – Surface Stream Field Measurement Results
Watts Bar Fossil Plant
July and November 2019

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
July 2019	STR-TR01-LB	7/10/2019	24.20	182.2	7.06	4.03	49.2	5.8	114	0.3	4.0	0.5	2.0	3.5
	STR-TR01-LB	7/10/2019	24.13	183.0	7.03	3.95	48.2	6.8	115	1.5				
	STR-TR01-LB	7/10/2019	24.14	181.9	6.97	3.95	48.2	6.8	117	3.0				
	STR-TR01-LB	7/10/2019	24.14	182.4	6.95	3.96	48.3	6.8	118	3.9				
	STR-TR01-CC	7/10/2019	24.19	182.8	7.17	4.07	49.7	3.5	189	0.3	4.2	0.5	2.0	3.7
	STR-TR01-CC	7/10/2019	24.19	182.3	7.18	4.10	50.0	3.4	190	1.5				
	STR-TR01-CC	7/10/2019	24.19	182.2	7.20	4.10	50.0	3.2	191	3.0				
	STR-TR01-CC	7/10/2019	24.17	182.7	7.21	4.04	49.3	3.0	193	4.1				
	STR-TR01-RB	7/10/2019	24.08	182.4	7.19	4.05	49.3	4.7	193	0.3	3.6	0.5	1.8	3.2
	STR-TR01-RB	7/10/2019	24.08	183.2	7.19	4.06	49.5	4.8	194	1.5				
	STR-TR01-RB	7/10/2019	24.09	182.6	7.19	4.06	49.5	4.7	196	3.0				
	STR-TR01-RB	7/10/2019	24.09	183.1	7.24	4.06	49.5	4.7	197	3.5				
	STR-TR02-LB	7/9/2019	25.34	182.8	7.39	4.53	56.7	4.5	234	0.3	6.18	0.5	2.9	5.8
	STR-TR02-LB	7/9/2019	24.53	182.8	7.35	4.31	53.2	4.6	226	1.5				
	STR-TR02-LB	7/9/2019	24.47	182.5	7.34	4.30	53.0	4.7	225	3.0				
	STR-TR02-LB	7/9/2019	24.47	182.9	7.32	4.30	53.0	4.7	227	4.0				
	STR-TR02-LB	7/9/2019	24.45	183.0	7.31	4.28	52.7	4.7	227	5.0				
	STR-TR02-LB	7/9/2019	24.42	182.3	7.32	4.25	52.3	4.9	227	6.0				
	STR-TR02-CC	7/9/2019	24.72	183.1	7.34	4.41	54.6	4.6	241	0.3	4.75	0.5	2.1	4.25
	STR-TR02-CC	7/9/2019	24.47	182.6	7.32	4.27	52.6	4.8	243	1.5				
	STR-TR02-CC	7/9/2019	24.35	182.3	7.31	4.31	53.0	4.8	246	3.0				
	STR-TR02-CC	7/9/2019	24.36	182.1	7.30	4.31	53.0	4.8	248	4.0				
	STR-TR02-CC	7/9/2019	24.34	182.5	7.31	4.27	52.5	4.8	249	4.75				
	STR-TR02-RB	7/9/2019	24.20	182.4	7.28	4.23	51.9	4.4	242	0.3	4.59	0.5	2.05	4.1
	STR-TR02-RB	7/9/2019	24.18	182.6	7.27	4.23	51.9	4.4	242	1.5				
	STR-TR02-RB	7/9/2019	24.19	182.3	7.24	4.22	51.7	4.3	244	3.0				
	STR-TR02-RB	7/9/2019	24.17	183.0	7.25	4.21	51.6	4.1	244	4.0				
	STR-TR02-RB	7/9/2019	24.18	182.4	7.25	4.19	51.4	4.0	246	4.59				
	STR-TR03-LB	7/9/2019	24.13	182.6	7.31	4.13	50.6	5.0	253	0.3	4.1	0.5	1.9	3.75
	STR-TR03-LB	7/9/2019	24.12	182.3	7.30	4.09	50.1	5.0	261	1.0				
	STR-TR03-LB	7/9/2019	24.10	182.7	7.28	4.09	50.1	5.0	257	1.5				
	STR-TR03-LB	7/9/2019	24.09	182.5	7.26	4.08	49.9	5.0	265	2.0				
	STR-TR03-LB	7/9/2019	24.09	182.6	7.22	4.08	49.9	5.0	272	3.0				
	STR-TR03-LB	7/9/2019	24.09	182.4	7.12	4.09	50.1	4.9	283	4.14				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Watts Bar Fossil Plant
July and November 2019

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
July 2019	STR-TR03-CC	7/9/2019	24.36	182.8	7.34	4.28	52.6	4.8	235	0.3	6.3	0.5	2.9	5.8
	STR-TR03-CC	7/9/2019	24.29	181.9	7.32	4.24	52.1	4.8	236	1.5				
	STR-TR03-CC	7/9/2019	24.26	181.8	7.30	4.25	52.2	4.8	237	3.0				
	STR-TR03-CC	7/9/2019	24.25	182.4	7.32	4.22	51.8	4.8	238	4.0				
	STR-TR03-CC	7/9/2019	24.24	182.4	7.30	4.21	51.7	4.9	239	5.0				
	STR-TR03-CC	7/9/2019	24.22	182.6	7.30	4.15	50.9	4.8	240	6.34				
	STR-TR03-RB	7/9/2019	25.62	192.1	7.43	4.85	61.1	4.4	236	0.3	4.65	0.5	2.05	4.1
	STR-TR03-RB	7/9/2019	24.52	185.8	7.34	4.38	54.0	4.5	239	1.5				
	STR-TR03-RB	7/9/2019	24.26	184.2	7.30	4.15	51.0	4.5	242	3.0				
	STR-TR03-RB	7/9/2019	24.23	183.7	7.27	4.14	50.8	4.5	243	4.0				
	STR-TR03-RB	7/9/2019	24.16	183.5	7.26	4.11	50.4	4.7	245	4.65				
	STR-TR04-LB	7/9/2019	24.78	182.6	7.26	4.38	54.3	4.3	184	0.3	4.4	0.5	2.0	4.0
	STR-TR04-LB	7/9/2019	24.71	182.0	7.25	4.40	54.5	4.4	186	1.0				
	STR-TR04-LB	7/9/2019	24.56	182.0	7.24	4.34	53.6	4.9	188	2.0				
	STR-TR04-LB	7/9/2019	24.54	182.5	7.21	4.32	53.3	4.7	190	3.0				
	STR-TR04-LB	7/9/2019	24.55	181.7	7.17	4.33	53.4	4.6	193	4.0				
	STR-TR04-CC	7/9/2019	24.54	181.7	7.23	4.46	55.0	5.0	163	0.3	4.5	0.5	2.0	4.0
	STR-TR04-CC	7/9/2019	24.52	182.5	7.21	4.45	54.9	4.9	164	1.0				
	STR-TR04-CC	7/9/2019	24.50	181.6	7.20	4.42	54.5	4.9	166	2.0				
	STR-TR04-CC	7/9/2019	24.51	181.4	7.16	4.45	54.9	4.7	168	3.0				
	STR-TR04-CC	7/9/2019	24.50	181.7	7.11	4.43	54.6	4.9	172	4.0				
	STR-TR04-RB	7/9/2019	24.46	184.0	7.18	4.21	51.9	4.5	174	0.3	2.0	0.5	–	1.5
	STR-TR04-RB	7/9/2019	24.25	183.0	7.14	4.09	50.2	5.0	177	1.0				
	STR-TR04-RB	7/9/2019	24.26	183.1	7.11	4.11	50.5	4.5	180	2.0				
	STR-TR05-LB	7/10/2019	24.71	184.2	7.28	4.44	54.7	4.3	220	0.3	4.3	0.5	2.1	3.8
	STR-TR05-LB	7/10/2019	24.67	184.1	7.28	4.43	54.6	4.4	222	1.5				
	STR-TR05-LB	7/10/2019	24.50	183.3	7.30	4.34	53.3	4.7	224	3.0				
	STR-TR05-LB	7/10/2019	24.50	182.6	7.32	4.30	52.8	5.1	225	4.2				
	STR-TR05-CC	7/10/2019	25.05	186.0	7.29	4.75	58.9	4.4	213	0.3	6.4	0.5	3.0	6.0
	STR-TR05-CC	7/10/2019	24.30	182.9	7.23	4.23	51.7	4.7	216	1.5				
	STR-TR05-CC	7/10/2019	24.28	182.5	7.23	4.23	51.7	4.7	217	3.0				
	STR-TR05-CC	7/10/2019	24.30	183.0	7.27	4.19	51.2	5.0	218	4.0				
	STR-TR05-CC	7/10/2019	24.30	182.8	7.25	4.16	50.9	5.0	220	5.0				
	STR-TR05-CC	7/10/2019	24.25	182.3	7.37	4.14	50.6	6.0	221	6.2				
	STR-TR05-RB	7/10/2019	24.44	183.9	7.30	4.25	52.1	5.5	200	0.3	1.3	0.6	–	–
	STR-TR05-RB	7/10/2019	24.47	184.1	7.38	4.30	52.8	5.2	200	1.1				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Watts Bar Fossil Plant
July and November 2019

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
July 2019	STR-TR06-LB	7/9/2019	24.00	181.8	7.01	3.83	46.8	3.7	164	0.3	2.9	0.5	1.5	2.5
	STR-TR06-LB	7/9/2019	23.99	181.5	6.99	3.83	46.8	3.6	166	1.0				
	STR-TR06-LB	7/9/2019	23.98	181.6	6.97	3.80	46.4	3.9	169	2.0				
	STR-TR06-LB	7/9/2019	23.98	182.2	6.91	3.81	46.5	3.4	174	2.5				
	STR-TR06-CC	7/9/2019	24.19	182.3	7.18	4.13	50.6	4.9	165	0.3	7.4	0.5	3.5	7.0
	STR-TR06-CC	7/9/2019	24.16	182.7	7.18	4.14	50.7	5.2	166	1.0				
	STR-TR06-CC	7/9/2019	24.15	182.4	7.15	4.10	50.2	5.3	167	2.0				
	STR-TR06-CC	7/9/2019	24.15	181.9	7.15	4.07	49.9	5.1	168	3.0				
	STR-TR06-CC	7/9/2019	24.12	182.0	7.13	4.07	49.8	5.2	169	4.0				
	STR-TR06-CC	7/9/2019	24.11	182.1	7.12	4.04	49.5	5.2	170	5.0				
	STR-TR06-CC	7/9/2019	24.09	181.9	7.11	4.01	49.1	4.9	171	6.0				
	STR-TR06-CC	7/9/2019	24.09	182.7	7.10	4.00	49.0	5.2	173	7.0				
	STR-TR06-RB	7/9/2019	24.23	183.6	7.16	4.11	50.4	4.3	174	0.3	3.1	0.5	1.5	2.7
	STR-TR06-RB	7/9/2019	24.16	182.9	7.15	4.06	49.8	4.7	176	1.0				
	STR-TR06-RB	7/9/2019	24.14	182.8	7.11	4.05	49.6	4.9	178	2.0				
	STR-TR06-RB	7/9/2019	24.14	182.7	7.06	4.05	49.6	5.0	181	3.0				
	STR-TR07-LB	7/10/2019	26.94	183.9	7.32	5.28	67.8	3.4	216	0.3	3.9	0.5	2.0	3.5
	STR-TR07-LB	7/10/2019	24.51	183.3	7.25	4.08	50.1	3.4	222	1.5				
	STR-TR07-LB	7/10/2019	24.45	183.0	7.28	4.05	49.7	3.7	222	3.0				
	STR-TR07-LB	7/10/2019	24.41	183.6	7.49	4.00	49.0	4.0	222	3.9				
	STR-TR07-CC	7/10/2019	26.13	184.6	7.34	5.24	66.3	3.9	218	0.3	8.1	0.5	4.0	7.6
	STR-TR07-CC	7/10/2019	24.70	183.5	7.27	4.51	55.6	4.6	222	1.5				
	STR-TR07-CC	7/10/2019	24.40	183.1	7.30	4.19	51.3	5.0	224	3.0				
	STR-TR07-CC	7/10/2019	24.40	182.2	7.24	4.14	50.7	5.1	225	4.0				
	STR-TR07-CC	7/10/2019	24.37	183.3	7.24	4.10	50.2	5.0	226	5.0				
	STR-TR07-CC	7/10/2019	24.35	182.9	7.25	4.11	50.3	5.3	227	6.0				
	STR-TR07-CC	7/10/2019	24.30	182.7	7.28	4.07	49.8	5.3	228	7.0				
	STR-TR07-CC	7/10/2019	24.30	183.9	7.35	4.00	48.9	5.2	229	8.0				
	STR-TR07-RB	7/10/2019	25.32	184.3	7.29	4.59	57.2	4.6	213	0.3	4.4	0.5	2.1	4.0
	STR-TR07-RB	7/10/2019	24.60	183.8	7.25	4.26	52.4	4.8	215	1.5				
	STR-TR07-RB	7/10/2019	24.43	183.5	7.25	4.13	50.6	4.9	216	3.0				
	STR-TR07-RB	7/10/2019	24.42	183.2	7.30	4.10	50.3	4.9	217	4.0				
	STR-TR07-RB	7/10/2019	24.42	183.1	7.33	4.08	50.0	4.9	217	4.4				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Watts Bar Fossil Plant
July and November 2019

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
November 2019	STR-TR01-LB	11/6/2019	17.78	181.0	7.82 *	7.61	81.6	5.5	166 *	0.5	3.6	0.5	1.8	3.1
	STR-TR01-LB	11/6/2019	17.78	181.3	7.82 *	7.62	81.7	5.4	166 *	1.5				
	STR-TR01-LB	11/6/2019	17.78	182.3	7.83 *	7.61	81.6	5.3	166 *	3.0				
	STR-TR01-CC	11/6/2019	17.75	181.9	7.79 *	7.63	81.7	5.6	169 *	0.5	3.8	0.5	1.9	2.8
	STR-TR01-CC	11/6/2019	17.75	181.4	7.89 *	7.62	81.6	5.7	169 *	1.5				
	STR-TR01-CC	11/6/2019	17.74	181.5	7.84 *	7.61	81.5	5.6	169 *	3.0				
	STR-TR01-RB	11/6/2019	17.70	182.2	7.74 *	7.59	81.2	5.8	184 *	0.5	2.8	0.5	–	2.3
	STR-TR01-RB	11/6/2019	17.70	181.6	7.80 *	7.62	81.5	5.7	183 *	1.5				
	STR-TR01-RB	11/6/2019	17.71	181.6	7.77 *	7.61	81.5	5.7	185 *	2.5				
	STR-TR02-LB	11/6/2019	17.75	181.4	7.96 *	7.63	81.7	5.0	245 *	0.5	5.2	0.5	2.6	4.7
	STR-TR02-LB	11/6/2019	17.73	181.4	7.76 *	7.59	81.3	4.8	245 *	1.5				
	STR-TR02-LB	11/6/2019	17.73	181.7	7.74 *	7.61	81.5	4.7	245 *	2.0				
	STR-TR02-LB	11/6/2019	17.73	181.3	7.72 *	7.63	81.7	4.5	246 *	3.0				
	STR-TR02-LB	11/6/2019	17.73	181.4	7.73 *	7.62	81.6	4.4	246 *	4.0				
	STR-TR02-LB	11/6/2019	17.73	181.6	7.73 *	7.61	81.5	4.2	249 *	5.0				
	STR-TR02-CC	11/6/2019	17.71	181.3	7.76 *	7.60	81.3	6.3	219 *	0.5	4.3	0.5	2.1	3.8
	STR-TR02-CC	11/6/2019	17.70	181.8	7.76 *	7.57	81.0	6.5	219 *	1.5				
	STR-TR02-CC	11/6/2019	17.71	181.3	7.74 *	7.61	81.5	7.0	220 *	3.0				
	STR-TR02-CC	11/6/2019	17.71	181.8	7.76 *	7.60	81.3	10.7	220 *	4.0				
	STR-TR02-RB	11/6/2019	17.79	182.5	8.03 *	7.75	83.1	5.0	96 *	0.5	2.1	0.5	–	1.5
	STR-TR02-RB	11/6/2019	17.77	182.1	8.23 *	7.75	83.1	5.0	91 *	1.5				
	STR-TR03-LB	11/6/2019	17.73	181.8	7.75 *	7.63	81.7	5.2	228 *	0.5	4.0	0.5	2.0	3.5
	STR-TR03-LB	11/6/2019	17.73	181.1	7.75 *	7.64	81.8	5.1	229 *	1.5				
	STR-TR03-LB	11/6/2019	17.72	181.5	7.74 *	7.63	81.7	5.0	230 *	2.5				
	STR-TR03-LB	11/6/2019	17.72	182.4	7.74 *	7.63	81.7	5.0	232 *	3.5				
	STR-TR03-CC	11/6/2019	17.71	182.6	7.74 *	7.61	81.5	5.3	171 *	0.5	4.0	0.5	2.0	3.5
	STR-TR03-CC	11/6/2019	17.70	181.8	7.74 *	7.60	81.3	5.3	174 *	1.5				
	STR-TR03-CC	11/6/2019	17.70	181.8	7.71 *	7.61	81.4	5.2	174 *	2.5				
	STR-TR03-CC	11/6/2019	17.69	182.0	7.70 *	7.60	81.3	5.2	174 *	3.5				
	STR-TR03-RB	11/6/2019	18.16	189.9	7.73 *	7.98	86.2	13.5	162 *	0.5	3.9	0.5	2.0	3.0 [1]
	STR-TR03-RB	11/6/2019	18.14	189.0	7.72 *	7.96	86.0	6.1	174 *	1.5				
	STR-TR03-RB	11/6/2019	18.13	188.9	7.69 *	7.97	86.0	6.4	177 *	2.5				
	STR-TR03-RB	11/6/2019	18.17	190.2	7.57 *	8.00	86.4	7.4	183 *	3.5				
	STR-TR04-LB	11/6/2019	17.78	180.5	7.77	7.70	82.5	5.0	255	0.5	3.38	0.5	–	2.9
	STR-TR04-LB	11/6/2019	17.79	180.8	7.78	7.70	82.5	5.0	256	1.5				
	STR-TR04-LB	11/6/2019	17.80	180.8	7.78	7.71	82.7	4.9	258	3.0				
	STR-TR04-LB	11/6/2019	17.81	180.7	7.77	7.72	82.8	4.6	271	3.38				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Watts Bar Fossil Plant
July and November 2019

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
November 2019	STR-TR04-CC	11/6/2019	17.76	180.7	7.78	7.73	82.8	4.1	265	0.5	5.02	0.5	2.5	4.5
	STR-TR04-CC	11/6/2019	17.76	180.3	7.78	7.74	82.9	4.1	267	1.5				
	STR-TR04-CC	11/6/2019	17.76	180.8	7.78	7.72	82.7	4.0	270	3.0				
	STR-TR04-CC	11/6/2019	17.76	180.3	7.78	7.71	82.6	3.9	273	4.0				
	STR-TR04-CC	11/6/2019	17.76	180.9	7.77	7.71	82.6	3.9	276	5.02				
	STR-TR04-RB	11/6/2019	18.09	185.6	7.84	7.80	84.1	4.4	274	0.5	2.1	–	1.0	–
	STR-TR04-RB	11/6/2019	18.08	185.3	7.83	7.76	83.7	4.2	276	1.5				
	STR-TR04-RB	11/6/2019	18.08	185.6	7.83	7.77	83.8	4.1	279	2.0				
	STR-TR04-RB	11/6/2019	18.08	185.6	7.83	7.76	83.7	4.2	281	2.1				
	STR-TR05-LB	11/6/2019	17.84	180.4	7.79	7.72	82.8	4.4	261	0.5	3.43	0.5	–	2.9
	STR-TR05-LB	11/6/2019	17.86	181.0	7.78	7.76	83.3	4.4	263	1.5				
	STR-TR05-LB	11/6/2019	17.86	180.2	7.79	7.74	83.1	4.3	266	3.0				
	STR-TR05-LB	11/6/2019	17.84	180.4	7.79	7.72	82.8	4.2	269	3.43				
	STR-TR05-CC	11/6/2019	17.76	180.9	7.78	7.64	81.9	4.7	246	0.5	5.4	0.5	2.5	4.9
	STR-TR05-CC	11/6/2019	17.75	180.5	7.77	7.67	82.2	4.7	247	1.5				
	STR-TR05-CC	11/6/2019	17.75	180.5	7.77	7.65	81.9	4.7	249	3.0				
	STR-TR05-CC	11/6/2019	17.75	180.5	7.77	7.65	81.9	4.6	250	4.0				
	STR-TR05-CC	11/6/2019	17.75	180.7	7.77	7.64	81.8	4.5	256	5.0				
	STR-TR05-CC	11/6/2019	17.75	180.2	7.77	7.64	81.8	4.3	259	5.4				
	STR-TR05-RB	11/6/2019	18.22	185.7	7.88	8.03	86.9	4.7	243	0.5	3.3	0.5	–	2.8
	STR-TR05-RB	11/6/2019	18.25	185.4	7.89	8.03	86.9	4.7	246	1.5				
	STR-TR05-RB	11/6/2019	18.19	185.4	7.87	7.98	86.3	4.5	250	3.0				
	STR-TR05-RB	11/6/2019	18.19	185.1	7.87	7.99	86.4	4.4	253	3.3				
	STR-TR06-LB	11/6/2019	17.63	180.3	7.70	7.59	81.1	11.2	208	0.5	4.3	0.5	–	2.5 [2]
	STR-TR06-LB	11/6/2019	17.63	180.6	7.70	7.60	81.2	11.6	208	1.0				
	STR-TR06-LB	11/6/2019	17.61	180.6	7.65	7.61	81.3	13.4	213	2.0				
	STR-TR06-LB	11/6/2019	17.62	180.2	7.64	7.61	81.3	14.0	215	3.0				
	STR-TR06-LB	11/6/2019	17.61	180.5	7.60	7.61	81.3	14.7	217	4.0				
	STR-TR06-LB	11/6/2019	17.61	180.4	7.59	7.62	81.4	14.3	219	4.25				
	STR-TR06-CC	11/6/2019	17.75	180.2	7.73	7.64	81.8	4.9	241	0.5	4.76	0.5	2.0	4.2
	STR-TR06-CC	11/6/2019	17.74	180.4	7.76	7.63	81.7	4.9	243	1.5				
	STR-TR06-CC	11/6/2019	17.73	180.9	7.75	7.61	81.5	4.8	245	3.0				
	STR-TR06-CC	11/6/2019	17.74	180.8	7.76	7.61	81.5	4.6	249	4.0				
	STR-TR06-CC	11/6/2019	17.73	180.1	7.73	7.59	81.3	4.4	252	4.73				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Watts Bar Fossil Plant
July and November 2019

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
November 2019	STR-TR06-RB	11/6/2019	18.16	185.4	7.88	8.02	86.6	4.5	242	0.5	5.57	0.5	2.5	5.0
	STR-TR06-RB	11/6/2019	18.11	185.1	7.86	8.02	86.5	4.3	244	1.5				
	STR-TR06-RB	11/6/2019	18.11	184.4	7.85	7.97	86.0	4.2	246	3.0				
	STR-TR06-RB	11/6/2019	18.06	184.6	7.86	7.99	86.1	4.1	248	4.0				
	STR-TR06-RB	11/6/2019	18.05	184.2	7.85	7.97	85.9	4.1	251	5.0				
	STR-TR06-RB	11/6/2019	18.10	184.7	7.86	8.02	86.5	4.4	256	5.57				
	STR-TR07-LB	11/6/2019	17.90	181.3	8.23 *	7.76	83.4	6.2	58 *	0.5	2.4	0.5	–	2.0
	STR-TR07-LB	11/6/2019	17.89	181.3	8.47 *	7.75	83.3	6.4	52 *	1.5				
	STR-TR07-LB	11/6/2019	17.90	181.2	9.04 *	7.77	83.5	6.8	47 *	2.0				
	STR-TR07-CC	11/6/2019	17.83	181.8	7.82 *	7.72	82.8	6.5	129 *	0.5	7.0	0.5	3.5	6.5
	STR-TR07-CC	11/6/2019	17.83	182.8	7.78 *	7.72	82.8	6.7	130 *	1.5				
	STR-TR07-CC	11/6/2019	17.83	182.5	7.82 *	7.73	82.9	6.9	129 *	3.0				
	STR-TR07-CC	11/6/2019	17.83	182.2	7.82 *	7.74	83.0	7.5	129 *	4.0				
	STR-TR07-CC	11/6/2019	17.83	181.7	7.82 *	7.72	82.8	8.4	129 *	5.0				
	STR-TR07-CC	11/6/2019	17.83	182.0	7.84 *	7.71	82.7	9.8	130 *	6.0				
	STR-TR07-RB	11/6/2019	17.99	183.6	7.88 *	7.82	84.2	6.8	81 *	0.5	2.1	0.5	–	1.6
	STR-TR07-RB	11/6/2019	17.94	183.7	7.88 *	7.79	83.8	6.9	80 *	1.5				

Notes:

–	Not applicable
˚C	degrees Celsius
%	percent
*	Accuracy of pH and ORP measurements uncertain due to malfunction of pH probe during post-sampling verification. The pH probe malfunctioned (reading 14.00#) during post-sampling verification on November 6, 2019; ORP was within acceptance criteria. The sonde was inspected again on November 7, 2019, and pH readings were within acceptance criteria.
ID	Identification
m	meter
mg/L	milligrams per Liter
µS/cm	microSiemens per centimeter
mV	milliVolts
NTU	Nephelometric Turbidity Units
ORP	Oxidation-Reduction Potential
SU	Standard Units

1. Due to streamflow velocity and variations in reservoir bottom structures, 3.5 meter sample depth was not obtained.
2. During sample collection, boat pivoted on anchor and moved closer to shore. Max depth 2.85m.

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR01								
Sample Date		10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019
Sample ID		WBF-STR-TR01-LB-SUR-20190710	WBF-STR-TR01-LB-MID-20190710	WBF-STR-TR01-LB-BOT-20190710	WBF-STR-TR01-CC-SUR-20190710	WBF-STR-TR01-CC-MID-20190710	WBF-STR-TR01-CC-BOT-20190710	WBF-STR-TR01-RB-SUR-20190710	WBF-STR-TR01-RB-MID-20190710	WBF-STR-TR01-RB-BOT-20190710
Sample Depth (m)		0.5 m	2.0 m	3.5 m	0.5 m	2.0 m	3.7 m	0.5 m	1.8 m	3.2 m
Sample Type[1]		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
Parent Sample Code										
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units									
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.549 J	0.578 J	0.613 J	0.561 J	0.494 J	0.552 J	0.764 J	0.769 J	0.731 J
Barium	µg/L	29.5	28.6	28.9	28.8	28.0	28.0	28.4	28.7	28.8
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	µg/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,000	21,100	21,600	21,700	21,600	21,000	23,100	23,100	22,600
Chromium	µg/L	<1.53	<1.53	2.24 U*	2.31 U*	<1.53	2.74 U*	2.43 U*	1.60 U*	1.61 U*
Cobalt	µg/L	0.134 J	0.128 J	0.146 J	0.113 J	0.127 J	0.109 J	0.178 J	0.163 J	0.139 J
Copper	µg/L	1.02 J	0.802 J	0.846 J	0.811 J	0.755 J	0.801 J	1.25 J	1.07 J	0.948 J
Iron	µg/L	126	170	149	113	125	121	132	126	140
Lead	µg/L	0.135 J	0.149 J	0.155 J	<0.128	<0.128	<0.128	0.199 J	0.149 J	0.151 J
Lithium	µg/L	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	5.82	4.06 J	4.74 J
Magnesium	µg/L	6,230	6,090	6,090	6,180	5,910	5,960	5,920	5,990	5,830
Manganese	µg/L	97.0	102	103	91.6	90.7	89.2	89.3	90.0	87.6
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.453 J	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	µg/L	0.995 U*	1.28 U*	1.54 U*	1.50 U*	1.02 U*	1.33 U*	2.04 U*	1.59 U*	1.64 U*
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	3.68 J	<3.22	<3.22	<3.22
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.408 U*
Arsenic	µg/L	0.466 J	0.418 J	0.473 J	0.500 J	0.528 J	0.651 J	0.647 J	0.674 J	0.907 J
Barium	µg/L	27.1	27.7	26.3	27.2	27.0	27.8	26.6	27.0	27.4
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.504 J
Boron	µg/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	36.0 J
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,200	22,100	21,900	21,400	21,900	21,600	22,600	22,900	23,600
Chromium	µg/L	<1.53	<1.53	2.02 U*	<1.53	1.86 U*	3.10 U*	<1.53	<1.53	2.24 U*
Cobalt	µg/L	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	0.0930 J	0.0860 J	0.0800 J	0.169 J
Copper	µg/L	<0.627	<0.627	<0.627	<0.627	<0.627	0.894 J	1.03 J	0.742 J	0.973 J
Iron	µg/L	<14.1	29.2 J	<14.1	46.0 J	<14.1	119	<14.1	<14.1	<14.1
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	3.92 J	3.77 J	6.64
Magnesium	µg/L	6,250	6,080	6,240	5,890	6,120	6,160	5,870	5,950	6,170
Manganese	µg/L	2.95 J	26.4	2.36 J	44.1	6.14	54.3	7.90	7.43	7.50
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	<0.312	<0.312	<0.312	<0.312	0.325 J	<0.312	<0.312	<0.312
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.163 J
Vanadium	µg/L	<0.899	<0.899	1.18	<0.899	1.02	1.75	1.45	1.40	2.09
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	4.06	4.10	4.08	4.08	4.12	4.10	4.12	4.15	4.10
Fluoride	mg/L	0.0547 J	0.0549 J	0.0564 J	0.0570 J	0.0547 J	0.0545 J	0.0566 J	0.0556 J	0.0566 J
Sulfate	mg/L	8.26	8.22	8.32	8.27	8.23	8.19	8.35	8.36	8.37
Radiological										
Radium-226	pCi/L	-0.0411 +/-(0.0707) UJ	0.0446 +/-(0.0945) UJ	-0.00392 +/-(0.0659) UJ	-0.0452 +/-(0.0709) UJ	0.0438 +/-(0.0741) UJ	-0.00187 +/-(0.0876) UJ	0.104 +/-(0.0861) UJ	0.0548 +/-(0.0742) UJ	-0.0709 +/-(0.0527) UJ
Radium-226+228	pCi/L	0.124 +/-(0.256) UJ	0.0943 +/-(0.226) UJ	0.000 +/-(0.209) UJ	0.168 +/-(0.230) UJ	0.152 +/-(0.230) UJ	0.0479 +/-(0.260) UJ	0.490 +/-(0.345) UJ	0.309 +/-(0.324) UJ	0.194 +/-(0.254) UJ
Radium-228	pCi/L	0.124 +/-(0.246) U	0.0497 +/-(0.205) U	-0.205 +/-(0.198) U	0.168 +/-(0.219) U	0.108 +/-(0.218) U	0.0479 +/-(0.245) U	0.386 +/-(0.334) U	0.255 +/-(0.315) U	0.194 +/-(0.248) U
General Chemistry										
Total Dissolved Solids	mg/L	101	100	92.0	101	92.0 J	86.0 J	103	94.0 J	104
Total Suspended Solids	mg/L	4.50	4.70	4.90	4.00	3.90	4.10	3.80	4.30	4.40
Hardness (as CaCO3)	mg/L	80.7	77.8	79.1	79.6	78.3	77.0	82.1	82.5	80.4

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR01							
Sample Date		6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019
Sample ID		WBF-STR-TR01-LB-SUR-20191106	WBF-STR-TR01-LB-MID-20191106	WBF-STR-TR01-LB-BOT-20191106	WBF-STR-TR01-CC-SUR-20191106	WBF-STR-TR01-CC-MID-20191106	WBF-STR-TR01-CC-BOT-20191106	WBF-STR-TR01-RB-SUR-20191106	WBF-STR-TR01-RB-BOT-20191106
Sample Depth (m)		0.5 m	1.8 m	3.1 m	0.5 m	1.9 m	2.8 m	0.5 m	2.3 m
Sample Type[1]		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Parent Sample Code									
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units								
Total Metals									
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.498 J	0.462 J	0.538 J	0.505 J	0.603 J	0.491 J	0.596 J	0.551 J
Barium	µg/L	26.8	28.2	27.4	25.6	29.7	30.6	30.0	29.6
Beryllium	µg/L	<0.182	0.339 J	0.289 J	<0.182	0.292 J	0.201 J	0.195 J	0.431 J
Boron	µg/L	<38.6	<38.6	<38.6	<38.6	42.4 J	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	0.141 J	<0.125	<0.125	<0.125
Calcium	µg/L	22,500	22,900	22,500	22,000	21,100	21,100	20,900	20,900
Chromium	µg/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	0.211 J	0.165 J	0.131 J	0.118 J	0.167 J	0.138 J	0.117 J	0.0990 J
Copper	µg/L	1.46 J	1.48 J	1.18 J	1.08 J	1.42 J	0.904 J	0.887 J	1.08 J
Iron	µg/L	84.1	81.8	88.2	83.0	177	203	186	184
Lead	µg/L	0.149 J	0.310 J	0.154 J	0.154 J	0.177 J	<0.128	<0.128	<0.128
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	5.40	3.71 J	<3.39	3.57 J
Magnesium	µg/L	6,800	7,030	6,890	6,650	5,850	5,900	5,850	5,880
Manganese	µg/L	47.5	48.2	47.8	46.4	49.2	51.0	47.3	47.6
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	1.15 U*	1.23 U*	1.56 U*	1.30 U*	0.434 U*	0.449 U*	0.447 U*	0.468 U*
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	0.381 J	<0.148	<0.148	<0.148
Vanadium	µg/L	1.02	1.19	1.25	1.00	1.14	1.01	1.13	1.03
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals									
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.518 J	0.437 J	0.547 J	0.430 J	0.589 J	0.801 J	0.543 J	0.570 J
Barium	µg/L	25.0	26.3	26.2	25.4	27.3	26.2	27.1	27.6
Beryllium	µg/L	0.182 J	0.208 J	<0.182	0.258 J	0.289 J	0.190 J	<0.182	<0.182
Boron	µg/L	<38.6	<38.6	<38.6	<38.6	41.0 J	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	0.170 J	<0.125	<0.125
Calcium	µg/L	22,100	23,000	22,400	22,100	21,400	20,900	21,600	21,200
Chromium	µg/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	<0.0750	0.0910 J	0.109 J	<0.0750	<0.0750	0.0810 J	<0.0750	<0.0750
Copper	µg/L	1.13 J	1.23 J	0.731 J	0.699 J	2.41	2.19	1.95 J	2.26
Iron	µg/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	0.288 J	0.203 J	<0.128	<0.128
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	5.68	4.23 J	<3.39	3.48 J
Magnesium	µg/L	6,760	7,070	6,790	6,660	5,850	5,670	5,910	5,810
Manganese	µg/L	2.86 J	3.09 J	9.33	2.88 J	1.93 J	1.72 J	5.06	2.69 J
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	1.01 U*	1.17 U*	1.11 U*	1.15 U*	<0.336	0.391 U*	<0.336	<0.336
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	0.268 J	0.211 J	<0.177	<0.177
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	0.319 J	0.177 J	<0.148	<0.148
Vanadium	µg/L	<0.991	1.17	1.13	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions									
Chloride	mg/L	6.09	30.4	30.3	6.12	6.04	6.09	6.08	6.09
Fluoride	mg/L	0.0614 J	0.326 J	0.311 J	0.0560 J	0.0606 J	0.0612 J	0.0573 J	0.0535 J
Sulfate	mg/L	10.7	56.4	54.8	11.0	11.0	11.2	10.7	10.8
Radiological									
Radium-226	pCi/L	-0.0600 +/-(0.0641) U	-0.0621 +/-(0.0653) U	0.0487 +/-(0.0721) U	-0.0147 +/-(0.0681) U	0.00158 +/-(0.0742) U	-0.0601 +/-(0.0691) U	-0.0703 +/-(0.0640) U	0.0479 +/-(0.0977) U
Radium-226+228	pCi/L	0.000 +/-(0.357) U	0.000 +/-(0.246) U	0.0944 +/-(0.317) U	0.000 +/-(0.518) U	0.601 +/-(0.348) U*	0.121 +/-(0.354) U	0.309 +/-(0.337) U	0.0479 +/-(0.347) U
Radium-228	pCi/L	-0.0664 +/-(0.351) U	-0.00454 +/-(0.237) U	0.0458 +/-(0.309) U	-0.162 +/-(0.513) U	0.599 +/-(0.340) U*	0.121 +/-(0.347) U	0.309 +/-(0.331) U	-0.170 +/-(0.333) U
General Chemistry									
Total Dissolved Solids	mg/L	87.0	82.0	84.0	85.0	98.0	91.0	92.0	90.0
Total Suspended Solids	mg/L	4.90	5.00	5.00	4.60	5.00	4.80	5.00	5.50
Hardness (as CaCO3)	mg/L	84.3	86.1	84.6	82.2	76.8	77.1	76.2	76.5

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR02								
Sample Date		9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019
Sample ID		WBF-STR-TR02-LB-SUR-20190709	WBF-STR-DUP02-20190709	WBF-STR-TR02-LB-MID-20190709	WBF-STR-TR02-LB-BOT-20190709	WBF-STR-TR02-CC-SUR-20190709	WBF-STR-TR02-CC-MID-20190709	WBF-STR-TR02-CC-BOT-20190709	WBF-STR-TR02-RB-SUR-20190709	WBF-STR-DUP01-20190709
Sample Depth (m)		0.5 m	0.5 m	2.9 m	5.8 m	0.5 m	2.1 m	4.25 m	0.5 m	0.5 m
Sample Type[1]		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Parent Sample Code			WBF-STR-TR02-LB-SUR-20190709							WBF-STR-TR02-RB-SUR-20190709
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units									
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.615 J	0.546 J	0.666 J	0.551 J	0.641 J	0.734 J	0.620 J	0.773 J	0.629 J
Barium	µg/L	29.6	28.3	29.1	30.3	28.7	28.7	30.4	28.5	30.4
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	µg/L	30.3 UJ	169 J	<30.3	<30.3	<30.3	<30.3	31.7 J	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	24,000	22,400	22,800	23,900	23,000	23,000	23,900	22,700	24,400
Chromium	µg/L	<1.53	<1.53	1.76 U*	<1.53	2.07 U*	2.30 U*	<1.53	1.85 U*	<1.53
Cobalt	µg/L	0.110 J	0.108 J	0.143 J	0.152 J	0.137 J	0.141 J	0.147 J	0.174 J	0.133 J
Copper	µg/L	0.932 J	2.06	1.12 J	0.901 J	1.08 J	1.12 J	0.967 J	1.04 J	1.33 J
Iron	µg/L	97.7	106	189	137	158	160	126	160	140
Lead	µg/L	0.141 J	0.143 J	0.152 J	0.184 J	0.179 J	0.177 J	0.175 J	0.184 J	0.173 J
Lithium	µg/L	<3.14	4.58 J	<3.14	<3.14	<3.14	<3.14	<3.14	3.91 J	<3.14
Magnesium	µg/L	6,060	5,800	5,790	6,100	5,830	5,920	6,110	6,000	6,170
Manganese	µg/L	79.2	72.6	92.1	103	94.5	97.4	101	91.6	96.7
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	0.327 J	0.376 J	<0.312	0.398 J	0.388 J	<0.312	0.317 J	<0.312
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	µg/L	1.15 U*	1.19 U*	1.37 U*	1.08 U*	1.51 U*	1.90 U*	1.10 U*	1.83 U*	1.19 U*
Zinc	µg/L	<3.22	<3.22	3.22 UJ	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.507 U*	0.522 U*	0.567 U*	0.498 U*	0.588 U*	0.613 U*	0.563 U*	0.591 U*	0.606 U*
Barium	µg/L	27.3	27.7	27.4	27.3	26.6	28.6	28.3	27.2	28.1
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	µg/L	30.3 UJ	144 J	<30.3	<30.3	<30.3	33.4 J	<30.3	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,200	23,200	23,600	23,300	22,700	24,100	23,700	22,700	23,600
Chromium	µg/L	<1.53	1.75 U*	<1.53	<1.53	1.71 U*	1.85 U*	<1.53	<1.53	1.57 U*
Cobalt	µg/L	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	0.0750 J	<0.0750	<0.0750	<0.0750
Copper	µg/L	0.774 U*	2.22 U*	23.7 J	0.760 U*	0.801 U*	0.959 U*	0.826 U*	1.27 U*	1.53 U*
Iron	µg/L	<14.1	<14.1	<14.1	<14.1	<14.1	27.5 J	<14.1	<14.1	17.7 J
Lead	µg/L	<0.128	<0.128	1.03	<0.128	<0.128	<0.128	<0.128	0.131 U*	<0.128
Lithium	µg/L	<3.14	4.19 J	<3.14	<3.14	<3.14	<3.14	<3.14	3.38 J	<3.14
Magnesium	µg/L	5,900	6,010	6,000	5,920	5,810	6,100	6,050	6,010	6,000
Manganese	µg/L	12.2	11.9	8.36	12.8	14.2	15.7	15.7	9.94	10.1
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	0.322 J	0.331 J	<0.312	0.333 J	<0.312	<0.312	<0.312	<0.312
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	µg/L	<0.899	1.29 U*	1.05 U*	<0.899	1.38 U*	1.49 U*	0.983 U*	1.45 U*	1.18 U*
Zinc	µg/L	<3.22	<3.22	14.8 J	<3.22	<3.22	<3.22	<3.22	4.90 J	<3.22
Anions										
Chloride	mg/L	4.09	4.10	4.09	4.93	4.06	4.11	4.10	4.03	4.08
Fluoride	mg/L	0.0533 J	0.0584 J	0.0529 J	0.0576 J	0.0545 J	0.0598 J	0.0574 J	0.0530 J	0.0569 J
Sulfate	mg/L	8.24	8.32	8.29	13.5	8.40	8.46	8.30	8.29	8.40
Radiological										
Radium-226	pCi/L	0.00470 +/-(0.0518) U	-0.0227 +/-(0.0557) U	-0.0206 +/-(0.0523) U	0.000 +/-(0.0568) U	-0.0313 +/-(0.0435) U	0.0455 +/-(0.0666) U	-0.0213 +/-(0.0601) U	-0.101 +/-(0.0505) U	-0.0451 +/-(0.0664) U
Radium-226+228	pCi/L	0.187 +/-(0.275) U	0.259 +/-(0.293) U	0.357 +/-(0.260) U	0.205 +/-(0.256) U	0.142 +/-(0.243) U	0.135 +/-(0.238) U	0.115 +/-(0.242) U	0.353 +/-(0.237) J	0.241 +/-(0.274) U
Radium-228	pCi/L	0.183 +/-(0.270) U	0.259 +/-(0.288) U	0.357 +/-(0.255) U	0.205 +/-(0.250) U	0.142 +/-(0.239) U	0.0898 +/-(0.228) U	0.115 +/-(0.234) U	0.353 +/-(0.232)	0.241 +/-(0.266) U
General Chemistry										
Total Dissolved Solids	mg/L	92.0	103	129	113	93.0	97.0	103	92.0 J	116 J
Total Suspended Solids	mg/L	2.80	3.20	4.40	4.90	3.90	4.30	3.80	4.30 J	3.20 J
Hardness (as CaCO3)	mg/L	84.8	79.9	80.9	84.8	81.5	81.8	84.8	81.3	86.5

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR02		STR-TR02						
Sample Date		9-Jul 2019	9-Jul 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019
Sample ID		WBF-STR-TR02-RB-MID-20190709	WBF-STR-TR02-RB-BOT-20190709	WBF-STR-TR02-LB-SUR-20191106	WBF-STR-TR02-LB-MID-20191106	WBF-STR-TR02-LB-BOT-20191106	WBF-STR-TR02-CC-SUR-20191106	WBF-STR-DUP02-20191106	WBF-STR-TR02-CC-MID-20191106	WBF-STR-TR02-CC-BOT-20191106
Sample Depth (m)		2.05 m	4.1 m	0.5 m	2.6 m	4.7 m	0.5 m	0.5 m	2.1 m	3.8 m
Sample Type[1]		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
Parent Sample Code								WBF-STR-TR02-CC-SUR-20191106		
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units									
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.605 J	0.794 J	0.921 J	0.587 J	0.737 J	0.611 J	0.544 J	0.672 J	0.489 J
Barium	µg/L	27.9	27.8	26.9	27.6	29.5	27.9	28.5	26.3	27.4
Beryllium	µg/L	<0.155	<0.155	0.300 J	0.267 J	0.281 J	0.315 J	0.309 J	0.293 J	0.330 J
Boron	µg/L	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,000	22,400	21,800	22,000	22,300	22,300	22,100	20,900	22,700
Chromium	µg/L	<1.53	1.67 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	0.135 J	0.124 J	0.210 J	0.146 J	0.206 J	0.216 J	0.192 J	0.148 J	0.147 J
Copper	µg/L	1.12 J	1.11 J	1.24 J	0.978 J	1.05 J	1.12 J	1.32 J	1.22 J	1.05 J
Iron	µg/L	132	150	78.3	76.8	139	76.4	77.7	76.7	73.8
Lead	µg/L	0.170 J	0.175 J	0.202 J	0.162 J	0.160 J	0.142 J	0.138 J	0.151 J	0.133 J
Lithium	µg/L	<3.14	<3.14	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	µg/L	5,830	5,760	6,770	6,700	6,830	6,880	6,710	6,320	6,980
Manganese	µg/L	91.1	87.2	47.6	48.1	49.6	45.8	45.4	42.4	45.6
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	0.613 J
Nickel	µg/L	0.366 J	0.386 J	1.45 U*	1.18 U*	1.23 U*	1.14 U*	1.28 U*	1.09 U*	1.07 U*
Selenium	µg/L	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.505 J
Vanadium	µg/L	1.27 U*	1.67 U*	1.38	1.10	1.38	1.40	1.13	1.01	1.17
Zinc	µg/L	<3.22	3.48 J	3.64 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.556 U*	0.648 U*	0.451 J	0.587 J	0.534 J	0.592 J	0.516 J	0.562 J	0.613 J
Barium	µg/L	26.7	26.5	26.0	26.9	26.4	25.7	27.2	26.8	26.2
Beryllium	µg/L	<0.155	<0.155	0.209 J	0.194 J	0.230 J	0.233 J	0.321 J	0.285 J	0.266 J
Boron	µg/L	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,200	22,900	22,200	22,100	21,800	22,200	21,900	22,100	22,400
Chromium	µg/L	1.53 U*	1.97 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	<0.0750	<0.0750	0.0960 J	<0.0750	0.0940 J	0.0830 J	<0.0750	<0.0750	0.115 J
Copper	µg/L	0.760 U*	0.980 U*	1.28 J	<0.627	1.00 J	1.01 J	1.03 J	0.927 J	0.818 J
Iron	µg/L	<14.1	15.9 J	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.14	<3.14	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	µg/L	5,890	5,830	6,880	6,700	6,570	6,910	6,640	6,710	6,900
Manganese	µg/L	9.27	12.2	3.41 J	3.10 J	3.25 J	2.94 J	2.69 J	2.63 J	2.73 J
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	0.341 J	1.12 U*	0.944 U*	0.919 U*	1.14 U*	1.23 U*	1.14 U*	1.42 U*
Selenium	µg/L	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.211 J
Vanadium	µg/L	1.50 U*	1.80 U*	1.08	<0.991	<0.991	1.06	1.08	1.07	1.15
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	4.02	3.99	5.83	6.10	6.08	6.32	6.09	6.39	6.25
Fluoride	mg/L	0.0575 J	0.0546 J	0.0516 J	0.0552 J	0.0569 J	0.0714 J	0.0553 J	0.0697 J	0.0676 J
Sulfate	mg/L	8.18	8.17	10.3	11.0	10.9	10.9	10.6	10.8	10.6
Radiological										
Radium-226	pCi/L	0.0159 +/-(0.0584) U	-0.0435 +/-(0.0692) U	0.0343 +/-(0.0845) U	-0.0288 +/-(0.0737) U	-0.0117 +/-(0.0749) U	-0.00596 +/-(0.0683) U	-0.0825 +/-(0.0689) U	-0.0443 +/-(0.0754) U	-0.0641 +/-(0.0680) U
Radium-226+228	pCi/L	0.0851 +/-(0.231) U	0.406 +/-(0.293) U	0.0343 +/-(0.257) U	0.171 +/-(0.336) U	0.000 +/-(0.328) U	0.203 +/-(0.259) U	0.483 +/-(0.333) U	0.000 +/-(0.275) U	0.000 +/-(0.278) U
Radium-228	pCi/L	0.0692 +/-(0.223) U	0.406 +/-(0.285) U	-0.131 +/-(0.243) U	0.171 +/-(0.328) U	-0.326 +/-(0.319) U	0.203 +/-(0.250) U	0.483 +/-(0.326) U	-0.00876 +/-(0.264) U	-0.0497 +/-(0.270) U
General Chemistry										
Total Dissolved Solids	mg/L	86.0	98.0	96.0	97.0	93.0	106	91.0	85.0	101
Total Suspended Solids	mg/L	4.00	4.30	4.40	4.90	5.30	4.90	4.30	4.60	4.60
Hardness (as CaCO3)	mg/L	81.6	79.6	82.2	82.6	83.8	84.0	82.7	78.1	85.5

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR02		STR-TR03						
Sample Date		6-Nov 2019	6-Nov 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019
Sample ID		WBF-STR-TR02-RB-SUR-20191106	WBF-STR-TR02-RB-BOT-20191106	WBF-STR-TR03-LB-SUR-20190709	WBF-STR-TR03-LB-MID-20190709	WBF-STR-TR03-LB-BOT-20190709	WBF-STR-TR03-CC-SUR-20190709	WBF-STR-TR03-CC-MID-20190709	WBF-STR-TR03-CC-BOT-20190709	WBF-STR-TR03-RB-SUR-20190709
Sample Depth (m)		0.5 m	1.5 m	0.5 m	1.9 m	3.75 m	0.5 m	2.9 m	5.8 m	0.5 m
Sample Type[1]		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
Parent Sample Code										
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units									
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.717 J	0.669 J	0.553 J	0.715 J	0.637 J	0.533 J	0.608 J	0.654 J	0.727 J
Barium	µg/L	28.6	28.2	27.7	28.0	28.3	27.2	28.9	28.1	29.0
Beryllium	µg/L	<0.182	0.277 J	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.218 J
Boron	µg/L	<38.6	<38.6	37.7 J	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,700	22,000	23,100	23,000	22,700	21,800	22,400	22,400	22,900
Chromium	µg/L	<1.53	<1.53	<1.53	2.15 U*	<1.53	<1.53	1.67 U*	2.29 U*	<1.53
Cobalt	µg/L	0.118 J	0.233 J	0.131 J	0.136 J	0.153 J	0.148 J	0.137 J	0.150 J	0.172 J
Copper	µg/L	0.741 J	1.19 J	1.21 J	1.73 J	1.09 J	1.13 J	1.19 J	1.20 J	1.47 J
Iron	µg/L	154	85.5	133	145	172	176	161	169	133
Lead	µg/L	0.155 J	0.156 J	0.334 J	0.173 J	0.311 J	0.180 J	0.375 J	0.240 J	0.176 J
Lithium	µg/L	3.84 J	<3.39	3.43 J	4.78 J	<3.14	<3.14	<3.14	<3.14	4.41 J
Magnesium	µg/L	6,940	6,830	5,870	5,890	5,770	5,630	5,760	5,750	6,000
Manganese	µg/L	45.3	46.0	93.2	95.1	96.6	90.6	92.1	94.2	78.1
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	0.659 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.599 U*	1.18 U*	<0.312	<0.312	0.609 J	0.458 J	0.348 J	0.543 J	<0.312
Selenium	µg/L	<1.51	<1.51	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	0.451 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	µg/L	1.38	1.22	1.05 U*	1.79 U*	1.56 U*	1.36 U*	1.57 U*	1.71 U*	1.65 U*
Zinc	µg/L	<3.22	<3.22	<3.22	4.44 J	6.66	3.37 J	3.41 J	7.23	3.77 J
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.450 J	0.645 J	0.573 U*	0.631 U*	0.539 U*	0.581 U*	0.606 U*	0.512 U*	0.768 U*
Barium	µg/L	25.2	26.3	26.5	26.9	25.1	26.3	24.1	26.6	29.6
Beryllium	µg/L	<0.182	0.259 J	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.170 U*
Boron	µg/L	<38.6	<38.6	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,200	22,400	23,100	23,200	21,900	22,800	20,700	23,200	24,800
Chromium	µg/L	<1.53	<1.53	<1.53	1.72 U*	<1.53	1.88 U*	2.47 U*	<1.53	1.83 U*
Cobalt	µg/L	<0.0750	0.100 J	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	0.0960 J
Copper	µg/L	0.952 J	0.881 J	1.44 U*	1.39 U*	0.985 U*	1.09 U*	0.961 U*	0.897 U*	1.30 U*
Iron	µg/L	<19.5	<19.5	<14.1	<14.1	<14.1	18.4 J	<14.1	<14.1	<14.1
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.39	<3.39	3.15 J	<3.14	<3.14	<3.14	<3.14	<3.14	5.20
Magnesium	µg/L	6,780	6,900	5,900	5,950	5,640	5,830	5,350	5,950	6,520
Manganese	µg/L	3.90 J	4.27 J	9.99	6.43	7.71	9.98	8.71	10.3	6.73
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	1.05 U*	1.12 U*	<0.312	<0.312	0.431 J	0.343 J	<0.312	<0.312	<0.312
Selenium	µg/L	<1.51	<1.51	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	0.209 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	µg/L	1.16	1.21	0.961 U*	1.31 U*	1.25 U*	1.60 U*	1.88 U*	1.11 U*	1.85 U*
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	4.46 J	<3.22
Anions										
Chloride	mg/L	6.14	6.37	4.09	4.08	4.07	4.02	4.10	4.08	4.21
Fluoride	mg/L	0.0784 J	0.0795 J	0.0565 J	0.0605 J	0.0568 J	0.0554 J	0.0538 J	0.0569 J	0.0584 J
Sulfate	mg/L	10.5	11.2	8.43	8.45	8.33	8.20	8.38	8.27	8.62
Radiological										
Radium-226	pCi/L	0.0490 +/-(0.0633) U	-0.0429 +/-(0.0513) U	0.00146 +/-(0.0553) U	0.0497 +/-(0.0704) U	-0.000764 +/-(0.0532) U	0.0319 +/-(0.0418) U	-0.00627 +/-(0.0295) U	0.0379 +/-(0.0404) U	0.0462 +/-(0.0438) U
Radium-226+228	pCi/L	0.690 +/-(0.357) J	0.000 +/-(0.271) U	0.117 +/-(0.220) U	0.188 +/-(0.248) U	0.263 +/-(0.264) U	0.310 +/-(0.249) U	0.315 +/-(0.267) U	0.0379 +/-(0.245) U	0.189 +/-(0.235) U
Radium-228	pCi/L	0.641 +/-(0.351)	-0.0626 +/-(0.266) U	0.115 +/-(0.213) U	0.139 +/-(0.238) U	0.263 +/-(0.259) U	0.278 +/-(0.245) U	0.315 +/-(0.265) U	-0.0474 +/-(0.242) U	0.143 +/-(0.231) U
General Chemistry										
Total Dissolved Solids	mg/L	85.0	87.0	103	95.0	96.0	100	94.0	94.0	113
Total Suspended Solids	mg/L	4.50	4.50	4.20	4.40	4.60	4.10	4.60	4.70	4.20
Hardness (as CaCO3)	mg/L	85.2	83.2	81.8	81.7	80.4	77.7	79.7	79.6	81.9

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR03		STR-TR03						
Sample Date		9-Jul 2019	9-Jul 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019
Sample ID		WBF-STR-TR03-RB-MID-20190709	WBF-STR-TR03-RB-BOT-20190709	WBF-STR-TR03-LB-SUR-20191106	WBF-STR-TR03-LB-MID-20191106	WBF-STR-TR03-LB-BOT-20191106	WBF-STR-TR03-CC-SUR-20191106	WBF-STR-TR03-CC-MID-20191106	WBF-STR-TR03-CC-BOT-20191106	WBF-STR-TR03-RB-SUR-20191106
Sample Depth (m)		2.05 m	4.1 m	0.5 m	2.0 m	3.5 m	0.5 m	2.0 m	3.5 m	0.5 m
Sample Type[1]		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
Parent Sample Code										
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units									
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.758 J	0.697 J	0.589 J	0.713 J	0.739 J	0.565 J	0.514 J	0.539 J	0.612 J
Barium	µg/L	29.3	29.1	28.5	27.5	28.4	26.8	26.0	28.5	27.3
Beryllium	µg/L	<0.155	<0.155	<0.182	<0.182	<0.182	0.300 J	0.238 J	0.270 J	0.241 J
Boron	µg/L	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,300	22,900	22,900	23,100	22,400	23,000	22,100	22,300	23,300
Chromium	µg/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	0.171 J	0.161 J	0.105 J	0.120 J	0.175 J	0.172 J	0.100 J	0.170 J	0.217 J
Copper	µg/L	1.31 J	1.06 J	0.770 J	0.795 J	0.657 J	1.25 J	1.09 J	1.18 J	1.22 J
Iron	µg/L	156	154	153	86.3	137	87.6	73.4	69.1	99.6
Lead	µg/L	0.159 J	0.163 J	0.148 J	<0.128	0.152 J	0.133 J	0.140 J	0.135 J	0.164 J
Lithium	µg/L	3.53 J	3.33 J	<3.39	<3.39	3.79 J	<3.39	<3.39	<3.39	<3.39
Magnesium	µg/L	6,190	5,940	7,080	7,140	6,820	7,120	6,650	6,910	7,300
Manganese	µg/L	85.2	85.7	49.3	49.1	49.6	46.3	45.0	44.9	42.6
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	<0.312	0.664 U*	1.02 U*	0.680 U*	1.26 U*	0.913 U*	1.53 U*	1.78 U*
Selenium	µg/L	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.177	<0.177	0.270 J	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.148	<0.148	<0.148	0.160 J	<0.148	<0.148	<0.148
Vanadium	µg/L	1.56 U*	1.56 U*	1.49	1.29	1.33	1.33	1.06	1.45	1.68
Zinc	µg/L	3.33 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	6.57
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.709 U*	0.708 U*	0.502 J	0.603 J	0.651 J	0.563 J	0.433 J	0.471 J	0.687 J
Barium	µg/L	26.8	26.4	24.0	25.6	25.6	25.3	24.6	25.8	25.5
Beryllium	µg/L	<0.155	<0.155	<0.182	<0.182	0.263 J	0.321 J	0.291 J	0.303 J	0.239 J
Boron	µg/L	<30.3	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,000	23,000	22,900	22,600	23,100	22,100	22,000	22,200	23,200
Chromium	µg/L	1.55 U*	1.84 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	0.0870 J	0.0900 J	<0.0750	<0.0750	0.120 J	0.143 J	<0.0750	0.0930 J	0.136 J
Copper	µg/L	0.913 U*	1.30 U*	<0.627	<0.627	0.912 J	1.17 J	0.873 J	0.930 J	1.07 J
Iron	µg/L	<14.1	<14.1	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	4.17 J	4.27 J	3.48 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	µg/L	6,110	5,980	7,040	7,000	7,170	6,860	6,740	6,950	7,150
Manganese	µg/L	5.81	5.94	2.07 J	1.93 J	4.47 J	7.25	3.35 J	3.21 J	3.46 J
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	0.703 J	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	<0.312	0.824 U*	0.762 U*	1.11 U*	1.38 U*	1.64 U*	1.31 U*	1.25 U*
Selenium	µg/L	<2.62	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.148	<0.148	0.457 J	<0.148	<0.148	<0.148	<0.148
Vanadium	µg/L	1.54 U*	1.70 U*	1.01	1.04	1.28	1.47	1.32	1.35	1.15
Zinc	µg/L	5.65	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	4.11	4.09	6.13	6.09	6.21	6.45	6.29	6.62	6.60
Fluoride	mg/L	0.0535 J	0.0562 J	0.0632 J	0.0690 J	0.0652 J	0.0739 J	0.0729 J	0.0739 J	0.0824 J
Sulfate	mg/L	8.44	8.29	10.3	10.3	10.7	11.0	10.7	11.1	11.8
Radiological										
Radium-226	pCi/L	0.0554 +/-(0.0662) U	0.0480 +/-(0.0656) U	0.0125 +/-(0.0914) U	-0.00830 +/-(0.0635) U	-0.0728 +/-(0.0627) U	-0.0677 +/-(0.0652) U	-0.0315 +/-(0.0831) U	0.00247 +/-(0.0791) U	0.0267 +/-(0.0515) U
Radium-226+228	pCi/L	0.148 +/-(0.246) U	0.109 +/-(0.231) U	0.368 +/-(0.356) U	0.000 +/-(0.301) U	0.000 +/-(0.435) U	0.328 +/-(0.402) U	0.228 +/-(0.464) U	0.234 +/-(0.327) U	0.196 +/-(0.339) U
Radium-228	pCi/L	0.0926 +/-(0.237) U	0.0606 +/-(0.221) U	0.355 +/-(0.344) U	-0.0593 +/-(0.294) U	-0.217 +/-(0.430) U	0.328 +/-(0.397) U	0.228 +/-(0.456) U	0.231 +/-(0.317) U	0.169 +/-(0.335) U
General Chemistry										
Total Dissolved Solids	mg/L	110	104	94.0	88.0	121	123	120	94.0	96.0
Total Suspended Solids	mg/L	4.60	4.20	4.30	4.50	5.00	4.30	4.50	4.50	5.10
Hardness (as CaCO3)	mg/L	83.8	81.6	86.3	87.2	84.1	86.7	82.5	84.1	88.2

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR03		STR-TR04						
Sample Date		6-Nov 2019	6-Nov 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019
Sample ID		WBF-STR-TR03-RB-MID-20191106	WBF-STR-TR03-RB-BOT-20191106	WBF-STR-TR04-LB-SUR-20190709	WBF-STR-TR04-LB-MID-20190709	WBF-STR-TR04-LB-BOT-20190709	WBF-STR-TR04-CC-SUR-20190709	WBF-STR-TR04-CC-MID-20190709	WBF-STR-TR04-CC-BOT-20190709	WBF-STR-TR04-RB-SUR-20190709
Sample Depth (m)		2.0 m	3.0 m	0.5 m	2.0 m	4.0 m	0.5 m	2.0 m	4.0 m	0.5 m
Sample Type[1]		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
Parent Sample Code										
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units									
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.754 J	0.621 J	0.551 J	0.610 J	0.589 J	0.724 J	0.556 J	0.579 J	0.530 J
Barium	µg/L	27.0	28.1	25.8	46.6	28.6	25.9	24.8	26.1	27.5
Beryllium	µg/L	0.281 J	0.234 J	<0.155	<0.155	<0.155	0.170 J	<0.155	<0.155	<0.155
Boron	µg/L	<38.6	<38.6	<30.3	123	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,100	23,400	22,500	23,000	23,000	23,200	22,200	23,400	24,300
Chromium	µg/L	<1.53	<1.53	<1.53	1.73 U*	<1.53	1.72 U*	1.75 U*	1.75 U*	1.81 U*
Cobalt	µg/L	0.153 J	0.103 J	0.118 J	0.133 J	0.173 J	0.217 J	0.135 J	0.142 J	0.129 J
Copper	µg/L	1.51 J	1.15 J	0.974 J	2.45	1.03 J	1.18 J	1.15 J	1.12 J	1.22 J
Iron	µg/L	76.9	74.6	140	185	189	172	142	159	133
Lead	µg/L	0.162 J	0.227 J	0.153 J	0.188 J	0.185 J	0.271 J	0.189 J	0.154 J	0.139 J
Lithium	µg/L	<3.39	<3.39	<3.14	4.06 J	<3.14	3.18 J	<3.14	<3.14	<3.14
Magnesium	µg/L	7,260	7,170	5,060	5,970	5,920	5,080	4,880	5,170	5,120
Manganese	µg/L	41.3	41.5	86.1	91.2	99.7	91.6	87.3	93.6	81.2
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	1.86 U*	1.02 U*	0.382 J	0.495 J	0.387 U*	0.516 J	0.408 J	0.452 J	0.408 J
Selenium	µg/L	<1.51	<1.51	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	<0.148	<0.128	<0.128	<0.128	0.221 J	<0.128	<0.128	<0.128
Vanadium	µg/L	1.61	1.42	1.36	1.47	1.38	1.61	1.55	1.56	1.52
Zinc	µg/L	7.38	5.80	<3.22	3.65 J	3.84 J	<3.22	3.47 J	<3.22	<3.22
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.518 J	0.376 J	0.441 J	0.498 J	0.543 J	0.488 J	0.447 J	0.419 J	0.463 J
Barium	µg/L	26.4	28.4	24.1	29.3	25.3	25.2	23.8	24.3	24.9
Beryllium	µg/L	0.229 J	<0.182	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155
Boron	µg/L	<38.6	<38.6	<30.3	81.2	<30.3	<30.3	<30.3	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,200	22,700	22,900	23,200	22,700	23,400	22,900	23,200	24,500
Chromium	µg/L	<1.53	<1.53	<1.53	1.73 U*	1.64 U*	<1.53	<1.53	<1.53	5.20 U*
Cobalt	µg/L	<0.0750	0.119 J	<0.0750	<0.0750	<0.0750	0.0870 J	<0.0750	<0.0750	<0.0750
Copper	µg/L	1.01 J	0.908 J	0.706 J	2.20	0.796 J	0.906 J	0.902 J	0.727 J	1.02 J
Iron	µg/L	<19.5	23.4 J	<14.1	<14.1	<14.1	42.9 J	<14.1	<14.1	31.1 J
Lead	µg/L	<0.128	0.184 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.39	<3.39	<3.14	3.49 J	3.55 J	<3.14	<3.14	<3.14	<3.14
Magnesium	µg/L	7,170	6,920	5,030	6,020	5,760	5,150	4,970	5,060	5,100
Manganese	µg/L	3.12 J	25.5	7.99	8.53	10.8	37.4	10.4	10.3	9.25
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	1.40 U*	1.23 U*	<0.312	0.383 J	<0.312	<0.312	0.339 J	<0.312	0.399 J
Selenium	µg/L	<1.51	<1.51	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	<0.148	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Vanadium	µg/L	1.02	1.15	<0.899	1.24	1.32	1.22	0.917 J	0.976 J	1.20
Zinc	µg/L	<3.22	4.51 J	<3.22	<3.22	3.59 J	<3.22	4.73 J	<3.22	<3.22
Anions										
Chloride	mg/L	6.56	6.61	4.06	4.03	3.98	4.15	4.05	4.03	4.10
Fluoride	mg/L	0.0681 J	0.0670 J	0.0592 J	0.0539 J	0.0524 J	0.0563 J	0.0566 J	0.0582 J	0.0573 J
Sulfate	mg/L	11.3	11.1	8.32	8.33	8.16	8.93	8.30	8.23	8.52
Radiological										
Radium-226	pCi/L	-0.0638 +/-(0.0576) U	-0.0471 +/-(0.0721) U	0.0817 +/-(0.0664) U	-0.0569 +/-(0.0372) U	-0.0159 +/-(0.0639) U	0.0829 +/-(0.0791) U	-0.0677 +/-(0.0503) U	0.0529 +/-(0.0557) U	0.0731 +/-(0.0618) U
Radium-226+228	pCi/L	0.220 +/-(0.302) U	0.299 +/-(0.290) U	0.385 +/-(0.253) U	0.455 +/-(0.347) U	0.529 +/-(0.308) J	0.362 +/-(0.299) U	0.260 +/-(0.261) U	0.320 +/-(0.251) U	0.105 +/-(0.314) U
Radium-228	pCi/L	0.220 +/-(0.296) U	0.299 +/-(0.281) U	0.304 +/-(0.244) U	0.455 +/-(0.345) U	0.529 +/-(0.301)	0.279 +/-(0.288) U	0.260 +/-(0.256) U	0.267 +/-(0.245) U	0.0317 +/-(0.308) U
General Chemistry										
Total Dissolved Solids	mg/L	91.0	95.0	107	98.0	100	102	94.0	101	95.0
Total Suspended Solids	mg/L	5.00	4.80	4.40	4.60	4.60	4.40	4.90	5.50	3.70
Hardness (as CaCO3)	mg/L	87.5	88.0	77.1	82.0	82.9	78.9	75.5	79.7	81.8

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR04	STR-TR04							
Sample Date		9-Jul 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019
Sample ID		WBF-STR-TR04-RB-BOT-20190709	WBF-STR-TR04-LB-SUR-20191106	WBF-STR-DUP01-20191106	WBF-STR-TR04-LB-BOT-20191106	WBF-STR-TR04-CC-SUR-20191106	WBF-STR-TR04-CC-MID-20191106	WBF-STR-TR04-CC-BOT-20191106	WBF-STR-TR04-RB-MID-20191106	WBF-STR-DUP03-20191106
Sample Depth (m)		1.5 m	0.5 m	0.5 m	2.9 m	0.5 m	2.5 m	4.5 m	1.0 m	1.0 m
Sample Type[1]		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Parent Sample Code				WBF-STR-TR04-LB-SUR-20191106						WBF-STR-TR04-RB-MID-20191106
Level of Review[2]		Final-Verified	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
	Units									
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.530 J	0.752 J	0.905 J	0.750 J	0.762 J	0.682 J	0.769 J	0.755 J	0.775 J
Barium	µg/L	27.1	29.5	29.6	29.4	28.3	29.4	28.9	30.2	30.1
Beryllium	µg/L	<0.155	<0.182	0.229 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	µg/L	<30.3	<38.6	49.0 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	0.132 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	24,500	21,200	21,300	21,200	20,600	21,500	20,900	22,000	21,700
Chromium	µg/L	11.9	2.29	2.44	2.24	2.24	1.94 J	1.99 J	2.46	2.17
Cobalt	µg/L	0.122 J	0.157 J	0.213 J	0.144 J	0.142 J	0.156 J	0.141 J	0.163 J	0.194 J
Copper	µg/L	1.53 J	0.973 J	1.14 J	1.06 J	0.995 J	0.976 J	1.00 J	1.32 J	1.17 J
Iron	µg/L	215	200	183	190	171	179	183	221	235
Lead	µg/L	0.172 J	0.222 J	0.319 J	0.210 J	0.181 J	0.202 J	0.172 J	0.229 J	0.299 J
Lithium	µg/L	<3.14	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	µg/L	5,200	6,070	6,080	5,960	5,880	6,160	5,940	6,270	6,130
Manganese	µg/L	88.6	48.4	47.0	48.0	43.8	46.3	44.6	50.3	49.3
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.620 J	0.368 J	0.510 J	0.392 J	0.414 J	0.524 J	0.405 J	0.449 J	0.483 J
Selenium	µg/L	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.148	0.301 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	µg/L	1.57	1.83	1.72	1.64	1.63	1.59	1.57	1.82	1.50
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	7.89	9.55	6.51
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.448 J	0.614 J	0.700 J	0.701 J	0.630 J	0.657 J	0.681 J	0.844 J	0.748 J
Barium	µg/L	24.4	26.4	26.4	25.8	25.7	26.4	26.4	27.9	27.5
Beryllium	µg/L	<0.155	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	µg/L	<30.3	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	47.3 J	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.130 J	<0.125
Calcium	µg/L	24,000	21,400	21,000	20,600	20,700	21,200	21,100	22,400	21,800
Chromium	µg/L	1.58 U*	1.67 J	2.27	2.14	1.78 J	2.10	2.06	1.97 J	2.12
Cobalt	µg/L	<0.0750	<0.0750	0.0840 J	<0.0750	<0.0750	<0.0750	<0.0750	0.137 J	0.0760 J
Copper	µg/L	0.808 J	0.722 U*	0.857 U*	0.776 U*	0.704 U*	0.796 U*	0.750 U*	1.46 U*	0.837 U*
Iron	µg/L	<14.1	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.155 J	<0.128
Lithium	µg/L	<3.14	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	µg/L	5,050	6,080	6,040	5,870	5,930	6,090	6,060	6,310	6,240
Manganese	µg/L	6.50	1.73 J	2.46 J	1.75 J	1.91 J	<1.35	<1.35	4.31 J	4.07 J
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	0.377 J	<0.336
Selenium	µg/L	<2.62	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.148	0.155 U*	<0.148	<0.148	<0.148	<0.148	0.280 U*	<0.148
Vanadium	µg/L	1.10	1.34	1.36	1.45	1.29	1.44	1.45	1.30	1.40
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	4.10	6.34	6.40	6.33	6.40	6.39	6.30	6.48	6.53
Fluoride	mg/L	0.0551 J	0.0611 J	0.0529 J	0.0606 J	0.0602 J	0.0621 J	0.0586 J	0.0618 J	0.0585 J
Sulfate	mg/L	8.48	11.3	11.2	11.0	11.3	11.3	11.1	11.5	11.6
Radiological										
Radium-226	pCi/L	0.0517 +/-(0.0732) U	-0.123 +/-(0.111) U	-0.0445 +/-(0.0647) U	0.0221 +/-(0.0960) U	0.0273 +/-(0.0878) U	-0.0348 +/-(0.0651) U	-0.0651 +/-(0.0627) U	-0.0358 +/-(0.0716) U	0.00469 +/-(0.0769) U
Radium-226+228	pCi/L	0.517 +/-(0.302) J	0.000 +/-(0.549) U	0.434 +/-(0.295) U	0.271 +/-(0.400) U	0.242 +/-(0.341) U	0.403 +/-(0.366) U	0.0209 +/-(0.282) U	0.381 +/-(0.332) U	0.172 +/-(0.311) U
Radium-228	pCi/L	0.465 +/-(0.293)	-0.302 +/-(0.538) U	0.434 +/-(0.288) U	0.249 +/-(0.388) U	0.214 +/-(0.329) U	0.403 +/-(0.360) U	0.0209 +/-(0.275) U	0.381 +/-(0.324) U	0.167 +/-(0.301) U
General Chemistry										
Total Dissolved Solids	mg/L	109	137 J	112	93.0	111	118	116	103	105
Total Suspended Solids	mg/L	4.70	5.00	5.10	4.60	4.60	4.00	4.90	5.90	6.20
Hardness (as CaCO3)	mg/L	82.7	77.9	78.2	77.5	75.8	79.1	76.7	80.8	79.3

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR05								STR-TR05
Sample Date		10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	6-Nov 2019
Sample ID		WBF-STR-TR05-LB-SUR-20190710	WBF-STR-TR05-LB-MID-20190710	WBF-STR-TR05-LB-BOT-20190710	WBF-STR-TR05-CC-SUR-20190710	WBF-STR-TR05-CC-MID-20190710	WBF-STR-TR05-CC-BOT-20190710	WBF-STR-TR05-RB-SUR-20190710	WBF-STR-DUP01-20190710	WBF-STR-TR05-LB-SUR-20191106
Sample Depth (m)		0.5 m	2.1 m	3.8 m	0.5 m	3.0 m	6.0 m	0.6 m	0.6 m	0.5 m
Sample Type[1]		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
Parent Sample Code									WBF-STR-TR05-RB-SUR-20190710	
Level of Review[2]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.625 J	0.786 J	0.621 J	0.491 J	0.553 J	0.542 J	0.759 J	0.563 J	0.865 J
Barium	µg/L	28.8	29.5	28.3	28.4	28.6	28.4	29.1	27.5	30.0
Beryllium	µg/L	0.162 U*	<0.155	<0.155	<0.155	<0.155	<0.155	0.368 J	<0.155	<0.182
Boron	µg/L	168	<30.3	<30.3	116	55.9 J	48.2 J	34.5 J	<30.3	43.7 J
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,600	22,900	22,700	21,300	21,200	21,300	23,100	21,800	21,700
Chromium	µg/L	<1.53	2.98 U*	1.67 U*	<1.53	<1.53	<1.53	<1.53	<1.53	2.13
Cobalt	µg/L	0.142 J	0.138 J	0.142 J	0.196 J	0.132 J	0.142 J	0.198 J	0.133 J	0.139 U*
Copper	µg/L	1.10 J	1.26 J	1.01 J	1.06 J	0.914 J	0.829 J	1.08 J	1.38 J	1.23 U*
Iron	µg/L	126	162	152	108	139	156	141	157	93.0
Lead	µg/L	0.210 J	0.190 J	0.188 J	0.135 J	0.141 J	0.150 J	0.213 J	0.319 J	0.192 U*
Lithium	µg/L	<3.14	3.46 J	<3.14	<3.14	<3.14	<3.14	4.89 J	<3.14	<3.39
Magnesium	µg/L	5,990	5,850	5,760	6,050	6,090	6,070	6,020	5,560	6,080
Manganese	µg/L	86.7	88.6	84.9	79.1	92.4	96.4	76.7	73.4	49.7
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	0.323 J	<0.312	<0.312	0.324 J	0.329 J	<0.312	0.316 J	0.357 J
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148
Vanadium	µg/L	1.08 U*	2.24 U*	1.48 U*	0.955 U*	1.23 U*	1.28 U*	1.42 U*	1.45 U*	1.66
Zinc	µg/L	<3.22	<3.22	3.78 J	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.504 J	0.563 J	0.610 J	0.504 J	0.483 J	0.569 J	0.703 J	0.549 J	0.796 J
Barium	µg/L	24.5	27.1	24.9	25.9	27.0	28.2	27.7	27.8	26.0
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.265 J	<0.155	<0.182
Boron	µg/L	<30.3	<30.3	<30.3	60.8 J	51.2 J	45.6 J	31.9 J	<30.3	39.5 J
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	21,300	23,000	21,500	20,500	20,800	21,300	23,500	23,700	21,200
Chromium	µg/L	<1.53	<1.53	2.84 U*	1.72 U*	<1.53	2.09 U*	<1.53	1.84 U*	2.07
Cobalt	µg/L	<0.0750	<0.0750	<0.0750	<0.0750	0.0850 J	0.104 J	0.0960 J	<0.0750	<0.0750
Copper	µg/L	1.14 J	0.891 J	0.914 J	0.744 J	<0.627	0.754 J	0.830 J	0.825 J	1.02 U*
Iron	µg/L	<14.1	<14.1	<14.1	<14.1	45.9 J	77.1	<14.1	<14.1	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	4.78 J	<3.14	<3.39
Magnesium	µg/L	5,450	5,820	5,450	5,940	6,050	6,060	6,240	6,050	5,920
Manganese	µg/L	4.17 J	3.61 J	4.62 J	4.93 J	39.8	55.3	3.85 J	3.74 J	2.15 J
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	<0.336
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148
Vanadium	µg/L	1.16	1.18	1.92	1.01	1.02	1.46	1.51	1.44	1.56
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	4.27	4.10	4.15	4.14	4.10	4.09	4.15	4.73	6.37
Fluoride	mg/L	0.0568 J	0.0549 J	0.0592 J	0.0553 J	0.0594 J	0.0553 J	0.0560 J	0.0728 J	0.0622 J
Sulfate	mg/L	8.58	8.19	8.42	8.32	8.18	8.19	8.29	9.79	11.2
Radiological										
Radium-226	pCi/L	-0.0183 +/-(0.0698) UJ	0.0252 +/-(0.0654) UJ	-0.0589 +/-(0.0483) UJ	-0.0148 +/-(0.0594) UJ	0.0551 +/-(0.0807) UJ	0.0473 +/-(0.0683) UJ	0.0750 +/-(0.0762) UJ	0.00898 +/-(0.0751) U	-0.0637 +/-(0.0765) U
Radium-226+228	pCi/L	0.0624 +/-(0.269) UJ	0.0566 +/-(0.264) UJ	0.504 +/-(0.303) U*	0.00650 +/-(0.245) UJ	0.398 +/-(0.314) UJ	0.338 +/-(0.275) UJ	0.327 +/-(0.335) UJ	0.0756 +/-(0.255) U	0.000 +/-(0.279) U
Radium-228	pCi/L	0.0624 +/-(0.260) U	0.0314 +/-(0.256) U	0.504 +/-(0.299) U*	0.00650 +/-(0.238) U	0.343 +/-(0.303) U	0.290 +/-(0.266) U	0.252 +/-(0.326) U	0.0667 +/-(0.244) U	-0.132 +/-(0.268) U
General Chemistry										
Total Dissolved Solids	mg/L	87.0	93.0	93.0	100	98.0	106	106	105	95.0
Total Suspended Solids	mg/L	4.10	4.40	4.00	3.50	4.20	4.10	4.50 J	3.60 J	4.70
Hardness (as CaCO3)	mg/L	83.5	81.3	80.3	78.1	78.1	78.1	82.3	77.4	79.1

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR05						STR-TR06		
Sample Date		6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019
Sample ID		WBF-STR-TR05-LB-BOT-20191106	WBF-STR-TR05-CC-SUR-20191106	WBF-STR-TR05-CC-MID-20191106	WBF-STR-TR05-CC-BOT-20191106	WBF-STR-TR05-RB-SUR-20191106	WBF-STR-TR05-RB-BOT-20191106	WBF-STR-TR06-LB-SUR-20190709	WBF-STR-TR06-LB-MID-20190709	WBF-STR-TR06-LB-BOT-20190709
Sample Depth (m)		2.9 m	0.5 m	2.5 m	4.9 m	0.5 m	2.8 m	0.5 m	1.5 m	2.5 m
Sample Type[1]		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
Parent Sample Code										
Level of Review[2]	Units	Validated	Validated	Validated	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.559 J	0.425 J
Arsenic	µg/L	0.789 J	0.639 J	0.603 J	0.927 J	0.607 J	0.599 J	0.540 J	0.707 J	0.583 J
Barium	µg/L	29.8	27.0	27.3	29.6	28.9	29.2	27.4	26.2	26.8
Beryllium	µg/L	<0.182	0.320 U*	0.261 U*	<0.182	<0.182	<0.182	<0.155	0.164 U*	<0.155
Boron	µg/L	38.8 J	<38.6	<38.6	68.4 J	<38.6	<38.6	<30.3	39.5 U*	36.3 U*
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	21,300	23,200	23,200	21,700	23,300	24,200	23,400	23,400	24,100
Chromium	µg/L	1.84 J	<1.53	<1.53	2.68	<1.53	<1.53	<1.53	2.73 U*	2.07 U*
Cobalt	µg/L	0.146 U*	0.164 J	0.151 J	0.151 U*	0.224 J	0.127 J	0.147 J	0.159 J	0.147 J
Copper	µg/L	1.15 U*	1.17 J	1.35 J	1.48 U*	1.13 J	1.04 J	1.02 J	1.23 J	1.13 J
Iron	µg/L	101	81.9	80.0	122	88.9	97.4	178	171	165
Lead	µg/L	0.194 U*	<0.128	0.132 J	0.218 U*	0.181 J	0.175 J	0.170 J	0.244 J	0.206 J
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	4.22 J	<3.14
Magnesium	µg/L	5,960	7,060	7,100	6,100	7,160	7,310	5,230	5,000	5,120
Manganese	µg/L	50.9	47.6	47.4	48.3	46.3	48.6	95.3	95.6	96.9
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.368 J	1.41 U*	1.80 U*	0.419 J	1.35 U*	1.36 U*	0.429 J	0.423 J	0.432 J
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.128	0.152 J	<0.128
Vanadium	µg/L	1.65	1.16	1.50	2.40	1.71	1.27	1.22	1.89	1.49
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	4.71 J	5.22	<3.22	<3.22	6.57
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.467 J	<0.378
Arsenic	µg/L	0.779 J	0.626 J	0.575 J	0.734 J	0.637 J	0.701 J	0.476 J	0.668 J	0.558 J
Barium	µg/L	27.3	26.4	25.8	26.0	26.8	26.7	24.6	24.4	26.5
Beryllium	µg/L	<0.182	<0.182	0.269 U*	<0.182	0.250 U*	0.327 U*	<0.155	0.244 U*	<0.155
Boron	µg/L	<38.6	<38.6	<38.6	48.1 J	<38.6	<38.6	<30.3	54.9 U*	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,000	23,500	23,200	21,200	23,500	24,100	23,200	23,800	23,900
Chromium	µg/L	1.99 J	<1.53	1.79 J	1.86 J	<1.53	<1.53	<1.53	1.70 U*	1.56 U*
Cobalt	µg/L	<0.0750	<0.0750	0.0880 J	<0.0750	<0.0750	0.100 J	<0.0750	0.106 J	0.103 J
Copper	µg/L	0.897 U*	0.855 U*	0.883 U*	0.929 U*	1.09 U*	0.780 U*	0.979 J	1.07 J	0.902 J
Iron	µg/L	<19.5	46.9 J	25.5 J	<19.5	<19.5	<19.5	<14.1	<14.1	87.1
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.138 J	<0.128
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	<3.14
Magnesium	µg/L	6,140	7,140	7,050	5,920	7,240	7,390	5,160	5,140	5,100
Manganese	µg/L	2.05 J	3.04 J	2.97 J	1.42 J	5.05	4.86 J	5.08	4.76 J	58.6
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.366 J	1.13 U*	1.75 U*	<0.336	1.48 U*	1.28 U*	<0.312	0.400 J	0.348 J
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.128	0.226 J	<0.128
Vanadium	µg/L	1.61	1.38	1.34	1.53	1.38	1.29	1.09	1.29	1.19
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	6.22	6.41	6.36	6.35	6.54	6.51	4.06	4.08	4.04
Fluoride	mg/L	0.0587 J	0.0608 J	0.0603 J	0.0628 J	0.0592 J	0.0619 J	0.0579 J	0.0579 J	0.0580 J
Sulfate	mg/L	11.0	11.4	11.2	11.2	11.5	11.5	8.35	8.32	8.39
Radiological										
Radium-226	pCi/L	-0.0136 +/-(0.128) U	0.115 +/-(0.102) U	-0.0150 +/-(0.0698) U	0.0465 +/-(0.113) U	-0.0421 +/-(0.0673) U	-0.0598 +/-(0.0751) U	-0.0349 +/-(0.0573) U	-0.0508 +/-(0.0660) U	0.0473 +/-(0.0688) U
Radium-226+228	pCi/L	0.674 +/-(0.657) U	0.189 +/-(0.352) U	0.132 +/-(0.273) U	0.255 +/-(0.484) U	0.370 +/-(0.495) U	0.160 +/-(0.426) U	0.623 +/-(0.303) J	0.133 +/-(0.283) U	0.136 +/-(0.295) U
Radium-228	pCi/L	0.674 +/-(0.644) U	0.0737 +/-(0.337) U	0.132 +/-(0.264) U	0.208 +/-(0.471) U	0.370 +/-(0.490) U	0.160 +/-(0.419) U	0.623 +/-(0.298)	0.133 +/-(0.275) U	0.0884 +/-(0.287) U
General Chemistry										
Total Dissolved Solids	mg/L	96.0	96.0	102	99.0	89.0	86.0	94.0	108	106
Total Suspended Solids	mg/L	4.40	4.50	4.60	4.50	5.60	5.60	4.70	4.70	4.60
Hardness (as CaCO3)	mg/L	77.8	86.9	87.0	79.2	87.5	90.5	79.9	79.1	81.4

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR06						STR-TR06		
Sample Date		9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	9-Jul 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019
Sample ID		WBF-STR-TR06-CC-SUR-20190709	WBF-STR-TR06-CC-MID-20190709	WBF-STR-TR06-CC-BOT-20190709	WBF-STR-TR06-RB-SUR-20190709	WBF-STR-TR06-RB-MID-20190709	WBF-STR-TR06-RB-BOT-20190709	WBF-STR-TR06-LB-SUR-20191106	WBF-STR-TR06-LB-BOT-20191106	WBF-STR-TR06-CC-SUR-20191106
Sample Depth (m)		0.5 m	3.5 m	7.0 m	0.5 m	1.5 m	2.7 m	0.5 m	2.5 m	0.5 m
Sample Type[1]		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
Parent Sample Code										
Level of Review[2]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated
Total Metals										
Antimony	µg/L	<0.378	<0.378	0.585 J	<0.378	<0.378	0.394 J	<0.378	<0.378	<0.378
Arsenic	µg/L	0.550 J	0.493 J	0.678 J	0.482 J	0.620 J	0.621 J	0.593 J	0.603 J	0.691 J
Barium	µg/L	26.4	25.6	26.9	26.4	27.2	27.3	29.5 J	30.6 J	29.8 J
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.325 U*	0.907 U*	0.725 U*
Boron	µg/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	51.0 J	38.8 J
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.153 J	0.152 J
Calcium	µg/L	24,500	23,400	24,100	24,400	24,700	24,200	20,700	21,300	21,400
Chromium	µg/L	2.33 U*	<1.53	3.90 U*	<1.53	1.94 U*	4.06 U*	<1.53	<1.53	<1.53
Cobalt	µg/L	0.120 J	0.133 J	0.125 J	0.130 J	0.115 J	0.131 J	0.142 J	0.187 J	0.137 J
Copper	µg/L	1.10 J	1.03 J	1.29 J	1.01 J	1.22 J	1.37 J	0.809 J	1.02 J	0.958 J
Iron	µg/L	131	132	152	125	137	158	255	238	177
Lead	µg/L	0.164 J	0.167 J	0.180 J	0.159 J	0.147 J	0.179 J	<0.128	0.165 J	<0.128
Lithium	µg/L	<3.14	<3.14	3.59 J	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	µg/L	5,170	4,860	5,130	5,120	5,160	5,140	5,880	5,920	5,960
Manganese	µg/L	91.0	94.8	98.1	88.4	90.7	88.9	57.3	56.1	47.5
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.428 J	0.424 J	0.437 J	0.446 J	0.421 J	0.439 J	0.449 J	0.446 J	<0.336
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	0.437 J	0.258 J
Vanadium	µg/L	1.22	1.26	2.26	1.05	1.80	1.98	1.05	1.19	1.21
Zinc	µg/L	<3.22	<3.22	<3.22	3.56 J	<3.22	<3.22	<3.22	<3.22	<3.22
Dissolved Metals										
Antimony	µg/L	0.378 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.545 J	0.473 J	0.486 J	0.384 J	0.544 J	0.474 J	0.540 J	0.543 J	0.560 J
Barium	µg/L	24.0	24.6	25.1	24.8	25.4	24.8	27.6	28.1	27.2
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.210 U*	<0.182	<0.182
Boron	µg/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	23,700	24,300	23,400	24,400	24,200	23,900	21,400	21,200	21,500
Chromium	µg/L	2.22 U*	<1.53	1.67 U*	<1.53	<1.53	1.62 U*	<1.53	<1.53	<1.53
Cobalt	µg/L	<0.0750	<0.0750	0.0850 J	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	µg/L	0.878 J	1.73 J	0.891 J	0.784 J	1.31 J	0.810 J	1.03 U*	0.898 U*	0.859 U*
Iron	µg/L	<14.1	22.1 J	58.4	<14.1	63.4	<14.1	<19.5	<19.5	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	3.34 J	<3.14	<3.14	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	µg/L	4,980	5,150	4,960	5,090	5,110	5,000	5,840	5,900	5,900
Manganese	µg/L	6.66	6.74	49.4	4.40 J	4.91 J	4.14 J	3.11 J	2.64 J	1.58 J
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	0.374 J	0.342 J	<0.312	0.441 J	<0.312	<0.336	<0.336	0.345 J
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	µg/L	1.48	<0.899	1.28	1.05	1.46	1.14	<0.991	<0.991	<0.991
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	4.11	4.08	4.06	4.14	4.08	4.11	5.14	6.21	6.08
Fluoride	mg/L	0.0562 J	0.0590 J	0.0595 J	0.0540 J	0.0529 J	0.0540 J	0.0515 U*	0.0579 U*	0.0576 U*
Sulfate	mg/L	8.36	8.50	8.31	8.47	8.31	8.48	8.44	10.8	10.7
Radiological										
Radium-226	pCi/L	0.0142 +/-(0.0561) U	-0.0291 +/-(0.0688) U	-0.0545 +/-(0.0567) U	0.0361 +/-(0.0608) U	-0.0414 +/-(0.0650) U	0.0164 +/-(0.0603) U	0.0182 +/-(0.0913) U	-0.0237 +/-(0.0838) U	-0.00673 +/-(0.110) U
Radium-226+228	pCi/L	0.368 +/-(0.289) U	0.587 +/-(0.344) J	0.156 +/-(0.327) U	0.654 +/-(0.323) J	0.231 +/-(0.292) U	0.0672 +/-(0.277) U	0.147 +/-(0.392) U	0.0759 +/-(0.361) U	0.407 +/-(0.384) U
Radium-228	pCi/L	0.353 +/-(0.283) U	0.587 +/-(0.337)	0.156 +/-(0.322) U	0.618 +/-(0.317)	0.231 +/-(0.285) U	0.0508 +/-(0.270) U	0.129 +/-(0.381) U	0.0759 +/-(0.351) U	0.407 +/-(0.368) U
General Chemistry										
Total Dissolved Solids	mg/L	107	114	108	88.0	91.0	88.0	94.0	79.0	86.0
Total Suspended Solids	mg/L	4.20	4.50	4.50	4.40	3.20	4.60	8.20	7.10	5.00
Hardness (as CaCO3)	mg/L	82.5	78.5	81.3	81.9	82.9	81.6	75.9	77.5	78.0

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR06					STR-TR07			
Sample Date		6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019
Sample ID		WBF-STR-TR06-CC-MID-20191106	WBF-STR-TR06-CC-BOT-20191106	WBF-STR-TR06-RB-SUR-20191106	WBF-STR-TR06-RB-MID-20191106	WBF-STR-TR06-RB-BOT-20191106	WBF-STR-TR07-LB-SUR-20190710	WBF-STR-DUP02-20190710	WBF-STR-TR07-LB-MID-20190710	WBF-STR-TR07-LB-BOT-20190710
Sample Depth (m)		2.0 m	4.2 m	0.5 m	2.5 m	5.0 m	0.5 m	0.5 m	2.0 m	3.5 m
Sample Type[1]		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
Parent Sample Code								WBF-STR-TR07-LB-SUR-20190710		
Level of Review[2]	Units	Validated	Validated	Validated	Validated	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.632 J	0.549 J	0.569 J	0.614 J	0.732 J	0.487 J	0.487 J	0.515 J	0.689 J
Barium	µg/L	29.3 J	29.1 J	29.1 J	27.9	28.4	24.5	27.8	27.4	30.5
Beryllium	µg/L	0.673 U*	0.660 U*	0.615 U*	0.303 U*	0.325 U*	<0.155	<0.155	<0.155	<0.155
Boron	µg/L	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	<30.3	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	21,400	21,200	21,100	22,500	23,100	22,500	22,200	24,700	23,200
Chromium	µg/L	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	1.60 U*	2.31 U*
Cobalt	µg/L	0.107 J	0.119 J	0.116 J	0.147 J	0.181 J	0.0910 J	0.117 J	0.130 J	0.160 J
Copper	µg/L	0.833 J	0.838 J	1.05 J	1.14 J	1.27 J	0.912 J	0.838 J	1.04 J	1.20 J
Iron	µg/L	179	177	158	75.6	90.3	105	123	205	223
Lead	µg/L	<0.128	<0.128	<0.128	0.154 J	0.224 J	<0.128	<0.128	0.171 J	0.203 J
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	<3.14	<3.14
Magnesium	µg/L	5,910	5,950	5,920	6,990	7,090	4,810	5,760	5,280	5,980
Manganese	µg/L	46.9	46.2	41.3	43.2	48.5	59.3	61.1	86.2	87.0
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.417 J	0.497 J	<0.336	1.48 U*	1.13 U*	0.390 J	<0.312	0.445 J	0.444 J
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.128	<0.128	<0.128	<0.128
Vanadium	µg/L	1.26	1.12	1.17	1.37	1.28	1.34 U*	1.05 U*	1.47 U*	2.09 U*
Zinc	µg/L	<3.22	<3.22	<3.22	4.07 J	4.40 J	<3.22	<3.22	<3.22	<3.22
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.633 U*	<0.378
Arsenic	µg/L	0.441 J	0.526 J	0.497 J	0.515 J	0.567 J	0.470 J	0.574 J	0.631 J	0.464 J
Barium	µg/L	26.2	27.4	27.6	27.1	26.5	24.6	28.2	25.8	27.6
Beryllium	µg/L	<0.182	<0.182	0.192 U*	0.218 U*	<0.182	<0.155	<0.155	0.169 J	<0.155
Boron	µg/L	<38.6	<38.6	<38.6	<38.6	<38.6	<30.3	<30.3	45.4 J	<30.3
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	21,000	21,200	21,300	21,000	22,400	24,000	23,800	24,700	23,400
Chromium	µg/L	<1.53	<1.53	<1.53	<1.53	<1.53	1.95 U*	1.78 U*	2.71 U*	<1.53
Cobalt	µg/L	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	0.0880 J	<0.0750
Copper	µg/L	0.860 U*	0.876 U*	0.928 U*	0.834 U*	0.774 U*	0.797 J	0.795 J	1.21 J	0.700 J
Iron	µg/L	<19.5	<19.5	<19.5	<19.5	<19.5	<14.1	<14.1	<14.1	<14.1
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.14	<3.14	3.46 J	<3.14
Magnesium	µg/L	5,830	5,880	5,950	5,840	6,840	5,180	6,110	5,300	5,990
Manganese	µg/L	1.58 J	1.48 J	<1.35	1.83 J	4.64 J	4.36 J	4.72 J	3.19 J	2.52 J
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.336	<0.336	<0.336	<0.336	1.00 U*	<0.312	<0.312	0.347 J	<0.312
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51	<2.62	<2.62	<2.62	<2.62
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.121	<0.121	<0.121	<0.121
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.128	<0.128	0.151 J	<0.128
Vanadium	µg/L	<0.991	<0.991	<0.991	<0.991	1.08	1.48	1.43	1.49	1.02
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	6.16	6.08	6.24	6.41	6.41	4.68	4.69	4.69	4.73
Fluoride	mg/L	0.0578 U*	0.0602 U*	0.0576 U*	0.0599 U*	0.0622 U*	0.0728 J	0.0766 J	0.0770 J	0.0718 J
Sulfate	mg/L	10.5	10.6	10.7	10.9	11.2	9.71	9.81	9.76	9.81
Radiological										
Radium-226	pCi/L	-0.0106 +/-(0.0813) U	-0.0731 +/-(0.0630) U	-0.0371 +/-(0.0759) U	0.0129 +/-(0.0884) U	-0.0520 +/-(0.0755) U	-0.00673 +/-(0.0589) U	0.0239 +/-(0.0795) U	0.0156 +/-(0.0608) U	-0.0721 +/-(0.0514) U
Radium-226+228	pCi/L	0.0370 +/-(0.320) U	0.0669 +/-(0.439) U	0.000 +/-(0.319) U	0.0129 +/-(0.288) U	0.000 +/-(0.367) U	0.269 +/-(0.293) U	0.273 +/-(0.267) U	0.0156 +/-(0.230) U	0.224 +/-(0.302) U
Radium-228	pCi/L	0.0370 +/-(0.309) U	0.0669 +/-(0.434) U	-0.113 +/-(0.310) U	-0.0870 +/-(0.274) U	-0.194 +/-(0.359) U	0.269 +/-(0.287) U	0.249 +/-(0.255) U	-0.0105 +/-(0.222) U	0.224 +/-(0.298) U
General Chemistry										
Total Dissolved Solids	mg/L	88.0	91.0	92.0	97.0	88.0	83.0 J	102 J	93.0	101
Total Suspended Solids	mg/L	4.70	4.80	5.60	5.30	6.20	2.70 J	1.40 J	5.30	5.70
Hardness (as CaCO3)	mg/L	77.9	77.5	77.0	84.9	86.9	75.9	79.3	83.3	82.7

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR07						STR-TR07		
Sample Date		10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	10-Jul 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019
Sample ID		WBF-STR-TR07-CC-SUR-20190710	WBF-STR-TR07-CC-MID-20190710	WBF-STR-TR07-CC-BOT-20190710	WBF-STR-TR07-RB-SUR-20190710	WBF-STR-TR07-RB-MID-20190710	WBF-STR-TR07-RB-BOT-20190710	WBF-STR-TR07-LB-SUR-20191106	WBF-STR-TR07-LB-BOT-20191106	WBF-STR-TR07-CC-SUR-20191106
Sample Depth (m)		0.5 m	4.0 m	7.6 m	0.5 m	2.1 m	4.0 m	0.5 m	2.0 m	0.5 m
Sample Type[1]		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
Parent Sample Code										
Level of Review[2]	Units	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Total Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.454 J	0.497 J	0.445 J	0.576 J	0.598 J	0.536 J	0.625 J	0.564 J	0.578 J
Barium	µg/L	24.7	24.3	27.0	29.5	30.1	26.3	29.3	29.7	29.6
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	0.485 J	0.532 J	0.623 J
Boron	µg/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,500	21,400	23,700	22,600	23,700	23,000	21,500	21,100	20,800
Chromium	µg/L	<1.53	<1.53	6.61 U*	<1.53	1.67 U*	1.79 U*	<1.53	<1.53	<1.53
Cobalt	µg/L	0.0950 J	0.102 J	0.136 J	0.122 J	0.134 J	0.116 J	0.172 J	0.164 J	0.0970 J
Copper	µg/L	0.951 J	0.962 J	1.44 J	1.01 J	1.10 J	1.10 J	0.992 J	0.939 J	0.883 J
Iron	µg/L	96.1	142	198	123	155	152	274	323	160 J
Lead	µg/L	<0.128	0.133 J	0.207 J	0.147 J	0.169 J	0.148 J	<0.128	0.128 J	<0.128
Lithium	µg/L	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	µg/L	4,920	4,600	5,110	5,790	5,990	5,090	5,890	5,860	5,860
Manganese	µg/L	67.2	75.2	90.3	70.2	77.2	74.5	53.8	56.9	44.8
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.369 J	0.380 J	0.506 J	<0.312	<0.312	0.394 J	0.432 U*	0.431 U*	0.399 U*
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	µg/L	1.30 U*	1.40 U*	1.23 U*	1.31 U*	1.69 U*	1.54 U*	1.17	1.26	<0.991
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	3.77 J	<3.22
Dissolved Metals										
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.454 J	0.450 J	0.480 J	0.602 J	0.668 J	0.448 J	0.625 J	0.484 J	0.651 J
Barium	µg/L	22.9	21.6	23.4	28.1	25.9	23.8	27.4	26.8	25.7
Beryllium	µg/L	<0.155	<0.155	<0.155	<0.155	<0.155	<0.155	<0.182	<0.182	<0.182
Boron	µg/L	<30.3	<30.3	<30.3	<30.3	<30.3	<30.3	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,500	20,600	22,700	23,100	22,000	23,200	21,500	20,800	20,800
Chromium	µg/L	2.28 U*	1.61 U*	1.78 U*	1.88 U*	2.55 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	<0.0750	<0.0750	<0.0750	0.0980 J	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750
Copper	µg/L	0.826 J	0.892 J	0.835 J	0.906 J	0.814 J	0.893 J	1.83 J	1.47 J	1.45 J
Iron	µg/L	<14.1	<14.1	<14.1	53.6	<14.1	<14.1	<19.5	<19.5	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.14	<3.14	<3.14	<3.14	<3.14	<3.14	<3.39	<3.39	<3.39
Magnesium	µg/L	4,800	4,460	4,740	5,880	5,580	5,060	5,860	5,810	5,740
Manganese	µg/L	10.6	1.46 J	<1.35	33.7	2.26 J	2.28 J	3.50 J	3.07 J	<1.35
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	<0.312	<0.312	<0.312	<0.312	<0.312	<0.312	0.336 U*	<0.336	<0.336
Selenium	µg/L	<2.62	<2.62	<2.62	<2.62	<2.62	<2.62	<1.51	<1.51	<1.51
Silver	µg/L	<0.121	<0.121	<0.121	<0.121	<0.121	<0.121	<0.177	<0.177	<0.177
Thallium	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.148	<0.148	<0.148
Vanadium	µg/L	1.26	1.26	1.37	1.39	2.16	0.899 J	<0.991	<0.991	<0.991
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22	<3.22
Anions										
Chloride	mg/L	4.84	4.74	4.73	4.17	4.72	4.73	6.09	6.08	6.09
Fluoride	mg/L	0.0696 J	0.0819 J	0.0720 J	0.0568 J	0.0749 J	0.0735 J	0.0543 J	0.0536 J	0.0604 J
Sulfate	mg/L	9.82	9.95	9.83	8.39	9.86	9.91	10.9	11.0	11.0
Radiological										
Radium-226	pCi/L	-0.0337 +/-(0.0447) U	-0.0149 +/-(0.0499) U	-0.000814 +/-(0.0513) U	-0.0409 +/-(0.0556) UJ	0.0322 +/-(0.0647) UJ	0.0398 +/-(0.0704) U	-0.108 +/-(0.0605) U	-0.0360 +/-(0.0737) U	-0.0206 +/-(0.0728) U
Radium-226+228	pCi/L	0.811 +/-(0.313) U*	0.288 +/-(0.314) U	0.326 +/-(0.256) U	0.000 +/-(0.279) UJ	0.363 +/-(0.289) UJ	0.405 +/-(0.252) U	0.0813 +/-(0.352) U	0.000 +/-(0.291) U	0.000 +/-(0.335) U
Radium-228	pCi/L	0.811 +/-(0.310) U*	0.288 +/-(0.310) U	0.326 +/-(0.251) U	-0.0372 +/-(0.273) U	0.331 +/-(0.282) U	0.365 +/-(0.242) U	0.0813 +/-(0.347) U	-0.416 +/-(0.282) U	-0.0311 +/-(0.327) U
General Chemistry										
Total Dissolved Solids	mg/L	90.0	80.0	87.0	101	92.0	96.0	91.0	87.0	88.0
Total Suspended Solids	mg/L	3.20	3.80	4.60	3.50	3.60	4.40	7.40	7.90	4.80
Hardness (as CaCO3)	mg/L	76.5	72.4	80.3	80.3	83.9	78.5	77.8	76.7	76.2

TABLE B.5 – Surface Stream Analytical Results
Watts Bar Fossil Plant
July and November 2019

Transect Location ID		STR-TR07				
Sample Date		6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019	6-Nov 2019
Sample ID		WBF-STR-DUP04-20191106	WBF-STR-TR07-CC-MID-20191106	WBF-STR-TR07-CC-BOT-20191106	WBF-STR-TR07-RB-SUR-20191106	WBF-STR-TR07-RB-BOT-20191106
Sample Depth (m)		0.5 m	3.5 m	6.5 m	0.5 m	1.6 m
Sample Type[1]		Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Parent Sample Code		WBF-STR-TR07-CC-SUR-20191106				
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units					
Total Metals						
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.478 J	0.596 J	0.583 J	0.553 J	0.888 J
Barium	µg/L	27.7	28.8	29.1	30.7	31.1
Beryllium	µg/L	0.258 J	0.359 J	0.459 J	0.543 J	0.846 J
Boron	µg/L	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,000	21,200	20,900	21,300	21,600
Chromium	µg/L	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	0.150 J	0.0880 J	0.0870 J	0.113 J	0.272 J
Copper	µg/L	1.23 J	0.817 J	0.831 J	0.807 J	1.17 J
Iron	µg/L	73.4 J	171	183	228	303
Lead	µg/L	0.156 J	<0.128	<0.128	<0.128	0.242 J
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	3.51 J
Magnesium	µg/L	6,760	5,790	5,840	5,910	6,150
Manganese	µg/L	44.7	46.0	46.7	48.5	55.6
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	1.32 U*	0.364 U*	0.367 U*	0.437 U*	0.591 U*
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	0.210 J
Vanadium	µg/L	1.32	<0.991	1.08	1.10	1.25
Zinc	µg/L	<3.22	<3.22	<3.22	3.80 J	<3.22
Dissolved Metals						
Antimony	µg/L	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	µg/L	0.551 J	0.516 J	0.542 J	0.521 J	0.522 J
Barium	µg/L	25.8	26.3	27.5	28.7	27.1
Beryllium	µg/L	0.196 J	<0.182	<0.182	0.197 J	0.216 J
Boron	µg/L	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	µg/L	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	µg/L	22,300	21,200	21,400	21,400	21,400
Chromium	µg/L	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	µg/L	0.0830 J	<0.0750	<0.0750	<0.0750	<0.0750
Copper	µg/L	0.674 J	1.07 J	1.49 J	1.33 J	1.16 J
Iron	µg/L	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	µg/L	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	µg/L	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	µg/L	6,740	5,830	5,860	5,930	6,000
Manganese	µg/L	2.34 J	1.82 J	2.26 J	4.32 J	5.75
Mercury	µg/L	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	µg/L	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	µg/L	0.913 U*	<0.336	<0.336	<0.336	<0.336
Selenium	µg/L	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	µg/L	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	µg/L	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	µg/L	<0.991	<0.991	<0.991	<0.991	<0.991
Zinc	µg/L	<3.22	<3.22	<3.22	<3.22	<3.22
Anions						
Chloride	mg/L	6.17	6.12	6.10	6.14	6.02
Fluoride	mg/L	0.0546 J	0.0618 J	0.0586 J	0.0523 J	0.0541 J
Sulfate	mg/L	10.9	11.0	10.8	11.0	10.8
Radiological						
Radium-226	pCi/L	0.0142 +/-(0.0660) U	0.0450 +/-(0.0917) U	-0.0177 +/-(0.0691) U	-0.0551 +/-(0.0667) U	-0.0190 +/-(0.0747) U
Radium-226+228	pCi/L	0.0142 +/-(0.322) U	0.467 +/-(0.346) U	0.335 +/-(0.370) U	0.195 +/-(0.451) U	0.370 +/-(0.392) U
Radium-228	pCi/L	-0.212 +/-(0.315) U	0.422 +/-(0.334) U	0.335 +/-(0.363) U	0.195 +/-(0.446) U	0.370 +/-(0.385) U
General Chemistry						
Total Dissolved Solids	mg/L	89.0	88.0	104	115	105
Total Suspended Solids	mg/L	4.60	4.90	4.50	6.70	7.40
Hardness (as CaCO3)	mg/L	82.8	76.8	76.2	77.5	79.4

Notes:

<	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
µg/L	micrograms per Liter
pCi/L	picoCuries per Liter
U	Not detected
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. Units have been converted automatically in this table, and significant figures may not have been maintained.
2. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX J.3

TECHNICAL EVALUATION OF SEDIMENT AND BENTHIC INVERTEBRATE DATA

TVA TENNESSEE VALLEY AUTHORITY

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

Watts Bar Fossil Plant

Spring City, Tennessee

Tennessee Valley Authority

TVA

Title and Approval Page

Title of Document:	Appendix J.3 – Technical Evaluation of Sediment and Benthic Macroinvertebrate Data Watts Bar Plant Tennessee Valley Authority Spring City, Tennessee
Prepared By:	Tennessee Valley Authority
Effective Date:	March 31, 2024 Revision: 1

TVA Compliance Point of Contact	3/25/24 Date
TVA Technical Point of Contact	3/25/24 Date
TVA Limnologist, Fisheries & Aquatic Monitoring	3/25/2024 Date
QA Oversight Manager	3/17/2024 Date

TVA

Revision Log

Revision	Date	Description
0	November 7, 2023	Submittal to TDEC
1	March 31, 2024	Addresses January 31, 2024 TDEC Review Comments and Issued for TDEC

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Acronyms and Abbreviations

ATL	Alternate Thermal Limit
BIP	Balanced Indigenous Population
CARA	Corrective Action and Risk Assessment
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
CWA	Clean Water Act
EAR	Environmental Assessment Report
EI	Environmental Investigation
EIP	Environmental Investigation Plan
ESV	Ecological Screening Value
EPT	Ephemeroptera, Plecoptera, and Trichoptera
HBI	Hilsenhoff Biotic Index
NPDES	National Pollutant Discharge Elimination System
%	Percent
PLM	Polarized Light Microscopy
RBI	Reservoir Benthic Index
REH	Reservoir Ecological Health
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
TRM	Tennessee River Mile
TTR	Total Taxa Richness
TVA	Tennessee Valley Authority
VS	Vital Signs
WBF Plant	Watts Bar Fossil Plant
WBN Plant	Watts Bar Nuclear Plant

Chapter 1 Introduction

The Tennessee Valley Authority (TVA) has prepared this technical evaluation appendix to summarize historical and recent sediment, benthic macroinvertebrate, and Asiatic clam sampling data at TVA's Watts Bar Fossil Plant (WBF Plant) in Spring 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 Asiatic Clam Investigation

The purposes of the sediment and benthic macroinvertebrate investigations were to characterize concentrations of Coal Combustion Residuals (CCR)-related constituents in sediment and in Asiatic clam 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 WBF Plant.

Benthic macroinvertebrates are aquatic organisms that live in and on riverbed substrates, are relatively immobile, and 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 WBF Plant CCR management units.

For this investigation, TVA reviewed historical sediment and benthic macroinvertebrate studies in streams and rivers adjacent to the WBF 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 Asiatic clams (*Corbicula fluminea*) for evaluation of bioaccumulation of CCR constituents because insufficient mayflies were encountered in the study area.

The following chapters summarize the previous studies and present overall sediment, benthic macroinvertebrate, and Asiatic clam investigation and evaluation findings based on data obtained during previous studies and the EI for the WBF Plant.

2.1 Historical Studies

Located adjacent to the WBF Plant, historical monitoring data collected in association with the Watts Bar Nuclear Plant (WBN Plant) is applicable to both facilities, having similar spatial coverages for sediment and benthic studies. The WBF Plant was decommissioned in 1982 and is currently inactive, and the WBN Plant became operational in 1996. Benthic studies completed between 1973 and 1985 were considered pre-operational studies for the WBN Plant.

Historically, TVA has conducted biological assessments by periodically monitoring aquatic communities (fish and benthic macroinvertebrates) near the WBF and WBN Plants to evaluate their status upstream and downstream of the WBN Plant thermal discharge. As previously discussed, the WBF has been inactive since 1982 and does not currently discharge thermal effluent. This monitoring was conducted in support of the WBF and WBN Plants Alternate Thermal Limit (ATL) site discharges under WBF National Pollutant Discharge Elimination System (NPDES) Permit No. TN0005461 (inactive) and WBN NPDES No. TN0020168 (TDEC 2022). The primary focus of the Clean Water Act (CWA) Section 316(a)[1] biological assessments consisted of TVA collecting and analyzing biological data on fish and benthic invertebrate communities to characterize the compositions of those communities upstream and downstream of the plant and

[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.

demonstrate that a balanced indigenous population (BIP[2]) of fish and wildlife is present and being maintained downstream of the WBF Plant.

In 2001, TVA and TDEC reached an agreement whereby TVA's Reservoir Ecological Health (REH) program (formerly known as the Vital Signs program) would be the accepted study design for measuring the presence and maintenance of a BIP to support 316(a)-based ATLs (TDEC 2001). Initially, the Section 316(a) demonstration studies focused on fish community sampling (see Appendix J.5). In 2010, sampling of benthic macroinvertebrate communities using the REH Reservoir Benthic Index (RBI) methodology was added to the Section 316(a) program to assess the status and composition of the benthic community upstream and downstream from WBN (TVA 2018a).

Historical sediment sampling for CCR constituents and historical benthic macroinvertebrate sampling for bioaccumulation analysis have not been conducted in the Tennessee River adjacent to the WBF Plant, as detailed in Sections 2.1.1 and 2.1.3, respectively. Historical benthic community assessments were completed in the 1970s through 2017 as detailed in Section 2.1.2. The TDEC Order investigation included collection of sediment samples for chemical analysis, benthic macroinvertebrate samples for assessing benthic community composition, and Asiatic clam samples for bioaccumulation analysis, as summarized in Section 2.2. Analysis and discussion of the results are presented in Section 3 and conclusions are presented in Section 4.

2.1.1 Historical Sediment Studies

Historical sediment sampling for CCR constituents has not been conducted in the Tennessee River adjacent to the WBF Plant.

2.1.2 Historical Benthic Macroinvertebrate Studies

Non-radiological pre- and post-operational biomonitoring was conducted at the WBN Plant from 1973-1979, 1982-1985, and 1996-1997 (TVA 1980a, 1980b, 1986, 1997, and 1998). This monitoring evaluated biological and chemical parameters for potential impacts associated with WBN operations. Parameters included juvenile and adult fish, entrainment of fish eggs and larvae, fish impingement, fishery creel survey, benthic macroinvertebrate communities, native mussel fauna, and various water quality parameters (TVA 1998). Several communities of invertebrates, plankton, and periphyton showed declining abundance trends during the WBN Plant pre-operational assessment, which was attributed to the wide range in flow and climatic conditions. TVA's 1998 analysis showed seasonal and yearly changes in abundance and other variables for all studied populations except freshwater mussels (which were common throughout the period analyzed) and concluded that the first two years of the WBN Plant operation were not negatively impacting the fish population, benthic macroinvertebrate community, or water quality downstream from the WBN Plant.

Beginning in 1999, NPDES Permit No. TN0020168 for operation of the WBN Plant required periodic aquatic monitoring to determine if the CWA Section 316(a) ATLs established for the thermal component of the WBN Plant discharge were protective of a BIP of aquatic life. NPDES permit renewal is based on demonstrating successful fish and wildlife BIP protection in accordance with Section 316(a) of the CWA. This monitoring detects and evaluates any impact of the WBN Plant thermal discharge on various biological and chemical components including fish, benthic macroinvertebrate, and wildlife communities; thermal plume intensity and extent; and water quality parameters upstream and downstream from the WBN Plant. Benthic grab samples were collected at full width reservoir transects at the Chickamauga Reservoir

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[2] 40 C.F.R. § 125.71(c) (2021).

downstream and Watts Bar Reservoir upstream, and benthic community results were evaluated using the RBI methodology. The RBI scores were then compared to reference conditions developed as part of TVA's REH monitoring program because the upstream (control) reach was established in the Watts Bar forebay which is a different reservoir zone type than the downstream Chickamauga Reservoir inflow region with appreciably different flow regimes and ecologies. Therefore, comparisons between the two are inappropriate and biological monitoring data within the two reaches were compared to the same locations during previous sampling periods (TVA 2018a).

Between 2001 and 2017, the RBI scores for the Chickamauga Reservoir inflow (Tennessee River Mile (TRM) 529) downstream from the WBF Plant were categorized as "Good" to "Excellent" with individual scores varying less than 5 points year-to-year indicating consistency of ecological conditions. Watts Bar Reservoir forebay (TRM 531) has typically been categorized as "Poor" due to the poor benthic habitat in the forebay. Chickamauga Reservoir inflow RBI scores have typically been higher than Watts Bar Reservoir forebay scores but have followed the same year-to-year trends (TVA 2018a).

2.1.2.1 Historical Benthic Macroinvertebrate Studies Conclusions

Monitoring reports have found that fish, benthic, and wildlife communities downstream from the WBN Plant appear healthy and TVA has concluded that the WBN Plant effluent has not adversely impacted a BIP of aquatic life (TVA 2018a).

2.1.3 Historical Mayfly or Alternate Benthic Macroinvertebrate Tissue Studies

Asiatic clam collections during previous studies were limited to those incorporated into the RBI sampling. Clams were not historically collected for bioaccumulation analysis for the 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 bioaccumulation in benthic macroinvertebrates (Asiatic clams) in the Tennessee River in proximity to the WBF Plant CCR management units to evaluate if CCR material and/or dissolved CCR constituents have moved into surface water, potentially impacting aquatic life. The EI activities were conducted in general accordance with the *Environmental Investigation Plan (EIP)* (TVA 2018b), *Benthic Sampling and Analysis Plan (SAP)* (Stantec 2018), 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).

The scope of the EI sampling activities is described below.

<u>Sediment</u>

Sediment sampling was proposed at three discrete stations along each of seven transects in the Tennessee River, located downstream of Watts Bar Dam. However, due to high flow velocities in this river reach, resulting in sediment transport and scour, depositional areas were expected to be lacking. Reconnaissance of the substrates within the proposed study area was conducted on January 31 and March 28, 2019, to evaluate the likelihood of success in collecting grab samples of depositional sediments. As anticipated, it was only possible to collect sediment samples from a total of seven locations during sediment sampling conducted on March 28 and April 1, 2019. These included five of the 21 stations originally proposed in the Benthic SAP and two additional stations substantially offset from the proposed locations. Only surficial sediments (0 to 6 inches deep) were encountered in the WBF Plant study area. By necessity, each sediment sample was composited from several substrate grabs within an approximately 300-foot distance upstream and/or downstream of each sampling transect to obtain sufficient sample volumes to meet study objectives. The expanded sampling zones along the transects are shown as shaded areas in Exhibit J.3-1.

Benthic Macroinvertebrates

Benthic macroinvertebrate sampling was conducted within the Tennessee River for the TDEC Order EI, as shown on Exhibit J.3-2. The Tennessee River was sampled at seven transect locations using a Ponar Dredge: two upstream locations in the Watts Bar Reservoir (above Watts Bar Dam), three adjacent to the WBF Plant, and two downstream of the WBF Plant.

Sampling was performed in September 2019, along the 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).

Asiatic Clam Tissue

The Benthic SAP specified the collection of composite samples of mayfly (*Hexagenia* spp.) adults and nymphs but allowed for the evaluation of other benthic macroinvertebrate species if an insufficient number of mayflies were encountered in the designated areas. Mayflies, which inhabit fine silt-clay substrates versus the sand-gravel substrates characterizing the study area, were not present in sufficient numbers to generate the composite samples. Composite Asiatic clam (*Corbicula fluminea*) tissue samples were therefore collected in lieu of mayflies in June and July 2019 from three areas (reaches) of the Tennessee River. The reaches were located upstream, adjacent, and downstream relative to the WBF Plant CCR management units, as shown on Exhibit J.3-3.

Chapter 3 Results and Discussion

Data from the EI were collected from the Tennessee River proximate to the WBF Plant. The results of the sample analyses and evaluation are discussed in the Chapters below.

TDEC-approved acute and chronic ecological screening values (ESVs) for the EAR (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 data for the WBF Plant is presented in Appendix E.6, 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 investigation.

3.1 Sediment

A total of seven shallow sediment samples and one duplicate sample were collected from the Tennessee River proximal to the WBF Plant, as described in Chapter 2.2. The sediment samples were analyzed by an accredited laboratory for percent ash and the following CCR-related constituents, hereafter referred to collectively as “CCR Parameters.”

- 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 in Table J.3-1.

3.1.1 Exploratory Data Analysis

Based on the phased approach proposed in the *Benthic SAP*, the seven shallow sediment samples and one duplicate sample were analyzed using Polarized Light Microscopy (PLM) for percent ash and for the CCR Parameters as part of Phase 1. None of the PLM results for sediment samples collected from the Tennessee River were above the 20 percent

(%) ash threshold defined for the EAR (Appendix A.2) that would potentially trigger additional sampling. The Phase 1 exploratory data analysis (Table 1-3 and Appendix E.6) showed that none of the sediment sample CCR Parameter concentrations were above the TDEC-approved chronic or acute ESVs.

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 WBF 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 WBF 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 Asiatic clam 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 (Pennington Associates, Inc.) to generate complete taxa lists and individual taxon counts for each sampling transect or location. These community composition data were then used to calculate the multi-metric RBI and supplemental individual metrics for comparative analysis of conditions surrounding the WBF Plant within the Tennessee River.

Past practice has been that the multi-metric RBI was applied by treating 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 collected at each transect in the Tennessee River to generate a comprehensive taxa list for each transect prior to calculating RBI outcomes. This transect composite 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 and robust 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, 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 will be highlighted and discussed in Chapters 3.2.1.1 and 3.2.1.2.

<u>Reservoir Benthic Index (RBI)</u>

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 WBF plant. The RBI methodology uses seven metrics that represent different benthic community characteristics. Results for each metric are assigned an adjusted score of 1, 3, or 5 based on established categorical value ranges (TVA 2016, Table 5). The seven adjusted 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 Tennessee River near Watts Bar Nuclear Plant Discharge* (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).

<u>Supplemental Metrics</u>

Four additional metrics, supplemental to the multi-metric RBI, were also included in this analysis as stand-alone indicators of biological health in the Tennessee River.

1. Hilsenhoff Biotic Index (HBI) – An index that measures community sensitivity to environmental stress, based on 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 Department of Environment and Natural Resources tolerance values adopted for use in Tennessee. The HBI is calculated using the following equation:

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

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 reaches of the Tennessee River proximal to the WBF plant, the value ranges in each category are shown in the figures referenced in forthcoming sections 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 3.2.1.1 for the Tennessee River, as they do not accurately describe conditions for this application. The score ranges within each category remain applicable in evaluating conditions therein, 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 (6.51-7.50)
- 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.

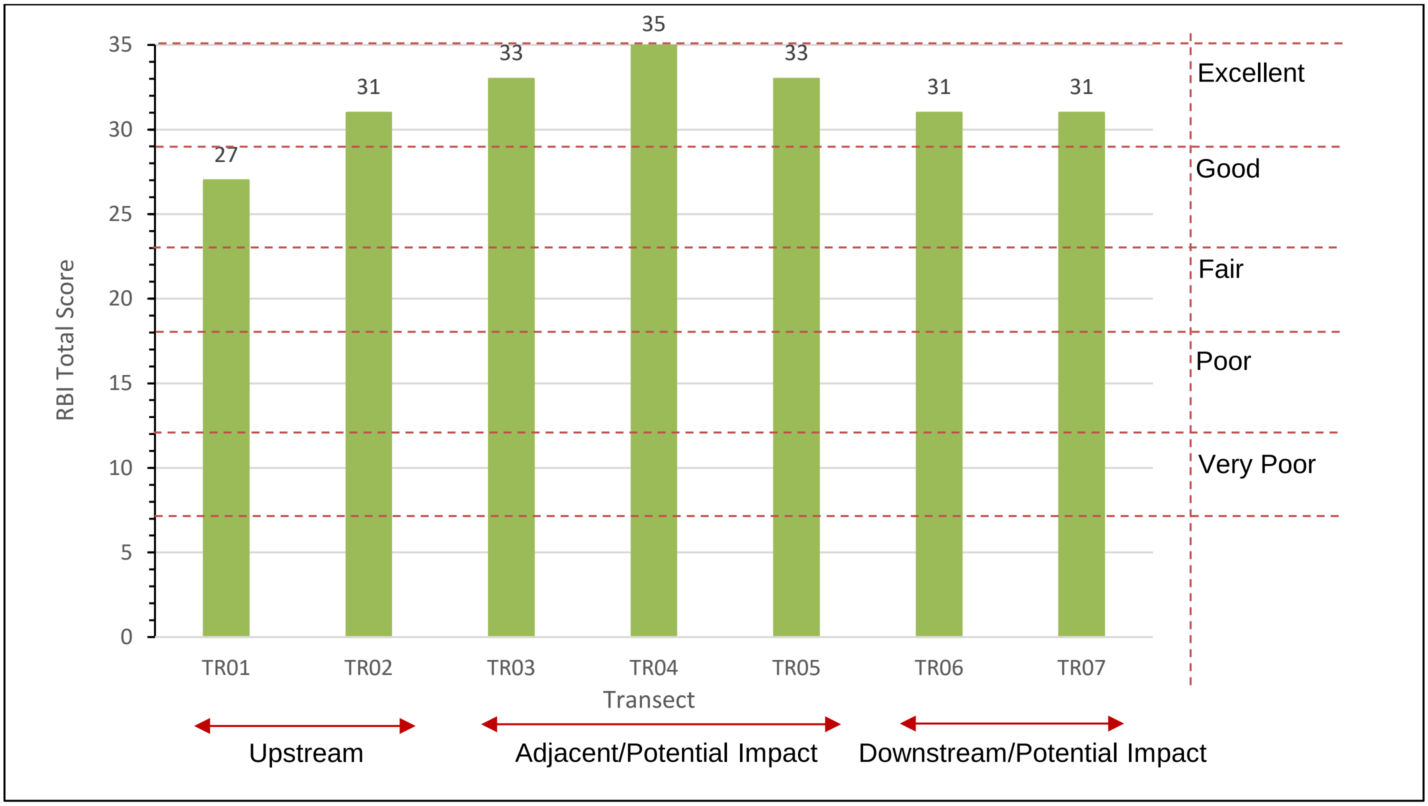
Additionally, functional feeding groups were assigned to each taxon, and community distributions were calculated as relative abundance (%). Taxa lists, the metrics described above, and feeding group distributions are included on benthic community summary sheets in Attachment J.3-A along with a summary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

The following subsections summarize the results of the RBI applied to the Tennessee River. 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 Multi-metric Biotic Index Results

<u>Tennessee River – Reservoir Biotic Index</u>

Figure J.3-1 presents the RBI Total Scores and associated categorical ratings from the September 2019 (Low Pool) macroinvertebrate survey on the Tennessee 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 – Tennessee River 2019 RBI Results Summary

Transects TR01 and TR02 represent upstream conditions not affected by plant operations; however, it should be noted that they are separated from the Plant by the Watts Bar Dam. As the two upstream transects are located within the lentic environment of the Watts Bar Reservoir, habitat conditions differ from those within the Tennessee River flowing past the WBF Plant. Therefore, while upstream locations are outside of the zone of potential impact from the Plant, they do not serve as ideal controls for comparison to conditions adjacent to and downstream of the WBF Plant, captured by transects TR03, TR04, and TR05 and transects TR06 and TR07, respectively.

According to the results of the RBI, biological integrity appears to be consistently favorable throughout the Tennessee River reaches of the study area. With the exception of the farthest upstream transect (TR01), all of the sampling locations scored within the ‘Excellent’ category. RBI total scores adjacent to and downstream of the WBF Plant were equivalent to or higher than either of the transects upstream of the Watts Bar Dam. Although TR01 and TR02 were outside of potential influences from the WBF Plant CCR management units, as previously discussed, their RBI scores may be comparably more limited by physical habitat factors than adjacent and downstream sampling locations surrounding the WBN Plant. These habitat differences preclude upstream transects from serving as suitable controls for direct metric comparisons, and differing RBI scores, between upstream transects and adjacent/downstream transects, would not be appropriate for evaluating potential water quality impacts. Acknowledging this limitation of the study where suitable upstream controls were not available, the data do not suggest potential impacts on benthic macroinvertebrate communities from the WBF Plant CCR management units, and benthic communities appear to be healthy and productive based on their classification as ‘Excellent.

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 Tennessee River between 2001 and 2016. A substantial body of long-term data was available from annual sampling during this time. In all monitoring years where benthic communities were evaluated both upstream of the dam and adjacent and downstream of the WBF Plant, adjacent and downstream communities (potentially influenced by the WBF Plant CCR management units) scored comparably much higher than upstream communities (outside of the zone of influence). As previously discussed, lower scores upstream of the Watts Bar Dam may be partially attributable to the differences in physical habitat associated with the impounded waters of the Watts Bar Reservoir. However, these historical results are consistent with and support the RBI findings of 2019 EI sampling in which no potential impacts from the WBF Plant CCR management units were observable, and biological integrity in reaches of the Tennessee River adjacent and downstream of the WBF Plant has generally remained 'Excellent' in the long term.

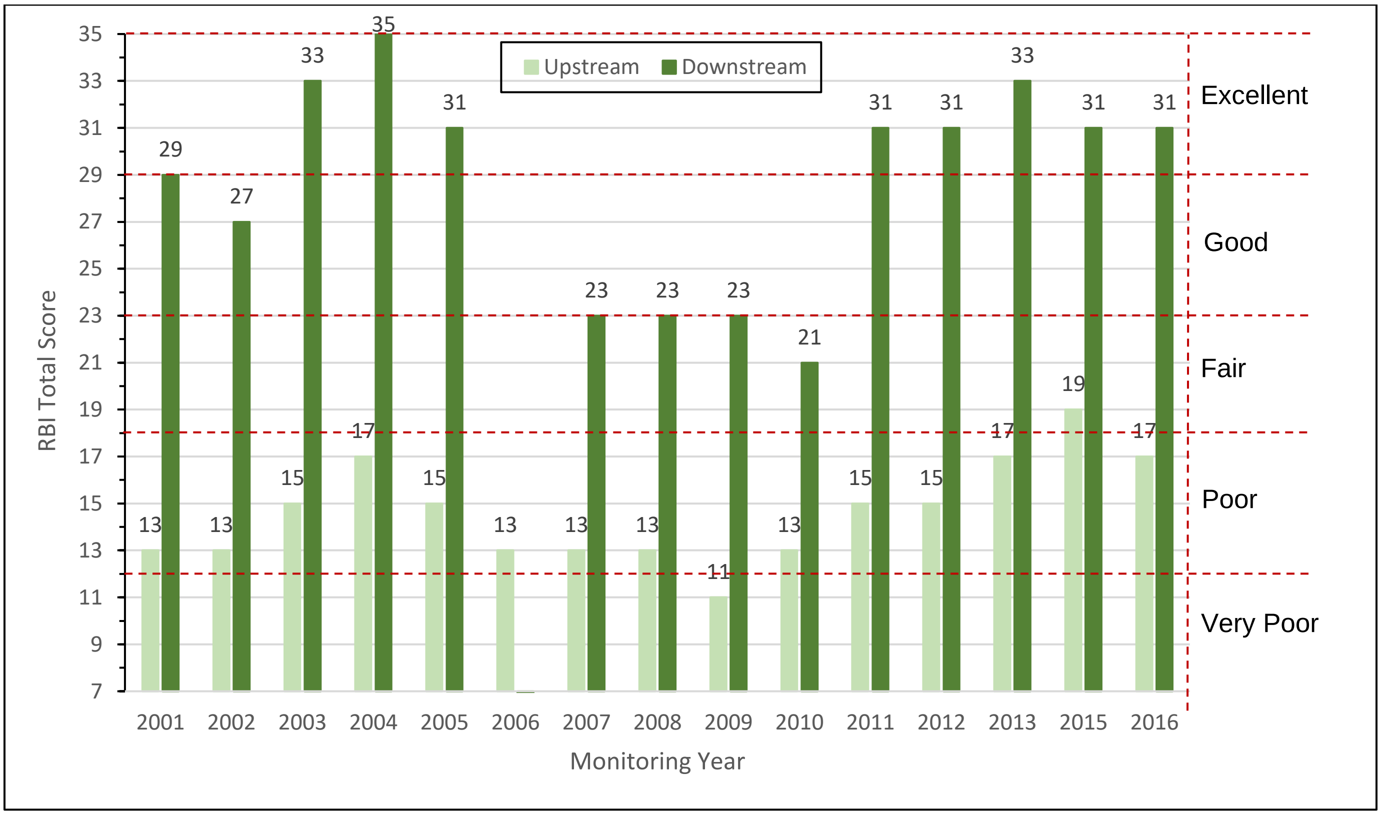


Figure J.3-2. Tennessee River Historical Average RBI Results Summary

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 Figure J.3-3 for the Tennessee River.

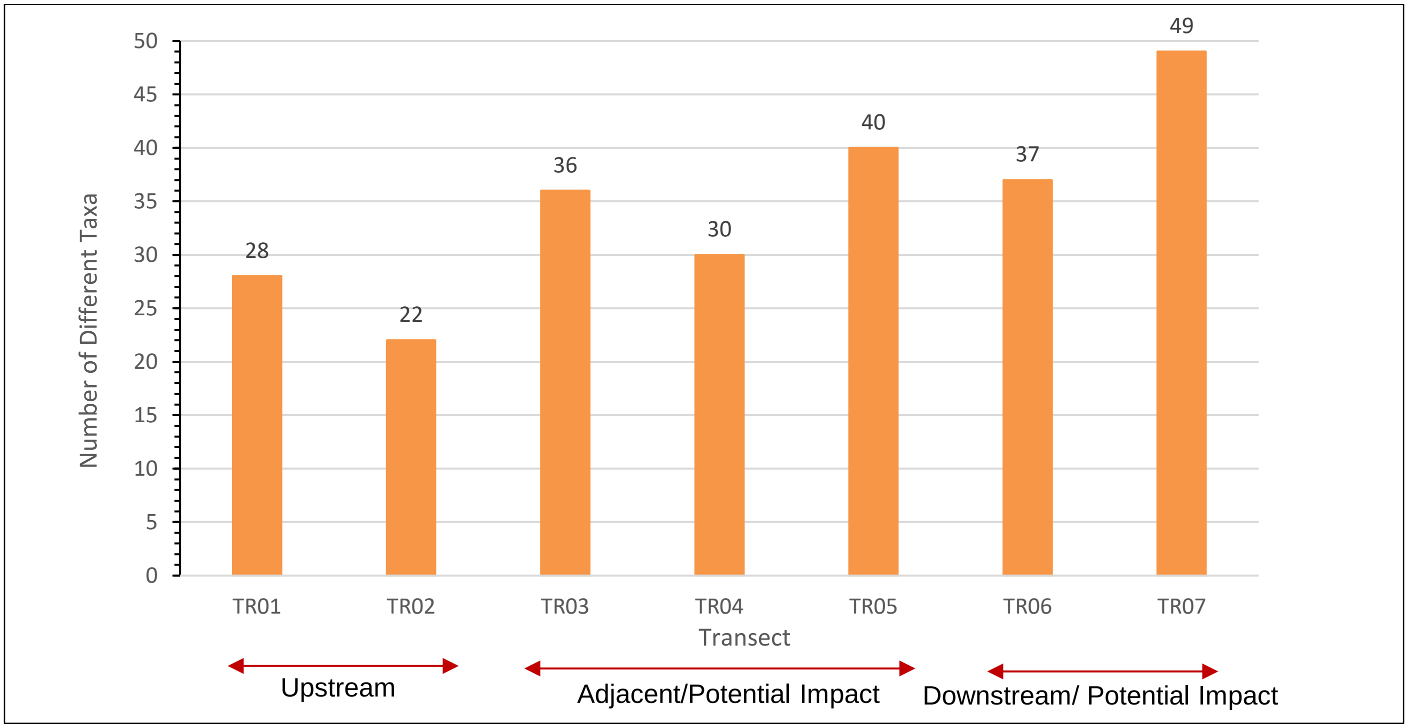
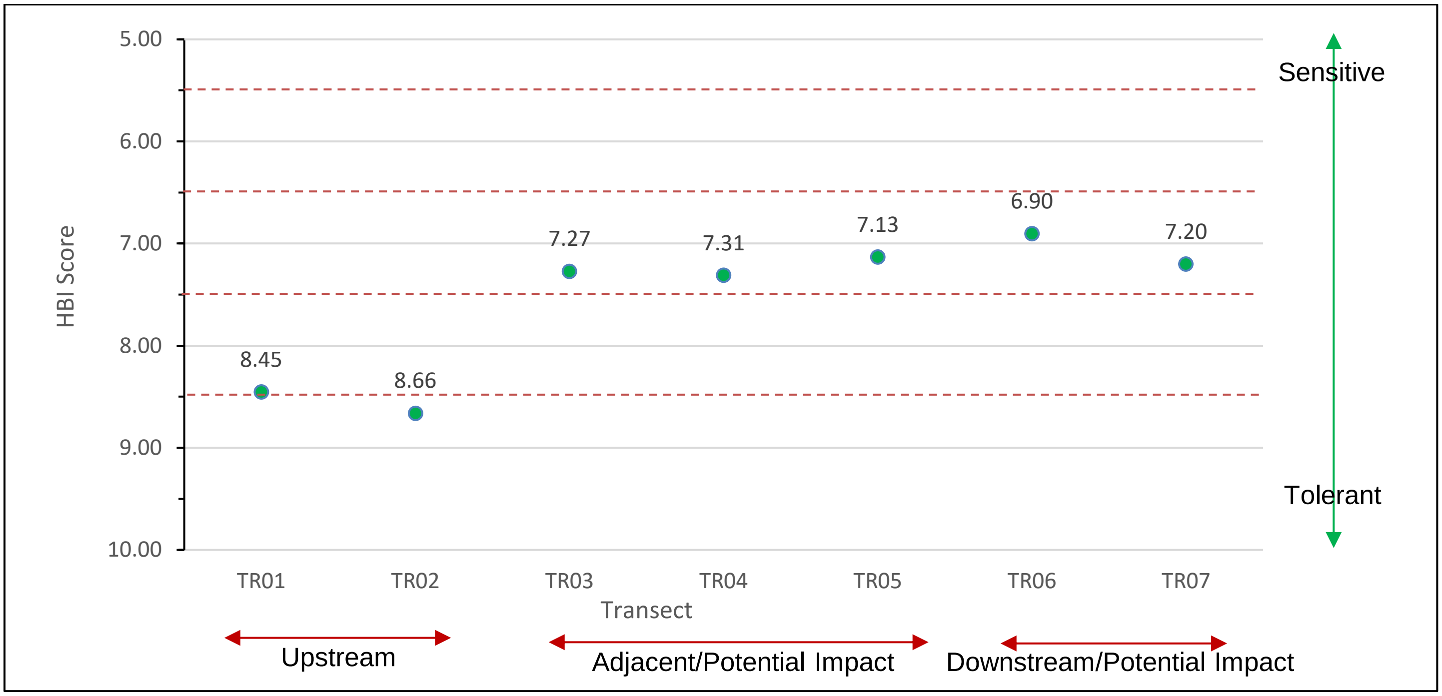


Figure J.3-3 – Total Taxa Richness Summary for the Tennessee River, 2019

TTR generally increased moving from upstream to downstream, with the highest richness observed at the farthest downstream transect (TR07). These results demonstrate that community richness in potential impact areas was consistently greater than locations upstream of the Watts Bar Dam, irrespective of physical habitat differences. Results reflect rich, robust, and healthy macroinvertebrate communities throughout the study area and provide no evidence that adverse effects from WBF Plant CCR management units are constraining adjacent or downstream communities.

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. Figure J.3-4 presents HBI results for the Tennessee River. 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.3-4 – Hilsenhoff Biotic Index Summary for the Tennessee River, 2019

In evaluation of the HBI results for the Tennessee River, spatial relationships among sampling locations were similar to the RBI and TTR results previously discussed, with the least favorable conditions represented upstream of the Watts Bar Dam and with generally consistent community conditions below the dam. HBI scores demonstrate similarly stress-sensitive macroinvertebrate communities adjacent to and immediately downstream of the WBF Plant CCR Management Units, all scoring within the same rating category. As such, results do not suggest limiting effects that would have shown higher proportions of more tolerant organisms adjacent to the WBF Plant CCR Management Units (with comparably higher HBI values). Again, acknowledging the likely influence of the impoundment on physical upstream conditions, observance of more tolerant upstream communities and consistently sensitive adjacent and downstream communities support the conclusion that potential impacts related to the WBF Plant CCR management units are not apparent in the data.

3.3 Asiatic Clam Tissue

In June and July 2019, composite samples of Asiatic clams (*Corbicula fluminea*) were collected from random locations in three separate reaches of the Tennessee River (upstream, adjacent, and downstream of the WBF Plant), as shown on Exhibit J.3-3. In accordance with the Benthic SAP, a portion of the Asiatic clams collected from each reach was processed by depurating their digestive systems prior to preparing the composite samples for laboratory analysis. The remaining non-depurated Asiatic clams from each reach were prepared as separate composite samples.

The depurated and non-depurated Asiatic clam composite samples were submitted for laboratory analysis of metals included in the CCR Parameters list (excluding radium 226/228). A summary of the Asiatic clam tissue analytical results is provided in Table J.3-2.

For Asiatic clam tissue samples collected in the Tennessee River, no CCR Parameters were above ESVs in sediment or surface stream samples, so only mercury and selenium were further evaluated due to their potential to bioaccumulate in the tissues of aquatic organisms. EAR screening levels (i.e., Critical Body Residue values for No Observed Adverse Effect Levels and Lowest Observed Adverse Effect Levels) were not established for Asiatic clams, so the tissue sample data was evaluated using spatial comparisons only. As shown on Table J.3-2, non-depurated and depurated composite Asiatic clam tissue sample concentrations of mercury and selenium were similar in all three reaches.

Chapter 4 Summary

The following chapters summarize the evaluation findings presented in this appendix for sediment, benthic macroinvertebrate, and Asiatic clam 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.5 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 WBF Plant, including a map depicting the location of CCR material in the stream, if identified during the investigation. None of the PLM results for sediment samples collected from the Tennessee River were above the 20% ash threshold and none of the sediment sample CCR Parameter concentrations were above the TDEC-approved chronic or acute ESVs. Based on these results, a map depicting the location of CCR material deposition is not included.

4.2 Benthic Macroinvertebrate Community Analysis

Generally, the benthic macroinvertebrate community metrics were corroborative and demonstrated spatially consistent relationships among indicators. Representative of overall biological integrity, the RBI showed highest Total Scores adjacent to the WBF plant and lowest scores in the Watts Bar Reservoir upstream of the Watts Bar Dam. RBI outcomes for upstream communities likely reflect a level of habitat-related stress associated with the impoundment, and therefore, the upstream transects are not ideal control locations. However, the RBI categorized all adjacent and downstream EI sampling locations as having ‘Excellent’ biological integrity in 2019. These findings were reinforced by long term historical monitoring data, demonstrating consistently ‘Excellent’ biological integrity in downstream reaches since 2011 (and from 2003 through 2005). Upstream reaches maintained comparably much lower biological integrity. RBI results indicate no potential impacts to aquatic life and/or water quality associated with WBF Plant CCR management units.

TTR and the HBI were selected from RBI-component and supplemental metrics as independent indicators. These two community elements of support capacity and stress tolerance, respectively, help to corroborate the findings of the RBI.

TTR generally increased moving from upstream to downstream, with the greatest richness observed at the farthest downstream transect. Community richness in potential impact areas adjacent to and downstream of the WBF Plant was consistently greater than locations upstream of the Watts Bar Dam. Results reflect rich, robust, and healthy macroinvertebrate communities adjacent to and downstream of the WBF Plant. The TTR metric evaluation provides no evidence that adverse effects from WBF Plant CCR management units are constraining adjacent or downstream communities.

HBI scores reflect similar community sensitivity among adjacent and downstream sampling locations and comparably more tolerant communities upstream of Watts Bar Dam, outside of the influence of the WBF Plant. Therefore, HBI data do not provide any indication of impacts that would reduce benthic community sensitivity associated with the WBF Plant CCR management units.

In summary, benthic communities within adjacent and downstream areas appear to be healthier, richer, and more sensitive than locations upstream of the WBF Plant CCR management units, and adjacent and downstream reaches consistently support more favorable conditions regardless of proximity to the WBF Plant.

4.3 Asiatic Clam Tissue

For Asiatic clam composite tissue samples collected in the Tennessee River, only mercury and selenium were reviewed due to their potential for bioaccumulation in the tissues of aquatic organisms. Non-depurated and depurated composite Asiatic clam tissue sample concentrations of mercury and selenium were similar in all three reaches. Although there are clear differences between the ecosystems in the Tennessee River upstream and downstream of Watts Bar Dam, there was minimal variability in the mercury and selenium concentrations relative to sampling locations (i.e., upstream of the dam versus adjacent and downstream of the WBF Plant). The Asiatic clam tissue results therefore suggest that measured mercury or selenium concentrations are not related to WBF Plant CCR management unit activities. The findings of the benthic macroinvertebrate community analysis indicate that bioaccumulation of these CCR Parameter metals is not impacting the benthic macroinvertebrate populations in the Tennessee River and corroborates findings of the fish tissue investigation (Appendix J.5). Further evaluation of the ecological implications of the Asiatic clam tissue results will be completed in the CARA Plan.

Chapter 5 References

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TABLES

Table J.3-1 - Sediment Analytical Results
Watts Bar Fossil Plant
March/April 2019

Sample Location		Freshwater Sediment		Sediment Quality		TR04		TR05		TR05.5	
Sample Date						1-Apr-19	1-Apr-19	1-Apr-19	1-Apr-19	1-Apr-19	1-Apr-19
Sample ID						WBF-SED-TR04-CORRB-0.0/0.5-20190401	WBF-SED-TR04-CORRB-0.0/0.5-20190401	WBF-SED-TR05-CORRB-0.0/0.5-20190401	WBF-SED-TR05-CORRB-0.0/0.5-20190401	WBF-SED-TR05.5-CORLB-0.0/0.5-20190401	WBF-SED-TR05.5-CORLB-0.0/0.5-20190401
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
Sample Type		Screening Values		Assessment Guidelines		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Chronic	Acute	TEC	PEC	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated
Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.0865 J	-	0.0916 J	-	0.159 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	2.41	-	3.64	-	4.59
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	94.0	-	75.7	-	106
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.821	-	0.608	-	0.884
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.89 J	-	1.16 J	-	1.83 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.0959	-	0.348	-	0.423
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	9,500 J	-	1,420 J	-	4,080 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	13.8	-	14.2	-	17.9
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	8.92	-	8.45	-	11.3
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	9.35	-	12.8	-	30.3
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	9.41 J	-	16.1 J	-	21.2 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	11.4 J	-	6.94 J	-	10.7 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0185 J	-	0.0501	-	0.0790
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.401	-	0.418	-	0.572
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	12.1	-	9.63	-	13.5
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.953 J	-	0.638 J	-	1.02 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0263 J	-	0.0268 J	-	0.0409 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	13.6 J	-	5.63 J	-	10.9 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.151	-	0.155	-	0.215
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	17.7	-	19.0	-	26.1
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	40.8	-	82.6	-	98.6
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.999 +/-(0.273)	-	0.991 +/-(0.250)	-	1.38 +/-(0.369)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.46 +/-(0.384)	-	1.05 +/-(0.398)	-	1.58 +/-(0.433)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.46 +/-(0.471)	-	2.04 +/-(0.470)	-	2.96 +/-(0.569)
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<5.59	-	<5.42	-	<5.88
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.24 J	-	0.950 J	-	1.32 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	65.1	-	40.1	-	47.6
General Chemistry											
% ASH	%	20[A]	40[B]	n/v	n/v	5	-	4	-	1	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.5	-	7.2	-	7.3

See notes on last page.

Stantec

Table J.3-1 - Sediment Analytical Results
Watts Bar Fossil Plant
March/April 2019

Sample Location Sample Date Sample ID Parent Sample ID Sample Depth Sample Type Level of Review	Units	Freshwater Sediment Screening Values		Sediment Quality Assessment Guidelines		TR06 28-Mar-19 WBF-SED-TR06-CORRB-0.0/0.5-20190328 0 - 0.5 ft Normal Environmental Sample Final-Verified	TR06 28-Mar-19 WBF-SED-TR06-CORRB-0.0/0.5-20190328 0 - 0.5 ft Normal Environmental Sample Validated	TR06.75 28-Mar-19 WBF-SED-TR06.75-CORLB-0.0/0.5-20190328 0 - 0.5 ft Normal Environmental Sample Final-Verified	TR06.75 28-Mar-19 WBF-SED-TR06.75-CORLB-0.0/0.5-20190328 0 - 0.5 ft Normal Environmental Sample Validated
		Chronic	Acute	TEC	PEC				
Metals									
Antimony	mg/kg	2^{A}	25^{B}	n/v	n/v	-	0.0465 UJ	-	0.0719 J
Arsenic	mg/kg	9.8^{A}	33^{B}	9.8^{C}	33^{D}	-	1.34	-	2.29
Barium	mg/kg	240^{A}	$22,925^{B}$	n/v	n/v	-	43.3	-	108
Beryllium	mg/kg	1.2^{A}	42^{B}	n/v	n/v	-	0.309	-	1.09
Boron	mg/kg	n/v	n/v	n/v	n/v	-	1.03 J	-	2.36 J
Cadmium	mg/kg	1^{A}	5^{B}	1^{C}	5^{D}	-	0.0743 J	-	0.127
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	1,590 J	-	1,510 J
Chromium	mg/kg	43.4^{A}	111^{B}	43^{C}	110^{D}	-	7.43	-	16.5
Cobalt	mg/kg	50^{A}	n/v	50^{C}	n/v	-	4.63	-	9.79
Copper	mg/kg	31.6^{A}	149^{B}	32^{C}	150^{D}	-	4.52	-	10.3
Lead	mg/kg	35.8^{A}	128^{B}	36^{C}	130^{D}	-	5.82 J	-	12.0 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	5.52 J	-	16.9 J
Mercury	mg/kg	0.18^{A}	1.1^{B}	0.18^{C}	1.1^{D}	-	0.0116 J	-	0.0298
Molybdenum	mg/kg	38^{A}	$69,760^{B}$	n/v	n/v	-	0.163 J	-	0.418
Nickel	mg/kg	22.7^{A}	48.6^{B}	23^{C}	49^{D}	-	5.80	-	14.3
Selenium	mg/kg	2^{A}	2.9^{B}	n/v	n/v	-	0.430 J	-	1.09 J
Silver	mg/kg	1^{A}	2.2^{B}	n/v	n/v	-	<0.0210	-	0.0232 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	5.08 J	-	8.88 J
Thallium	mg/kg	1.2^{A}	10^{B}	n/v	n/v	-	0.0887	-	0.189
Vanadium	mg/kg	66^{A}	564^{B}	n/v	n/v	-	8.54	-	19.0
Zinc	mg/kg	121^{A}	459^{B}	120^{C}	460^{D}	-	58.9	-	48.5
Radiological Parameters									
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.657 +/-(0.171)	-	1.26 +/-(0.277)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.00 +/-(0.242)	-	1.65 +/-(0.364)
Radium-226+228	pCi/g	90^{A}	90^{B}	n/v	n/v	-	1.66 +/-(0.296)	-	2.91 +/-(0.457)
Anions									
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<5.72	-	<6.19
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	<1.00	-	1.22 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	38.3	-	48.3
General Chemistry									
% ASH	%	20^{A}	40^{B}	n/v	n/v	2	-	1	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.6	-	7.3

See notes on last page.

Table J.3-1 - Sediment Analytical Results
Watts Bar Fossil Plant
March/April 2019

Sample Location		Freshwater Sediment		Sediment Quality		TR07					
Sample Date						28-Mar-19	28-Mar-19	28-Mar-19	28-Mar-19	28-Mar-19	28-Mar-19
Sample ID						WBF-SED-TR07-CORLB-0.0/0.5-20190328	WBF-SED-TR07-CORLB-0.0/0.5-20190328	WBF-SED-TR07-DUP01-20190328	WBF-SED-TR07-DUP01-20190328	WBF-SED-TR07-CORRB-0.0/0.5-20190328	WBF-SED-TR07-CORRB-0.0/0.5-20190328
Parent Sample ID								WBF-SED-TR07-CORLB-0.0/0.5-20190328	WBF-SED-TR07-CORLB-0.0/0.5-20190328		
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
Sample Type		Screening Values		Assessment Guidelines		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Chronic	Acute	TEC	PEC	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated
Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.101 J	-	0.0473 J	-	0.0498 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	1.79	-	1.73	-	1.45
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	81.5	-	78.1	-	58.0
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.803	-	0.761	-	0.485
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.11 J	-	1.38 J	-	1.38 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.0878	-	0.0764	-	0.0800
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	1,090 J	-	1,070 J	-	2,360 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	13.5	-	13.2	-	9.47
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	7.88	-	7.60	-	5.58
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	8.32	-	8.12	-	5.80
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	7.53 J	-	7.14 J	-	5.88 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	12.7 J	-	11.5 J	-	7.51 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0144 J	-	0.0128 J	-	<0.0102
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.341 J	-	0.308 J	-	0.250 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	11.5	-	11.0	-	7.52
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	1.12 J	-	1.01 J	-	0.485 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	<0.0216	-	<0.0212	-	<0.0195
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	6.95 J	-	6.44 J	-	6.04 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.153	-	0.142	-	0.109
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	15.4	-	15.1	-	10.9
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	42.2	-	40.9	-	33.9
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.28 +/-(0.309)J	-	0.827 +/-(0.249)J	-	1.06 +/-(0.242)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.55 +/-(0.386)	-	1.37 +/-(0.383)	-	1.30 +/-(0.328)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.83 +/-(0.494)J	-	2.20 +/-(0.457)J	-	2.36 +/-(0.408)
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<5.82	-	<5.77	-	<5.43
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.47 J	-	1.81	-	<0.952
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	25.4	-	32.4	-	45.0
General Chemistry											
% ASH	%	20[A]	40[B]	n/v	n/v	5 J	-	1 UJ	-	5	-
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.3	-	7.4	-	7.3

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
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
n/v	No standard/guideline value.
-	Parameter not analyzed / not available.
J	quantitation is approximate due to limitations identified during data validation
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
pCi/g	picocuries per gram
SU	standard unit

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

TABLE J.3-2 - Asiatic Clam Analytical Results
Watts Bar Fossil Plant
June / July 2019

Sample Location		WBF-TRA		WBF-TRD				WBF-TRU	
Sample Date		27-Jun-19	1-Jul-19	1-Jul-19	1-Jul-19	1-Jul-19	1-Jul-19	2-Jul-19	2-Jul-19
Sample ID		WBF-ACN-TRA-20190627	WBF-ACP-TRA-20190701	WBF-ACN-TRD-20190701	WBF-ACN-DUP01-20190701	WBF-ACP-TRD-20190701	WBF-ACP-DUP01-20190701	WBF-ACN-TRU-20190702	WBF-ACP-TRU-20190702
Parent Sample					WBF-ACN-TRD-20190701		WBF-ACP-TRD-20190701		
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Field Duplicate 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	Final-Verified
Biota Data									
Antimony	mg/kg	<0.020	<0.019	<0.021	<0.020	<0.021	<0.021	<0.021	<0.020
Arsenic	mg/kg	0.82	0.91	1.3	1.3	1.4	1.2	1.0	0.93
Barium	mg/kg	4.4	2.9	2.8	3.1	2.1	2.8	3.9	3.6
Beryllium	mg/kg	<0.032	<0.031	<0.033	<0.032	<0.032	<0.033	<0.033	<0.031
Boron	mg/kg	<0.67	<0.64	<0.70	<0.67	<0.68	<0.69	<0.69	<0.66
Cadmium	mg/kg	0.051 J	0.045 J	0.054 J	0.061 J	0.051 J	0.051 J	0.075 J	0.10
Calcium	mg/kg	371	387	374	404	288	296	1,060	396
Chromium	mg/kg	0.23 J	0.13 J	0.16 J	0.22 J	0.14 J	0.16 J	0.23 J	0.17 J
Cobalt	mg/kg	0.15	0.078 J	0.078 J	0.11	0.069 J	0.068 J	0.17	0.12
Copper	mg/kg	5.6	6.7	7.8	9.1	9.0	7.1	7.1	5.7
Lead	mg/kg	0.11	<0.028	<0.030	0.073 J	<0.029	<0.030	0.074 J	<0.028
Lithium	mg/kg	0.083 J	<0.020	<0.021	0.048 J	<0.021	<0.021	0.053 J	<0.020
Mercury	mg/kg	0.011 U*	0.0099 U*	0.013 U*	0.011 U*	0.015 U*	<0.0073	0.0084 U*	<0.0076
Molybdenum	mg/kg	0.096 J	0.082 J	0.085 J	0.10 J	0.089 J	0.092 J	0.13	0.082 J
Nickel	mg/kg	0.22 U*	0.11 U*	0.13 U*	0.18 U*	0.10 U*	0.11 U*	0.25 U*	0.18 U*
Selenium	mg/kg	0.45	0.43	0.53	0.61	0.52	0.49	0.50	0.38
Silver	mg/kg	<0.011	<0.010	<0.011	0.015 J	<0.011	<0.011	<0.011	<0.011
Strontium	mg/kg	0.81	0.68	0.64	0.72	0.49 J	0.55	1.4	0.67
Thallium	mg/kg	<0.013	<0.012	<0.013	<0.013	<0.013	<0.013	<0.013	<0.012
Vanadium	mg/kg	0.18	<0.031	0.057 J	0.12	<0.033	<0.033	0.13	<0.032
Zinc	mg/kg	22.9	21.5	22.6	23.7	22.1	22.1	23.8	24.9
% Moisture	%	81.9	84.1	79.8	78.0	81.6	81.1	81.6	83.7

Notes:

ID	identification
J	quantitation is approximate due to limitations identified during data validation
U*	This result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level.
%	percent
mg/kg	milligrams per kilogram

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

Stantec

EXHIBITS

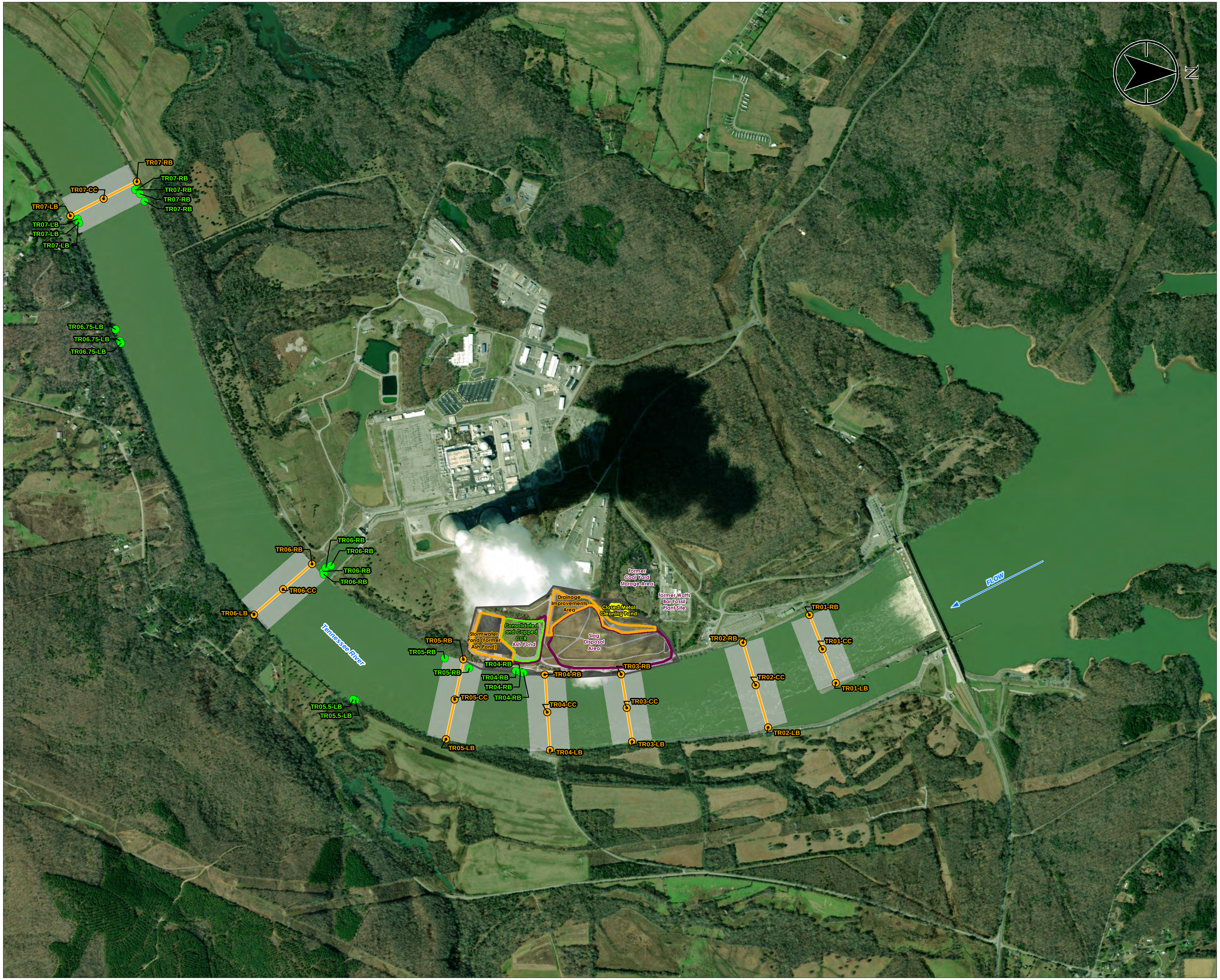


Exhibit No.

J.3-1

Title

Sediment Sampling Locations

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location 175668050

Spring City, Tennessee

Prepared by DMB on 2022-06-24
Technical Review by TB on 2022-06-24

0 700 1,400 2,100 2,800 Feet

1:8,400 (At original document size of 22x34)

Legend

- Sediment Sample Locations - Collected
- Sediment Sample Locations - Proposed
- Sediment Sample Location Transects - Proposed
- 2018 Imagery Boundary
- Expanded Proposed Sediment Sampling Area
- CCR Unit Area (Approximate)
- Closed Metal Cleaning Pond (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018
3. Sediment samples were obtained from only seven locations.
4. Each sediment sample comprised the contents of two to four substrate grabs.
5. Depositional sediments were not encountered beyond 100 feet from the shoreline.

Stantec TVA

Exhibit No.

J.3-2

Title

Benthic Macroinvertebrate Community Sampling Locations

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by DMB on 2022-06-29
Technical Review by TB on 2022-06-29

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

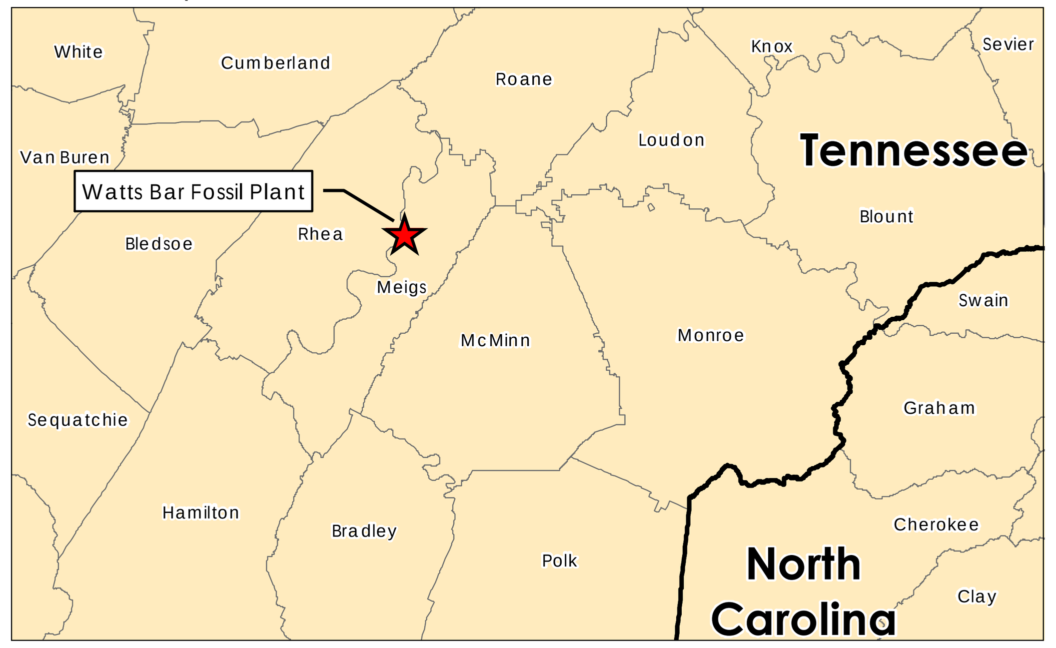
1:15,000 (At original document size of 22x34)

Legend

- Benthic Macroinvertebrate Community Sampling Locations
- Benthic Macroinvertebrate Community Sampling Locations - Transect
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Closed Metal Cleaning Pond (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



Stantec TVA

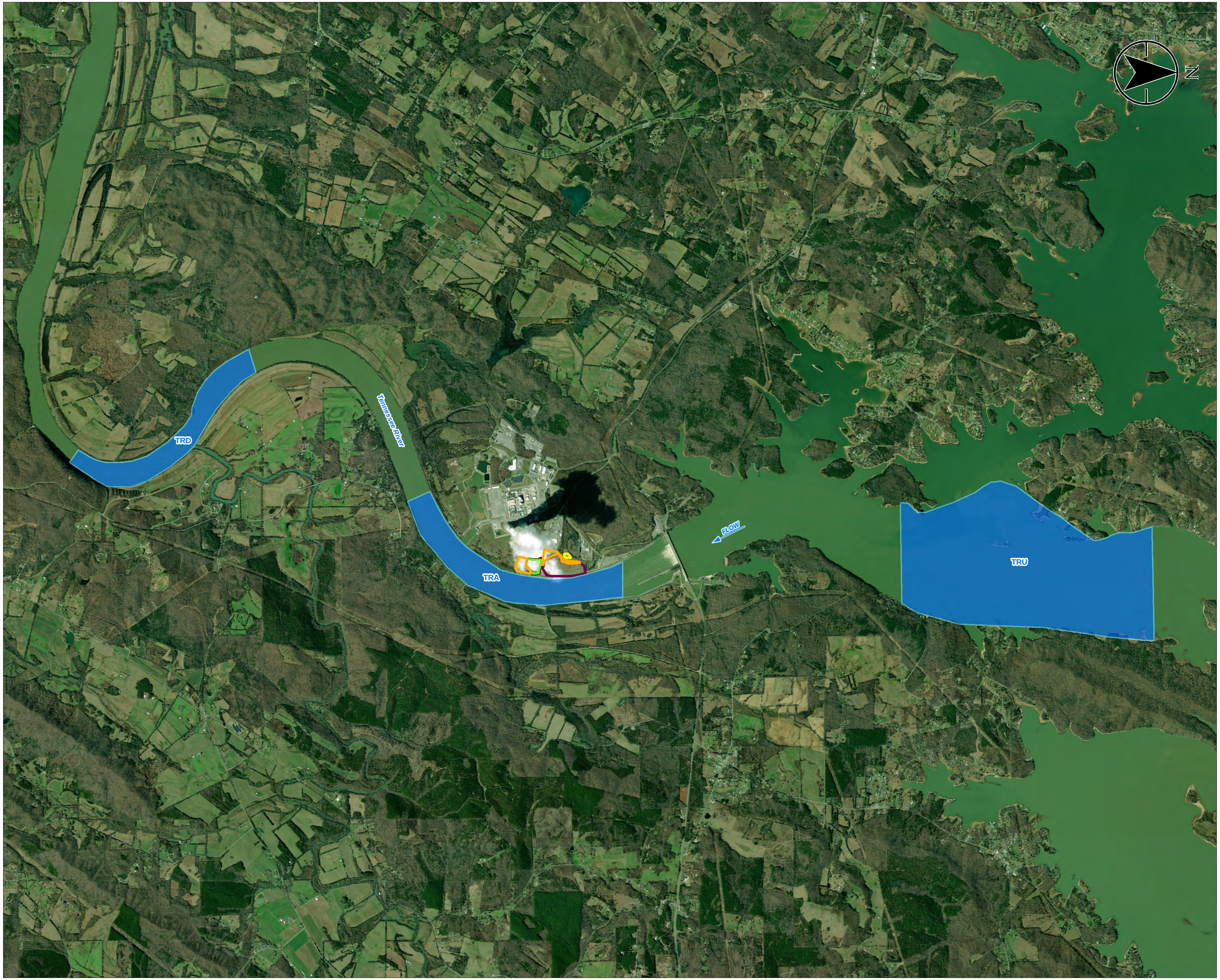


Exhibit No.

J.3-3

Title

Asiatic Clam Sampling Reaches

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by DMB on 2022-06-24
Technical Review by TB on 2022-06-24

0 2,000 4,000 6,000 8,000 Feet

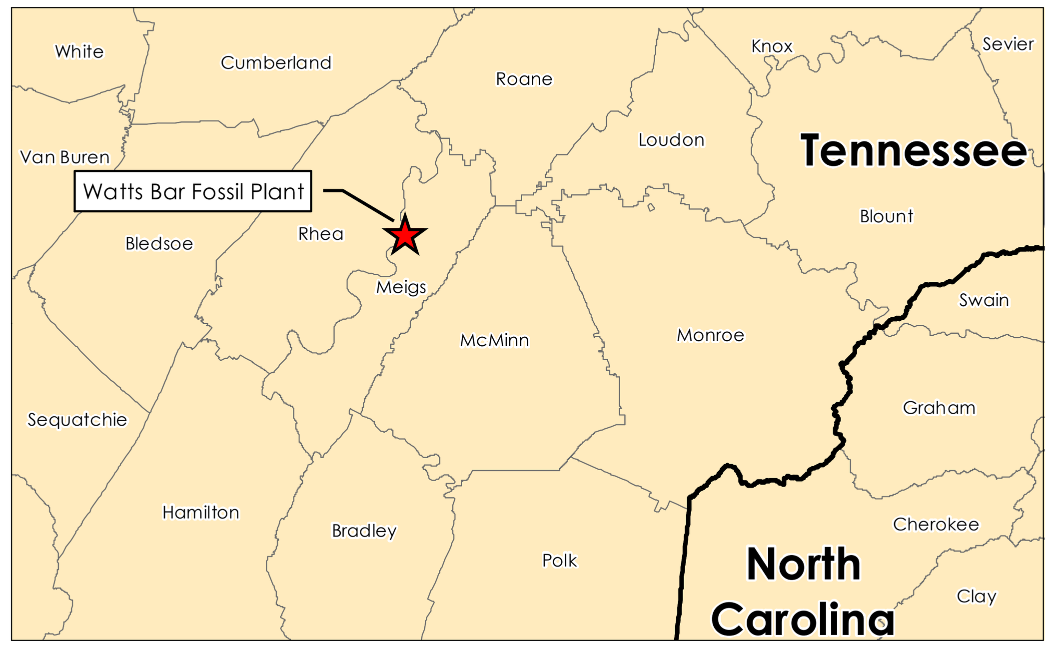
1:24,000 (At original document size of 22x34)

Legend

- Asiatic Clam Sampling Locations — TRU – Tennessee River Upstream; TRA – Tennessee River Adjacent; TRD – Tennessee River Downstream
- CCR Unit Area (Approximate)
- Closed Metal Cleaning Pond (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond)

Notes

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



Stantec TVA

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U:\TVA-EIP\175668050_WBF_WorkPlans\gis\mxd\EAR\WBF_ExJ.3-3_Asiatic_Clam_Sampling_Reaches.mxd Revised: 2022-06-24 By: TRink

ATTACHMENT J.3-A - BENTHIC COMMUNITY SUMMARY SHEETS

Watts Bar Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR01 (TRM 533.0) - Forebay
Date: 09/23/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Talitridae	Hyalella azteca	CG	7.2	2
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	22
Bivalvia	Dreissenidae	Dreissena polymorpha	CF	8	6
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	2
Bivalvia	Sphaeriidae	Pisidium compressum	CF	6.6	1
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	56
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	5
Diptera	Chironomidae	Chironomus sp.	CG	9.3	28
Diptera	Chironomidae	Coelotanypus sp.	CG	8	15
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	12
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	30
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	14
Diptera	Chironomidae	Polypedilum illinoense gp.	CG	6.1	6
Diptera	Chironomidae	Tanypus concavus	CG	9.2	14
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	2
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	8
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	10
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	12
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	8
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	5
Oligochaeta	Lumbriculidae	Lumbriculidae	CG	7	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Dero trifida	CG	9.8	53
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	19
Oligochaeta	Naididae	Limnodrilus claparedeianus	CG	9.5	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	2
Oligochaeta	Naididae	Limnodrilus sp.	CG	9.5	2
Oligochaeta	Naididae	Naididae	CG	8	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	24
Oligochaeta	Naididae	Tubificinae wohc	CG	10	147
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	CF	6.6	2
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	1
Tricladida	Planariidae	Girardia tigrina	CG	7.1	41
			Total Organisms Collected		**554**

Reservoir Benthic Index

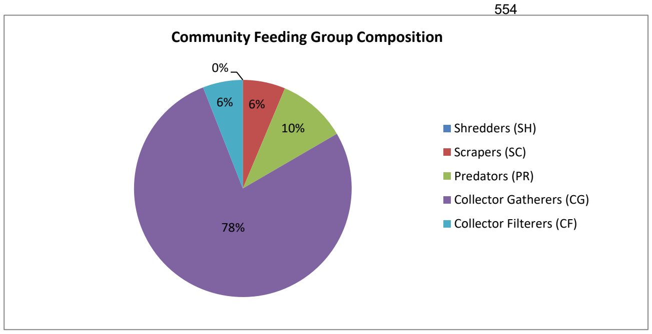
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	28	5	
EPT Richness (Genus)	4	5	
Percent Grabs Containing Long Lived Organisms	80.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	45.5	1	
Percent Top Two Dominant Taxa (Genus)	41.0	5	(Tubificinae, Chaoborus)
Total Abundance Less Chironomidae and Oligochaeta	176	3	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**27**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	8.45	Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	9.39	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	35	6
Predators (PR)	57	10
Collector Gatherers (CG)	429	77
Collector Filterers (CF)	33	6
	554	100



Watts Bar Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR02 (TRM 531.0) - Forebay
Date: 09/23/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	7
Bivalvia	Dreissenidae	Dreissena polymorpha	CF	8	1
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	8
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	242
Diptera	Chironomidae	Chironomus sp.	CG	9.3	32
Diptera	Chironomidae	Coelotanypus sp.	CG	8	44
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	4
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	1
Diptera	Chironomidae	Nanocladius distinctus	CG	7.4	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	25
Diptera	Chironomidae	Tanypus concavus	CG	9.2	2
Diptera	Chironomidae	Thienemanniella xena	CG	6.4	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	1
Ephemeroptera	Leptohyphidae	Tricorythodes sp.	CG	5	1
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	7
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	1
Hirudinea	Glossiphoniidae	Helobdella stagnalis	PR	9.3	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	3
Oligochaeta	Naididae	Ilyodrilus templetoni	CG	9.3	2
Oligochaeta	Naididae	Limnodrilus cervix	CG	9.5	6
Oligochaeta	Naididae	Limnodrilus claparedeianus	CG	9.5	6
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	15
Oligochaeta	Naididae	Limnodrilus sp.	CG	9.5	1
Oligochaeta	Naididae	Naididae	CG	8	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	6
Oligochaeta	Naididae	Tubificinae wohc	CG	10	67
			Total Organisms Collected		**486**

Reservoir Benthic Index

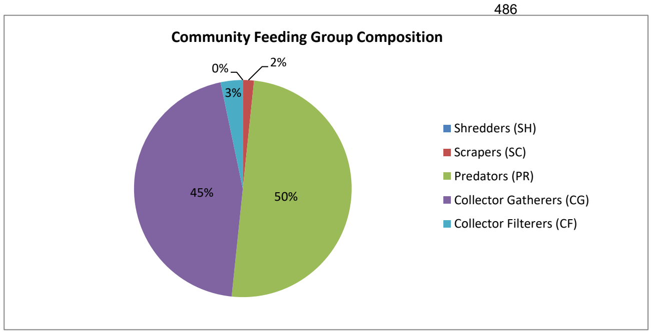
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	22	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	60.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	22.0	3	
Percent Top Two Dominant Taxa (Genus)	64.8	5	(Chaoborus, Tubificinae)
Total Abundance Less Chironomidae and Oligochaeta	269	5	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	8.66	Very Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	0.41	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	8	2
Predators (PR)	243	50
Collector Gatherers (CG)	219	45
Collector Filterers (CF)	16	3
	486	100



Watts Bar Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR03 (TRM 529.34) - Inflow
Date: 09/24/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Crangonyctidae	Crangonyx sp.	CG	7.2	3
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	69
Bivalvia	Dreissenidae	Dreissena polymorpha	CF	8	166
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	4
Bivalvia	Unionidae	Unionidae	CF	6	3
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	3
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	17
Diptera	Chironomidae	Chironomus sp.	CG	9.3	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	1
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	2
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	4
Diptera	Chironomidae	Dicrotendipes simpsoni	CG	7.2	117
Diptera	Chironomidae	Nanocladius distinctus	CG	7.4	141
Diptera	Chironomidae	Parachironomus sp.	CG	8	1
Diptera	Chironomidae	Paratanytarsus dissimilis	CG	8	3
Diptera	Chironomidae	Paratendipes albimanus/duplicatus	CG	5.6	1
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	4
Diptera	Chironomidae	Rheotanytarsus exiguus gp.	CG	6.5	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	2
Ephemeroptera	Heptageniidae	Heptageniidae	SC	3	1
Ephemeroptera	Heptageniidae	Maccaffertium sp.	SC	3.1	1
Ephemeroptera	Leptohyphidae	Tricorythodes sp.	CG	5	4
Gastropoda	Ancylidae	Ferrissia rivularis	SC	6.6	23
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	1
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	3
Gastropoda	Planorbidae	Menetus dilatatus	SC	7.6	1
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	21
Odonata/Anisoptera	Corduliidae	Neurocordulia molesta	PR	5.3	2
Oligochaeta	Naididae	Dero sp.	CG	9.8	7
Oligochaeta	Naididae	Naidinae	CG	8	2
Oligochaeta	Naididae	Nais sp.	CG	8.7	6
Oligochaeta	Naididae	Slavina appendiculata	CG	8.4	12
Oligochaeta	Naididae	Stylaria lacustris	CG	8.4	8
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	CF	6.6	17
Trichoptera	Leptoceridae	Ceraclea sp.	CG	2.2	1
Trichoptera	Leptoceridae	Oecetis avara	PR	5.1	1
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	13
Tricladida	Planariidae	Girardia tigrina	CG	7.1	185
			Total Organisms Collected		**854**

Reservoir Benthic Index

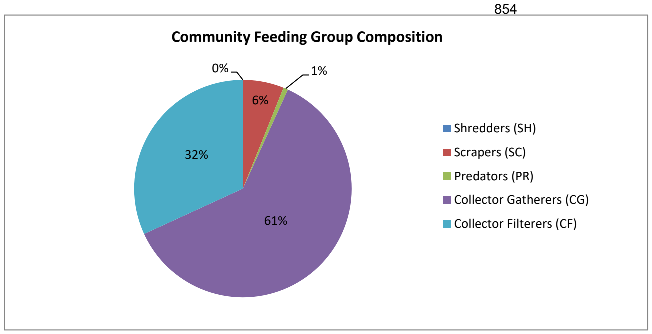
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	36	5	
EPT Richness (Genus)	5	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	4.1	5	
Percent Top Two Dominant Taxa (Genus)	41.1	5	(Girardia, Dreissena)
Total Abundance Less Chironomidae and Oligochaeta	523	3	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**33**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.27	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	2	
Percent Tolerant Taxa (TV > 3)	99.8	
Percent EPT-H	4.45	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	52	6
Predators (PR)	6	1
Collector Gatherers (CG)	524	61
Collector Filterers (CF)	272	32
	854	100



Watts Bar Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR04 (TRM 528.95) - Inflow
Date: 09/24/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Crangonyctidae	Crangonyx sp.	CG	7.2	13
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	166
Bivalvia	Dreissenidae	Dreissena polymorpha	CF	8	124
Bivalvia	Sphaeriidae	Musculium sp.	CF	7.5	3
Bivalvia	Unionidae	Obliquaria reflexa	CF	6	1
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	41
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	33
Diptera	Chironomidae	Dicrotendipes simpsoni	CG	7.2	201
Diptera	Chironomidae	Nanocladius distinctus	CG	7.4	150
Diptera	Chironomidae	Parachironomus sp.	CG	8	2
Diptera	Chironomidae	Procladius sp.	CG	8.8	1
Diptera	Chironomidae	Rheotanytarsus exiguus gp.	CG	6.5	3
Ephemeroptera	Heptageniidae	Stenacron interpunctatum	SC	3.5	13
Ephemeroptera	Leptohyphidae	Tricorythodes sp.	CG	5	16
Gastropoda	Ancylidae	Ferrissia rivularis	SC	6.6	60
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	2
Gastropoda	Planorbidae	Menetus dilatatus	SC	7.6	10
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	11
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	24
Isopoda	Asellidae	Caecidotea sp.	CG	8.4	50
Isopoda	Asellidae	Lirceus sp.	CG	7.4	1
Oligochaeta	Naididae	Dero sp.	CG	9.8	8
Oligochaeta	Naididae	Dero trifida	CG	9.8	90
Oligochaeta	Naididae	Naidinae	CG	8	2
Oligochaeta	Naididae	Nais sp.	CG	8.7	9
Oligochaeta	Naididae	Pristina sp.	CG	7.7	1
Oligochaeta	Naididae	Slavina appendiculata	CG	8.4	47
Oligochaeta	Naididae	Stylaria lacustris	CG	8.4	26
Platyhelminthes	-	Platyhelminthes	CG	8	47
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	CF	6.6	27
Trichoptera	Hydropsychidae	Hydropsychidae	CF	4.1	6
Trichoptera	Leptoceridae	Ceraclea sp.	CG	2.2	1
Trichoptera	Leptoceridae	Leptoceridae	CG	3.15	1
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	3
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	9
Tricladida	Planariidae	Girardia tigrina	CG	7.1	609
			Total Organisms Collected		**1811**

Reservoir Benthic Index

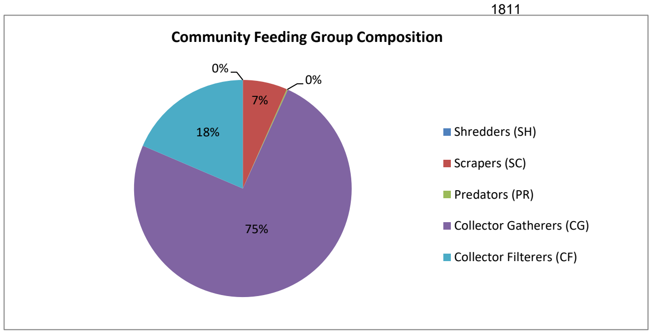
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	30	5	
EPT Richness (Genus)	6	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	10.1	5	
Percent Top Two Dominant Taxa (Genus)	46.5	5	(Girardia, Dicrotendipes)
Total Abundance Less Chironomidae and Oligochaeta	1197	5	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**35**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.31	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	99.9	
Percent EPT-H	2.37	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	120	7
Predators (PR)	3	0
Collector Gatherers (CG)	1352	75
Collector Filterers (CF)	336	19
	1811	100



Watts Bar Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR05 (TRM 528.5) - Inflow
Date: 09/24/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Crangonyctidae	Crangonyx sp.	CG	7.2	3
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	12
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	245
Bivalvia	Dreissenidae	Dreissena polymorpha	CF	8	121
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	14
Bivalvia	Unionidae	Obliquaria reflexa	CF	6	1
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	21
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	8
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	29
Diptera	Chironomidae	Dicrotendipes simpsoni	CG	7.2	88
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	5
Diptera	Chironomidae	Nanocladius distinctus	CG	7.4	30
Diptera	Chironomidae	Parachironomus sp.	CG	8	1
Diptera	Chironomidae	Paratanytarsus dissimilis	CG	8	5
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	53
Diptera	Chironomidae	Rheotanytarsus exiguus gp.	CG	6.5	8
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	3
Ephemeroptera	Heptageniidae	Heptageniidae	SC	3	1
Ephemeroptera	Heptageniidae	Stenacron interpunctatum	SC	3.5	44
Ephemeroptera	Heptageniidae	Stenacron sp.	SC	3.5	16
Ephemeroptera	Leptohyphidae	Tricorythodes sp.	CG	5	19
Gastropoda	Ancylidae	Ferrissia rivularis	SC	6.6	4
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	12
Gastropoda	Planorbidae	Menetus dilatatus	SC	7.6	5
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	16
Gastropoda	Pleuroceridae	Pleurocera sp.	SC	6	2
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	20
Isopoda	Asellidae	Caecidotea sp.	CG	8.4	3
Isopoda	Asellidae	Lirceus sp.	CG	7.4	5
Odonata/Anisoptera	Corduliidae	Corduliidae	PR	5.7	1
Oligochaeta	Lumbriculidae	Lumbriculidae	CG	7	2
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	9
Oligochaeta	Naididae	Dero sp.	CG	9.8	10
Oligochaeta	Naididae	Dero trifida	CG	9.8	60
Oligochaeta	Naididae	Naidinae	CG	8	10
Oligochaeta	Naididae	Nais sp.	CG	8.7	7
Oligochaeta	Naididae	Pristina sp.	CG	7.7	2
Oligochaeta	Naididae	Ripistes parasita	CG	8.4	1
Oligochaeta	Naididae	Slavina appendiculata	CG	8.4	49
Oligochaeta	Naididae	Stylaria lacustris	CG	8.4	64
Oligochaeta	Naididae	Tubificinae wohc	CG	10	43
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	CF	6.6	44
Trichoptera	Leptoceridae	Ceraclea sp.	CG	2.2	3
Trichoptera	Leptoceridae	Leptoceridae	CG	3.15	5
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	6
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	1
Tricladida	Planariidae	Girardia tigrina	CG	7.1	312
			Total Organisms Collected		**1423**

Reservoir Benthic Index

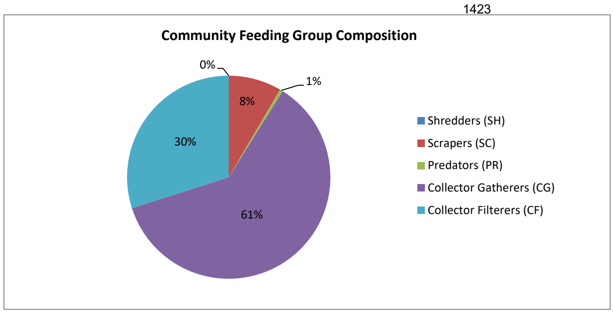
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	40	5	
EPT Richness (Genus)	8	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastrop
Percent Oligochaeta	18.1	3	
Percent Top Two Dominant Taxa (Genus)	39.1	5	(Girardia, Corbicula)
Total Abundance Less Chironomidae and Oligochaeta	915	5	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**33**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.13	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	2	
Percent Tolerant Taxa (TV > 3)	99.7	
Percent EPT-H	6.68	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	120	8
Predators (PR)	7	0
Collector Gatherers (CG)	870	61
Collector Filterers (CF)	426	30
	1423	100



Watts Bar Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR06 (TRM 527.55) - Inflow
Date: 09/24/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	22
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	190
Bivalvia	Dreissenidae	Dreissena polymorpha	CF	8	126
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	6
Bivalvia	Unionidae	Unionidae	CF	6	2
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	6
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	7
Diptera	Chironomidae	Axarus sp.	CG	2	33
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	6
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	2
Diptera	Chironomidae	Dicrotendipes simpsoni	CG	7.2	38
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	8
Diptera	Chironomidae	Nanocladius distinctus	CG	7.4	3
Diptera	Chironomidae	Parachironomus frequens	CG	8	2
Diptera	Chironomidae	Parachironomus sp.	CG	8	2
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	3
Diptera	Chironomidae	Rheotanytarsus exiguus gp.	CG	6.5	28
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	2
Ephemeroptera	Heptageniidae	Heptageniidae	SC	3	1
Ephemeroptera	Heptageniidae	Stenacron interpunctatum	SC	3.5	31
Ephemeroptera	Leptohyphidae	Tricorythodes sp.	CG	5	6
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	4
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	4
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	13
Isopoda	Asellidae	Caecidotea sp.	CG	8.4	2
Isopoda	Asellidae	Lirceus sp.	CG	7.4	1
Odonata/Anisoptera	Corduliidae	Neurocordulia molesta	PR	5.3	2
Odonata/Anisoptera	Corduliidae	Neurocordulia sp.	PR	5.3	1
Odonata/Anisoptera	Gomphidae	Gomphidae	PR	4	1
Oligochaeta	Naididae	Dero sp.	CG	9.8	1
Oligochaeta	Naididae	Dero trifida	CG	9.8	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Oligochaeta	Naididae	Naidinae	CG	8	1
Oligochaeta	Naididae	Nais sp.	CG	8.7	3
Oligochaeta	Naididae	Piguetiella michiganensis	CG	6	1
Oligochaeta	Naididae	Ripistes parasita	CG	8.4	8
Oligochaeta	Naididae	Slavina appendiculata	CG	8.4	21
Oligochaeta	Naididae	Stylaria lacustris	CG	8.4	86
Oligochaeta	Naididae	Tubificinae wohc	CG	10	5
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	CF	6.6	11
Trichoptera	Hydropsychidae	Hydropsychidae	CF	4.1	7
Trichoptera	Leptoceridae	Ceraclea sp.	CG	2.2	2
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	2
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	3
Tricladida	Planariidae	Girardia tigrina	CG	7.1	192
			Total Organisms Collected		**898**

Reservoir Benthic Index

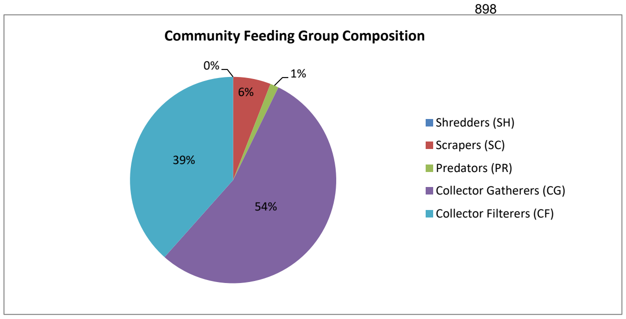
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	37	5	
EPT Richness (Genus)	6	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastr
Percent Oligochaeta	14.4	3	
Percent Top Two Dominant Taxa (Genus)	42.5	5	(Girardia, Corbicula)
Total Abundance Less Chironomidae and Oligochaeta	635	3	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.90	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	3	
Percent Tolerant Taxa (TV > 3)	96.0	
Percent EPT-H	5.01	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	53	6
Predators (PR)	12	1
Collector Gatherers (CG)	488	54
Collector Filterers (CF)	345	38
	898	100



Watts Bar Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR07 (TRM 526.7) - Inflow
Date: 09/24/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Crangonyctidae	Crangonyx sp.	CG	7.2	10
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	6
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	237
Bivalvia	Dreissenidae	Dreissena polymorpha	CF	8	59
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	14
Bivalvia	Unionidae	Utterbackia imbecillis	CF	6	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	3
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	18
Diptera	Chironomidae	Axarus sp.	CG	2	6
Diptera	Chironomidae	Chironomini	CG	6	1
Diptera	Chironomidae	Chironomus sp.	CG	9.3	1
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	1
Diptera	Chironomidae	Cricotopus bicinctus	CG	7.44	1
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	6
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	27
Diptera	Chironomidae	Dicrotendipes simpsoni	CG	7.2	9
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	10
Diptera	Chironomidae	Nanocladius distinctus	CG	7.4	2
Diptera	Chironomidae	Parachironomus frequens	CG	8	2
Diptera	Chironomidae	Parachironomus sp.	CG	8	1
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	6
Diptera	Chironomidae	Procladius sp.	CG	8.8	1
Diptera	Chironomidae	Pseudochironomus sp.	CG	4.9	4
Diptera	Chironomidae	Rheotanytarsus exiguus gp.	CG	6.5	3
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	9
Ephemeroptera	Caenidae	Caenis sp.	CG	6.8	1
Ephemeroptera	Heptageniidae	Stenacron interpunctatum	SC	3.5	20
Ephemeroptera	Leptohyphidae	Tricorythodes sp.	CG	5	6
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	3
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	1
Gastropoda	Viviparidae	Campeloma decisum	SC	5.8	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	8
Isopoda	Asellidae	Caecidotea sp.	CG	8.4	1
Isopoda	Asellidae	Lirceus sp.	CG	7.4	25
Odonata/Anisoptera	Corduliidae	Neurocordulia molesta	PR	5.3	1
Odonata/Anisoptera	Corduliidae	Neurocordulia sp.	PR	5.3	1
Odonata/Anisoptera	Gomphidae	Gomphidae	PR	4	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	8
Oligochaeta	Naididae	Dero sp.	CG	9.8	3
Oligochaeta	Naididae	Dero trifida	CG	9.8	10
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	3
Oligochaeta	Naididae	Naididae	CG	8	3
Oligochaeta	Naididae	Nais communis	CG	8.7	4
Oligochaeta	Naididae	Nais sp.	CG	8.7	8
Oligochaeta	Naididae	Ophidonais serpentina	CG	2	2
Oligochaeta	Naididae	Ripistes parasita	CG	8.4	9
Oligochaeta	Naididae	Slavina appendiculata	CG	8.4	7
Oligochaeta	Naididae	Stylaria lacustris	CG	8.4	123
Oligochaeta	Naididae	Tubificinae whc	CG	10	16
Oligochaeta	Naididae	Tubificinae wohc	CG	10	24
Trichoptera	Hydroptilidae	Hydroptila sp.	SC	6.5	1
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	20
Trichoptera	Philopotamidae	Chimarra obscura	CF	3.3	2
Tricladida	Planariidae	Girardia tigrina	CG	7.1	232
			Total Organisms Collected		**984**

Reservoir Benthic Index

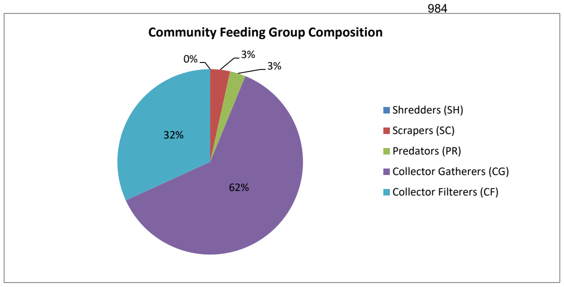
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	49	5	
EPT Richness (Genus)	6	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastro
Percent Oligochaeta	22.4	3	
Percent Top Two Dominant Taxa (Genus)	47.7	5	(Corbicula, Girardia)
Total Abundance Less Chironomidae and Oligochaeta	655	3	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.21	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	2	
Percent Tolerant Taxa (TV > 3)	99.2	
Percent EPT-H	5.08	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	34	3
Predators (PR)	27	3
Collector Gatherers (CG)	610	62
Collector Filterers (CF)	313	32
	984	100



APPENDIX J.4

BENTHIC INVESTIGATION SAMPLING AND ANALYSIS REPORT

Watts Bar Fossil Plant - Benthic Sampling and Analysis Report

TDEC Commissioner’s Order:
Environmental Investigation Plan
Watts Bar Fossil Plant
Spring City, Tennessee

September 30, 2022

Prepared by:

Tennessee Valley Authority

TVA TENNESSEE VALLEY AUTHORITY

Revision Record

Revision	Description	Date
0	Submittal to TDEC	August 29, 2022
1	Addresses September 23, 2022 TDEC Review Comments and Issued for TDEC	September 30, 2022

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APPENDIX B - TABLES

APPENDIX C – PHOTOGRAPHIC LOGS

Abbreviations

°C	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
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
WBF Plant	Watts Bar Fossil Plant

1.0 INTRODUCTION

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

The purpose of the benthic investigation was to characterize sediment chemistry, benthic macroinvertebrate (invertebrate) communities, and bioaccumulation in benthic invertebrates (Asiatic clams) in the vicinity of the WBF 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 Benthic Sampling and Analysis Plan (SAP) (Stantec Consulting Services Inc. [Stantec] 2018a). 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 WBF Plant. The evaluation of the results will consider other aspects of the environmental investigation, as well as data collected under other State and/or coal combustion residuals (CCR) programs, and will be presented in the Environmental Assessment Report (EAR).

Benthic investigation activities were performed in general accordance with the following documents developed by TVA to support fulfilling the requirements of the TDEC Order at the WBF Plant:

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

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 was conducted on March 28 and April 1, 2019. Benthic invertebrate community sampling was conducted on September 23 and 24, 2019. Asiatic clam (*Corbicula fluminea*) sampling and processing were conducted between June 27 and August 23, 2019. TVA personnel performed the sample collection and processing activities.

Laboratory analysis of constituents in sediments was performed by Eurofins TestAmerica, Inc. (TestAmerica) in 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 clams was performed by Pace Analytical in Green Bay, Wisconsin. Laboratory 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 EnvStds under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the investigation conducted pursuant to the Benthic SAP were to characterize sediment chemistry, benthic invertebrate communities, and bioaccumulation in benthic invertebrates in the Tennessee River adjacent to the WBF Plant property to evaluate whether CCR constituents have migrated into the river and, if so, the magnitude and extent of any effects on benthic organisms. Each component of the benthic investigation included samples collected from locations upstream of, adjacent to, and downstream of the WBF 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 Asiatic clams (both depurated and non-depurated) 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 seven transect locations (21 individual stations), benthic invertebrate populations from seven transect locations, and Asiatic clams from three river reaches. This report describes the activities related to the sampling events performed to complete Phase 1.

Phase 2 was not implemented since ash content did not exceed 20 percent in the sediment samples collected within the WBF Plant study area.

3.0 FIELD ACTIVITIES

Sediment sampling was conducted on March 28 and April 1, 2019. Benthic invertebrate community sampling was conducted on September 23 and 24, 2019. Asiatic clam sampling and processing were conducted between June 27 and August 23, 2019.

TVA performed the benthic investigation sample collection activities based on guidance and specifications listed in TVA's Technical Instructions (TIs) and Standard Operating Procedures (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 April 1, 2019 and obtained split samples from surficial sediments collected at stations SED-TR04-RB, SED-TR05-RB, and SED-TR05.5-LB.

During the benthic investigation, TVA:

- Verified and documented sampling locations using the global positioning system (GPS)
- Collected surficial sediment samples from five stations distributed among four of the seven proposed transects plus two additional stations offset from the proposed locations
- Collected quantitative benthic invertebrate community samples from seven transects
- Collected Asiatic clams from three sampling reaches and generated composite samples of non-depurated clams and of depurated clams for each sampling reach
- Collected quality control (QC) samples including one sediment matrix spike/matrix spike duplicate/lab duplicate, one field duplicate, two field banks, and three equipment blanks; and two Asiatic clam field duplicates and nine equipment blanks
- Shipped the sediment samples to TestAmerica and RJ Lee, and the Asiatic clam 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 Asiatic clam sampling locations and the TDEC Order CCR units at the WBF Plant are shown on Exhibits A.1, A.2, 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

Seven sediment sampling transects (21 individual stations) were proposed under the benthic investigation scope of work (Exhibit A.1). These transects were selected to generally coincide with the surface stream sampling transects (Stantec 2018c). Sample transects were established across the mainstream of the Tennessee River 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. However, sediment samples were obtained from only seven sampling stations; five of the 21 stations originally proposed in the SAP and two additional stations offset from the proposed locations. Additional information regarding samples that were collected is provided in Section 3.3.1, Sediment Sampling, and in Section 3.6.1, Variations in Scope.

Benthic Invertebrate Community

Benthic invertebrate community sampling was conducted at seven transect locations on the Tennessee River as shown on Exhibit A.2. 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 Watts Bar Nuclear Plant Alternate Thermal Limit site discharge National Pollutant Discharge Elimination System permit. Sample transects were established across the mainstream of the Tennessee River perpendicular to the direction of flow, and discrete grab samples were collected from five approximately equally spaced locations along each transect.

Asiatic Clam

Asiatic clam sample locations were randomly selected within the three sampling reaches depicted on Exhibit A.3. These areas represent background, adjacent, and downstream conditions relative to the WBF Plant CCR units and coincide with the fish tissue sampling areas (Stantec 2018d), and also incorporate many of the sediment and benthic invertebrate community sample transects.

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 Community 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, the number of Asiatic clams 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 Asiatic clams collected during the invertebrate bioaccumulation investigation field activities. The *Biota Field COC* documents the field collection team, the sampling locations, collection dates and times, the number of clams retained from each sampling location, and the custody record for the collected organisms.

3.2.1.5 Laboratory Chain-of-Custody

TVA personnel completed *Laboratory* COCs, listing each sediment, benthic invertebrate community, and Asiatic clam 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 sediment samples 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 sampling was conducted at the seven transect locations proposed under Phase 1 of the benthic investigation scope of work (Exhibit A.1). As detailed below, sediment samples were obtained from only seven sampling stations; five of the 21 stations originally proposed in the SAP and two additional stations offset from the proposed locations. 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.5 (Appendix B). Split samples collected by CEC during this investigation are also identified in Table B.5.

Phase 1 sediment sampling transects were located within a three mile reach of the Tennessee River extending downstream from Watts Bar Dam. Due to high flow velocities in this river reach, depositional areas were expected to be lacking. Therefore, TVA conducted reconnaissance of the substrates within the proposed study area on January 31, 2019. During this reconnaissance, Peterson dredges were used to evaluate the likelihood of success in collecting grab samples of depositional sediments throughout the proposed three mile sampling reach. A total of 173 Peterson grabs were collected, both from near-shore locations and across the river channel (Exhibit A.4). The substrates were predominantly composed of varying proportions of bedrock, cobble, gravel, sands, and/or mollusk shells. Depositional areas occurred only at near-shore locations, primarily where bank structures divert enough river flow to reduce velocities enough to allow suspended sediments (silts and clays) to be deposited. Except for two locations, only shallow layers of depositional sediments were present, and most depositional sediments were mixed with higher fractions of sand and/or gravel. The two exceptions occurred in the channel leading to the lock at Watts Bar Dam, which was outside the proposed study area, and the channel leading to the Watts Bar Nuclear Plant condenser cooling water intake.

TVA also conducted supplemental reconnaissance of the substrates during the March 28, 2019 sediment sampling. This reconnaissance was conducted by a second field team that primarily targeted the proposed mid-channel locations within the study area. This allowed the sediment sampling team to focus on the near-shore locations where there was a higher probability of collecting depositional sediments. The March reconnaissance confirmed the findings of the January reconnaissance; no depositional sediments were encountered mid-channel.

Accordingly, as allowed for in the TDEC-approved Benthic SAP, the numbers and locations of sediment samples collected were modified as needed based on conditions encountered in the field. In addition, due to the absence of depositional substrates, using a VibeCore™ sampler was not practical. Instead, as allowed for in the SAP, sampling dredges were used to attempt to collect surficial sediments. TDEC approved a modification to allow compositing of several substrate grabs within an approximately 300 foot distance upstream and/or downstream of each sampling transect to obtain sufficient sample volumes to meet study objectives. The expanded sampling zones along the transects are shown as shaded areas in Exhibit A.1.

Sediment sampling was conducted on March 28 and April 1, 2019. Several Ponar or Peterson grabs of substrate were collected at each location. If depositional sediments were present, then sediments from multiple grabs were collected and composited to obtain a sufficient sample volume for analysis. With these modifications, it was possible to collect sediment samples from a total of seven locations; five of the 21 stations originally proposed in the SAP and two additional stations substantially offset from the proposed locations (Table B.5). The two offset stations were assigned station IDs of SED-TR05.5-LB and SED-TR06.75-LB to represent their approximate locations relative to those proposed in the SAP. Depositional sediments were not encountered beyond 100 feet from the shoreline; therefore, no sediments samples were obtained mid-channel. Descriptions of the sediment samples collected are provided in Table B.6.

The predominant substates encountered in the study area downstream of Watts Bar Dam are represented by the photographs provided in Attachment C.1 (Appendix C), as well as the photographs of the benthic invertebrate community substrate samples collected on transects MAC-TR03 through MAC-TR07 (Attachment C.2).

Only surficial sediments (0 to 6 inches deep) were encountered in the WBF Plant study area. Each sediment sample comprised the contents of two to four Peterson grabs. For each grab, surface water was slowly decanted from the dredge and the collected sediments were deposited onto a clean sheet of polyethylene. The sediments were then transferred to clean, resealable plastic bags using new, certified clean scoops. To the extent practicable, clay parent material, twigs, roots, leaves, mollusk shells, rocks, and miscellaneous debris were removed. Samples were labeled, custody-sealed, and maintained in a cooler with ice until further processing. Sampling personnel wore new, clean nitrile gloves at each station when handling sample containers and sampling equipment that might come into contact with the sediment samples.

Dredges were rinsed with surface water between each deployment and decontaminated between each change in sampling station. Decontamination of sampling equipment was conducted in accordance with TVA, ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination*.

Further processing of the collected sediments consisted of homogenizing in the plastic bags or by transferring to a decontaminated plastic bowl and homogenizing using new, certified clean scoops. Scoops were treated as single-use and were discarded after each sample collection. The homogenized sediments then were transferred to laboratory-supplied sample containers. Samples were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.* TVA personnel secured a cap on each container, attached a custody seal across each cap, and placed samples into coolers for shipment to the analytical laboratory. Samples for metals and anions were maintained in ice. New, clean nitrile gloves were worn for compositing and handling each sample and sample container.

For Phase 1, collected sediment samples were analyzed for the presence of ash (percent ash) by polarized light microscopy (PLM) and 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 2 was not implemented since ash content did not exceed 20 percent in the sediment samples collected within the WBF Plant study area.

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.7.

3.3.2 Benthic Invertebrate Community Sampling

Quantitative benthic invertebrate community samples were collected at seven transect locations under Phase 1 of the benthic investigation scope of work (Exhibit A.2). 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 reservoir perpendicular to the direction of flow, and discrete grab samples were collected from five approximately equally spaced locations along each transects 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 Asiatic Clam Sampling

Samples of Asiatic clams were collected from the three river reaches specified under Phase 1 of the benthic investigation scope of work (Exhibit A.3). Samples of clams were collected in general 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.

The Benthic SAP emphasizes the collection of composite samples of mayfly (*Hexagenia* spp.) nymphs and adults for analytical analysis, but it allows for evaluation of other species if an insufficient number of mayflies are encountered within the designated areas. The nymphs of *Hexagenia* inhabit fine silt-clay substrates which were lacking in the WBF Plant study area downstream of Watts Bar Dam. Consequently, sufficient numbers of mayflies were not present for the purposes of this investigation, so the Asiatic clam was used for the bioaccumulation investigation.

Clams were collected by taking multiple random Ponar or Peterson grabs of substrates within a sample reach and selectively removing the organisms. Each substrate grab was emptied onto a stainless steel, Nitex, or Teflon screen then rinsed with river water to remove fine sediments and expose the clams. The clams were removed from the screen using gloved hands 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. Clams that appeared damaged were discarded. Undamaged clams collected from an area were randomly sorted into composite samples of approximately 35 to 45 clams for each depurated (i.e., held 72-hrs to allow evacuation of digestive system contents) and non-depurated sample. Additional clams were collected to form duplicate and archived samples. Clams collected for analysis without depuration of gut contents (i.e., non-depurated) were transferred into clean, resealable plastic bags and held in wet ice at temperatures less than six degrees Celsius (°C) pending processing. Clams collected for depuration prior to laboratory analysis were maintained alive in coolers filled with surface water from the sampling reach pending processing.

Clams were transported to the TVA Chickamauga Power Service Center in Chattanooga, Tennessee, for processing. They were scrubbed lightly with a small nylon brush to remove external debris, followed by a triple rinse with deionized (DI) water. Non-depurated clams were placed in clean, resealable plastic bags and frozen within 24 hours of collection. Clams collected for depuration were held in a DI water bath for a 72-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 72 hours, the clams were triple rinsed with DI water and transferred to clean, resealable plastic bags and frozen to form the depurated samples for each location. Clams were maintained at or below −20°C in a secure freezer at the TVA Chickamauga Power Service Center until further processed.

For tissue extraction, clams were removed from the freezer and processed in small batches to keep thawing to a minimum. Clams were rinsed with DI water, then shells were pried open using a scalpel. A second scalpel was used to remove the soft tissue from each organism. The tissues from the clams in each sample were composited into a new, certified clean, pre-weighed glass container. The filled container was weighed to determine total wet sample mass, and then was frozen. Utensils used for tissue extractions were decontaminated between a change in sample.

Decontamination was performed for Asiatic clam sampling and processing equipment in accordance with TVA TI ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination.* QC samples were collected in accordance with TVA ENV-TI-05.80.04, *Field Sampling Quality Control.* Sample containers were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody*.

Asiatic clam 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 clam tissue analysis did not include chloride, fluoride, pH, sulfate, or radium. The analytical data for Asiatic clams are presented in Table 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 WBF 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*. Samples were shipped as described below.

- Sediment samples were shipped via a commercial courier to the TestAmerica facility 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.
- Asiatic clam 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 WBF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- Using the sampling modifications approved by TDEC, it was possible to collect sediment samples from seven sampling stations; five of the 21 stations originally proposed in the SAP and two additional stations offset from the proposed locations. As detailed in the sections above, Phase 1 sediment sampling transects were located within a three mile reach of the Tennessee River extending downstream from Watts Bar Dam. Due to high flow velocities in this river reach, there were very few depositional areas. 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; thus, the seven samples collected were sufficient to meet the overall intent of the SAP.

- The Benthic SAP emphasizes the collection of composite samples of mayfly (*Hexagenia* spp.) nymphs and adults for analytical analysis. However, as allowed for in the Benthic SAP and detailed in the sections above, the Asiatic clam was used for the bioaccumulation investigation because insufficient numbers of mayflies were encountered in the designated study area downstream of Watts Bar Dam.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- Sediment samples were composites of two to four Peterson grabs collected within an approximately 300 foot distance upstream and/or downstream of a sampling transect as necessary to obtain sufficient sample volume for analysis. This modification was approved by TDEC.

- Photographs were not available for the following surficial sediment samples that were analyzed: SED-TR06-RB, SED-TR06.75-LB, and SED-TR07-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 Tennessee

River within the WBF 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 WBF Plant. The scope of work during this investigation included Phase 1 sediment sampling at seven transect locations (21 individual stations), benthic invertebrate community sampling at seven transect locations (35 individual stations), and benthic invertebrate (Asiatic clam) bioaccumulation sampling in three river reaches. Due to high flow velocities within the proposed sediment sampling river reach, there were very few depositional areas. Therefore, sediment samples were obtained from only seven sampling stations; five of the 21 stations originally proposed in the SAP and two additional stations substantially offset from the proposed locations. Sediment, benthic invertebrate community, and Asiatic clam sampling locations are summarized in Tables B.1 through B.3, and depicted on Exhibits A.1 through A.3, respectively. Phase 2 was not implemented since ash content did not exceed 20 percent in the sediment samples collected within the WBF Plant study area.

A summary of sediment samples collected, including field duplicates, is presented in Table B.5. Sediment field data are presented in Table B.6. Sediment analytical data for CCR Parameters are presented in Table 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 (Asiatic clam) samples collected, including field duplicates, is presented in Table B.10. Asiatic clam analytical data for percent moisture and CCR Parameters, excluding chloride, fluoride, pH, sulfate, and radium are presented in Table B.11. Analytical data were reported by Pace Analytical, and data verification or validation was performed by EnvStds.

TVA has completed the benthic investigation at the WBF Plant in Spring City, Tennessee, in accordance with the Benthic SAP and TDEC-approved SAP modifications, 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 Watts Bar Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 2. November 2018.

Stantec Consulting Services Inc. (Stantec). (2018a). *Benthic Sampling and Analysis Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

Stantec. (2018b). *Environmental Investigation Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

Stantec. (2018c). *Surface Stream Investigation Sampling and Analysis Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

Stantec. (2018d). *Fish Tissue Sampling and Analysis Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

Tennessee Department of Environment and Conservation. (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-05.80.50, *Soil and Sediment Sampling.*

TVA. TVA-KIF-SOP-29, *Standard Operating Procedure for: Mayfly Sampling*. Revision 1.

TVA. TVA-KIF-SOP-35, *Standard Operating Procedure for: Reservoir Benthic Macroinvertebrate Sampling.* Revision 2.

APPENDIX A - EXHIBITS

Exhibit No.
A.1

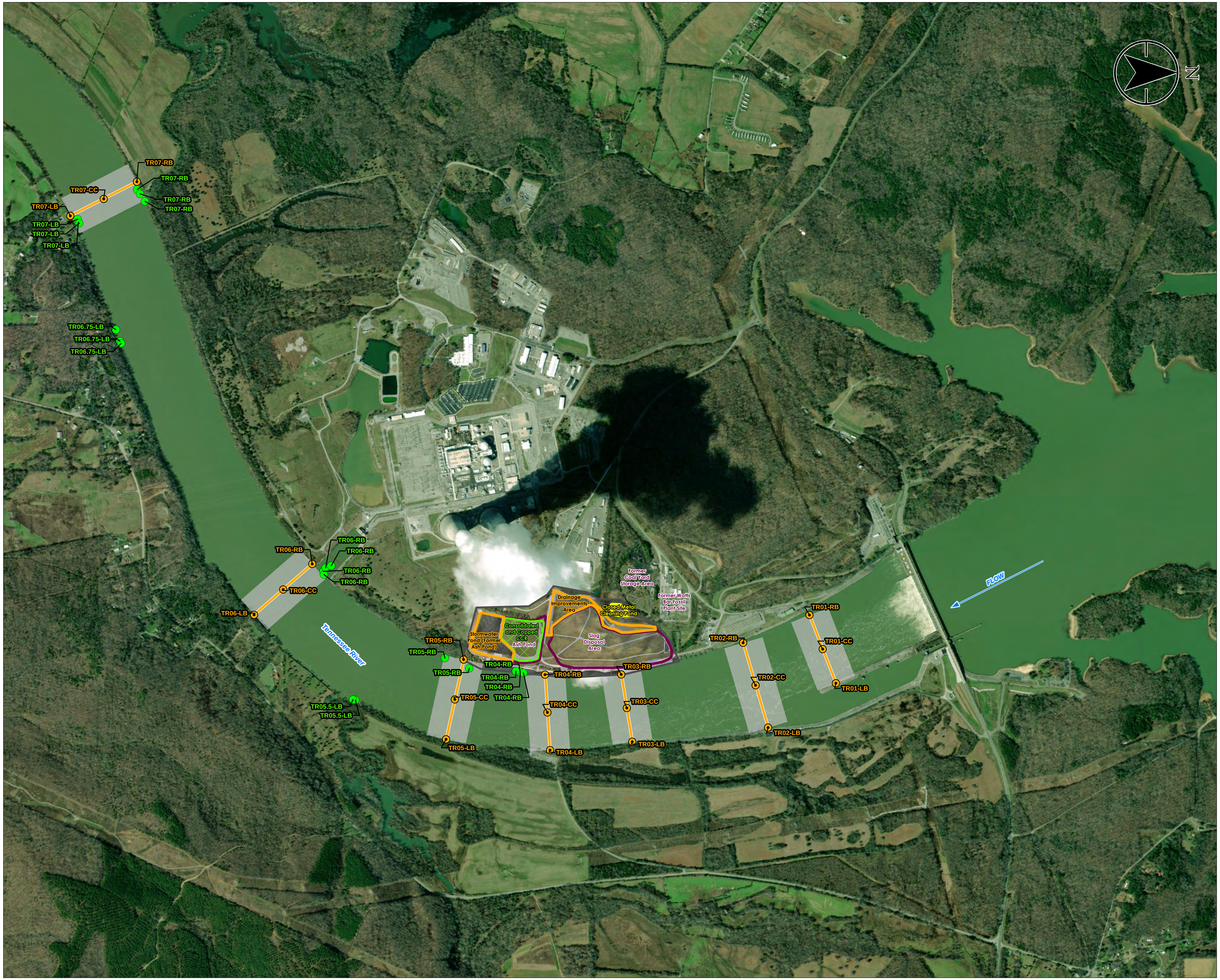
Title
Sediment Sampling Locations

Client/Project
Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location
Spring City, Tennessee

175668050
Prepared by DMB on 2022-08-08
Technical Review by TB on 2022-08-08

0 700 1,400 2,100 2,800 Feet
1:8,400 (At original document size of 22x34)



Legend

- Sediment Sampling Locations - Collected
- Sediment Sampling Locations - Proposed
- Sediment Sampling Location Transects - Proposed
- 2018 Imagery Boundary
- Expanded Proposed Sediment Sampling Area
- CCR Unit Area (Approximate)
- Closed Metal Cleaning Pond (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018
3. Sediment samples were obtained from only seven locations.
4. Each sediment sample comprised the contents of two to four substrate grabs.
5. Depositional sediments were not encountered beyond 100 feet from the shoreline.

Stantec TVA

Exhibit No.
A.2

Title
Benthic Invertebrate Community Sampling Locations

Client/Project
Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location
Spring City, Tennessee

175668050
Prepared by DMB on 2022-08-10
Technical Review by TB on 2022-08-10

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

Legend

- Benthic Invertebrate Community Sampling Locations
- Benthic Invertebrate Community Sampling Locations - Transect
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Closed Metal Cleaning Pond (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)

Notes
1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018

Stantec TVA

U:\TVA-EP\175668050_WBF_WorkPlans\gis\mxd\Env_SARS\WBF_SARS_ExhA.2_Benthic_Invt_Sampling_Locations.mxd Revised: 2022-08-10 By: mbough

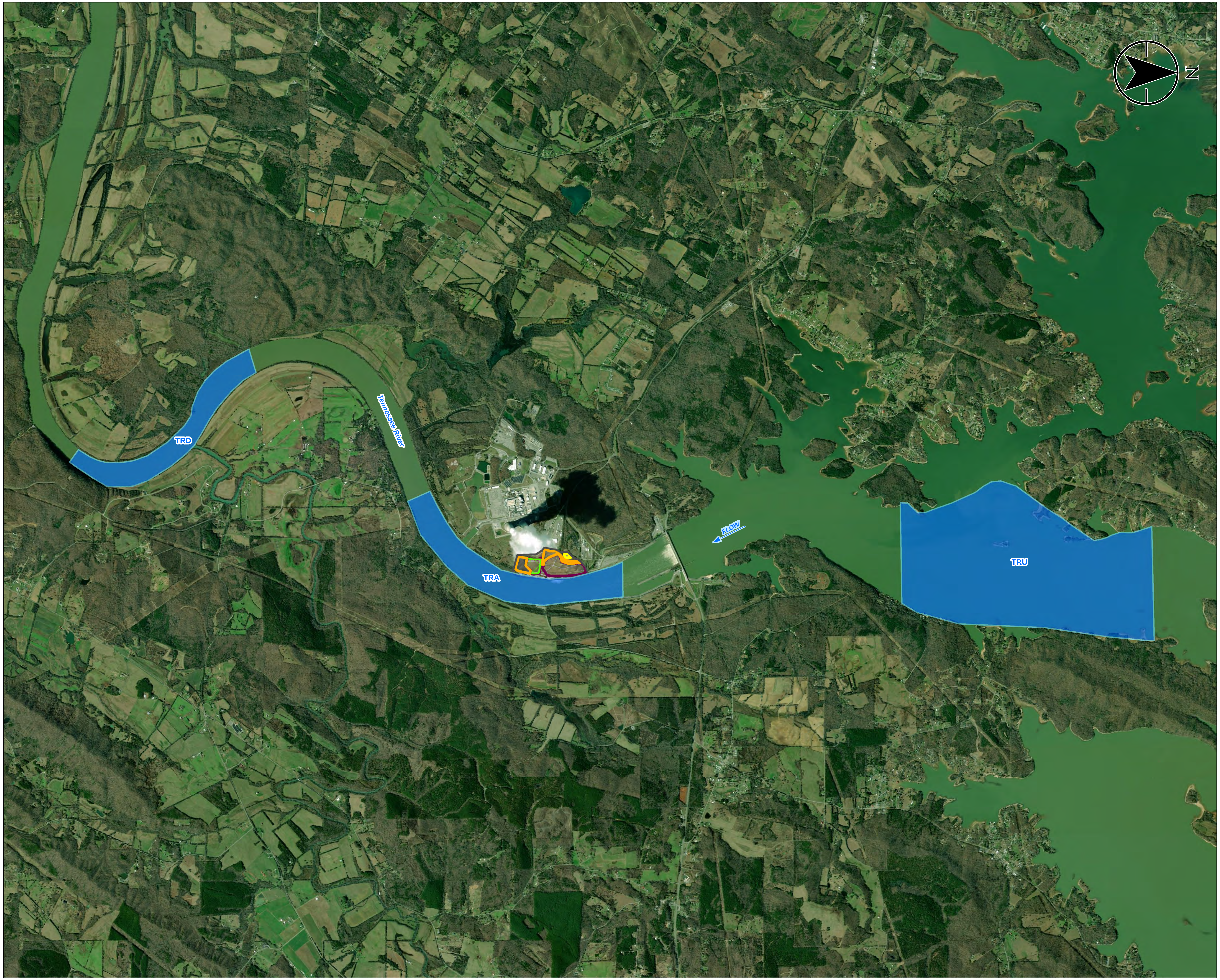


Exhibit No.

A.3

Title

Asiatic Clam Sampling Reaches

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050

Prepared by DMB on 2022-08-08
Technical Review by TB on 2022-08-08

0 2,000 4,000 6,000 8,000 Feet

1:24,000 (At original document size of 22x34)

Legend

- Asiatic Clam Sampling Locations — TRU – Tennessee River Upstream; TRA – Tennessee River Adjacent; TRD – Tennessee River Downstream
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Closed Metal Cleaning Pond (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018

Stantec TVA

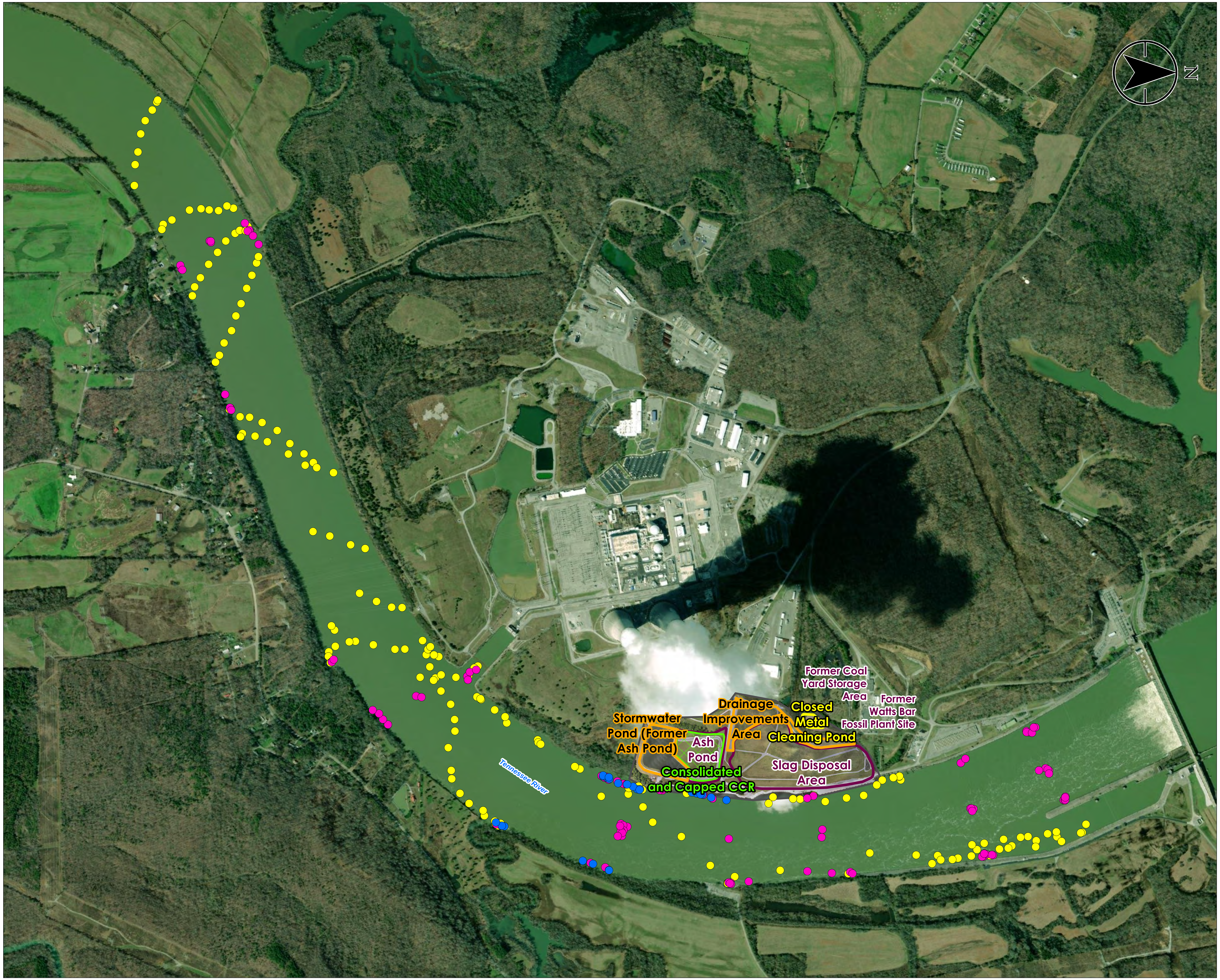


Exhibit No.

A.4

Title

Substrate Grab Sampling Locations

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050

Prepared by DMB on 2022-08-08
Technical Review by TB on 2022-08-08

0 600 1,200 1,800 2,400 Feet

1:7,200 (At original document size of 22x34)

Legend

Substrate Grab Sampling Locations

- Sampling Date - 1/31/2019
- Sampling Date - 3/28/2019
- Sampling Date - 4/1/2019
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Closed Metal Cleaning Pond (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018

U:\TVA-EIP\175668050_WBF_WorkPlans\gis\mxd\Env_SARS\WBF_SARS_ExhA.4_Substrate_Grab_Sample_Locations.mxd Revised: 2022-08-08 By: mbough

APPENDIX B - TABLES

TABLE B.1 – Proposed Sediment Sampling Locations
Watts Bar Fossil Plant

Transect Location ID[1]	Description
SED-TR01	Tennessee River Upstream of WBF Plant, and just downstream of Watts Bar Dam (Background)
SED-TR02	Tennessee River just Upstream of Former Slag Disposal Area/Historic Fly Ash Pond (Background)
SED-TR03	Tennessee River Adjacent to Former Slag Disposal Area/Historic Fly Ash Pond
SED-TR04	Tennessee River Downstream of Former Slag Disposal Area/Historic Fly Ash Pond, and Upstream of Former Ash Pond Area
SED-TR05	Tennessee River just Downstream of Former Ash Pond Area
SED-TR06	Tennessee River Downstream of WBF CCR Units
SED-TR07	Tennessee River Downstream of WBF Plant

Notes:

ID Identification

1. The sediment transects presented are those proposed in the Benthic Sampling and Analysis Plan (SAP). The sediment samples collected are summarized in Table B.5, and depicted on Exhibit A.1.

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

Transect Location ID	Description
MAC-TR01[1]	Tennessee River Upstream of WBF Plant within Watts Bar Reservoir (Background)
MAC-TR02	Tennessee River Upstream of WBF Plant within Watts Bar Reservoir (Background)
MAC-TR03	Tennessee River Upstream of WBF Plant and just Downstream of Watts Bar Dam within Chickamauga Reservoir (Background)
MAC-TR04	Tennessee River Adjacent to Former Slag Disposal Area/Historic Fly Ash Pond
MAC-TR05	Tennessee River just Downstream of Former Ash Pond Area
MAC-TR06[1]	Tennessee River Downstream of WBF CCR Units
MAC-TR07	Tennessee River Downstream of WBF Plant

Notes:

ID Identification

1. Coincides with historical benthic invertebrate community sampling location.

TABLE B.3 – Asiatic Clam Sampling Reaches
Watts Bar Fossil Plant

Sample Reach ID	Description
TRU	Tennessee River Upstream of WBF Plant within Watts Bar Reservoir (Background)
TRA	Tennessee River Adjacent to WBF Plant
TRD	Tennessee River Downstream of WBF Plant

Notes:

ID Identification

TABLE B.4 – Corresponding Environmental Sampling Locations
Watts Bar Fossil Plant

Corresponding Sampling Locations				
Surface Stream	**Sediment[1]**	**Benthic Community**	**Asiatic Clam**	**Fish Tissue**
–	–	MAC-TR01	TRU	TRU
–	–	MAC-TR02	–	–
STR-TR01	SED-TR01	–	–	–
STR-TR02	SED-TR02	MAC-TR03	TRA	TRA
STR-TR03	SED-TR03	MAC-TR04		
STR-TR04	SED-TR04	–		
STR-TR05	SED-TR05	MAC-TR05		
STR-TR06	SED-TR06	–		
–	–	MAC-TR06		
STR-TR07	SED-TR07	MAC-TR07	–	–
–	–	–	TRD	TRD

Notes:

– Not applicable

1. The sediment transects presented are those proposed in the Benthic Sampling and Analysis Plan (SAP). The sediment samples collected are summarized in Table B.5, and depicted on Exhibit A.1.

TABLE B.5 – Summary of Sediment Samples
Watts Bar Fossil Plant
March and April 2019

			Analysis Type					
Station ID[1]	**Sample ID**	**Sample Type**	**% Ash**	**Total Metals**	**Total Mercury**	**Anions**	**pH (laboratory)**	**Radium-226, Radium-228, Radium-226+228**
SED-TR04-RB	WBF-SED-TR04-CORRB-0.0/0.5-20190401	Normal Environmental Sample[3]	x	x	x	x	x	x
SED-TR05-RB	WBF-SED-TR05-CORRB-0.0/0.5-20190401	Normal Environmental Sample[3]	x	x	x	x	x	x
SED-TR05.5-LB[2]	WBF-SED-TR05.5-CORLB-0.0/0.5-20190401	Normal Environmental Sample[3]	x	x	x	x	x	x
SED-TR06-RB	WBF-SED-TR06-CORRB-0.0/0.5-20190328	Normal Environmental Sample	x	x	x	x	x	x
SED-TR06.75-LB[2]	WBF-SED-TR06.75-CORLB-0.0/0.5-20190328	Normal Environmental Sample	x	x	x	x	x	x
SED-TR07-RB	WBF-SED-TR07-CORRB-0.0/0.5-20190328	Normal Environmental Sample	x	x	x	x	x	x
SED-TR07-LB	WBF-SED-TR07-CORLB-0.0/0.5-20190328	Normal Environmental Sample	x	x	x	x	x	x
	WBF-SED-TR07-DUP01-20190328	Field Duplicate Sample	x	x	x	x	x	x

Notes:

% Ash	Percent 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	EPA 901.1
ID	Identification

1. Station ID: LB=Left Bank, RB=Right Bank (left bank and right bank determined with a downstream-facing orientation)
2. Stations SED-TR05.5-LB and SED-TR06.75-LB were substantially offset from the locations proposed in the Benthic Sampling and Analysis Plan (SAP). These stations were assigned station IDs that represent their approximate locations relative to those proposed in the SAP.
3. Civil & Environmental Consultants, Inc (CEC) obtained split samples from surficial sediments collected at stations SED-TR04-RB, SED-TR05-RB, and SED-TR05.5-LB

TABLE B.6 – Sediment Sampling Field Data
Watts Bar Fossil Plant
March and April 2019

Station ID[1]	Sample Date	Water Depth (ft)	Gear Type	Sample ID	Horizon (ft)	No. of Substrate Grabs Composited	Photograph ID[2]	Substrate Description[3,4]
SED-TR04-RB	4/1/2019	5 - 6	PE	WBF-SED-TR04-CORRB-0.0/0.5-20190401	0.0 - 0.5	4	26	Mix of fines and sand, overlaying clay/parent material
SED-TR05-RB	4/1/2019	3 - 9	PE	WBF-SED-TR05-CORRB-0.0/0.5-20190401	0.0 - 0.5	2	38	Mix of fines and sand, overlaying clay/parent material
SED-TR05.5-LB[5]	4/1/2019	4 - 5	PE	WBF-SED-TR05.5-CORLB-0.0/0.5-20190401	0.0 - 0.5	2	42	Mix of fines, sand, and mollusk shells, overlaying clay/parent material
SED-TR06-RB	3/28/2019	17 - 18	PE	WBF-SED-TR06.0-CORRB-0.0/0.5-20190328	0.0 - 0.5	4	N/A	Fines mixed with high proportions of sand
SED-TR06.75-LB[5]	3/28/2019	6 - 7	PE	WBF-SED-TR06.75-CORLB-0.0/0.5-20190328	0.0 - 0.5	3	N/A	Silty-sand
SED-TR07-RB	3/28/2019	5 - 6	PE	WBF-SED-TR07-CORRB-0.0/0.5-20190328	0.0 - 0.5	3	N/A	Mix of fines and sand, overlaying clay/parent material
SED-TR07-LB	3/28/2019	5 - 8	PE	WBF-SED-TR07-CORLB-0.0/0.5-20190328 WBF-SED-TR07-DUP01-20190328	0.0 - 0.5	3	56	Mix of fines, sand, gravel, and mollusk shell, overlaying clay/parent material

Notes:

ft	feet
ID	Identification
N/A	Not available
PE	Peterson dredge (Wildco™)

1. Station ID: LB=Left Bank, RB=Right Bank (left bank and right bank determined with a downstream-facing orientation)
2. See Photographic Logs of Sediment Samples, Attachment C.1 in Appendix C.
3. Fines: alluvial silts and clays
4. To the extent practicable, clay parent material, twigs, roots, leaves, mollusk shells, rocks, and miscellaneous debris were removed from each sample.
5. Stations SED-TR05.5-LB and SED-TR06.75-LB were substantially offset from the locations proposed in the Benthic Sampling and Analysis Plan (SAP). These stations were assigned station IDs that represent their approximate locations relative to those proposed in the SAP.

TABLE B.7 – Sediment Analytical Results
Watts Bar Fossil Plant
March and April 2019

Sample Location		**SED-TR04-RB**	**SED-TR05-RB**	**SED-TR05.5-LB**	**SED-TR06-RB**	**SED-TR06.75-LB**	**SED-TR07-LB**		**SED-TR07-RB**
Sample Date		**01-Apr 2019**	**01-Apr 2019**	**01-Apr 2019**	**28-Mar 2019**	**28-Mar 2019**	**28-Mar 2019**	**28-Mar 2019**	**28-Mar 2019**
Sample ID		**WBF-SED-TR04-CORRB-0.0/0.5-20190401**	**WBF-SED-TR05-CORRB-0.0/0.5-20190401**	**WBF-SED-TR05.5-CORLB-0.0/0.5-20190401**	**WBF-SED-TR06-CORRB-0.0/0.5-20190328**	**WBF-SED-TR06.75-CORLB-0.0/0.5-20190328**	**WBF-SED-TR07-DUP01-20190328**	**WBF-SED-TR07-CORLB-0.0/0.5-20190328**	**WBF-SED-TR07-CORRB-0.0/0.5-20190328**
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**
Sample Type[1]		**N**	**N**	**N**	**N**	**N**	**FD**	**N**	**N**
Parent Sample ID							**WBF-SED-TR07-CORLB-0.0/0.5-20190328**		
Level of Review[2,3]		**Validated**	**Validated**	**Validated**	**Validated**	**Validated**	**Validated**	**Validated**	**Validated**
	Units								
PLM									
% ASH[4]	%	5	4	1	2	1	1 UJ	5 J	5
Total Metals									
Antimony	mg/kg	0.0865 J	0.0916 J	0.159 J	0.0465 UJ	0.0719 J	0.0473 J	0.101 J	0.0498 J
Arsenic	mg/kg	2.41	3.64	4.59	1.34	2.29	1.73	1.79	1.45
Barium	mg/kg	94.0	75.7	106	43.3	108	78.1	81.5	58.0
Beryllium	mg/kg	0.821	0.608	0.884	0.309	1.09	0.761	0.803	0.485
Boron	mg/kg	2.89 J	1.16 J	1.83 J	1.03 J	2.36 J	1.38 J	2.11 J	1.38 J
Cadmium	mg/kg	0.0959	0.348	0.423	0.0743 J	0.127	0.0764	0.0878	0.0800
Calcium	mg/kg	9,500 J	1,420 J	4,080 J	1,590 J	1,510 J	1,070 J	1,090 J	2,360 J
Chromium	mg/kg	13.8	14.2	17.9	7.43	16.5	13.2	13.5	9.47
Cobalt	mg/kg	8.92	8.45	11.3	4.63	9.79	7.60	7.88	5.58
Copper	mg/kg	9.35	12.8	30.3	4.52	10.3	8.12	8.32	5.80
Lead	mg/kg	9.41 J	16.1 J	21.2 J	5.82 J	12.0 J	7.14 J	7.53 J	5.88 J
Lithium	mg/kg	11.4 J	6.94 J	10.7 J	5.52 J	16.9 J	11.5 J	12.7 J	7.51 J
Mercury	mg/kg	0.0185 J	0.0501	0.0790	0.0116 J	0.0298	0.0128 J	0.0144 J	< 0.0102
Molybdenum	mg/kg	0.401	0.418	0.572	0.163 J	0.418	0.308 J	0.341 J	0.250 J
Nickel	mg/kg	12.1	9.63	13.5	5.80	14.3	11.0	11.5	7.52
Selenium	mg/kg	0.953 J	0.638 J	1.02 J	0.430 J	1.09 J	1.01 J	1.12 J	0.485 J
Silver	mg/kg	0.0263 J	0.0268 J	0.0409 J	< 0.0210	0.0232 J	< 0.0212	< 0.0216	< 0.0195
Strontium	mg/kg	13.6 J	5.63 J	10.9 J	5.08 J	8.88 J	6.44 J	6.95 J	6.04 J
Thallium	mg/kg	0.151	0.155	0.215	0.0887	0.189	0.142	0.153	0.109
Vanadium	mg/kg	17.7	19.0	26.1	8.54	19.0	15.1	15.4	10.9
Zinc	mg/kg	40.8	82.6	98.6	58.9	48.5	40.9	42.2	33.9
Anions									
Chloride	mg/kg	< 5.59	< 5.42	< 5.88	< 5.72	< 6.19	< 5.77	< 5.82	< 5.43
Fluoride	mg/kg	1.24 J	0.950 J	1.32 J	< 1.00	1.22 J	1.81	1.47 J	< 0.952
Sulfate	mg/kg	65.1	40.1	47.6	38.3	48.3	32.4	25.4	45.0
Radiological Parameters									
Radium-226	pCi/g	0.999 (+/-0.273)	0.991 (+/-0.250)	1.38 (+/-0.369)	0.657 (+/-0.171)	1.26 (+/-0.277)	0.827 (+/-0.249) J	1.28 (+/-0.309) J	1.06 (+/-0.242)
Radium-228	pCi/g	1.46 (+/-0.384)	1.05 (+/-0.398)	1.58 (+/-0.433)	1.00 (+/-0.242)	1.65 (+/-0.364)	1.37 (+/-0.383)	1.55 (+/-0.386)	1.30 (+/-0.328)
Radium-226+228	pCi/g	2.46 (+/-0.471)	2.04 (+/-0.470)	2.96 (+/-0.569)	1.66 (+/-0.296)	2.91 (+/-0.457)	2.20 (+/-0.457) J	2.83 (+/-0.494) J	2.36 (+/-0.408)
General Chemistry									
pH (lab)	SU	7.5	7.2	7.3	7.6	7.3	7.4	7.3	7.3

Notes:

<	Analyte was not detected at a concentration greater than the Method Detection Limit.
%	percent
ft	feet
ID	Identification
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 - analysis for percent (%) ash
SU	Standard Unit
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 Sample
2. Level of review is defined in the Quality Assurance Project Plan.
3. Level of review for percent (%) 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
Watts Bar Fossil Plant
September 2019

Transect ID	Station ID[1]	Sample Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[2]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	Hardpan Clay
MAC-TR01	1	9/23/2019	WBF-MAC-TR01-BEN01-20190923	PO	8.3	50	–	–	50	20	20	–	–	10
MAC-TR01	2	9/23/2019	WBF-MAC-TR01-BEN02-20190923	PO	39.0	100	98	1	–	1	–	–	–	–
MAC-TR01	3	9/23/2019	WBF-MAC-TR01-BEN03-20190923	PO	34.0	60	9	–	90	1	–	–	–	–
MAC-TR01	4	9/23/2019	WBF-MAC-TR01-BEN04-20190923	PO	34.0	70	8	–	90	1	1	–	–	–
MAC-TR01	5	9/23/2019	WBF-MAC-TR01-BEN05-20190923	PO	15.0	90	99	1	–	–	–	–	–	–
MAC-TR02	1	9/23/2019	WBF-MAC-TR02-BEN01-20190923	PO	71.0	100	98	1	–	1	–	–	–	–
MAC-TR02	2	9/23/2019	WBF-MAC-TR02-BEN02-20190923	PO	53.0	50	–	–	25	5	–	–	–	70
MAC-TR02	3	9/23/2019	WBF-MAC-TR02-BEN03-20190923	PO	43.0	100	99	1	–	–	–	–	–	–
MAC-TR02	4	9/23/2019	WBF-MAC-TR02-BEN04-20190923	PO	39.0	90	90	1	–	–	–	–	–	9
MAC-TR02	5	9/23/2019	WBF-MAC-TR02-BEN05-20190923	PO	17.2	60	–	–	95	1	–	–	–	4
MAC-TR03	1	9/24/2019	WBF-MAC-TR03-BEN01-20190924	PO	16.3	40	1	–	–	99	–	–	–	–
MAC-TR03	2	9/24/2019	WBF-MAC-TR03-BEN02-20190924	PO	14.6	30	–	–	–	–	90	10	–	–
MAC-TR03	3	9/24/2019	WBF-MAC-TR03-BEN03-20190924	PO	14.0	25	–	–	–	–	20	80	–	–
MAC-TR03	4	9/24/2019	WBF-MAC-TR03-BEN04-20190924	PO	13.2	20	–	15	–	–	65	20	–	–
MAC-TR03	5	9/24/2019	WBF-MAC-TR03-BEN05-20190924	PO	10.1	25	–	–	–	10	70	20	–	–
MAC-TR04	1	9/24/2019	WBF-MAC-TR04-BEN01-20190924	PO	10.8	30	–	–	–	–	10	90	–	–
MAC-TR04	2	9/24/2019	WBF-MAC-TR04-BEN02-20190924	PO	17.9	20	–	–	–	5	35	60	–	–
MAC-TR04	3	9/24/2019	WBF-MAC-TR04-BEN03-20190924	PO	14.4	25	–	–	–	5	80	15	–	–
MAC-TR04	4	9/24/2019	WBF-MAC-TR04-BEN04-20190924	PO	14.6	20	–	–	–	–	80	20	–	–
MAC-TR04	5	9/24/2019	WBF-MAC-TR04-BEN05-20190924	PO	8.9	50	–	–	–	25	75	–	–	–
MAC-TR05	1	9/24/2019	WBF-MAC-TR05-BEN01-20190924	PO	9.7	30	–	–	–	20	30	50	–	–
MAC-TR05	2	9/24/2019	WBF-MAC-TR05-BEN02-20190924	PO	18.4	20	–	–	–	5	15	80	–	–
MAC-TR05	3	9/24/2019	WBF-MAC-TR05-BEN03-20190924	PO	14.3	25	–	–	–	10	90	–	–	–
MAC-TR05	4	9/24/2019	WBF-MAC-TR05-BEN04-20190924	PO	15.1	20	–	–	–	5	85	10	–	–
MAC-TR05	5	9/24/2019	WBF-MAC-TR05-BEN05-20190924	PO	8.7	25	–	10	50	–	40	–	–	–
MAC-TR06	1	9/24/2019	WBF-MAC-TR06-BEN01-20190924	PO	12.3	30	–	–	–	–	2	98	–	–
MAC-TR06	2	9/24/2019	WBF-MAC-TR06-BEN02-20190924	PO	19.8	20	–	–	–	5	95	–	–	–
MAC-TR06	3	9/24/2019	WBF-MAC-TR06-BEN03-20190924	PO	20.0	20	–	–	–	–	5	95	–	–
MAC-TR06	4	9/24/2019	WBF-MAC-TR06-BEN04-20190924	PO	23.0	25	–	–	–	2	98	–	–	–
MAC-TR06	5	9/24/2019	WBF-MAC-TR06-BEN05-20190924	PO	10.8	30	25	–	–	5	–	–	–	70

See notes on last page.

TABLE B.8 – Benthic Invertebrate Community Field Data
Watts Bar Fossil Plant
September 2019

Transect ID	Station ID[1]	Sample Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[2]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	Hardpan Clay
MAC-TR07	1	9/24/2019	WBF-MAC-TR07-BEN01-20190924	PO	10.3	40	18	–	–	2	–	–	–	80
MAC-TR07	2	9/24/2019	WBF-MAC-TR07-BEN02-20190924	PO	22.0	90	–	–	–	5	–	95	–	–
MAC-TR07	3	9/24/2019	WBF-MAC-TR07-BEN03-20190924	PO	22.0	20	–	–	–	–	5	95	–	–
MAC-TR07	4	9/24/2019	WBF-MAC-TR07-BEN04-20190924	PO	24.0	30	–	–	–	50	50	–	–	–
MAC-TR07	5	9/24/2019	WBF-MAC-TR07-BEN05-20190924	PO	8.4	60	–	2	50	3	–	–	–	45

Notes:

–	Not applicable
% Dredge Full	Estimated percentage of the dredge that was filled with substrate
ID	Identification
PO	Ponar Dredge (Wildco™)

1. 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.
2. Visual assessment of substrate composition conducted in the field.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Watts Bar Fossil Plant
September 2019

River	Tennessee River																																		
Transect ID	**MAC-TR01**					**MAC-TR02**					**MAC-TR03**					**MAC-TR04**					**MAC-TR05**					**MAC-TR06**					**MAC-TR07**				
Sample Date	**9/23/2019**					**9/23/2019**					**9/24/2019**					**9/24/2019**					**9/24/2019**					**9/24/2019**					**9/24/2019**				
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	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Glossiphoniidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Helobdella stagnalis	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
OLIGOCHAETA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Lumbriculidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	1	·	·	·	·	·	·	·	·	·	·	·	·
Lumbricidae	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
TUBIFICIDA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Naididae	·	·	·	1	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·
Branchiura sowerbyi	·	1	·	·	·	1	1	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	1	·	8	·	·	·	·	·	·	·	·	7	1
Dero sp.	·	·	·	·	·	·	·	·	·	·	3	·	·	1	3	·	1	·	7	·	·	·	·	10	·	·	·	·	1	·	1	·	2	·	·
Dero trifida	53	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	10	·	80	·	4	21	·	35	·	·	2	·	·	·	6	·	4	·
Ilyodrilus templetoni	·	·	·	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Limnodrilus cervix	11	1	1	3	3	·	2	1	·	3	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Limnodrilus claparedianus	·	·	2	·	·	·	·	·	6	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Limnodrilus hoffmeisteri	·	2	·	·	·	·	·	·	2	13	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	3
Limnodrilus sp.	·	·	1	1	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Naidinae	·	·	·	·	·	·	·	·	·	·	·	2	·	·	·	1	1	·	·	·	·	·	·	2	8	·	·	1	·	·	1	·	·	1	·
Nais communis	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	4	·	·
Nais sp.	·	·	·	·	·	·	·	·	·	·	·	·	2	4	·	2	2	4	1	·	3	1	1	2	·	·	·	2	·	1	·	·	8	·	·
Ophidonais serpentina	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2
Piguetiella michiganensis	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·
Pristina sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	·	·	·
Ripistes parasita	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	6	2	·	·	·	9	·	·
Slavina appendiculata	·	·	·	·	·	·	·	·	·	·	·	4	2	6	·	3	8	34	2	·	1	14	7	27	·	·	·	14	5	2	·	·	6	1	·
Stylaria lacustris	·	·	·	·	·	·	·	·	·	·	3	·	·	·	5	17	2	·	·	7	4	17	·	·	43	·	65	5	16	·	2	94	11	16	·
Tubificinae w/ hair chaetae	21	·	·	2	1	1	·	·	3	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	6	·	9	·
Tubificinae w/out hair chaetae	126	5	3	11	2	6	12	9	15	25	·	·	·	·	·	·	·	·	·	·	·	·	·	·	43	·	·	·	·	5	7	·	·	5	12
INSECTA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
DIPTERA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Ceratopogonidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3
Chaoboridae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Chaoborus punctipennis	4	39	4	7	2	160	7	28	42	5	3	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	6	1	·	·	·	·
Chironomidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Ablabesmyia annulata	·	·	·	·	5	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Ablabesmyia rhamphe gp.	·	·	·	·	·	·	·	·	·	·	10	·	·	·	7	·	·	·	1	40	5	9	2	·	5	·	·	7	·	·	11	2	·	5	·
Axarus sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	33	·	·	·	·	6
Chironomini	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·
Chironomus sp.	·	7	2	·	19	2	11	10	9	·	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Cladotanytarsus sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·
Coelotanypus sp.	·	2	·	·	13	9	1	18	8	8	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·
Cricotopus bicinctus	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·
Cryptochironomus sp.	12	·	·	·	·	·	·	·	1	3	2	·	·	·	·	·	·	·	·	·	·	·	·	·	8	·	·	·	·	6	·	·	·	6	·
Dicrotendipes neomodestus	30	·	·	·	·	·	·	·	·	·	·	·	·	1	3	·	·	·	·	33	·	·	2	·	27	·	·	1	1	·	25	·	·	·	2
Dicrotendipes simpsoni	·	·	·	·	·	·	·	·	·	·	·	32	18	30	37	26	20	26	36	93	5	17	5	18	43	1	·	6	30	1	5	4	·	·	·
Dicrotendipes sp.	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	5	·	3	5	·	·	7	·	2	1	·

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Watts Bar Fossil Plant
September 2019

River	Tennessee River																																		
Transect ID	MAC-TR01					MAC-TR02					MAC-TR03					MAC-TR04					MAC-TR05					MAC-TR06					MAC-TR07				
Sample Date	9/23/2019					9/23/2019					9/24/2019					9/24/2019					9/24/2019					9/24/2019					9/24/2019				
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)	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Nanocladius distinctus	·	·	·	·	·	·	·	·	·	1	·	51	45	37	8	1	25	88	33	3	5	3	11	11	·	1	·	2	·	·	·	·	1	1	·
Parachironomus frequens	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2	·	·	·	2	·	·	·
Parachironomus sp.	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	1	·	1	·	·	1	·	·	·	·	1	1	·	·	·	·	1	·	·
Paratanytarsus dissimilis	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3	·	·	·	·	·	·	·	·	·	5	·	·	·	·	·	·	·	·	·	·
Paratendipes albimanus/duplicatus	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Polypedilum halterale gp.	12	·	1	1	·	·	·	·	·	·	2	2	·	·	·	·	·	·	·	·	·	·	·	·	53	1	·	·	·	2	6	·	·	·	·
Polypedilum illinoense gp.	6	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Procladius sp.	·	·	·	·	·	1	23	·	1	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Pseudochironomus sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	4
Rheotanytarsus exiguus gp.	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	2	1	·	·	·	5	3	·	·	·	13	15	·	·	·	3	·	·
Tanypus concavus	·	14	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Tanytarsus sp.	2	·	·	·	·	·	·	·	·	·	1	·	·	·	1	·	·	·	·	·	·	·	·	·	3	·	·	2	·	·	8	·	·	·	1
Thienemanniella xena	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
EPHEMEROPTERA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Caenidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Caenis sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·
Ephemeridae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Hexagenia sp. >10mm	·	·	·	·	8	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Heptageniidae	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	1	·	·	·	·	·	·	·
Maccaffertium sp.	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Stenacron interpunctatum	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	13	·	·	·	·	39	·	1	·	4	27	·	4	·	·	·	20	·	·	·
Stenacron sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	16	·	·	·	·	·	·	·	·	·	·	·	·	·
Leptohyphidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Tricorythodes sp.	·	·	·	·	·	·	1	·	·	·	·	1	1	2	·	·	5	2	2	7	·	·	5	8	6	1	1	2	1	1	·	6	·	·	·
ODONATA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Corduliidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·
Neurocordulia molesta	·	·	·	·	·	·	·	·	·	·	·	·	1	1	·	·	·	·	·	·	·	·	·	·	·	·	·	1	1	·	·	1	·	·	·
Neurocordulia sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	1	·	·
Gomphidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	1	·
TRICHOPTERA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Hydropsychidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	6	·	·	·	·	·	·	·	·	·	3	·	1	3	·	·	·	·	·	·
Cheumatopsyche sp.	·	1	1	·	·	·	·	·	·	·	·	·	8	9	·	11	2	11	3	·	11	13	9	11	·	1	6	2	·	2	·	·	·	·	·
Hydroptilidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Hydroptila sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·
Leptoceridae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	3	·	·	2	·	·	·	·	·	·	·	·	·	·	·
Ceraclea sp.	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	1	·	·	·	·	·	·	3	·	·	·	2	·	·	·	·	·	·	·
Oecetis avara	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Oecetis sp.	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	3	·	·	·	·	·	1	·	·	5	·	·	·	1	1	6	10	·	1	3
Philopotamidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Chimarra obscura	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2	·	·	·
Polycentropodidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Cyrnellus fraternus	·	·	·	·	·	·	·	·	·	·	·	·	·	10	3	2	·	1	6	·	·	1	·	·	·	·	·	3	·	·	·	·	·	·	·

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Watts Bar Fossil Plant
September 2019

River	Tennessee River																																		
Transect ID	MAC-TR01					MAC-TR02					MAC-TR03					MAC-TR04					MAC-TR05					MAC-TR06					MAC-TR07				
Sample Date	9/23/2019					9/23/2019					9/24/2019					9/24/2019					9/24/2019					9/24/2019					9/24/2019				
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	·	·	·	·	·	·	·	·	·	·	3	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2	·	·	·	·	·	·	·
Obliquaria reflexa	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·
Utterbackia imbecillis	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Corbiculidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Corbicula fluminea <10mm	17	·	1	4	·	·	·	·	·	7	26	22	4	10	5	17	40	28	1	80	7	10	44	38	145	3	29	53	13	91	49	42	23	78	19
Corbicula fluminea >10mm	·	·	·	·	·	·	·	·	·	·	1	1	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	1	10	·	·	·	16
Dreissenidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Dreissena polymorpha	6	·	·	·	·	·	·	·	·	1	3	11	5	7	140	13	5	29	17	60	28	11	31	20	31	5	40	32	49	·	3	38	9	9	·
Sphaeriidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Musculium sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	3	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Musculium transversum	·	·	·	·	2	6	·	2	·	·	4	·	·	·	·	·	·	·	·	·	·	2	2	·	10	1	2	3	·	·	7	2	2	3	·
Pisidium compressum	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
GASTROPODA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Viviparidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Campeloma decisum	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
Viviparus subpurpureus	4	·	·	·	1	1	·	·	·	·	3	3	2	·	13	4	2	12	3	3	14	2	2	2	·	3	4	·	6	·	3	2	·	3	·
Ancylidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Ferrissia rivularis	·	·	·	·	·	·	·	·	·	·	·	19	3	1	·	25	12	16	·	7	1	·	·	3	·	·	·	·	·	·	·	·	·	·	·
Planorbidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Menetus dilatatus	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	6	1	·	·	3	·	2	1	2	·	·	·	·	·	·	·	·	·	·	·
Hydrobiidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Amnicola limosa	10	·	·	·	·	·	·	·	·	7	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Somatogyrus sp.	12	·	·	·	·	·	·	·	·	·	·	3	·	·	·	·	2	·	·	·	8	1	3	·	·	·	·	·	·	4	·	·	·	·	3
Pleuroceridae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Pleurocera canaliculata	7	·	·	·	1	·	·	·	·	·	·	·	·	·	1	·	·	1	·	10	·	1	4	·	11	·	3	·	·	1	·	·	·	·	1
Pleurocera sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	·	·	·
NEMATODA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1
NEMERTEA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	1	·	·	·	1	·
PLATYHELMINTHES	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	47	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Planariidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Girardia tigrina	41	·	·	·	·	·	·	·	·	·	14	100	16	48	7	39	78	147	18	327	37	32	22	179	42	·	44	83	62	3	2	110	11	109	·
CRUSTACEA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
AMPHIPODA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Crangonyctidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Crangonyx sp.	·	·	·	·	·	·	·	·	·	·	2	·	·	·	1	·	·	·	·	13	2	·	1	·	·	·	·	·	·	·	·	9	·	1	·
Gammaridae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Gammarus sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	12	1	10	10	·	1	3	·	3	·	·
Talitridae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Hyalella azteca	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
ISOPODA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Asellidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Caecidotea sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	50	2	·	1	·	·	·	·	2	·	·	·	·	1	·	·
Lirceus sp.	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	3	·	1	·	1	·	1	·	·	·	·	19	1	3	2

See notes on last page.

TABLE B.9 – Benthic Invertebrate Taxonomic Dataset
Watts Bar Fossil Plant
September 2019

River	Tennessee River																																		
Transect ID	**MAC-TR01**					**MAC-TR02**					**MAC-TR03**					**MAC-TR04**					**MAC-TR05**					**MAC-TR06**					**MAC-TR07**				
Sample Date	**9/23/2019**					**9/23/2019**					**9/24/2019**					**9/24/2019**					**9/24/2019**					**9/24/2019**					**9/24/2019**				
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 (continued)	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
CYCLOPOIDA	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	2	·	·	·	·	·	·
Cyclopidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Mesocyclops edax	10	·	1	·	·	2	·	·	·	2	·	·	·	4	·	·	·	16	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	4	·
OSTRACODA	6	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	2	62	·	·	·	2	8	·	·	·	·	2	·	·	·	·	·	·	·
BRANCHIOPODA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Cladocera	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Daphniidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Ceriodaphnia sp.	·	·	·	·	·	·	·	·	·	·	1	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Daphnia lumholtzi	·	·	·	·	·	12	·	·	·	·	·	·	·	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Ilyocryptidae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Ilyocryptus spinifer	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	4	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Sididae	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
Sida crystallina	·	·	·	·	·	·	·	·	·	·	1	2	·	·	4	9	1	·	·	·	32	15	5	·	·	·	·	22	24	2	14	36	4	5	·
ARACHNIDA	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·
ORIBATIDA	2	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	·	18	·	·	6	·	1	·	·	·	·	·	·	·	·	·	·	·	·

Notes:

ID Identification
PO Ponar Dredge (Wildco™)

1. 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 Asiatic Clam Samples
Watts Bar Fossil Plant
June and July 2019

Sampling Reach	Composite Type	Sample ID[1]	Sample Type	Laboratory Analysis: Total Metals	Laboratory Analysis: Total Mercury	Laboratory Analysis: % Moisture
Tennessee River Upstream (TRU)	Asiatic Clam Non-depurated	WBF-ACN-TRU-20190702	Normal Environmental Sample	x	x	x
	Asiatic Clam Depurated	WBF-ACP-TRU-20190702	Normal Environmental Sample	x	x	x
Tennessee River Adjacent (TRA)	Asiatic Clam Non-depurated	WBF-ACN-TRA-20190627	Normal Environmental Sample	x	x	x
	Asiatic Clam Depurated	WBF-ACP-TRA-20190701	Normal Environmental Sample	x	x	x
Tennessee River Downstream (TRD)	Asiatic Clam Non-depurated	WBF-ACN-TRD-20190701	Normal Environmental Sample	x	x	x
		WBF-ACN-DUP01-20190701	Field Duplicate Sample	x	x	x
	Asiatic Clam Depurated	WBF-ACP-TRD-20190701	Normal Environmental Sample	x	x	x
		WBF-ACP-DUP01-20190701	Field Duplicate Sample	x	x	x

Notes:

Total Metals	SW-846 Method 6020A
Total Mercury	SW-846 Method 7473
% Moisture	ASTM D2974-87
ID	Identification

1. Sample ID Nomenclature
   Sample Naming Convention for Asiatic Clams: Plant Acronym - Matrix Acronym - Sampling Reach Identifier - Sample Date
   Sample Naming Convention for Duplicate Samples: Plant Acronym - Matrix Acronym - Duplicate Number - Sample Date
   Matrix Acronym: ACN=Asiatic Clam Non-Depurated, ACP=Asiatic Clam Purged (Depurated)

TABLE B.11 – Asiatic Clam Analytical Results
Watts Bar Fossil Plant
June and July 2019

Location		WBF-TRU		WBF-TRA		WBF-TRD			
Sample Date		02-Jul 2019	02-Jul 2019	27-Jun 2019	01-Jul 2019	01-Jul 2019	01-Jul 2019	01-Jul 2019	01-Jul 2019
Sample ID		WBF-ACN-TRU-20190702	WBF-ACP-TRU-20190702	WBF-ACN-TRA-20190627	WBF-ACP-TRA-20190701	WBF-ACN-TRD-20190701	WBF-ACN-DUP01-20190701	WBF-ACP-TRD-20190701	WBF-ACP-DUP01-20190701
Sample Type [1]		N	N	N	N	N	FD	N	FD
Parent Sample ID							WBF-ACN-TRD-20190701		WBF-ACP-TRD-20190701
Level of Review [2]	**Units**	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
Percent Moisture									
% Moisture	%	81.6	83.7	81.9	84.1	79.8	78.0	81.6	81.1
Total Metals									
Antimony	mg/kg	< 0.021	< 0.020	< 0.020	< 0.019	< 0.021	< 0.020	< 0.021	< 0.021
Arsenic	mg/kg	1.0	0.93	0.82	0.91	1.3	1.3	1.4	1.2
Barium	mg/kg	3.9	3.6	4.4	2.9	2.8	3.1	2.1	2.8
Beryllium	mg/kg	< 0.033	< 0.031	< 0.032	< 0.031	< 0.033	< 0.032	< 0.032	< 0.033
Boron	mg/kg	< 0.69	< 0.66	< 0.67	< 0.64	< 0.70	< 0.67	< 0.68	< 0.69
Cadmium	mg/kg	0.075 J	0.10	0.051 J	0.045 J	0.054 J	0.061 J	0.051 J	0.051 J
Calcium	mg/kg	1060	396	371	387	374	404	288	296
Chromium	mg/kg	0.23 J	0.17 J	0.23 J	0.13 J	0.16 J	0.22 J	0.14 J	0.16 J
Cobalt	mg/kg	0.17	0.12	0.15	0.078 J	0.078 J	0.11	0.069 J	0.068 J
Copper	mg/kg	7.1	5.7	5.6	6.7	7.8	9.1	9.0	7.1
Lead	mg/kg	0.074 J	< 0.028	0.11	< 0.028	< 0.030	0.073 J	< 0.029	< 0.030
Lithium	mg/kg	0.053 J	< 0.020	0.083 J	< 0.020	< 0.021	0.048 J	< 0.021	< 0.021
Mercury	mg/kg	0.0084 U*	< 0.0076	0.011 U*	0.0099 U*	0.013 U*	0.011 U*	0.015 U*	< 0.0073
Molybdenum	mg/kg	0.13	0.082 J	0.096 J	0.082 J	0.085 J	0.10 J	0.089 J	0.092 J
Nickel	mg/kg	0.25 U*	0.18 U*	0.22 U*	0.11 U*	0.13 U*	0.18 U*	0.10 U*	0.11 U*
Selenium	mg/kg	0.50	0.38	0.45	0.43	0.53	0.61	0.52	0.49
Silver	mg/kg	< 0.011	< 0.011	< 0.011	< 0.010	< 0.011	0.015 J	< 0.011	< 0.011
Strontium	mg/kg	1.4	0.67	0.81	0.68	0.64	0.72	0.49 J	0.55
Thallium	mg/kg	< 0.013	< 0.012	< 0.013	< 0.012	< 0.013	< 0.013	< 0.013	< 0.013
Vanadium	mg/kg	0.13	< 0.032	0.18	< 0.031	0.057 J	0.12	< 0.033	< 0.033
Zinc	mg/kg	23.8	24.9	22.9	21.5	22.6	23.7	22.1	22.1

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*	Result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level.

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

APPENDIX C - PHOTOGRAPHIC LOGS

ATTACHMENT C.1

Photographic Logs of Sediment Samples

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 1

Photo Location: SED-TR01-CC

Survey Date: 3/28/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from shoreline. Water depth: 11.6 feet.

Photograph ID: 2

Photo Location: SED-TR01.5-CC

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from shoreline. Water depth: 20 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 3 **Photo Location:** SED-TR02-LB **Survey Date:** 1/31/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 17 feet.	
Photograph ID: 4 **Photo Location:** SED-TR02-LB **Survey Date:** 3/28/2019 **Sample ID:** No sample generated. **Comments:** Several Ponar grabs collected within a 50 foot distance from the shoreline. Water depth: 12-18 feet. Photo of substrate from a single Ponar grab.	

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 5

Photo Location: SED-TR02-LB

Survey Date: 3/28/2019

Sample ID: No sample generated.

Comments: Several Ponar grabs collected within a 50 foot distance from the shoreline. Water depth: 12-18 feet. Photo of composited substrate from Ponar grabs.

Photograph ID: 6

Photo Location: SED-TR02-CC

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from the shoreline. Water depth: 20 feet.

See notes on last page.

Tennessee Valley Authority

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 7

Photo Location: SED-TR02-CC

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from the shoreline. Water depth: 20 feet.

Photograph ID: 8

Photo Location: SED-TR02-CC

Survey Date: 3/28/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from the shoreline. Water depth: 13.8 feet.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 9

Photo Location:
SED-TR02-RB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Ponar grab collected within a 50 foot distance from the shoreline. Water depth: 9.0-10.5 feet.

Photograph ID: 10

Photo Location:
SED-TR02.2-LB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline.
Water depth: 15.5 feet.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 11

Photo Location: SED-TR02.25-LB

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 14 feet.

Photograph ID: 12

Photo Location: SED-TR02.4-RB

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 16.3 feet.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 13

Photo Location:
SED-TR02.4-RB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline.
Water depth: 12.1 feet.

Photograph ID: 14

Photo Location:
SED-TR02.5-RB

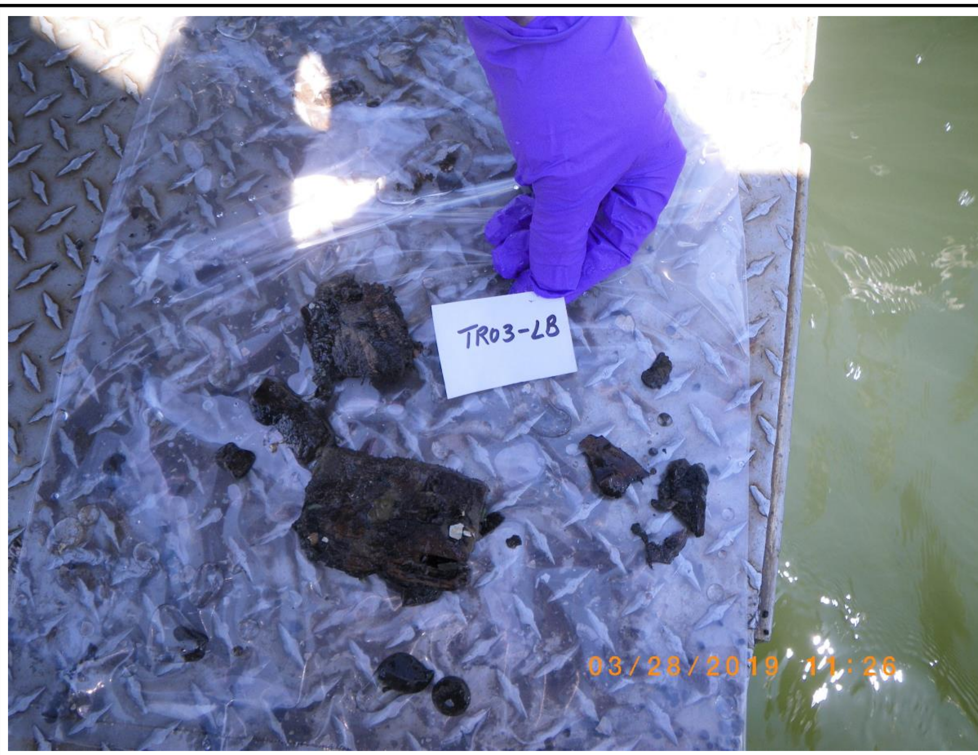
Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 15.2 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 15 **Photo Location:** SED-TR02.5-RB **Survey Date:** 1/31/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab collected approximately 70 feet from the shoreline. Water depth: 16 feet.	
Photograph ID: 16 **Photo Location:** SED-TR03-LB **Survey Date:** 3/28/2019 **Sample ID:** No sample generated. **Comments:** Ponar grab collected within a 50 foot distance from the shoreline. Water depth: 11.7 feet.	

See notes on last page.

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 17

Photo Location:
SED-TR03-LB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Ponar grab collected within a 50 foot distance from the shoreline. Water depth: 9.3 feet.

Photograph ID: 18

Photo Location:
SED-TR03-CC

Survey Date:
3/28/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected more than 200 feet from the shoreline. Water depth: 12.7 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 19 **Photo Location:** SED-TR03-RB **Survey Date:** 1/31/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 10 feet.	
Photograph ID: 20 **Photo Location:** SED-TR03-RB **Survey Date:** 3/28/2019 **Sample ID:** No sample generated. **Comments:** Ponar grab collected approximately 70 feet from the shoreline. Water depth: Not available.	

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 21

Photo Location:
SED-TR04-LB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected approximately 100 feet from the shoreline. Water depth: 15.7 feet.

Photograph ID: 22

Photo Location:
SED-TR04-LB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Ponar grab collected approximately 50 feet from the shoreline. Water depth: 6.2 feet.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 23

Photo Location:
SED-TR04-LB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Several Ponar grabs collected within a 60 foot distance from the shoreline. Water depth: 4-10 feet. Photo of composited substrate from Ponar grabs.

Photograph ID: 24

Photo Location:
SED-TR04-CC

Survey Date:
3/28/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected more than 200 feet from the shoreline. Water depth: Not available.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 25

Photo Location:
SED-TR04-RB

Survey Date:
4/1/2019

Sample ID:
No sample generated.

Comments:
Peterson grab collected approximately 70 feet from the shoreline. Water depth: 6 feet.

Photograph ID: 26

Photo Location:
SED-TR04-RB

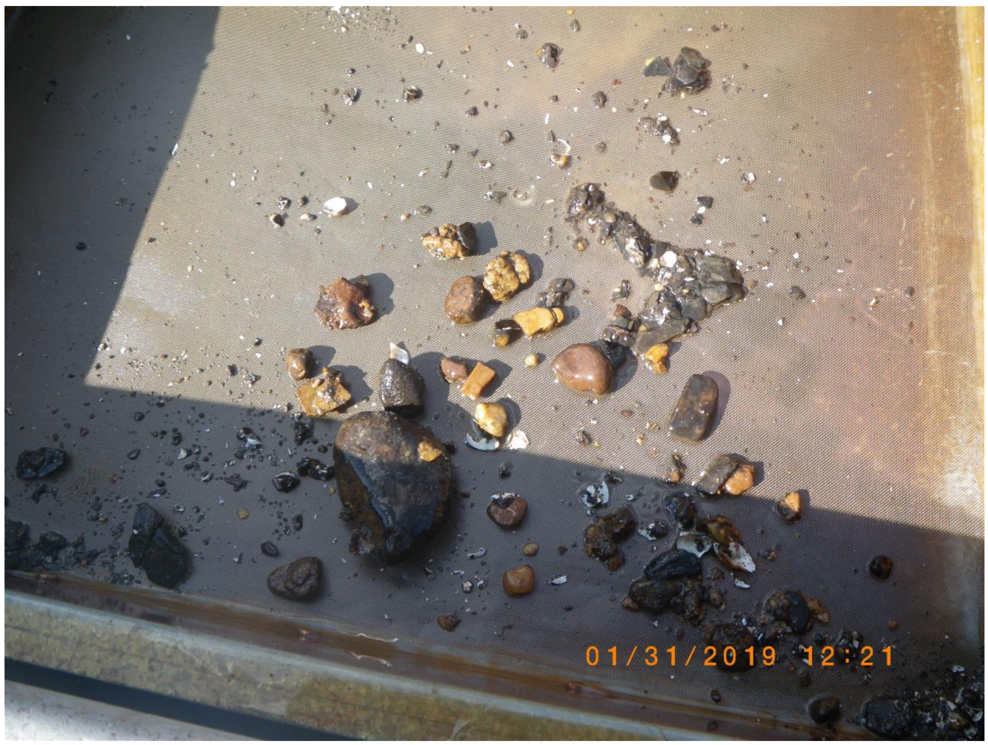
Survey Date:
4/1/2019

Sample ID:
WBF-SED-TR04-CORRB-0.0/0.5-20190401

Comments:
Sediment sample composed of substrate (mix of fines and sand) obtained from four Peterson grabs. Water depth: 5-6 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 27	
Photo Location: SED-TR04.4-RB	
Survey Date: 1/31/2019	
Sample ID: Substrate reconnaissance. No sample generated.	
Comments: Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 10.6 feet.	
Photograph ID: 28	
Photo Location: SED-TR04.5-CC	
Survey Date: 1/31/2019	
Sample ID: Substrate reconnaissance. No sample generated.	
Comments: Peterson grab collect more than 200 feet from the shoreline. Water depth: 15 feet.	

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 29

Photo Location:
SED-TR04.75-CC

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected more than 200 feet from the shoreline. Water depth: 11 feet.

Photograph ID: 30

Photo Location:
SED-TR05-LB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Shoreline adjacent to sampling station SED-TR05-LB

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 31

Photo Location:
SED-TR05-LB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Several Peterson grabs collected within a 50 foot distance from the shoreline. Water depth: 12-15 feet. Photo of substrate from a single Peterson grab.

Photograph ID: 32

Photo Location:
SED-TR05-LB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Several Peterson grabs collected within a 50 foot distance from the shoreline. Water depth: 12-15 feet. Photo of substrate from a single Peterson grab.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 33

Photo Location:
SED-TR05-LB

Survey Date:
4/1/2019

Sample ID:
No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 10.1 feet.

Photograph ID: 34

Photo Location:
SED-TR05-LB

Survey Date:
4/1/2019

Sample ID:
No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 10.9 feet.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 35 **Photo Location:** SED-TR05-CC **Survey Date:** 1/31/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab collected more than 200 feet from the shoreline. Water depth: 12.5 feet.	
Photograph ID: 36 **Photo Location:** SED-TR05-CC **Survey Date:** 3/28/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab collected more than 200 feet from the shoreline. Water depth: 13.3 feet.	

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 37

Photo Location:
SED-TR05-RB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 4 feet.

Photograph ID: 38

Photo Location:
SED-TR05-RB

Survey Date:
4/1/2019

Sample ID:
WBF-SED-TR05-CORRB-0.0/0.5-20190401

Comments:
Peterson grab collected approximately 75 feet from the shoreline. Water depth: 9 feet. Sediment sample composed of substrate (mix of fines and sand) obtained from two Peterson grabs. Water depths: 3 and 9 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 39 **Photo Location:** SED-TR05-RB **Survey Date:** 4/1/2019 **Sample ID:** No sample generated. **Comments:** Shoreline adjacent to sampling station SED-TR05-RB	
Photograph ID: 40 **Photo Location:** SED-TR05.1-CC **Survey Date:** 1/31/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab collected more than 200 feet from the shoreline. Water depth: 14.2 feet.	

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 41

Photo Location:
SED-TR05.15-LB

Survey Date:
4/1/2019

Sample ID:
No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 9.8 feet.

Photograph ID: 42

Photo Location:
SED-TR05.5-LB

Survey Date:
4/1/2019

Sample ID:
WBF-SED-TR05.5-CORLB-0.0/0.5-20190401

Comments:
Peterson grab within a 60 foot distance from the shoreline. Sediment sample composed of substrate (mix of fines and sand) obtained from two Peterson grabs. Water depth: 4-5 feet. Assigned station ID SED-TR05.5-LB to represent the approximate sampling location relative to those proposed in the SAP.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 43

Photo Location: SED-TR05.75-CC

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from the shoreline. Water depth: 24 feet.

Photograph ID: 44

Photo Location: SED-TR05.75-CC

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from the shoreline. Water depth: 25 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 45

Photo Location: SED-TR05.9-CC

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected more than 200 feet from the shoreline. Water depth: 27 feet.

Photograph ID: 46

Photo Location: SED-TR06-LB

Survey Date: 3/28/2019

Sample ID: No sample generated.

Comments: Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 8.6 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 47

Photo Location:
SED-TR06-LB

Survey Date:
3/28/2019

Sample ID:
No sample generated.

Comments:
Peterson grab collected approximately 60 feet from the shoreline. Water depth: 8.6 feet.

Photograph ID: 48

Photo Location:
SED-TR06-CC

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected more than 200 feet from the shoreline. Water depth: 24 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 49 **Photo Location:** SED-TR06-RB **Survey Date:** 1/31/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab collected approximately 60 feet from the shoreline. Water depth: 9.4 feet.	
Photograph ID: 50 **Photo Location:** SED-TR06-RB **Survey Date:** 1/31/2019 **Sample ID:** Substrate reconnaissance. No sample generated. **Comments:** Peterson grab in channel leading to the Watts Bar Nuclear Plant condenser cooling water intake. Water depth: 20 feet.	

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 51

Photo Location:
SED-TR06-RB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected approximately 160 feet from the shoreline. Water depth: 25 feet.

Photograph ID: 52

Photo Location:
SED-TR06.1-CC

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected more than 200 feet from the shoreline. Water depth: 25 feet.

See notes on last page.

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 53

Photo Location:
SED-TR06.9-LB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 10 feet.

Photograph ID: 54

Photo Location:
SED-TR06.9-LB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected approximately 130 feet from the shoreline. Water depth: 19.4 feet.

See notes on last page.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 55

Photo Location:
SED-TR06.9-CC

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected more than 200 feet from the shoreline. Water depth: 22 feet.

Photograph ID: 56

Photo Location:
SED-TR07-LB

Survey Date:
3/28/2019

Sample ID:
WBF-SED-TR07-CORLB-0.0/0.5-20190328

Comments:
Peterson grab collected approximately 60 feet from the shoreline. Water depth: 6.5 feet. Sediment sample composed of substrate (mix of fines and sand) obtained from three Peterson grabs. Water depth: 5-8 feet.

See notes on last page.

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 57

Photo Location:
SED-TR07-CC

Survey Date:
3/28/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected more than 200 feet from the shoreline. Water depth: 22 feet.

Photograph ID: 58

Photo Location:
SED-TR07-RB

Survey Date:
1/31/2019

Sample ID:
Substrate reconnaissance. No sample generated.

Comments:
Peterson grab collected approximately 85 feet from the shoreline. Water depth: 12.3 feet.

See notes on last page.

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 59

Photo Location: SED-TR07-RB

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 6.1 feet.

Photograph ID: 60

Photo Location: SED-TR07-RB

Survey Date: 1/31/2019

Sample ID: Substrate reconnaissance. No sample generated.

Comments: Peterson grab collected within a 50 foot distance from the shoreline. Water depth: 4.9 feet.

1. Substrate grab samples were assigned location IDs that represent their approximate locations relative to the sediment sampling transects proposed in the SAP (e.g., TR05.5 is the approximate midpoint between the proposed transects TR05 and TR06).

2. Fines: alluvial silts and clays

ATTACHMENT C.2

Photographic Logs of Benthic Invertebrate Community Substrate Samples

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 1

Photo Location:
MAC-TR01-BEN01

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR01-BEN01-20190923

Comments:
Pre-washdown

Photograph ID: 2

Photo Location:
MAC-TR01-BEN01

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR01-BEN01-20190923

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 3

Photo Location:
MAC-TR01-BEN02

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR01-BEN02-20190923

Comments:
Pre-washdown

Photograph ID: 4

Photo Location:
MAC-TR01-BEN02

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR01-BEN02-20190923

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 5

Photo Location:
MAC-TR01-BEN03

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR01-BEN03-20190923

Comments:
Pre-washdown

Photograph ID: 6

Photo Location:
MAC-TR01-BEN04

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR01-BEN04-20190923

Comments:
Post-washdown

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 7 **Photo Location:** MAC-TR01-BEN05 **Survey Date:** 9/23/2019 **Sample ID:** WBF-MAC-TR01-BEN05-20190923 **Comments:** Pre-washdown	
Photograph ID: 8 **Photo Location:** MAC-TR01-BEN05 **Survey Date:** 9/23/2019 **Sample ID:** WBF-MAC-TR01-BEN05-20190923 **Comments:** Post-washdown	

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 9

Photo Location: MAC-TR02-BEN01

Survey Date: 9/23/2019

Sample ID: WBF-MAC-TR02-BEN01-20190923

Comments: Pre-washdown

Photograph ID: 10

Photo Location: MAC-TR02-BEN01

Survey Date: 9/23/2019

Sample ID: WBF-MAC-TR02-BEN01-20190923

Comments: Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 11

Photo Location:
MAC-TR02-BEN02

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR02-BEN02-20190923

Comments:
Pre-washdown

Photograph ID: 12

Photo Location:
MAC-TR02-BEN03

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR02-BEN03-20190923

Comments:
Pre-washdown

Tennessee Valley Authority

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	Watts Bar Fossil (WBF) Plant	Site Location:	Spring City, Tennessee

Photograph ID: 13

Photo Location:
MAC-TR02-BEN04

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR02-BEN04-20190923

Comments:
Pre-washdown

Photograph ID: 14

Photo Location:
MAC-TR02-BEN04

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR02-BEN04-20190923

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 15

Photo Location:
MAC-TR02-BEN05

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR02-BEN05-20190923

Comments:
Pre-washdown

Photograph ID: 16

Photo Location:
MAC-TR02-BEN05

Survey Date:
9/23/2019

Sample ID:
WBF-MAC-TR02-BEN05-20190923

Comments:
Post-washdown

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 17	
Photo Location: MAC-TR03-BEN01	
Survey Date: 9/24/2019	
Sample ID: WBF-MAC-TR03-BEN01-20190924	
Comments: Pre-washdown	

Photograph ID: 18	
Photo Location: MAC-TR03-BEN02	
Survey Date: 9/24/2019	
Sample ID: WBF-MAC-TR03-BEN02-20190924	
Comments: Pre-washdown	

Tennessee Valley Authority

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 19

Photo Location:
MAC-TR03-BEN03

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR03-BEN03-20190924

Comments:
Pre-washdown

Photograph ID: 20

Photo Location:
MAC-TR03-BEN04

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR03-BEN04-20190924

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

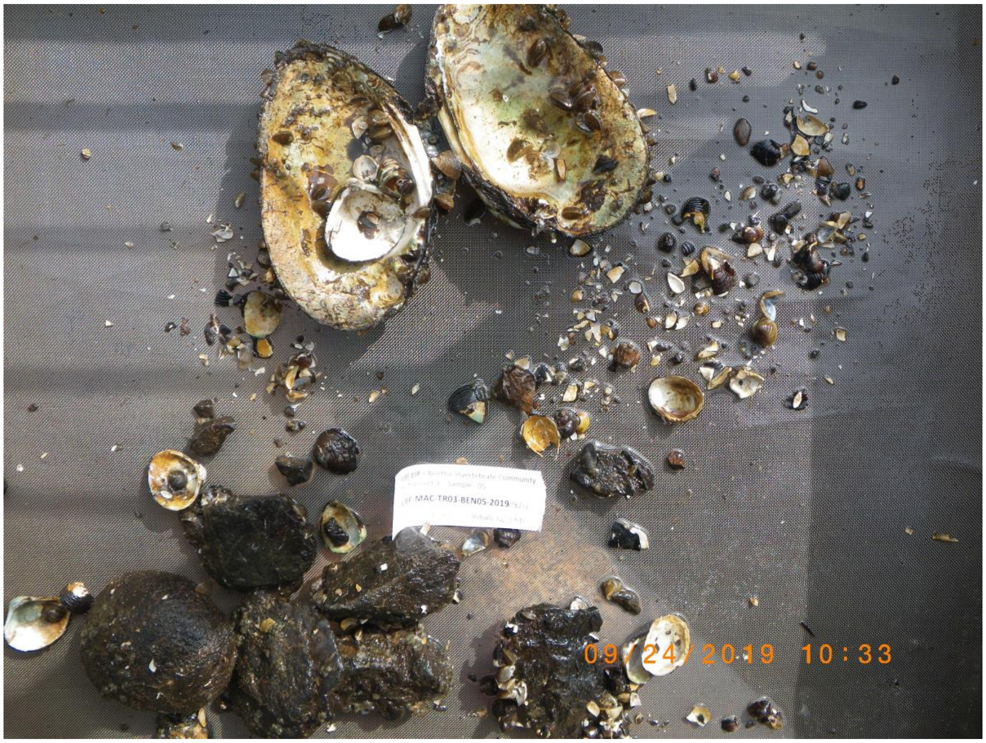
Photograph ID: 21

Photo Location: MAC-TR03-BEN05

Survey Date: 9/24/2019

Sample ID: WBF-MAC-TR03-BEN05-20190924

Comments: Pre-washdown



Photograph ID: 22

Photo Location: MAC-TR04-BEN01

Survey Date: 9/24/2019

Sample ID: WBF-MAC-TR04-BEN01-20190924

Comments: Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 23

Photo Location:
MAC-TR04-BEN02

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR04-BEN02-20190924

Comments:
Pre-washdown

Photograph ID: 24

Photo Location:
MAC-TR04-BEN03

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR04-BEN03-20190924

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 25

Photo Location:
MAC-TR04-BEN04

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR04-BEN04-20190924

Comments:
Pre-washdown

Photograph ID: 26

Photo Location:
MAC-TR04-BEN05

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR04-BEN05-20190924

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 27

Photo Location:
MAC-TR05-BEN01

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR05-BEN01-20190924

Comments:
Pre-washdown

Photograph ID: 28

Photo Location:
MAC-TR05-BEN02

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR05-BEN02-20190924

Comments:
Pre-washdown

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 29

Photo Location: MAC-TR05-BEN03

Survey Date: 9/24/2019

Sample ID: WBF-MAC-TR05-BEN03-20190924

Comments: Pre-washdown

Photograph ID: 30

Photo Location: MAC-TR05-BEN04

Survey Date: 9/24/2019

Sample ID: WBF-MAC-TR05-BEN04-20190924

Comments: Pre-washdown

Tennessee Valley Authority

Photographic Log

Client:	Tennessee Valley Authority	Project:	TDEC Order
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 31

Photo Location:
MAC-TR05-BEN05

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR05-BEN05-20190924

Comments:
Pre-washdown

Photograph ID: 32

Photo Location:
MAC-TR06-BEN01

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR06-BEN01-20190924

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 33

Photo Location:
MAC-TR06-BEN02

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR06-BEN02-20190924

Comments:
Pre-washdown

Photograph ID: 34

Photo Location:
MAC-TR06-BEN03

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR06-BEN03-20190924

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 35

Photo Location:
MAC-TR06-BEN04

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR06-BEN04-20190924

Comments:
Pre-washdown

Photograph ID: 36

Photo Location:
MAC-TR06-BEN05

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR06-BEN05-20190924

Comments:
Pre-washdown

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 37

Photo Location:
MAC-TR07-BEN01

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR07-BEN01-20190924

Comments:
Pre-washdown

Photograph ID: 38

Photo Location:
MAC-TR07-BEN02

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR07-BEN02-20190924

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 39

Photo Location:
MAC-TR07-BEN03

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR07-BEN03-20190924

Comments:
Pre-washdown

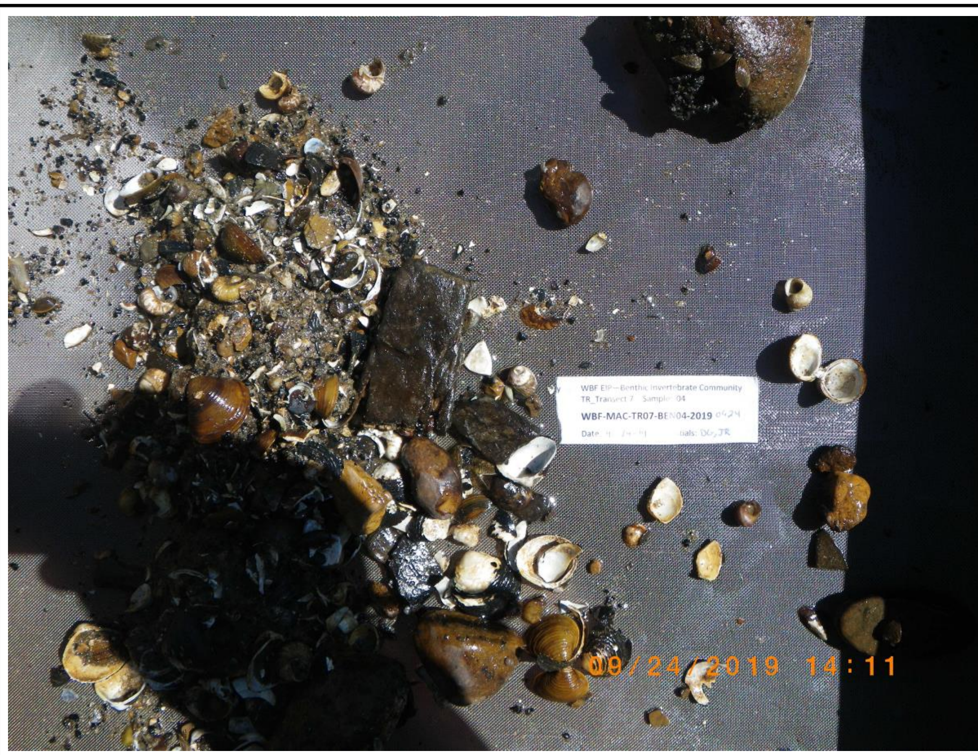
Photograph ID: 40

Photo Location:
MAC-TR07-BEN04

Survey Date:
9/24/2019

Sample ID:
WBF-MAC-TR07-BEN04-20190924

Comments:
Pre-washdown



Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Watts Bar Fossil (WBF) Plant**	**Site Location:**	**Spring City, Tennessee**

Photograph ID: 41	
Photo Location: MAC-TR07-BEN05	
Survey Date: 9/24/2019	
Sample ID: WBF-MAC-TR07-BEN05-20190924	
Comments: Pre-washdown	

APPENDIX J.5

TECHNICAL EVALUATION OF FISH COMMUNITY AND FISH TISSUE DATA

TENNESSEE VALLEY AUTHORITY

Appendix J.5 - Technical Evaluation of Fish Community and Fish Tissue Data

Watts Bar Fossil Plant
Spring City, Tennessee
Tennessee Valley Authority

TVA

Title and Approval Page

Title of Document:	Appendix J.5 – Technical Evaluation of Fish Tissue Data Watts Bar Fossil Plant Tennessee Valley Authority Spring City, Tennessee
Prepared By:	Tennessee Valley Authority
Effective Date:	March 31, 2024 Revision: 1

TVA Compliance Point of Contact	3/25/24 Date
TVA Technical Point of Contact	3/25/24 Date
Tyler Baker TVA Limnologist, Fisheries & Aquatic Monitoring	3/25/2024 Date
QA Oversight Manager	3/17/2024 Date

TVA

Revision Log

Revision	Date	Description
0	November 7, 2023	Submittal to TDEC
1	March 31, 2024	Addresses January 31, 2024 TDEC Review Comments and Issued for TDEC

Table of Contents

LIST OF TABLES

LIST OF EXHIBITS

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
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
PCB	Poly-Chlorinated Biphenyl
QA/QC	Quality Assurance/Quality Control
RBI	Reservoir Benthic Index
REH	Reservoir Ecological Health
RFAI	Reservoir Fish Assemblage Index
SAP	Sampling and Analysis Plan
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
WBF Plant	Watts Bar Fossil Plant
WBN Plant	Watts Bar Nuclear Plant

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 Watts Bar Fossil Plant (WBF Plant) in Spring City, Tennessee. 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 WBF Plant.

For this investigation, TVA reviewed available historical fishery study data from reservoirs and rivers adjacent to the WBF 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 WBF 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 WBF Plant.

2.1 Historical Studies

Since the 1970s, various fishery studies have been conducted in the vicinity of the WBF Plant, including fish population studies, sport fish surveys, impingement and entrainment monitoring, and fish tissue collection. Located adjacent to the WBF Plant, the Watts Bar Nuclear Plant (WBN Plant) has similar ecological ranges for fishery study evaluation. The WBF Plant was decommissioned in 1982 and is currently inactive, and the WBN Plant became operational in 1996. Fishery studies completed between 1977 and 1985 were often completed as pre-operational studies for the WBN Plant.

Historically, TVA has conducted biological assessments by periodically monitoring aquatic communities (fish and benthic invertebrates) located near the inactive WBF Plant site to evaluate their status upstream and downstream of the plant's thermal discharge. This monitoring was conducted in support of the WBF and WBN Plants' Alternate Thermal Limit (ATL) site discharges under WBF National Pollutant Discharge Elimination System (NPDES) Permit No. TN0005461 (inactive) and WBN NPDES No. TN0020168 (TDEC 2022). The primary focus of the biological assessments conducted by TVA in accordance with the Clean Water Act (CWA) Section 316(a)[1] consists of analyzing data to characterize the compositions of fish and benthic invertebrate communities upstream and downstream of the WBF and WBN Plants. Benthic invertebrate community information is provided in Appendix J.3.

Historical fish population assessments were completed from the 1970s through 2015, 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, respectively. Historical studies also included fish tissue collection and analysis as presented in Chapter 2.1.5. The historical fish tissue data served as a foundation to support TDEC Order EI activities but were limited, so a more comprehensive collection and analyses of fish and associated fish tissue were conducted as part of the EI, as described in Chapter 2.2. The results and discussion of the previous studies and fish tissue sample data collected under the TDEC Order are presented in Chapter 3.0.

[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.

2.1.1 Fish Population Monitoring

Non-radiological, pre-operational fishery monitoring studies were conducted at the WBN Plant site from 1977 through 1979 and 1982 through 1985 (TVA 1980b, 1986). This monitoring provided baseline fisheries data on the distribution, relative abundance, species composition, and standing stocks of fish in the vicinity of the WBN Plant. From 1996 through 1997, operational fishery monitoring studies were conducted to evaluate and compare the data collected during the first two years of WBN Plant operation to the data collected during the pre-operational studies (TVA 1997b and 1998b). During the operational phase of the WBN Plant, TVA concluded that the first two years of WBN Plant operation did not adversely impact the tailwater fish population below Watts Bar Dam, and a comparison of fish community sampling during pre-operational and operational monitoring showed minimal variations in comparisons of 12 important species (TVA 1998b). 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).

From 1990 through 2000, TVA collected data to evaluate the fish community in Chickamauga Reservoir as part of the TVA Reservoir Ecological Health (REH) program (formerly known as the Vital Signs program). During that time, the fish community evaluations evolved into an approach known as the Reservoir Fish Assemblage Index (RFAI) methodology[2], which uses 12 fish community metrics from four general categories, as detailed in TVA (2011). Fish community data collected for the REH program and Aquatic Ecological Health Determinations are available in reports found at TVA (1992, 1993, 1994a-b, 1995, 1996, 1997a, 1998a, 1999a-b, 2001-2005, and 2006b).

Prior to 1999, the WBN Plant operated under a Section 316(a) ATL that had been continued with each permit renewal based on studies conducted in the mid-1970s. However, beginning in 1999, EPA Region 4 began requesting additional data in conjunction with the NPDES permit renewal applications to verify that a balanced indigenous population (BIP) was being maintained at TVA's thermal plants with ATLs. The WBN's NPDES permit TN0020168 required that impacts to aquatic communities in the vicinity of WBN be evaluated. In 2001, TVA and TDEC reached an agreement whereby results of TVA's REH program would be the accepted study design for measuring the presence and maintenance of a BIP to support Section316(a)-based ATLs. The study design at the time (starting in 2001) was based on measuring fish community health using multi-metric community structure assessment techniques and focused on fish community sampling in three zonal areas of the reservoir during autumn: the inflow, transitional and forebay zones (TVA 2018a).

From 1999 through 2017, TVA conducted studies on fish and benthic macroinvertebrates in areas immediately upstream and downstream of WBN using RFAI multi-metric evaluation techniques. In 2009, TVA began a study to evaluate fish and benthic macroinvertebrate communities in areas immediately upstream and downstream of the WBN Plant. In 2011, the study was broadened to include assessments of wildlife communities that could be impacted by thermal discharges from the WBN Plant. In 2012 seasonal assessments of the fish, benthic, and wildlife communities were conducted at the request of TDEC (TVA 2018b).

From 2001 until 2009, the use of multi-metric assessment techniques was the accepted primary method of demonstrating a BIP for supporting an ATL at the WBN Plant, with the fish community status the primary community of interest. However, beginning in 2009, TVA began conducting autumn (and summer 2012) monitoring of the benthic macroinvertebrate community in the Watts Bar Reservoir, developing its Reservoir Benthic Index (RBI) for Tennessee

[2] RFAI has been thoroughly tested on TVA and other reservoirs and published in peer-reviewed literature (Jennings et al. 1995; Hickman and McDonough 1996; McDonough and Hickman 1999).

River reservoirs. By providing multi-metric assessment methods for evaluating ecological health of benthic communities in large river systems (and/or artificial reservoir settings), supplemental information would be available for a BIP determination in addition to the fish community assessment.

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 that a 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 previously collected samples are reported in TVA (2001-2006, 2007b, 2008- 2010, 2011b, 2012b, 2013- 2014, and 2016). RFAI annual and seasonal index scores indicate consistent and balanced indigenous fish populations between upstream and downstream areas in the immediate vicinity of the WBN Plant over a 17-year period, as shown on Exhibits J.5-1 and J.5-2.

From 2000 through 2017, TVA Reservoir Ecological Health Monitoring Program RFAI scores for the Chickamauga Reservoir headwater region (Tennessee River Mile (TRM) 529) downstream from the WBF Plant have been categorized as "Fair" to "Good" and have typically been higher than scores at the upstream Watts Bar Reservoir forebay (TRM 531). Additionally, Chickamauga Reservoir RFAI scores downstream from the WBF/WBN Plants have varied by 6 points or less year-to-year, indicating similar fish communities over time (TVA 2018a).

Because the WBN Plant discharge is located immediately downstream of the Watts Bar Dam and within the Chickamauga Reservoir inflow zone, sufficient sampling area immediately upstream of the WBN Plant discharge does not exist, precluding the ability to obtain an appropriate upstream control site for comparison. In addition, the Chickamauga Reservoir inflow zone and the Watts Bar Reservoir forebay zone have appreciably different flow regimes and ecologies, making direct upstream/downstream comparisons between the two inappropriate. The Watts Bar Reservoir RFAI forebay site may be used to document any notable changes in Tennessee River ecological conditions above the WBN Plant discharge but cannot be used for upstream/downstream comparisons of RFAI scores. Therefore, site data was compared to previous data collected from the same site (e.g., site data collected in 2015 was compared to site data collected in 2013) (TVA 2016).

TVA's biological assessment data has consistently indicated that fish assemblages of Chickamauga Reservoir downstream of the WBN Plant thermal discharge were similar to those of previous years sampled at the downstream location during autumn seasons. Comparisons of the 2017 RFAI results to the 2015 RFAI results and the historical (2000-2015) averages at the same downstream site indicated that the WBN Plant thermal effluent had no adverse environmental impact on the fish community downstream of the WBN Plant discharge, and a BIP was maintained (TVA 2018a). The WBN Plant has maintained a good compliance record with its ATL throughout each NPDES permit term since first authorized in the late-1990s; ongoing biological monitoring has consistently demonstrated the ATL is protective of aquatic communities in the river near the facility. (TVA 2018a). The findings have demonstrated, with acceptance by TDEC and EPA Region, the presence, protection, and maintenance of a BIP in Chickamauga Reservoir in support of continuing the ATL in the WBN Plant NPDES permit (TVA 2018a).

Data from the historical fish population monitoring events were used solely to determine maintenance of a BIP. Those events did not include collecting fish tissue.

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 sportfish species (Hickman 2000). The SFI incorporated fish population sampling and creel results from multiple agencies to measure quantity (fish abundance) and quality (size structure and relative weights) of sport fish species in Tennessee Valley reservoirs. TVA reported those SFI findings on its website for use by anglers and other members of the public. The SFI was discontinued in 2009.

Annual sport fish surveys were conducted on Chickamauga Reservoir from 1995 through 2014 and from 2021 through the present as part of TVA's valley wide REH monitoring program. Surveys are conducted during the spring at multiple reservoir locations. The surveys primarily focus on black bass and crappie and are not used to assess entire fishery populations. The surveys include electrofishing to collect data on fish abundance, species distribution, length, weight, relative stock density, and proportional stock density. Data are also collected on habitat type to determine the multi-metric Shoreline Aquatic Habitat Index, which measures existing fish habitat quality (TVA 2009).

2.1.3 Fish Impingement Monitoring

Between 1974 through 1975, TVA conducted fish impingement[3] investigations at the WBF Plant cooling water intake to evaluate potential effects on the aquatic community; the study concluded that the impingement of fish at the WBF Plant did not constitute an adverse environmental impact to the fish population of the Watts Bar Reservoir due to the low numbers of each species of fish impinged in comparison to their estimated populations in the reservoir (TVA 1975).

Beginning in 1996 and continuing from 2005 through 2007 and 2010 through 2011, TVA conducted fish impingement investigations at the WBN Plant (TVA 2007a, 2011a, and 2017). The investigations were conducted in accordance with NPDES Permit No. TN0020168.

Because the WBF Plant is subject to compliance with the Tennessee Water Quality Act and the federal CWA, TVA must demonstrate that the condenser cooling water withdrawal at the WBF Plant has no significant impact on the aquatic community. The impingement monitoring investigation at the WBF Plant in 2005 through 2007 was in response to the 2004 USEPA rule for implementing Section 316(b), and in accordance with a Proposal for Information Collection submitted to TDEC in 2005. The 2004 USEPA impingement monitoring rule subsequently was suspended in 2007.

Fish tissue for analysis of CCR Parameters (defined for this investigation in Chapter 3.1 below) was not included in fish impingement monitoring.

2.1.4 Fish Entrainment Monitoring

In 1975, TVA conducted entrainment[4] studies at the WBF Plant to evaluate the effects of the plant's cooling water intake on fish eggs and larvae. The study concluded that the low entrainment of fish eggs and larvae at the WBF Plant did not have a significant adverse impact on the fisheries resource of the Watts Bar Reservoir (TVA 1976). In 1976 through 1979 and 1982 through 1985, pre-operational monitoring studies were conducted to collect data on fish eggs and larvae near

[3] 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.
[4] 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.

the WBN Plant for future evaluation of the effects of the plant's cooling water intake system on the aquatic community (TVA 1980a-b, 1986). These pre-operational monitoring data were later compared with 1996 through 1997 operational data (TVA 1998b, 2010b). Further entrainment studies in support of WBN Plant CWA Section 316(b) compliance were conducted in 2010 through 2011 (TVA 2012a) and 2011 through 2012 (TVA 2012c, 2017). TVA concluded that the WBN Plant did not adversely impact the ichythyoplankton population below the Watts Bar Dam in the upper Chickamauga Reservoir during 2011 through 2012 (TVA 2012c).

In 2014, the USEPA issued a final Section 316(b) rule for existing power generating and industrial facilities, requiring the facility to provide several compliance documents under its WBN Plant NPDES permit (TVA 2017), including an Entrainment Characterization Study.

Data collected from the historical fish entrainment studies did not include collecting fish tissue for analysis of CCR Parameters (see Chapter 3.1 below).

2.1.5 Fish Tissue Monitoring

In 1987 and 1988, TVA conducted fish tissue sampling in Chickamauga Reservoir to determine if toxics had accumulated to levels that could potentially impact fish or humans (via consumption of fish) (TVA 1988 and 1990). After these initial studies, to meet the CWA "fishable" goals, screening level fish tissue samples were collected from the Chickamauga Reservoir on a rotational basis from 1989 through 2021. TVA, in cooperation with TDEC, analyzed fillets of indicator fish species (primarily channel catfish and largemouth bass) to inform human health fish consumption advisories and identify reservoirs for further intensive study (TVA 1992). Screening-level samples were collected by TVA from the Chickamauga Reservoir forebay, transition, and inflow zones downstream from the WBF Plant. Tissue samples were analyzed for EPA Priority Pollutants including metals, polychlorinated biphenyls (PCBs), and pesticides. Fish tissue contaminant concentrations were either below detectable levels or below TDEC fish consumption advisory levels, with the exception of mercury concentrations in largemouth bass collected from the Hiwassee River arm of the reservoir. Consequently, over the years, analyses have been reduced to PCBs in channel catfish and arsenic, mercury, and selenium in channel catfish and largemouth bass. Fish tissue study result summaries for years 1986 through 2012 can be found in TVA's annual fish tissue reports. Results for subsequent years are available electronically.

Since the mid-1980s, TVA has maintained an annual monitoring program to examine contaminants (pesticides, PCBs, metals) in fish tissue from TVA reservoirs and major tributary streams (TVA 1995). Fish from 69 reservoir sites and 18 river sites are examined on a rotational basis. The sampled species and analyses have varied during the span of the monitoring program, but the program has continuously included the analysis of channel catfish for PCBs and black bass (largemouth, smallmouth, or spotted bass) for mercury. Collections of samples are coordinated with state agencies which use these data to advise the public of health risks (TVA 2006).

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 historical fish population monitoring studies include:

- Sufficient WBN Plant upstream sampling area does not exist due to the proximity of the WBN Plant discharge to Watts Bar Dam. The upstream (control) reach was established in the Watts Bar Reservoir forebay zone which is a different reservoir zone type than the downstream Chickamauga Reservoir inflow zone with appreciably different flow regimes and ecologies. Therefore, comparisons between the two is inappropriate and biological monitoring data within the two reaches were compared to the same locations during previous sampling periods (TVA 2018a).
- TVA concluded that the first two years of WBN Plant operation was not negatively impacting the tailwater fish population downstream from the WBN Plant (TVA 1998).
- WBN Plant has maintained a good compliance record with its ATL throughout each NPDES permit term since first authorized in the late-1990s; ongoing biological monitoring has consistently demonstrated the ATL is protective of aquatic communities in the river near the facility (TVA 2018a).
- TVA's RFAI assessment data has consistently indicated that Chickamauga Reservoir headwater region fish assemblages downstream from WBN Plant remain similar over time (TVA 2018a).

Fish Impingement Monitoring. The initial 1974-1975 WBF Plant impingement monitoring study and later 2005-2007 and 2010-2011 WBN Plant impingement monitoring studies concluded that no fish species were impinged at those facilities in sufficient numbers to impact Watts Bar and Chickamauga Reservoir fish communities (TVA 1975, 2007a, 2011a, and 2017).

Fish Entrainment Studies. The 1975 WBF entrainment study found an no significant impact on the Watts Bar Reservoir fishery resource, and that WBF Plant's low demand for cooling water as a peaking plant minimized the impact on the larval fish of Watts Bar Reservoir (TVA 1976). Entrainment studies conducted from 2010 through 2012 demonstrated that the WBN Plant did not adversely impact the ichythyoplankton population below the Watts Bar Dam in the upper Chickamauga Reservoir.

Fish Tissue Studies. With the exception of mercury concentrations in largemouth bass collected from the Hiwassee River arm of the Chickamauga Reservoir, fish tissue contaminant concentrations were either below detectable levels or below TDEC fish consumption advisory levels. TDEC has issued a precautionary advisory specific to Hiwassee River miles 7.4 to 18.9 for largemouth bass consumption due to mercury levels (TDEC 2023). No fish consumption advisories have been issued for the Tennessee River arm of Chickamauga Reservoir.

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 WBF 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 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 Tennessee River in general accordance with the *Fish Tissue Sampling and Analysis Plan (SAP)* (Stantec 2018), *Environmental Investigation Plan (EIP)* (TVA 2018b), 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. 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* included in Appendix J.6.

The scope of the EI sampling activities included collecting targeted fish samples identified in the *SAP* during April through June 2019 from three reaches on the Tennessee River. Exhibit J.5-2 shows the locations of the sampling reaches. The river reaches were established upstream, adjacent, and downstream of the WBF Plant CCR management units. A total of 39 composite samples were collected, 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 29 duplicate samples (Table J.5.1).

Chapter 3 Results and Discussion

Fish tissue data from the EI were collected from three sample reaches in the Tennessee River proximate to the WBF 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 (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, 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 Code of Federal Regulations (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 sample results for the WBF Plant are presented in Appendix E.7.

3.2 Exploratory Data Analysis

Exploratory data analyses for the surface stream and sediment sample results identified no 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). Therefore, only mercury and selenium were evaluated for fish tissue samples due to their known bioaccumulation potential. A summary of the fish tissue sampling results for mercury and selenium is provided in Table J.5-1.

3.2.1 Comparative Analysis

Because no CCR Parameters were identified from the exploratory data analysis of the surface stream and sediment sample results, only mercury and selenium were evaluated by comparison to the CBR values for the specific fish tissues due to their bioaccumulation properties. CBR values are included in the ESVs provided in Table 1-4 and Appendix A.2.

The comparative analysis chart for CBR values provided in Table J.5-2 demonstrates the relationships between the fish tissue constituent concentrations for mercury and selenium in the Tennessee River sampling reaches 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 or copper 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.

The comparative analysis chart clearly shows that gamefish (bluegill, channel catfish, largemouth, and redear sunfish) liver tissues had selenium concentrations higher that the NOAEL for all sampling reaches, whereas the selenium concentrations for gamefish muscle and ovary, and whole fish (shad) were lower than the NOAEL for all sampling reaches. Mercury concentrations were higher than the NOAEL for whole fish samples in all three sampling reaches and gamefish mercury concentrations for liver tissues were higher than the LOAEL for all sampling reaches. Mercury concentrations for largemouth bass and bluegill muscle were consistently above and below the NOAEL for all reaches, respectively. Exhibit J.5-3 shows the CCR Parameter results that were higher than CBR values for each fish type, tissue type, and reach.

Due to the proximity of the former WBF Plant to the Watts Bar Dam, there was insufficient space to establish a sampling control area within Chickamauga Reservoir immediately upstream of the WBF Plant. Therefore, the upstream control sampling reach was established in the forebay area of the Watts Bar Reservoir, resulting in the downstream and adjacent sampling reaches being located in the Chickamauga Reservoir inflow zone and the upstream sampling reach being located in the Watts Bar Reservoir forebay zone. Although there are clear differences between the ecosystems in Chickamauga Reservoir adjacent to the WBF Plant and upstream in Watts Bar Reservoir, similarities (and generally minimal variability) were observed between the fish tissue mercury and selenium concentrations for the three sampling reaches and the tissue concentrations displayed no consistent spatial patterns relative to the CCR management units.

TVA’s biological assessment data has consistently indicated that fish assemblages of Chickamauga Reservoir downstream of the WBN Plant thermal discharge were similar when compared to data results of previous years at the same downstream location. The findings have demonstrated, with acceptance by TDEC and EPA Region 4, the presence, protection, and maintenance of a BIP in Chickamauga Reservoir in support of continuing the ATL in the WBN Plant NPDES permit.

Chapter 4 Summary

No CCR Parameters were identified from the exploratory data analysis of the surface stream and sediment sample results, allowing only mercury and selenium to be compared to the CBR values for the specific fish tissues due to their bioaccumulation properties.

Although there are differences between the ecosystems in the Tennessee River upstream and downstream of Watts Bar Dam, mercury and selenium concentrations in the various fish tissues exhibited similarities among the three sampling reaches. Additionally, the fish tissue concentrations displayed no consistent spatial patterns relative to the CCR management units. The fish tissue results therefore suggest that measured mercury and selenium concentrations are not related to WBF Plant CCR management unit activities and corroborate the findings of the Asiatic clam tissue results (Appendix J.3).

TVA’s biological assessment data has consistently indicated that fish assemblages of Chickamauga Reservoir downstream of the WBF Plant and the WBN Plant thermal discharge were similar when compared to data from previous years at the same downstream location. The findings have demonstrated, with acceptance by TDEC and EPA Region 4, the presence, protection, and maintenance of a BIP in Chickamauga Reservoir in support of continuing the ATL in the WBN Plant NPDES permit. The evidence of the generally good health of the fish communities near the WBF Plant is illustrated by the RFAI scores over an 18-year period (shown in Exhibit J.5-1) indicating the presence of consistent, balanced, and reproducing indigenous fish populations in the Tennessee River, with only minor seasonal variations.

The fish assemblage results for the Tennessee River in the vicinity of the WBF Plant, together with the associated RFAI scores, illustrate a balanced indigenous fish population, with no indication of impacts to the fish community related to the WBF Plant CCR management units.

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TABLES

TABLE J.5-1 - Fish Tissue Analytical Data
Watts Bar Fossil Plant
April/May 2019

Species	Sample Location	Sample Date	Sample ID	Parent Sample	Sample Type	Level of Review	Mercury mg/kg	Selenium* mg/kg
Bluegill	WBF-TRA	21-May-19	WBF-FH-BG-TRA-F-20190521		Normal Environmental Sample	Validated	<0.0072	1.3
		21-May-19	WBF-FH-BG-F-DUP01-20190521	WBF-FH-BG-TRA-F-20190521	Field Duplicate Sample	Validated	0.039 J	1.3
		21-May-19	WBF-FH-BG-TRA-L-20190521		Normal Environmental Sample	Validated	0.026 J	1.6
		21-May-19	WBF-FH-BG-L-DUP01-20190521	WBF-FH-BG-TRA-L-20190521	Field Duplicate Sample	Validated	0.022 J	1.4
		21-May-19	WBF-FH-BG-TRA-O-20190521		Normal Environmental Sample	Validated	<0.0072	2.8
		21-May-19	WBF-FH-BG-O-DUP01-20190521	WBF-FH-BG-TRA-O-20190521	Field Duplicate Sample	Validated	<0.0074	3.5
	WBF-TRD	21-May-19	WBF-FH-BG-TRD-F-20190521		Normal Environmental Sample	Validated	0.054 J	1.3
		21-May-19	WBF-FH-BG-TRD-L-20190521		Normal Environmental Sample	Validated	0.029 J	1.1
		21-May-19	WBF-FH-BG-TRD-O-20190521		Normal Environmental Sample	Validated	<0.0072	2.2
	WBF-TRU	14-May-19	WBF-FH-BG-TRU-F-20190514		Normal Environmental Sample	Validated	0.070 J	1.4
		14-May-19	WBF-FH-BG-TRU-L-20190514		Normal Environmental Sample	Validated	0.033 J	1.3
		14-May-19	WBF-FH-BG-TRU-O-20190514		Normal Environmental Sample	Validated	<0.0076	2.3
Channel Catfish	WBF-TRA	15-May-19	WBF-FH-CC-TRA-F-20190515		Normal Environmental Sample	Validated	0.12 J	0.70 J
		29-Apr-19	WBF-FH-CC-F-DUP01-20190429	WBF-FH-CC-TRA-F-20190515	Field Duplicate Sample	Validated	0.084 J	0.76
		15-May-19	WBF-FH-CC-TRA-L-20190515		Normal Environmental Sample	Final-Verified	0.25 J	1.3
		29-Apr-19	WBF-FH-CC-L-DUP01-20190429	WBF-FH-CC-TRA-L-20190515	Field Duplicate Sample	Final-Verified	0.089 J	1.1
		15-May-19	WBF-FH-CC-TRA-O-20190515		Normal Environmental Sample	Validated	<0.0076	2.1 J
		29-Apr-19	WBF-FH-CC-O-DUP01-20190429	WBF-FH-CC-TRA-O-20190515	Field Duplicate Sample	Final-Verified	0.0078 J	3.1 J
	WBF-TRD	15-May-19	WBF-FH-CC-TRD-F-20190515		Normal Environmental Sample	Validated	0.072 J	0.67 J
		29-Apr-19	WBF-FH-CC-F-DUP02-20190429	WBF-FH-CC-TRD-F-20190515	Field Duplicate Sample	Validated	0.17 J	0.64 J
		15-May-19	WBF-FH-CC-TRD-L-20190515		Normal Environmental Sample	Final-Verified	0.11 J	1.3
		29-Apr-19	WBF-FH-CC-L-DUP02-20190429	WBF-FH-CC-TRD-L-20190515	Field Duplicate Sample	Final-Verified	0.17 J	1.2
		15-May-19	WBF-FH-CC-TRD-O-20190515		Normal Environmental Sample	Validated	<0.0074	2.3
		29-Apr-19	WBF-FH-CC-O-DUP02-20190429	WBF-FH-CC-TRD-O-20190515	Field Duplicate Sample	Final-Verified	0.012 J	3.2
	WBF-TRU	16-May-19	WBF-FH-CC-TRU-F-20190516		Normal Environmental Sample	Validated	0.11 J	0.78 J
		16-May-19	WBF-FH-CC-TRU-L-20190516		Normal Environmental Sample	Final-Verified	0.27	1.2
		16-May-19	WBF-FH-CC-TRU-O-20190516		Normal Environmental Sample	Validated	<0.0071	2.2
Gizzard Shad	WBF-TRA	15-May-19	WBF-FH-SH-TRA-WF-20190515		Normal Environmental Sample	Final-Verified	0.013 J	1.2 J
		15-May-19	WBF-FH-SH-WF-DUP01-20190515	WBF-FH-SH-TRA-WF-20190515	Field Duplicate Sample	Final-Verified	0.014 J	1.2 J
	WBF-TRD	15-May-19	WBF-FH-SH-TRD-WF-20190515		Normal Environmental Sample	Final-Verified	0.014 J	1.4 J
	WBF-TRU	14-May-19	WBF-FH-SH-TRU-WF-20190514		Normal Environmental Sample	Final-Verified	0.020 J	1.7 J
		2-May-19	WBF-FH-SH-WF-DUP02-20190502	WBF-FH-SH-TRU-WF-20190514	Field Duplicate Sample	Final-Verified	0.021 J	1.9 J
Largemouth Bass	WBF-TRA	15-Apr-19	WBF-FH-LB-TRA-F-20190415		Normal Environmental Sample	Final-Verified	0.28 J	1.4
		15-Apr-19	WBF-FH-LB-F-DUP01-20190415	WBF-FH-LB-TRA-F-20190415	Field Duplicate Sample	Final-Verified	0.18 J	1.3
		15-Apr-19	WBF-FH-LB-TRA-L-20190415		Normal Environmental Sample	Final-Verified	0.17 J	1.1
		15-Apr-19	WBF-FH-LB-L-DUP01-20190415	WBF-FH-LB-TRA-L-20190415	Field Duplicate Sample	Final-Verified	0.060 J	0.89
	WBF-TRA	15-Apr-19	WBF-FH-LB-TRA-O-20190415		Normal Environmental Sample	Final-Verified	0.026	2.7
		15-Apr-19	WBF-FH-LB-O-DUP01-20190415	WBF-FH-LB-TRA-O-20190415	Field Duplicate Sample	Final-Verified	0.0088 J	2.2
	WBF-TRD	8-Apr-19	WBF-FH-LB-TRD-F-20190408		Normal Environmental Sample	Final-Verified	0.20	1.3
		23-Apr-19	WBF-FH-LB-F-DUP02-20190423	WBF-FH-LB-TRD-F-20190408	Field Duplicate Sample	Final-Verified	0.23	1.3
		8-Apr-19	WBF-FH-LB-TRD-L-20190408		Normal Environmental Sample	Final-Verified	0.070	1.0
		23-Apr-19	WBF-FH-LB-L-DUP02-20190423	WBF-FH-LB-TRD-L-20190408	Field Duplicate Sample	Final-Verified	0.073	0.92
		8-Apr-19	WBF-FH-LB-TRD-O-20190408		Normal Environmental Sample	Final-Verified	0.014 J	2.6
		23-Apr-19	WBF-FH-LB-O-DUP02-20190423	WBF-FH-LB-TRD-O-20190408	Field Duplicate Sample	Final-Verified	0.010 J	2.6
	WBF-TRU	16-Apr-19	WBF-FH-LB-TRU-F-20190416		Normal Environmental Sample	Final-Verified	0.20	1.5
		16-Apr-19	WBF-FH-LB-F-DUP03-20190416	WBF-FH-LB-TRU-F-20190416	Field Duplicate Sample	Final-Verified	0.17	1.5
		16-Apr-19	WBF-FH-LB-TRU-L-20190416		Normal Environmental Sample	Final-Verified	0.081 J	1.1
		16-Apr-19	WBF-FH-LB-L-DUP03-20190416	WBF-FH-LB-TRU-L-20190416	Field Duplicate Sample	Final-Verified	0.053 J	1.1
		16-Apr-19	WBF-FH-LB-TRU-O-20190416		Normal Environmental Sample	Final-Verified	0.011 J	2.4
		16-Apr-19	WBF-FH-LB-O-DUP03-20190416	WBF-FH-LB-TRU-O-20190416	Field Duplicate Sample	Final-Verified	0.0086 J	2.6

See notes on last page.

TABLE J.5-1 - Fish Tissue Analytical Data
Watts Bar Fossil Plant
April/May 2019

Species	Sample Location	Sample Date	Sample ID	Parent Sample	Sample Type	Level of Review	Mercury mg/kg	Selenium* mg/kg
Redear Sunfish	WBF-TRA	21-May-19	WBF-FH-RS-TRA-F-20190521		Normal Environmental Sample	Final-Verified	0.029 J	1.9
		15-May-19	WBF-FH-RS-F-DUP01-20190515	WBF-FH-RS-TRA-F-20190521	Field Duplicate Sample	Final-Verified	0.057 J	2.0
		21-May-19	WBF-FH-RS-TRA-L-20190521		Normal Environmental Sample	Final-Verified	0.081 J	2.1 J
		15-May-19	WBF-FH-RS-L-DUP01-20190515	WBF-FH-RS-TRA-L-20190521	Field Duplicate Sample	Final-Verified	0.034 J	1.2 J
		21-May-19	WBF-FH-RS-TRA-O-20190521		Normal Environmental Sample	Final-Verified	<0.0075	3.2
		15-May-19	WBF-FH-RS-O-DUP01-20190515	WBF-FH-RS-TRA-O-20190521	Field Duplicate Sample	Final-Verified	<0.0074	2.6
	WBF-TRD	21-May-19	WBF-FH-RS-TRD-F-20190521		Normal Environmental Sample	Final-Verified	0.083 J	2.0
		21-May-19	WBF-FH-RS-F-DUP02-20190521	WBF-FH-RS-TRD-F-20190521	Field Duplicate Sample	Final-Verified	0.087 J	2.0
		21-May-19	WBF-FH-RS-TRD-L-20190521		Normal Environmental Sample	Final-Verified	0.14 J	1.9
		21-May-19	WBF-FH-RS-L-DUP02-20190521	WBF-FH-RS-TRD-L-20190521	Field Duplicate Sample	Final-Verified	0.052 J	1.6
		21-May-19	WBF-FH-RS-TRD-O-20190521		Normal Environmental Sample	Final-Verified	0.0080 J	3.6
		21-May-19	WBF-FH-RS-O-DUP02-20190521	WBF-FH-RS-TRD-O-20190521	Field Duplicate Sample	Final-Verified	<0.0073	3.7
	WBF-TRU	30-Apr-19	WBF-FH-RS-TRU-F-20190430		Normal Environmental Sample	Final-Verified	0.060 J	2.1
		30-Apr-19	WBF-FH-RS-F-DUP03-20190430	WBF-FH-RS-TRU-F-20190430	Field Duplicate Sample	Final-Verified	0.053 J	2.3
		30-Apr-19	WBF-FH-RS-TRU-L-20190430		Normal Environmental Sample	Final-Verified	0.045 J	1.1
		30-Apr-19	WBF-FH-RS-L-DUP03-20190430	WBF-FH-RS-TRU-L-20190430	Field Duplicate Sample	Final-Verified	0.029 J	0.92
		30-Apr-19	WBF-FH-RS-TRU-O-20190430		Normal Environmental Sample	Final-Verified	<0.0071	2.6
		30-Apr-19	WBF-FH-RS-O-DUP03-20190430	WBF-FH-RS-TRU-O-20190430	Field Duplicate Sample	Final-Verified	<0.0073	2.2

Legend:
Concentration > CBR NOAEL
Concentration > CBR LOAEL

		Mercury	Selenium
Whole Body Fish Tissue (WF)	NOAEL	0.006	8.5
	LOAEL	0.06	8.5
Liver Tissue (L)	NOAEL	0.0009	0.524
	LOAEL	0.009	5.24
Muscle Tissue (F)	NOAEL	0.08	11.3
	LOAEL	0.8	11.3
Ovary Tissue (O)	NOAEL	NA	15.1
	LOAEL	NA	15.1

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
J	quantitation is approximate due to limitations identified during data validation
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).
3. NOAEL and LOAEL values are specific to the Fish Tissue Type (Whole Body, Liver, Muscle, Ovary)
4. Selenium concentrations reported as mg/kg wet weight for liver tissue and mg/kg dry weight for whole body, muscle, and ovary to permit direct comparison to the selenium CBRs for these tissues.

Table J.5-2 Critical Body Residue Value Analysis – Tennessee River

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
CCR Rule Appendix IV Constituents	Mercury	TRU	Upstream	0.07	0.11	0.2	0.06	0.033	0.27	0.081	0.045	<0.0076	<0.0071	0.011	<0.0071	0.02
		TRA	Adjacent	<0.0072	0.12	0.28	0.029	0.026	0.25	0.17	0.081	<0.0072	<0.0076	0.026	<0.0075	0.013
		TRD	Downstream	0.054	0.072	0.2	0.083	0.029	0.11	0.07	0.14	<0.0072	<0.0074	0.014	0.008	0.014
	Selenium	TRU	Upstream	1.4	0.78	1.5	2.1	1.3	1.2	1.1	1.1	2.3	2.2	2.4	2.6	1.7
		TRA	Adjacent	1.3	0.7	1.4	1.9	1.6	1.3	1.1	2.1	2.8	2.1	2.7	3.2	1.2
		TRD	Downstream	1.3	0.67	1.3	2	1.1	1.3	1	1.9	2.2	2.3	2.6	3.6	1.4

	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

TDEC – Tennessee Department of Environment and Conservation

TRU – Tennessee River Upstream

TRA – Tenneessee River Adjacent

TRD – Tennessee River Downstream

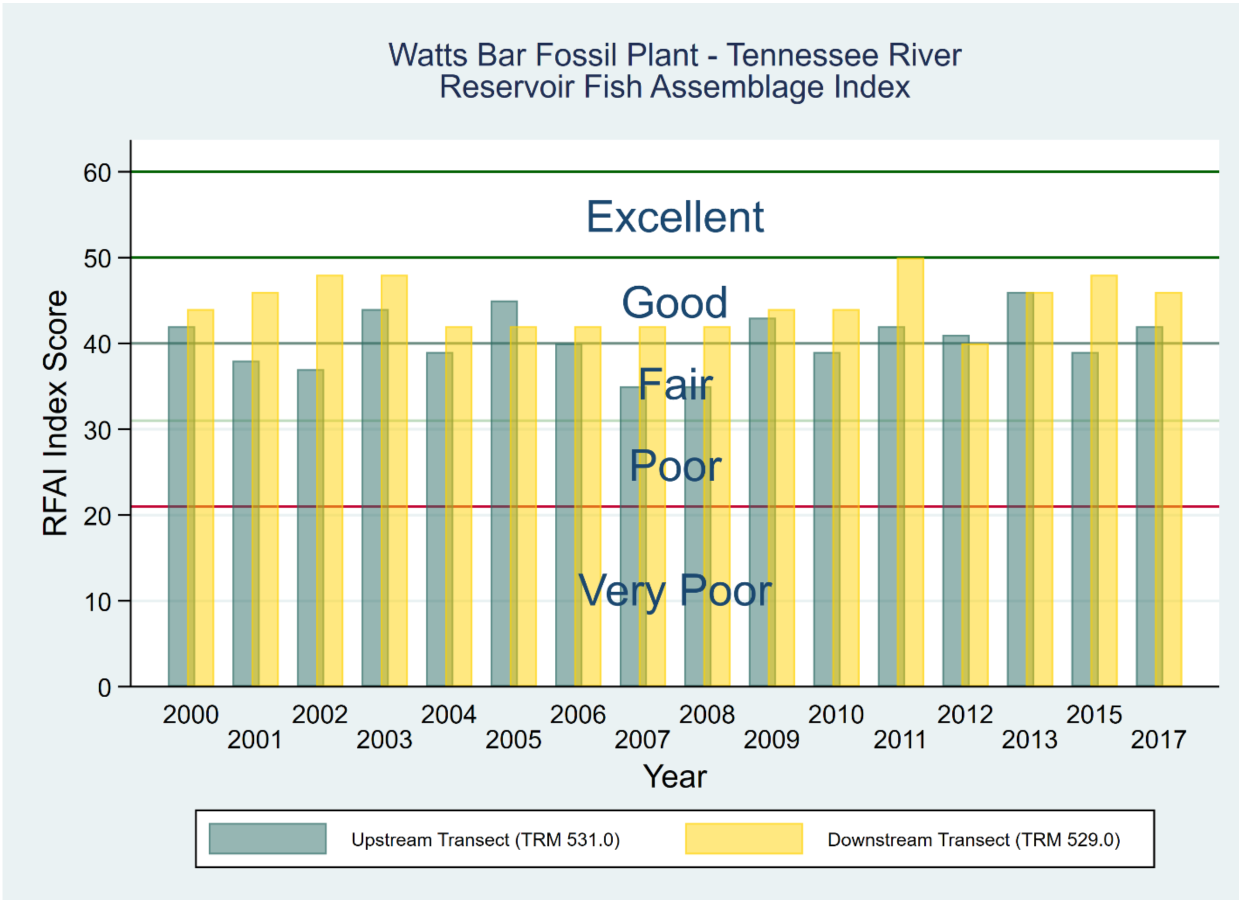
BG – Bluegill, CC – Channel Catfish, LB – Largemouth Bass,

RS – Redear Sunfish, SH – Shad

1. Selenium concentrations reported as mg/kg ww for liver tissue and mg/kg dry weight for whole body, muscle, and ovary to permit direct comparison to the selenium critical body residues (CBRs) for these tissues.

EXHIBITS

Exhibit J.5-1 Reservoir Fish Assemblage Annual Index



Reference: TVA 2018, “Evaluating the Presence and Maintenance of a Balanced Indigenous Population of Fish and Wildlife in the Tennessee River Downstream of TVA’s Watts Bar Nuclear Plant.” July 2018.

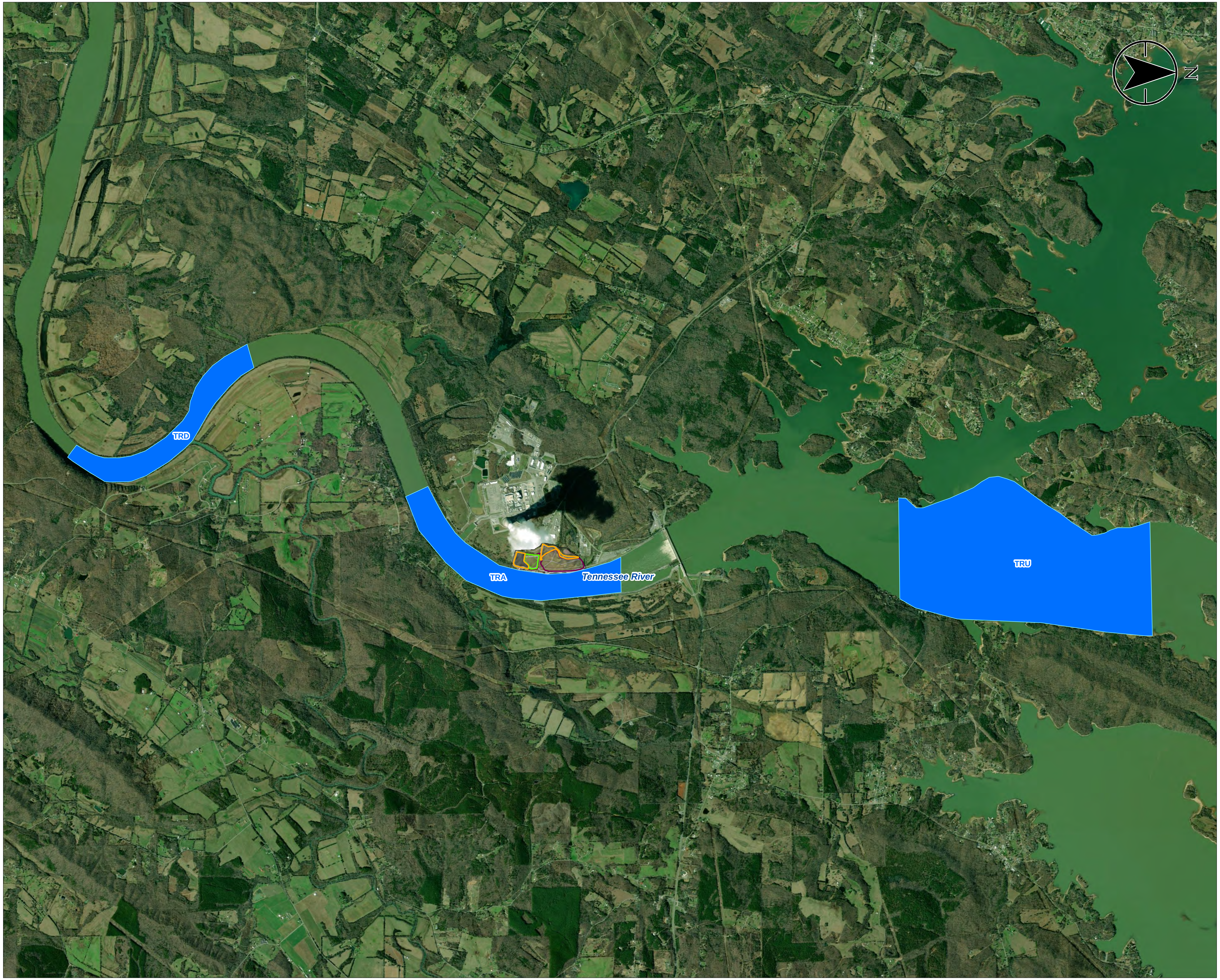


Exhibit No.

J.5-2

Title

Fish Tissue Sampling Reaches

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by MB on 2022-06-14
Technical Review by CA on 2022-06-14

0 2,000 4,000 6,000 8,000 Feet

1:24,000 (At original document size of 22x34)

Legend

Fish Sampling Reaches

TRU - Tennessee River Upstream
TRA - Tennessee River Adjacent
TRD - Tennessee River Downstream

CCR Unit Area (Approximate)

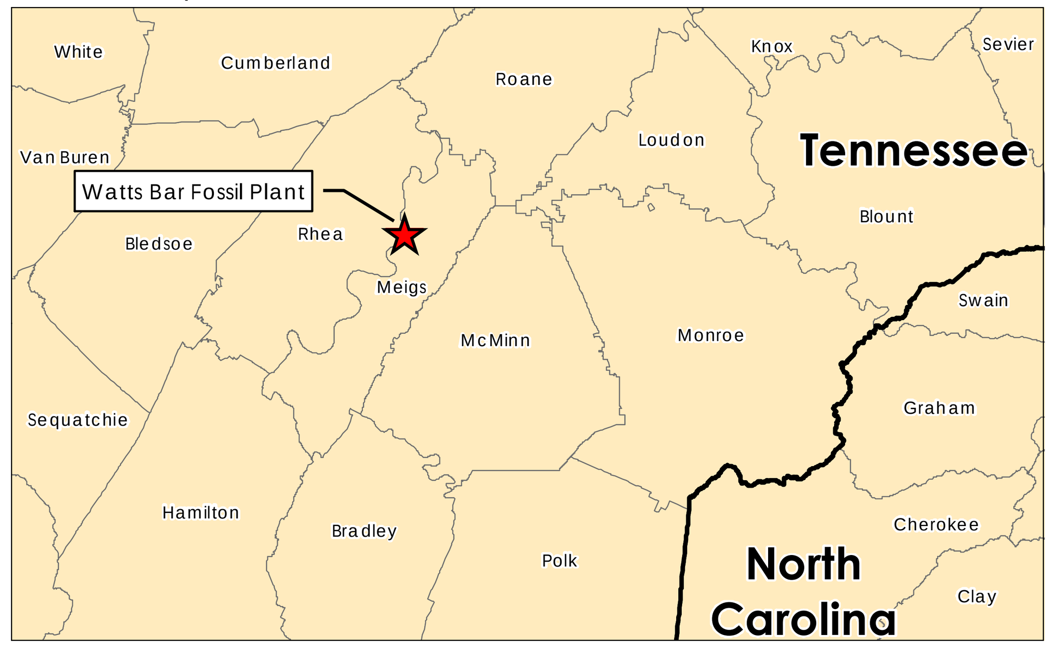
Consolidated and Capped CCR Area (Approximate)

Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)

Abbreviations:
TR = Tennessee River
U = Upstream
A = Adjacent
D = Downstream

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



Stantec TVA

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Exhibit No.

J.5-3

Title

Fish Tissue Sampling Results Above Critical Body Residue Values

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location: Spring City, Tennessee

175668050
Prepared by MB on 2023-10-12
Technical Review by CA on 2023-10-12

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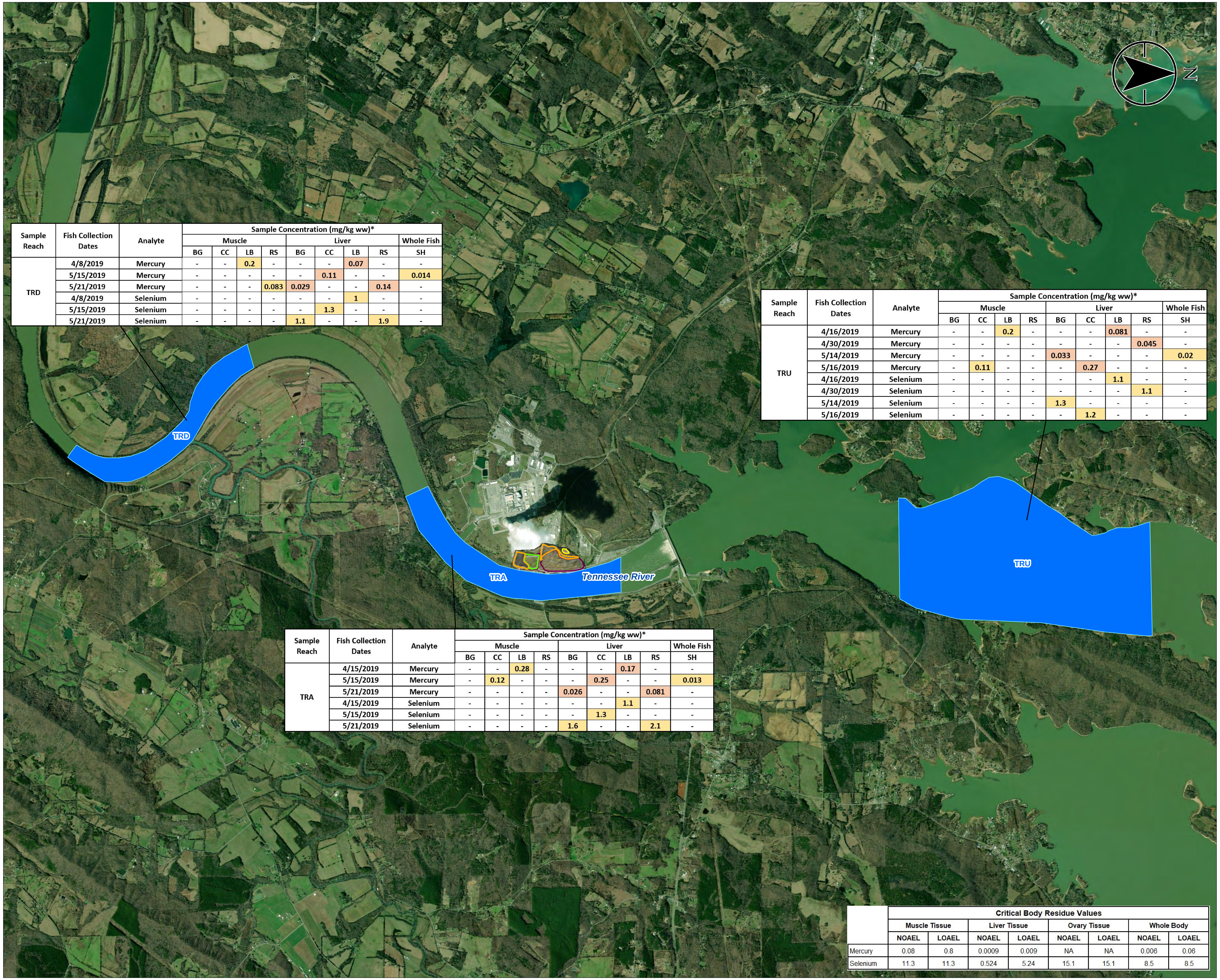
1:24,000 (At original document size of 22x34)



Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
TRD	4/8/2019	Mercury	-	-	0.2	-	-	-	0.07	-	-
	5/15/2019	Mercury	-	-	-	-	-	0.11	-	-	0.014
	5/21/2019	Mercury	-	-	-	0.083	0.029	-	-	0.14	-
	4/8/2019	Selenium	-	-	-	-	-	-	1	-	-
	5/15/2019	Selenium	-	-	-	-	-	1.3	-	-	-
	5/21/2019	Selenium	-	-	-	-	1.1	-	-	1.9	-

Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
TRU	4/16/2019	Mercury	-	-	0.2	-	-	-	0.081	-	-
	4/30/2019	Mercury	-	-	-	-	-	-	-	0.045	-
	5/14/2019	Mercury	-	-	-	-	0.033	-	-	-	0.02
	5/16/2019	Mercury	-	0.11	-	-	-	0.27	-	-	-
	4/16/2019	Selenium	-	-	-	-	-	-	1.1	-	-
	4/30/2019	Selenium	-	-	-	-	-	-	-	1.1	-
	5/14/2019	Selenium	-	-	-	-	1.3	-	-	-	-
	5/16/2019	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
TRA	4/15/2019	Mercury	-	-	0.28	-	-	-	0.17	-	-
	5/15/2019	Mercury	-	0.12	-	-	-	0.25	-	-	0.013
	5/21/2019	Mercury	-	-	-	-	0.026	-	-	0.081	-
	4/15/2019	Selenium	-	-	-	-	-	-	1.1	-	-
	5/15/2019	Selenium	-	-	-	-	-	1.3	-	-	-
	5/21/2019	Selenium	-	-	-	-	1.6	-	-	2.1	-

	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

Fish Sampling Reaches: *TRU - Tennessee River Upstream*, *TRA - Tennessee River Adjacent*, *TRD - Tennessee River Downstream*

CCR Unit Area (Approximate)

Closed Metal Cleaning Pond (Approximate)

Consolidated and Capped CCR Area (Approximate)

Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)

Concentration > CBR NOAEL

Concentration > CBR LOAEL

Abbreviations:

BG Bluegill
CC Channel Catfish
LB Largemouth Bass
RS Redear Sunfish
SH Shad

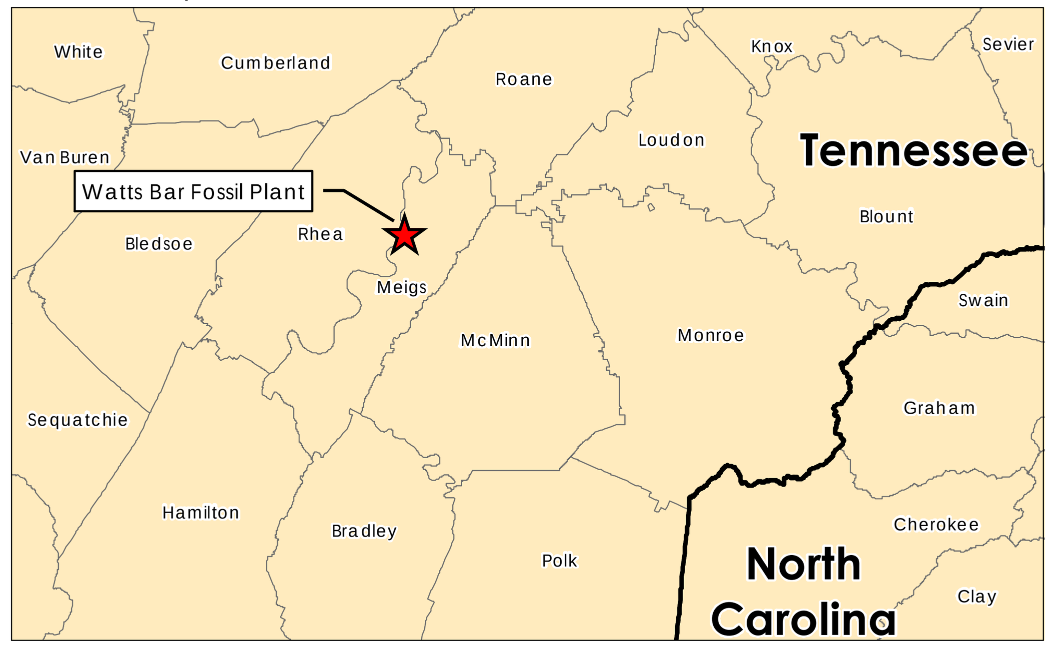
TR = Tennessee River
U = Upstream
A = Adjacent
D = Downstream

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.

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



Stantec TVA

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APPENDIX J.6

FISH TISSUE SAMPLING AND ANALYSIS REPORT

Watts Bar Fossil Plant -
Fish Tissue Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Watts Bar Fossil Plant
Spring City, Tennessee

September 6, 2022

Prepared by:

Tennessee Valley Authority

Revision Record

Revision	Description	Date
0	Submittal to TDEC	September 6, 2022

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LIST OF APPENDICES

Abbreviations

˚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
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
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
WBF Plant	Watts Bar Fossil Plant

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 Watts Bar Fossil Plant (WBF Plant) in Spring 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 WBF 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 Consulting Services Inc. [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 WBF Plant. The evaluation of the results will consider other aspects of the environmental investigation, as well as data collected under other State and/or coal 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 at the WBF Plant:

- *Fish Tissue SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. [EnvStds] 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 were performed during April through June 2019, when the targeted fish species were reproductively mature. TVA personnel performed all field work activities, including fish tissue resections. TVA shipped the fish tissue samples to the analytical laboratory in October 2019. 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 EnvStds under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The primary objective of the investigation conducted pursuant to the Fish Tissue SAP was to assess whether fish in the immediate vicinity and downstream of the WBF Plant have higher tissue concentrations of CCR-related constituents than fish from an upstream reference location. 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 WBF Plant. The approach for the fish tissue investigation was to:

- Collect fish from three sampling reaches located on the Tennessee River 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 conducted during April through June 2019. TVA performed fish collections and fish tissue processing activities based on guidance and specifications listed in TVA's Technical Instructions (TIs) and Standard Operating Procedures (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 three sampling reaches located on the Tennessee River, including one sampling reach upstream of the CCR units, one 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 29 field duplicates and 12 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

Three sampling reaches were selected on the Tennessee River for the collection of fish and associated fish tissues. These areas represent background, adjacent, and downstream conditions relative to the CCR units and coincide with the Asiatic clam sampling areas (Stantec 2018c). The sampling reaches and the TDEC Order CCR units at the WBF 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.

Sampling reaches extended approximately 1.8 to 2.1 river miles. Sampling reach TRA (Tennessee River Mile [TRM] 527.5 – 529.4) was located adjacent to the WBF CCR units. The downstream most sampling reach, TRD (TRM 523.6 – 525.4), was located approximately two river miles downstream from the TRA sampling reach. The upstream sampling reach, TRU (TRM 531.9 – 534.0), was located upstream of Watts Bar Dam and approximately 2.5 miles upstream of the TRA sampling reach.

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 through June 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 WBF 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*). Electrofishing 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 in 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, except as noted in the Variations section of this report. 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 degree Celsius (˚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. Accordingly, females of each gamefish species were preferred over males. However, as allowed for in the Fish Tissue SAP, male fish were utilized in composites when sufficient numbers of females were not obtained from a given sampling reach. 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 10 to 13 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˚C.

In addition, three or five co-located samples were collected from each sampling reach. Co-located samples were additional 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 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 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™ 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™ 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 WBF 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, transport, 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, 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 fish tissue investigation at the WBF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- The Fish Tissue SAP specified collecting one co-located sample from each of the three sampling reaches. In practice, a total of 11 co-located samples were collected (Table B.2). These consisted of nine samples comprised of a targeted gamefish species, plus two gizzard shad samples. Additionally, fillet, ovary, and liver samples were generated from each co-located sample of a gamefish, resulting in a total of 29 duplicate samples submitted for chemical analysis.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- The Fish Tissue SAP specified that each composite sample submitted for chemical analysis consist of at least eight grams of tissue. The four bluegill liver composites consisted of 4.0 to 6.1 grams of tissue, and two of six redear sunfish liver composites consisted of 3.5 and 3.9 grams of tissue. However, 3.5 grams of tissue was sufficient for analysis of the CCR Parameters and percent moisture.

- The Fish Tissue SAP specified that each composite sample for the gamefish species consist of a minimum of six individual fish. In practice, two of three co-located samples of redear sunfish comprised four fish each, and three of five channel catfish ovary composite samples and three of six redear sunfish ovary composite samples comprised tissue from three to five fish (Table B.2). The two co-located samples of redear sunfish were supplemental to those specified in the SAP. These samples were created to utilize the limited number of larger redear sunfish collected from the two sampling reaches (TRA and TRD) downstream of Watts Bar Dam. The sizes (total length) of these redear sunfish were similar to those collected from TRU, upstream in Watts Bar Reservoir.

- The Fish Tissue SAP specified collecting an equipment blank each day of fish tissue sample processing, anticipating only fish from one TVA fossil plant would be processed per day. In practice, fish from several different plants typically were processed each day, so rather than collecting one equipment blank per day, a sufficient number of equipment blanks were collected to cover all the plants. The result was that 33 equipment blanks were collected during 14 of the 18 days that fish from the WBF Plant were processed. This 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 WBF Plant. The scope of work during this investigation included collecting five targeted species of fish from each of three sampling reaches located on the Tennessee River, and processing fish tissue to prepare samples for analysis of CCR Parameters. Fish tissue investigation field activities were completed during April through June 2019, and the fish tissue samples were shipped to the analytical laboratory in October 2019.

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 WBF Plant in Spring 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 Watts Bar Fossil Plant Environmental Investigation*. Revision 2. Prepared for Tennessee Valley Authority. November 2018.

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Stantec. 2018b. *Environmental Investigation Plan, Watts Bar Fossil Plant.* Revision 3. Prepared for Tennessee Valley Authority. November 19, 2018.

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

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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

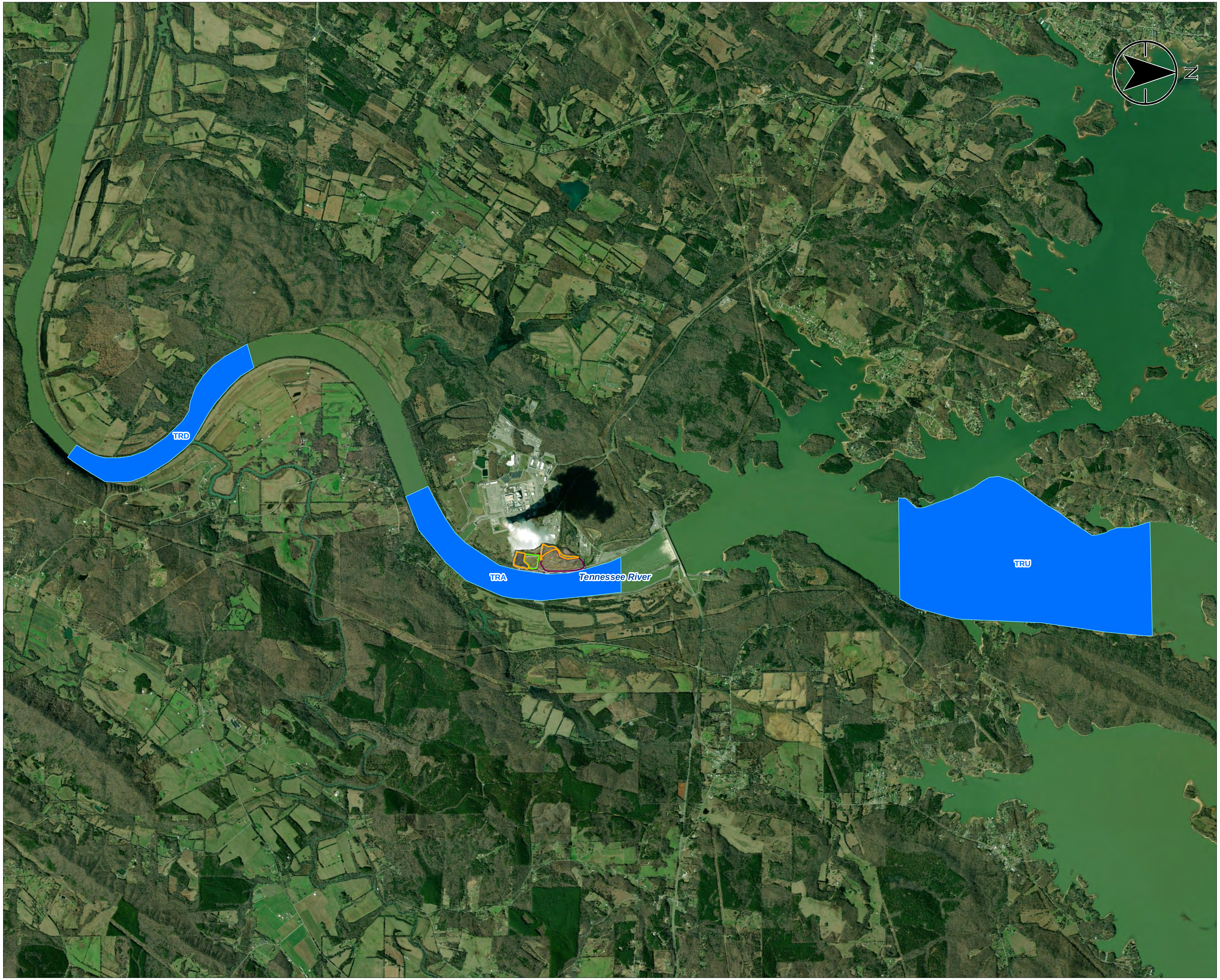


Exhibit No.

A.1

Title

Fish Tissue Sampling Reaches

Client/Project

Tennessee Valley Authority
Watts Bar Fossil (WBF) Plant TDEC Order

Project Location

Spring City, Tennessee

175668050
Prepared by MB on 2022-06-14
Technical Review by CP on 2022-06-14

0 2,000 4,000 6,000 8,000 Feet

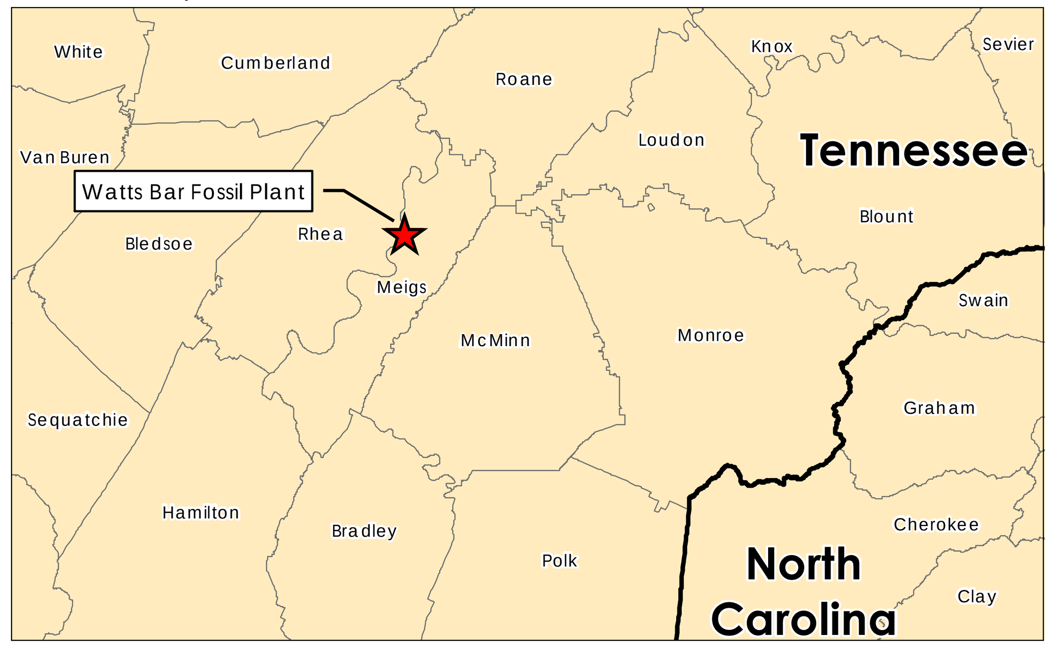
1:24,000 (At original document size of 22x34)

Legend

- Fish Sampling Reaches: *TRU - Tennessee River Upstream*; *TRA - Tennessee River Adjacent*; *TRD - Tennessee River Downstream*
- CCR Unit Area (Approximate)
- Consolidated and Capped CCR Area (Approximate)
- Drainage Improvements Area; Stormwater Pond (Former Ash Pond) (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by ESRI Imagery; 2018 Imagery Provided by TVA and is dated September 12, 2018



Stantec TVA

APPENDIX B - TABLES

TABLE B.1 – Fish Tissue Sampling Reaches
Watts Bar Fossil Plant

Sampling Reach ID	Sampling Reach Name[1]	Sampling Reach Location[2]			
		Approximate River Miles (extent)		Latitude	Longitude
TRU	Tennessee River Upstream	TRM 531.9 – 534.0 (2.1)	Downstream	35.647953	-84.781019
			Upstream	35.677609	-84.776651
TRA	Tennessee River Adjacent	TRM 527.5 – 529.4 (1.9)	Downstream	35.591150	-84.790367
			Upstream	35.615099	-84.778307
TRD	Tennessee River Downstream	TRM 523.6 – 525.4 (1.8)	Downstream	35.550624	-84.796929
			Upstream	35.571717	-84.810343

Notes:

ID Identification
TRM Tennessee River Mile

1. Upstream, Adjacent, and Downstream relative to the Watts Bar Fossil Plant CCR units
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
Watts Bar Fossil Plant
April - June 2019

Sampling	Fish	Sample IDs			Sample	Number of fish						Length (mm)		Collection Date Range		Analysis Type		
						Sex		Tissue Composite								Total	Total	%
Reach	Species	Fillet or Whole Fish	Ovary	Liver	Type[2]	Male	Female	Fillet	Ovary	Liver	Whole Fish	Min	Max	Initial	Final	Metals	Mercury	Moisture
Tennessee River Upstream (TRU)	Bluegill	WBF-FH-BG-TRU-F-20190514	WBF-FH-BG-TRU-O-20190514	WBF-FH-BG-TRU-L-20190514	N	–	6	6	6	6	–	128	145	5/14/2019	5/20/2019	x	x	x
	Channel Catfish	WBF-FH-CC-TRU-F-20190516	WBF-FH-CC-TRU-O-20190516	WBF-FH-CC-TRU-L-20190516	N	–	6	6	3	6	–	428	495	5/16/2019	5/23/2019	x	x	x
	Largemouth Bass	WBF-FH-LB-TRU-F-20190416	WBF-FH-LB-TRU-O-20190416	WBF-FH-LB-TRU-L-20190416	N	–	6	6	6	6	–	401	485	4/16/2019	4/22/2019	x	x	x
		WBF-FH-LB-F-DUP03-20190416	WBF-FH-LB-O-DUP03-20190416	WBF-FH-LB-L-DUP03-20190416	FD	–	6	6	6	6	–	384	416	4/16/2019	4/24/2019	x	x	x
	Redear Sunfish	WBF-FH-RS-TRU-F-20190430	WBF-FH-RS-TRU-O-20190430	WBF-FH-RS-TRU-L-20190430	N	–	6	6	6	6	–	193	206	4/30/2019	5/20/2019	x	x	x
		WBF-FH-RS-F-DUP03-20190430	WBF-FH-RS-O-DUP03-20190430	WBF-FH-RS-L-DUP03-20190430	FD	–	6	6	6	6	–	219	232	4/30/2019	5/16/2019	x	x	x
	Gizzard Shad	WBF-FH-SH-TRU-WF-20190514	–	–	N	–	–	–	–	–	10	190	230	5/14/2019	5/14/2019	x	x	x
		WBF-FH-SH-WF-DUP02-20190502	–	–	FD	–	–	–	–	–	10	210	250	5/2/2019	5/2/2019	x	x	x
Tennessee River Adjacent (TRA)	Bluegill	WBF-FH-BG-TRA-F-20190521	WBF-FH-BG-TRA-O-20190521	WBF-FH-BG-TRA-L-20190521	N	–	6	6	6	6	–	132	163	5/21/2019	5/29/2019	x	x	x
		WBF-FH-BG-F-DUP01-20190521	WBF-FH-BG-O-DUP01-20190521	WBF-FH-BG-L-DUP01-20190521	FD	–	6	6	6	6	–	122	145	5/21/2019	5/29/2019	x	x	x
	Channel Catfish	WBF-FH-CC-TRA-F-20190515	WBF-FH-CC-TRA-O-20190515	WBF-FH-CC-TRA-L-20190515	N	–	6	6	6	6	–	450	542	5/15/2019	5/29/2019	x	x	x
		WBF-FH-CC-F-DUP01-20190429	WBF-FH-CC-O-DUP01-20190429	WBF-FH-CC-L-DUP01-20190429	FD	–	6	6	5	6	–	420	507	4/29/2019	5/15/2019	x	x	x
	Largemouth Bass	WBF-FH-LB-TRA-F-20190415	WBF-FH-LB-TRA-O-20190415	WBF-FH-LB-TRA-L-20190415	N	–	6	6	6	6	–	401	481	4/15/2019	4/23/2019	x	x	x
		WBF-FH-LB-F-DUP01-20190415	WBF-FH-LB-O-DUP01-20190415	WBF-FH-LB-L-DUP01-20190415	FD	–	6	6	6	6	–	382	460	4/15/2019	4/23/2019	x	x	x
	Redear Sunfish	WBF-FH-RS-TRA-F-20190521	WBF-FH-RS-TRA-O-20190521	WBF-FH-RS-TRA-L-20190521	N	–	6	6	6	6	–	135	165	5/21/2019	5/29/2019	x	x	x
		WBF-FH-RS-F-DUP01-20190515	WBF-FH-RS-O-DUP01-20190515	WBF-FH-RS-L-DUP01-20190515	FD	–	4	4	3	4	–	181	233	5/15/2019	5/29/2019	x	x	x
	Gizzard Shad	WBF-FH-SH-TRA-WF-20190515	–	–	N	–	–	–	–	–	13	210	240	5/15/2019	5/15/2019	x	x	x
		WBF-FH-SH-WF-DUP01-20190515	–	–	FD	–	–	–	–	–	13	210	240	5/15/2019	5/15/2019	x	x	x
Tennessee River Downstream (TRD)	Bluegill	WBF-FH-BG-TRD-F-20190521	WBF-FH-BG-TRD-O-20190521	WBF-FH-BG-TRD-L-20190521	N	–	6	6	6	6	–	133	157	5/21/2019	5/29/2019	x	x	x
	Channel Catfish	WBF-FH-CC-TRD-F-20190515	WBF-FH-CC-TRD-O-20190515	WBF-FH-CC-TRD-L-20190515	N	–	6	6	6	6	–	422	502	5/15/2019	5/29/2019	x	x	x
		WBF-FH-CC-F-DUP02-20190429	WBF-FH-CC-O-DUP02-20190429	WBF-FH-CC-L-DUP02-20190429	FD	–	6	6	4	6	–	460	565	4/29/2019	5/1/2019	x	x	x
	Largemouth Bass	WBF-FH-LB-TRD-F-20190408	WBF-FH-LB-TRD-O-20190408	WBF-FH-LB-TRD-L-20190408	N	–	6	6	6	6	–	416	445	4/8/2019	4/23/2019	x	x	x
		WBF-FH-LB-F-DUP02-20190423	WBF-FH-LB-O-DUP02-20190423	WBF-FH-LB-L-DUP02-20190423	FD	–	6	6	6	6	–	386	440	4/23/2019	4/23/2019	x	x	x
	Redear Sunfish	WBF-FH-RS-TRD-F-20190521	WBF-FH-RS-TRD-O-20190521	WBF-FH-RS-TRD-L-20190521	N	–	6	6	5	6	–	142	164	5/21/2019	5/29/2019	x	x	x
		WBF-FH-RS-F-DUP02-20190521	WBF-FH-RS-O-DUP02-20190521	WBF-FH-RS-L-DUP02-20190521	FD	–	4	4	4	4	–	213	276	5/21/2019	5/29/2019	x	x	x
	Gizzard Shad	WBF-FH-SH-TRD-WF-20190515	–	–	N	–	–	–	–	–	12	195	225	5/15/2019	5/15/2019	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
ID	Identification
mm	millimeter
N/A	tissue not analyzed / not available

1. Sample Naming Convention
   - Sample Naming Convention for Normal Environmental Samples: Plant Acronym - Matrix Acronym - Species Acronym - Sampling Reach Identifier - Tissue Identifier - yyyymmdd
   - Sample Naming Convention for Field 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 Samples

TABLE B.3 – Fish Measurements and Observations
Watts Bar Fossil Plant
April - June 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]
Tennessee River Upstream (TRU)	Bluegill	WBF-FH-BG-TRU-F-20190514 WBF-FH-BG-TRU-O-20190514 WBF-FH-BG-TRU-L-20190514	5/14/2019	142	60.2	F	9.2	7.9	2.7	2.9	5.6	0.7	–	0.7	none
			5/14/2019	143	44.5	F	6.5	6.3	1.2	1.3	2.5	1.5	–	1.5	none
			5/20/2019	145	54.6	F	9.3	9.1	1.8	2.2	4.0	0.5	–	0.5	none
			5/20/2019	129	42.5	F	6.5	5.9	3.1	2.8	5.9	0.6	–	0.6	none
			5/20/2019	131	41.2	F	7.5	7.2	1.9	1.5	3.4	0.4	–	0.4	none
			5/20/2019	128	33.5	F	5.4	5.0	1.3	1.0	2.3	0.3	–	0.3	none
Tennessee River Adjacent (TRA)	Bluegill	WBF-FH-BG-TRA-F-20190521 WBF-FH-BG-TRA-O-20190521 WBF-FH-BG-TRA-L-20190521	5/21/2019	160	96.1	F	14.7	13.8	4.0	3.5	7.5	2.6	–	2.6	none
			5/21/2019	154	88.8	F	17.2	17.2	3.2	2.8	6.0	0.8	–	0.8	none
			5/21/2019	163	88.1	F	14.1	14.5	3.6	3.5	7.1	0.7	–	0.7	none
			5/21/2019	133	44.2	F	6.9	6.8	0.7	0.7	1.4	0.4	–	0.4	none
			5/29/2019	143	54.0	F	9.4	9.1	2.7	2.4	5.1	0.5	–	0.5	Upper caudal fin erosion
			5/29/2019	132	43.8	F	7.5	7.8	1.8	1.5	3.3	0.5	–	0.5	none
		WBF-FH-BG-F-DUP01-20190521 WBF-FH-BG-O-DUP01-20190521 WBF-FH-BG-L-DUP01-20190521	5/21/2019	143	67.1	F	12.6	13.2	2.6	2.0	4.6	0.7	–	0.7	none
			5/21/2019	144	65.5	F	10.3	10.8	2.1	1.8	3.9	0.9	–	0.9	none
			5/21/2019	133	52.0	F	6.9	7.2	1.5	1.9	3.4	1.1	–	1.1	none
			5/29/2019	145	64.2	F	10.2	10.9	1.8	1.8	3.6	0.8	–	0.8	none
			5/29/2019	123	36.3	F	6.1	5.7	1.3	1.2	2.5	0.5	–	0.5	none
			5/29/2019	122	33.9	F	5.1	5.5	1.2	1.1	2.3	0.5	–	0.5	none
Tennessee River Downstream (TRD)	Bluegill	WBF-FH-BG-TRD-F-20190521 WBF-FH-BG-TRD-O-20190521 WBF-FH-BG-TRD-L-20190521	5/21/2019	143	57.8	F	9.7	10.1	1.6	1.0	2.6	0.9	–	0.9	none
			5/29/2019	150	72.6	F	13.0	12.4	3.6	3.6	7.2	1.2	–	1.2	none
			5/29/2019	157	78.5	F	12.0	11.7	3.3	2.9	6.2	1.4	–	1.4	none
			5/29/2019	135	50.2	F	8.4	8.3	2.5	2.2	4.7	0.7	–	0.7	none
			5/29/2019	133	41.2	F	7.3	7.2	0.8	0.9	1.7	0.5	–	0.5	none
			5/29/2019	141	67.6	F	11.6	12.8	1.5	1.2	2.7	1.4	–	1.4	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Watts Bar Fossil Plant
April - June 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]
Tennessee River Upstream (TRU)	Channel Catfish	WBF-FH-CC-TRU-F-20190516 WBF-FH-CC-TRU-O-20190516 WBF-FH-CC-TRU-L-20190516	5/16/2019	457	1024	F	166.9	157.4	IM	IM	IM	9.4	14.0	23.4	none
			5/20/2019	468	860	F	193.5	185.6	IM	IM	IM	5.1	4.8	9.9	none
			5/20/2019	428	742	F	136.3	128.4	34.7	30.6	65.3	8.6	6.8	15.4	none
			5/23/2019	495	990	F	194.7	193.7	IM	IM	IM	11.8	7.4	19.2	none
			5/23/2019	431	834	F	133.5	133.8	76.9	67.3	144.2	6.1	6.2	12.3	none
			5/23/2019	493	1110	F	158.5	152.1	97.3	110.6	207.9	9.5	8.3	17.8	none
Tennessee River Adjacent (TRA)	Channel Catfish	WBF-FH-CC-TRA-F-20190515 WBF-FH-CC-TRA-O-20190515 WBF-FH-CC-TRA-L-20190515	5/15/2019	482	1258	F	187.3	202.6	72.6	72.7	145.3	12.8	10.5	23.3	none
			5/15/2019	460	1006	F	191.5	188.3	40.1	33.5	73.6	11.2	10.2	21.4	none
			5/15/2019	450	998	F	162.4	163.8	95.1	78.3	173.4	8.4	9.4	17.8	none
			5/21/2019	505	1246	F	261.8	257.2	131.8	129.3	261.1	9.9	8.7	18.6	none
			5/21/2019	504	1480	F	245.8	249.1	83.3	91.5	174.8	10.1	8.1	18.2	none
			5/29/2019	542	1786	F	266.8	271.1	142.4	122.5	264.9	14.1	12.9	27.0	none
		WBF-FH-CC-F-DUP01-20190429 WBF-FH-CC-O-DUP01-20190429 WBF-FH-CC-L-DUP01-20190429	4/29/2019	467	996	F	291.8	276.3	22.0	23.8	45.8	10.9	8.6	19.5	none
			4/29/2019	507	1746	F	200.7	195.5	83.5	91.8	175.3	23.9	18.7	42.6	none
			4/29/2019	485	1082	F	167.3	168.0	IM	IM	IM	9.4	10.1	19.5	none
			5/8/2019	468	1053	F	177.2	193.2	49.4	47.6	97.0	10.7	8.6	19.3	none
			5/8/2019	420	856	F	146.5	148.4	32.6	33.6	66.2	9.4	10.5	19.9	none
			5/15/2019	487	1248	F	252.5	247.1	80.1	71.8	151.9	11.9	8.8	20.7	none
Tennessee River Downstream (TRD)	Channel Catfish	WBF-FH-CC-TRD-F-20190515 WBF-FH-CC-TRD-O-20190515 WBF-FH-CC-TRD-L-20190515	5/15/2019	463	1144	F	245.5	251.0	30.0	28.4	58.4	12.3	12.8	25.1	none
			5/15/2019	448	1018	F	168.6	170.0	63.8	65.7	129.5	10.5	11.9	22.4	none
			5/15/2019	502	1238	F	224.1	240.3	32.8	30.1	62.9	16.3	12.2	28.5	none
			5/15/2019	427	824	F	139.3	148.6	50.5	41.2	91.7	13.0	10.9	23.9	none
			5/29/2019	490	1406	F	234.0	228.7	116.2	112.5	228.7	9.7	8.1	17.8	none
			5/29/2019	422	930	F	163.1	148.9	56.9	51.7	108.6	11.6	9.3	20.9	none
		WBF-FH-CC-F-DUP02-20190429 WBF-FH-CC-O-DUP02-20190429 WBF-FH-CC-L-DUP02-20190429	4/29/2019	541	1498	F	309.3	316.4	IM	IM	IM	18.4	16.0	34.4	none
			5/1/2019	500	1248	F	224.1	236.3	24.9	20.2	45.1	22.2	8.9	31.1	none
			5/1/2019	565	1708	F	332.0	318.0	IM	IM	IM	18.3	18.2	36.5	none
			5/1/2019	460	1082	F	163.0	164.0	47.8	48.1	95.9	18.2	12.8	31.0	none
			5/1/2019	520	1776	F	299.6	292.1	92.6	91.8	184.4	27.0	31.3	58.3	none
			5/1/2019	520	1824	F	333.6	359.2	68.2	58.1	126.3	15.1	9.2	24.3	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Watts Bar Fossil Plant
April - June 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]
Tennessee River Upstream (TRU)	Largemouth Bass	WBF-FH-LB-TRU-F-20190416 WBF-FH-LB-TRU-O-20190416 WBF-FH-LB-TRU-L-20190416	4/16/2019	414	990	F	171.3	158.2	36.7	41.2	77.9	9.5	8.2	17.7	none
			4/16/2019	401	990	F	158.8	149.0	32.3	30.5	62.8	6.2	9.8	16.0	none
			4/16/2019	412	1188	F	205.5	192.8	27.5	27.2	54.7	12.5	9.3	21.8	none
			4/16/2019	402	1062	F	162.2	161.5	26.5	28.6	55.1	9.6	8.2	17.8	none
			4/16/2019	428	1164	F	180.9	175.8	22.1	23.8	45.9	10.6	8.5	19.1	none
			4/22/2019	485	1700	F	298.6	302.2	29.0	30.4	59.4	18.3	13.4	31.7	none
		WBF-FH-LB-F-DUP03-20190416 WBF-FH-LB-O-DUP03-20190416 WBF-FH-LB-L-DUP03-20190416	4/16/2019	388	798	F	132.3	126.3	18.8	22.9	41.7	6.8	6.0	12.8	none
			4/16/2019	390	976	F	157.0	159.0	17.7	14.7	32.4	11.1	8.5	19.6	none
			4/24/2019	384	826	F	144.9	138.0	14.1	12.3	26.4	7.4	5.9	13.3	none
			4/24/2019	416	1052	F	201.0	189.0	25.2	24.5	49.7	8.4	8.1	16.5	none
			4/24/2019	388	866	F	152.0	144.3	21.2	20.0	41.2	7.9	8.0	15.9	none
			4/24/2019	387	778	F	126.9	117.6	23.1	20.5	43.6	6.5	5.1	11.6	none
Tennessee River Adjacent (TRA)	Largemouth Bass	WBF-FH-LB-TRA-F-20190415 WBF-FH-LB-TRA-O-20190415 WBF-FH-LB-TRA-L-20190415	4/15/2019	481	1724	F	249.0	250.3	77.5	56.9	134.4	14.4	15.2	29.6	Hook wound
			4/15/2019	439	1316	F	244.9	232.8	48.8	46.9	95.7	8.2	9.0	17.2	none
			4/15/2019	401	1038	F	180.0	189.6	33.6	27.6	61.2	7.9	8.9	16.8	none
			4/15/2019	468	1856	F	282.3	285.2	86.7	89.3	176.0	17.7	19.0	36.7	none
			4/15/2019	455	1568	F	287.6	286.6	56.0	51.7	107.7	10.3	8.4	18.7	none
			4/23/2019	465	1490	F	255.3	238.8	55.0	50.6	105.6	10.8	11.5	22.3	none
		WBF-FH-LB-F-DUP01-20190415 WBF-FH-LB-O-DUP01-20190415 WBF-FH-LB-L-DUP01-20190415	4/15/2019	386	968	F	176.4	173.3	55.2	49.6	104.8	5.3	4.5	9.8	none
			4/15/2019	431	1082	F	183.5	191.8	36.4	28.5	64.9	6.3	6.5	12.8	none
			4/23/2019	395	862	F	160.5	166.0	14.9	13.6	28.5	5.2	5.3	10.5	none
			4/23/2019	460	1444	F	250.0	240.9	33.3	36.2	69.5	10.6	7.6	18.2	none
			4/23/2019	382	966	F	168.4	171.1	38.6	42.2	80.8	10.3	6.3	16.6	none
			4/23/2019	383	904	F	160.6	155.4	29.3	31.9	61.2	7.7	5.7	13.4	none
Tennessee River Downstream (TRD)	Largemouth Bass	WBF-FH-LB-TRD-F-20190408 WBF-FH-LB-TRD-O-20190408 WBF-FH-LB-TRD-L-20190408	4/8/2019	423	1298	F	212.0	206.0	42.3	49.9	92.2	15.7	13.6	29.3	none
			4/8/2019	416	1232	F	224.0	215.0	37.7	39.5	77.2	6.7	9.7	16.4	none
			4/8/2019	426	1222	F	186.0	180.0	43.9	40.1	84.0	10.4	8.6	19.0	none
			4/8/2019	420	1248	F	220.0	220.0	42.0	33.8	75.8	13.3	11.3	24.6	none
			4/10/2019	445	1454	F	258.3	244.1	52.9	55.4	108.3	11.8	10.2	22.0	none
			4/23/2019	435	1502	F	239.5	242.4	39.8	35.0	74.8	10.6	11.1	21.7	none
		WBF-FH-LB-F-DUP02-20190423 WBF-FH-LB-O-DUP02-20190423 WBF-FH-LB-L-DUP02-20190423	4/23/2019	393	968	F	169.4	174.7	38.9	31.5	70.4	10.9	7.1	18.0	none
			4/23/2019	417	1128	F	182.8	179.6	77.4	72.0	149.4	7.9	10.1	18.0	none
			4/23/2019	424	1192	F	211.9	214.1	33.0	29.6	62.6	7.5	8.8	16.3	none
			4/23/2019	440	1340	F	248.9	236.7	33.2	25.5	58.7	8.0	8.1	16.1	none
			4/23/2019	407	1130	F	184.4	181.4	24.8	26.2	51.0	10.1	8.6	18.7	none
			4/23/2019	386	946	F	173.7	173.0	24.2	28.2	52.4	7.4	8.2	15.6	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Watts Bar Fossil Plant
April - June 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]
Tennessee River Upstream (TRU)	Redear Sunfish	WBF-FH-RS-TRU-F-20190430 WBF-FH-RS-TRU-O-20190430 WBF-FH-RS-TRU-L-20190430	4/30/2019	200	166.6	F	21.6	21.0	7.2	4.9	12.1	3.4	–	3.4	none
			4/30/2019	193	159.4	F	27.8	28.3	5.4	4.2	9.6	2.7	–	2.7	none
			5/2/2019	206	192.7	F	29.6	29.4	7.1	7.6	14.7	3.9	–	3.9	none
			5/20/2019	206	193.0	F	30.0	30.0	5.6	5.5	11.1	2.4	–	2.4	none
			5/20/2019	199	170.6	F	26.2	24.4	7.6	7.0	14.6	1.9	–	1.9	none
			5/20/2019	195	159.1	F	23.2	22.2	5.2	5.5	10.7	2.0	–	2.0	none
		WBF-FH-RS-F-DUP03-20190430 WBF-FH-RS-O-DUP03-20190430 WBF-FH-RS-L-DUP03-20190430	4/30/2019	232	269.4	F	41.2	44.5	9.7	8.3	18.0	4.8	–	4.8	none
			5/2/2019	225	247.0	F	41.4	39.0	5.4	6.1	11.5	3.2	–	3.2	none
			5/2/2019	219	223.4	F	35.9	34.7	9.6	9.1	18.7	3.3	–	3.3	none
			5/16/2019	230	240.4	F	33.4	34.1	12.6	11.3	23.9	3.5	–	3.5	none
			5/16/2019	230	232.4	F	37.9	39.1	4.6	4.1	8.7	2.0	–	2.0	none
			5/16/2019	227	212.1	F	38.9	36.6	5.1	5.2	10.3	2.0	–	2.0	none
Tennessee River Adjacent (TRA)	Redear Sunfish	WBF-FH-RS-TRA-F-20190521 WBF-FH-RS-TRA-O-20190521 WBF-FH-RS-TRA-L-20190521	5/21/2019	141	56.9	F	9.3	9.3	2.0	1.3	3.3	0.7	–	0.7	none
			5/21/2019	165	76.7	F	11.6	11.0	2.2	3.3	5.5	0.8	–	0.8	none
			5/23/2019	165	83.9	F	14.5	15.7	1.5	1.9	3.4	0.8	–	0.8	none
			5/29/2019	152	72.0	F	10.4	10.8	3.9	2.8	6.7	0.6	–	0.6	none
			5/29/2019	139	52.2	F	8.9	8.7	2.3	2.2	4.5	0.5	–	0.5	none
			5/29/2019	135	46.3	F	7.7	8.3	1.8	1.8	3.6	0.5	–	0.5	none
		WBF-FH-RS-F-DUP01-20190515 WBF-FH-RS-O-DUP01-20190515 WBF-FH-RS-L-DUP01-20190515	5/15/2019	222	242.5	F	37.4	41.2	11.2	8.3	19.5	3.0	–	3.0	none
			5/21/2019	181	105.9	F	19.4	19.1	IM	IM	IM	0.9	–	0.9	none
			5/29/2019	210	156.0	F	22.5	22.0	2.8	2.1	4.9	1.6	–	1.6	none
			5/29/2019	233	281.8	F	37.1	38.8	7.2	6.4	13.6	3.1	–	3.1	none
Tennessee River Downstream (TRD)	Redear Sunfish	WBF-FH-RS-TRD-F-20190521 WBF-FH-RS-TRD-O-20190521 WBF-FH-RS-TRD-L-20190521	5/21/2019	161	69.9	F	11.1	10.7	2.3	1.9	4.2	0.6	–	0.6	none
			5/21/2019	152	57.1	F	9.1	9.1	1.2	0.9	2.1	0.5	–	0.5	none
			5/29/2019	144	54.1	F	8.2	8.2	1.5	1.3	2.8	0.6	–	0.6	none
			5/29/2019	164	82.0	F	13.4	14.5	IM	IM	IM	0.9	–	0.9	none
			5/29/2019	145	56.1	F	9.5	9.4	1.6	1.5	3.1	0.5	–	0.5	none
			5/29/2019	142	54.9	F	9.4	9.1	1.1	0.7	1.8	0.4	–	0.4	none
		WBF-FH-RS-F-DUP02-20190521 WBF-FH-RS-O-DUP02-20190521 WBF-FH-RS-L-DUP02-20190521	5/21/2019	213	149.7	F	22.1	20.9	1.9	1.7	3.6	1.5	–	1.5	Skinny
			5/29/2019	261	329.2	F	45.8	42.9	3.6	4.0	7.6	3.9	–	3.9	none
			5/29/2019	276	424.0	F	61.1	61.8	6.9	5.0	11.9	5.2	–	5.2	none
			5/29/2019	236	257.6	F	34.4	33.2	4.0	2.2	6.2	2.1	–	2.1	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Watts Bar Fossil Plant
April - June 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]
Tennessee River Upstream (TRU)	Gizzard Shad	WBF-FH-SH-TRU-WF-20190514	5/14/2019	190-230 (10)	1024	–	–	–	–	–	–	–	–	–	none
		WBF-FH-SH-WF-DUP02-20190502	5/2/2019	210-250 (10)	1611	–	–	–	–	–	–	–	–	–	none
Tennessee River Adjacent (TRA)	Gizzard Shad	WBF-FH-SH-TRA-WF-20190515	5/15/2019	210-240 (13)	1506	–	–	–	–	–	–	–	–	–	none
		WBF-FH-SH-WF-DUP01-20190515	5/15/2019	210-240 (13)	1436	–	–	–	–	–	–	–	–	–	none
Tennessee River Downstream (TRD)	Gizzard Shad	WBF-FH-SH-TRD-WF-20190515	5/15/2019	195-225 (12)	1246	–	–	–	–	–	–	–	–	–	none

Notes:

–	measurement or observation not applicable
g	gram
mm	millimeter
ID	Identification
IM	immature eggs/ovaries or fish had spawned

1. Sample Naming Convention
   Sample Naming Convention for Normal Environmental 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
Watts Bar Fossil Plant
April - June 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	TRU	5/14/2019	WBF-FH-BG-TRU-F-20190514		N	Validated	82.2	<0.020	0.073 J	<0.029	<0.031	<0.65	<0.010	307 J	<0.083	<0.018	<0.27	<0.028	<0.020	0.070 J	<0.033	<0.038	0.25	<0.010	0.23 J	<0.012	<0.031	7.0
			WBF-FH-BG-TRU-O-20190514		N	Validated	68.6	<0.019	0.063 J	0.085 J	<0.030	<0.64	<0.010	284 J	<0.081	0.025 J	0.87 J	<0.027	<0.019	<0.0076	0.044 J	<0.037	0.72	<0.010	0.30 J	<0.012	<0.030	25.9
			WBF-FH-BG-TRU-L-20190514		N	Validated	76.5	<0.020	0.40	0.034 J	<0.031	<0.65	0.10	101 J	<0.083	0.19	9.4	<0.028	<0.020	0.033 J	0.15	<0.038	1.3	<0.010	<0.15	<0.012	0.18	20.8
	TRA	5/21/2019	WBF-FH-BG-TRA-F-20190521		N	Validated	80.7	<0.021	0.16	0.044 J	<0.033	<0.69	0.024 J	475 J	<0.088	<0.019	0.53 J	<0.030	<0.021	<0.0072	<0.036	<0.041	0.26	<0.011	0.35 J	<0.013	<0.033	5.9
			WBF-FH-BG-TRA-O-20190521		N	Validated	64.8	<0.021	0.35	0.12	<0.032	<0.68	<0.011	136 J	<0.087	0.029 J	1.4	<0.029	<0.021	<0.0072	<0.035	<0.040	1.0	<0.011	0.27 J	<0.013	<0.033	31.0
			WBF-FH-BG-TRA-L-20190521		N	Validated	77.0	<0.020	0.82	<0.030	<0.032	<0.68	0.069 J	104 J	<0.086	0.28	7.8 J	<0.029	<0.021	0.026 J	0.18	0.040 J	1.6	<0.011	<0.16	0.018 U*	0.31	24.5
		5/21/2019	WBF-FH-BG-F-DUP01-20190521	WBF-FH-BG-TRA-F-20190521	FD	Validated	80.8	<0.021	0.099 J	<0.031	<0.033	<0.70	<0.011	201 J	<0.088	<0.019	<0.28	<0.030	<0.021	0.039 J	<0.036	0.091 J	0.25	<0.011	<0.16	<0.013	<0.033	5.9
			WBF-FH-BG-O-DUP01-20190521	WBF-FH-BG-TRA-O-20190521	FD	Validated	65.5	<0.021	0.37	0.18	<0.033	<0.69	<0.011	124 J	<0.087	0.039 J	1.4	<0.030	<0.021	<0.0074	<0.035	<0.041	1.2	<0.011	0.22 J	<0.013	<0.033	33.6
			WBF-FH-BG-L-DUP01-20190521	WBF-FH-BG-TRA-L-20190521	FD	Validated	78.5	<0.021	1.1	0.038 J	<0.033	<0.69	0.070 J	91.0 J	<0.087	0.22	2.2 J	<0.029	<0.021	0.022 J	0.17	<0.040	1.4	<0.011	<0.16	0.019 U*	0.27	21.9
	TRD	5/21/2019	WBF-FH-BG-TRD-F-20190521		N	Validated	81.0	<0.020	0.078 J	0.035 J	<0.031	<0.66	<0.010	306 J	<0.083	<0.018	0.58 J	<0.028	<0.020	0.054 J	<0.034	<0.039	0.24	<0.011	0.18 J	<0.012	<0.031	6.0
			WBF-FH-BG-TRD-O-20190521		N	Validated	67.8	<0.020	0.28	0.22	<0.031	<0.65	<0.010	117 J	<0.083	0.030 J	1.2	<0.028	<0.020	<0.0072	<0.034	<0.039	0.71	<0.010	0.22 J	<0.012	0.035 J	32.7
			WBF-FH-BG-TRD-L-20190521		N	Validated	78.6	<0.020	0.37	0.036 J	<0.031	<0.66	0.097	82.4 J	<0.083	0.13	5.3	<0.028	<0.020	0.029 J	0.14	<0.039	1.1	<0.011	<0.15	<0.012	0.19	21.5
Channel Catfish	TRU	5/16/2019	WBF-FH-CC-TRU-F-20190516		N	Validated	80.8	<0.021	<0.030	<0.030	<0.033	<0.69	<0.011	75.2 J	<0.088	<0.019	<0.28	<0.030	<0.021	0.11 J	<0.036	<0.041	0.15 J	<0.011	<0.16	<0.013	<0.033	6.3
			WBF-FH-CC-TRU-O-20190516		N	Validated	57.5	<0.020	<0.029	0.35	<0.032	<0.67	<0.011	913 J	<0.086	0.037 J	5.5	<0.029	<0.021	<0.0071	<0.035	<0.040	0.94	<0.011	1.2	<0.013	0.061 J	42.1
			WBF-FH-CC-TRU-L-20190516		N	Final-Verified	81.2	<0.019	0.054 J	0.033 J	<0.030	<0.64	0.062 J	73.4 J	<0.081	0.058 J	2.2	0.11	<0.019	0.27	0.20	<0.038	1.2	<0.010	<0.15	<0.012	0.74	21.9
	TRA	5/15/2019	WBF-FH-CC-TRA-F-20190515		N	Validated	78.6	<0.020	0.075 J	<0.030	<0.032	<0.68	<0.011	75.5 J	<0.086	<0.018	<0.28	<0.029	<0.021	0.12 J	<0.035	0.043 J	0.15 J	<0.011	<0.16	<0.013	<0.032	5.9
			WBF-FH-CC-TRA-O-20190515		N	Validated	57.4	<0.020	0.033 J	0.26	<0.032	<0.68	<0.011	786 J	<0.086	0.021 J	1.2	<0.029	<0.021	<0.0076	<0.035	<0.040	0.90 J	<0.011	0.99	<0.013	<0.032	41.6
			WBF-FH-CC-TRA-L-20190515		N	Final-Verified	81.2	<0.021	0.041 J	<0.030	<0.033	<0.69	0.12	52.2 J	<0.088	0.037 J	2.3	0.11	<0.021	0.25 J	0.18	<0.041	1.3	<0.011	<0.16	0.014 J	1.6 J	23.5
		4/29/2019	WBF-FH-CC-F-DUP01-20190429	WBF-FH-CC-TRA-F-20190515	FD	Validated	77.6	<0.020	0.082 J	<0.029	<0.031	<0.66	<0.010	86.0 J	<0.084	<0.018	2.1	<0.028	<0.020	0.084 J	<0.034	0.046 J	0.17	<0.011	<0.15	<0.012	<0.031	6.0
			WBF-FH-CC-O-DUP01-20190429	WBF-FH-CC-TRA-O-20190515	FD	Final-Verified	58.4	<0.020	0.070 J	0.23	<0.032	<0.67	<0.010	858	<0.085	0.038 J	1.4	<0.029	<0.020	0.0078 J	<0.034	<0.039	1.3 J	<0.011	1.2	<0.012	0.077 J	45.3
			WBF-FH-CC-L-DUP01-20190429	WBF-FH-CC-TRA-L-20190515	FD	Final-Verified	80.8	<0.019	0.048 J	<0.028	<0.030	<0.64	0.045 J	56.8 J	<0.081	0.041 J	2.2	0.064 J	<0.020	0.089 J	0.12	<0.038	1.1	<0.010	<0.15	0.012 J	0.66 J	23.8
	TRD	5/15/2019	WBF-FH-CC-TRD-F-20190515		N	Validated	77.7	<0.020	0.12	<0.029	<0.031	<0.66	<0.010	247 J	<0.083	<0.018	10.8 J	<0.028	<0.020	0.072 J	<0.034	0.067 J	0.15 J	<0.011	<0.15	<0.012	<0.031	6.4
			WBF-FH-CC-TRD-O-20190515		N	Validated	58.3	<0.020	0.041 J	0.25	<0.032	<0.67	<0.011	848 J	<0.085	0.018 J	1.2 J	<0.029	<0.021	<0.0074	<0.035	<0.040	0.96	<0.011	1.0	<0.013	0.039 J	44.3
			WBF-FH-CC-TRD-L-20190515		N	Final-Verified	80.6	<0.020	0.064 J	<0.029	<0.031	<0.66	0.057 J	49.8 J	<0.084	0.022 J	2.2	0.050 J	<0.020	0.11 J	0.12	<0.039	1.3	<0.011	<0.15	<0.012	0.78 J	21.5
		4/29/2019	WBF-FH-CC-F-DUP02-20190429	WBF-FH-CC-TRD-F-20190515	FD	Validated	76.6	<0.020	0.097	<0.029	<0.031	<0.66	<0.010	246 J	<0.084	<0.018	0.33 J	<0.028	<0.020	0.17 J	<0.034	<0.039	0.15 J	<0.011	<0.15	<0.012	<0.032	6.6
			WBF-FH-CC-O-DUP02-20190429	WBF-FH-CC-TRD-O-20190515	FD	Final-Verified	59.0	<0.020	0.078 J	0.18	<0.031	<0.65	<0.010	849	<0.082	0.022 J	9.3 J	<0.028	<0.020	0.012 J	<0.033	<0.038	1.3	<0.010	0.97	<0.012	0.069 J	44.6
			WBF-FH-CC-L-DUP02-20190429	WBF-FH-CC-TRD-L-20190515	FD	Final-Verified	81.2	<0.020	0.064 J	<0.029	<0.032	<0.67	0.052 J	41.9 J	<0.085	<0.018	2.1	<0.029	<0.020	0.17 J	0.13	<0.040	1.2	<0.011	<0.15	<0.013	0.44 J	22.5
Largemouth Bass	TRU	4/16/2019	WBF-FH-LB-TRU-F-20190416		N	Final-Verified	80.2	<0.019	0.16	0.033 J	<0.031	<0.64	<0.010	834 J	<0.082	<0.018	<0.26	<0.028	<0.020	0.20	<0.033	<0.038	0.29	<0.010	0.59	<0.012	<0.031	5.0
			WBF-FH-LB-TRU-O-20190416		N	Final-Verified	69.4	<0.020	0.29	<0.029	<0.031	<0.66	<0.010	108	<0.084	<0.018	1.6	<0.028	<0.020	0.011 J	<0.034	<0.039	0.74	<0.011	<0.15	<0.012	<0.032	31.8
			WBF-FH-LB-TRU-L-20190416		N	Final-Verified	78.8	<0.020	0.51	<0.029	<0.062	<1.3	0.077 J	101 J	<0.17	0.044 J	6.5 J	<0.028	<0.040	0.081 J	0.16 J	<0.078	1.1	<0.021	<0.30	0.031 J	0.099 J	26.7
		4/16/2019	WBF-FH-LB-F-DUP03-20190416	WBF-FH-LB-TRU-F-20190416	FD	Final-Verified	80.3	<0.021	0.25	<0.030	<0.033	<0.69	0.037 J	228 J	<0.088	<0.019	0.61 J	<0.030	<0.021	0.17	<0.036	<0.041	0.29	<0.011	<0.16	<0.013	<0.033	5.1
			WBF-FH-LB-O-DUP03-20190416	WBF-FH-LB-TRU-O-20190416	FD	Final-Verified	69.9	<0.020	0.32	0.032 J	<0.032	<0.68	<0.011	108	<0.086	<0.019	1.5	<0.029	<0.021	0.0086 J	<0.035	<0.040	0.79	<0.011	<0.16	<0.013	<0.032	32.9
			WBF-FH-LB-L-DUP03-20190416	WBF-FH-LB-TRU-L-20190416	FD	Final-Verified	79.4	<0.019	0.41	<0.028	<0.061	<1.3	0.055 J	108 J	<0.17	0.057 J	4.0 J	<0.028	<0.039	0.053 J	0.15 J	<0.077	1.1	<0.021	<0.30	0.028 J	<0.062	25.4
	TRA	4/15/2019	WBF-FH-LB-TRA-F-20190415		N	Final-Verified	80.0	<0.020	0.14	<0.029	<0.031	<0.65	<0.010	226	<0.083	<0.018	<0.27	<0.028	<0.020	0.28 J	<0.033	<0.038	0.28	<0.010	<0.15	<0.012	<0.031	4.2 J
			WBF-FH-LB-TRA-O-20190415		N	Final-Verified	66.7	<0.020	0.27	<0.030	<0.032	<0.67	<0.011	104	<0.086	0.023 J	1.8	<0.029	<0.021	0.026	<0.035	<0.040	0.91	<0.011	<0.16	<0.013	<0.032	36.7
			WBF-FH-LB-TRA-L-20190415		N	Final-Verified	78.7	<0.019	0.34	<0.028	<0.030	<0.64	0.12	96.8	<0.081	0.049 J	7.5 J	<0.027	<0.019	0.17 J	0.17	<0.038	1.1	0.022 J	<0.15	0.027 J	0.17	25.3
		4/15/2019	WBF-FH-LB-F-DUP01-20190415	WBF-FH-LB-TRA-F-20190415	FD	Final-Verified	79.5	<0.021	0.15	<0.031	<0.033	<0.70	<0.011	272	<0.088	<0.019	<0.28	<0.030	<0.021	0.18 J	<0.036	<0.041	0.26	<0.011	<0.16	<0.013	<0.033	4.7
			WBF-FH-LB-O-DUP01-20190415	WBF-FH-LB-TRA-O-20190415	FD	Final-Verified	66.0	<0.020	0.21	0.034 J	<0.031	<0.66	<0.010	109	<0.084	0.026 J	1.5	<0.028	<0.020	0.0088 J	<0.034	<0.039	0.76	<0.011	<0.15	<0.012	<0.032	31.6
			WBF-FH-LB-L-DUP01-20190415	WBF-FH-LB-TRA-L-20190415	FD	Final-Verified	78.3	<0.020	0.26	<0.030	<0.064	<1.4	0.048 J	95.2 J	<0.17	0.056 J	3.6 J	<0.029	<0.041	0.060 J	0.19 J	<0.081	0.89	<0.022	<0.31	0.024 J	0.077 J	22.7
	TRD	4/8/2019	WBF-FH-LB-TRD-F-20190408		N	Final-Verified	79.6	<0.019	0.17	<0.028	<0.031	<0.65	<0.010	143	<0.082	<0.018	<0.26	<0.028	<0.020	0.20	<0.033	<0.038	0.26	<0.010	<0.15	<0.012	<0.031	4.1 J
			WBF-FH-LB-TRD-O-20190408		N	Final-Verified	64.7	<0.021	0.36	<0.030	<0.066	<1.4	<0.022	112 J	<0.17	<0.038	1.7 J	<0.030	<0.042	0.014 J	<0.071	<0.078	0.92	<0.022	<0.32	<0.013	<0.066	33.9
			WBF-FH-LB-TRD-L-20190408		N	Final-Verified	79.8	<0.021	0.35	<0.030	<0.033	<0.69	0.038 J	154	<0.087	0.046 J	6.0 J	<0.030	<0.021	0.070	0.13	<0.041	1.0	<0.011	<0.16	0.019 J	0.049 J	23.5
		4/23/2019	WBF-FH-LB-F-DUP02-20190423	WBF-FH-LB-TRD-F-20190408	FD	Final-Verified	80.7	<0.020	0.16	<0.029	<0.031	<0.65	<0.010	122	<0.083	<0.018	<0.27	<0.028	<0.020	0.23	<0.033	<0.038	0.26	<0.010	<0.15	<0.012	<0.031	3.9 J
			WBF-FH-LB-O-DUP02-20190423	WBF-FH-LB-TRD-O-20190408	FD	Final-Verified	68.6	<0.020	0.30	<0.029	<0.032	<0.67	<0.011	135	<0.085	0.027 J	1.6	<0.029	<0.020	0.010 J	<0.034	<0.039	0.82	<0.011	<0.15	<0.012	<0.032	30.6
			WBF-FH-LB-L-DUP02-20190423	WBF-FH-LB-TRD-L-20190408	FD	Final-Verified	78.9	<0.020	0.35	<0.030	<0.064	<1.3	0.050 J	135 J	<0.16	0.064 J	2.2 J	<0.029	<0.041	0.073	0.16 J	<0.077	0.92	<0.022	<0.31	0.022 J	<0.064	21.5

See notes on last page.

TABLE B.4 – Fish Tissue Analytical Results
Watts Bar Fossil Plant
April - June 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																				
Redear Sunfish	TRU	4/30/2019	WBF-FH-RS-TRU-F-20190430		N	Final-Verified	81.5	<0.019	0.16	0.092	<0.030	<0.63	<0.0099	776 J	<0.080	<0.017	<0.26	<0.027	<0.019	0.060 J	<0.032	<0.037	0.39	<0.010	0.54	<0.012	<0.030	6.5
			WBF-FH-RS-TRU-O-20190430		N	Final-Verified	65.0	<0.020	0.72	0.14	<0.032	<0.68	<0.011	160 J	<0.086	0.031 J	1.1	<0.029	<0.021	<0.0071	0.060 J	<0.040	0.92	<0.011	0.22 J	<0.013	0.070 J	37.0
			WBF-FH-RS-TRU-L-20190430		N	Final-Verified	81.4	<0.020	0.71	<0.029	<0.032	<0.67	0.023 J	89.0 J	<0.085	0.11	1.5	<0.029	<0.020	0.045 J	0.16	<0.039	1.1	<0.011	<0.15	<0.012	0.37	18.3
		4/30/2019	WBF-FH-RS-F-DUP03-20190430	WBF-FH-RS-TRU-F-20190430	FD	Final-Verified	81.6	<0.020	0.17	0.043 J	<0.032	<0.66	<0.010	337 J	<0.084	<0.018	<0.27	<0.029	<0.020	0.053 J	<0.034	<0.039	0.42	<0.011	0.19 J	<0.012	<0.032	8.3
			WBF-FH-RS-O-DUP03-20190430	WBF-FH-RS-TRU-O-20190430	FD	Final-Verified	65.7	<0.019	0.62	0.12	<0.030	<0.62	<0.0098	104 J	<0.079	0.031 J	0.90	<0.027	<0.019	<0.0073	0.053 J	<0.037	0.74	<0.010	0.16 J	<0.012	0.051 J	31.1
			WBF-FH-RS-L-DUP03-20190430	WBF-FH-RS-TRU-L-20190430	FD	Final-Verified	81.3	<0.019	0.59	<0.028	<0.031	<0.65	0.019 J	54.7 J	<0.082	0.15	1.3	<0.028	<0.020	0.029 J	0.12	<0.038	0.92	<0.010	<0.15	0.013 J	0.31	15.9
	TRA	5/21/2019	WBF-FH-RS-TRA-F-20190521		N	Final-Verified	80.9	<0.021	0.11	0.061 J	<0.033	<0.70	0.028 J	442 J	<0.088	<0.019	0.48 J	<0.030	<0.021	0.029 J	<0.036	0.24	0.37	<0.011	0.17 J	<0.013	<0.033	5.9
			WBF-FH-RS-TRA-O-20190521		N	Final-Verified	63.0	<0.019	0.22 J	0.35 J	<0.030	<0.64	<0.010	173 J	<0.081	0.035 J	1.1	<0.027	<0.019	<0.0075	0.039 J	<0.038	1.2	<0.010	0.22 J	<0.012	0.038 J	37.8
			WBF-FH-RS-TRA-L-20190521		N	Final-Verified	80.7	<0.019	0.62	<0.028	<0.030	<0.63	0.23	73.3 J	<0.080	0.24	4.4 J	<0.027	<0.019	0.081 J	0.20	0.058 J	2.1 J	<0.010	<0.15	0.017 J	0.41 J	24.6
		5/15/2019	WBF-FH-RS-F-DUP01-20190515	WBF-FH-RS-TRA-F-20190521	FD	Final-Verified	82.4	<0.019	0.12	<0.028	<0.030	<0.63	<0.0099	148 J	<0.080	<0.017	<0.26	<0.027	<0.019	0.057 J	<0.032	<0.037	0.35	<0.010	<0.14	<0.012	<0.030	5.5
			WBF-FH-RS-O-DUP01-20190515	WBF-FH-RS-TRA-O-20190521	FD	Final-Verified	65.3	<0.021	0.71 J	0.15 J	<0.033	<0.69	<0.011	137 J	<0.087	0.033 J	1.1	<0.030	<0.021	<0.0074	0.041 J	<0.041	0.91	<0.011	0.21 J	<0.013	0.078 J	36.3
			WBF-FH-RS-L-DUP01-20190515	WBF-FH-RS-TRA-L-20190521	FD	Final-Verified	81.3	<0.019	0.74	<0.028	<0.030	<0.64	0.061 J	78.1 J	<0.081	0.20	1.8 J	<0.027	<0.019	0.034 J	0.17	0.048 J	1.2 J	<0.010	<0.15	<0.012	0.69 J	22.0
	TRD	5/21/2019	WBF-FH-RS-TRD-F-20190521		N	Final-Verified	81.4	<0.020	0.062 J	<0.029	<0.031	<0.65	<0.010	211 J	<0.083	<0.018	<0.27	<0.028	<0.020	0.083 J	<0.034	<0.038	0.37	<0.010	<0.15	<0.012	<0.031	6.6
			WBF-FH-RS-TRD-O-20190521		N	Final-Verified	66.8	<0.021	0.14 J	0.23	<0.033	<0.70	<0.011	197 J	<0.088	0.045 J	1.1	<0.030	<0.021	0.0080 J	0.044 J	0.041 J	1.2	<0.011	0.19 J	<0.013	0.053 J	51.5
			WBF-FH-RS-TRD-L-20190521		N	Final-Verified	79.1	<0.020	0.42 J	<0.028	<0.031	<0.65	0.14	87.2 J	<0.082	0.26	3.1	<0.028	<0.020	0.14 J	0.26	0.050 J	1.9	<0.010	<0.15	<0.012	0.24 J	23.5
		5/21/2019	WBF-FH-RS-F-DUP02-20190521	WBF-FH-RS-TRD-F-20190521	FD	Final-Verified	83.8	<0.020	0.14	0.037 J	<0.031	<0.66	<0.010	346 J	0.11 J	<0.018	0.35 J	<0.029	<0.020	0.087 J	<0.034	0.22	0.32	<0.011	0.20 J	<0.012	<0.032	7.8
			WBF-FH-RS-O-DUP02-20190521	WBF-FH-RS-TRD-O-20190521	FD	Final-Verified	70.6	<0.020	0.52 J	0.24	<0.032	<0.67	<0.010	1,990 J	<0.084	0.049 J	0.89 J	<0.029	<0.020	<0.0073	0.049 J	<0.039	1.1	<0.011	1.4 J	<0.012	0.15	62.1
			WBF-FH-RS-L-DUP02-20190521	WBF-FH-RS-TRD-L-20190521	FD	Final-Verified	82.3	<0.019	0.72 J	<0.028	<0.030	<0.64	0.13	82.6 J	<0.081	0.26	2.2	<0.028	<0.020	0.052 J	0.12	0.069 J	1.6	<0.010	<0.15	0.012 J	1.2 J	18.1
Gizzard Shad	TRU	5/14/2019	WBF-FH-SH-TRU-WF-20190514		N	Final-Verified	75.4	<0.021	0.20 J	3.8 J	<0.16	<3.5	<0.054	9,240 J	0.78 J	0.17 J	<1.4	0.25 J	0.17 J	0.020 J	<0.18	0.33 J	0.42 J	<0.056	6.0 J	<0.013	0.33 J	14.9 J
		5/2/2019	WBF-FH-SH-WF-DUP02-20190502	WBF-FH-SH-TRU-WF-20190514	FD	Final-Verified	76.8	<0.020	<0.14	2.5 J	<0.16	<3.3	<0.052	8,820 J	1.0 J	<0.091	1.4 J	0.13 J	<0.10	0.021 J	<0.17	<0.20	0.43 J	<0.053	5.7 J	<0.012	0.23 J	14.8 J
	TRA	5/15/2019	WBF-FH-SH-TRA-WF-20190515		N	Final-Verified	74.9	<0.021	<0.15	1.9	<0.16	<3.5	<0.054	7,760 J	<0.44	<0.095	<1.4	0.047 J	<0.11	0.013 J	<0.18	<0.20	0.31 J	<0.056	3.5 J	<0.013	<0.17	11.3 J
		5/15/2019	WBF-FH-SH-WF-DUP01-20190515	WBF-FH-SH-TRA-WF-20190515	FD	Final-Verified	75.4	<0.021	<0.15	2.2	<0.16	<3.4	<0.054	8,020 J	<0.43	<0.093	<1.4	0.081 J	<0.10	0.014 J	<0.18	<0.20	0.29 J	<0.055	4.2 J	<0.013	<0.16	14.4 J
	TRD	5/15/2019	WBF-FH-SH-TRD-WF-20190515		N	Final-Verified	76.9	<0.021	<0.15	2.4	<0.17	<3.5	<0.055	9,750 J	<0.42	<0.095	<1.4	0.070 J	<0.11	0.014 J	<0.18	<0.20	0.32 J	<0.056	5.3 J	<0.013	<0.17	14.7 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*	Result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level.

1. Sampling Reach ID: TRU=Tennessee River Upstream, TRA=Tennessee River Adjacent, TRD=Tennessee River Downstream.
   Sampling reaches are shown on Exhibits 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.