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

Johnsonville Fossil Plant

New Johnsonville, Tennessee

Tennessee Valley Authority

TVA

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Acronyms and Abbreviations

CARA	Corrective Action and 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
JOF Plant	Johnsonville Fossil Plant
NA	Not Applicable
%	Percent
REH	Reservoir Ecological Health
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
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority

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 Johnsonville Fossil Plant (JOF Plant) in New Johnsonville, Tennessee. This technical appendix provides a detailed evaluation of these data to support information provided in the Environmental Assessment Report (EAR) to fulfill the requirements for the Tennessee Department of Environment and Conservation-issued Commissioner's Order No. OGC15-0177 (TDEC Order) Program (TDEC 2015).

Chapter 2 Surface Stream Investigation

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

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

2.1 Historical Studies

The JOF Plant is located on the eastern bank of the Tennessee River, in the upstream riverine reaches of the Kentucky Reservoir. The next upstream impoundment on the Tennessee River is Pickwick Reservoir. Pickwick Dam is located approximately 107 river miles upstream of the JOF Plant. TDEC's assessment and recent 2020 surface water quality reporting characterizes conditions within the Kentucky Reservoir near the JOF plant as fully supporting intended water uses (TDEC 2020a and 2020b). To date, no adverse surface stream impacts directly resulting from JOF Plant operations have been observed.

From 1990 to present, TVA has conducted surface stream water quality surveys on Kentucky Reservoir in conjunction with the Reservoir Ecological Health (REH) program. The water quality analyses have varied through the years, with samples generally being collected and analyzed for physical (i.e., pH, temperature, dissolved oxygen, depth measurements, etc.) and/or chemical characteristics (i.e. organic nitrogen, ammonia nitrogen, organic carbon, etc.). Results of the water quality surveys were used to document ambient conditions at that time that may have affected aquatic life use related to overall ecological health within Kentucky Reservoir. However, these data were collected at the reservoir transition (Tennessee River Mile [TRM] 85) and forebay (TRM 23), and in the Big Sandy River Embayment located at TRM 67. Due to their distance from the JOF Plant, these locations were not appropriate for 316(a) Assessments.

Surface stream monitoring previously conducted near the JOF Plant was focused on *in situ* general water quality parameters only and did not include laboratory evaluation for potential CCR impacts. Historical surface stream-related water quality studies are summarized below.

Water quality sampling was conducted as part of 316(a)[1] biological monitoring studies, which were performed in autumn of 2010 and in summer and autumn of 2011. Water quality parameters, measured *in situ*, included temperature, conductivity, dissolved oxygen, and pH. Samples were collected along Tennessee River transects upstream and downstream of the JOF Plant cooling water discharge to evaluate fish, benthic macroinvertebrate, and shoreline wildlife communities; shoreline aquatic and river bottom habitats; and thermal plume intensity and extent (TVA 2011).

Temperature profiles from August 2011 indicated the thermal plume extended from the JOF discharge located at TRM 99.0 to TRM 96.0. The thermal plume (defined as the area where water temperatures were 2 degrees Celsius or more

[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.

above ambient) extended to depths up to 5 meters in the immediate vicinity of the JOF Plant's discharge and continued downstream across the width of the river to a depth of approximately 2 meters at TRM 98.8. Elevated temperatures at the surface continued downstream in the midchannel to TRM 96.0. Water quality parameters measured upstream and downstream of the JOF Plant were within acceptable ranges. The studies found that upstream and downstream aquatic communities near the JOF Plant were ecologically similar. As such, TVA concluded that the JOF Plant thermal effluent was not adversely affecting the fish community of Kentucky Reservoir (TVA 2011 and 2012).

2.2 Current and Ongoing Monitoring

Outside of TDEC Order investigation activities, there are no current or ongoing surface water monitoring programs at the JOF Plant.

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 JOF Plant CCR management units[2] 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 collection of surface water samples and measurement of field parameters along sample transects in the Tennessee River proximal to the JOF Plant including the Intake Channel, Boat Harbor and three coves. Each transect was made up of three sampling points, including the descending right bank (RB), center channel or thalweg (CC), and left bank (LB) positions within the channel. Depending on water depth at a station/sampling point, surface, mid-depth, and/or epibenthic (within 0.5 meters of the streambed) samples were collected. The sampling events were conducted in July 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 water sample collection for laboratory analysis and pursuant to the *Surface Stream SAP*, corresponding *in situ* water quality parameters were measured within the Tennessee River, Intake Channel, Boat Harbor and coves using a Hydrolab® multi-parameter sonde. Parameters included temperature, dissolved oxygen, specific conductance, oxidation reduction potential, pH and turbidity, and measurements were performed on a depth gradient. These data were collected to document general existing water quality conditions in the Tennessee River, Intake Channel,

[2] The term "CCR management unit" is used in this document generally and is not intended to be a designation under federal or state regulations.

Boat Harbor and coves, 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 the Tennessee River and associated water bodies near the JOF Plant CCR management units was performed during two monitoring events conducted in July and November 2019, as described in the SAR (Appendix J.2). Samples were collected at representative locations upstream, adjacent, and downstream of the JOF Plant CCR management units, with upstream locations representing control conditions unimpacted by CCR from the Plant. As shown on Exhibits J.1-1 and J.1-2, surface stream samples were collected along eight transects in the Tennessee River, two transects in the Intake Channel, three transects in the Boat Harbor and one transect each in three nearby coves. The table below summarizes the number of samples collected within representative zones upstream of, adjacent to, and downstream of the JOF Plant CCR management units.

Waterbody	Total Number of Samples Collected (2019)		
	Upstream (Control)	Adjacent	Downstream
Tennessee River	29	48	14
Intake Channel	NA	21	NA
Boat Harbor	NA	43	NA
Coves 01, 02, 03	20	NA	NA

Notes: NA – not applicable.
Transects CV01, CV02, and CV03 are control locations for comparison to data collected in the Intake Channel and Boat Harbor.
The Intake Channel and Boat Harbor either receive water or contribute to the Tennessee River in the vicinity of the JOF Plant CCR management units; therefore, reaches representative of downstream conditions were not present and are captured through Tennessee River sampling locations.

During the investigation, 175 primary samples were collected and analyzed: 91 in the Tennessee River, 21 in the Intake Channel, 43 in the Boat Harbor and 20 in the coves. Including duplicates, a total of 187 samples were collected within the study area; duplicate results were not evaluated in the statistical analysis (Appendix E.5).

Based on the phased approach proposed in the *Surface Stream SAP*, additional Phase 2 surface stream sampling would have been required if over 20 percent (%) ash was observed in corresponding sediment samples. As described in Appendix J.3, none of the polarized light microscopy results for the sediment samples were above this threshold in the sampled transects and 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). The human health screening levels were only applied to surface stream sampling results for the Tennessee River, as it is used as a potable water source near the JOF Plant. The Intake Channel, Boat Harbor and the Coves were not evaluated under these human health screening levels, as they are not used as potable water sources.

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

Statistical evaluation of the EI surface stream data for the JOF 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 the CCR Parameter concentrations in the Tennessee River, Intake Channel, Boat Harbor and coves were below the EAR screening levels (chronic ESVs, acute ESVs, and screening levels based on protection of human health; Table 1-2 and Appendix A.2). A summary of the surface stream analytical results compared to the surface stream ESVs for the 2019 sampling events is presented in Tables J.1-1 and J.1-2 for the Tennessee River and the Intake Channel, Boat Harbor and coves, respectively. As noted above, human health screening levels based on consumption of surface water as potable water were only applied to the Tennessee River samples.

These exploratory analyses indicate that the EI identified no surface stream water quality impacts from JOF Plant operations or related to CCR management units.

2.5 Summary

The exploratory data analysis found that CCR Parameter concentrations were consistently below EAR human health screening levels and acute and chronic ESVs in the Tennessee River and associated coves, the Intake Channel and the Boat Harbor. The predominance of surface stream sampling results below the EAR screening levels in these water bodies demonstrates that potential impacts from CCR materials associated with JOF Plant CCR management units are unlikely and do not appear to be affecting water quality or associated biological communities within these systems (see Appendices J.3 and J.5). These surface stream water quality results are further evaluated in the context of other environmental data in the EAR and will be included in risk assessments as part of the CARA Plan.

Chapter 3 References

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TABLES

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR01-CC						STR-TR01-LB	
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19	30-Jul-19	19-Nov-19
Sample ID					JOF-STR-TR01-CC-SUR-20190730	JOF-STR-TR01-CC-MID-20190730	JOF-STR-TR01-CC-BOT-20190730	JOF-STR-TR01-CC-SUR-20191119	JOF-STR-TR01-CC-MID-20191119	JOF-STR-TR01-CC-BOT-20191119	JOF-STR-TR01-LB-SUR-20190730	JOF-STR-TR01-LB-MID-20191119
Parent Sample ID												
Sample Depth					0.5 ft	8 ft	16.1 ft	0.5 ft	7.2 ft	13.9 ft	0.5 ft	0.8 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 = 60 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	0.879 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.889 J	1.07	0.970 J	0.766 J	0.743 J	0.910 J	1.01	0.697 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.3	25.2	25.7	24.8	25.4	25.6	25.8	25.2
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	0.350 J	<0.182	<0.182	<0.182	0.292 U*	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	41.1 U*	<38.6	<38.6	<38.6	47.7 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	<0.125	<0.125	0.171 U*	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	18,100	18,300	18,400	21,900	21,800	22,000	18,600	21,600
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	4.59 U*	2.29 U*	2.00 U*	1.68 J	1.59 J	1.65 J	42.2	1.82 J
Cobalt	ug/L	6[A]	19[B]	120[C]	0.150 J	0.196 J	0.217 J	0.168 J	0.177 J	0.222 U*	0.680	0.191 U*
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	3.09	0.919 J	0.917 J	0.875 J	0.905 J	1.03 J	2.12	1.25 J
Iron	ug/L	n/v	n/v	n/v	186	214	266	217	239	263	502	254
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.284 J	0.247 J	0.251 J	0.180 J	0.206 J	0.315 U*	0.312 J	0.258 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<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	4,140	4,190	4,100	4,970	4,940	4,900	4,200	4,800
Manganese	ug/L	n/v	n/v	n/v	35.6	40.8	49.6	26.6 U*	30.7 U*	29.9 U*	69.1	30.1 U*
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	0.114 J	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	0.753 J	<0.610	<0.610	<0.610	<0.610	<0.610	4.96 J	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	2.11	0.621 U*	0.688 U*	<0.336	0.356 U*	0.470 U*	22.6	0.412 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	1.57[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	0.225 U*	<0.148	<0.148	<0.148	0.330 U*	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.05 U*	2.44 U*	2.14 U*	1.92	2.03	2.19	2.72 U*	1.92
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	5.11 U*	4.19 U*	4.30 U*	18.3 U*	16.8 U*	4.60 U*	6.80 U*	5.16 U*
Dissolved Metals												
Antimony	ug/L	6[A]	n/v	n/v	0.553 J	0.577 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	1.09 J	0.993 J	0.831 J	0.667 J	0.652 J	0.682 J	0.922 J	0.696 J
Barium	ug/L	2,000[A]	n/v	n/v	22.4 J	22.2 J	22.9 J	24.0	23.7	23.5	23.6 J	23.6
Beryllium	ug/L	4[A]	n/v	n/v	0.355 J	0.244 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
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]	0.489[D]	1.12[E]	0.125 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	17,600	17,300	18,000	22,300	21,900	21,600	18,500	22,100
Chromium	ug/L	100[A]	48.8[D]	375[E]	3.69 U*	1.97 U*	2.33 U*	<1.53	<1.53	<1.53	1.61 U*	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	0.155 J	0.0860 J	<0.0750	<0.0750	0.0860 J	0.0960 U*	<0.0750	0.101 U*
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.799 J	1.32 J	0.840 J	0.720 J	0.706 J	0.749 J	1.06 J	0.712 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	106	20.6 J	<19.5	35.0 J
Lead	ug/L	5[A]	1.44[D]	36.9[E]	0.150 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	3,950	3,950	4,040	5,000	4,820	4,820	4,120	4,860
Manganese	ug/L	n/v	n/v	n/v	2.43 J	<1.35	2.57 J	8.01 U*	8.18 U*	8.43 U*	25.5	11.3 U*
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	0.766 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.8[D]	304[E]	1.57 J	0.478 J	0.686 J	<0.336	<0.336	<0.336	0.426 J	<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	1.34[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	0.236 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.86 U*	2.02 U*	1.78 U*	1.63	1.79	1.62	1.89 U*	1.57
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	3.51 U*	<3.22	4.49 U*	<3.22	<3.22	3.89 U*	4.35 U*	<3.22
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	-0.0183 +/-(0.0742)UJ	-0.0575 +/-(0.0615)UJ	0.0255 +/-(0.0706)UJ	-0.0672 +/-(0.0530)U	0.0260 +/-(0.0597)U	0.00475 +/-(0.0663)U	0.00422 +/-(0.0585)UJ	0.0624 +/-(0.0769)U
Radium-228	pCi/L	n/v	n/v	n/v	0.161 +/-(0.268)U	-0.123 +/-(0.236)U	0.315 +/-(0.250)U	0.0734 +/-(0.244)U	0.0303 +/-(0.255)U	0.214 +/-(0.217)U	0.445 +/-(0.292)U	0.264 +/-(0.246)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.161 +/-(0.278)UJ	0.000 +/-(0.244)UJ	0.341 +/-(0.260)UJ	0.0734 +/-(0.250)U	0.0562 +/-(0.262)U	0.219 +/-(0.227)U	0.449 +/-(0.298)UJ	0.326 +/-(0.258)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	3.93	3.93	3.90	6.88	6.68	6.92	3.81	7.17
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0600 J	0.0559 J	0.0618 J	0.0721 J	0.0774 J	0.0725 J	0.0651 J	0.0785 J
Sulfate	mg/L	250[A]	n/v	n/v	5.81	5.73	5.71	10.3	10.3	10.6	5.79	11.2
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	62.3	62.9	62.8	76.2	74.8	75.0	63.9	73.8
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	84.0	75.0	88.0	95.0	94.0	114	61.0	102
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.80	6.10	8.40	4.00	4.10	4.20	10.8	5.40

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR01-RB		STR-TR02-CC					
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	19-Nov-19	30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19
Sample ID					JOF-STR-TR01-RB-SUR-20190730	JOF-STR-TR01-RB-SUR-20191119	JOF-STR-TR02-CC-SUR-20190730	JOF-STR-TR02-CC-MID-20190730	JOF-STR-TR02-CC-BOT-20190730	JOF-STR-TR02-CC-SUR-20191119	JOF-STR-TR02-CC-MID-20191119	JOF-STR-TR02-CC-BOT-20191119
Parent Sample ID												
Sample Depth					0.5 ft	0.5 ft	0.5 ft	8 ft	16 ft	0.5 ft	7.7 ft	14.9 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 = 60 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	0.609 J	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.960 J	0.740 J	0.839 J	1.14	0.888 J	0.743 J	0.737 J	0.750 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	28.0	24.9	22.8	25.2	23.8	25.0	25.4	25.5
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	0.350 J	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	50.6 U*	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	0.138 J	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	18,300	22,100	17,300	17,600	17,500	22,300	21,800	21,600
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	2.18 U*	1.59 J	<1.53	4.94 U*	4.26 U*	<1.53	1.70 J	1.63 J
Cobalt	ug/L	6[A]	19[B]	120[C]	0.223 J	0.166 J	0.113 J	0.302 J	0.234 J	0.135 J	0.166 J	0.171 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.60 J	0.983 J	1.04 U*	4.80	0.933 U*	0.815 J	0.863 J	0.895 J
Iron	ug/L	n/v	n/v	n/v	298	197	140	279	273	165	222	248
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.271 J	0.181 J	<0.128	1.30	0.233 J	0.187 J	0.202 J	0.244 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,030	4,940	4,030	4,090	4,080	5,050	4,940	4,840
Manganese	ug/L	n/v	n/v	n/v	55.0	25.5 U*	33.3	44.9	47.2	26.6 U*	29.2 U*	31.3 U*
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	0.772 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	0.874 U*	0.371 U*	0.389 U*	2.40	1.86 U*	<0.336	0.377 U*	0.376 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	1.57[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	0.308 U*	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.29 U*	1.88	1.80 U*	2.15 U*	1.82 U*	1.80	1.97	2.15
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	5.00 U*	3.56 U*	4.14 U*	7.03 U*	7.25 U*	8.62 U*	3.87 U*	3.77 U*
Dissolved Metals												
Antimony	ug/L	6[A]	n/v	n/v	0.582 J	<0.378	0.446 J	0.383 J	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	1.01 J	0.651 J	0.949 J	0.906 J	0.803 J	0.648 J	0.628 J	0.677 J
Barium	ug/L	2,000[A]	n/v	n/v	22.7 J	23.8	21.8	20.7	21.5	23.9	24.0	23.5
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	0.294 J	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	44.3 J	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	<0.125	<0.125	0.148 J	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	18,200	21,800	17,100	17,000	17,500	22,200	22,000	21,800
Chromium	ug/L	100[A]	48.8[D]	375[E]	2.42 U*	<1.53	3.36 U*	4.89 U*	5.65 U*	1.65 J	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	0.0810 J	0.171 J	0.129 J	0.119 J	<0.0750	0.0850 J	0.0790 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.817 J	0.730 J	1.22 U*	0.712 U*	0.806 U*	0.678 J	0.710 J	0.698 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	22.8 J	25.7 J	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[E]	<0.128	<0.128	0.130 J	<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	4,020	4,930	4,020	3,980	4,100	5,000	4,960	4,910
Manganese	ug/L	n/v	n/v	n/v	13.1	8.32 U*	3.12 J	1.47 J	1.67 J	8.01 U*	7.89 U*	7.83 U*
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	0.721 J	0.828 J	0.962 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.8[D]	304[E]	0.508 J	<0.336	1.65 J	2.40	3.10 J	<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	1.34[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	0.299 J	0.159 J	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	2.37 U*	1.66	1.71 U*	1.70 U*	1.47 U*	1.74	1.54	1.74
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	4.94 U*	<3.22	4.38 U*	4.55 U*	4.91 U*	<3.22	<3.22	<3.22
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	-0.0191 +/-(0.0637)UJ	0.0472 +/-(0.0569)U	-0.0426 +/-(0.107)U	-0.0180 +/-(0.105)U	-0.00579 +/-(0.0912)U	-0.00382 +/-(0.0622)U	0.0328 +/-(0.0817)U	0.000 +/-(0.0516)U
Radium-228	pCi/L	n/v	n/v	n/v	0.302 +/-(0.274)U	0.144 +/-(0.212)U	0.560 +/-(0.281)U*	0.0519 +/-(0.231)U	0.273 +/-(0.233)U	0.238 +/-(0.234)U	0.248 +/-(0.234)U	0.0686 +/-(0.239)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.302 +/-(0.281)UJ	0.191 +/-(0.220)U	0.560 +/-(0.301)U*	0.0519 +/-(0.254)U	0.273 +/-(0.250)U	0.238 +/-(0.242)U	0.281 +/-(0.248)U	0.0686 +/-(0.245)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	3.89	6.64	3.89	3.88	3.89	6.92	6.72	6.72
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0575 J	0.0724 J	0.0586 J	0.0620 J	0.0607 J	0.0771 J	0.0752 J	0.0730 J
Sulfate	mg/L	250[A]	n/v	n/v	5.68	10.1	5.65	5.66	5.67	10.7	10.3	10.1
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	62.3	75.4	59.8	60.8	60.6	76.6	74.7	73.9
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	81.0	81.0	78.0	92.0	93.0	106	100	91.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	9.10	4.20	5.20	7.50	7.80	4.00	4.70	4.70

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR02-LB			STR-TR02-RB	
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	19-Nov-19	30-Jul-19	19-Nov-19
Sample ID					JOF-STR-TR02-LB-MID-20190730	JOF-STR-DUP04-20190730	JOF-STR-TR02-LB-MID-20191119	JOF-STR-TR02-RB-SUR-20190730	JOF-STR-TR02-RB-MID-20191119
Parent Sample ID						JOF-STR-TR02-LB-MID-20190730			
Sample Depth					0.8 ft	0.8 ft	0.9 ft	0.5 ft	0.7 ft
Sample Type					Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		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
Arsenic	ug/L	10[A]	150[B]	340[C]	0.970 J	1.06	0.683 J	0.851 J	0.728 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	25.6	25.6	24.6	23.7	24.2
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	0.284 J	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	18,300	18,500	21,700	17,500	21,800
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	2.55 U*	3.99 U*	<1.53	2.13 U*	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.237 J	0.262 J	0.162 J	0.187 J	0.165 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.36 U*	1.26 J	0.856 J	0.725 U*	0.841 J
Iron	ug/L	n/v	n/v	n/v	232 J	283 J	194	236	204
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.243 J	0.313 J	0.221 J	0.190 J	0.183 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,310	4,070	4,860	4,040	4,890
Manganese	ug/L	n/v	n/v	n/v	48.2	47.4	31.3 U*	51.3	25.6 U*
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	0.154 J	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	0.745 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	1.09 U*	2.01	<0.336	0.820 U*	0.361 U*
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	0.160 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.08 U*	2.24 U*	1.90	1.86 U*	1.82
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	4.54 U*	4.93 U*	5.16 U*	4.84 U*	3.95 U*
Dissolved Metals									
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.857 J	0.876 J	0.673 J	0.852 J	0.620 J
Barium	ug/L	2,000[A]	n/v	n/v	26.2	22.3 J	23.0	21.7	23.8
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	17,600	18,100	21,600	17,500	22,000
Chromium	ug/L	100[A]	48.8[D]	375[E]	<1.53	3.29 U*	<1.53	2.06 U*	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	0.0750 J	0.0790 J	0.0810 J	<0.0750	0.0790 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.762 U*	0.903 J	0.915 J	0.753 U*	0.737 J
Iron	ug/L	n/v	n/v	n/v	<19.5	21.3 J	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[E]	<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
Magnesium	ug/L	n/v	n/v	n/v	4,140	4,010	4,860	3,980	4,860
Manganese	ug/L	n/v	n/v	n/v	11.3	11.6	9.08 U*	4.07 J	8.35 U*
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	0.669 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.8[D]	304[E]	0.389 J	1.42 J	<0.336	0.653 J	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<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
Vanadium	ug/L	86[A]	n/v	n/v	1.64 U*	1.70 U*	1.58	1.90 U*	1.51
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	8.60 U*	3.71 U*	3.25 U*	4.04 U*	3.35 U*
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	n/v	0.126 +/-(0.127)U	-0.0278 +/-(0.0699)UJ	0.00475 +/-(0.0796)U	0.0212 +/-(0.102)U	-0.0394 +/-(0.0525)U
Radium-228	pCi/L	n/v	n/v	n/v	-0.116 +/-(0.195)U	0.332 +/-(0.268)U	0.467 +/-(0.249)J	0.240 +/-(0.229)U	0.0386 +/-(0.229)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.126 +/-(0.233)U	0.332 +/-(0.277)UJ	0.471 +/-(0.261)J	0.262 +/-(0.251)U	0.0386 +/-(0.235)U
Anions									
Chloride	mg/L	250[A]	230[B]	860[C]	3.89	3.99	6.91	3.83	6.63
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0566 J	0.0567 J	0.0817 J	0.0587 J	0.0708 J
Sulfate	mg/L	250[A]	n/v	n/v	5.71	5.68	10.8	5.66	10.1
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	63.5	62.9	74.3	60.4	74.6
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	91.0 J	63.0 J	116	65.0	68.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	7.90	8.10	5.80	8.40	4.00

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR03-CC					
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19
Sample ID					JOF-STR-TR03-CC-SUR-20190730	JOF-STR-TR03-CC-MID-20190730	JOF-STR-TR03-CC-BOT-20190730	JOF-STR-TR03-CC-SUR-20191119	JOF-STR-TR03-CC-MID-20191119	JOF-STR-TR03-CC-BOT-20191119
Parent Sample ID										
Sample Depth					0.5 ft	8 ft	16.2 ft	0.5 ft	8 ft	15.5 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute						
Total Metals										
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.935 J	0.984 J	1.07	0.834 U*	0.740 U*	0.812 U*
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.2	24.5	25.0	26.8	26.6	27.8
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	0.137 J	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	18,000	17,700	18,000	22,100	21,900	22,700
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	2.35 U*	1.69 U*	<1.53	2.02 U*	1.76 U*	2.03 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.166 J	0.220 J	0.282 J	0.181 U*	0.170 U*	0.189 U*
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	0.959 J	0.805 J	1.34 U*	0.970 U*	0.936 U*	0.991 U*
Iron	ug/L	n/v	n/v	n/v	224	286	260	185	211	242
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.180 J	0.232 J	0.317 J	0.180 U*	0.175 U*	0.187 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,180	4,120	4,170	5,110	5,050	5,220
Manganese	ug/L	n/v	n/v	n/v	40.6	44.8	47.3	24.9	28.0	30.2
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	0.574 U*	0.608 U*	0.634 U*	0.411 J	0.390 J	0.438 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<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	0.281 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.50 U*	2.14 U*	2.02 U*	2.68 U*	2.56 U*	2.63 U*
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	<3.22	3.58 U*	5.30 U*	3.41 U*	3.96 U*	4.18 U*
Dissolved Metals										
Antimony	ug/L	6[A]	n/v	n/v	0.504 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	1.11	0.938 J	0.890 J	0.750 J	0.641 J	0.694 J
Barium	ug/L	2,000[A]	n/v	n/v	32.0	22.4	22.7	24.9	24.0	25.9
Beryllium	ug/L	4[A]	n/v	n/v	0.329 J	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	51.1 U*	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	0.158 J	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	17,800	18,100	18,300	21,800	20,900	22,100
Chromium	ug/L	100[A]	48.8[D]	375[E]	1.73 U*	<1.53	2.81 U*	1.95 J	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	0.202 J	0.103 J	0.0880 J	0.0860 J	<0.0750	<0.0750
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.846 J	0.639 J	0.771 U*	0.827 J	0.743 J	0.758 J
Iron	ug/L	n/v	n/v	n/v	35.7 J	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[E]	0.187 J	<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
Magnesium	ug/L	n/v	n/v	n/v	4,110	4,140	4,190	5,010	4,790	5,060
Manganese	ug/L	n/v	n/v	n/v	6.00	<1.35	<1.35	7.74	7.40	7.79
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.8[D]	304[E]	0.471 J	0.507 J	1.16	<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
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	0.347 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.96 U*	1.50 U*	1.45 U*	2.50	1.99	1.98
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	<3.22	<3.22	4.37 U*	3.41 J	3.47 J	<3.22
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	n/v	-0.0875 +/-(0.114)U	-0.0920 +/-(0.127)U	0.116 +/-(0.130)U	-0.0835 +/-(0.0567)U	0.0552 +/-(0.0812)U	0.0626 +/-(0.0771)U
Radium-228	pCi/L	n/v	n/v	n/v	0.492 +/-(0.282)U*	0.359 +/-(0.254)U	0.389 +/-(0.229)U*	0.0601 +/-(0.268)U	0.137 +/-(0.247)U	0.280 +/-(0.240)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.492 +/-(0.304)U*	0.359 +/-(0.284)U	0.504 +/-(0.263)U*	0.0601 +/-(0.274)U	0.192 +/-(0.260)U	0.343 +/-(0.252)U
Anions										
Chloride	mg/L	250[A]	230[B]	860[C]	3.86	3.82	3.85	5.50	5.52	5.45
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0606 J	0.0567 J	0.0573 J	0.0662 J	0.0678 J	0.0687 J
Sulfate	mg/L	250[A]	n/v	n/v	5.69	5.49	5.63	8.83	8.83	8.67
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	62.1	61.3	62.1	76.3	75.5	78.2
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	71.0	89.0	61.0	91.0	100	110
Total Suspended Solids	mg/L	n/v	n/v	n/v	5.00	6.70	7.70	3.80	4.50	4.90

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR03-LB				STR-TR03-RB				
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19	30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19
Sample ID					JOF-STR-TR03-LB-SUR-20190730	JOF-STR-TR03-LB-BOT-20191119	JOF-STR-TR03-LB-SUR-20191119	JOF-STR-DUP01-20191119	JOF-STR-TR03-RB-SUR-20190730	JOF-STR-TR03-RB-MID-20190730	JOF-STR-TR03-RB-BOT-20190730	JOF-STR-TR03-RB-SUR-20191119	JOF-STR-TR03-RB-BOT-20191119
Parent Sample ID								JOF-STR-TR03-LB-SUR-20191119					
Sample Depth					0.5 ft	1.9 ft	0.5 ft	0.5 ft	0.5 ft	2.5 ft	4.5 ft	0.5 ft	2 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.961 J	0.698 U*	0.776 U*	0.900 U*	0.936 J	0.888 J	1.01	0.867 U*	0.797 U*
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.9	26.6	26.1	27.9	23.4	23.9	25.4	30.0	29.3
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	0.155 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	17,900	21,400	21,000	21,900	18,500	18,200	18,200	22,800	21,700
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	1.77 U*	1.62 U*	1.88 U*	2.04 U*	<1.53	2.92 U*	2.58 U*	2.28 U*	1.83 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.193 J	0.223 U*	0.208 U*	0.205 U*	0.170 J	0.210 J	0.285 J	0.474 J	0.491 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.11 J	1.54 U*	0.934 U*	0.917 U*	0.941 U*	0.882 U*	0.952 U*	1.19 U*	1.18 U*
Iron	ug/L	n/v	n/v	n/v	275	257	229	254	133	264	427	619	593
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.275 J	0.216 U*	0.211 U*	0.224 U*	0.138 J	0.226 J	0.301 J	0.411 U*	0.437 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,120	4,950	4,790	5,050	4,200	4,070	4,100	5,150	4,970
Manganese	ug/L	n/v	n/v	n/v	57.2	34.1	27.4	29.7	66.0	91.7	108	89.7	93.5
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	<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]	33.9[B]	305[C]	1.06 U*	0.419 J	0.445 J	0.513 J	0.547 U*	1.31 U*	1.10 U*	0.691 J	0.689 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.31 U*	2.30 U*	2.55 U*	2.05 U*	1.82 U*	1.84 U*	2.25 U*	3.13 U*	2.64 U*
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	9.39 U*	3.88 U*	4.02 U*	4.19 U*	4.98 U*	4.50 U*	5.16 U*	4.69 U*	4.32 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.828 J	0.669 J	0.891 J	0.770 J	0.951 J	0.903 J	0.821 J	0.634 J	0.697 J
Barium	ug/L	2,000[A]	n/v	n/v	22.6	25.3	24.3	25.7	20.6	21.1	21.8	24.4	25.0
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	0.220 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	51.3 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	<0.125	<0.125	0.211 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	17,900	22,100	21,200	21,700	18,000	18,100	17,800	21,700	22,200
Chromium	ug/L	100[A]	48.8[D]	375[E]	<1.53	1.69 J	2.12	<1.53	2.83 U*	2.01 U*	<1.53	<1.53	1.71 J
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	0.0750 J	0.248 J	0.0840 J	<0.0750	<0.0750	<0.0750	0.0890 J	0.0880 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	<0.627	0.798 J	1.03 J	0.728 J	0.630 U*	0.677 U*	0.713 U*	0.759 J	0.748 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	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[E]	0.143 J	<0.128	0.208 J	<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	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,080	5,060	4,810	4,960	4,100	4,060	3,960	4,880	5,040
Manganese	ug/L	n/v	n/v	n/v	16.9	8.40	8.75	8.90	<1.35	10.3	16.7	14.9	14.6
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]	33.8[D]	304[E]	<0.336	<0.336	0.420 J	<0.336	0.653 J	0.518 J	<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	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	0.317 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.70 U*	2.12	2.46	1.67	2.01 U*	1.80 U*	1.58 U*	1.97	2.22
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	4.86 U*	3.40 J	<3.22	3.30 J	3.81 U*	3.76 U*	3.98 U*	<3.22	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	-0.143 +/-(0.0850)U	-0.0157 +/-(0.0632)U	-0.0235 +/-(0.0685)U	-0.0179 +/-(0.0548)U	-0.102 +/-(0.110)U	-0.0361 +/-(0.102)U	-0.0854 +/-(0.0905)U	0.0581 +/-(0.0742)U	0.0129 +/-(0.0828)U
Radium-228	pCi/L	n/v	n/v	n/v	0.419 +/-(0.235)	0.193 +/-(0.282)U	0.103 +/-(0.268)U	0.0476 +/-(0.221)U	0.235 +/-(0.262)U	0.175 +/-(0.247)U	0.620 +/-(0.314)U*	0.119 +/-(0.241)U	0.259 +/-(0.270)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.419 +/-(0.250)J	0.193 +/-(0.289)U	0.103 +/-(0.277)U	0.0476 +/-(0.228)U	0.235 +/-(0.284)U	0.175 +/-(0.267)U	0.620 +/-(0.327)U*	0.178 +/-(0.252)U	0.272 +/-(0.282)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	3.84	5.50	5.47	5.88	4.40	4.34	4.10	6.30	6.20
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0583 J	0.0655 J	0.0674 J	0.0624 J	0.0586 J	0.0621 J	0.0622 J	0.0664 J	0.0675 J
Sulfate	mg/L	250[A]	n/v	n/v	5.67	8.88	8.90	8.58	5.89	5.99	5.97	9.09	8.88
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	61.5	73.9	72.2	75.3	63.4	62.2	62.3	78.1	74.8
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	72.0	107	112	115	72.0	61.0	86.0	104	99.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	8.00	6.30	5.10	5.40	5.00	10.4	12.2	15.0	15.9

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR04-CC						STR-TR04-LB		
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19	30-Jul-19	30-Jul-19	19-Nov-19
Sample ID					JOF-STR-TR04-CC-SUR-20190730	JOF-STR-TR04-CC-MID-20190730	JOF-STR-TR04-CC-BOT-20190730	JOF-STR-TR04-CC-SUR-20191119	JOF-STR-TR04-CC-MID-20191119	JOF-STR-TR04-CC-BOT-20191119	JOF-STR-TR04-LB-SUR-20190730	JOF-STR-DUP02-20190730	JOF-STR-TR04-LB-SUR-20191119
Parent Sample ID												JOF-STR-TR04-LB-SUR-20190730	
Sample Depth					0.5 ft	7 ft	13.7 ft	0.5 ft	7 ft	13 ft	0.5 ft	0.5 ft	0.3 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.943 J	0.968 J	1.12	0.748 U*	0.883 U*	0.919 U*	0.921 J	0.844 J	0.726 U*
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.1	28.2	25.3	26.8	27.4	27.2	25.0	25.3	26.7
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	0.264 J	0.199 J	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	<38.6	47.4 U*	43.7 J	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	<0.125	0.166 U*	0.149 U*	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	17,500	17,700	17,300	22,400	22,100	22,100	17,800	18,200	21,600
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	2.38 U*	2.45 U*	4.25 U*	1.62 U*	1.81 U*	1.82 U*	1.85 U*	2.86 U*	1.60 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.160 J	0.181 J	0.194 J	0.159 U*	0.248 U*	0.262 U*	0.193 J	0.220 J	0.192 U*
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.06 J	0.933 J	1.04 J	1.00 U*	1.17 U*	1.09 U*	0.946 J	0.915 U*	0.943 U*
Iron	ug/L	n/v	n/v	n/v	219	259	319	191	220	270	279	313	212
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.184 J	0.196 J	0.241 J	0.158 U*	0.267 U*	0.287 U*	0.211 J	0.238 J	0.194 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	3.89 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,070	4,150	4,050	5,130	4,980	5,040	4,140	4,160	4,970
Manganese	ug/L	n/v	n/v	n/v	37.7	42.4	47.2	27.9	27.5	32.9	46.5	49.1	27.2
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]	33.9[B]	305[C]	0.533 U*	0.563 U*	0.632 U*	0.397 J	0.501 J	0.517 J	0.549 U*	1.41 U*	0.442 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	<0.148	<0.148	<0.148	0.254 U*	0.244 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.51 U*	2.62 U*	3.68 U*	2.20 U*	2.43 U*	2.65 U*	2.20 U*	1.78 U*	2.33 U*
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	<3.22	3.22 U*	3.89 U*	3.35 U*	3.74 U*	5.16 U*	<3.22	4.92 U*	4.17 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.833 J	0.834 J	0.942 J	0.816 J	0.715 J	0.707 J	0.840 J	0.834 J	0.736 J
Barium	ug/L	2,000[A]	n/v	n/v	22.5	22.0	21.8	27.0	25.2	25.1	21.4	23.0	26.0
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	0.193 J	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<38.6	45.1 U*	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[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	17,700	17,700	17,900	22,500	22,200	21,900	17,500	18,200	22,400
Chromium	ug/L	100[A]	48.8[D]	375[E]	<1.53	1.93 U*	2.47 U*	<1.53	<1.53	1.71 J	1.85 U*	<1.53	1.74 J
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	<0.0750	0.111 J	0.101 J	0.0940 J	<0.0750	<0.0750	0.0970 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.721 J	0.953 J	<0.627	0.940 J	0.851 J	0.807 J	0.663 J	0.832 U*	0.846 J
Iron	ug/L	n/v	n/v	n/v	74.0	<19.5	<19.5	<19.5	32.6 J	28.9 J	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[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	<3.39	<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	4,100	4,080	4,140	5,040	5,030	4,930	4,060	4,180	5,150
Manganese	ug/L	n/v	n/v	n/v	<1.35	<1.35	<1.35	7.98	7.86	8.68	6.39	6.71	8.25
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]	33.8[D]	304[E]	0.363 J	0.369 J	<0.336	<0.336	<0.336	<0.336	<0.336	0.539 J	<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	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	<0.148	0.209 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.78 U*	2.06 U*	2.41 U*	1.99	1.65	2.19	1.94 U*	1.67 U*	2.37
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	3.60 U*	<3.22	<3.22	4.05 J	<3.22	3.49 J	<3.22	4.52 U*	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	-0.0806 +/-(0.0854)U	-0.0207 +/-(0.0876)U	-0.115 +/-(0.0810)U	-0.0945 +/-(0.0647)U	-0.0364 +/-(0.0713)U	-0.0426 +/-(0.0783)U	0.0237 +/-(0.102)U	0.0331 +/-(0.124)U	-0.00618 +/-(0.0586)U
Radium-228	pCi/L	n/v	n/v	n/v	0.220 +/-(0.212)U	0.151 +/-(0.225)U	0.277 +/-(0.198)U	-0.113 +/-(0.222)U	0.0586 +/-(0.205)U	0.00426 +/-(0.220)U	0.225 +/-(0.216)U	0.123 +/-(0.232)U	-0.324 +/-(0.215)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.220 +/-(0.229)U	0.151 +/-(0.241)U	0.277 +/-(0.214)U	0.000 +/-(0.231)U	0.0586 +/-(0.217)U	0.00426 +/-(0.234)U	0.248 +/-(0.239)U	0.157 +/-(0.263)U	0.000 +/-(0.223)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	3.81	3.82	3.82	5.48	5.49	5.51	3.91	3.99	5.41
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0578 J	0.0578 J	0.0563 J	0.0699 J	0.0707 J	0.0649 J	0.0569 J	0.0615 J	0.0662 J
Sulfate	mg/L	250[A]	n/v	n/v	5.62	5.68	5.64	8.90	8.96	8.91	5.80	5.96	8.72
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	60.5	61.4	59.8	77.0	75.7	76.0	61.5	62.6	74.3
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	83.0	84.0	80.0	117	113	114	65.0 J	83.0 J	116
Total Suspended Solids	mg/L	n/v	n/v	n/v	5.80	6.70	8.10	3.90	4.20	5.30	8.20	8.10	4.80

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR04-RB		STR-TR05-CC					
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	19-Nov-19	30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19
Sample ID					JOF-STR-TR04-RB-SUR-20190730	JOF-STR-TR04-RB-SUR-20191119	JOF-STR-TR05-CC-SUR-20190730	JOF-STR-TR05-CC-MID-20190730	JOF-STR-TR05-CC-BOT-20190730	JOF-STR-TR05-CC-SUR-20191119	JOF-STR-TR05-CC-MID-20191119	JOF-STR-TR05-CC-BOT-20191119
Parent Sample ID												
Sample Depth					0.5 ft	0.4 ft	0.5 ft	9 ft	17.5 ft	0.5 ft	9 ft	17.5 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 = 60 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]	1.09	0.828 U*	1.16	1.36	1.25	0.688 J	0.692 J	0.673 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	28.0	26.5	23.0	23.8	25.0	25.2	24.9	25.0
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	39.4 U*	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[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	18,500	22,200	16,700	17,000	16,400	21,100	21,300	22,000
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	<1.53	2.12 U*	2.86 U*	3.51 U*	3.64 U*	<1.53	<1.53	1.70 J
Cobalt	ug/L	6[A]	19[B]	120[C]	0.184 J	0.198 U*	0.191 J	0.253 J	0.344 J	0.176 J	0.160 J	0.146 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.15 J	1.29 U*	1.01 J	2.43	1.19 J	0.913 J	0.825 J	0.856 J
Iron	ug/L	n/v	n/v	n/v	207	185	195	257	374	290	231	240
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.191 J	0.201 U*	0.159 J	0.249 J	0.300 J	0.225 J	0.177 J	0.183 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,150	5,020	3,910	3,970	3,830	4,800	4,820	4,910
Manganese	ug/L	n/v	n/v	n/v	85.7	27.3	34.5	43.9	62.8	35.7 U*	29.0 U*	30.0 U*
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]	33.9[B]	305[C]	0.651 U*	0.481 J	0.385 U*	0.549 U*	0.608 U*	0.388 U*	0.362 U*	<0.336
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	1.57[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	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.89 U*	2.41 U*	2.95 U*	3.39 U*	3.66 U*	1.86	1.82	1.92
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	3.78 U*	3.93 U*	4.99 U*	6.30 U*	12.6 U*	4.07 U*	3.83 U*	3.32 U*
Dissolved Metals												
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	1.10	0.671 J	1.23	1.16	1.12	0.618 J	0.589 J	0.604 J
Barium	ug/L	2,000[A]	n/v	n/v	25.5	25.2	21.3	21.9	21.9	23.9	23.2	23.2
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	44.8 U*	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[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	18,000	22,200	16,800	17,100	16,800	22,200	21,700	21,500
Chromium	ug/L	100[A]	48.8[D]	375[E]	2.33 U*	1.74 J	3.29 U*	2.91 U*	3.05 U*	1.54 J	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	0.0780 J	0.0790 J	0.0960 J	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.865 J	0.983 J	0.884 J	0.826 J	0.849 J	0.738 J	0.660 J	0.784 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	32.3 J	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[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	4.32 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,140	5,050	3,940	3,950	3,880	4,960	4,850	4,840
Manganese	ug/L	n/v	n/v	n/v	4.29 J	10.5	2.16 J	<1.35	11.1	8.09 U*	7.70 U*	7.91 U*
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]	33.8[D]	304[E]	0.400 J	<0.336	<0.336	<0.336	0.354 J	<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	1.34[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	2.32 U*	2.17	3.06 U*	2.76 U*	2.99 U*	1.68	1.68	1.71
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	<3.22	3.31 J	3.76 U*	4.83 U*	3.89 U*	3.23 U*	3.37 U*	<3.22
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	-0.0648 +/-(0.0929)U	0.0374 +/-(0.0791)U	-0.0936 +/-(0.0830)U	0.105 +/-(0.118)U	-0.0126 +/-(0.0930)U	-0.0259 +/-(0.0568)U	-0.0195 +/-(0.0742)U	0.000813 +/-(0.0818)U
Radium-228	pCi/L	n/v	n/v	n/v	0.625 +/-(0.261)	0.121 +/-(0.243)U	0.0611 +/-(0.226)U	0.108 +/-(0.249)U	0.259 +/-(0.256)U	0.115 +/-(0.212)U	0.0490 +/-(0.196)U	0.139 +/-(0.242)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.625 +/-(0.277)J	0.158 +/-(0.256)U	0.0611 +/-(0.241)U	0.213 +/-(0.276)U	0.259 +/-(0.272)U	0.115 +/-(0.219)U	0.0490 +/-(0.210)U	0.140 +/-(0.255)U
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	8.95	5.49	3.85	3.84	3.82	6.68	6.60	6.59
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0600 J	0.0652 J	0.0565 J	0.0589 J	0.0549 J	0.0734 J	0.0781 J	0.0725 J
Sulfate	mg/L	250[A]	n/v	n/v	6.31	8.81	5.74	5.71	5.55	10.2	9.95	10.0
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	63.3	76.1	57.9	58.7	56.6	72.5	72.9	75.1
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	97.0	87.0	88.0	94.0	86.0	103	99.0	105
Total Suspended Solids	mg/L	n/v	n/v	n/v	8.80	3.10	5.50	7.50	13.3	5.50	4.90	4.80

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR05-LB			STR-TR05-RB	
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		19-Nov-19	19-Nov-19	30-Jul-19	30-Jul-19	19-Nov-19
Sample ID					JOF-STR-TR05-LB-SUR-20191119	JOF-STR-DUP02-20191119	JOF-STR-TR05-LB-MID-20190730	JOF-STR-TR05-RB-MID-20190730	JOF-STR-TR05-RB-MID-20191119
Parent Sample ID						JOF-STR-TR05-LB-SUR-20191119			
Sample Depth					0.1 ft	0.1 ft	0.75 ft	0.6 ft	0.6 ft
Sample Type					Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		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	0.457 J	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	0.774 J	0.847 J	1.25	1.24	0.635 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	27.2	26.8	27.3	23.3	24.6
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	0.276 U*	0.216 J	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	47.0 J	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	0.155 U*	0.177 J	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	21,400	21,300	18,000	17,700	21,600
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	1.72 J	1.69 J	2.87 U*	3.26 U*	<1.53
Cobalt	ug/L	6[A]	19[B]	120[C]	0.281 J	0.309 J	0.656	0.204 J	0.155 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.07 J	1.05 J	1.37 J	1.07 J	0.805 J
Iron	ug/L	n/v	n/v	n/v	527	504	421	207	215
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.358 J	0.456 J	0.426 J	0.170 J	0.171 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,870	4,820	4,190	4,020	4,810
Manganese	ug/L	n/v	n/v	n/v	67.9	68.4	77.2	43.2	31.7 U*
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<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
Nickel	ug/L	100[A]	33.9[B]	305[C]	0.592 U*	0.522 U*	1.41 U*	0.455 U*	<0.336
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	0.283 U*	0.314 J	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.35	2.30	2.91 U*	3.25 U*	1.86
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	4.43 U*	4.88 U*	5.38 U*	5.37 U*	3.30 U*
Dissolved Metals									
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	0.683 J	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.639 J	0.685 J	1.26	1.24	0.795 J
Barium	ug/L	2,000[A]	n/v	n/v	22.9	23.1	23.3	21.1	23.2
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	0.328 J	<0.182	0.398 U*
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	47.2 J	<38.6	46.8 J
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	<0.125	<0.125	0.165 J	<0.125	0.187 J
Calcium	ug/L	n/v	n/v	n/v	21,400	21,800	18,000	17,000	21,600
Chromium	ug/L	100[A]	48.8[D]	375[E]	<1.53	<1.53	2.61 U*	3.10 U*	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	0.0790 J	0.195 J	0.0990 J	0.148 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.768 J	0.808 J	0.824 J	0.914 J	0.861 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	105
Lead	ug/L	5[A]	1.44[D]	36.9[E]	<0.128	<0.128	0.202 J	<0.128	0.185 J
Lithium	ug/L	40[A]	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,830	4,880	4,180	3,880	4,890
Manganese	ug/L	n/v	n/v	n/v	23.9 U*	24.8 U*	20.9	3.12 J	12.0 U*
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<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
Nickel	ug/L	100[A]	33.8[D]	304[E]	<0.336	<0.336	0.513 J	<0.336	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	0.349 J	<0.148	0.323 U*
Vanadium	ug/L	86[A]	n/v	n/v	1.72	1.96	2.25 U*	3.07 U*	1.64
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	<3.22	<3.22	5.85 U*	3.89 U*	<3.22
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	n/v	-0.0185 +/-(0.0565)U	0.0371 +/-(0.0756)U	-0.148 +/-(0.0881)U	-0.00636 +/-(0.0846)U	0.00147 +/-(0.0575)U
Radium-228	pCi/L	n/v	n/v	n/v	0.131 +/-(0.234)U	0.293 +/-(0.224)U	0.239 +/-(0.246)U	0.0483 +/-(0.273)U	0.273 +/-(0.254)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.131 +/-(0.241)U	0.330 +/-(0.236)U	0.239 +/-(0.261)U	0.0483 +/-(0.286)U	0.274 +/-(0.260)U
Anions									
Chloride	mg/L	250[A]	230[B]	860[C]	6.29	6.85	3.83	4.01	6.65
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0982 J	0.0791 J	0.0628 J	0.0661 J	0.0727 J
Sulfate	mg/L	250[A]	n/v	n/v	9.46	10.3	5.66	5.82	10.1
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	73.6	73.0	62.3	60.6	73.6
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	75.0	82.0	81.0	82.0	115
Total Suspended Solids	mg/L	n/v	n/v	n/v	10.6	11.3	8.20	5.80	4.20

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR06-CC						STR-TR06-LB	
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19	19-Nov-19	30-Jul-19
Sample ID					JOF-STR-TR06-CC-SUR-20190730	JOF-STR-TR06-CC-MID-20190730	JOF-STR-TR06-CC-BOT-20190730	JOF-STR-TR06-CC-SUR-20191119	JOF-STR-TR06-CC-MID-20191119	JOF-STR-TR06-CC-BOT-20191119	JOF-STR-TR06-LB-SUR-20191119	JOF-STR-TR06-LB-MID-20190730
Parent Sample ID												
Sample Depth					0.5 ft	8.8 ft	17.3 ft	0.5 ft	8 ft	15.2 ft	0.3 ft	0.7 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 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]	0.885 J	0.994 J	1.24	0.859 U*	0.891 U*	1.20 U*	0.785 U*	1.13
Barium	ug/L	2,000[A]	220[B]	2,000[C]	22.3	22.9	24.2	26.6	27.0	41.2	27.6	24.1
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	<0.125	0.148 U*	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	17,500	17,800	17,000	22,000	22,300	23,000	22,800	17,800
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	<1.53	1.55 U*	6.87 U*	1.56 U*	1.92 U*	2.95 U*	1.62 U*	2.05 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.163 J	0.240 J	0.307 J	0.220 U*	0.290 U*	1.11	0.176 U*	0.275 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	0.787 J	0.820 J	1.25 J	1.20 U*	1.33 U*	2.00 U*	1.24 U*	1.07 J
Iron	ug/L	n/v	n/v	n/v	178	275	455	223	229	1,910	228	358
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.134 J	0.202 J	0.292 J	0.213 U*	0.282 U*	1.31	0.208 U*	0.263 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,050	4,150	3,880	5,020	5,010	5,300	5,250	4,190
Manganese	ug/L	n/v	n/v	n/v	33.8	44.6	51.6	27.5	29.1	226	27.4	45.1
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	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	1.37 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	0.446 U*	0.549 U*	0.744 U*	0.480 J	0.513 J	1.55	0.453 J	0.713 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	1.57[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	0.220 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	1.54 U*	2.18 U*	3.51 U*	1.85 U*	2.12 U*	4.13 U*	1.85 U*	2.26 U*
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	4.82 U*	4.76 U*	5.12 U*	3.79 U*	4.26 U*	8.44 U*	3.67 U*	5.12 U*
Dissolved Metals												
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.971 J	0.932 J	1.14	0.767 J	0.708 J	0.763 J	0.712 J	0.858 J
Barium	ug/L	2,000[A]	n/v	n/v	20.1	20.6	22.8	25.4	25.9	25.3	24.6	22.4
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
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]	0.489[D]	1.12[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	17,100	17,500	16,900	22,200	23,300	22,500	21,700	17,600
Chromium	ug/L	100[A]	48.8[D]	375[E]	2.61 U*	1.77 U*	3.00 U*	<1.53	<1.53	1.54 J	<1.53	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	<0.0750	<0.0750	0.0900 J	0.103 J	0.0960 J	<0.0750	0.0870 J	0.160 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.747 J	0.687 J	0.893 J	1.10 J	0.979 J	0.961 J	1.11 J	0.716 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	135
Lead	ug/L	5[A]	1.44[D]	36.9[E]	0.182 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,000	4,080	3,840	5,010	5,250	5,100	4,920	4,090
Manganese	ug/L	n/v	n/v	n/v	1.36 J	<1.35	2.58 J	7.95	8.04	14.1	7.23	21.5
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]	33.8[D]	304[E]	<0.336	<0.336	<0.336	<0.336	0.353 J	<0.336	0.340 J	0.523 J
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.34[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	2.34 U*	2.00 U*	2.77 U*	1.67	1.70	1.93	1.67	1.48 U*
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	3.81 U*	3.57 U*	3.86 U*	<3.22	3.49 J	3.33 J	3.41 J	3.23 U*
Radiological Parameters												
Radium-226	pCi/L	n/v	n/v	n/v	-0.128 +/-(0.0970)U	-0.0175 +/-(0.140)U	-0.0673 +/-(0.114)U	-0.0483 +/-(0.0644)U	0.0114 +/-(0.0574)U	-0.0119 +/-(0.0670)U	0.00308 +/-(0.0456)U	0.0937 +/-(0.131)U
Radium-228	pCi/L	n/v	n/v	n/v	0.125 +/-(0.251)U	0.122 +/-(0.222)U	0.203 +/-(0.275)U	0.000 +/-(0.228)U	0.258 +/-(0.252)U	0.167 +/-(0.221)U	-0.0150 +/-(0.222)U	0.736 +/-(0.316)U*
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.125 +/-(0.269)U	0.122 +/-(0.262)U	0.203 +/-(0.298)U	0.000 +/-(0.237)U	0.269 +/-(0.258)U	0.167 +/-(0.231)U	0.00308 +/-(0.227)U	0.830 +/-(0.342)U*
Anions												
Chloride	mg/L	250[A]	230[B]	860[C]	3.86	3.87	3.88	6.95	6.93	6.92	7.00	3.85
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0576 J	0.0569 J	0.0566 J	0.0658 J	0.0683 J	0.0691 J	0.0684 J	0.0577 J
Sulfate	mg/L	250[A]	n/v	n/v	5.70	5.66	5.59	10.5	10.3	10.3	10.5	5.64
General Chemistry												
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	60.4	61.5	58.5	75.7	76.2	79.3	78.5	61.8
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	62.0	69.0	73.0	101	73.0	72.0	67.0	88.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	5.10	7.10	9.60	2.90	4.70	35.2	4.60	9.00

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR06-RB				
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19
Sample ID					JOF-STR-TR06-RB-SUR-20190730	JOF-STR-TR06-RB-MID-20190730	JOF-STR-TR06-RB-BOT-20190730	JOF-STR-DUP03-20190730	JOF-STR-TR06-RB-SUR-20191119
Parent Sample ID								JOF-STR-TR06-RB-BOT-20190730	
Sample Depth					0.5 ft	2.6 ft	4.8 ft	4.8 ft	0.3 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		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
Arsenic	ug/L	10[A]	150[B]	340[C]	1.28	1.30	1.42	1.47	0.773 U*
Barium	ug/L	2,000[A]	220[B]	2,000[C]	23.4	23.1	25.2	26.2	28.3
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	38.7 U*	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	17,500	17,200	16,800	17,300	23,000
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	3.35 U*	3.23 U*	3.88 U*	3.90 U*	1.62 U*
Cobalt	ug/L	6[A]	19[B]	120[C]	0.272 J	0.257 J	0.400 J	0.443 J	0.214 U*
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.17 J	1.04 J	1.40 J	1.33 J	1.09 U*
Iron	ug/L	n/v	n/v	n/v	199	249	538	573	279
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.197 J	0.216 J	0.384 J	0.392 J	0.227 U*
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	3.90 U*	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	3,960	3,920	3,880	4,010	5,170
Manganese	ug/L	n/v	n/v	n/v	40.1	47.0	77.7	79.1	34.9
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<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
Nickel	ug/L	100[A]	33.9[B]	305[C]	0.640 U*	0.496 U*	0.808 U*	0.864 U*	0.534 J
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<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 UJ
Vanadium	ug/L	86[A]	27[B]	79[C]	3.12 U*	3.27 U*	3.68 U*	3.92 U*	1.95 U*
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	5.06 U*	4.31 U*	5.38 U*	5.93 U*	3.98 U*
Dissolved Metals									
Antimony	ug/L	6[A]	n/v	n/v	<0.378	0.557 J	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	1.20	1.57	1.34	1.29	2.33 J
Barium	ug/L	2,000[A]	n/v	n/v	21.6	21.1	24.9	23.5	27.5
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	0.473 J	<0.182	<0.182	0.950 J
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	55.9 J	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	<0.125	0.154 J	<0.125	<0.125	--[2]
Calcium	ug/L	n/v	n/v	n/v	17,100	17,000	17,300	17,100	22,500
Chromium	ug/L	100[A]	48.8[D]	375[E]	3.37 U*	3.28 U*	6.16 U*	3.48 U*	2.42
Cobalt	ug/L	6[A]	n/v	n/v	0.0920 J	0.170 J	0.324 J	0.301 J	1.01 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.919 J	1.13 J	1.35 J	0.930 J	1.97 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	371	405	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[E]	<0.128	0.193 J	0.253 J	1.62 J	0.922 J
Lithium	ug/L	40[A]	n/v	n/v	<3.39	5.81 U*	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	3,870	3,850	3,980	3,890	5,090
Manganese	ug/L	n/v	n/v	n/v	2.57 J	2.92 J	57.7	56.1	15.3
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<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	1.37 J
Nickel	ug/L	100[A]	33.8[D]	304[E]	<0.336	0.395 J	0.630 J	1.81 J	1.10
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	2.17 J
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	0.343 J	<0.148	<0.148	1.69 J
Vanadium	ug/L	86[A]	n/v	n/v	2.89 U*	3.06 U*	3.42 U*	3.50 U*	2.79
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	3.70 U*	3.90 U*	4.25 U*	<3.22	<3.22
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	n/v	-0.0859 +/-(0.0761)U	0.0315 +/-(0.118)U	-0.143 +/-(0.0858)U	-0.00953 +/-(0.0904)U	0.0216 +/-(0.0666)U
Radium-228	pCi/L	n/v	n/v	n/v	0.211 +/-(0.243)U	0.187 +/-(0.283)U	0.220 +/-(0.224)U	0.185 +/-(0.224)U	0.184 +/-(0.244)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.211 +/-(0.255)U	0.219 +/-(0.307)U	0.220 +/-(0.240)U	0.185 +/-(0.242)U	0.206 +/-(0.253)U
Anions									
Chloride	mg/L	250[A]	230[B]	860[C]	3.92	4.04	4.16	4.17	7.00
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0603 J	0.0652 J	0.0589 J	0.0657 J	0.0720 J
Sulfate	mg/L	250[A]	n/v	n/v	5.76	5.85	5.75	5.79	9.98
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	60.0	59.2	57.8	59.6	78.8
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	76.0	78.0	75.0	78.0	75.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	6.00	7.80	15.7	15.6	6.30

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR07-CC						STR-TR07-LB		
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19	30-Jul-19	19-Nov-19	19-Nov-19
Sample ID					JOF-STR-TR07-CC-SUR-20190730	JOF-STR-TR07-CC-MID-20190730	JOF-STR-TR07-CC-BOT-20190730	JOF-STR-TR07-CC-SUR-20191119	JOF-STR-TR07-CC-MID-20191119	JOF-STR-TR07-CC-BOT-20191119	JOF-STR-TR07-LB-MID-20190730	JOF-STR-TR07-LB-SUR-20191119	JOF-STR-TR07-LB-BOT-20191119
Parent Sample ID													
Sample Depth					0.5 ft	8.2 ft	16 ft	0.5 ft	7.8 ft	15 ft	0.6 ft	0.5 ft	1.7 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	1.12	0.856 J	0.983 J	0.610 J	0.703 J	0.714 J	0.959 J	0.933 J	0.772 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	23.5	23.5	25.3	23.8	25.1	25.0	24.2	28.0	25.5
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.276 U*
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	46.0 J
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.133 J
Calcium	ug/L	n/v	116,000[B]	n/v	17,100	17,800	17,600	21,200	21,800	22,200	17,800	22,100	21,400
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	7.79 U*	<1.53	4.34 U*	<1.53	<1.53	<1.53	1.68 U*	2.16	1.69 J
Cobalt	ug/L	6[A]	19[B]	120[C]	0.214 J	0.185 J	0.330 J	0.128 J	0.174 J	0.160 J	0.264 J	0.179 J	0.185 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.97 J	0.959 J	1.14 J	1.00 J	0.982 J	0.941 J	1.11 J	1.00 J	1.20 J
Iron	ug/L	n/v	n/v	n/v	170	191	455	165	248	234	324	309	250
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.151 J	0.152 J	0.309 J	0.190 J	0.225 J	0.207 J	0.223 J	0.201 J	0.281 J
Lithium	ug/L	40[A]	440[B]	910[C]	3.53 U*	<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	4,030	4,050	4,030	4,760	4,890	5,010	4,120	5,140	4,890
Manganese	ug/L	n/v	n/v	n/v	35.6	43.7	65.2	22.8 U*	31.1 U*	32.0 U*	47.7	28.2 U*	28.8 U*
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]	0.932 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	3.77	0.596 U*	2.32	0.365 U*	0.441 U*	0.369 U*	0.557 U*	0.540 U*	0.508 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	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.214 U*
Vanadium	ug/L	86[A]	27[B]	79[C]	2.65 U*	1.75 U*	1.93 U*	2.03	1.97	1.93	2.17 U*	2.13	2.10
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	5.61 U*	5.30 U*	5.51 U*	3.62 U*	4.34 U*	3.84 U*	5.03 U*	3.84 U*	3.48 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.882 J	0.867 J	0.933 J	0.589 J	0.617 J	0.642 J	1.06	0.873 J	0.645 J
Barium	ug/L	2,000[A]	n/v	n/v	22.2	21.5	22.9	23.8	23.1	23.3	20.9	26.7	23.4
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.368 J	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	46.2 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[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	17,800	17,500	17,700	21,500	21,400	21,800	17,500	22,100	21,600
Chromium	ug/L	100[A]	48.8[D]	375[E]	2.87 U*	<1.53	<1.53	<1.53	<1.53	<1.53	<1.53	2.37	<1.53
Cobalt	ug/L	6[A]	n/v	n/v	0.0780 J	<0.0750	0.200 J	<0.0750	<0.0750	<0.0750	0.120 J	0.0820 J	0.0770 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	1.02 J	0.773 J	1.13 J	0.856 J	0.752 J	0.910 J	0.787 J	0.870 J	0.911 J
Iron	ug/L	n/v	n/v	n/v	22.3 J	<19.5	241	124	<19.5	31.0 J	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[E]	<0.128	<0.128	0.189 J	<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	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,180	3,980	4,020	4,820	4,800	4,850	4,050	5,180	4,920
Manganese	ug/L	n/v	n/v	n/v	<1.35	<1.35	46.9	9.22 U*	7.97 U*	10.2 U*	2.98 J	8.04 U*	7.51 U*
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]	33.8[D]	304[E]	1.27	<0.336	0.550 J	<0.336	<0.336	<0.336	0.443 J	0.342 U*	<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	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.191 J	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.93 U*	1.67 U*	1.69 U*	1.59	1.74	1.66	1.76 U*	2.11	1.68
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	4.19 U*	4.32 U*	4.86 U*	<3.22	4.17 U*	<3.22	4.89 U*	3.52 U*	<3.22
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	0.0321 +/-(0.122)U	0.186 +/-(0.147)U	-0.0870 +/-(0.0922)U	-0.0121 +/-(0.0394)U	-0.0510 +/-(0.0561)U	0.0336 +/-(0.0620)U	0.0353 +/-(0.123)U	0.0237 +/-(0.0592)U	-0.0638 +/-(0.0463)U
Radium-228	pCi/L	n/v	n/v	n/v	0.398 +/-(0.291)U	0.848 +/-(0.359)U*	0.339 +/-(0.250)U	-0.0805 +/-(0.191)U	0.103 +/-(0.227)U	0.286 +/-(0.235)U	0.373 +/-(0.247)U	0.403 +/-(0.303)U	0.00210 +/-(0.200)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.430 +/-(0.316)U	1.03 +/-(0.388)U*	0.339 +/-(0.266)U	0.000 +/-(0.195)U	0.103 +/-(0.234)U	0.320 +/-(0.243)U	0.408 +/-(0.276)U	0.426 +/-(0.309)U	0.00210 +/-(0.205)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	3.86	3.87	3.94	6.60	6.61	6.54	3.86	6.58	6.55
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0577 J	0.0592 J	0.0591 J	0.0706 J	0.0739 J	0.0794 J	0.0591 J	0.0774 J	0.0813 J
Sulfate	mg/L	250[A]	n/v	n/v	5.61	5.70	5.82	10.1	10.1	10.1	5.76	10.1	10.1
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	59.4	61.0	60.6	72.5	74.5	76.1	61.5	76.5	73.5
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	78.0	77.0	93.0	85.0	76.0	74.0	77.0	87.0	104
Total Suspended Solids	mg/L	n/v	n/v	n/v	4.60	6.90	12.5	3.00	5.20	5.40	9.50	3.60	4.50

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR07-RB			STR-TR08-CC					
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	19-Nov-19	30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19	19-Nov-19
Sample ID					JOF-STR-TR07-RB-MID-20190730	JOF-STR-DUP01-20190730	JOF-STR-TR07-RB-SUR-20191119	JOF-STR-TR08-CC-SUR-20190730	JOF-STR-TR08-CC-MID-20190730	JOF-STR-TR08-CC-BOT-20190730	JOF-STR-TR08-CC-SUR-20191119	JOF-STR-TR08-CC-MID-20191119	JOF-STR-TR08-CC-BOT-20191119
Parent Sample ID						JOF-STR-TR07-RB-MID-20190730							
Sample Depth					0.6 ft	0.6 ft	0.3 ft	0.5 ft	7.3 ft	14.1 ft	0.5 ft	6.9 ft	13.4 ft
Sample Type					Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
			Chronic	Acute									
Total Metals													
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	0.461 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	1.08	1.24	0.811 J	1.03	1.12	1.26	0.882 J	0.921 J	0.919 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	25.4 J	42.7 J	26.7	25.0	25.5	26.2	28.1	28.4	28.7
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	0.416 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	56.0 U*	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[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	17,300	17,200	21,900	17,600	17,800	17,700	21,900	22,300	22,200
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	<3.07	2.15 U*	2.00	3.58 U*	6.98 U*	7.81 U*	2.14	1.94 J	2.27
Cobalt	ug/L	6[A]	19[B]	120[C]	0.293 J	0.367 J	0.316 J	0.220 J	0.265 J	0.420 J	0.165 J	0.164 J	0.183 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.98 J	1.14 J	1.09 J	1.04 J	2.39	1.96 J	1.15 J	1.31 J	1.12 J
Iron	ug/L	n/v	n/v	n/v	397	439	609	230	318	1,080	206	248	255
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.285 J	0.369 J	0.427 J	0.167 J	0.212 J	0.293 J	0.195 J	0.265 J	0.191 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	<3.39	<3.39	<3.39	<3.39	3.41 U*	3.59 J	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	4,020	4,020	4,900	4,050	4,120	4,190	5,080	5,130	5,120
Manganese	ug/L	n/v	n/v	n/v	66.7	66.0	78.5	41.7	48.2	69.1	26.3 U*	29.6 U*	31.8 U*
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	0.709 J	1.55 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	1.15 U*	0.802 U*	0.606 U*	0.781 U*	2.97	3.92	0.497 U*	0.537 U*	0.507 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	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	0.233 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	2.52 U*	2.50 U*	2.59	2.84 U*	3.07 U*	3.52 U*	2.44	2.21	2.32
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	5.39 U*	5.05 U*	4.77 U*	4.37 U*	5.54 U*	5.58 U*	3.54 U*	4.05 U*	4.51 U*
Dissolved Metals													
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.821 J	0.940 J	0.623 J	1.04	0.966 J	1.07	0.863 J	0.825 J	0.865 J
Barium	ug/L	2,000[A]	n/v	n/v	21.6	21.5	23.1	25.7	22.5	25.5	25.9	26.0	26.2
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	39.7 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[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	17,500	17,600	22,000	17,800	17,600	17,800	21,500	22,000	21,900
Chromium	ug/L	100[A]	48.8[D]	375[E]	<1.53	<1.53	<1.53	3.45 U*	3.28 U*	3.74 U*	2.10	1.79 J	2.01
Cobalt	ug/L	6[A]	n/v	n/v	0.213 J	0.117 J	0.0810 J	<0.0750	<0.0750	0.103 J	<0.0750	<0.0750	<0.0750
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	1.62 J	0.722 J	0.930 J	0.661 J	0.699 J	0.686 J	0.970 J	0.917 J	0.873 J
Iron	ug/L	n/v	n/v	n/v	54.2	<19.5	312	<19.5	<19.5	83.2	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[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	<3.39	<3.39	<3.39	4.15 U*	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	3,990	4,060	4,870	4,060	4,050	4,110	4,960	5,080	5,080
Manganese	ug/L	n/v	n/v	n/v	17.4	16.6	26.9 U*	1.50 J	2.94 J	16.2	7.87 U*	7.98 U*	7.92 U*
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	1.59 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.8[D]	304[E]	<0.336	0.368 J	<0.336	0.573 J	0.508 J	0.631 J	<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	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	1.54 U*	1.69 U*	1.64	2.67 U*	2.61 U*	2.84 U*	2.13	1.98	2.01
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	4.60 U*	<3.22	<3.22	4.11 U*	4.64 U*	4.40 U*	3.40 U*	3.51 U*	3.43 U*
Radiological Parameters													
Radium-226	pCi/L	n/v	n/v	n/v	-0.0369 +/-(0.104)U	0.121 +/-(0.135)U	0.0214 +/-(0.0726)U	-0.0300 +/-(0.100)U	-0.0988 +/-(0.121)U	0.0592 +/-(0.134)U	0.0343 +/-(0.0674)U	-0.0820 +/-(0.0600)U	0.00378 +/-(0.0633)U
Radium-228	pCi/L	n/v	n/v	n/v	0.402 +/-(0.290)U	0.112 +/-(0.278)U	0.207 +/-(0.211)U	0.445 +/-(0.260)U*	0.157 +/-(0.222)U	0.104 +/-(0.229)U	0.0567 +/-(0.197)U	-0.102 +/-(0.201)U	0.174 +/-(0.213)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.402 +/-(0.308)U	0.233 +/-(0.309)U	0.229 +/-(0.223)U	0.445 +/-(0.279)U*	0.157 +/-(0.253)U	0.163 +/-(0.265)U	0.0909 +/-(0.208)U	0.000 +/-(0.210)U	0.178 +/-(0.222)U
Anions													
Chloride	mg/L	250[A]	230[B]	860[C]	4.00	4.01	7.26	3.85	3.88	3.88	6.64	6.68	6.65
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0586 J	0.0579 J	0.0712 J	0.0585 J	0.0596 J	0.0582 J	0.0758 J	0.0738 J	0.0810 J
Sulfate	mg/L	250[A]	n/v	n/v	5.92	5.97	11.1	5.78	5.66	5.90	10.1	10.2	10.3
General Chemistry													
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	59.9	59.4	74.9	60.7	61.5	61.4	75.6	76.7	76.6
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	67.0 J	96.0 J	84.0	149	128	133	42.0	84.0	44.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	13.2	13.0	13.4	6.00	7.40	11.5	4.00	4.40	5.40

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR08-LB		
Sample Date					30-Jul-19	30-Jul-19	19-Nov-19
Sample ID					JOF-STR-TR08-LB-SUR-20190730	JOF-STR-TR08-LB-BOT-20190730	JOF-STR-TR08-LB-SUR-20191119
Parent Sample ID							
Sample Depth					0.5 ft	1.25 ft	0.5 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		Final-Verified	Final-Verified	Final-Verified
			Tennessee River (Hardness = 60 mg/L)				
			Chronic	Acute			
Total Metals							
Antimony	ug/L	6[A]	190[B]	900[C]	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[B]	340[C]	1.19	1.03	0.901 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	24.7	23.9	27.2
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	17,800	17,600	22,100
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	3.11 U*	1.56 U*	1.97 J
Cobalt	ug/L	6[A]	19[B]	120[C]	0.234 J	0.239 J	0.137 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	1.14 J	1.09 J	1.03 J
Iron	ug/L	n/v	n/v	n/v	299	253	170
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.229 J	0.218 J	0.139 J
Lithium	ug/L	40[A]	440[B]	910[C]	<3.39	3.53 U*	<3.39
Magnesium	ug/L	n/v	n/v	n/v	3,940	4,000	5,100
Manganese	ug/L	n/v	n/v	n/v	44.3	42.4	20.6 U*
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	800[B]	7,200[C]	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.9[B]	305[C]	0.563 U*	0.631 U*	0.449 U*
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	6[B]	54[C]	<0.148	<0.148	<0.148
Vanadium	ug/L	86[A]	27[B]	79[C]	3.62 U*	1.90 U*	2.21
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	4.36 U*	4.62 U*	4.09 U*
Dissolved Metals							
Antimony	ug/L	6[A]	n/v	n/v	0.627 J	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	1.56	0.953 J	0.859 J
Barium	ug/L	2,000[A]	n/v	n/v	21.2	22.1	26.3
Beryllium	ug/L	4[A]	n/v	n/v	0.350 J	<0.182	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	39.1 J	<38.6	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	0.170 J	<0.125	<0.125
Calcium	ug/L	n/v	n/v	n/v	17,000	18,100	22,200
Chromium	ug/L	100[A]	48.8[D]	375[E]	3.76 U*	2.13 U*	1.92 J
Cobalt	ug/L	6[A]	n/v	n/v	0.243 J	0.0780 J	<0.0750
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	1.20 J	1.10 J	0.891 J
Iron	ug/L	n/v	n/v	n/v	<19.5	<19.5	<19.5
Lead	ug/L	5[A]	1.44[D]	36.9[E]	0.207 J	<0.128	<0.128
Lithium	ug/L	40[A]	n/v	n/v	3.82 U*	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	n/v	3,800	4,140	5,100
Manganese	ug/L	n/v	n/v	n/v	3.94 J	3.71 J	7.57 U*
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	0.669 J	<0.610
Nickel	ug/L	100[A]	33.8[D]	304[E]	0.511 J	0.909 J	0.365 U*
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<0.177	<0.177	<0.177
Thallium	ug/L	2[A]	n/v	n/v	0.412 J	<0.148	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	3.20 U*	1.67 U*	1.95
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	4.89 U*	4.03 U*	<3.22
Radiological Parameters							
Radium-226	pCi/L	n/v	n/v	n/v	0.132 +/-(0.143)U	-0.0921 +/-(0.119)U	-0.0215 +/-(0.0647)U
Radium-228	pCi/L	n/v	n/v	n/v	0.780 +/-(0.279)U*	0.825 +/-(0.350)U*	0.215 +/-(0.219)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.912 +/-(0.314)U*	0.825 +/-(0.370)U*	0.215 +/-(0.228)U
Anions							
Chloride	mg/L	250[A]	230[B]	860[C]	3.85	3.85	6.59
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0556 J	0.0599 J	0.0777 J
Sulfate	mg/L	250[A]	n/v	n/v	5.57	5.92	10.2
General Chemistry							
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	60.6	60.5	76.2
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	118	95.0	68.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	7.20	8.20	2.70

See last page for notes.

Table J.1-1 Surface Stream Analytical Results - Tennessee River
Johnsonville Fossil Plant

Sample Location					STR-TR08-RB				
Sample Date		Human Health Surface Water Screening Levels	Ecological Surface Screening Levels		30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19
Sample ID					JOF-STR-TR08-RB-SUR-20190730	JOF-STR-TR08-RB-MID-20190730	JOF-STR-TR08-RB-BOT-20190730	JOF-STR-TR08-RB-SUR-20191119	JOF-STR-TR08-RB-BOT-20191119
Parent Sample ID									
Sample Depth					0.5 ft	1.5 ft	2.5 ft	0.5 ft	1.7 ft
Sample Type					Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units		Tennessee River (Hardness = 60 mg/L)		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
Arsenic	ug/L	10[A]	150[B]	340[C]	1.09	1.12	1.08	0.918 J	0.994 J
Barium	ug/L	2,000[A]	220[B]	2,000[C]	25.2	61.8	25.5	27.6	28.7
Beryllium	ug/L	4[A]	11[B]	93[C]	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	4,000[A]	7,200[B]	34,000[C]	<38.6	<38.6	<38.6	<38.6	39.4 J
Cadmium	ug/L	5[A]	0.526[B]	1.16[C]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	116,000[B]	n/v	17,800	18,000	18,000	22,200	22,700
Chromium	ug/L	100[A]	56.7[B]	1,187[C]	3.75 U*	3.31 U*	3.23 U*	2.22	2.35
Cobalt	ug/L	6[A]	19[B]	120[C]	0.243 J	0.214 J	0.248 J	0.184 J	0.191 J
Copper	ug/L	1,300[A]	6.03[B]	8.65[C]	0.977 J	0.967 J	0.931 J	1.22 J	1.23 J
Iron	ug/L	n/v	n/v	n/v	275	277	336	220	226
Lead	ug/L	5[A]	1.66[B]	42.6[C]	0.196 J	0.186 J	0.219 J	0.216 J	0.233 J
Lithium	ug/L	40[A]	440[B]	910[C]	4.23 U*	3.84 U*	<3.39	4.94 J	5.21
Magnesium	ug/L	n/v	n/v	n/v	4,100	4,160	4,130	5,030	5,120
Manganese	ug/L	n/v	n/v	n/v	44.2	43.6	46.9	32.3 U*	34.6 U*
Mercury	ug/L	2[A]	0.77[B]	1.4[C]	<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
Nickel	ug/L	100[A]	33.9[B]	305[C]	0.962 U*	1.01 U*	0.980 U*	0.483 U*	0.480 U*
Selenium	ug/L	50[A]	3.1[B]	20[C]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.57[C]	<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
Vanadium	ug/L	86[A]	27[B]	79[C]	2.82 U*	2.76 U*	2.58 U*	1.96	2.34
Zinc	ug/L	2,000[A]	77.7[B]	77.7[C]	4.96 U*	4.43 U*	4.60 U*	4.67 U*	3.61 U*
Dissolved Metals									
Antimony	ug/L	6[A]	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	10[A]	150[D]	340[E]	0.963 J	1.08	1.08	0.947 J	0.885 J
Barium	ug/L	2,000[A]	n/v	n/v	22.5	22.6	22.3	25.7	26.9
Beryllium	ug/L	4[A]	n/v	n/v	<0.182	<0.182	<0.182	0.315 J	<0.182
Boron	ug/L	4,000[A]	n/v	n/v	<38.6	<38.6	<38.6	55.7 J	<38.6
Cadmium	ug/L	5[A]	0.489[D]	1.12[E]	<0.125	<0.125	<0.125	0.137 J	<0.125
Calcium	ug/L	n/v	n/v	n/v	18,000	17,500	17,600	22,300	22,500
Chromium	ug/L	100[A]	48.8[D]	375[E]	2.18 U*	<1.53	3.20 U*	1.92 J	2.15
Cobalt	ug/L	6[A]	n/v	n/v	0.141 J	0.137 J	<0.0750	0.140 J	0.0980 J
Copper	ug/L	1,300[A]	5.79[D]	8.31[E]	0.816 J	--[2]	0.673 J	1.11 J	1.09 J
Iron	ug/L	n/v	n/v	n/v	148	65.3 U*	<19.5	<19.5	41.0 J
Lead	ug/L	5[A]	1.44[D]	36.9[E]	<0.128	<0.128	<0.128	0.166 J	<0.128
Lithium	ug/L	40[A]	n/v	n/v	<3.39	<3.39	<3.39	4.57 J	4.38 J
Magnesium	ug/L	n/v	n/v	n/v	4,110	4,000	4,020	5,090	5,130
Manganese	ug/L	n/v	n/v	n/v	26.1	9.98	1.83 J	16.6 U*	15.7 U*
Mercury	ug/L	2[A]	0.77[D]	1.4[E]	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	100[A]	n/v	n/v	<0.610	0.725 J	<0.610	<0.610	<0.610
Nickel	ug/L	100[A]	33.8[D]	304[E]	0.708 J	2.41 J	0.574 J	0.377 U*	<0.336
Selenium	ug/L	50[A]	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	100[A]	n/v	1.34[E]	<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	0.275 J	<0.148
Vanadium	ug/L	86[A]	n/v	n/v	2.03 U*	2.53 U*	2.44 U*	2.03	2.23
Zinc	ug/L	2,000[A]	76.6[D]	76.0[E]	4.13 U*	3.64 U*	3.97 U*	3.55 U*	<3.22
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	n/v	-0.0605 +/-(0.108)U	-0.110 +/-(0.0976)U	-0.00659 +/-(0.104)U	0.0230 +/-(0.0725)U	-0.0461 +/-(0.0563)U
Radium-228	pCi/L	n/v	n/v	n/v	0.280 +/-(0.243)U	0.677 +/-(0.316)U*	0.772 +/-(0.302)U*	0.360 +/-(0.263)U	0.104 +/-(0.215)U
Radium-226+228	pCi/L	5[A]	3[B]	3[C]	0.280 +/-(0.266)U	0.677 +/-(0.331)U*	0.772 +/-(0.319)U*	0.383 +/-(0.273)U	0.104 +/-(0.222)U
Anions									
Chloride	mg/L	250[A]	230[B]	860[C]	3.85	3.93	4.06	7.14	7.32
Fluoride	mg/L	4.0[A]	2.7[B]	9.8[C]	0.0560 J	0.0592 J	0.0589 J	0.0748 J	0.0827 J
Sulfate	mg/L	250[A]	n/v	n/v	5.63	5.75	5.71	10.3	10.2
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	n/v	61.5	62.1	62.0	76.1	77.7
Total Dissolved Solids	mg/L	500[A]	n/v	n/v	125	127	144	69.0	54.0
Total Suspended Solids	mg/L	n/v	n/v	n/v	6.50	7.60	6.90	3.60	5.10

Notes:

[A]	Human Health Surface Water Screening Levels
[B]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Total Chronic
[C]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Total Acute
[D]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Dissolved Chronic
[E]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Dissolved Acute
6.5[A]	Concentration is greater than or equal to the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
ft	feet
ID	identification
mg/L	milligrams per Liter
n/v	No standard/guideline value.
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picocuries per Liter
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
ug/L	micrograms per Liter

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

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH01-CC					
Sample Date		Ecological Surface Screening Levels		31-Jul-19	31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19	20-Nov-19
Sample ID				JOF-STR-BH01-CC-SUR-20190731	JOF-STR-BH01-CC-MID-20190731	JOF-STR-BH01-CC-BOT-20190731	JOF-STR-BH01-CC-SUR-20191120	JOF-STR-BH01-CC-MID-20191120	JOF-STR-BH01-CC-BOT-20191120
Parent Sample ID									
Sample Depth				0.5 ft	2.5 ft	4.6 ft	0.5 ft	2 ft	3.9 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.786 J	0.831 J	1.01	0.865 U*	0.921 U*	0.892 U*
Barium	ug/L	220[A]	2,000[B]	23.8	23.1	25.3	26.9	27.6	28.6
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	18,700	18,400	18,700	22,300	22,400	22,400
Chromium	ug/L	56.7[A]	1,187[B]	<1.53	1.71 U*	2.34 U*	<1.53	1.92 U*	2.05 U*
Cobalt	ug/L	19[A]	120[B]	0.0950 J	0.0860 J	0.135 J	0.173 U*	0.170 U*	0.197 U*
Copper	ug/L	6.03[A]	8.65[B]	0.701 J	0.765 J	0.971 J	0.947 J	0.879 J	0.909 J
Iron	ug/L	n/v	n/v	66.5	78.1	165	122	135	183
Lead	ug/L	1.66[A]	42.6[B]	<0.128	<0.128	0.143 J	0.134 U*	0.139 U*	0.177 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,000	3,960	4,030	5,170	5,210	5,270
Manganese	ug/L	n/v	n/v	41.7	44.4	117	37.7	38.4	49.0
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	<0.610	0.620 J	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.378 U*	0.344 U*	0.468 U*	0.501 J	0.473 J	0.546 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	0.177 UJ	0.177 UJ	0.177 UJ
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.42 U*	1.91 U*	2.43 U*	1.64 U*	1.97 U*	2.15 U*
Zinc	ug/L	77.7[A]	77.7[B]	<3.22	3.27 U*	<3.22	3.40 U*	5.40 U*	5.13 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	<0.378	<0.378	0.388 J	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.749 J	0.931 J	0.946 J	0.828 J	0.782 J	0.825 J
Barium	ug/L	n/v	n/v	21.3	22.4	24.5	25.1	26.2	26.1
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,100	18,600	18,800	21,200	22,100	21,800
Chromium	ug/L	48.8[C]	375[D]	<1.53	1.88 U*	2.42 U*	1.78 J	1.84 J	1.76 J
Cobalt	ug/L	n/v	n/v	<0.0750	<0.0750	<0.0750	0.115 J	0.0910 J	0.104 J
Copper	ug/L	5.79[C]	8.31[D]	<0.627	0.799 J	0.735 J	0.787 J	0.734 J	0.682 J
Iron	ug/L	n/v	n/v	<19.5	40.9 J	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	3,890	4,000	4,040	4,930	5,080	5,000
Manganese	ug/L	n/v	n/v	<1.35	24.1	3.31 J	24.1	24.3	25.5
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	<0.610	<0.610	0.612 J	0.614 J	<0.610
Nickel	ug/L	33.8[C]	304[D]	<0.336	0.364 J	0.385 J	<0.336	0.483 J	0.375 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	0.177 UJ	0.177 UJ	0.177 UJ
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.40 U*	2.08 U*	2.16 U*	1.82	1.83	1.80
Zinc	ug/L	76.6[C]	76.0[D]	<3.22	<3.22	<3.22	<3.22	3.41 J	4.28 J
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	-0.179 +/-(0.0867)U	-0.112 +/-(0.130)U	-0.252 +/-(0.0834)U	-0.0178 +/-(0.0453)U	-0.0116 +/-(0.0653)U	0.0131 +/-(0.0624)U
Radium-228	pCi/L	n/v	n/v	0.124 +/-(0.303)U	0.634 +/-(0.390)	0.151 +/-(0.285)U	-0.00204 +/-(0.221)U	0.302 +/-(0.261)U	0.251 +/-(0.216)U
Radium-226+228	pCi/L	3[A]	3[B]	0.124 +/-(0.315)U	0.634 +/-(0.411)J	0.151 +/-(0.297)U	0.000 +/-(0.226)U	0.302 +/-(0.269)U	0.264 +/-(0.225)U
Anions									
Chloride	mg/L	230[A]	860[B]	4.79	4.76	4.76	7.68	7.69	7.64
Fluoride	mg/L	2.7[A]	9.8[B]	0.0660 J	0.0667 J	0.0666 J	0.0387 J	0.0375 J	0.0336 J
Sulfate	mg/L	n/v	n/v	7.79	7.89	7.71	12.1	12.1	11.9
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	63.1	62.2	63.2	77.1	77.3	77.7
Total Dissolved Solids	mg/L	n/v	n/v	83.0	149	155	80.0	120	82.0
Total Suspended Solids	mg/L	n/v	n/v	3.90	4.00	4.50	2.00	2.60	3.20

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH01-LB						
Sample Date		Ecological Surface Screening Levels		31-Jul-19	31-Jul-19	31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19	20-Nov-19
Sample ID				JOF-STR-BH01-LB-SUR-20190731	JOF-STR-DUP02-20190731	JOF-STR-BH01-LB-MID-20190731	JOF-STR-BH01-LB-BOT-20190731	JOF-STR-BH01-LB-SUR-20191120	JOF-STR-DUP03-20191120	JOF-STR-BH01-LB-BOT-20191120
Parent Sample ID					JOF-STR-BH01-LB-SUR-20190731				JOF-STR-BH01-LB-SUR-20191120	
Sample Depth				0.5 ft	0.5 ft	2.3 ft	4.1 ft	0.5 ft	0.5 ft	1.9 ft
Sample Type				Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.730 J	0.736 J	0.882 J	0.975 J	0.919 U*	0.741 U*	0.788 U*
Barium	ug/L	220[A]	2,000[B]	21.9	21.0	21.4	26.1	27.5	26.8	29.4
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	0.342 U*	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	52.7 J	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	0.197 U*	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	17,900	17,500	17,500	18,000	22,000	22,700	22,800
Chromium	ug/L	56.7[A]	1,187[B]	<1.53	4.56 U*	<1.53	<1.53	<1.53	1.70 U*	<1.53
Cobalt	ug/L	19[A]	120[B]	<0.0750	0.125 J	0.0880 J	0.245 J	0.266 U*	0.126 U*	0.295 U*
Copper	ug/L	6.03[A]	8.65[B]	0.756 J	**8.74 J[AB]**	0.679 J	1.00 J	0.833 J	0.909 J	0.881 J
Iron	ug/L	n/v	n/v	49.6 J	70.0	47.6 J	207	130	179	292
Lead	ug/L	1.66[A]	42.6[B]	<0.128	0.426 J	<0.128	0.217 J	0.246 U*	<0.128	0.267 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,180	4,070	4,070	4,300	5,050	5,480	5,150
Manganese	ug/L	n/v	n/v	40.2	39.6	40.1	267	44.9	44.5	72.6
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	1.26 U*	<0.610	0.681 U*	0.843 J	0.680 J	0.658 J
Nickel	ug/L	33.9[A]	305[B]	0.456 U*	2.96 J	0.631 U*	1.02 U*	0.547 J	0.444 J	0.587 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	0.177 UJ	<0.177	0.177 UJ
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	0.418 U*	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	<0.991	<0.991	<0.991	1.10 U*	<0.991	1.97 U*	1.06 U*
Zinc	ug/L	77.7[A]	77.7[B]	3.52 U*	8.05 U*	<3.22	4.30 U*	4.01 U*	3.83 U*	4.49 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.667 J	0.797 J	0.800 J	0.779 J	0.700 J	0.656 J	0.890 J
Barium	ug/L	n/v	n/v	19.6	20.8	19.9	22.8	26.0	24.9	25.7
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6	42.9 J	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.125 J
Calcium	ug/L	n/v	n/v	17,600	18,100	17,300	17,900	22,200	22,100	21,600
Chromium	ug/L	48.8[C]	375[D]	<1.53	4.73 U*	<1.53	<1.53	<1.53	1.69 J	2.25
Cobalt	ug/L	n/v	n/v	<0.0750	0.0830 J	<0.0750	<0.0750	0.127 J	<0.0750	0.115 J
Copper	ug/L	5.79[C]	8.31[D]	0.848 J	2.00	1.01 J	<0.627	0.686 J	0.723 J	0.821 J
Iron	ug/L	n/v	n/v	<19.5	28.0 J	27.0 J	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	4.18 J
Magnesium	ug/L	n/v	n/v	4,130	4,200	4,050	4,220	5,090	5,310	5,020
Manganese	ug/L	n/v	n/v	1.44 J	1.47 J	20.0	140	26.5	25.1	26.1
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	0.717 U*	0.947 U*	<0.610	0.622 U*	0.736 J	0.656 J	0.665 J
Nickel	ug/L	33.8[C]	304[D]	1.25 J	3.64 J	<0.336	0.350 J	0.384 J	<0.336	0.379 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	0.177 UJ	<0.177	0.177 UJ
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	0.179 J	<0.148	0.257 J
Vanadium	ug/L	n/v	n/v	<0.991	<0.991	<0.991	<0.991	<0.991	1.90	1.94
Zinc	ug/L	76.6[C]	76.0[D]	<3.22	<3.22	10.6 U*	3.69 U*	3.25 J	3.39 J	<3.22
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	-0.0662 +/-(0.118)U	-0.0461 +/-(0.0960)U	-0.105 +/-(0.113)U	0.0105 +/-(0.115)U	0.0251 +/-(0.0577)U	-0.0424 +/-(0.0449)U	-0.0648 +/-(0.0511)U
Radium-228	pCi/L	n/v	n/v	0.381 +/-(0.311)U	-0.0835 +/-(0.256)U	-0.0766 +/-(0.385)U	0.622 +/-(0.429)U	0.144 +/-(0.278)U	0.103 +/-(0.208)U	0.122 +/-(0.239)U
Radium-226+228	pCi/L	3[A]	3[B]	0.381 +/-(0.333)U	0.000 +/-(0.273)U	0.000 +/-(0.401)U	0.632 +/-(0.444)U	0.169 +/-(0.284)U	0.103 +/-(0.213)U	0.122 +/-(0.244)U
Anions										
Chloride	mg/L	230[A]	860[B]	4.75	4.74	4.75	4.74	5.90 J	7.64 J	7.54
Fluoride	mg/L	2.7[A]	9.8[B]	0.0659 J	0.0678 J	0.0687 J	0.0656 J	0.0681 J	0.0370 J	0.0353 J
Sulfate	mg/L	n/v	n/v	7.71	7.78	7.79	7.86	9.49 J	12.1 J	11.9
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	61.9	60.4	60.4	62.7	75.8	79.3	78.1
Total Dissolved Solids	mg/L	n/v	n/v	83.0	91.0	97.0	91.0	134 J	54.0 J	102
Total Suspended Solids	mg/L	n/v	n/v	4.30	3.80	3.90	10.2	3.00	3.30	4.20

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH01-RB					
Sample Date		Ecological Surface Screening Levels		31-Jul-19	31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19	20-Nov-19
Sample ID				JOF-STR-BH01-RB-SUR-20190731	JOF-STR-BH01-RB-MID-20190731	JOF-STR-BH01-RB-BOT-20190731	JOF-STR-BH01-RB-SUR-20191120	JOF-STR-BH01-RB-MID-20191120	JOF-STR-BH01-RB-BOT-20191120
Parent Sample ID									
Sample Depth				0.5 ft	2.4 ft	4.3 ft	0.5 ft	2 ft	3.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.784 J	1.12	1.10	0.909 U*	0.812 U*	0.793 U*
Barium	ug/L	220[A]	2,000[B]	22.8	21.1	22.5	26.9	26.4	26.4
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	48.7 U*	<38.6	<38.6	45.6 J	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	18,500	17,400	17,500	21,600	22,500	22,600
Chromium	ug/L	56.7[A]	1,187[B]	<1.53	1.69 U*	1.80 U*	2.10 U*	1.59 U*	2.50 U*
Cobalt	ug/L	19[A]	120[B]	0.0920 J	0.135 J	0.139 J	0.159 U*	0.146 U*	0.133 U*
Copper	ug/L	6.03[A]	8.65[B]	0.816 J	1.14 J	1.23 J	0.866 J	0.985 J	1.08 J
Iron	ug/L	n/v	n/v	59.4	83.2	100	120	129	170
Lead	ug/L	1.66[A]	42.6[B]	<0.128	<0.128	<0.128	<0.128	0.146 U*	0.144 U*
Lithium	ug/L	440[A]	910[B]	<3.39	3.56 U*	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	3,900	3,930	3,970	5,020	5,480	5,430
Manganese	ug/L	n/v	n/v	46.5	53.2	68.5	36.6	36.3	40.7
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	<0.610	<0.610	0.636 J	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.518 U*	0.361 U*	0.409 U*	0.510 J	0.470 J	0.774 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	0.177 UJ	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	0.180 U*	<0.148
Vanadium	ug/L	27[A]	79[B]	1.48 U*	2.25 U*	2.24 U*	2.06 U*	1.77 U*	2.07 U*
Zinc	ug/L	77.7[A]	77.7[B]	<3.22	3.98 U*	4.09 U*	5.02 U*	4.80 U*	3.83 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.864 J	0.985 J	1.07	0.887 J	0.691 J	0.674 J
Barium	ug/L	n/v	n/v	21.7	20.1	20.6	26.9	24.7	23.5
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	39.8 J	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,600	17,200	17,600	22,400	22,600	21,500
Chromium	ug/L	48.8[C]	375[D]	1.65 U*	<1.53	1.53 U*	1.78 J	1.85 J	1.60 J
Cobalt	ug/L	n/v	n/v	<0.0750	<0.0750	0.0810 J	0.105 J	<0.0750	<0.0750
Copper	ug/L	5.79[C]	8.31[D]	<0.627	0.931 J	0.934 J	0.711 J	0.835 J	0.839 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,010	3,900	3,960	5,240	5,410	5,170
Manganese	ug/L	n/v	n/v	<1.35	3.38 J	7.83	26.4	24.2	23.0
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	<0.610	<0.610	0.612 J	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	<0.336	<0.336	0.438 J	0.375 J	0.383 J	0.430 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	0.177 UJ	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.83 U*	1.76 U*	1.71 U*	1.80	1.75	1.70
Zinc	ug/L	76.6[C]	76.0[D]	<3.22	4.24 U*	<3.22	<3.22	4.28 J	3.94 J
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	0.0153 +/-(0.128)U	-0.0105 +/-(0.118)U	0.0455 +/-(0.134)U	0.0334 +/-(0.0707)U	0.0309 +/-(0.0777)U	-0.0523 +/-(0.0679)U
Radium-228	pCi/L	n/v	n/v	0.00969 +/-(0.263)U	-0.0633 +/-(0.281)U	0.246 +/-(0.225)U	0.267 +/-(0.193)U	0.0598 +/-(0.222)U	0.199 +/-(0.221)U
Radium-226+228	pCi/L	3[A]	3[B]	0.0249 +/-(0.292)U	0.000 +/-(0.305)U	0.292 +/-(0.262)U	0.301 +/-(0.206)U	0.0907 +/-(0.235)U	0.199 +/-(0.231)U
Anions									
Chloride	mg/L	230[A]	860[B]	4.79	4.82	4.08	7.58	7.58	7.50
Fluoride	mg/L	2.7[A]	9.8[B]	0.0628 J	0.0644 J	0.0585 J	0.0357 J	0.0396 J	0.0347 J
Sulfate	mg/L	n/v	n/v	7.86	7.96	6.09	11.9	11.8	11.6
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	62.3	59.5	60.0	74.6	78.9	78.8
Total Dissolved Solids	mg/L	n/v	n/v	141	72.0	102	67.0	99.0	97.0
Total Suspended Solids	mg/L	n/v	n/v	3.90	4.10	4.40	1.60	1.70	1.90

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH02-CC						
Sample Date		Ecological Surface Screening Levels		31-Jul-19	31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19	20-Nov-19	20-Nov-19
Sample ID				JOF-STR-BH02-CC-SUR-20190731	JOF-STR-BH02-CC-MID-20190731	JOF-STR-BH02-CC-BOT-20190731	JOF-STR-BH02-CC-SUR-20191120	JOF-STR-DUP01-20191120	JOF-STR-BH02-CC-MID-20191120	JOF-STR-BH02-CC-BOT-20191120
Parent Sample ID								JOF-STR-BH02-CC-SUR-20191120		
Sample Depth				0.5 ft	3.5 ft	6.2 ft	0.5 ft	0.5 ft	2.5 ft	5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.931 J	0.842 J	1.28	0.916 U*	0.646 U*	0.953 U*	0.902 U*
Barium	ug/L	220[A]	2,000[B]	23.3	23.4	28.2	27.3	25.9	27.9	29.0
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	0.202 U*	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	42.5 J	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	18,400	18,700	18,800	22,000	22,400	22,000	22,700
Chromium	ug/L	56.7[A]	1,187[B]	2.87 U*	1.91 U*	<1.53	2.28 U*	1.53 U*	2.33 U*	1.92 U*
Cobalt	ug/L	19[A]	120[B]	0.0930 J	0.0940 J	0.243 J	0.194 U*	0.126 U*	0.207 U*	0.226 U*
Copper	ug/L	6.03[A]	8.65[B]	0.849 J	0.853 J	0.988 J	0.979 J	0.864 J	0.910 J	0.909 J
Iron	ug/L	n/v	n/v	84.1	106	272	166	169	170	175
Lead	ug/L	1.66[A]	42.6[B]	<0.128	<0.128	0.196 J	0.178 U*	0.133 U*	0.181 U*	0.134 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,030	4,100	4,120	5,080	5,380	5,060	5,310
Manganese	ug/L	n/v	n/v	40.8	46.5	425	37.5	35.7	37.0	44.0
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.783 U*	0.510 U*	0.634 U*	0.502 J	0.422 J	0.512 J	0.577 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	0.177 UJ	<0.177	0.177 UJ	0.177 UJ
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	0.205 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	2.49 U*	1.88 U*	2.06 U*	2.15 U*	1.79 U*	2.37 U*	2.01 U*
Zinc	ug/L	77.7[A]	77.7[B]	3.35 U*	3.48 U*	4.65 U*	3.69 U*	4.32 U*	3.79 U*	3.71 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.858 J	0.766 J	1.18	1.04	0.679 J	0.817 J	0.808 J
Barium	ug/L	n/v	n/v	21.7	22.3	27.1	26.6	24.3	26.3	26.7
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	0.163 J	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,700	18,700	18,700	22,100	22,200	22,000	22,100
Chromium	ug/L	48.8[C]	375[D]	3.97 U*	2.39 U*	4.19 U*	1.87 J	1.66 J	1.86 J	1.73 J
Cobalt	ug/L	n/v	n/v	<0.0750	<0.0750	0.0900 J	0.228 J	<0.0750	0.100 J	0.135 J
Copper	ug/L	5.79[C]	8.31[D]	0.749 J	0.717 J	0.802 J	0.879 J	0.728 J	0.772 J	0.675 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	0.150 J	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,020	4,060	4,100	5,070	5,270	5,080	5,110
Manganese	ug/L	n/v	n/v	<1.35	<1.35	305	23.4	22.4	18.4	26.8
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	0.658 J	0.820 J	0.640 J	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	1.38 U*	1.01 U*	1.56 U*	0.561 J	0.363 J	0.365 J	0.484 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	0.177 UJ	<0.177	0.177 UJ	0.177 UJ
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	0.286 J	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.62 U*	1.46 U*	2.25 U*	1.93	1.84	1.97	1.74
Zinc	ug/L	76.6[C]	76.0[D]	<3.22	<3.22	3.88 U*	3.27 J	3.53 J	<3.22	3.50 J
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	0.0505 +/-(0.149)U	-0.0267 +/-(0.119)U	-0.0332 +/-(0.135)U	-0.0210 +/-(0.0631)U	-0.0731 +/-(0.0666)U	0.0466 +/-(0.0641)U	-0.0381 +/-(0.0509)U
Radium-228	pCi/L	n/v	n/v	0.305 +/-(0.270)U	-0.0827 +/-(0.257)U	0.257 +/-(0.271)U	0.0323 +/-(0.236)U	0.258 +/-(0.219)U	0.136 +/-(0.341)U	0.247 +/-(0.241)U
Radium-226+228	pCi/L	3[A]	3[B]	0.355 +/-(0.308)U	0.000 +/-(0.283)U	0.257 +/-(0.303)U	0.0323 +/-(0.244)U	0.258 +/-(0.229)U	0.183 +/-(0.347)U	0.247 +/-(0.246)U
Anions										
Chloride	mg/L	230[A]	860[B]	4.76	4.76	4.83	5.88 J	7.65 J	5.73	5.90
Fluoride	mg/L	2.7[A]	9.8[B]	0.0674 J	0.0671 J	0.0655 J	0.0681 J	0.0400 J	0.0657 J	0.0661 J
Sulfate	mg/L	n/v	n/v	7.79	7.75	7.89	9.39 J	12.1 J	9.14	9.58
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	62.6	63.5	64.0	75.8	78.2	75.6	78.5
Total Dissolved Solids	mg/L	n/v	n/v	69.0	82.0	77.0	165	146	173	210
Total Suspended Solids	mg/L	n/v	n/v	3.70	3.50	7.50	2.50	2.60	3.80	2.40

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH02-LB			STR-BH02-RB		
Sample Date		Ecological Surface Screening Levels		31-Jul-19	20-Nov-19	31-Jul-19	20-Nov-19	31-Jul-19	20-Nov-19
Sample ID				JOF-STR-BH02-LB-SUR-20190731	JOF-STR-BH02-LB-MID-20191120	JOF-STR-BH02-LB-BOT-20190731	JOF-STR-BH02-RB-SUR-20191120	JOF-STR-BH02-RB-MID-20190731	JOF-STR-BH02-RB-BOT-20191120
Parent Sample ID									
Sample Depth				0.5 ft	0.8 ft	2.1 ft	0.5 ft	0.9 ft	1.7 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.788 J	0.847 U*	0.920 J	0.902 U*	0.833 J	0.887 U*
Barium	ug/L	220[A]	2,000[B]	22.7	27.0	23.5	29.3	23.5	28.0
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	18,700	22,200	18,600	23,100	19,000	22,300
Chromium	ug/L	56.7[A]	1,187[B]	<1.53	1.60 U*	2.70 U*	1.78 U*	22.4	1.88 U*
Cobalt	ug/L	19[A]	120[B]	0.103 J	0.195 U*	0.117 J	0.191 U*	0.218 J	0.185 U*
Copper	ug/L	6.03[A]	8.65[B]	0.764 J	0.809 J	0.811 J	0.892 J	1.48 J	0.840 J
Iron	ug/L	n/v	n/v	96.5	144	119	171	198	166
Lead	ug/L	1.66[A]	42.6[B]	<0.128	<0.128	<0.128	0.155 U*	<0.128	0.142 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,060	5,110	4,060	5,290	4,130	5,250
Manganese	ug/L	n/v	n/v	44.7	40.5	46.8	41.6	49.3	41.6
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	<0.610	<0.610	1.58 J	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.459 U*	0.432 J	0.714 U*	0.526 J	5.37	0.492 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	0.177 UJ	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.53 U*	1.83 U*	2.24 U*	1.91 U*	1.83 U*	2.11 U*
Zinc	ug/L	77.7[A]	77.7[B]	3.38 U*	4.14 U*	3.83 U*	4.67 U*	3.32 U*	4.60 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	<0.378	<0.378	0.531 J	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.845 J	0.994 J	1.07	0.904 J	0.856 J	0.835 J
Barium	ug/L	n/v	n/v	21.7	27.8	22.1	26.2	21.4	26.6
Beryllium	ug/L	n/v	n/v	<0.182	0.305 J	0.291 J	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	51.6 J	44.1 J	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	0.151 J	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,900	22,000	19,100	21,900	18,400	22,400
Chromium	ug/L	48.8[C]	375[D]	1.78 U*	2.22	3.19 U*	2.23	2.39 U*	1.83 J
Cobalt	ug/L	n/v	n/v	<0.0750	0.141 J	0.121 J	0.103 J	<0.0750	0.119 J
Copper	ug/L	5.79[C]	8.31[D]	<0.627	0.811 J	0.789 J	0.725 J	0.835 J	0.779 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	3.57 J	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,060	5,120	4,100	5,040	3,960	5,220
Manganese	ug/L	n/v	n/v	1.67 J	26.5	2.22 J	24.4	<1.35	25.0
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	0.658 J	0.853 J	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	<0.336	0.429 J	1.24 U*	0.397 J	0.598 U*	0.377 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	0.177 UJ	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	0.310 J	0.185 J	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.96 U*	2.16	1.97 U*	2.09	2.08 U*	2.01
Zinc	ug/L	76.6[C]	76.0[D]	5.33 U*	3.61 J	4.23 U*	3.50 J	8.94 U*	3.39 J
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	-0.0890 +/-(0.0943)U	0.0618 +/-(0.0605)U	-0.00772 +/-(0.103)U	0.0431 +/-(0.0848)U	-0.118 +/-(0.122)U	0.0201 +/-(0.0712)U
Radium-228	pCi/L	n/v	n/v	-0.247 +/-(0.209)U	0.00828 +/-(0.226)U	-0.248 +/-(0.264)U	-0.0127 +/-(0.245)U	0.388 +/-(0.318)U	-0.0354 +/-(0.309)U
Radium-226+228	pCi/L	3[A]	3[B]	0.000 +/-(0.229)U	0.0701 +/-(0.234)U	0.000 +/-(0.283)U	0.0431 +/-(0.259)U	0.388 +/-(0.341)U	0.0201 +/-(0.317)U
Anions									
Chloride	mg/L	230[A]	860[B]	4.76	6.29	4.76	5.94	4.80	5.94
Fluoride	mg/L	2.7[A]	9.8[B]	0.0620 J	0.0663 J	0.0611 J	0.0650 J	0.0699 J	0.0682 J
Sulfate	mg/L	n/v	n/v	7.81	9.20	7.85	9.41	7.98	9.52
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	63.3	76.4	63.2	79.4	64.4	77.4
Total Dissolved Solids	mg/L	n/v	n/v	72.0	78.0	79.0	177	68.0	184
Total Suspended Solids	mg/L	n/v	n/v	4.20	2.50	4.20	2.40	3.50	2.50

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH03-CC					
Sample Date		Ecological Surface Screening Levels		31-Jul-19	31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19	20-Nov-19
Sample ID				JOF-STR-BH03-CC-SUR-20190731	JOF-STR-BH03-CC-MID-20190731	JOF-STR-BH03-CC-BOT-20190731	JOF-STR-BH03-CC-SUR-20191120	JOF-STR-BH03-CC-MID-20191120	JOF-STR-BH03-CC-BOT-20191120
Parent Sample ID									
Sample Depth				0.5 ft	2 ft	3.8 ft	0.5 ft	1.8 ft	3.1 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	2.78	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.18	1.02	0.974 J	0.847 U*	0.875 U*	0.907 U*
Barium	ug/L	220[A]	2,000[B]	21.2	22.6	24.0	27.6	27.7	27.4
Beryllium	ug/L	11[A]	93[B]	0.413 J	0.212 J	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	19,500	18,400	18,200	22,200	21,800	21,800
Chromium	ug/L	56.7[A]	1,187[B]	<1.53	5.71 U*	1.87 U*	1.91 U*	1.76 U*	2.01 U*
Cobalt	ug/L	19[A]	120[B]	0.146 J	0.189 J	0.151 J	0.174 U*	0.184 U*	0.203 U*
Copper	ug/L	6.03[A]	8.65[B]	0.971 J	0.982 J	0.794 J	0.903 J	0.970 J	0.848 J
Iron	ug/L	n/v	n/v	89.1	143	187	169	170	177
Lead	ug/L	1.66[A]	42.6[B]	0.156 J	0.172 J	0.196 J	0.139 U*	0.165 U*	0.156 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,980	4,030	4,030	5,150	5,070	5,050
Manganese	ug/L	n/v	n/v	54.9	53.0	74.8	40.3	39.4	40.9
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	1.58 J	0.961 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.614 U*	2.40 U*	0.507 U*	0.494 J	0.525 J	0.454 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	0.977 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	<0.991	2.00 U*	2.13 U*	2.00 U*	2.01 U*	2.10 U*
Zinc	ug/L	77.7[A]	77.7[B]	4.58 U*	3.51 U*	4.15 U*	4.46 U*	3.83 U*	4.22 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	0.610 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.810 J	0.875 J	0.910 J	0.839 J	0.805 J	0.807 J
Barium	ug/L	n/v	n/v	19.9	22.0	24.6	25.2	25.7	33.7
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	19,300	18,400	18,500	21,900	21,600	22,200
Chromium	ug/L	48.8[C]	375[D]	<1.53	<1.53	2.10 U*	1.54 J	<1.53	1.91 J
Cobalt	ug/L	n/v	n/v	<0.0750	<0.0750	<0.0750	0.0980 J	0.103 J	0.100 J
Copper	ug/L	5.79[C]	8.31[D]	2.19	0.669 J	0.798 J	0.687 J	0.633 J	0.707 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,980	4,030	4,140	5,040	4,990	5,060
Manganese	ug/L	n/v	n/v	2.39 J	<1.35	6.82	21.8	23.8	23.3
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	0.641 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	0.628 J	<0.336	0.388 U*	0.391 J	0.411 J	0.422 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	0.193 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	<0.991	1.61 U*	2.04 U*	1.63	1.51	1.83
Zinc	ug/L	76.6[C]	76.0[D]	<3.22	3.97 U*	5.30 U*	4.41 J	3.98 J	3.91 J
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	0.0612 +/-(0.127)U	-0.112 +/-(0.101)U	-0.150 +/-(0.128)U	-0.0191 +/-(0.0604)U	-0.0417 +/-(0.0691)U	0.0413 +/-(0.0684)U
Radium-228	pCi/L	n/v	n/v	0.250 +/-(0.279)U	0.191 +/-(0.269)U	-0.273 +/-(0.232)U	0.0680 +/-(0.217)U	0.132 +/-(0.228)U	0.0893 +/-(0.228)U
Radium-226+228	pCi/L	3[A]	3[B]	0.312 +/-(0.307)U	0.191 +/-(0.287)U	0.000 +/-(0.265)U	0.0680 +/-(0.225)U	0.132 +/-(0.238)U	0.131 +/-(0.238)U
Anions									
Chloride	mg/L	230[A]	860[B]	4.86	4.81	4.80	6.31	6.30	6.44
Fluoride	mg/L	2.7[A]	9.8[B]	0.0688 J	0.0637 J	0.0674 J	0.0681 J	0.0663 J	0.0690 J
Sulfate	mg/L	n/v	n/v	7.96	7.67	7.61	9.31	9.23	9.43
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	69.1	62.7	62.1	75.4	75.3	75.3
Total Dissolved Solids	mg/L	n/v	n/v	73.0	76.0	75.0	70.0	28.0	41.0
Total Suspended Solids	mg/L	n/v	n/v	3.40	4.00	6.00	2.10	2.70	3.00

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH03-LB			
Sample Date		Ecological Surface Screening Levels		31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19
Sample ID				JOF-STR-BH03-LB-SUR-20190731	JOF-STR-BH03-LB-BOT-20190731	JOF-STR-BH03-LB-SUR-20191120	JOF-STR-BH03-LB-BOT-20191120
Parent Sample ID							
Sample Depth				0.5 ft	2.6 ft	0.5 ft	2 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute				
Total Metals							
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.910 J	0.903 J	1.05 U*	0.910 U*
Barium	ug/L	220[A]	2,000[B]	24.0	23.4	28.3	26.7
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	0.341 U*	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	51.1 J	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	0.148 U*	<0.125
Calcium	ug/L	116,000[A]	n/v	18,000	17,900	22,000	21,500
Chromium	ug/L	56.7[A]	1,187[B]	5.76 U*	1.74 U*	2.48 U*	2.27 U*
Cobalt	ug/L	19[A]	120[B]	0.167 J	0.153 J	0.236 U*	0.192 U*
Copper	ug/L	6.03[A]	8.65[B]	1.15 J	0.873 J	0.974 J	0.929 J
Iron	ug/L	n/v	n/v	186	185	197	177
Lead	ug/L	1.66[A]	42.6[B]	0.178 J	0.137 J	0.247 U*	0.167 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	3.66 J	<3.39
Magnesium	ug/L	n/v	n/v	4,140	4,180	5,120	5,000
Manganese	ug/L	n/v	n/v	51.5	50.7	29.7	32.1
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	0.633 J	<0.610
Nickel	ug/L	33.9[A]	305[B]	2.59	0.745 U*	0.536 J	0.436 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	0.362 U*	<0.148
Vanadium	ug/L	27[A]	79[B]	1.90 U*	1.82 U*	2.24 U*	2.17 U*
Zinc	ug/L	77.7[A]	77.7[B]	5.54 U*	4.53 U*	4.03 U*	4.45 U*
Dissolved Metals							
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.817 J	0.857 J	0.805 J	0.783 J
Barium	ug/L	n/v	n/v	23.9	22.8	24.9	27.1
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,000	17,700	21,100	22,000
Chromium	ug/L	48.8[C]	375[D]	3.89 U*	1.86 U*	1.68 J	<1.53
Cobalt	ug/L	n/v	n/v	0.156 J	0.112 J	0.103 J	0.102 J
Copper	ug/L	5.79[C]	8.31[D]	1.23 J	0.700 J	0.687 J	0.878 J
Iron	ug/L	n/v	n/v	198	88.0	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,170	4,160	4,890	5,130
Manganese	ug/L	n/v	n/v	35.5	28.5	13.9	15.8
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	0.757 J	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	2.00	0.566 J	<0.336	0.386 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.76 U*	1.75 U*	1.76	1.60
Zinc	ug/L	76.6[C]	76.0[D]	4.53 U*	4.38 U*	<3.22	3.81 J
Radiological Parameters							
Radium-226	pCi/L	n/v	n/v	-0.0558 +/-(0.0728)UJ	-0.0617 +/-(0.0713)UJ	0.00819 +/-(0.0697)U	-0.0248 +/-(0.0657)U
Radium-228	pCi/L	n/v	n/v	0.243 +/-(0.289)U	-0.0362 +/-(0.218)U	0.325 +/-(0.248)U	0.0516 +/-(0.220)U
Radium-226+228	pCi/L	3[A]	3[B]	0.243 +/-(0.298)UJ	0.000 +/-(0.229)UJ	0.334 +/-(0.258)U	0.0516 +/-(0.230)U
Anions							
Chloride	mg/L	230[A]	860[B]	4.11	4.12	6.11	6.16
Fluoride	mg/L	2.7[A]	9.8[B]	0.0606 J	0.0561 J	0.0673 J	0.0670 J
Sulfate	mg/L	n/v	n/v	5.99	5.94	8.87	8.96
General Chemistry							
Hardness (as CaCO3)	mg/L	n/v	n/v	61.9	62.0	75.9	74.2
Total Dissolved Solids	mg/L	n/v	n/v	55.0	81.0	83.0	71.0
Total Suspended Solids	mg/L	n/v	n/v	5.60	5.40	3.20	3.00

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-BH03-RB				STR-CV01-CC	
Sample Date		Ecological Surface Screening Levels		31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19	19-Nov-19	30-Jul-19
Sample ID				JOF-STR-BH03-RB-SUR-20190731	JOF-STR-BH03-RB-BOT-20190731	JOF-STR-BH03-RB-SUR-20191120	JOF-STR-BH03-RB-BOT-20191120	JOF-STR-CV01-CC-SUR-20191119	JOF-STR-CV01-CC-MID-20190730
Parent Sample ID									
Sample Depth				0.5 ft	3.4 ft	0.5 ft	2 ft	0.4 ft	0.6 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.903 J	0.885 J	0.857 U*	0.824 U*	0.794 J	0.939 J
Barium	ug/L	220[A]	2,000[B]	22.9	23.3	27.7	27.7	22.8	24.2
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	18,700	19,100	22,400	22,000	20,400	19,100
Chromium	ug/L	56.7[A]	1,187[B]	5.10 U*	1.86 U*	<1.53	1.75 U*	1.90 J	<1.53
Cobalt	ug/L	19[A]	120[B]	0.142 J	0.227 J	0.195 U*	0.223 U*	0.435 U*	0.216 J
Copper	ug/L	6.03[A]	8.65[B]	0.920 J	0.770 J	0.785 J	0.790 J	1.02 J	0.777 J
Iron	ug/L	n/v	n/v	130	143	157	168	1,040	257
Lead	ug/L	1.66[A]	42.6[B]	0.128 J	<0.128	0.136 U*	<0.128	0.375 U*	0.239 J
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	53.4	<3.39
Magnesium	ug/L	n/v	n/v	4,060	4,150	5,190	5,090	4,620	4,010
Manganese	ug/L	n/v	n/v	53.0	72.7	39.5	42.5	355	123
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	0.815 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	1.81 U*	0.613 U*	0.521 J	0.562 J	0.824 U*	0.465 U*
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	2.01 U*	1.85 U*	1.74 U*	1.95 U*	2.13	1.85 U*
Zinc	ug/L	77.7[A]	77.7[B]	4.80 U*	4.51 U*	5.04 U*	4.37 U*	7.23 U*	3.57 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378	0.468 J
Arsenic	ug/L	150[C]	340[D]	0.824 J	0.862 J	0.791 J	0.833 J	0.617 J	1.01
Barium	ug/L	n/v	n/v	20.8	21.7	26.4	26.2	19.1	20.4
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,300	18,500	22,300	22,100	20,100	19,200
Chromium	ug/L	48.8[C]	375[D]	1.60 U*	4.39 U*	2.88	1.98 J	<1.53	1.95 U*
Cobalt	ug/L	n/v	n/v	<0.0750	0.114 J	0.125 J	0.122 J	0.173 U*	0.0760 J
Copper	ug/L	5.79[C]	8.31[D]	0.726 J	1.09 J	0.695 J	1.03 J	0.713 J	0.664 J
Iron	ug/L	n/v	n/v	<19.5	26.6 J	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	50.9	<3.39
Magnesium	ug/L	n/v	n/v	3,930	3,980	5,110	5,060	4,460	4,040
Manganese	ug/L	n/v	n/v	<1.35	12.4	25.5	27.4	261	3.36 J
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	0.863 J	0.673 J	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	0.339 U*	2.03 U*	1.11	0.400 J	0.415 U*	0.338 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.68 U*	1.68 U*	1.72	1.82	1.49	2.01 U*
Zinc	ug/L	76.6[C]	76.0[D]	3.35 U*	<3.22	3.32 J	8.37	<3.22	<3.22
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	-0.0268 +/-(0.115)U	0.0669 +/-(0.131)U	0.00567 +/-(0.0700)U	-0.0359 +/-(0.0704)U	0.0192 +/-(0.0868)U	-0.0159 +/-(0.127)U
Radium-228	pCi/L	n/v	n/v	0.00471 +/-(0.213)U	0.0354 +/-(0.276)U	-0.0214 +/-(0.224)U	0.00215 +/-(0.231)U	0.0941 +/-(0.287)U	0.0467 +/-(0.240)U
Radium-226+228	pCi/L	3[A]	3[B]	0.00471 +/-(0.242)U	0.102 +/-(0.306)U	0.00567 +/-(0.235)U	0.00215 +/-(0.241)U	0.113 +/-(0.300)U	0.0467 +/-(0.272)U
Anions									
Chloride	mg/L	230[A]	860[B]	4.82	4.86	5.91	5.93	7.93	3.76
Fluoride	mg/L	2.7[A]	9.8[B]	0.0666 J	0.0675 J	0.0682 J	0.0668 J	0.0799 J	0.0587 J
Sulfate	mg/L	n/v	n/v	8.17	8.54	9.74	9.75	13.9	5.58
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	63.5	64.8	77.3	76.0	69.9	64.1
Total Dissolved Solids	mg/L	n/v	n/v	86.0	84.0	43.0	59.0	113	94.0
Total Suspended Solids	mg/L	n/v	n/v	3.90	4.30	2.20	1.60	8.40	9.40

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location		Ecological Surface Screening Levels		STR-CV01-LB			STR-CV01-RB		STR-CV02-CC	
Sample Date				19-Nov-19	19-Nov-19	30-Jul-19	19-Nov-19	30-Jul-19	20-Nov-19	31-Jul-19
Sample ID				JOF-STR-CV01-LB-SUR-20191119	JOF-STR-DUP04-20191119	JOF-STR-CV01-LB-MID-20190730	JOF-STR-CV01-RB-SU-20191119	JOF-STR-CV01-RB-MID-20190730	JOF-STR-CV02-CC-SUR-20191120	JOF-STR-CV02-CC-MID-20190731
Parent Sample ID					JOF-STR-CV01-LB-SUR-20191119					
Sample Depth				0.2 ft	0.2 ft	0.6 ft	0.2 ft	0.7 ft	0.1 ft	0.8 ft
Sample Type				Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.409 U*
Arsenic	ug/L	150[A]	340[B]	0.810 J	0.805 J	1.10	0.784 J	1.21	0.699 J	1.94 U*
Barium	ug/L	220[A]	2,000[B]	26.3	25.2	25.2	23.8	28.9	27.7	47.3
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	0.249 J	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	21,100	21,200	19,000	20,300	18,400	16,000	16,700
Chromium	ug/L	56.7[A]	1,187[B]	1.85 J	1.70 J	1.57 U*	1.67 J	2.24 U*	2.15 U*	3.67 U*
Cobalt	ug/L	19[A]	120[B]	0.436 U*	0.367 J	0.351 J	0.524 U*	0.488 J	0.380 U*	0.540
Copper	ug/L	6.03[A]	8.65[B]	1.04 J	1.03 J	0.948 J	1.01 J	1.03 J	1.12 J	1.16 J
Iron	ug/L	n/v	n/v	587	494	511	597	693	812	879
Lead	ug/L	1.66[A]	42.6[B]	0.504 U*	0.434 J	0.409 J	0.553 U*	0.512 J	0.428 U*	0.418 J
Lithium	ug/L	440[A]	910[B]	24.3	26.7	<3.39	52.7	4.96 U*	4.55 J	6.95 U*
Magnesium	ug/L	n/v	n/v	4,700	4,810	3,990	4,570	3,900	4,150	3,940
Manganese	ug/L	n/v	n/v	249	245	149	385	341	92.2	391
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.683 U*	0.643 U*	0.669 U*	0.847 U*	0.834 U*	1.44 U*	1.08 U*
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	0.154 J	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	2.27	2.23	2.32 U*	2.20	2.76 U*	2.32	3.50 U*
Zinc	ug/L	77.7[A]	77.7[B]	4.96 U*	7.08 U*	3.95 U*	4.69 U*	4.08 U*	5.42 U*	5.51 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	<0.378	<0.378	0.473 J	<0.378	0.458 J	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.638 J	0.680 J	1.01	0.681 J	1.07	0.547 J	1.19
Barium	ug/L	n/v	n/v	22.1	20.8	19.2	18.0	18.3	21.8	18.7
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	0.374 J	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	38.6 J	<38.6	<38.6	46.1 J	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	0.143 U*	<0.125
Calcium	ug/L	n/v	n/v	21,500	20,900	18,800	19,900	18,700	15,800	16,200
Chromium	ug/L	48.8[C]	375[D]	<1.53	<1.53	<1.53	<1.53	2.14 U*	1.55 J	3.34 U*
Cobalt	ug/L	n/v	n/v	0.113 U*	0.103 J	0.154 J	0.165 U*	0.0850 J	0.167 U*	<0.0750
Copper	ug/L	5.79[C]	8.31[D]	0.660 J	0.847 J	0.693 J	0.707 J	0.690 J	0.849 J	<0.627
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	102	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	0.144 J	<0.128	<0.128	0.153 U*	<0.128
Lithium	ug/L	n/v	n/v	15.0	15.0	<3.39	54.1	5.06 U*	5.24	5.60 U*
Magnesium	ug/L	n/v	n/v	4,770	4,670	3,950	4,390	3,950	4,070	3,800
Manganese	ug/L	n/v	n/v	87.2	86.8	6.62	248	21.0	16.5 U*	1.65 J
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	<0.336	<0.336	0.384 J	0.443 U*	0.410 J	1.16 U*	0.554 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	0.234 J	<0.148	<0.148	0.225 U*	<0.148
Vanadium	ug/L	n/v	n/v	1.42	1.67	1.67 U*	1.39	2.25 U*	1.40	2.31 U*
Zinc	ug/L	76.6[C]	76.0[D]	4.15 U*	<3.22	<3.22	<3.22	3.54 U*	3.45 U*	3.89 U*
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	-0.0346 +/-(0.0569)U	0.0801 +/-(0.0780)U	-0.0971 +/-(0.0870)U	0.0482 +/-(0.0823)U	0.0254 +/-(0.109)U	-0.0552 +/-(0.0739)U	-0.0157 +/-(0.137)U
Radium-228	pCi/L	n/v	n/v	0.235 +/-(0.275)U	0.0383 +/-(0.226)U	0.127 +/-(0.230)U	0.783 +/-(0.316)J	0.183 +/-(0.214)U	0.180 +/-(0.276)U	0.701 +/-(0.302)
Radium-226+228	pCi/L	3[A]	3[B]	0.235 +/-(0.281)U	0.118 +/-(0.239)U	0.127 +/-(0.246)U	0.832 +/-(0.327)J	0.208 +/-(0.240)U	0.180 +/-(0.286)U	0.701 +/-(0.332)J
Anions										
Chloride	mg/L	230[A]	860[B]	7.40	7.21	3.85	7.80	3.95	14.8	4.74
Fluoride	mg/L	2.7[A]	9.8[B]	0.0738 J	0.0768 J	0.0621 J	0.0752 J	0.0617 J	0.0366 J	0.0699 J
Sulfate	mg/L	n/v	n/v	11.7	11.7	5.66	13.7	5.86	18.4	5.88
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	72.2	72.8	64.0	69.4	62.1	57.1	57.9
Total Dissolved Solids	mg/L	n/v	n/v	103	88.0	82.0	126	81.0	80.0	70.0
Total Suspended Solids	mg/L	n/v	n/v	6.90	6.30	13.5	10.6	25.6	12.7	17.0

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location		Ecological Surface Screening Levels		STR-CV02-LB				STR-CV02-RB	STR-CV03-CC	
Sample Date				31-Jul-19	31-Jul-19	31-Jul-19	20-Nov-19	31-Jul-19	31-Jul-19	20-Nov-19
Sample ID				JOF-STR-CV02-LB-SUR-20190731	JOF-STR-DUP01-20190731	JOF-STR-CV02-LB-BOT-20190731	JOF-STR-CV02-LB-MID-20191120	JOF-STR-CV02-RB-MID-20190731	JOF-STR-CV03-CC-MID-20190731	JOF-STR-CV03-CC-MID-20191120
Parent Sample ID					JOF-STR-CV02-LB-SUR-20190731					
Sample Depth				0.5 ft	0.5 ft	1.8 ft	0.7 ft	0.7 ft	0.8 ft	0.8 ft
Sample Type				Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	0.880 U*	<0.378	<0.378	<0.378	<0.378	0.442 U*	<0.378
Arsenic	ug/L	150[A]	340[B]	1.54 U*	1.53 U*	1.53 U*	0.750 J	1.76 U*	1.49 U*	0.596 J
Barium	ug/L	220[A]	2,000[B]	37.0	32.0	33.4	27.5	51.3	30.5	21.0
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	16,700	16,400	16,300	17,200	18,000	16,700	14,000
Chromium	ug/L	56.7[A]	1,187[B]	3.42 U*	3.34 U*	3.67 U*	1.89 U*	<1.53	3.79 U*	<1.53
Cobalt	ug/L	19[A]	120[B]	0.315 J	0.305 J	0.333 J	0.385 U*	0.588	0.319 J	0.192 U*
Copper	ug/L	6.03[A]	8.65[B]	1.22 J	0.986 J	1.01 J	1.11 J	0.937 J	0.767 J	0.866 J
Iron	ug/L	n/v	n/v	472	427	571	906	1,120	457	248
Lead	ug/L	1.66[A]	42.6[B]	0.266 J	0.226 J	0.308 J	0.403 U*	0.732 J	0.290 J	0.232 U*
Lithium	ug/L	440[A]	910[B]	5.78 U*	4.90 U*	4.74 U*	3.98 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	3,990	3,940	3,940	4,310	4,850	3,770	3,360
Manganese	ug/L	n/v	n/v	236	234	274	98.2	472	201	45.7
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	<0.610	<0.610	<0.610	0.623 J	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.838 U*	0.762 U*	0.857 U*	1.44 U*	1.34 U*	1.19 U*	0.886 U*
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	0.225 J	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	3.25 U*	3.08 U*	3.43 U*	2.18	2.21 U*	2.91 U*	1.56
Zinc	ug/L	77.7[A]	77.7[B]	5.15 U*	4.42 U*	5.08 U*	4.96 U*	4.15 U*	5.36 U*	3.94 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	0.630 J	<0.378	<0.378	<0.378	1.47 J	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.17	1.13	1.23	0.459 J	1.06	1.12	0.470 J
Barium	ug/L	n/v	n/v	19.9	19.5	19.9	21.9	19.0	17.6	18.5
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	0.421 J	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	16,600	16,200	16,400	17,100	18,100	16,800	14,000
Chromium	ug/L	48.8[C]	375[D]	2.88 U*	2.98 U*	3.33 U*	<1.53	<1.53	2.60 U*	<1.53
Cobalt	ug/L	n/v	n/v	<0.0750	<0.0750	<0.0750	0.131 U*	0.0760 J	<0.0750	0.0890 U*
Copper	ug/L	5.79[C]	8.31[D]	1.32 J	0.660 J	0.710 J	0.799 J	<0.627	<0.627	0.679 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	87.4	37.2 J	<19.5	34.9 J
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	4.85 U*	4.36 U*	4.26 U*	3.54 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	3,980	3,900	3,950	4,300	4,830	3,810	3,250
Manganese	ug/L	n/v	n/v	2.67 J	2.17 J	21.8	26.9 U*	7.50	<1.35	<1.35
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	<0.610	<0.610	<0.610	1.26 J	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	0.434 J	0.367 J	0.380 J	0.948 U*	0.683 J	0.677 J	0.646 U*
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	0.177 UJ	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	1.08	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	2.29 U*	2.36 U*	2.58 U*	1.17	<0.991	1.87 U*	1.18
Zinc	ug/L	76.6[C]	76.0[D]	4.41 U*	<3.22	3.98 U*	3.50 U*	3.68 U*	3.31 U*	<3.22
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	0.104 +/-(0.116)U	-0.0319 +/-(0.167)U	0.0207 +/-(0.135)U	-0.0241 +/-(0.0784)U	-0.0579 +/-(0.123)U	-0.0201 +/-(0.0849)U	0.0153 +/-(0.0553)U
Radium-228	pCi/L	n/v	n/v	0.406 +/-(0.257)J	0.0319 +/-(0.250)UJ	0.272 +/-(0.243)U	-0.0460 +/-(0.231)U	0.0294 +/-(0.299)U	0.478 +/-(0.281)	0.412 +/-(0.254)
Radium-226+228	pCi/L	3[A]	3[B]	0.510 +/-(0.282)J	0.0319 +/-(0.301)UJ	0.293 +/-(0.278)U	0.000 +/-(0.244)U	0.0294 +/-(0.323)U	0.478 +/-(0.294)J	0.427 +/-(0.260)J
Anions										
Chloride	mg/L	230[A]	860[B]	4.39	4.36	4.24	13.2	4.64	3.56	6.14
Fluoride	mg/L	2.7[A]	9.8[B]	0.0642 J	0.0652 J	0.0643 J	0.0338 J	0.0687 J	0.0621 J	0.0305 J
Sulfate	mg/L	n/v	n/v	5.91	5.71	5.64	16.6	5.68	5.52	12.8
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	58.1	57.1	57.0	60.6	65.0	57.2	48.5
Total Dissolved Solids	mg/L	n/v	n/v	79.0	85.0	75.0	90.0	86.0	76.0	40.0
Total Suspended Solids	mg/L	n/v	n/v	9.20	9.30	12.8	11.5	37.2	11.3	8.90

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location				STR-CV03-LB			STR-CV03-RB			
Sample Date				31-Jul-19	31-Jul-19	20-Nov-19	31-Jul-19	31-Jul-19	20-Nov-19	20-Nov-19
Sample ID		Ecological Surface Screening Levels		JOF-STR-CV03-LB-SUR-20190731	JOF-STR-CV03-LB-BOT-20190731	JOF-STR-CV03-LB-SUR-20191120	JOF-STR-CV03-RB-SUR-20190731	JOF-STR-CV03-RB-BOT-20190731	JOF-STR-CV03-RB-MID-20191120	JOF-STR-DUP02-20191120
Parent Sample ID										JOF-STR-CV03-RB-MID-20191120
Sample Depth				0.5 ft	2 ft	0.1 ft	0.5 ft	2.1 ft	0.8 ft	0.8 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute							
Total Metals										
Antimony	ug/L	190[A]	900[B]	0.688 U*	0.473 U*	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.66 U*	1.43 U*	0.725 J	1.51 U*	1.47 U*	0.611 J	0.590 J
Barium	ug/L	220[A]	2,000[B]	28.1	29.4	22.2	32.9	34.0	20.8	20.9
Beryllium	ug/L	11[A]	93[B]	0.396 J	<0.182	0.431 U*	<0.182	<0.182	0.236 J	<0.182
Boron	ug/L	7,200[A]	34,000[B]	50.2 U*	<38.6	53.6 J	<38.6	<38.6	39.8 J	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	0.228 J	<0.125	0.160 U*	<0.125	<0.125	0.141 J	<0.125
Calcium	ug/L	116,000[A]	n/v	16,700	17,100	15,800	16,800	16,900	13,800	14,100
Chromium	ug/L	56.7[A]	1,187[B]	2.82 U*	3.15 U*	<1.53	3.14 U*	3.01 U*	1.81 U*	1.53 U*
Cobalt	ug/L	19[A]	120[B]	0.416 J	0.388 J	0.242 U*	0.298 J	0.354 J	0.240 J	0.185 J
Copper	ug/L	6.03[A]	8.65[B]	0.981 J	0.998 J	0.947 J	0.665 J	0.815 J	1.17 J	1.14 J
Iron	ug/L	n/v	n/v	431	1,170	300	478	653	338	318
Lead	ug/L	1.66[A]	42.6[B]	0.446 J	0.327 J	0.349 U*	0.271 J	0.356 J	0.322 J	0.250 J
Lithium	ug/L	440[A]	910[B]	3.93 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	3,840	3,970	3,760	3,870	3,870	3,280	3,420
Manganese	ug/L	n/v	n/v	186	196	62.4	213	235	49.7	49.3
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	0.745 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	1.25 U*	1.21 U*	0.783 U*	1.08 U*	1.31 U*	0.958 U*	0.822 U*
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	0.402 J	0.192 J	0.366 U*	<0.148	<0.148	0.227 J	<0.148
Vanadium	ug/L	27[A]	79[B]	2.70 U*	2.77 U*	1.70	2.70 U*	2.86 U*	1.85	1.71
Zinc	ug/L	77.7[A]	77.7[B]	4.57 U*	4.39 U*	5.73 U*	5.01 U*	5.96 U*	4.66 U*	3.96 U*
Dissolved Metals										
Antimony	ug/L	n/v	n/v	0.555 J	0.450 J	<0.378	<0.378	1.16 J	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.19	1.23	0.565 J	1.05	1.21	0.460 J	0.401 J
Barium	ug/L	n/v	n/v	19.4	19.4	19.0	17.2	17.2	18.1	17.6
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	0.206 U*	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	39.4 J	<38.6	40.1 J	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	16,900	16,900	15,500	16,500	15,400	13,900	13,700
Chromium	ug/L	48.8[C]	375[D]	2.62 U*	3.14 U*	<1.53	2.76 U*	2.99 U*	<1.53	<1.53
Cobalt	ug/L	n/v	n/v	0.110 J	0.130 J	0.113 U*	<0.0750	<0.0750	<0.0750	<0.0750
Copper	ug/L	5.79[C]	8.31[D]	<0.627	4.02 J	0.767 J	<0.627	0.795 J	0.984 J	0.939 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	30.5 J	<19.5	<19.5	27.2 J	28.7 J
Lead	ug/L	1.44[C]	36.9[D]	<0.128	0.172 J	0.146 U*	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	5.64 U*	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	3,850	3,950	3,670	3,760	3,510	3,360	3,300
Manganese	ug/L	n/v	n/v	<1.35	3.63 J	10.5 U*	<1.35	3.67 J	2.05 U*	1.85 U*
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	0.643 J	0.548 J	0.547 U*	0.723 J	0.598 J	0.592 U*	0.531 U*
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	0.230 J	<0.148	0.207 U*	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.92 U*	2.08 U*	1.35	1.80 U*	2.21 U*	1.35	1.22
Zinc	ug/L	76.6[C]	76.0[D]	<3.22	5.57 U*	<3.22	3.86 U*	3.86 U*	<3.22	<3.22
Radiological Parameters										
Radium-226	pCi/L	n/v	n/v	-0.0594 +/-(0.120)U	-0.0232 +/-(0.0942)U	0.000851 +/-(0.0798)U	0.0886 +/-(0.132)U	0.0779 +/-(0.117)U	-0.0508 +/-(0.0542)U	-0.00455 +/-(0.0423)U
Radium-228	pCi/L	n/v	n/v	-0.0485 +/-(0.236)U	0.202 +/-(0.220)U	0.165 +/-(0.289)U	-0.0582 +/-(0.218)U	0.119 +/-(0.224)U	-0.0755 +/-(0.273)U	0.0599 +/-(0.226)U
Radium-226+228	pCi/L	3[A]	3[B]	0.000 +/-(0.265)U	0.202 +/-(0.239)U	0.166 +/-(0.300)U	0.0886 +/-(0.255)U	0.197 +/-(0.253)U	0.000 +/-(0.278)U	0.0599 +/-(0.230)U
Anions										
Chloride	mg/L	230[A]	860[B]	3.75	3.63	6.32	3.48	3.47	5.97	5.93
Fluoride	mg/L	2.7[A]	9.8[B]	0.0662 J	0.0612 J	0.0377 J	0.0602 J	0.0606 J	0.0321 J	0.0335 J
Sulfate	mg/L	n/v	n/v	5.93	5.50	12.5	5.41	5.47	12.5	12.4
General Chemistry										
Hardness (as CaCO3)	mg/L	n/v	n/v	57.6	59.0	55.0	58.0	58.1	47.9	49.4
Total Dissolved Solids	mg/L	n/v	n/v	66.0	70.0	64.0	78.0	85.0	22.0 J	43.0 J
Total Suspended Solids	mg/L	n/v	n/v	11.4	12.4	10.8	10.5	14.0	11.1	10.9

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location		Ecological Surface Screening Levels		STR-IC01-CC			STR-IC01-LB	
Sample Date				30-Jul-19	19-Nov-19	19-Nov-19	30-Jul-19	19-Nov-19
Sample ID				JOF-STR-IC01-CC-MID-20190730	JOF-STR-IC01-CC-SUR-20191119	JOF-STR-IC01-CC-BOT-20191119	JOF-STR-IC01-LB-MID-20190730	JOF-STR-IC01-LB-SUR-20191119
Parent Sample ID								
Sample Depth				1 ft	0.5 ft	1.9 ft	0.6 ft	0.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute					
Total Metals								
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	0.995 J	1.25 U*	1.21 U*	1.13	1.03 U*
Barium	ug/L	220[A]	2,000[B]	24.2	35.4	36.3	26.3	30.5
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	18,500	22,500	22,700	18,800	22,700
Chromium	ug/L	56.7[A]	1,187[B]	<1.53	2.74 U*	2.55 U*	43.2	2.16 U*
Cobalt	ug/L	19[A]	120[B]	0.198 J	1.43	1.66	0.727	0.539
Copper	ug/L	6.03[A]	8.65[B]	0.804 J	1.66 U*	1.72 U*	2.20	1.08 U*
Iron	ug/L	n/v	n/v	161	900	842	454	502
Lead	ug/L	1.66[A]	42.6[B]	0.147 J	0.786 U*	0.755 U*	0.240 J	0.399 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,060	5,220	5,220	4,150	5,200
Manganese	ug/L	n/v	n/v	120	343	401	128	139
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	0.644 J	<0.610	5.33	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.749 U*	1.18	1.18	25.8	0.781 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.68 U*	2.98 U*	2.91 U*	2.19 U*	2.41 U*
Zinc	ug/L	77.7[A]	77.7[B]	4.92 U*	5.57 U*	6.14 U*	5.31 U*	4.98 U*
Dissolved Metals								
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	0.870 J	0.861 J	0.811 J	0.903 J	0.939 J
Barium	ug/L	n/v	n/v	21.2	26.1	25.1	20.2	26.0
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	<38.6	<38.6	<38.6	<38.6	38.6 J
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,400	22,300	22,300	18,200	23,100
Chromium	ug/L	48.8[C]	375[D]	2.28 U*	2.00	1.70 J	1.91 U*	1.70 J
Cobalt	ug/L	n/v	n/v	<0.0750	0.123 J	0.104 J	0.0790 J	0.139 J
Copper	ug/L	5.79[C]	8.31[D]	<0.627	0.783 J	0.698 J	0.643 J	0.742 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	3.50 J	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,080	5,130	5,100	4,030	5,220
Manganese	ug/L	n/v	n/v	<1.35	43.2	42.6	<1.35	45.2
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	0.611 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	1.15	0.409 J	0.392 J	0.666 J	0.420 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.48 U*	1.77	1.77	1.70 U*	1.79
Zinc	ug/L	76.6[C]	76.0[D]	3.79 U*	3.60 J	3.73 J	8.32 U*	3.56 J
Radiological Parameters								
Radium-226	pCi/L	n/v	n/v	-0.0572 +/-(0.0607)UJ	-0.0262 +/-(0.0609)U	0.0345 +/-(0.0848)U	-0.00366 +/-(0.0768)UJ	-0.00722 +/-(0.0790)U
Radium-228	pCi/L	n/v	n/v	0.0629 +/-(0.244)U	0.387 +/-(0.234)	0.0316 +/-(0.237)U	-0.0712 +/-(0.240)U	0.0561 +/-(0.211)U
Radium-226+228	pCi/L	3[A]	3[B]	0.0629 +/-(0.251)UJ	0.387 +/-(0.242)J	0.0661 +/-(0.252)U	0.000 +/-(0.252)UJ	0.0561 +/-(0.225)U
Anions								
Chloride	mg/L	230[A]	860[B]	5.19	7.18	7.18	4.94	7.16
Fluoride	mg/L	2.7[A]	9.8[B]	0.0606 J	0.0679 J	0.0675 J	0.0661 J	0.0661 J
Sulfate	mg/L	n/v	n/v	6.31	9.79	9.70	6.40	10.2
General Chemistry								
Hardness (as CaCO3)	mg/L	n/v	n/v	62.8	77.7	78.1	64.0	78.1
Total Dissolved Solids	mg/L	n/v	n/v	140	108	57.0	132	58.0
Total Suspended Solids	mg/L	n/v	n/v	8.90	17.2	22.0	12.5	9.30

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location		Ecological Surface Screening Levels		STR-IC01-RB				
Sample Date				30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19
Sample ID				JOF-STR-IC01-RB-SUR-20190730	JOF-STR-IC01-RB-MID-20190730	JOF-STR-IC01-RB-BOT-20190730	JOF-STR-IC01-RB-SUR-20191119	JOF-STR-IC01-RB-BOT-20191119
Parent Sample ID								
Sample Depth				0.5 ft	2 ft	3.5 ft	0.5 ft	2.4 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute					
Total Metals								
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.08	1.08	1.16	1.07 U*	1.07 U*
Barium	ug/L	220[A]	2,000[B]	23.9	24.5	27.2	31.2	31.4
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	44.6 U*	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	18,900	18,200	18,900	22,400	22,000
Chromium	ug/L	56.7[A]	1,187[B]	4.52 U*	2.02 U*	1.85 U*	2.38 U*	2.11 U*
Cobalt	ug/L	19[A]	120[B]	0.211 J	0.237 J	0.410 J	0.943	0.961
Copper	ug/L	6.03[A]	8.65[B]	1.10 J	0.937 J	1.26 J	1.35 U*	1.29 U*
Iron	ug/L	n/v	n/v	125	195	405	570	577
Lead	ug/L	1.66[A]	42.6[B]	0.149 J	0.204 J	0.331 J	0.515 U*	0.478 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,160	4,090	4,280	5,150	5,060
Manganese	ug/L	n/v	n/v	98.3	146	239	228	231
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	0.118 J	0.111 J	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	0.883 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	2.40 J	0.773 U*	0.766 U*	0.900 J	0.875 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	1.95 U*	2.11 U*	2.32 U*	2.61 U*	2.35 U*
Zinc	ug/L	77.7[A]	77.7[B]	4.74 U*	4.62 U*	6.15 U*	7.57 U*	5.35 U*
Dissolved Metals								
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.03	0.961 J	0.946 J	0.823 J	0.877 J
Barium	ug/L	n/v	n/v	21.4	21.0	22.4	25.3	25.5
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	44.8 J	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	18,700	18,000	18,600	22,300	22,000
Chromium	ug/L	48.8[C]	375[D]	8.41 U*	9.35 U*	2.67 U*	1.70 J	1.97 J
Cobalt	ug/L	n/v	n/v	0.165 J	0.154 J	0.0860 J	0.0990 J	0.102 J
Copper	ug/L	5.79[C]	8.31[D]	0.766 J	1.11 J	<0.627	0.784 J	0.790 J
Iron	ug/L	n/v	n/v	38.9 J	44.8 J	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,090	4,030	4,130	5,110	5,040
Manganese	ug/L	n/v	n/v	1.55 J	1.60 J	67.7	36.4	38.0
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	1.35 J	1.37 J	0.683 J	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	4.60 J	5.50 J	1.51	0.391 J	0.415 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.75 U*	1.79 U*	1.56 U*	1.84	1.84
Zinc	ug/L	76.6[C]	76.0[D]	5.22 U*	4.50 U*	4.66 U*	3.45 J	<3.22
Radiological Parameters								
Radium-226	pCi/L	n/v	n/v	-0.00493 +/-(0.0748)UJ	0.0520 +/-(0.0904)UJ	0.0235 +/-(0.0705)UJ	-0.00374 +/-(0.0629)U	-0.0429 +/-(0.0711)U
Radium-228	pCi/L	n/v	n/v	0.108 +/-(0.252)U	0.129 +/-(0.257)U	0.194 +/-(0.261)U	0.126 +/-(0.223)U	0.172 +/-(0.232)U
Radium-226+228	pCi/L	3[A]	3[B]	0.108 +/-(0.263)UJ	0.181 +/-(0.272)UJ	0.218 +/-(0.270)UJ	0.126 +/-(0.232)U	0.172 +/-(0.243)U
Anions								
Chloride	mg/L	230[A]	860[B]	5.50	5.27	5.39	7.20	7.21
Fluoride	mg/L	2.7[A]	9.8[B]	0.0670 J	0.0655 J	0.0654 J	0.0684 J	0.0678 J
Sulfate	mg/L	n/v	n/v	6.90	6.47	6.51	9.87	9.88
General Chemistry								
Hardness (as CaCO3)	mg/L	n/v	n/v	64.4	62.2	64.9	77.0	75.9
Total Dissolved Solids	mg/L	n/v	n/v	151	124	138	110	117
Total Suspended Solids	mg/L	n/v	n/v	6.40	7.90	13.8	11.1	12.2

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location		Ecological Surface Screening Levels		STR-IC02-CC				
Sample Date				30-Jul-19	30-Jul-19	30-Jul-19	19-Nov-19	19-Nov-19
Sample ID				JOF-STR-IC02-CC-SUR-20190730	JOF-STR-IC02-CC-MID-20190730	JOF-STR-IC02-CC-BOT-20190730	JOF-STR-IC02-CC-SUR-20191119	JOF-STR-IC02-CC-BOT-20191119
Parent Sample ID								
Sample Depth				0.5 ft	2 ft	3.8 ft	0.7 ft	0.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute					
Total Metals								
Antimony	ug/L	190[A]	900[B]	0.424 J	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	150[A]	340[B]	1.25	1.15	1.16	1.06 U*	0.949 U*
Barium	ug/L	220[A]	2,000[B]	27.4	25.6	23.9	29.7	29.7
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	0.237 J	0.223 U*	0.183 U*
Boron	ug/L	7,200[A]	34,000[B]	41.8 U*	<38.6	50.8 U*	47.6 J	61.6 J
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	0.146 J	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	20,500	19,800	18,100	22,500	22,500
Chromium	ug/L	56.7[A]	1,187[B]	2.50 U*	4.31 U*	1.65 U*	2.00 U*	2.45 U*
Cobalt	ug/L	19[A]	120[B]	0.183 J	0.191 J	0.286 J	0.438 U*	0.394 U*
Copper	ug/L	6.03[A]	8.65[B]	0.905 J	1.06 J	0.945 J	1.17 U*	1.14 U*
Iron	ug/L	n/v	n/v	179	170	207	327	340
Lead	ug/L	1.66[A]	42.6[B]	0.155 J	0.148 J	0.274 J	0.332 U*	0.318 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	3.71 J	<3.39
Magnesium	ug/L	n/v	n/v	4,260	4,210	4,000	5,180	5,110
Manganese	ug/L	n/v	n/v	118	114	117	101	105
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	<0.610	0.802 J	0.696 J	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	0.627 U*	1.79 U*	0.863 U*	0.626 J	0.725 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	0.256 U*	0.220 U*	<0.148
Vanadium	ug/L	27[A]	79[B]	2.47 U*	2.44 U*	1.92 U*	2.24 U*	2.08 U*
Zinc	ug/L	77.7[A]	77.7[B]	4.12 U*	3.65 U*	4.72 U*	4.06 U*	4.96 U*
Dissolved Metals								
Antimony	ug/L	n/v	n/v	0.414 J	<0.378	0.835 J	<0.378	<0.378
Arsenic	ug/L	150[C]	340[D]	1.12 J	0.956 J	1.35	0.961 J	0.880 J
Barium	ug/L	n/v	n/v	23.2 J	21.9 J	22.2	24.7	27.7
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	0.369 J	0.292 J	<0.182
Boron	ug/L	n/v	n/v	42.3 J	<38.6	75.6 J	65.4 J	65.4 J
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	0.204 J	0.163 J	<0.125
Calcium	ug/L	n/v	n/v	20,700	19,400	19,200	21,600	23,100
Chromium	ug/L	48.8[C]	375[D]	3.67 U*	1.81 U*	2.09 U*	1.88 J	1.96 J
Cobalt	ug/L	n/v	n/v	<0.0750	<0.0750	0.195 J	0.150 J	0.123 J
Copper	ug/L	5.79[C]	8.31[D]	1.52 J	0.650 J	1.15 J	1.13 J	0.901 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	0.192 J	0.145 J	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	4.12 U*	3.78 J	<3.39
Magnesium	ug/L	n/v	n/v	4,290	4,050	4,260	4,970	5,200
Manganese	ug/L	n/v	n/v	<1.35	<1.35	<1.35	33.1	54.8
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	0.653 J	<0.610	0.708 J	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	1.08 J	0.602 J	0.722 J	0.427 J	0.443 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	0.404 J	0.324 J	<0.148
Vanadium	ug/L	n/v	n/v	2.32 U*	1.71 U*	2.05 U*	1.78	1.83
Zinc	ug/L	76.6[C]	76.0[D]	3.61 U*	<3.22	4.63 U*	<3.22	3.90 J
Radiological Parameters								
Radium-226	pCi/L	n/v	n/v	-0.0605 +/-(0.0740)UJ	0.0748 +/-(0.104)UJ	0.0770 +/-(0.102)UJ	-0.00702 +/-(0.0715)U	0.0231 +/-(0.0576)U
Radium-228	pCi/L	n/v	n/v	0.198 +/-(0.267)U	0.201 +/-(0.270)U	0.419 +/-(0.287)U	0.218 +/-(0.295)U	0.339 +/-(0.272)U
Radium-226+228	pCi/L	3[A]	3[B]	0.198 +/-(0.277)UJ	0.276 +/-(0.289)UJ	0.496 +/-(0.305)UJ	0.218 +/-(0.304)U	0.362 +/-(0.278)U
Anions								
Chloride	mg/L	230[A]	860[B]	6.04	5.34	5.10	7.07	7.95
Fluoride	mg/L	2.7[A]	9.8[B]	0.0705 J	0.0681 J	0.0671 J	0.0628 J	0.0659 J
Sulfate	mg/L	n/v	n/v	7.64	6.91	6.63	9.74	10.9
General Chemistry								
Hardness (as CaCO3)	mg/L	n/v	n/v	68.8	66.7	61.7	77.4	77.3
Total Dissolved Solids	mg/L	n/v	n/v	96.0	97.0	93.0	112	118
Total Suspended Solids	mg/L	n/v	n/v	6.80	5.90	7.40	6.80	6.60

See last page for notes.

Table J.1-2 Surface Stream Analytical Results - Intake Channel, Boat Harbor, Cove 1, Cove 2, and Cove 3
Johnsonville Fossil Plant

Sample Location		Ecological Surface Screening Levels		STR-IC02-LB			STR-IC02-RB		
Sample Date				30-Jul-19	30-Jul-19	19-Nov-19	30-Jul-19	19-Nov-19	19-Nov-19
Sample ID				JOF-STR-IC02-LB-SUR-20190730	JOF-STR-IC02-LB-BOT-20190730	JOF-STR-IC02-LB-MID-20191119	JOF-STR-IC02-RB-MID-20190730	JOF-STR-IC02-RB-SUR-20191119	JOF-STR-IC02-RB-BOT-20191119
Parent Sample ID									
Sample Depth				0.5 ft	2.3 ft	2 ft	1 ft	2.9 ft	0.5 ft
Sample Type				Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Tennessee River (Hardness = 60 mg/L)		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute						
Total Metals									
Antimony	ug/L	190[A]	900[B]	<0.378	<0.378	<0.378	<0.378	0.378 UJ	<0.378
Arsenic	ug/L	150[A]	340[B]	1.17	1.18	0.874 U*	1.12	0.937 U*	0.920 U*
Barium	ug/L	220[A]	2,000[B]	26.5	29.2	29.8	24.5	30.2	30.9
Beryllium	ug/L	11[A]	93[B]	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	7,200[A]	34,000[B]	41.9 U*	<38.6	39.8 J	55.5 U*	44.0 J	42.3 J
Cadmium	ug/L	0.526[A]	1.16[B]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	116,000[A]	n/v	20,600	20,600	22,600	18,600	23,000	22,300
Chromium	ug/L	56.7[A]	1,187[B]	2.70 U*	3.95 U*	1.96 U*	3.27 U*	1.97 U*	1.84 U*
Cobalt	ug/L	19[A]	120[B]	0.173 J	0.247 J	0.497 J	0.227 J	0.427 U*	0.412 U*
Copper	ug/L	6.03[A]	8.65[B]	0.869 J	1.27 J	1.23 U*	0.866 J	1.14 U*	1.01 U*
Iron	ug/L	n/v	n/v	157	250	546	158	382	382
Lead	ug/L	1.66[A]	42.6[B]	0.129 J	0.230 J	0.403 U*	0.188 J	0.347 U*	0.332 U*
Lithium	ug/L	440[A]	910[B]	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	n/v	n/v	4,200	4,290	5,120	4,100	5,290	5,160
Manganese	ug/L	n/v	n/v	107	234	113	131	103	112
Mercury	ug/L	0.77[A]	1.4[B]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	800[A]	7,200[B]	0.761 J	0.691 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	33.9[A]	305[B]	1.14 U*	1.34 U*	0.728 J	1.53 U*	0.745 J	0.717 J
Selenium	ug/L	3.1[A]	20[B]	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.57[B]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	6[A]	54[B]	<0.148	<0.148	<0.148	0.179 U*	<0.148	<0.148
Vanadium	ug/L	27[A]	79[B]	2.11 U*	2.08 U*	2.82 U*	1.73 U*	2.14 U*	2.15 U*
Zinc	ug/L	77.7[A]	77.7[B]	3.80 U*	11.5 U*	4.81 U*	4.33 U*	4.70 U*	4.57 U*
Dissolved Metals									
Antimony	ug/L	n/v	n/v	<0.378	<0.378	<0.378	0.387 J	3.31 J	<0.378
Arsenic	ug/L	150[C]	340[D]	1.07 J	1.18 J	0.760 J	1.02	0.911 J	0.907 J
Barium	ug/L	n/v	n/v	22.9 J	23.3 J	25.7	22.2	25.9	24.9
Beryllium	ug/L	n/v	n/v	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	n/v	n/v	41.0 J	<38.6	39.9 J	49.6 J	41.4 J	40.9 J
Cadmium	ug/L	0.489[C]	1.12[D]	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	n/v	n/v	20,400	20,100	23,200	19,100	22,500	21,600
Chromium	ug/L	48.8[C]	375[D]	<1.53	<1.53	1.71 J	3.53 U*	1.82 J	2.03
Cobalt	ug/L	n/v	n/v	<0.0750	<0.0750	0.113 J	0.116 J	0.115 J	0.102 J
Copper	ug/L	5.79[C]	8.31[D]	0.650 J	<0.627	0.877 J	0.724 J	1.01 J	0.782 J
Iron	ug/L	n/v	n/v	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	1.44[C]	36.9[D]	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	n/v	n/v	<3.39	<3.39	<3.39	<3.39	3.71 J	<3.39
Magnesium	ug/L	n/v	n/v	4,170	4,180	5,210	4,190	5,120	4,920
Manganese	ug/L	n/v	n/v	<1.35	17.3	37.9	<1.35	30.8	38.2
Mercury	ug/L	0.77[C]	1.4[D]	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	n/v	n/v	0.613 J	<0.610	<0.610	0.797 J	<0.610	<0.610
Nickel	ug/L	33.8[C]	304[D]	0.476 J	0.339 J	0.476 J	1.77	0.411 J	0.378 J
Selenium	ug/L	n/v	n/v	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	n/v	1.34[D]	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	n/v	n/v	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	n/v	n/v	1.77 U*	1.85 U*	2.35	1.81 U*	1.73	1.88
Zinc	ug/L	76.6[C]	76.0[D]	3.92 U*	3.89 U*	3.73 J	4.12 U*	9.53	3.92 J
Radiological Parameters									
Radium-226	pCi/L	n/v	n/v	-0.0925 +/-(0.0703)UJ	-0.0853 +/-(0.0728)UJ	0.0769 +/-(0.0837)U	0.0801 +/-(0.102)UJ	0.0548 +/-(0.0590)U	-0.0737 +/-(0.0500)U
Radium-228	pCi/L	n/v	n/v	0.262 +/-(0.383)U	0.430 +/-(0.281)U	0.142 +/-(0.278)U	-0.0685 +/-(0.210)U	0.00211 +/-(0.230)U	0.352 +/-(0.266)U
Radium-226+228	pCi/L	3[A]	3[B]	0.262 +/-(0.389)UJ	0.430 +/-(0.290)UJ	0.219 +/-(0.290)U	0.0801 +/-(0.233)UJ	0.0569 +/-(0.237)U	0.352 +/-(0.271)U
Anions									
Chloride	mg/L	230[A]	860[B]	6.14	5.55	7.23	5.38	6.90	7.34
Fluoride	mg/L	2.7[A]	9.8[B]	0.0684 J	0.0694 J	0.0671 J	0.0693 J	0.0696 J	0.0679 J
Sulfate	mg/L	n/v	n/v	7.85	6.88	9.90	6.82	9.56	10.1
General Chemistry									
Hardness (as CaCO3)	mg/L	n/v	n/v	68.8	69.0	77.5	63.4	79.2	77.0
Total Dissolved Solids	mg/L	n/v	n/v	95.0	96.0	114	91.0	98.0	109
Total Suspended Solids	mg/L	n/v	n/v	6.80	8.10	7.60	8.00	6.90	6.10

See last page for notes.

Notes:

[A]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Total Chronic
[B]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Total Acute
[C]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Dissolved Chronic
[D]	Ecological Surface Water Screening Levels - Tennessee River (Hardness = 60 mg/L) Dissolved Acute
6.5[A]	Concentration is greater than or equal to the indicated standard.
15.2	Measured concentration did not exceed the indicated standard.
<0.03	Analyte was not detected at a concentration greater than the laboratory reporting limit.
ft	feet
ID	identification
mg/L	milligrams per Liter
n/v	No standard/guideline value.
J	quantitation is approximate due to limitations identified during data validation
pCi/L	picocuries per Liter
U*	result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.
ug/L	micrograms per Liter

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

EXHIBITS

Exhibit No.

J.1-1

Title

Surface Stream Sampling Locations - July 2019

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-08-17
Technical Review by BL on 2023-08-17

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

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

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- Surface Stream Flow
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Management Unit Area (Approximate)
- Former Coal Yard (Approximate)
- Former Stilling Pond (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) and Esri World Imagery

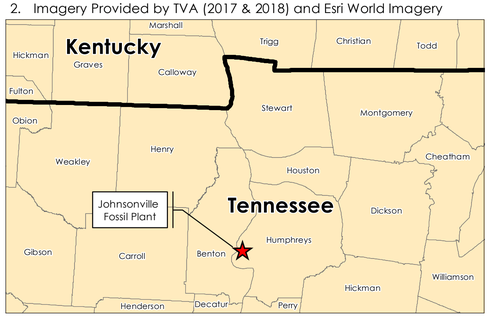

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Exhibit No.

J.1-2

Title

Surface Stream Sampling Locations - November 2019

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-08-17
Technical Review by BL on 2023-08-17

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

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

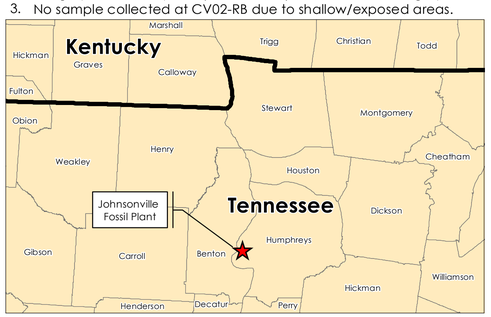
Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transect
- Surface Stream Flow
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Management Unit Area (Approximate)
- Former Coal Yard (Approximate)
- Former Stilling Pond (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) and Esri World Imagery
3. No sample collected at CV02-RB due to shallow/exposed areas.



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APPENDIX J.2

SURFACE STREAM SAMPLING AND ANALYSIS REPORT

Johnsonville Fossil Plant - Surface Stream Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Johnsonville Fossil Plant
New Johnsonville, Tennessee

October 14, 2022

Prepared by:

Tennessee Valley Authority

TENNESSEE VALLEY AUTHORITY

Revision Record

Revision	Description	Date
0	Submittal to TDEC	October 14, 2022

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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
JOF Plant	Johnsonville Fossil Plant
ORP	Oxidation-Reduction Potential
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) has prepared this sampling and analysis report (SAR) to document the completion of activities related to the surface stream investigation at TVA's Johnsonville Fossil Plant (JOF Plant) in New Johnsonville, 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 JOF 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 JOF 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 JOF 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 29, 2019, and the week of November 18, 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 JOF 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 JOF 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 JOF Plant Benthic SAP.

The scope of work for Phase 1 of the surface stream investigation consisted of sampling at 16 transect locations (up to 48 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 JOF Plant study area. Details of the sediment sampling activities are provided in the JOF Plant Benthic SAR.

3.0 FIELD ACTIVITIES

Surface stream investigation field activities were conducted during the weeks of July 29, 2019 and November 18, 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 November 19, 2019. CEC obtained split samples from each station and sample depth on transects STR-TR06 and STR-IC02.

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 16 transects specified in the SAP during a summer and autumn sampling event
- Recorded field measurements of surface stream water quality parameters at the sampled stations
- Collected QC samples including nine matrix spike/matrix spike duplicate/lab duplicates, 12 field duplicates, and eight field blanks, four equipment blanks, and four 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 16 transect locations under the surface stream investigation scope of work. The sampling locations and the TDEC Order CCR units at the JOF 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 eight transects on the mainstream of the Tennessee River and three in associated coves, two transects in the Intake Channel, and three transects in the Boat Harbor. These locations were selected to generally coincide with the sediment sampling locations (Stantec 2018b). Sample transects extended across the width of the reservoir 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 48 individual 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™ 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 (25th to 75th percentile) based on analysis of the mean daily flows for the Tennessee River at Pickwick 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™ 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 JOF 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 JOF 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 JOF 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.

- Surface water samples were not collected at station STR-CV02-RB during the November 2019 sampling event due to shallow water and seasonally exposed substrates.

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 JOF 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 JOF Plant. The scope of work during this investigation included Phase 1 surface stream sampling at 16 transect locations (up to 48 individual stations) during two seasonal sampling events. A total of 187 surface stream samples, including 12 field duplicates, were collected during the implementation of Phase 1 sampling the weeks of July 29, 2019 (summer pool) and November 18, 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 JOF Plant in New Johnsonville, 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 Johnsonville Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 3. December 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Surface Stream Sampling and Analysis Plan, Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec. 2018b. *Benthic Sampling and Analysis Plan, Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

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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
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2022-09-15
Technical Review by TB on 2022-09-15

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

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

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transects
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & Esri World Imagery

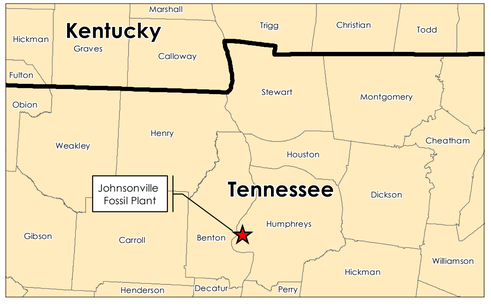

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Exhibit No.

A.2

Title

Surface Stream Sampling Locations - November 2019

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2022-09-15
Technical Review by TB on 2022-09-15

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

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

Legend

- Surface Stream Sampling Locations
- Surface Stream Sampling Locations – Transects
- 2017 Imagery Boundary
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- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
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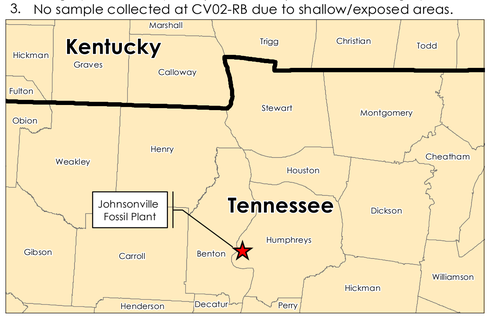
3. No sample collected at CV02-RB due to shallow/exposed areas.



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APPENDIX B - TABLES

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

Transect Location ID	Description
STR-TR01	Tennessee River Upstream of Plant (Background)
STR-TR02	Tennessee River Upstream of Plant (Background)
STR-TR03	Tennessee River Upstream of Plant (Background)
STR-TR04	Tennessee River on West Side of Ash Pond 2
STR-TR05	Tennessee River on West Side of Ash Pond 2
STR-TR06	Tennessee River at Northern End of Ash Pond 2 and Southern End of Ash Pond 1
STR-TR07	Tennessee River at Northern End of Ash Pond 1
STR-TR08	Tennessee River Downstream from Ash Ponds
STR-IC01	Intake Channel Adjacent to Ash Pond 2
STR-IC02	Intake Channel Adjacent to Ash Pond 2
STR-BH01	Boat Harbor Adjacent to Ash Pond 2
STR-BH02	Boat Harbor Adjacent to Ash Pond 2
STR-BH03	Boat Harbor North of Ash Pond 2
STR-CV01	Cove on East Side of Tennessee River Upstream from Plant (Indian Creek)
STR-CV02	Cove on West Side of Tennessee River (Cypress Creek)
STR-CV03	Cove on West Side of Tennessee River (Beaverdam Creek)

Notes:

ID Identification

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

Corresponding Sampling Locations				
Surface Stream	**Sediment**	**Benthic Community**	**Mayfly**	**Fish Tissue**
–	–	MAC-TR01	–	–
STR-TR01	SED-TR01	–	–	–
STR-TR02	SED-TR02	MAC-TR02	–	–
STR-TR03	SED-TR03	–	–	–
STR-TR04	SED-TR04	MAC-TR03	TRA	TRA
STR-TR05	SED-TR05	MAC-TR04		
STR-TR06	SED-TR06	MAC-TR05	–	–
STR-TR07	SED-TR07	MAC-TR06	–	–
STR-TR08	SED-TR08	MAC-TR07	–	–
–	–	MAC-TR08	–	–
–	–	MAC-TR09	–	–
–	–	MAC-TR10	TRU	TRU
–	–	MAC-TR11	TRD	TRD
STR-CV01	SED-CV01	MAC-CV01	–	–
STR-CV02	SED-CV02	MAC-CV02	–	–
STR-CV03	SED-CV03	MAC-CV03	–	–
–	–	MAC-IC01	–	–
–	–	MAC-IC02	–	–
STR-IC01	SED-IC01	MAC-IC03	IC	IC
STR-IC02	SED-IC02	–		
STR-BH01	SED-BH01	MAC-BH01	BH	BH
STR-BH02	SED-BH02	MAC-BH02		
STR-BH03	SED-BH03	MAC-BH03		

Notes:

– Not applicable

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

				Field Measurements						Analysis										
Location ID	Date	Sample ID	Sample Type	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	30-Jul-2019	JOF-STR-TR01-LB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-RB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR01-LB-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-CC-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR01-RB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR02	30-Jul-2019	JOF-STR-TR02-LB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP04-20190730	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-RB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR02-LB-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-CC-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR02-RB-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR03	30-Jul-2019	JOF-STR-TR03-LB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-RB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-RB-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR03-LB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP01-20191119	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-LB-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-CC-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-RB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR03-RB-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR04	30-Jul-2019	JOF-STR-TR04-LB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP02-20190730	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-RB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR04-LB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-CC-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR04-RB-SUR-20191119	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
Johnsonville Fossil Plant
July and November 2019

				Field Measurements						Analysis										
Location ID	Date	Sample ID	Sample Type	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-TR05	30-Jul-2019	JOF-STR-TR05-LB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR05-LB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP02-20191119	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-CC-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR05-RB-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR06	30-Jul-2019	JOF-STR-TR06-LB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-RB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-RB-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP03-20190730	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR06-LB-SUR-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-CC-SUR-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-CC-MID-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-CC-BOT-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR06-RB-SUR-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR07	30-Jul-2019	JOF-STR-TR07-LB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP01-20190730	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR07-LB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-LB-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-CC-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR07-RB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-TR08	30-Jul-2019	JOF-STR-TR08-LB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-LB-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-RB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-RB-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-TR08-LB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-CC-MID-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-RB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-TR08-RB-BOT-20191119	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
Johnsonville Fossil Plant
July and November 2019

				Field Measurements						Analysis										
Location ID	Date	Sample ID	Sample Type	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-IC01	30-Jul-2019	JOF-STR-IC01-LB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-RB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-RB-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-IC01-LB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-CC-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-RB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC01-RB-BOT-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-IC02	30-Jul-2019	JOF-STR-IC02-LB-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-LB-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-CC-SUR-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-CC-BOT-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-IC02-LB-MID-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-CC-SUR-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-CC-BOT-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-RB-SUR-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-IC02-RB-BOT-20191119	Normal Environmental Sample [2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-BH01	31-Jul-2019	JOF-STR-BH01-LB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP02-20190731	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-LB-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-LB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-CC-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-CC-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-CC-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-RB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-RB-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-RB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	20-Nov-2019	JOF-STR-BH01-LB-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP03-20191120	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-LB-BOT-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-CC-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-CC-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-CC-BOT-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-RB-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-RB-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH01-RB-BOT-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-BH02	31-Jul-2019	JOF-STR-BH02-LB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-LB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-CC-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-CC-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-CC-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-RB-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	20-Nov-2019	JOF-STR-BH02-LB-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-CC-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP01-20191120	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-CC-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-CC-BOT-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-RB-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH02-RB-BOT-20191120	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
Johnsonville Fossil Plant
July and November 2019

				Field Measurements						Analysis										
Location ID	Date	Sample ID	Sample Type	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-BH03	31-Jul-2019	JOF-STR-BH03-LB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-LB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-CC-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-CC-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-CC-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-RB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-RB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	20-Nov-2019	JOF-STR-BH03-LB-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-LB-BOT-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-CC-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-CC-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-CC-BOT-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-RB-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-BH03-RB-BOT-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-CV01	30-Jul-2019	JOF-STR-CV01-LB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV01-CC-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV01-RB-MID-20190730	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	19-Nov-2019	JOF-STR-CV01-LB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP04-20191119	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV01-CC-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV01-RB-SUR-20191119	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-CV02	31-Jul-2019	JOF-STR-CV02-LB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP01-20190731	Field Duplicate Sample							X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV02-LB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV02-CC-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV02-RB-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	20-Nov-2019	JOF-STR-CV02-LB-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV02-CC-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STR-CV03	31-Jul-2019	JOF-STR-CV03-LB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV03-LB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV03-CC-MID-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV03-RB-SUR-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV03-RB-BOT-20190731	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	20-Nov-2019	JOF-STR-CV03-LB-SUR-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV03-CC-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-CV03-RB-MID-20191120	Normal Environmental Sample	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		JOF-STR-DUP02-20191120	Field Duplicate Sample							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
Johnsonville 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
Tennessee River July 2019	STR-TR01-LB	7/30/2019	29.67	143.0	7.62	7.87	105.0	13.6	192	0.5	1.24	0.5	–	–
	STR-TR01-LB	7/30/2019	29.36	141.8	7.49	7.42	98.4	17.4	198	1				
	STR-TR01-LB	7/30/2019	29.36	142.0	7.50	7.61	100.9	19.5	204	1.24				
	STR-TR01-CC	7/30/2019	29.64	141.4	7.79	8.42	112.2	6.6	188	0.5	16.6	0.5	8	16.1
	STR-TR01-CC	7/30/2019	29.57	141.3	7.78	8.44	112.4	6.7	189	1.5				
	STR-TR01-CC	7/30/2019	29.05	141.1	7.63	7.88	104.0	7.1	190	3				
	STR-TR01-CC	7/30/2019	28.93	140.8	7.50	7.52	99.0	7.2	193	4				
	STR-TR01-CC	7/30/2019	28.89	140.9	7.50	7.43	97.7	7.3	194	5				
	STR-TR01-CC	7/30/2019	28.84	141.5	7.52	7.42	97.5	7.6	194	6				
	STR-TR01-CC	7/30/2019	28.81	141.7	7.54	7.46	98.0	7.8	195	7				
	STR-TR01-CC	7/30/2019	28.79	141.7	7.53	7.46	98.0	7.9	197	8				
	STR-TR01-CC	7/30/2019	28.75	141.8	7.48	7.44	97.6	7.9	200	9				
	STR-TR01-CC	7/30/2019	28.70	142.4	7.50	7.35	96.4	7.9	201	10				
	STR-TR01-CC	7/30/2019	28.70	142.3	7.47	7.37	96.6	7.9	202	11				
	STR-TR01-CC	7/30/2019	28.67	142.4	7.49	7.27	95.3	7.9	204	12				
	STR-TR01-CC	7/30/2019	28.65	142.6	7.49	7.27	95.2	7.9	205	13				
	STR-TR01-CC	7/30/2019	28.65	142.4	7.49	7.24	94.8	8.0	206	14				
	STR-TR01-CC	7/30/2019	28.65	142.6	7.50	7.24	94.8	8.0	208	15				
	STR-TR01-CC	7/30/2019	28.65	142.6	7.51	7.20	94.3	8.0	210	16				
	STR-TR01-CC	7/30/2019	28.65	142.6	7.51	7.22	94.6	8.1	212	16.6				
	STR-TR01-RB	7/30/2019	30.07	142.4	7.88	8.75	117.5	8.4	213	0.5	1.06	0.5	–	–
	STR-TR01-RB	7/30/2019	30.05	142.2	7.84	8.68	116.5	8.4	216	1.06				
	STR-TR02-LB	7/30/2019	29.23	142.9	7.62	7.93	104.9	10.9	211	0.5	1.5	–	0.8	–
	STR-TR02-LB	7/30/2019	29.14	142.8	7.57	7.75	102.4	12.0	214	1				
	STR-TR02-LB	7/30/2019	29.05	142.4	7.51	7.44	98.2	13.5	214	1.5				
	STR-TR02-CC	7/30/2019	29.37	142.4	7.67	7.92	105.1	6.6	181	0.5	16.7	0.5	8	16.2
	STR-TR02-CC	7/30/2019	29.28	142.2	7.65	7.93	103.2	6.9	181	1.5				
	STR-TR02-CC	7/30/2019	28.87	142.4	7.58	7.69	101.1	7.1	182	3				
	STR-TR02-CC	7/30/2019	28.83	142.3	7.56	7.53	99.0	7.2	182	4				
	STR-TR02-CC	7/30/2019	28.80	142.7	7.60	7.50	98.5	7.3	183	5				
	STR-TR02-CC	7/30/2019	28.80	142.4	7.50	7.43	97.6	7.3	183	6				
	STR-TR02-CC	7/30/2019	28.80	142.8	7.50	7.40	97.2	7.3	184	7				
	STR-TR02-CC	7/30/2019	28.80	142.8	7.50	7.40	97.2	7.3	185	8				
	STR-TR02-CC	7/30/2019	28.80	142.7	7.50	7.40	97.2	7.3	186	9				
	STR-TR02-CC	7/30/2019	28.70	142.9	7.50	7.40	97.0	7.4	187	10				
	STR-TR02-CC	7/30/2019	28.70	142.9	7.50	7.30	95.7	7.5	188	11				
	STR-TR02-CC	7/30/2019	28.70	143.3	7.50	7.30	95.7	7.7	188	12				
	STR-TR02-CC	7/30/2019	28.70	143.0	7.50	7.30	95.7	7.8	188	13				
	STR-TR02-CC	7/30/2019	28.60	143.4	7.50	7.30	95.5	8.0	188	14				
	STR-TR02-CC	7/30/2019	28.60	143.4	7.50	7.30	95.5	8.2	188	15				
	STR-TR02-CC	7/30/2019	28.60	143.4	7.50	7.30	95.5	8.8	188	16				
	STR-TR02-CC	7/30/2019	28.60	143.0	7.50	7.30	95.5	8.4	188	16.7				
	STR-TR02-RB	7/30/2019	29.13	143.5	7.73	8.30	109.7	9.4	204	0.5	1.14	0.5	–	–
	STR-TR02-RB	7/30/2019	29.05	143.4	7.74	8.54	112.7	9.8	207	1				
	STR-TR02-RB	7/30/2019	28.97	143.3	7.76	8.60	113.3	10.4	208	1.14				
	STR-TR03-LB	7/30/2019	28.60	144.2	7.51	7.36	96.3	14.1	179	0.5	0.96	0.5	–	–
	STR-TR03-LB	7/30/2019	28.60	143.8	7.50	7.34	96.1	15.1	181	0.96				
	STR-TR03-CC	7/30/2019	28.74	143.7	7.55	7.45	97.8	7.1	185	0.5	16.41	0.5	8	16
	STR-TR03-CC	7/30/2019	28.73	143.6	7.54	7.40	97.1	7.1	187	1.5				
	STR-TR03-CC	7/30/2019	28.72	143.9	7.52	7.44	97.6	7.2	185	3				
	STR-TR03-CC	7/30/2019	28.71	143.9	7.53	7.38	96.8	7.2	181	4				
	STR-TR03-CC	7/30/2019	28.71	143.8	7.53	7.41	97.2	7.2	182	5				
	STR-TR03-CC	7/30/2019	28.73	143.7	7.53	7.49	98.3	7.2	181	6				
	STR-TR03-CC	7/30/2019	28.72	143.8	7.52	7.43	97.5	7.3	182	7				
	STR-TR03-CC	7/30/2019	28.72	143.5	7.53	7.41	97.2	7.3	183	8				
	STR-TR03-CC	7/30/2019	28.71	143.9	7.51	7.42	97.3	7.3	184	9				
	STR-TR03-CC	7/30/2019	28.72	143.6	7.50	7.39	96.9	7.3	185	10				
	STR-TR03-CC	7/30/2019	28.70	143.9	7.49	7.40	97.0	7.3	186	11				
	STR-TR03-CC	7/30/2019	28.72	143.8	7.49	7.39	96.9	7.3	186	12				
	STR-TR03-CC	7/30/2019	28.71	143.6	7.50	7.41	97.2	7.3	187	13				
	STR-TR03-CC	7/30/2019	28.68	143.7	7.50	7.32	95.9	7.3	189	14				
	STR-TR03-CC	7/30/2019	28.69	143.7	7.51	7.36	96.5	7.3	189	15				
	STR-TR03-CC	7/30/2019	28.68	143.9	7.51	7.34	96.2	7.5	191	16				
	STR-TR03-CC	7/30/2019	28.67	143.5	7.52	7.32	95.9	7.6	195	16.41				
	STR-TR03-RB	7/30/2019	29.10	148.5	7.80	8.00	105.6	8.4	176	0.5	5.02	0.5	2.5	4.5
	STR-TR03-RB	7/30/2019	28.90	148.0	7.66	7.40	97.4	10.1	177	1.5				
	STR-TR03-RB	7/30/2019	28.80	146.7	7.60	7.10	93.3	12.9	178	3				
	STR-TR03-RB	7/30/2019	28.77	146.5	7.56	7.02	92.2	13.9	177	4				
	STR-TR03-RB	7/30/2019	28.77	146.4	7.53	7.07	92.8	13.5	177	5.02				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Johnsonville 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
Tennessee River July 2019	STR-TR04-LB	7/30/2019	28.64	143.7	7.51	7.34	96.1	10.1	173	0.5	1.2	0.5	–	–
	STR-TR04-LB	7/30/2019	26.64	143.9	7.47	7.39	93.4	10.0	176	1				
	STR-TR04-LB	7/30/2019	28.62	143.4	7.46	7.29	95.5	10.3	174	1.2				
	STR-TR04-CC	7/30/2019	28.70	144.6	7.60	7.40	97.0	7.5	166	0.5	14.2	0.5	7	13.7
	STR-TR04-CC	7/30/2019	28.70	144.7	7.60	7.40	97.0	7.6	168	1.5				
	STR-TR04-CC	7/30/2019	28.70	144.0	7.60	7.40	97.0	7.6	163	3				
	STR-TR04-CC	7/30/2019	28.70	144.4	7.50	7.40	97.0	7.6	162	4				
	STR-TR04-CC	7/30/2019	28.70	144.3	7.60	7.40	97.0	7.6	159	5				
	STR-TR04-CC	7/30/2019	28.70	144.4	7.50	7.40	97.0	7.5	159	6				
	STR-TR04-CC	7/30/2019	28.70	144.2	7.50	7.40	97.0	7.4	159	7				
	STR-TR04-CC	7/30/2019	28.70	144.2	7.50	7.40	97.0	7.4	161	8				
	STR-TR04-CC	7/30/2019	28.70	144.6	7.50	7.40	97.0	7.4	161	9				
	STR-TR04-CC	7/30/2019	28.70	144.3	7.50	7.30	95.7	7.5	162	10				
	STR-TR04-CC	7/30/2019	28.70	144.4	7.50	7.40	97.0	7.6	161	11				
	STR-TR04-CC	7/30/2019	28.70	144.0	7.50	7.30	95.7	7.7	161	12				
	STR-TR04-CC	7/30/2019	28.70	144.2	7.50	7.40	97.0	8.3	161	13				
	STR-TR04-CC	7/30/2019	28.70	144.4	7.50	7.30	95.7	9.3	162	14				
	STR-TR04-CC	7/30/2019	28.67	144.4	7.50	7.30	95.7	9.0	162	14.2				
	STR-TR04-RB	7/30/2019	28.60	162.5	7.60	7.20	94.2	7.3	187	0.5	1.16	0.5	–	–
	STR-TR04-RB	7/30/2019	28.60	165.7	7.50	7.10	92.9	7.6	193	1				
	STR-TR04-RB	7/30/2019	28.60	164.8	7.40	7.09	92.8	8.9	204	1.16				
	STR-TR05-LB	7/30/2019	29.80	143.9	7.09	8.02	107.2	9.6	221	0.5	1.5	–	0.75	–
	STR-TR05-LB	7/30/2019	29.30	143.2	7.06	7.92	104.9	10.8	222	1				
	STR-TR05-LB	7/30/2019	29.10	142.5	7.04	7.79	102.9	11.7	221	1.5				
	STR-TR05-CC	7/30/2019	29.50	142.7	7.15	8.11	107.8	6.6	215	0.5	18	0.5	9	17.5
	STR-TR05-CC	7/30/2019	29.50	142.3	7.12	8.01	106.5	6.8	217	1				
	STR-TR05-CC	7/30/2019	29.20	142.5	7.08	7.95	105.2	7.0	218	2				
	STR-TR05-CC	7/30/2019	28.90	142.4	7.07	7.80	102.6	7.2	219	3				
	STR-TR05-CC	7/30/2019	28.80	143.1	7.02	7.59	99.7	7.5	221	4				
	STR-TR05-CC	7/30/2019	28.80	143.0	7.01	7.48	98.3	7.6	222	5				
	STR-TR05-CC	7/30/2019	28.70	142.6	7.00	7.46	97.8	7.7	223	6				
	STR-TR05-CC	7/30/2019	28.70	142.9	7.00	7.42	97.3	7.9	223	7				
	STR-TR05-CC	7/30/2019	28.70	142.7	7.00	7.42	97.3	8.0	224	8				
	STR-TR05-CC	7/30/2019	28.70	143.0	7.00	7.42	97.3	8.2	225	9				
	STR-TR05-CC	7/30/2019	28.70	142.2	7.00	7.41	97.2	8.5	225	10				
	STR-TR05-CC	7/30/2019	28.70	142.6	6.99	7.41	97.2	8.5	226	11				
	STR-TR05-CC	7/30/2019	28.70	143.3	6.99	7.40	97.0	8.6	226	12				
	STR-TR05-CC	7/30/2019	28.70	142.8	6.99	7.41	97.2	8.9	227	13				
	STR-TR05-CC	7/30/2019	28.70	142.9	6.99	7.37	96.6	9.3	229	14				
	STR-TR05-CC	7/30/2019	28.70	143.1	6.99	7.36	96.5	9.6	229	15				
	STR-TR05-CC	7/30/2019	28.70	143.3	6.99	7.37	96.6	11.1	229	16				
	STR-TR05-CC	7/30/2019	28.70	143.1	6.99	7.38	96.8	11.9	230	17				
	STR-TR05-CC	7/30/2019	28.70	143.4	7.00	7.37	96.6	10.8	231	18				
	STR-TR05-RB	7/30/2019	29.80	145.1	7.29	8.39	112.1	7.5	213	0.5	1.27	–	0.6	–
	STR-TR05-RB	7/30/2019	29.80	144.6	7.29	8.37	111.9	8.5	213	1				
	STR-TR05-RB	7/30/2019	29.70	146.8	7.34	8.69	116.0	10.3	213	1.27				
	STR-TR06-LB	7/30/2019	28.80	143.4	7.02	7.64	100.4	9.6	213	0.5	1.36	–	0.7	–
	STR-TR06-LB	7/30/2019	28.80	143.9	6.99	7.61	100.0	10.3	214	1				
	STR-TR06-LB	7/30/2019	28.80	143.4	6.99	7.59	99.7	12.1	215	1.36				
	STR-TR06-CC	7/30/2019	29.20	144.3	7.07	7.84	103.7	6.6	205	0.5	17.78	0.5	8.8	17.3
	STR-TR06-CC	7/30/2019	29.10	143.8	7.07	7.88	104.1	6.7	205	1				
	STR-TR06-CC	7/30/2019	28.70	143.6	7.07	7.81	102.4	6.9	206	2				
	STR-TR06-CC	7/30/2019	28.70	144.2	7.02	7.59	99.3	7.0	208	3				
	STR-TR06-CC	7/30/2019	28.70	144.0	6.99	7.48	98.1	7.2	209	4				
	STR-TR06-CC	7/30/2019	28.70	144.3	6.99	7.47	97.9	7.3	209	5				
	STR-TR06-CC	7/30/2019	28.70	144.2	6.98	7.45	97.7	7.4	210	6				
	STR-TR06-CC	7/30/2019	28.70	143.8	6.98	7.46	97.8	7.5	210	7				
	STR-TR06-CC	7/30/2019	28.70	143.9	6.97	7.47	97.9	7.5	211	8				
	STR-TR06-CC	7/30/2019	28.70	143.7	6.97	7.47	97.9	7.5	211	9				
	STR-TR06-CC	7/30/2019	28.70	144.2	6.98	7.49	98.2	7.5	211	10				
	STR-TR06-CC	7/30/2019	28.70	144.4	6.97	7.48	98.1	7.5	212	11				
	STR-TR06-CC	7/30/2019	28.70	144.3	6.97	7.45	97.7	7.8	213	12				
	STR-TR06-CC	7/30/2019	28.70	144.3	6.97	7.45	97.7	7.9	214	13				
	STR-TR06-CC	7/30/2019	28.70	144.0	6.97	7.43	97.4	7.8	214	14				
	STR-TR06-CC	7/30/2019	28.70	144.2	6.97	7.44	97.6	7.9	215	15				
	STR-TR06-CC	7/30/2019	28.70	143.3	6.97	7.40	97.0	8.0	215	16				
	STR-TR06-CC	7/30/2019	28.70	144.0	6.97	7.43	97.4	8.2	216	17				
	STR-TR06-CC	7/30/2019	28.60	144.3	6.97	7.42	97.1	8.2	214	17.44				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Johnsonville 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
Tennessee River July 2019	STR-TR06-RB	7/30/2019	29.30	144.6	7.14	7.96	105.5	7.4	215	0.5	5.33	0.5	2.6	4.8
	STR-TR06-RB	7/30/2019	29.30	145.0	7.13	7.96	105.5	7.7	216	1				
	STR-TR06-RB	7/30/2019	29.20	144.8	7.13	7.97	105.4	8.7	217	2				
	STR-TR06-RB	7/30/2019	29.10	145.9	7.12	7.92	104.6	8.8	218	3				
	STR-TR06-RB	7/30/2019	28.80	146.1	7.11	7.06	92.7	9.7	219	4				
	STR-TR06-RB	7/30/2019	28.70	145.8	7.06	7.69	100.8	11.3	221	5				
	STR-TR06-RB	7/30/2019	28.70	145.5	7.05	7.65	100.3	13.6	222	5.33				
	STR-TR07-LB	7/30/2019	28.70	144.7	6.96	7.47	97.9	11.7	206	0.5	1.16	–	0.6	–
	STR-TR07-LB	7/30/2019	28.70	144.7	6.96	7.45	97.7	14.6	206	1.16				
	STR-TR07-CC	7/30/2019	28.70	144.8	7.04	7.78	102.0	6.6	195	0.5	16.5	0.5	8.2	16
	STR-TR07-CC	7/30/2019	28.70	144.7	7.01	7.70	101.0	6.8	196	1				
	STR-TR07-CC	7/30/2019	28.70	144.7	7.00	7.63	100.0	7.0	197	2				
	STR-TR07-CC	7/30/2019	28.70	144.6	6.98	7.57	99.3	7.1	198	3				
	STR-TR07-CC	7/30/2019	28.70	144.3	6.97	7.50	98.3	7.2	199	4				
	STR-TR07-CC	7/30/2019	28.70	144.3	6.97	7.51	98.5	7.4	199	5				
	STR-TR07-CC	7/30/2019	28.70	144.7	6.96	7.47	97.9	7.6	200	6				
	STR-TR07-CC	7/30/2019	28.70	144.9	6.96	7.49	98.2	7.7	200	7				
	STR-TR07-CC	7/30/2019	28.70	144.5	6.96	7.46	97.8	8.0	200	8				
	STR-TR07-CC	7/30/2019	28.70	144.7	6.96	7.48	98.1	8.1	201	9				
	STR-TR07-CC	7/30/2019	28.70	144.8	6.96	7.46	97.8	8.3	201	10				
	STR-TR07-CC	7/30/2019	28.70	144.9	6.96	7.46	97.8	8.6	202	11				
	STR-TR07-CC	7/30/2019	28.70	144.8	6.96	7.46	97.8	8.8	202	12				
	STR-TR07-CC	7/30/2019	28.70	144.9	6.95	7.44	97.6	8.9	203	13				
	STR-TR07-CC	7/30/2019	28.70	144.4	6.95	7.44	97.6	9.0	203	14				
	STR-TR07-CC	7/30/2019	28.70	144.9	6.95	7.45	97.7	9.5	205	15				
	STR-TR07-CC	7/30/2019	28.70	144.9	6.95	7.42	97.3	9.8	205	16				
	STR-TR07-CC	7/30/2019	28.70	144.8	6.95	7.44	97.6	10.7	206	16.5				
	STR-TR07-RB	7/30/2019	28.70	144.5	7.00	7.79	102.1	11.4	197	0.5	1.35	–	0.6	–
	STR-TR07-RB	7/30/2019	28.20	144.0	6.99	7.81	101.5	11.4	199	1				
	STR-TR07-RB	7/30/2019	28.30	151.4	7.00	8.19	106.6	11.7	200	1.35				
	STR-TR08-LB	7/30/2019	28.80	144.9	6.90	7.53	98.9	7.5	165	0.5	1.75	0.5	–	1.25
	STR-TR08-LB	7/30/2019	28.80	145.7	6.88	7.54	99.0	7.5	165	1				
	STR-TR08-LB	7/30/2019	28.80	144.9	6.83	7.51	98.6	7.7	167	1.75				
	STR-TR08-CC	7/30/2019	28.80	145.9	6.98	7.65	100.5	7.7	169	0.5	14.61	0.5	7.3	14.1
	STR-TR08-CC	7/30/2019	28.80	145.4	6.98	7.65	100.5	7.9	169	1				
	STR-TR08-CC	7/30/2019	28.80	145.4	6.97	7.62	100.1	8.1	169	2				
	STR-TR08-CC	7/30/2019	28.80	145.4	6.97	7.63	100.2	8.3	169	3				
	STR-TR08-CC	7/30/2019	28.80	145.3	6.96	7.57	99.4	8.6	169	4				
	STR-TR08-CC	7/30/2019	28.80	145.4	6.95	7.59	99.7	8.9	169	5				
	STR-TR08-CC	7/30/2019	28.80	145.3	6.96	7.60	99.8	8.9	168	6				
	STR-TR08-CC	7/30/2019	28.80	145.4	6.96	7.67	100.7	9.2	168	7				
	STR-TR08-CC	7/30/2019	28.80	145.3	6.95	7.63	100.2	9.5	168	8				
	STR-TR08-CC	7/30/2019	28.80	145.3	6.95	7.58	99.6	9.8	168	9				
	STR-TR08-CC	7/30/2019	28.80	145.1	6.93	7.58	99.6	10.0	168	10				
	STR-TR08-CC	7/30/2019	28.80	145.6	6.93	7.54	99.0	10.7	167	10.5				
	STR-TR08-CC	7/30/2019	28.80	145.1	6.93	7.55	99.2	10.9	167	11.5				
	STR-TR08-CC	7/30/2019	28.80	145.6	6.93	7.56	99.3	11.1	167	12.5				
	STR-TR08-CC	7/30/2019	28.70	145.1	6.91	7.52	98.6	12.0	167	13.5				
	STR-TR08-CC	7/30/2019	29.80	145.3	6.89	7.54	100.8	14.7	167	14.5				
	STR-TR08-RB	7/30/2019	28.90	146.5	6.96	7.73	101.7	6.0	172	0.5	2.98	0.5	1.5	2.5
	STR-TR08-RB	7/30/2019	28.80	145.5	6.95	7.73	101.5	4.5	172	1.48				
	STR-TR08-RB	7/30/2019	28.80	146.2	6.88	7.70	101.1	2.1	174	2.5				
Intake Channel July 2019	STR-IC01-LB	7/30/2019	29.58	150.6	8.73	10.53	140.2	10.9	186	0.5	1.2	–	0.6	–
	STR-IC01-LB	7/30/2019	29.49	150.1	8.68	10.32	137.2	13.2	196	1.2				
	STR-IC01-CC	7/30/2019	30.33	152.5	8.70	10.13	136.7	10.3	188	0.5	1.9	–	1	–
	STR-IC01-CC	7/30/2019	29.46	151.2	7.82	8.30	110.3	14.0	207	1.5				
	STR-IC01-CC	7/30/2019	29.34	150.4	8.23	9.05	120.0	18.1	206	1.9				
	STR-IC01-RB	7/30/2019	30.76	154.9	8.58	9.56	129.9	5.6	185	0.5	4.06	0.5	2	3.5
	STR-IC01-RB	7/30/2019	29.42	152.3	8.07	8.32	110.5	7.6	200	1.5				
	STR-IC01-RB	7/30/2019	29.07	153.0	7.59	6.46	85.3	8.8	208	3				
	STR-IC01-RB	7/30/2019	28.97	154.7	7.55	6.11	80.5	14.7	207	4.06				
	STR-IC02-LB	7/30/2019	30.17	157.7	8.36	8.68	116.8	7.8	201	0.5	2.77	0.5	–	2.3
	STR-IC02-LB	7/30/2019	29.43	155.8	7.51	5.65	75.0	9.7	219	1.5				
	STR-IC02-LB	7/30/2019	29.29	156.2	7.45	5.24	69.4	11.5	222	2				
	STR-IC02-LB	7/30/2019	29.13	155.1	7.44	5.31	70.2	12.6	224	2.77				
	STR-IC02-CC	7/30/2019	30.02	157.8	8.49	9.11	122.2	5.3	178	0.5	4.36	0.5	2	3.8
	STR-IC02-CC	7/30/2019	29.31	154.1	7.82	7.31	96.9	5.6	191	1.5				
	STR-IC02-CC	7/30/2019	29.04	152.3	7.78	7.27	95.9	6.4	193	3				
	STR-IC02-CC	7/30/2019	28.95	152.3	7.70	7.07	93.1	6.5	195	4				
	STR-IC02-CC	7/30/2019	28.92	152.6	7.69	6.86	90.3	7.7	193	4.36				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Johnsonville 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
Intake Channel July 2019	STR-IC02-RB	7/30/2019	30.85	156.3	8.63	9.42	128.2	4.9	191	0.5	2.02	–	1	–
	STR-IC02-RB	7/30/2019	29.42	153.2	7.85	7.58	100.7	5.8	208	1.5				
	STR-IC02-RB	7/30/2019	29.30	153.2	7.72	7.14	94.6	6.9	215	2.02				
Boat Harbor July 2019	STR-BH01-LB	7/31/2019	29.50	144.3	8.60	10.60	140.8	4.4	164	0.5	4.6	0.5	2.3	4.1
	STR-BH01-LB	7/31/2019	29.50	144.3	8.70	10.50	139.5	5.1	165	1.5				
	STR-BH01-LB	7/31/2019	29.30	144.5	8.50	9.80	129.7	6.1	171	3				
	STR-BH01-LB	7/31/2019	29.00	145.1	7.90	7.60	100.1	9.8	181	4				
	STR-BH01-LB	7/31/2019	28.60	145.9	7.40	5.10	66.7	9.6	190	4.6				
	STR-BH01-CC	7/31/2019	29.60	144.7	8.80	10.70	142.4	4.4	177	0.5	5.1	0.5	2.5	4.6
	STR-BH01-CC	7/31/2019	29.50	144.2	8.80	10.70	142.1	4.8	177	1.5				
	STR-BH01-CC	7/31/2019	29.20	144.6	8.50	9.90	130.8	5.9	183	3				
	STR-BH01-CC	7/31/2019	29.02	144.7	8.00	8.40	110.6	7.0	194	4				
	STR-BH01-CC	7/31/2019	28.50	144.5	7.30	5.40	70.5	8.5	205	5				
	STR-BH01-CC	7/31/2019	28.50	146.2	7.30	5.50	71.8	8.7	202	5.1				
	STR-BH01-RB	7/31/2019	29.80	145.3	8.70	10.50	140.2	3.2	193	0.5	4.8	0.5	2.4	4.3
	STR-BH01-RB	7/31/2019	29.80	144.5	8.70	10.30	137.5	3.7	195	1.5				
	STR-BH01-RB	7/31/2019	29.10	145.5	8.40	9.50	125.3	4.8	206	3				
	STR-BH01-RB	7/31/2019	29.00	145.6	7.90	8.40	110.6	6.3	218	4				
	STR-BH01-RB	7/31/2019	28.70	146.7	7.50	5.90	77.3	7.7	228	4.8				
	STR-BH02-LB	7/31/2019	29.40	144.1	8.60	10.30	136.6	3.6	168	0.5	2.6	0.5	–	2.1
	STR-BH02-LB	7/31/2019	29.30	144.2	8.60	10.30	136.3	3.8	166	1.5				
	STR-BH02-LB	7/31/2019	29.30	144.3	8.60	10.20	135.0	4.7	168	2				
	STR-BH02-LB	7/31/2019	29.20	144.5	8.50	10.10	133.5	5.5	171	2.6				
	STR-BH02-CC	7/31/2019	29.30	144.7	8.60	10.10	133.7	4.6	157	0.5	6.7	0.5	3.5	6.2
	STR-BH02-CC	7/31/2019	29.10	144.5	8.40	9.60	126.6	5.2	158	1.5				
	STR-BH02-CC	7/31/2019	29.00	144.8	8.20	9.20	121.1	5.9	160	3				
	STR-BH02-CC	7/31/2019	28.90	144.5	8.00	8.50	111.7	7.8	164	4				
	STR-BH02-CC	7/31/2019	28.50	144.9	7.50	6.70	87.5	8.6	173	5				
	STR-BH02-CC	7/31/2019	28.40	146.1	7.30	5.10	66.4	10.8	174	6				
	STR-BH02-CC	7/31/2019	28.10	147.8	7.30	4.50	58.3	12.0	160	6.7				
	STR-BH02-RB	7/31/2019	29.20	144.7	8.40	9.30	122.9	2.5	190	0.5	1.8	–	0.9	–
	STR-BH02-RB	7/31/2019	29.10	144.7	8.20	9.10	120.0	2.7	197	1.5				
	STR-BH02-RB	7/31/2019	29.10	145.0	8.20	9.00	118.7	2.3	199	1.8				
	STR-BH03-LB	7/31/2019	28.90	142.7	7.70	8.00	105.2	4.5	200	0.5	3.7	0.5	–	2.6
	STR-BH03-LB	7/31/2019	28.90	143.3	7.70	7.90	103.8	4.1	169	1.5				
	STR-BH03-LB	7/31/2019	28.90	142.5	7.60	7.90	103.8	3.7	172	3				
	STR-BH03-LB	7/31/2019	28.80	143.2	7.60	7.60	99.7	5.5	171	3.7				
	STR-BH03-CC	7/31/2019	29.00	144.5	8.10	9.00	118.5	4.5	192	0.5	4.3	0.5	2	3.8
	STR-BH03-CC	7/31/2019	28.90	143.9	8.00	8.70	114.4	4.7	194	1.5				
	STR-BH03-CC	7/31/2019	28.90	143.5	7.70	8.30	109.1	5.3	203	3				
	STR-BH03-CC	7/31/2019	28.80	143.1	7.60	7.50	98.4	6.3	206	4				
	STR-BH03-CC	7/31/2019	28.80	144.0	7.60	7.40	97.1	7.1	205	4.3				
	STR-BH03-RB	7/31/2019	29.00	145.6	8.20	9.10	119.8	4.3	191	0.5	3.9	0.5	–	3.4
	STR-BH03-RB	7/31/2019	28.95	145.7	8.10	8.90	117.1	4.7	190	1.5				
	STR-BH03-RB	7/31/2019	28.90	146.2	8.10	8.70	114.4	5.3	192	3				
	STR-BH03-RB	7/31/2019	28.90	147.2	7.90	8.30	109.1	6.0	185	3.9				
Coves July 2019	STR-CV01-LB	7/30/2019	30.00	145.2	8.13	10.46	140.1	14.1	198	0.5	1.18	–	0.6	–
	STR-CV01-LB	7/30/2019	29.20	144.7	7.77	10.21	134.9	20.9	207	1.18				
	STR-CV01-CC	7/30/2019	30.20	145.4	8.05	9.91	133.2	10.3	201	0.5	1.15	–	0.6	–
	STR-CV01-CC	7/30/2019	29.90	145.3	7.83	9.52	127.3	23.5	207	1.15				
	STR-CV01-RB	7/30/2019	30.10	145.5	7.97	9.39	126.0	14.3	202	0.5	1.42	–	0.7	–
	STR-CV01-RB	7/30/2019	30.10	145.0	7.99	9.19	123.3	17.0	204	1				
	STR-CV01-RB	7/30/2019	29.90	144.7	7.69	8.79	117.6	23.2	212	1.42				
	STR-CV02-LB	7/31/2019	29.30	140.4	7.33	7.49	99.1	14.6	57	0.5	2.3	0.5	–	1.8
	STR-CV02-LB	7/31/2019	29.10	140.7	7.16	7.09	93.5	19.1	51	1.5				
	STR-CV02-LB	7/31/2019	29.00	141.1	6.93	6.22	81.9	26.1	47	2.0				
	STR-CV02-CC	7/31/2019	29.10	139.9	7.14	6.89	90.9	18.0	8	0.5	1.6	–	0.8	–
	STR-CV02-CC	7/31/2019	28.50	140.1	6.87	5.63	73.5	34.1	11	1.5				
	STR-CV02-RB	7/31/2019	29.10	140.3	7.06	6.62	87.3	34.3	78	0.5	1.3	–	0.7	–
	STR-CV03-LB	7/31/2019	29.20	134.4	7.18	7.39	97.6	9.9	149	0.5	2.5	0.5	–	2
	STR-CV03-LB	7/31/2019	29.10	135.1	7.06	7.02	92.6	11.0	150	1.5				
	STR-CV03-LB	7/31/2019	29.10	134.2	7.09	7.08	93.4	11.9	148	2.0				
	STR-CV03-CC	7/31/2019	29.10	134.0	7.23	7.18	94.7	15.3	182	0.5	1.6	–	0.8	–
	STR-CV03-CC	7/31/2019	29.00	134.1	7.16	6.94	91.4	23.9	184	1.5				
	STR-CV03-RB	7/31/2019	29.20	132.6	7.21	6.95	91.8	9.8	74	0.5	2.6	0.5	–	2.1
	STR-CV03-RB	7/31/2019	29.20	132.9	7.19	6.91	91.3	10.5	66	1.5				
	STR-CV03-RB	7/31/2019	29.10	132.5	7.14	6.68	88.1	11.3	47	2.0				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Johnsonville 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
Tennessee River November 2019	STR-TR01-LB	11/19/2019	12.62	181.7	7.82	10.22	98.6	6.7	147	0.5	1.7	–	0.8	–
	STR-TR01-LB	11/19/2019	12.49	181.3	7.85	10.33	99.4	6.4	147	1.5				
	STR-TR01-CC	11/19/2019	12.17	181.9	7.84	10.21	97.5	4.5	147	0.5	14.4	0.5	7.2	13.9
	STR-TR01-CC	11/19/2019	12.17	181.7	7.83	10.20	97.4	4.5	148	1.5				
	STR-TR01-CC	11/19/2019	12.18	181.5	7.81	10.19	97.4	5.1	148	3				
	STR-TR01-CC	11/19/2019	12.17	181.8	7.82	10.20	97.4	5.3	148	4				
	STR-TR01-CC	11/19/2019	12.17	181.5	7.81	10.20	97.4	5.1	148	5				
	STR-TR01-CC	11/19/2019	12.17	180.7	7.84	10.20	97.4	5.1	148	6				
	STR-TR01-CC	11/19/2019	12.17	181.5	7.82	10.17	97.2	5.0	147	7				
	STR-TR01-CC	11/19/2019	12.17	181.3	7.82	10.19	97.3	5.4	147	8				
	STR-TR01-CC	11/19/2019	12.16	182.8	7.81	10.18	97.2	5.3	147	9				
	STR-TR01-CC	11/19/2019	12.16	182.5	7.81	10.21	97.5	5.1	147	10				
	STR-TR01-CC	11/19/2019	12.15	182.0	7.80	10.14	96.8	5.2	147	11				
	STR-TR01-CC	11/19/2019	12.15	181.7	7.81	10.17	97.1	5.5	147	12				
	STR-TR01-CC	11/19/2019	12.13	182.1	7.80	10.16	97.0	6.2	146	13				
	STR-TR01-CC	11/19/2019	12.15	182.1	7.83	10.18	97.2	6.4	146	14				
	STR-TR01-RB	11/19/2019	12.34	181.0	7.82	10.20	97.8	4.0	153	0.5	0.9	0.5	–	–
	STR-TR02-LB	11/19/2019	12.43	181.5	7.80	10.20	98.0	6.1	138	0.5	1.8	–	0.9	–
	STR-TR02-LB	11/19/2019	12.24	182.1	7.79	10.16	97.2	7.0	138	1.5				
	STR-TR02-CC	11/19/2019	12.17	181.4	7.81	10.16	97.1	4.8	142	0.5	15.4	0.5	7.7	14.9
	STR-TR02-CC	11/19/2019	12.15	181.5	7.81	10.16	97.0	5.4	142	1.5				
	STR-TR02-CC	11/19/2019	12.13	181.8	7.82	10.16	97.0	5.7	142	3				
	STR-TR02-CC	11/19/2019	12.15	181.3	7.81	10.15	96.9	5.4	142	4				
	STR-TR02-CC	11/19/2019	12.13	181.4	7.82	10.15	96.9	5.2	142	5				
	STR-TR02-CC	11/19/2019	12.14	181.7	7.81	10.12	96.6	5.5	142	6				
	STR-TR02-CC	11/19/2019	12.13	181.8	7.80	10.15	96.9	5.7	141	7				
	STR-TR02-CC	11/19/2019	12.14	181.5	7.80	10.19	97.3	5.8	141	8				
	STR-TR02-CC	11/19/2019	12.14	181.5	7.81	10.18	97.2	5.4	141	9				
	STR-TR02-CC	11/19/2019	12.13	181.0	7.79	10.18	97.2	5.5	141	10				
	STR-TR02-CC	11/19/2019	12.13	181.5	7.79	10.19	97.3	5.9	141	11				
	STR-TR02-CC	11/19/2019	12.13	181.5	7.79	10.18	97.2	5.4	140	12				
	STR-TR02-CC	11/19/2019	12.13	181.5	7.79	10.17	97.1	5.9	140	13				
	STR-TR02-CC	11/19/2019	12.13	180.3	7.78	10.19	97.3	5.8	140	14				
	STR-TR02-CC	11/19/2019	12.13	181.3	7.78	10.19	97.3	5.5	140	15				
	STR-TR02-RB	11/19/2019	12.77	181.9	7.77	9.94	96.3	5.2	130	0.5	1.4	–	0.7	–
	STR-TR03-LB	11/19/2019	12.30	180.1	7.87	10.08	96.6	6.0	160	0.5	2.35	0.5	–	1.9
	STR-TR03-LB	11/19/2019	12.21	180.0	7.88	10.08	96.4	6.1	161	1				
	STR-TR03-LB	11/19/2019	12.19	180.0	7.89	10.09	96.4	6.1	161	2				
	STR-TR03-LB	11/19/2019	12.20	180.0	7.90	10.09	96.5	6.2	160	2.35				
	STR-TR03-CC	11/19/2019	12.14	180.1	7.90	10.15	96.9	4.9	162	0.5	16.09	0.5	8	15.5
	STR-TR03-CC	11/19/2019	12.12	180.0	7.89	10.12	96.6	5.0	162	1				
	STR-TR03-CC	11/19/2019	12.11	180.1	7.89	10.14	96.7	5.0	163	2				
	STR-TR03-CC	11/19/2019	12.10	180.0	7.89	10.13	96.6	5.1	163	3				
	STR-TR03-CC	11/19/2019	12.08	180.0	7.88	10.13	96.6	5.2	162	4				
	STR-TR03-CC	11/19/2019	12.08	180.1	7.88	10.11	96.4	5.2	163	5				
	STR-TR03-CC	11/19/2019	12.08	180.1	7.88	10.12	96.5	5.2	163	6				
	STR-TR03-CC	11/19/2019	12.08	180.1	7.88	10.10	96.3	5.2	162	7				
	STR-TR03-CC	11/19/2019	12.08	180.0	7.87	10.10	96.3	5.3	162	8				
	STR-TR03-CC	11/19/2019	12.09	180.0	7.88	10.10	96.3	5.3	162	9				
	STR-TR03-CC	11/19/2019	12.08	180.1	7.87	10.11	96.4	5.3	162	10				
	STR-TR03-CC	11/19/2019	12.08	180.0	7.87	10.12	96.5	5.4	162	11				
	STR-TR03-CC	11/19/2019	12.08	180.0	7.87	10.11	96.4	5.4	162	12				
	STR-TR03-CC	11/19/2019	12.08	180.1	7.88	10.11	96.4	5.3	162	13				
	STR-TR03-CC	11/19/2019	12.08	180.1	7.88	10.10	96.3	5.4	161	14				
	STR-TR03-CC	11/19/2019	12.08	180.2	7.88	10.09	96.2	5.3	161	15				
	STR-TR03-CC	11/19/2019	12.07	180.2	7.88	10.11	96.4	5.3	161	16.09				
	STR-TR03-RB	11/19/2019	12.17	181.0	7.90	10.13	96.8	3.8	160	0.5	2.46	0.5	–	2
	STR-TR03-RB	11/19/2019	12.14	181.1	7.90	10.13	96.7	3.9	160	1				
	STR-TR03-RB	11/19/2019	12.03	181.0	7.90	10.11	96.3	4.0	159	2				
	STR-TR03-RB	11/19/2019	12.01	181.2	7.92	10.11	96.2	3.6	160	2.46				
	STR-TR04-LB	11/19/2019	12.19	180.0	7.87	10.12	96.7	5.5	160	0.5	0.71	0.3	–	–
	STR-TR04-LB	11/19/2019	12.18	180.0	7.88	10.10	96.5	6.2	161	0.71				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Johnsonville 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
Tennessee River November 2019	STR-TR04-CC	11/19/2019	12.04	180.1	7.84	10.10	96.2	4.8	163	0.5	13.5	0.5	7	13
	STR-TR04-CC	11/19/2019	12.03	180.0	7.84	10.12	96.4	4.7	163	1				
	STR-TR04-CC	11/19/2019	12.03	180.1	7.83	10.10	96.2	4.7	163	2				
	STR-TR04-CC	11/19/2019	12.04	180.0	7.84	10.09	96.1	4.7	163	3				
	STR-TR04-CC	11/19/2019	12.02	180.0	7.84	10.10	96.2	4.7	163	4				
	STR-TR04-CC	11/19/2019	12.04	180.0	7.86	10.09	96.1	4.6	163	5				
	STR-TR04-CC	11/19/2019	12.02	180.1	7.88	10.05	95.7	4.6	163	6				
	STR-TR04-CC	11/19/2019	12.01	180.0	7.85	10.10	96.1	4.5	163	7				
	STR-TR04-CC	11/19/2019	12.01	180.0	7.85	10.08	95.9	4.5	163	8				
	STR-TR04-CC	11/19/2019	12.01	179.8	7.84	10.08	95.9	4.6	163	9				
	STR-TR04-CC	11/19/2019	12.01	179.8	7.83	10.07	95.9	4.8	163	10				
	STR-TR04-CC	11/19/2019	12.00	180.0	7.83	10.10	96.1	5.0	162	11				
	STR-TR04-CC	11/19/2019	12.00	180.0	7.83	10.09	96.0	5.2	162	12				
	STR-TR04-CC	11/19/2019	12.01	180.0	7.83	10.10	96.1	5.7	162	13				
	STR-TR04-CC	11/19/2019	12.00	180.1	7.83	10.08	95.9	7.9	162	13.5				
	STR-TR04-RB	11/19/2019	12.17	180.1	7.83	10.16	97.1	5.0	162	0.5	0.79	0.4	–	–
	STR-TR04-RB	11/19/2019	12.17	180.1	7.83	10.18	97.3	5.1	162	0.79				
	STR-TR05-LB	11/19/2019	12.74	181.3	7.82	10.19	98.6	17.8	137	0.1	0.3	0.1	–	–
	STR-TR05-CC	11/19/2019	12.18	181.6	7.81	10.08	96.3	4.9	139	0.5	18.1	0.5	9	17.6
	STR-TR05-CC	11/19/2019	12.13	181.7	7.80	10.08	96.2	5.1	140	1.5				
	STR-TR05-CC	11/19/2019	12.09	181.1	7.78	10.09	96.2	5.7	140	3				
	STR-TR05-CC	11/19/2019	12.09	181.4	7.78	10.10	96.3	5.4	140	4				
	STR-TR05-CC	11/19/2019	12.07	182.4	7.78	10.11	96.4	6.3	140	5				
	STR-TR05-CC	11/19/2019	12.06	181.8	7.78	10.10	96.2	6.1	140	6				
	STR-TR05-CC	11/19/2019	12.07	181.6	7.78	10.12	96.5	5.6	139	7				
	STR-TR05-CC	11/19/2019	12.06	181.7	7.78	10.08	96.1	5.9	139	8				
	STR-TR05-CC	11/19/2019	12.05	180.4	7.78	10.13	96.5	6.4	139	9				
	STR-TR05-CC	11/19/2019	12.05	181.7	7.82	10.11	96.3	6.5	139	10				
	STR-TR05-CC	11/19/2019	12.05	180.5	7.78	10.15	96.7	6.5	138	11				
	STR-TR05-CC	11/19/2019	12.05	181.5	7.77	10.11	96.3	7.2	138	12				
	STR-TR05-CC	11/19/2019	12.05	181.7	7.77	10.12	96.4	8.5	137	13				
	STR-TR05-CC	11/19/2019	12.05	182.1	7.77	10.10	96.2	9.0	137	14				
	STR-TR05-CC	11/19/2019	12.05	181.3	7.77	10.15	96.7	8.4	136	15				
	STR-TR05-CC	11/19/2019	12.05	181.4	7.77	10.10	96.2	8.0	136	16				
	STR-TR05-CC	11/19/2019	12.05	181.8	7.78	10.13	96.5	12.6	136	17				
	STR-TR05-RB	11/19/2019	12.74	182.0	7.83	10.29	99.6	5.6	136	0.5	1.2	–	0.6	–
	STR-TR06-LB	11/19/2019	12.12	179.9	7.55	10.11	96.5	0.0	195	0.3	0.63	0.3	–	–
	STR-TR06-LB	11/19/2019	12.12	180.0	7.57	10.12	96.6	0.0	192	0.63				
	STR-TR06-CC	11/19/2019	12.05	180.1	7.86	10.11	96.3	0.0	168	0.5	15.73	0.5	8	15.2
	STR-TR06-CC	11/19/2019	12.04	180.0	7.87	10.10	96.2	0.0	169	1				
	STR-TR06-CC	11/19/2019	12.04	180.0	7.85	10.08	96.0	0.0	170	2				
	STR-TR06-CC	11/19/2019	12.00	180.1	7.85	10.10	96.1	0.0	170	3				
	STR-TR06-CC	11/19/2019	11.99	180.1	7.84	10.09	96.0	0.0	170	4				
	STR-TR06-CC	11/19/2019	11.99	180.1	7.80	10.09	96.0	0.0	170	5				
	STR-TR06-CC	11/19/2019	12.00	180.0	7.81	10.09	96.0	0.0	170	6				
	STR-TR06-CC	11/19/2019	11.99	180.1	7.80	10.10	96.1	0.0	170	7				
	STR-TR06-CC	11/19/2019	11.98	180.0	7.80	10.06	95.7	0.0	170	8				
	STR-TR06-CC	11/19/2019	11.99	180.1	7.79	10.11	96.2	0.0	170	9				
	STR-TR06-CC	11/19/2019	11.99	180.3	7.79	10.06	95.7	0.0	170	10				
	STR-TR06-CC	11/19/2019	11.99	180.0	7.81	10.07	95.8	0.0	170	11				
	STR-TR06-CC	11/19/2019	11.99	180.1	7.80	10.08	95.9	0.0	170	12				
	STR-TR06-CC	11/19/2019	11.99	180.0	7.77	10.06	95.7	0.0	170	13				
	STR-TR06-CC	11/19/2019	11.99	180.1	7.76	10.06	95.7	0.0	170	14				
	STR-TR06-CC	11/19/2019	11.99	180.1	7.76	10.07	95.8	1.6	167	15				
	STR-TR06-CC	11/19/2019	12.00	180.2	7.73	10.06	95.7	7.8	171	15.73				
	STR-TR06-RB	11/19/2019	11.93	184.5	7.91	10.45	99.3	0.0	162	0.5	0.66	0.3	–	–
	STR-TR06-RB	11/19/2019	11.92	184.7	7.91	10.47	99.5	0.0	162	0.66				
	STR-TR07-LB	11/19/2019	12.19	181.0	7.79	10.14	96.9	5.4	180	0.5	2.2	0.5	–	1.7
	STR-TR07-LB	11/19/2019	12.09	181.1	7.76	10.08	96.1	6.0	181	1.5				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Johnsonville 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
Tennessee River November 2019	STR-TR07-CC	11/19/2019	12.14	181.6	7.79	10.11	96.5	5.0	169	0.5	15.5	0.5	7.8	15
	STR-TR07-CC	11/19/2019	12.05	181.6	7.80	10.03	95.6	5.3	170	1.5				
	STR-TR07-CC	11/19/2019	12.07	181.5	7.78	10.09	96.2	5.8	170	3				
	STR-TR07-CC	11/19/2019	12.02	181.5	7.78	10.08	96.0	5.9	170	4				
	STR-TR07-CC	11/19/2019	12.02	181.6	7.78	10.09	96.1	5.9	169	5				
	STR-TR07-CC	11/19/2019	12.01	181.3	7.79	10.08	95.9	6.0	169	6				
	STR-TR07-CC	11/19/2019	12.01	181.5	7.78	10.09	96.0	6.2	169	7				
	STR-TR07-CC	11/19/2019	12.01	181.6	7.79	10.08	95.9	6.1	169	8				
	STR-TR07-CC	11/19/2019	12.01	182.5	7.79	10.05	95.7	6.1	169	9				
	STR-TR07-CC	11/19/2019	12.01	181.3	7.79	10.08	95.9	6.1	168	10				
	STR-TR07-CC	11/19/2019	12.01	182.1	7.76	10.05	95.7	6.1	168	11				
	STR-TR07-CC	11/19/2019	12.01	181.8	7.78	10.06	95.8	6.4	168	12				
	STR-TR07-CC	11/19/2019	12.01	182.1	7.77	10.03	95.5	6.2	167	13				
	STR-TR07-CC	11/19/2019	12.01	181.7	7.77	10.06	95.8	6.4	167	14				
	STR-TR07-CC	11/19/2019	12.01	181.3	7.78	10.02	95.4	6.3	166	15				
	STR-TR07-RB	11/19/2019	13.03	182.6	7.89	10.56	102.9	17.8	152	0.5	0.6	0.3	–	–
	STR-TR08-LB	11/19/2019	12.20	181.0	7.78	10.17	97.2	5.0	190	0.5	1	0.5	–	–
	STR-TR08-CC	11/19/2019	12.07	181.2	7.76	10.05	95.8	4.5	193	0.5	13.9	0.5	6.9	13.4
	STR-TR08-CC	11/19/2019	12.07	181.2	7.75	10.07	96.0	4.9	194	1.5				
	STR-TR08-CC	11/19/2019	12.06	181.1	7.76	10.06	95.9	4.8	194	3				
	STR-TR08-CC	11/19/2019	12.05	181.6	7.76	10.04	95.7	4.9	194	4				
	STR-TR08-CC	11/19/2019	12.05	181.5	7.75	10.06	95.8	4.9	195	5				
	STR-TR08-CC	11/19/2019	12.04	181.3	7.76	10.04	95.6	5.0	194	6				
	STR-TR08-CC	11/19/2019	12.04	181.2	7.75	10.02	95.4	5.3	194	7				
	STR-TR08-CC	11/19/2019	12.04	181.7	7.75	10.05	95.7	4.9	194	8				
	STR-TR08-CC	11/19/2019	12.04	181.8	7.76	10.06	95.8	5.5	194	9				
	STR-TR08-CC	11/19/2019	12.04	181.2	7.76	10.02	95.4	5.0	194	10				
	STR-TR08-CC	11/19/2019	12.04	181.2	7.74	10.06	95.8	4.8	194	11				
	STR-TR08-CC	11/19/2019	12.04	181.7	7.74	10.04	95.6	5.0	194	12				
	STR-TR08-CC	11/19/2019	12.04	181.6	7.76	9.99	95.2	5.2	194	13.0				
	STR-TR08-RB	11/19/2019	11.99	186.8	7.59	10.00	95.1	3.5	185	0.5	2.2	0.5	–	1.7
	STR-TR08-RB	11/19/2019	11.98	185.0	7.57	9.99	95.0	3.4	187	1.5				
	STR-TR08-RB	11/19/2019	11.98	187.1	7.54	9.98	94.9	3.4	188	2.0				
Intake Channel November 2019	STR-IC01-LB	11/19/2019	11.81	185.5	8.04	10.70	101.4	26.5	170	0.38	0.38	0.1	–	–
	STR-IC01-CC	11/19/2019	11.64	184.6	7.95	10.37	97.9	20.4	180	0.5	2.37	0.5	–	1.9
	STR-IC01-CC	11/19/2019	11.72	185.0	7.94	10.38	98.2	21.7	180	1				
	STR-IC01-CC	11/19/2019	11.69	184.5	7.96	10.38	98.1	22.4	180	2				
	STR-IC01-CC	11/19/2019	11.70	185.0	7.95	10.39	98.2	21.2	179	2.37				
	STR-IC01-RB	11/19/2019	11.65	184.6	7.97	10.48	98.9	14.1	189	0.5	2.89	0.5	–	2.4
	STR-IC01-RB	11/19/2019	11.70	184.5	7.96	10.49	99.1	13.8	189	1				
	STR-IC01-RB	11/19/2019	11.70	184.4	7.98	10.49	99.1	13.3	189	2				
	STR-IC01-RB	11/19/2019	11.70	184.5	7.98	10.50	99.2	12.6	189	2.89				
	STR-IC02-LB	11/19/2019	11.28	185.1	7.98	10.59	99.1	11.8	160	0.5	1.42	–	0.7	–
	STR-IC02-LB	11/19/2019	11.20	185.2	7.96	10.54	98.5	12.9	160	1				
	STR-IC02-LB	11/19/2019	11.10	185.3	7.95	10.35	96.5	14.2	160	1.42				
	STR-IC02-CC	11/19/2019	11.84	185.0	8.03	10.65	101.0	1.6	160	0.5	3.42	0.5	–	2.9
	STR-IC02-CC	11/19/2019	11.82	184.7	8.04	10.67	101.1	1.6	160	1				
	STR-IC02-CC	11/19/2019	11.05	186.0	7.96	10.56	98.3	1.9	161	2				
	STR-IC02-CC	11/19/2019	10.51	193.0	7.86	10.08	92.7	2.7	164	3				
	STR-IC02-CC	11/19/2019	10.51	193.1	7.85	10.12	93.1	3.0	163	3.42				
	STR-IC02-RB	11/19/2019	12.13	184.5	8.02	10.67	101.8	10.2	206	0.5	2.85	0.5	–	2.3
	STR-IC02-RB	11/19/2019	12.13	184.5	8.02	10.67	101.8	10.1	207	1				
	STR-IC02-RB	11/19/2019	11.60	185.0	8.01	10.67	100.6	10.1	208	2				
	STR-IC02-RB	11/19/2019	11.10	186.0	7.91	10.30	96.0	13.0	212	2.85				
Boat Harbor November 2019	STR-BH01-LB	11/20/2019	11.89	180.4	7.91	10.44	97.9	0.0	129	0.5	2.36	0.5	–	1.9
	STR-BH01-LB	11/20/2019	11.73	180.4	7.90	10.43	97.5	0.0	130	1				
	STR-BH01-LB	11/20/2019	11.66	180.4	7.83	10.20	95.2	0.0	131	2				
	STR-BH01-LB	11/20/2019	11.66	180.4	7.83	10.15	94.7	0.0	130	2.36				
	STR-BH01-CC	11/20/2019	11.82	180.3	7.92	10.45	97.9	0.0	136	0.5	4.34	0.5	2	3.9
	STR-BH01-CC	11/20/2019	11.76	180.3	7.92	10.48	98.0	0.0	136	1				
	STR-BH01-CC	11/20/2019	11.71	180.1	7.88	10.39	97.0	0.0	136	2				
	STR-BH01-CC	11/20/2019	11.64	180.1	7.87	10.31	96.1	0.0	136	3				
	STR-BH01-CC	11/20/2019	11.62	180.1	7.88	10.31	96.1	0.0	135	4				
	STR-BH01-CC	11/20/2019	11.59	180.2	7.88	10.30	95.9	0.0	135	4.34				
	STR-BH01-RB	11/20/2019	12.04	180.5	7.85	10.21	96.1	3.9	143	0.5	3.95	0.5	2	3.5
	STR-BH01-RB	11/20/2019	11.73	180.5	7.86	10.22	95.5	4.1	143	1				
	STR-BH01-RB	11/20/2019	11.67	180.5	7.85	10.24	95.6	4.6	143	2				
	STR-BH01-RB	11/20/2019	11.64	180.4	7.84	10.19	95.0	5.3	143	3				
	STR-BH01-RB	11/20/2019	11.64	180.4	7.84	10.14	94.6	5.3	141	3.95				

See notes on last page.

TABLE B.4 – Surface Stream Field Measurement Results
Johnsonville 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
Boat Harbor November 2019	STR-BH02-LB	11/20/2019	12.20	180.5	7.88	10.45	98.7	4.3	120	0.5	1.7	–	0.8	–
	STR-BH02-LB	11/20/2019	12.02	180.5	7.88	10.47	98.5	5.1	120	1				
	STR-BH02-LB	11/20/2019	11.93	180.5	7.87	10.47	98.3	6.5	119	1.7				
	STR-BH02-CC	11/20/2019	12.01	181.4	7.83	10.32	97.1	5.5	110	0.5	5.51	0.5	2.5	5
	STR-BH02-CC	11/20/2019	11.95	181.3	7.84	10.31	96.8	5.6	110	1				
	STR-BH02-CC	11/20/2019	11.69	181.2	7.81	10.20	95.2	5.6	110	2				
	STR-BH02-CC	11/20/2019	11.62	181.5	7.81	10.19	95.0	5.7	108	3				
	STR-BH02-CC	11/20/2019	11.62	181.5	7.79	10.15	94.6	5.9	108	4				
	STR-BH02-CC	11/20/2019	11.62	181.4	7.79	10.16	94.7	6.5	107	5				
	STR-BH02-CC	11/20/2019	11.63	181.4	7.79	10.15	94.6	7.5	104	5.51				
	STR-BH02-RB	11/20/2019	11.98	180.8	7.84	10.35	97.3	4.3	88	0.5	2.14	0.5	–	1.7
	STR-BH02-RB	11/20/2019	11.93	180.6	7.83	10.36	97.3	4.3	86	1				
	STR-BH02-RB	11/20/2019	11.90	180.8	7.83	10.35	97.1	4.4	84	2				
	STR-BH02-RB	11/20/2019	11.90	180.8	7.83	10.34	97.0	4.9	82	2.14				
	STR-BH03-LB	11/20/2019	11.79	180.2	7.64	10.24	95.8	5.4	178	0.5	2.45	0.5	–	2
	STR-BH03-LB	11/20/2019	11.79	180.1	7.63	10.24	95.8	5.4	179	1				
	STR-BH03-LB	11/20/2019	11.80	180.1	7.61	10.25	95.9	5.5	179	2				
	STR-BH03-LB	11/20/2019	11.78	180.0	7.60	10.23	95.7	5.5	181	2.45				
	STR-BH03-CC	11/20/2019	11.72	181.0	7.75	10.23	95.6	0.0	170	0.5	3.57	0.5	1.8	3.1
	STR-BH03-CC	11/20/2019	11.67	181.1	7.74	10.21	95.3	0.0	170	1				
	STR-BH03-CC	11/20/2019	11.60	181.1	7.73	10.17	94.8	0.0	171	2				
	STR-BH03-CC	11/20/2019	11.54	181.0	7.72	10.14	94.3	0.0	171	3				
	STR-BH03-CC	11/20/2019	11.54	181.0	7.71	10.14	94.3	0.0	171	3.57				
	STR-BH03-RB	11/20/2019	11.76	182.1	7.80	10.24	95.8	4.1	56	0.5	2.5	0.5	–	2
	STR-BH03-RB	11/20/2019	11.74	182.1	7.80	10.24	95.7	4.0	47	1				
	STR-BH03-RB	11/20/2019	11.70	182.1	7.78	10.24	95.6	4.1	39	2				
	STR-BH03-RB	11/20/2019	11.67	182.5	7.75	10.25	95.7	4.3	17	2.5				
Coves November 2019	STR-CV01-LB	11/19/2019	13.39	174.3	7.96	10.91	107.1	11.0	68	0.1	0.5	0.2	–	–
	STR-CV01-CC	11/19/2019	12.10	175.5	7.99	11.21	106.9	12.9	96	0.5	0.9	0.4	–	–
	STR-CV01-RB	11/19/2019	12.35	175.6	8.09	11.40	109.4	14.6	110	0.5	0.7	0.2	–	–
	STR-CV02-LB	11/20/2019	9.23	164.8	8.14	12.74	112.3	13.2	169	0.5	1.5	–	0.7	–
	STR-CV02-LB	11/20/2019	8.80	164.6	8.23	12.86	112.2	13.5	170	1.0				
	STR-CV02-CC	11/20/2019	8.97	158.8	8.43	13.10	114.7	12.6	117	0.5	0.8	0.1	–	–
	STR-CV02-RB[1]	11/20/2019	–	–	–	–	–	–	–	–	–	–	–	–
	STR-CV03-LB	11/20/2019	8.56	145.4	7.64	12.05	104.5	6.6	167	0.1	0.5	0.1	–	–
	STR-CV03-CC	11/20/2019	8.05	122.2	8.42	12.89	110.4	5.7	176	0.5	1.7	–	0.8	–
	STR-CV03-CC	11/20/2019	7.82	122.4	8.40	12.93	110.1	6.1	177	1.5				
	STR-CV03-RB	11/20/2019	8.05	123.7	8.35	12.77	109.4	7.8	175	0.5	1.6	–	0.8	–
	STR-CV03-RB	11/20/2019	7.77	123.7	8.35	12.78	108.7	7.7	175	1.5				

Notes:

–	Not applicable
°C	degrees Celsius
%	percent
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. STR-CV02-RB was not sampled during the November 2019 sampling event due to shallow water and seasonally exposed substrates.

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

Sample Location		STR-TR01									
Sample Date		30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019
Sample ID		JOF-STR-TR01-LB-SUR-20190730	JOF-STR-TR01-CC-SUR-20190730	JOF-STR-TR01-CC-MID-20190730	JOF-STR-TR01-CC-BOT-20190730	JOF-STR-TR01-RB-SUR-20190730	JOF-STR-TR01-LB-MID-20191119	JOF-STR-TR01-CC-SUR-20191119	JOF-STR-TR01-CC-MID-20191119	JOF-STR-TR01-CC-BOT-20191119	JOF-STR-TR01-RB-SUR-20191119
Parent Sample ID											
Sample Depth		0.5 m	0.5 m	8 m	16.1 m	0.5 m	0.8 m	0.5 m	7.2 m	13.9 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	0.879 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.01	0.889 J	1.07	0.970 J	0.960 J	0.697 J	0.766 J	0.743 J	0.910 J	0.740 J
Barium	ug/L	25.8	24.3	25.2	25.7	28.0	25.2	24.8	25.4	25.6	24.9
Beryllium	ug/L	<0.182	<0.182	0.350 J	<0.182	<0.182	<0.182	<0.182	<0.182	0.292 U*	<0.182
Boron	ug/L	<38.6	<38.6	41.1 U*	<38.6	<38.6	<38.6	<38.6	<38.6	47.7 J	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.171 U*	<0.125
Calcium	ug/L	18,600	18,100	18,300	18,400	18,300	21,600	21,900	21,800	22,000	22,100
Chromium	ug/L	42.2	4.59 U*	2.29 U*	2.00 U*	2.18 U*	1.82 J	1.68 J	1.59 J	1.65 J	1.59 J
Cobalt	ug/L	0.680	0.150 J	0.196 J	0.217 J	0.223 J	0.191 U*	0.168 J	0.177 J	0.222 U*	0.166 J
Copper	ug/L	2.12	3.09	0.919 J	0.917 J	1.60 J	1.25 J	0.875 J	0.905 J	1.03 J	0.983 J
Iron	ug/L	502	186	214	266	298	254	217	239	263	197
Lead	ug/L	0.312 J	0.284 J	0.247 J	0.251 J	0.271 J	0.258 U*	0.180 J	0.206 J	0.315 U*	0.181 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,200	4,140	4,190	4,100	4,030	4,800	4,970	4,940	4,900	4,940
Manganese	ug/L	69.1	35.6	40.8	49.6	55.0	30.1 U*	26.6 U*	30.7 U*	29.9 U*	25.5 U*
Mercury	ug/L	0.114 J	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	4.96 J	0.753 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	22.6	2.11	0.621 U*	0.688 U*	0.874 U*	0.412 U*	<0.336	0.356 U*	0.470 U*	0.371 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	0.225 U*	<0.148	<0.148	<0.148	<0.148	<0.148	0.330 U*	<0.148
Vanadium	ug/L	2.72 U*	2.05 U*	2.44 U*	2.14 U*	2.29 U*	1.92	1.92	2.03	2.19	1.88
Zinc	ug/L	6.80 U*	5.11 U*	4.19 U*	4.30 U*	5.00 U*	5.16 U*	18.3 U*	16.8 U*	4.60 U*	3.56 U*
Dissolved Metals											
Antimony	ug/L	<0.378	0.553 J	0.577 J	<0.378	0.582 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.922 J	1.09 J	0.993 J	0.831 J	1.01 J	0.696 J	0.667 J	0.652 J	0.682 J	0.651 J
Barium	ug/L	23.6 J	22.4 J	22.2 J	22.9 J	22.7 J	23.6	24.0	23.7	23.5	23.8
Beryllium	ug/L	<0.182	0.355 J	0.244 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	0.125 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,500	17,600	17,300	18,000	18,200	22,100	22,300	21,900	21,600	21,800
Chromium	ug/L	1.61 U*	3.69 U*	1.97 U*	2.33 U*	2.42 U*	<1.53	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	<0.0750	0.155 J	0.0860 J	<0.0750	<0.0750	0.101 U*	<0.0750	0.0860 J	0.0960 U*	0.0810 J
Copper	ug/L	1.06 J	0.799 J	1.32 J	0.840 J	0.817 J	0.712 J	0.720 J	0.706 J	0.749 J	0.730 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	35.0 J	<19.5	106	20.6 J	<19.5
Lead	ug/L	<0.128	0.150 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,120	3,950	3,950	4,040	4,020	4,860	5,000	4,820	4,820	4,930
Manganese	ug/L	25.5	2.43 J	<1.35	2.57 J	13.1	11.3 U*	8.01 U*	8.18 U*	8.43 U*	8.32 U*
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	0.766 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.426 J	1.57 J	0.478 J	0.686 J	0.508 J	<0.336	<0.336	<0.336	<0.336	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	0.236 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.89 U*	1.86 U*	2.02 U*	1.78 U*	2.37 U*	1.57	1.63	1.79	1.62	1.66
Zinc	ug/L	4.35 U*	3.51 U*	<3.22	4.49 U*	4.94 U*	<3.22	<3.22	<3.22	3.89 U*	<3.22
Radiological Parameters											
Radium-226	pCi/L	0.00422 +/-(0.0585)UJ	-0.0183 +/-(0.0742)UJ	-0.0575 +/-(0.0615)UJ	0.0255 +/-(0.0706)UJ	-0.0191 +/-(0.0637)UJ	0.0624 +/-(0.0769)U	-0.0672 +/-(0.0530)U	0.0260 +/-(0.0597)U	0.00475 +/-(0.0663)U	0.0472 +/-(0.0569)U
Radium-228	pCi/L	0.445 +/-(0.292)U	0.161 +/-(0.268)U	-0.123 +/-(0.236)U	0.315 +/-(0.250)U	0.302 +/-(0.274)U	0.264 +/-(0.246)U	0.0734 +/-(0.244)U	0.0303 +/-(0.255)U	0.214 +/-(0.217)U	0.144 +/-(0.212)U
Radium-226+228	pCi/L	0.449 +/-(0.298)UJ	0.161 +/-(0.278)UJ	0.000 +/-(0.244)UJ	0.341 +/-(0.260)UJ	0.302 +/-(0.281)UJ	0.326 +/-(0.258)U	0.0734 +/-(0.250)U	0.0562 +/-(0.262)U	0.219 +/-(0.227)U	0.191 +/-(0.220)U
Anions											
Chloride	mg/L	3.81	3.93	3.93	3.90	3.89	7.17	6.88	6.68	6.92	6.64
Fluoride	mg/L	0.0651 J	0.0600 J	0.0559 J	0.0618 J	0.0575 J	0.0785 J	0.0721 J	0.0774 J	0.0725 J	0.0724 J
Sulfate	mg/L	5.79	5.81	5.73	5.71	5.68	11.2	10.3	10.3	10.6	10.1
General Chemistry											
Hardness (as CaCO3)	mg/L	63.9	62.3	62.9	62.8	62.3	73.8	76.2	74.8	75.0	75.4
Total Dissolved Solids	mg/L	61.0	84.0	75.0	88.0	81.0	102	95.0	94.0	114	81.0
Total Suspended Solids	mg/L	10.8	4.80	6.10	8.40	9.10	5.40	4.00	4.10	4.20	4.20

See last page for notes.

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

Sample Location		STR-TR02									
Sample Date		30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019
Sample ID		JOF-STR-TR02-LB-MID-20190730	JOF-STR-DUP04-20190730	JOF-STR-TR02-CC-SUR-20190730	JOF-STR-TR02-CC-MID-20190730	JOF-STR-TR02-CC-BOT-20190730	JOF-STR-TR02-RB-SUR-20190730	JOF-STR-TR02-LB-MID-20191119	JOF-STR-TR02-CC-SUR-20191119	JOF-STR-TR02-CC-MID-20191119	JOF-STR-TR02-CC-BOT-20191119
Parent Sample ID			JOF-STR-TR02-LB-MID-20190730								
Sample Depth		0.8 m	0.8 m	0.5 m	8 m	16.2 m	0.5 m	0.9 m	0.5 m	7.7 m	14.9 m
Sample Type		Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	0.609 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.970 J	1.06	0.839 J	1.14	0.888 J	0.851 J	0.683 J	0.743 J	0.737 J	0.750 J
Barium	ug/L	25.6	25.6	22.8	25.2	23.8	23.7	24.6	25.0	25.4	25.5
Beryllium	ug/L	<0.182	0.284 J	<0.182	0.350 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	50.6 U*	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	0.138 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,300	18,500	17,300	17,600	17,500	17,500	21,700	22,300	21,800	21,600
Chromium	ug/L	2.55 U*	3.99 U*	<1.53	4.94 U*	4.26 U*	2.13 U*	<1.53	<1.53	1.70 J	1.63 J
Cobalt	ug/L	0.237 J	0.262 J	0.113 J	0.302 J	0.234 J	0.187 J	0.162 J	0.135 J	0.166 J	0.171 J
Copper	ug/L	1.36 U*	1.26 J	1.04 U*	4.80	0.933 U*	0.725 U*	0.856 J	0.815 J	0.863 J	0.895 J
Iron	ug/L	232 J	283 J	140	279	273	236	194	165	222	248
Lead	ug/L	0.243 J	0.313 J	<0.128	1.30	0.233 J	0.190 J	0.221 J	0.187 J	0.202 J	0.244 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,310	4,070	4,030	4,090	4,080	4,040	4,860	5,050	4,940	4,840
Manganese	ug/L	48.2	47.4	33.3	44.9	47.2	51.3	31.3 U*	26.6 U*	29.2 U*	31.3 U*
Mercury	ug/L	<0.101	0.154 J	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	0.745 J	<0.610	0.772 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	1.09 U*	2.01	0.389 U*	2.40	1.86 U*	0.820 U*	<0.336	<0.336	0.377 U*	0.376 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	0.160 U*	<0.148	0.308 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.08 U*	2.24 U*	1.80 U*	2.15 U*	1.82 U*	1.86 U*	1.90	1.80	1.97	2.15
Zinc	ug/L	4.54 U*	4.93 U*	4.14 U*	7.03 U*	7.25 U*	4.84 U*	5.16 U*	8.62 U*	3.87 U*	3.77 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	0.446 J	0.383 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.857 J	0.876 J	0.949 J	0.906 J	0.803 J	0.852 J	0.673 J	0.648 J	0.628 J	0.677 J
Barium	ug/L	26.2	22.3 J	21.8	20.7	21.5	21.7	23.0	23.9	24.0	23.5
Beryllium	ug/L	<0.182	<0.182	0.294 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	44.3 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	0.148 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	17,600	18,100	17,100	17,000	17,500	17,500	21,600	22,200	22,000	21,800
Chromium	ug/L	<1.53	3.29 U*	3.36 U*	4.89 U*	5.65 U*	2.06 U*	<1.53	1.65 J	<1.53	<1.53
Cobalt	ug/L	0.0750 J	0.0790 J	0.171 J	0.129 J	0.119 J	<0.0750	0.0810 J	<0.0750	0.0850 J	0.0790 J
Copper	ug/L	0.762 U*	0.903 J	1.22 U*	0.712 U*	0.806 U*	0.753 U*	0.915 J	0.678 J	0.710 J	0.698 J
Iron	ug/L	<19.5	21.3 J	<19.5	22.8 J	25.7 J	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	0.130 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,140	4,010	4,020	3,980	4,100	3,980	4,860	5,000	4,960	4,910
Manganese	ug/L	11.3	11.6	3.12 J	1.47 J	1.67 J	4.07 J	9.08 U*	8.01 U*	7.89 U*	7.83 U*
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	0.669 J	0.721 J	0.828 J	0.962 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.389 J	1.42 J	1.65 J	2.40	3.10 J	0.653 J	<0.336	<0.336	<0.336	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	0.299 J	0.159 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.64 U*	1.70 U*	1.71 U*	1.70 U*	1.47 U*	1.90 U*	1.58	1.74	1.54	1.74
Zinc	ug/L	8.60 U*	3.71 U*	4.38 U*	4.55 U*	4.91 U*	4.04 U*	3.25 U*	<3.22	<3.22	<3.22
Radiological Parameters											
Radium-226	pCi/L	0.126 +/-(0.127)U	-0.0278 +/-(0.0699)UJ	-0.0426 +/-(0.107)U	-0.0180 +/-(0.105)U	-0.00579 +/-(0.0912)U	0.0212 +/-(0.102)U	0.00475 +/-(0.0796)U	-0.00382 +/-(0.0622)U	0.0328 +/-(0.0817)U	0.000 +/-(0.0516)U
Radium-228	pCi/L	-0.116 +/-(0.195)U	0.332 +/-(0.268)U	0.560 +/-(0.281)U*	0.0519 +/-(0.231)U	0.273 +/-(0.233)U	0.240 +/-(0.229)U	0.467 +/-(0.249)J	0.238 +/-(0.234)U	0.248 +/-(0.234)U	0.0686 +/-(0.239)U
Radium-226+228	pCi/L	0.126 +/-(0.233)U	0.332 +/-(0.277)UJ	0.560 +/-(0.301)U*	0.0519 +/-(0.254)U	0.273 +/-(0.250)U	0.262 +/-(0.251)U	0.471 +/-(0.261)J	0.238 +/-(0.242)U	0.281 +/-(0.248)U	0.0686 +/-(0.245)U
Anions											
Chloride	mg/L	3.89	3.99	3.89	3.88	3.89	3.83	6.91	6.92	6.72	6.72
Fluoride	mg/L	0.0566 J	0.0567 J	0.0586 J	0.0620 J	0.0607 J	0.0587 J	0.0817 J	0.0771 J	0.0752 J	0.0730 J
Sulfate	mg/L	5.71	5.68	5.65	5.66	5.67	5.66	10.8	10.7	10.3	10.1
General Chemistry											
Hardness (as CaCO3)	mg/L	63.5	62.9	59.8	60.8	60.6	60.4	74.3	76.6	74.7	73.9
Total Dissolved Solids	mg/L	91.0 J	63.0 J	78.0	92.0	93.0	65.0	116	106	100	91.0
Total Suspended Solids	mg/L	7.90	8.10	5.20	7.50	7.80	8.40	5.80	4.00	4.70	4.70

See last page for notes.

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

Sample Location		STR-TR02	STR-TR03								
Sample Date		19-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019
Sample ID		JOF-STR-TR02-RB-MID-20191119	JOF-STR-TR03-LB-SUR-20190730	JOF-STR-TR03-CC-SUR-20190730	JOF-STR-TR03-CC-MID-20190730	JOF-STR-TR03-CC-BOT-20190730	JOF-STR-TR03-RB-SUR-20190730	JOF-STR-TR03-RB-MID-20190730	JOF-STR-TR03-RB-BOT-20190730	JOF-STR-TR03-LB-SUR-20191119	JOF-STR-DUP01-20191119
Parent Sample ID											JOF-STR-TR03-LB-SUR-20191119
Sample Depth		0.7 m	0.5 m	0.5 m	8 m	16 m	0.5 m	2.5 m	4.5 m	0.5 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.728 J	0.961 J	0.935 J	0.984 J	1.07	0.936 J	0.888 J	1.01	0.776 U*	0.900 U*
Barium	ug/L	24.2	24.9	24.2	24.5	25.0	23.4	23.9	25.4	26.1	27.9
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	0.155 J	<0.125	<0.125	0.137 J	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	21,800	17,900	18,000	17,700	18,000	18,500	18,200	18,200	21,000	21,900
Chromium	ug/L	<1.53	1.77 U*	2.35 U*	1.69 U*	<1.53	<1.53	2.92 U*	2.58 U*	1.88 U*	2.04 U*
Cobalt	ug/L	0.165 J	0.193 J	0.166 J	0.220 J	0.282 J	0.170 J	0.210 J	0.285 J	0.208 U*	0.205 U*
Copper	ug/L	0.841 J	1.11 J	0.959 J	0.805 J	1.34 U*	0.941 U*	0.882 U*	0.952 U*	0.934 U*	0.917 U*
Iron	ug/L	204	275	224	286	260	133	264	427	229	254
Lead	ug/L	0.183 J	0.275 J	0.180 J	0.232 J	0.317 J	0.138 J	0.226 J	0.301 J	0.211 U*	0.224 U*
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,890	4,120	4,180	4,120	4,170	4,200	4,070	4,100	4,790	5,050
Manganese	ug/L	25.6 U*	57.2	40.6	44.8	47.3	66.0	91.7	108	27.4	29.7
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.361 U*	1.06 U*	0.574 U*	0.608 U*	0.634 U*	0.547 U*	1.31 U*	1.10 U*	0.445 J	0.513 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	0.281 U*	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.82	2.31 U*	2.50 U*	2.14 U*	2.02 U*	1.82 U*	1.84 U*	2.25 U*	2.55 U*	2.05 U*
Zinc	ug/L	3.95 U*	9.39 U*	<3.22	3.58 U*	5.30 U*	4.98 U*	4.50 U*	5.16 U*	4.02 U*	4.19 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	0.504 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.620 J	0.828 J	1.11	0.938 J	0.890 J	0.951 J	0.903 J	0.821 J	0.891 J	0.770 J
Barium	ug/L	23.8	22.6	32.0	22.4	22.7	20.6	21.1	21.8	24.3	25.7
Beryllium	ug/L	<0.182	<0.182	0.329 J	<0.182	<0.182	<0.182	<0.182	<0.182	0.220 J	<0.182
Boron	ug/L	<38.6	<38.6	51.1 U*	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	0.158 J	<0.125	<0.125	<0.125	<0.125	<0.125	0.211 J	<0.125
Calcium	ug/L	22,000	17,900	17,800	18,100	18,300	18,000	18,100	17,800	21,200	21,700
Chromium	ug/L	<1.53	<1.53	1.73 U*	<1.53	2.81 U*	2.83 U*	2.01 U*	<1.53	2.12	<1.53
Cobalt	ug/L	0.0790 J	<0.0750	0.202 J	0.103 J	0.0880 J	<0.0750	<0.0750	<0.0750	0.248 J	0.0840 J
Copper	ug/L	0.737 J	<0.627	0.846 J	0.639 J	0.771 U*	0.630 U*	0.677 U*	0.713 U*	1.03 J	0.728 J
Iron	ug/L	<19.5	<19.5	35.7 J	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	0.143 J	0.187 J	<0.128	<0.128	<0.128	<0.128	<0.128	0.208 J	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,860	4,080	4,110	4,140	4,190	4,100	4,060	3,960	4,810	4,960
Manganese	ug/L	8.35 U*	16.9	6.00	<1.35	<1.35	<1.35	10.3	16.7	8.75	8.90
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	<0.336	<0.336	0.471 J	0.507 J	1.16	0.653 J	0.518 J	<0.336	0.420 J	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	0.347 J	<0.148	<0.148	<0.148	<0.148	<0.148	0.317 J	<0.148
Vanadium	ug/L	1.51	1.70 U*	1.96 U*	1.50 U*	1.45 U*	2.01 U*	1.80 U*	1.58 U*	2.46	1.67
Zinc	ug/L	3.35 U*	4.86 U*	<3.22	<3.22	4.37 U*	3.81 U*	3.76 U*	3.98 U*	<3.22	3.30 J
Radiological Parameters											
Radium-226	pCi/L	-0.0394 +/-(0.0525)U	-0.143 +/-(0.0850)U	-0.0875 +/-(0.114)U	-0.0920 +/-(0.127)U	0.116 +/-(0.130)U	-0.102 +/-(0.110)U	-0.0361 +/-(0.102)U	-0.0854 +/-(0.0905)U	-0.0235 +/-(0.0685)U	-0.0179 +/-(0.0548)U
Radium-228	pCi/L	0.0386 +/-(0.229)U	0.419 +/-(0.235)	0.492 +/-(0.282)U*	0.359 +/-(0.254)U	0.389 +/-(0.229)U*	0.235 +/-(0.262)U	0.175 +/-(0.247)U	0.620 +/-(0.314)U*	0.103 +/-(0.268)U	0.0476 +/-(0.221)U
Radium-226+228	pCi/L	0.0386 +/-(0.235)U	0.419 +/-(0.250)J	0.492 +/-(0.304)U*	0.359 +/-(0.284)U	0.504 +/-(0.263)U*	0.235 +/-(0.284)U	0.175 +/-(0.267)U	0.620 +/-(0.327)U*	0.103 +/-(0.277)U	0.0476 +/-(0.228)U
Anions											
Chloride	mg/L	6.63	3.84	3.86	3.82	3.85	4.40	4.34	4.10	5.47	5.88
Fluoride	mg/L	0.0708 J	0.0583 J	0.0606 J	0.0567 J	0.0573 J	0.0586 J	0.0621 J	0.0622 J	0.0674 J	0.0624 J
Sulfate	mg/L	10.1	5.67	5.69	5.49	5.63	5.89	5.99	5.97	8.90	8.58
General Chemistry											
Hardness (as CaCO3)	mg/L	74.6	61.5	62.1	61.3	62.1	63.4	62.2	62.3	72.2	75.3
Total Dissolved Solids	mg/L	68.0	72.0	71.0	89.0	61.0	72.0	61.0	86.0	112	115
Total Suspended Solids	mg/L	4.00	8.00	5.00	6.70	7.70	5.00	10.4	12.2	5.10	5.40

See last page for notes.

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

Sample Location		STR-TR03						STR-TR04			
Sample Date		19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019
Sample ID		JOF-STR-TR03-LB-BOT-20191119	JOF-STR-TR03-CC-SUR-20191119	JOF-STR-TR03-CC-MID-20191119	JOF-STR-TR03-CC-BOT-20191119	JOF-STR-TR03-RB-SUR-20191119	JOF-STR-TR03-RB-BOT-20191119	JOF-STR-TR04-LB-SUR-20190730	JOF-STR-DUP02-20190730	JOF-STR-TR04-CC-SUR-20190730	JOF-STR-TR04-CC-MID-20190730
Parent Sample ID									JOF-STR-TR04-LB-SUR-20190730		
Sample Depth		1.9 m	0.5 m	8 m	15.5 m	0.5 m	2 m	0.5 m	0.5 m	0.5 m	7 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.698 U*	0.834 U*	0.740 U*	0.812 U*	0.867 U*	0.797 U*	0.921 J	0.844 J	0.943 J	0.968 J
Barium	ug/L	26.6	26.8	26.6	27.8	30.0	29.3	25.0	25.3	24.1	28.2
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	21,400	22,100	21,900	22,700	22,800	21,700	17,800	18,200	17,500	17,700
Chromium	ug/L	1.62 U*	2.02 U*	1.76 U*	2.03 U*	2.28 U*	1.83 U*	1.85 U*	2.86 U*	2.38 U*	2.45 U*
Cobalt	ug/L	0.223 U*	0.181 U*	0.170 U*	0.189 U*	0.474 J	0.491 J	0.193 J	0.220 J	0.160 J	0.181 J
Copper	ug/L	1.54 U*	0.970 U*	0.936 U*	0.991 U*	1.19 U*	1.18 U*	0.946 J	0.915 U*	1.06 J	0.933 J
Iron	ug/L	257	185	211	242	619	593	279	313	219	259
Lead	ug/L	0.216 U*	0.180 U*	0.175 U*	0.187 U*	0.411 U*	0.437 U*	0.211 J	0.238 J	0.184 J	0.196 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,950	5,110	5,050	5,220	5,150	4,970	4,140	4,160	4,070	4,150
Manganese	ug/L	34.1	24.9	28.0	30.2	89.7	93.5	46.5	49.1	37.7	42.4
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.419 J	0.411 J	0.390 J	0.438 J	0.691 J	0.689 J	0.549 U*	1.41 U*	0.533 U*	0.563 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.30 U*	2.68 U*	2.56 U*	2.63 U*	3.13 U*	2.64 U*	2.20 U*	1.78 U*	2.51 U*	2.62 U*
Zinc	ug/L	3.88 U*	3.41 U*	3.96 U*	4.18 U*	4.69 U*	4.32 U*	<3.22	4.92 U*	<3.22	3.22 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.669 J	0.750 J	0.641 J	0.694 J	0.634 J	0.697 J	0.840 J	0.834 J	0.833 J	0.834 J
Barium	ug/L	25.3	24.9	24.0	25.9	24.4	25.0	21.4	23.0	22.5	22.0
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	51.3 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	22,100	21,800	20,900	22,100	21,700	22,200	17,500	18,200	17,700	17,700
Chromium	ug/L	1.69 J	1.95 J	<1.53	<1.53	<1.53	1.71 J	1.85 U*	<1.53	<1.53	1.93 U*
Cobalt	ug/L	0.0750 J	0.0860 J	<0.0750	<0.0750	0.0890 J	0.0880 J	<0.0750	<0.0750	<0.0750	<0.0750
Copper	ug/L	0.798 J	0.827 J	0.743 J	0.758 J	0.759 J	0.748 J	0.663 J	0.832 U*	0.721 J	0.953 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	74.0	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	5,060	5,010	4,790	5,060	4,880	5,040	4,060	4,180	4,100	4,080
Manganese	ug/L	8.40	7.74	7.40	7.79	14.9	14.6	6.39	6.71	<1.35	<1.35
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	0.539 J	0.363 J	0.369 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.12	2.50	1.99	1.98	1.97	2.22	1.94 U*	1.67 U*	1.78 U*	2.06 U*
Zinc	ug/L	3.40 J	3.41 J	3.47 J	<3.22	<3.22	<3.22	<3.22	4.52 U*	3.60 U*	<3.22
Radiological Parameters											
Radium-226	pCi/L	-0.0157 +/-(0.0632)U	-0.0835 +/-(0.0567)U	0.0552 +/-(0.0812)U	0.0626 +/-(0.0771)U	0.0581 +/-(0.0742)U	0.0129 +/-(0.0828)U	0.0237 +/-(0.102)U	0.0331 +/-(0.124)U	-0.0806 +/-(0.0854)U	-0.0207 +/-(0.0876)U
Radium-228	pCi/L	0.193 +/-(0.282)U	0.0601 +/-(0.268)U	0.137 +/-(0.247)U	0.280 +/-(0.240)U	0.119 +/-(0.241)U	0.259 +/-(0.270)U	0.225 +/-(0.216)U	0.123 +/-(0.232)U	0.220 +/-(0.212)U	0.151 +/-(0.225)U
Radium-226+228	pCi/L	0.193 +/-(0.289)U	0.0601 +/-(0.274)U	0.192 +/-(0.260)U	0.343 +/-(0.252)U	0.178 +/-(0.252)U	0.272 +/-(0.282)U	0.248 +/-(0.239)U	0.157 +/-(0.263)U	0.220 +/-(0.229)U	0.151 +/-(0.241)U
Anions											
Chloride	mg/L	5.50	5.50	5.52	5.45	6.30	6.20	3.91	3.99	3.81	3.82
Fluoride	mg/L	0.0655 J	0.0662 J	0.0678 J	0.0687 J	0.0664 J	0.0675 J	0.0569 J	0.0615 J	0.0578 J	0.0578 J
Sulfate	mg/L	8.88	8.83	8.83	8.67	9.09	8.88	5.80	5.96	5.62	5.68
General Chemistry											
Hardness (as CaCO3)	mg/L	73.9	76.3	75.5	78.2	78.1	74.8	61.5	62.6	60.5	61.4
Total Dissolved Solids	mg/L	107	91.0	100	110	104	99.0	65.0 J	83.0 J	83.0	84.0
Total Suspended Solids	mg/L	6.30	3.80	4.50	4.90	15.0	15.9	8.20	8.10	5.80	6.70

See last page for notes.

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

Sample Location		STR-TR04							STR-TR05		
Sample Date		30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019
Sample ID		JOF-STR-TR04-CC-BOT-20190730	JOF-STR-TR04-RB-SUR-20190730	JOF-STR-TR04-LB-SUR-20191119	JOF-STR-TR04-CC-SUR-20191119	JOF-STR-TR04-CC-MID-20191119	JOF-STR-TR04-CC-BOT-20191119	JOF-STR-TR04-RB-SUR-20191119	JOF-STR-TR05-LB-MID-20190730	JOF-STR-TR05-CC-SUR-20190730	JOF-STR-TR05-CC-MID-20190730
Parent Sample ID											
Sample Depth		13.7 m	0.5 m	0.3 m	0.5 m	7 m	13 m	0.4 m	0.75 m	0.5 m	9 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.457 J	<0.378	<0.378
Arsenic	ug/L	1.12	1.09	0.726 U*	0.748 U*	0.883 U*	0.919 U*	0.828 U*	1.25	1.16	1.36
Barium	ug/L	25.3	28.0	26.7	26.8	27.4	27.2	26.5	27.3	23.0	23.8
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	0.264 J	0.199 J	<0.182	0.216 J	<0.182	<0.182
Boron	ug/L	<38.6	39.4 U*	<38.6	<38.6	47.4 U*	43.7 J	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	0.166 U*	0.149 U*	<0.125	0.177 J	<0.125	<0.125
Calcium	ug/L	17,300	18,500	21,600	22,400	22,100	22,100	22,200	18,000	16,700	17,000
Chromium	ug/L	4.25 U*	<1.53	1.60 U*	1.62 U*	1.81 U*	1.82 U*	2.12 U*	2.87 U*	2.86 U*	3.51 U*
Cobalt	ug/L	0.194 J	0.184 J	0.192 U*	0.159 U*	0.248 U*	0.262 U*	0.198 U*	0.656	0.191 J	0.253 J
Copper	ug/L	1.04 J	1.15 J	0.943 U*	1.00 U*	1.17 U*	1.09 U*	1.29 U*	1.37 J	1.01 J	2.43
Iron	ug/L	319	207	212	191	220	270	185	421	195	257
Lead	ug/L	0.241 J	0.191 J	0.194 U*	0.158 U*	0.267 U*	0.287 U*	0.201 U*	0.426 J	0.159 J	0.249 J
Lithium	ug/L	3.89 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,050	4,150	4,970	5,130	4,980	5,040	5,020	4,190	3,910	3,970
Manganese	ug/L	47.2	85.7	27.2	27.9	27.5	32.9	27.3	77.2	34.5	43.9
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.632 U*	0.651 U*	0.442 J	0.397 J	0.501 J	0.517 J	0.481 J	1.41 U*	0.385 U*	0.549 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	0.254 U*	0.244 U*	<0.148	0.314 J	<0.148	<0.148
Vanadium	ug/L	3.68 U*	1.89 U*	2.33 U*	2.20 U*	2.43 U*	2.65 U*	2.41 U*	2.91 U*	2.95 U*	3.39 U*
Zinc	ug/L	3.89 U*	3.78 U*	4.17 U*	3.35 U*	3.74 U*	5.16 U*	3.93 U*	5.38 U*	4.99 U*	6.30 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.683 J	<0.378	<0.378
Arsenic	ug/L	0.942 J	1.10	0.736 J	0.816 J	0.715 J	0.707 J	0.671 J	1.26	1.23	1.16
Barium	ug/L	21.8	25.5	26.0	27.0	25.2	25.1	25.2	23.3	21.3	21.9
Beryllium	ug/L	<0.182	<0.182	<0.182	0.193 J	<0.182	<0.182	<0.182	0.328 J	<0.182	<0.182
Boron	ug/L	<38.6	44.8 U*	<38.6	45.1 U*	<38.6	<38.6	<38.6	47.2 J	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.165 J	<0.125	<0.125
Calcium	ug/L	17,900	18,000	22,400	22,500	22,200	21,900	22,200	18,000	16,800	17,100
Chromium	ug/L	2.47 U*	2.33 U*	1.74 J	<1.53	<1.53	1.71 J	1.74 J	2.61 U*	3.29 U*	2.91 U*
Cobalt	ug/L	<0.0750	<0.0750	0.0970 J	0.111 J	0.101 J	0.0940 J	<0.0750	0.195 J	0.0780 J	0.0790 J
Copper	ug/L	<0.627	0.865 J	0.846 J	0.940 J	0.851 J	0.807 J	0.983 J	0.824 J	0.884 J	0.826 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	32.6 J	28.9 J	<19.5	<19.5	<19.5	32.3 J
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.202 J	<0.128	<0.128
Lithium	ug/L	<3.39	4.32 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,140	4,140	5,150	5,040	5,030	4,930	5,050	4,180	3,940	3,950
Manganese	ug/L	<1.35	4.29 J	8.25	7.98	7.86	8.68	10.5	20.9	2.16 J	<1.35
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	<0.336	0.400 J	<0.336	<0.336	<0.336	<0.336	<0.336	0.513 J	<0.336	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	0.209 J	<0.148	<0.148	<0.148	0.349 J	<0.148	<0.148
Vanadium	ug/L	2.41 U*	2.32 U*	2.37	1.99	1.65	2.19	2.17	2.25 U*	3.06 U*	2.76 U*
Zinc	ug/L	<3.22	<3.22	<3.22	4.05 J	<3.22	3.49 J	3.31 J	5.85 U*	3.76 U*	4.83 U*
Radiological Parameters											
Radium-226	pCi/L	-0.115 +/-(0.0810)U	-0.0648 +/-(0.0929)U	-0.00618 +/-(0.0586)U	-0.0945 +/-(0.0647)U	-0.0364 +/-(0.0713)U	-0.0426 +/-(0.0783)U	0.0374 +/-(0.0791)U	-0.148 +/-(0.0881)U	-0.0936 +/-(0.0830)U	0.105 +/-(0.118)U
Radium-228	pCi/L	0.277 +/-(0.198)U	0.625 +/-(0.261)	-0.324 +/-(0.215)U	-0.113 +/-(0.222)U	0.0586 +/-(0.205)U	0.00426 +/-(0.220)U	0.121 +/-(0.243)U	0.239 +/-(0.246)U	0.0611 +/-(0.226)U	0.108 +/-(0.249)U
Radium-226+228	pCi/L	0.277 +/-(0.214)U	0.625 +/-(0.277)J	0.000 +/-(0.223)U	0.000 +/-(0.231)U	0.0586 +/-(0.217)U	0.00426 +/-(0.234)U	0.158 +/-(0.256)U	0.239 +/-(0.261)U	0.0611 +/-(0.241)U	0.213 +/-(0.276)U
Anions											
Chloride	mg/L	3.82	8.95	5.41	5.48	5.49	5.51	5.49	3.83	3.85	3.84
Fluoride	mg/L	0.0563 J	0.0600 J	0.0662 J	0.0699 J	0.0707 J	0.0649 J	0.0652 J	0.0628 J	0.0565 J	0.0589 J
Sulfate	mg/L	5.64	6.31	8.72	8.90	8.96	8.91	8.81	5.66	5.74	5.71
General Chemistry											
Hardness (as CaCO3)	mg/L	59.8	63.3	74.3	77.0	75.7	76.0	76.1	62.3	57.9	58.7
Total Dissolved Solids	mg/L	80.0	97.0	116	117	113	114	87.0	81.0	88.0	94.0
Total Suspended Solids	mg/L	8.10	8.80	4.80	3.90	4.20	5.30	3.10	8.20	5.50	7.50

See last page for notes.

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

Sample Location		STR-TR05								STR-TR06	
Sample Date		30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	30-Jul-2019	30-Jul-2019
Sample ID		JOF-STR-TR05-CC-BOT-20190730	JOF-STR-TR05-RB-MID-20190730	JOF-STR-TR05-LB-SUR-20191119	JOF-STR-DUP02-20191119	JOF-STR-TR05-CC-SUR-20191119	JOF-STR-TR05-CC-MID-20191119	JOF-STR-TR05-CC-BOT-20191119	JOF-STR-TR05-RB-MID-20191119	JOF-STR-TR06-LB-MID-20190730	JOF-STR-TR06-CC-SUR-20190730
Parent Sample ID					JOF-STR-TR05-LB-SUR-20191119						
Sample Depth		17.5 m	0.6 m	0.1 m	0.1 m	0.5 m	9 m	17.6 m	0.6 m	0.7 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.25	1.24	0.774 J	0.847 J	0.688 J	0.692 J	0.673 J	0.635 J	1.13	0.885 J
Barium	ug/L	25.0	23.3	27.2	26.8	25.2	24.9	25.0	24.6	24.1	22.3
Beryllium	ug/L	<0.182	<0.182	<0.182	0.276 U*	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	47.0 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	0.155 U*	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	16,400	17,700	21,400	21,300	21,100	21,300	22,000	21,600	17,800	17,500
Chromium	ug/L	3.64 U*	3.26 U*	1.72 J	1.69 J	<1.53	<1.53	1.70 J	<1.53	2.05 U*	<1.53
Cobalt	ug/L	0.344 J	0.204 J	0.281 J	0.309 J	0.176 J	0.160 J	0.146 J	0.155 J	0.275 J	0.163 J
Copper	ug/L	1.19 J	1.07 J	1.07 J	1.05 J	0.913 J	0.825 J	0.856 J	0.805 J	1.07 J	0.787 J
Iron	ug/L	374	207	527	504	290	231	240	215	358	178
Lead	ug/L	0.300 J	0.170 J	0.358 J	0.456 J	0.225 J	0.177 J	0.183 J	0.171 J	0.263 J	0.134 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	3,830	4,020	4,870	4,820	4,800	4,820	4,910	4,810	4,190	4,050
Manganese	ug/L	62.8	43.2	67.9	68.4	35.7 U*	29.0 U*	30.0 U*	31.7 U*	45.1	33.8
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.608 U*	0.455 U*	0.592 U*	0.522 U*	0.388 U*	0.362 U*	<0.336	<0.336	0.713 U*	0.446 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	0.283 U*	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	3.66 U*	3.25 U*	2.35	2.30	1.86	1.82	1.92	1.86	2.26 U*	1.54 U*
Zinc	ug/L	12.6 U*	5.37 U*	4.43 U*	4.88 U*	4.07 U*	3.83 U*	3.32 U*	3.30 U*	5.12 U*	4.82 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.12	1.24	0.639 J	0.685 J	0.618 J	0.589 J	0.604 J	0.795 J	0.858 J	0.971 J
Barium	ug/L	21.9	21.1	22.9	23.1	23.9	23.2	23.2	23.2	22.4	20.1
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.398 U*	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	46.8 J	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.187 J	<0.125	<0.125
Calcium	ug/L	16,800	17,000	21,400	21,800	22,200	21,700	21,500	21,600	17,600	17,100
Chromium	ug/L	3.05 U*	3.10 U*	<1.53	<1.53	1.54 J	<1.53	<1.53	<1.53	<1.53	2.61 U*
Cobalt	ug/L	0.0960 J	0.0990 J	<0.0750	0.0790 J	<0.0750	<0.0750	<0.0750	0.148 J	0.160 J	<0.0750
Copper	ug/L	0.849 J	0.914 J	0.768 J	0.808 J	0.738 J	0.660 J	0.784 J	0.861 J	0.716 J	0.747 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	105	135	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.185 J	<0.128	0.182 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	3,880	3,880	4,830	4,880	4,960	4,850	4,840	4,890	4,090	4,000
Manganese	ug/L	11.1	3.12 J	23.9 U*	24.8 U*	8.09 U*	7.70 U*	7.91 U*	12.0 U*	21.5	1.36 J
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.354 J	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	<0.336	0.523 J	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.323 U*	<0.148	<0.148
Vanadium	ug/L	2.99 U*	3.07 U*	1.72	1.96	1.68	1.68	1.71	1.64	1.48 U*	2.34 U*
Zinc	ug/L	3.89 U*	3.89 U*	<3.22	<3.22	3.23 U*	3.37 U*	<3.22	<3.22	3.23 U*	3.81 U*
Radiological Parameters											
Radium-226	pCi/L	-0.0126 +/-(0.0930)U	-0.00636 +/-(0.0846)U	-0.0185 +/-(0.0565)U	0.0371 +/-(0.0756)U	-0.0259 +/-(0.0568)U	-0.0195 +/-(0.0742)U	0.000813 +/-(0.0818)U	0.00147 +/-(0.0575)U	0.0937 +/-(0.131)U	-0.128 +/-(0.0970)U
Radium-228	pCi/L	0.259 +/-(0.256)U	0.0483 +/-(0.273)U	0.131 +/-(0.234)U	0.293 +/-(0.224)U	0.115 +/-(0.212)U	0.0490 +/-(0.196)U	0.139 +/-(0.242)U	0.273 +/-(0.254)U	0.736 +/-(0.316)U*	0.125 +/-(0.251)U
Radium-226+228	pCi/L	0.259 +/-(0.272)U	0.0483 +/-(0.286)U	0.131 +/-(0.241)U	0.330 +/-(0.236)U	0.115 +/-(0.219)U	0.0490 +/-(0.210)U	0.140 +/-(0.255)U	0.274 +/-(0.260)U	0.830 +/-(0.342)U*	0.125 +/-(0.269)U
Anions											
Chloride	mg/L	3.82	4.01	6.29	6.85	6.68	6.60	6.59	6.65	3.85	3.86
Fluoride	mg/L	0.0549 J	0.0661 J	0.0982 J	0.0791 J	0.0734 J	0.0781 J	0.0725 J	0.0727 J	0.0577 J	0.0576 J
Sulfate	mg/L	5.55	5.82	9.46	10.3	10.2	9.95	10.0	10.1	5.64	5.70
General Chemistry											
Hardness (as CaCO3)	mg/L	56.6	60.6	73.6	73.0	72.5	72.9	75.1	73.6	61.8	60.4
Total Dissolved Solids	mg/L	86.0	82.0	75.0	82.0	103	99.0	105	115	88.0	62.0
Total Suspended Solids	mg/L	13.3	5.80	10.6	11.3	5.50	4.90	4.80	4.20	9.00	5.10

See last page for notes.

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

Sample Location		STR-TR06									
Sample Date		30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019
Sample ID		JOF-STR-TR06-CC-MID-20190730	JOF-STR-TR06-CC-BOT-20190730	JOF-STR-TR06-RB-SUR-20190730	JOF-STR-TR06-RB-MID-20190730	JOF-STR-TR06-RB-BOT-20190730	JOF-STR-DUP03-20190730	JOF-STR-TR06-LB-SUR-20191119	JOF-STR-TR06-CC-SUR-20191119	JOF-STR-TR06-CC-MID-20191119	JOF-STR-TR06-CC-BOT-20191119
Parent Sample ID							JOF-STR-TR06-RB-BOT-20190730				
Sample Depth		8.8 m	17.3 m	0.5 m	2.6 m	4.8 m	4.8 m	0.3 m	0.5 m	8 m	15.2 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.994 J	1.24	1.28	1.30	1.42	1.47	0.785 U*	0.859 U*	0.891 U*	1.20 U*
Barium	ug/L	22.9	24.2	23.4	23.1	25.2	26.2	27.6	26.6	27.0	41.2
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	38.7 U*	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.148 U*	<0.125
Calcium	ug/L	17,800	17,000	17,500	17,200	16,800	17,300	22,800	22,000	22,300	23,000
Chromium	ug/L	1.55 U*	6.87 U*	3.35 U*	3.23 U*	3.88 U*	3.90 U*	1.62 U*	1.56 U*	1.92 U*	2.95 U*
Cobalt	ug/L	0.240 J	0.307 J	0.272 J	0.257 J	0.400 J	0.443 J	0.176 U*	0.220 U*	0.290 U*	1.11
Copper	ug/L	0.820 J	1.25 J	1.17 J	1.04 J	1.40 J	1.33 J	1.24 U*	1.20 U*	1.33 U*	2.00 U*
Iron	ug/L	275	455	199	249	538	573	228	223	229	1,910
Lead	ug/L	0.202 J	0.292 J	0.197 J	0.216 J	0.384 J	0.392 J	0.208 U*	0.213 U*	0.282 U*	1.31
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	3.90 U*	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,150	3,880	3,960	3,920	3,880	4,010	5,250	5,020	5,010	5,300
Manganese	ug/L	44.6	51.6	40.1	47.0	77.7	79.1	27.4	27.5	29.1	226
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	1.37 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.549 U*	0.744 U*	0.640 U*	0.496 U*	0.808 U*	0.864 U*	0.453 J	0.480 J	0.513 J	1.55
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.220 U*	<0.148
Vanadium	ug/L	2.18 U*	3.51 U*	3.12 U*	3.27 U*	3.68 U*	3.92 U*	1.85 U*	1.85 U*	2.12 U*	4.13 U*
Zinc	ug/L	4.76 U*	5.12 U*	5.06 U*	4.31 U*	5.38 U*	5.93 U*	3.67 U*	3.79 U*	4.26 U*	8.44 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	0.557 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.932 J	1.14	1.20	1.57	1.34	1.29	0.712 J	0.767 J	0.708 J	0.763 J
Barium	ug/L	20.6	22.8	21.6	21.1	24.9	23.5	24.6	25.4	25.9	25.3
Beryllium	ug/L	<0.182	<0.182	<0.182	0.473 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	55.9 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	0.154 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	17,500	16,900	17,100	17,000	17,300	17,100	21,700	22,200	23,300	22,500
Chromium	ug/L	1.77 U*	3.00 U*	3.37 U*	3.28 U*	6.16 U*	3.48 U*	<1.53	<1.53	<1.53	1.54 J
Cobalt	ug/L	<0.0750	0.0900 J	0.0920 J	0.170 J	0.324 J	0.301 J	0.0870 J	0.103 J	0.0960 J	<0.0750
Copper	ug/L	0.687 J	0.893 J	0.919 J	1.13 J	1.35 J	0.930 J	1.11 J	1.10 J	0.979 J	0.961 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	371	405	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	0.193 J	0.253 J	1.62 J	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	5.81 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,080	3,840	3,870	3,850	3,980	3,890	4,920	5,010	5,250	5,100
Manganese	ug/L	<1.35	2.58 J	2.57 J	2.92 J	57.7	56.1	7.23	7.95	8.04	14.1
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	<0.336	<0.336	<0.336	0.395 J	0.630 J	1.81 J	0.340 J	<0.336	0.353 J	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	0.343 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.00 U*	2.77 U*	2.89 U*	3.06 U*	3.42 U*	3.50 U*	1.67	1.67	1.70	1.93
Zinc	ug/L	3.57 U*	3.86 U*	3.70 U*	3.90 U*	4.25 U*	<3.22	3.41 J	<3.22	3.49 J	3.33 J
Radiological Parameters											
Radium-226	pCi/L	-0.0175 +/-(0.140)U	-0.0673 +/-(0.114)U	-0.0859 +/-(0.0761)U	0.0315 +/-(0.118)U	-0.143 +/-(0.0858)U	-0.00953 +/-(0.0904)U	0.00308 +/-(0.0456)U	-0.0483 +/-(0.0644)U	0.0114 +/-(0.0574)U	-0.0119 +/-(0.0670)U
Radium-228	pCi/L	0.122 +/-(0.222)U	0.203 +/-(0.275)U	0.211 +/-(0.243)U	0.187 +/-(0.283)U	0.220 +/-(0.224)U	0.185 +/-(0.224)U	-0.0150 +/-(0.222)U	0.000 +/-(0.228)U	0.258 +/-(0.252)U	0.167 +/-(0.221)U
Radium-226+228	pCi/L	0.122 +/-(0.262)U	0.203 +/-(0.298)U	0.211 +/-(0.255)U	0.219 +/-(0.307)U	0.220 +/-(0.240)U	0.185 +/-(0.242)U	0.00308 +/-(0.227)U	0.000 +/-(0.237)U	0.269 +/-(0.258)U	0.167 +/-(0.231)U
Anions											
Chloride	mg/L	3.87	3.88	3.92	4.04	4.16	4.17	7.00	6.95	6.93	6.92
Fluoride	mg/L	0.0569 J	0.0566 J	0.0603 J	0.0652 J	0.0589 J	0.0657 J	0.0684 J	0.0658 J	0.0683 J	0.0691 J
Sulfate	mg/L	5.66	5.59	5.76	5.85	5.75	5.79	10.5	10.5	10.3	10.3
General Chemistry											
Hardness (as CaCO3)	mg/L	61.5	58.5	60.0	59.2	57.8	59.6	78.5	75.7	76.2	79.3
Total Dissolved Solids	mg/L	69.0	73.0	76.0	78.0	75.0	78.0	67.0	101	73.0	72.0
Total Suspended Solids	mg/L	7.10	9.60	6.00	7.80	15.7	15.6	4.60	2.90	4.70	35.2

See last page for notes.

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

Sample Location		STR-TR06	STR-TR07								
Sample Date		19-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019
Sample ID		JOF-STR-TR06-RB-SUR-20191119	JOF-STR-TR07-LB-MID-20190730	JOF-STR-TR07-CC-SUR-20190730	JOF-STR-TR07-CC-MID-20190730	JOF-STR-TR07-CC-BOT-20190730	JOF-STR-TR07-RB-MID-20190730	JOF-STR-DUP01-20190730	JOF-STR-TR07-LB-SUR-20191119	JOF-STR-TR07-LB-BOT-20191119	JOF-STR-TR07-CC-SUR-20191119
Parent Sample ID								JOF-STR-TR07-RB-MID-20190730			
Sample Depth		0.3 m	0.6 m	0.5 m	8.2 m	16 m	0.6 m	0.6 m	0.5 m	1.7 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.461 J	<0.378	<0.378	<0.378
Arsenic	ug/L	0.773 U*	0.959 J	1.12	0.856 J	0.983 J	1.08	1.24	0.933 J	0.772 J	0.610 J
Barium	ug/L	28.3	24.2	23.5	23.5	25.3	25.4 J	42.7 J	28.0	25.5	23.8
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.416 J	<0.182	0.276 U*	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	56.0 U*	<38.6	46.0 J	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.133 J	<0.125
Calcium	ug/L	23,000	17,800	17,100	17,800	17,600	17,300	17,200	22,100	21,400	21,200
Chromium	ug/L	1.62 U*	1.68 U*	7.79 U*	<1.53	4.34 U*	<3.07	2.15 U*	2.16	1.69 J	<1.53
Cobalt	ug/L	0.214 U*	0.264 J	0.214 J	0.185 J	0.330 J	0.293 J	0.367 J	0.179 J	0.185 J	0.128 J
Copper	ug/L	1.09 U*	1.11 J	1.97 J	0.959 J	1.14 J	1.98 J	1.14 J	1.00 J	1.20 J	1.00 J
Iron	ug/L	279	324	170	191	455	397	439	309	250	165
Lead	ug/L	0.227 U*	0.223 J	0.151 J	0.152 J	0.309 J	0.285 J	0.369 J	0.201 J	0.281 J	0.190 J
Lithium	ug/L	<3.39	<3.39	3.53 U*	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	5,170	4,120	4,030	4,050	4,030	4,020	4,020	5,140	4,890	4,760
Manganese	ug/L	34.9	47.7	35.6	43.7	65.2	66.7	66.0	28.2 U*	28.8 U*	22.8 U*
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	0.932 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.534 J	0.557 U*	3.77	0.596 U*	2.32	1.15 U*	0.802 U*	0.540 U*	0.508 U*	0.365 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	0.148 UJ	<0.148	<0.148	<0.148	<0.148	<0.148	0.233 J	<0.148	0.214 U*	<0.148
Vanadium	ug/L	1.95 U*	2.17 U*	2.65 U*	1.75 U*	1.93 U*	2.52 U*	2.50 U*	2.13	2.10	2.03
Zinc	ug/L	3.98 U*	5.03 U*	5.61 U*	5.30 U*	5.51 U*	5.39 U*	5.05 U*	3.84 U*	3.48 U*	3.62 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	2.33 J	1.06	0.882 J	0.867 J	0.933 J	0.821 J	0.940 J	0.873 J	0.645 J	0.589 J
Barium	ug/L	27.5	20.9	22.2	21.5	22.9	21.6	21.5	26.7	23.4	23.8
Beryllium	ug/L	0.950 J	0.368 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	46.2 J	<38.6	<38.6	<38.6	<38.6	39.7 J	<38.6	<38.6	<38.6
Cadmium	ug/L	0.936 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	22,500	17,500	17,800	17,500	17,700	17,500	17,600	22,100	21,600	21,500
Chromium	ug/L	2.42	<1.53	2.87 U*	<1.53	<1.53	<1.53	<1.53	2.37	<1.53	<1.53
Cobalt	ug/L	1.01 J	0.120 J	0.0780 J	<0.0750	0.200 J	0.213 J	0.117 J	0.0820 J	0.0770 J	<0.0750
Copper	ug/L	1.97 J	0.787 J	1.02 J	0.773 J	1.13 J	1.62 J	0.722 J	0.870 J	0.911 J	0.856 J
Iron	ug/L	<19.5	<19.5	22.3 J	<19.5	241	54.2	<19.5	<19.5	<19.5	124
Lead	ug/L	0.922 J	<0.128	<0.128	<0.128	0.189 J	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	5,090	4,050	4,180	3,980	4,020	3,990	4,060	5,180	4,920	4,820
Manganese	ug/L	15.3	2.98 J	<1.35	<1.35	46.9	17.4	16.6	8.04 U*	7.51 U*	9.22 U*
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	1.37 J	<0.610	<0.610	<0.610	<0.610	1.59 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	1.10	0.443 J	1.27	<0.336	0.550 J	<0.336	0.368 J	0.342 U*	<0.336	<0.336
Selenium	ug/L	2.17 J	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	1.69 J	0.191 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.79	1.76 U*	1.93 U*	1.67 U*	1.69 U*	1.54 U*	1.69 U*	2.11	1.68	1.59
Zinc	ug/L	<3.22	4.89 U*	4.19 U*	4.32 U*	4.86 U*	4.60 U*	<3.22	3.52 U*	<3.22	<3.22
Radiological Parameters											
Radium-226	pCi/L	0.0216 +/-(0.0666)U	0.0353 +/-(0.123)U	0.0321 +/-(0.122)U	0.186 +/-(0.147)U	-0.0870 +/-(0.0922)U	-0.0369 +/-(0.104)U	0.121 +/-(0.135)U	0.0237 +/-(0.0592)U	-0.0638 +/-(0.0463)U	-0.0121 +/-(0.0394)U
Radium-228	pCi/L	0.184 +/-(0.244)U	0.373 +/-(0.247)U	0.398 +/-(0.291)U	0.848 +/-(0.359)U*	0.339 +/-(0.250)U	0.402 +/-(0.290)U	0.112 +/-(0.278)U	0.403 +/-(0.303)U	0.00210 +/-(0.200)U	-0.0805 +/-(0.191)U
Radium-226+228	pCi/L	0.206 +/-(0.253)U	0.408 +/-(0.276)U	0.430 +/-(0.316)U	1.03 +/-(0.388)U*	0.339 +/-(0.266)U	0.402 +/-(0.308)U	0.233 +/-(0.309)U	0.426 +/-(0.309)U	0.00210 +/-(0.205)U	0.000 +/-(0.195)U
Anions											
Chloride	mg/L	7.00	3.86	3.86	3.87	3.94	4.00	4.01	6.58	6.55	6.60
Fluoride	mg/L	0.0720 J	0.0591 J	0.0577 J	0.0592 J	0.0591 J	0.0586 J	0.0579 J	0.0774 J	0.0813 J	0.0706 J
Sulfate	mg/L	9.98	5.76	5.61	5.70	5.82	5.92	5.97	10.1	10.1	10.1
General Chemistry											
Hardness (as CaCO3)	mg/L	78.8	61.5	59.4	61.0	60.6	59.9	59.4	76.5	73.5	72.5
Total Dissolved Solids	mg/L	75.0	77.0	78.0	77.0	93.0	67.0 J	96.0 J	87.0	104	85.0
Total Suspended Solids	mg/L	6.30	9.50	4.60	6.90	12.5	13.2	13.0	3.60	4.50	3.00

See last page for notes.

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

Sample Location		STR-TR07			STR-TR08						
Sample Date		19-Nov-2019	19-Nov-2019	19-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019
Sample ID		JOF-STR-TR07-CC-MID-20191119	JOF-STR-TR07-CC-BOT-20191119	JOF-STR-TR07-RB-SUR-20191119	JOF-STR-TR08-LB-SUR-20190730	JOF-STR-TR08-LB-BOT-20190730	JOF-STR-TR08-CC-SUR-20190730	JOF-STR-TR08-CC-MID-20190730	JOF-STR-TR08-CC-BOT-20190730	JOF-STR-TR08-RB-SUR-20190730	JOF-STR-TR08-RB-MID-20190730
Parent Sample ID											
Sample Depth		7.8 m	15 m	0.3 m	0.5 m	1.25 m	0.5 m	7.3 m	14.1 m	0.5 m	1.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.703 J	0.714 J	0.811 J	1.19	1.03	1.03	1.12	1.26	1.09	1.12
Barium	ug/L	25.1	25.0	26.7	24.7	23.9	25.0	25.5	26.2	25.2	61.8
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	21,800	22,200	21,900	17,800	17,600	17,600	17,800	17,700	17,800	18,000
Chromium	ug/L	<1.53	<1.53	2.00	3.11 U*	1.56 U*	3.58 U*	6.98 U*	7.81 U*	3.75 U*	3.31 U*
Cobalt	ug/L	0.174 J	0.160 J	0.316 J	0.234 J	0.239 J	0.220 J	0.265 J	0.420 J	0.243 J	0.214 J
Copper	ug/L	0.982 J	0.941 J	1.09 J	1.14 J	1.09 J	1.04 J	2.39	1.96 J	0.977 J	0.967 J
Iron	ug/L	248	234	609	299	253	230	318	1,080	275	277
Lead	ug/L	0.225 J	0.207 J	0.427 J	0.229 J	0.218 J	0.167 J	0.212 J	0.293 J	0.196 J	0.186 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	3.53 U*	<3.39	<3.39	3.41 U*	4.23 U*	3.84 U*
Magnesium	ug/L	4,890	5,010	4,900	3,940	4,000	4,050	4,120	4,190	4,100	4,160
Manganese	ug/L	31.1 U*	32.0 U*	78.5	44.3	42.4	41.7	48.2	69.1	44.2	43.6
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	0.709 J	1.55 J	<0.610	<0.610
Nickel	ug/L	0.441 U*	0.369 U*	0.606 U*	0.563 U*	0.631 U*	0.781 U*	2.97	3.92	0.962 U*	1.01 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.97	1.93	2.59	3.62 U*	1.90 U*	2.84 U*	3.07 U*	3.52 U*	2.82 U*	2.76 U*
Zinc	ug/L	4.34 U*	3.84 U*	4.77 U*	4.36 U*	4.62 U*	4.37 U*	5.54 U*	5.58 U*	4.96 U*	4.43 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	0.627 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.617 J	0.642 J	0.623 J	1.56	0.953 J	1.04	0.966 J	1.07	0.963 J	1.08
Barium	ug/L	23.1	23.3	23.1	21.2	22.1	25.7	22.5	25.5	22.5	22.6
Beryllium	ug/L	<0.182	<0.182	<0.182	0.350 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	39.1 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	0.170 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	21,400	21,800	22,000	17,000	18,100	17,800	17,600	17,800	18,000	17,500
Chromium	ug/L	<1.53	<1.53	<1.53	3.76 U*	2.13 U*	3.45 U*	3.28 U*	3.74 U*	2.18 U*	<1.53
Cobalt	ug/L	<0.0750	<0.0750	0.0810 J	0.243 J	0.0780 J	<0.0750	<0.0750	0.103 J	0.141 J	0.137 J
Copper	ug/L	0.752 J	0.910 J	0.930 J	1.20 J	1.10 J	0.661 J	0.699 J	0.686 J	0.816 J	7.25 J
Iron	ug/L	<19.5	31.0 J	312	<19.5	<19.5	<19.5	<19.5	83.2	148	65.3 U*
Lead	ug/L	<0.128	<0.128	<0.128	0.207 J	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	3.82 U*	<3.39	4.15 U*	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,800	4,850	4,870	3,800	4,140	4,060	4,050	4,110	4,110	4,000
Manganese	ug/L	7.97 U*	10.2 U*	26.9 U*	3.94 J	3.71 J	1.50 J	2.94 J	16.2	26.1	9.98
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	0.669 J	<0.610	<0.610	<0.610	<0.610	0.725 J
Nickel	ug/L	<0.336	<0.336	<0.336	0.511 J	0.909 J	0.573 J	0.508 J	0.631 J	0.708 J	2.41 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	0.412 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.74	1.66	1.64	3.20 U*	1.67 U*	2.67 U*	2.61 U*	2.84 U*	2.03 U*	2.53 U*
Zinc	ug/L	4.17 U*	<3.22	<3.22	4.89 U*	4.03 U*	4.11 U*	4.64 U*	4.40 U*	4.13 U*	3.64 U*
Radiological Parameters											
Radium-226	pCi/L	-0.0510 +/-(0.0561)U	0.0336 +/-(0.0620)U	0.0214 +/-(0.0726)U	0.132 +/-(0.143)U	-0.0921 +/-(0.119)U	-0.0300 +/-(0.100)U	-0.0988 +/-(0.121)U	0.0592 +/-(0.134)U	-0.0605 +/-(0.108)U	-0.110 +/-(0.0976)U
Radium-228	pCi/L	0.103 +/-(0.227)U	0.286 +/-(0.235)U	0.207 +/-(0.211)U	0.780 +/-(0.279)U*	0.825 +/-(0.350)U*	0.445 +/-(0.260)U*	0.157 +/-(0.222)U	0.104 +/-(0.229)U	0.280 +/-(0.243)U	0.677 +/-(0.316)U*
Radium-226+228	pCi/L	0.103 +/-(0.234)U	0.320 +/-(0.243)U	0.229 +/-(0.223)U	0.912 +/-(0.314)U*	0.825 +/-(0.370)U*	0.445 +/-(0.279)U*	0.157 +/-(0.253)U	0.163 +/-(0.265)U	0.280 +/-(0.266)U	0.677 +/-(0.331)U*
Anions											
Chloride	mg/L	6.61	6.54	7.26	3.85	3.85	3.85	3.88	3.88	3.85	3.93
Fluoride	mg/L	0.0739 J	0.0794 J	0.0712 J	0.0556 J	0.0599 J	0.0585 J	0.0596 J	0.0582 J	0.0560 J	0.0592 J
Sulfate	mg/L	10.1	10.1	11.1	5.57	5.92	5.78	5.66	5.90	5.63	5.75
General Chemistry											
Hardness (as CaCO3)	mg/L	74.5	76.1	74.9	60.6	60.5	60.7	61.5	61.4	61.5	62.1
Total Dissolved Solids	mg/L	76.0	74.0	84.0	118	95.0	149	128	133	125	127
Total Suspended Solids	mg/L	5.20	5.40	13.4	7.20	8.20	6.00	7.40	11.5	6.50	7.60

See last page for notes.

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

Sample Location		STR-TR08							STR-IC01		
Sample Date		30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019
Sample ID		JOF-STR-TR08-RB-BOT-20190730	JOF-STR-TR08-LB-SUR-20191119	JOF-STR-TR08-CC-SUR-20191119	JOF-STR-TR08-CC-MID-20191119	JOF-STR-TR08-CC-BOT-20191119	JOF-STR-TR08-RB-SUR-20191119	JOF-STR-TR08-RB-BOT-20191119	JOF-STR-IC01-LB-MID-20190730	JOF-STR-IC01-CC-MID-20190730	JOF-STR-IC01-RB-SUR-20190730
Parent Sample ID											
Sample Depth		2.5 m	0.5 m	0.5 m	6.9 m	13.4 m	0.5 m	1.7 m	0.6 m	1 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.08	0.901 J	0.882 J	0.921 J	0.919 J	0.918 J	0.994 J	1.13	0.995 J	1.08
Barium	ug/L	25.5	27.2	28.1	28.4	28.7	27.6	28.7	26.3	24.2	23.9
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	39.4 J	<38.6	<38.6	44.6 U*
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,000	22,100	21,900	22,300	22,200	22,200	22,700	18,800	18,500	18,900
Chromium	ug/L	3.23 U*	1.97 J	2.14	1.94 J	2.27	2.22	2.35	43.2	<1.53	4.52 U*
Cobalt	ug/L	0.248 J	0.137 J	0.165 J	0.164 J	0.183 J	0.184 J	0.191 J	0.727	0.198 J	0.211 J
Copper	ug/L	0.931 J	1.03 J	1.15 J	1.31 J	1.12 J	1.22 J	1.23 J	2.20	0.804 J	1.10 J
Iron	ug/L	336	170	206	248	255	220	226	454	161	125
Lead	ug/L	0.219 J	0.139 J	0.195 J	0.265 J	0.191 J	0.216 J	0.233 J	0.240 J	0.147 J	0.149 J
Lithium	ug/L	<3.39	<3.39	3.59 J	<3.39	<3.39	4.94 J	5.21	<3.39	<3.39	<3.39
Magnesium	ug/L	4,130	5,100	5,080	5,130	5,120	5,030	5,120	4,150	4,060	4,160
Manganese	ug/L	46.9	20.6 U*	26.3 U*	29.6 U*	31.8 U*	32.3 U*	34.6 U*	128	120	98.3
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	5.33	<0.610	0.883 J
Nickel	ug/L	0.980 U*	0.449 U*	0.497 U*	0.537 U*	0.507 U*	0.483 U*	0.480 U*	25.8	0.749 U*	2.40 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.58 U*	2.21	2.44	2.21	2.32	1.96	2.34	2.19 U*	1.68 U*	1.95 U*
Zinc	ug/L	4.60 U*	4.09 U*	3.54 U*	4.05 U*	4.51 U*	4.67 U*	3.61 U*	5.31 U*	4.92 U*	4.74 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.08	0.859 J	0.863 J	0.825 J	0.865 J	0.947 J	0.885 J	0.903 J	0.870 J	1.03
Barium	ug/L	22.3	26.3	25.9	26.0	26.2	25.7	26.9	20.2	21.2	21.4
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	0.315 J	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	55.7 J	<38.6	<38.6	<38.6	44.8 J
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	0.137 J	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	17,600	22,200	21,500	22,000	21,900	22,300	22,500	18,200	18,400	18,700
Chromium	ug/L	3.20 U*	1.92 J	2.10	1.79 J	2.01	1.92 J	2.15	1.91 U*	2.28 U*	8.41 U*
Cobalt	ug/L	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	0.140 J	0.0980 J	0.0790 J	<0.0750	0.165 J
Copper	ug/L	0.673 J	0.891 J	0.970 J	0.917 J	0.873 J	1.11 J	1.09 J	0.643 J	<0.627	0.766 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	41.0 J	<19.5	<19.5	38.9 J
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	0.166 J	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	4.57 J	4.38 J	<3.39	<3.39	<3.39
Magnesium	ug/L	4,020	5,100	4,960	5,080	5,080	5,090	5,130	4,030	4,080	4,090
Manganese	ug/L	1.83 J	7.57 U*	7.87 U*	7.98 U*	7.92 U*	16.6 U*	15.7 U*	<1.35	<1.35	1.55 J
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	0.611 J	1.35 J
Nickel	ug/L	0.574 J	0.365 U*	<0.336	<0.336	<0.336	0.377 U*	<0.336	0.666 J	1.15	4.60 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	0.275 J	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.44 U*	1.95	2.13	1.98	2.01	2.03	2.23	1.70 U*	1.48 U*	1.75 U*
Zinc	ug/L	3.97 U*	<3.22	3.40 U*	3.51 U*	3.43 U*	3.55 U*	<3.22	8.32 U*	3.79 U*	5.22 U*
Radiological Parameters											
Radium-226	pCi/L	-0.00659 +/-(0.104)U	-0.0215 +/-(0.0647)U	0.0343 +/-(0.0674)U	-0.0820 +/-(0.0600)U	0.00378 +/-(0.0633)U	0.0230 +/-(0.0725)U	-0.0461 +/-(0.0563)U	-0.00366 +/-(0.0768)UJ	-0.0572 +/-(0.0607)UJ	-0.00493 +/-(0.0748)UJ
Radium-228	pCi/L	0.772 +/-(0.302)U*	0.215 +/-(0.219)U	0.0567 +/-(0.197)U	-0.102 +/-(0.201)U	0.174 +/-(0.213)U	0.360 +/-(0.263)U	0.104 +/-(0.215)U	-0.0712 +/-(0.240)U	0.0629 +/-(0.244)U	0.108 +/-(0.252)U
Radium-226+228	pCi/L	0.772 +/-(0.319)U*	0.215 +/-(0.228)U	0.0909 +/-(0.208)U	0.000 +/-(0.210)U	0.178 +/-(0.222)U	0.383 +/-(0.273)U	0.104 +/-(0.222)U	0.000 +/-(0.252)UJ	0.0629 +/-(0.251)UJ	0.108 +/-(0.263)UJ
Anions											
Chloride	mg/L	4.06	6.59	6.64	6.68	6.65	7.14	7.32	4.94	5.19	5.50
Fluoride	mg/L	0.0589 J	0.0777 J	0.0758 J	0.0738 J	0.0810 J	0.0748 J	0.0827 J	0.0661 J	0.0606 J	0.0670 J
Sulfate	mg/L	5.71	10.2	10.1	10.2	10.3	10.3	10.2	6.40	6.31	6.90
General Chemistry											
Hardness (as CaCO3)	mg/L	62.0	76.2	75.6	76.7	76.6	76.1	77.7	64.0	62.8	64.4
Total Dissolved Solids	mg/L	144	68.0	42.0	84.0	44.0	69.0	54.0	132	140	151
Total Suspended Solids	mg/L	6.90	2.70	4.00	4.40	5.40	3.60	5.10	12.5	8.90	6.40

See last page for notes.

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

Sample Location		STR-IC01							STR-IC02		
Sample Date		30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019
Sample ID		JOF-STR-IC01-RB-MID-20190730	JOF-STR-IC01-RB-BOT-20190730	JOF-STR-IC01-LB-SUR-20191119	JOF-STR-IC01-CC-SUR-20191119	JOF-STR-IC01-CC-BOT-20191119	JOF-STR-IC01-RB-SUR-20191119	JOF-STR-IC01-RB-BOT-20191119	JOF-STR-IC02-LB-SUR-20190730	JOF-STR-IC02-LB-BOT-20190730	JOF-STR-IC02-CC-SUR-20190730
Parent Sample ID											
Sample Depth		2 m	3.5 m	0.1 m	0.5 m	1.9 m	0.5 m	2.4 m	0.5 m	2.3 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.424 J
Arsenic	ug/L	1.08	1.16	1.03 U*	1.25 U*	1.21 U*	1.07 U*	1.07 U*	1.17	1.18	1.25
Barium	ug/L	24.5	27.2	30.5	35.4	36.3	31.2	31.4	26.5	29.2	27.4
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	41.9 U*	<38.6	41.8 U*
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,200	18,900	22,700	22,500	22,700	22,400	22,000	20,600	20,600	20,500
Chromium	ug/L	2.02 U*	1.85 U*	2.16 U*	2.74 U*	2.55 U*	2.38 U*	2.11 U*	2.70 U*	3.95 U*	2.50 U*
Cobalt	ug/L	0.237 J	0.410 J	0.539	1.43	1.66	0.943	0.961	0.173 J	0.247 J	0.183 J
Copper	ug/L	0.937 J	1.26 J	1.08 U*	1.66 U*	1.72 U*	1.35 U*	1.29 U*	0.869 J	1.27 J	0.905 J
Iron	ug/L	195	405	502	900	842	570	577	157	250	179
Lead	ug/L	0.204 J	0.331 J	0.399 U*	0.786 U*	0.755 U*	0.515 U*	0.478 U*	0.129 J	0.230 J	0.155 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,090	4,280	5,200	5,220	5,220	5,150	5,060	4,200	4,290	4,260
Manganese	ug/L	146	239	139	343	401	228	231	107	234	118
Mercury	ug/L	0.118 J	0.111 J	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	0.644 J	<0.610	<0.610	<0.610	0.761 J	0.691 J	<0.610
Nickel	ug/L	0.773 U*	0.766 U*	0.781 J	1.18	1.18	0.900 J	0.875 J	1.14 U*	1.34 U*	0.627 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.11 U*	2.32 U*	2.41 U*	2.98 U*	2.91 U*	2.61 U*	2.35 U*	2.11 U*	2.08 U*	2.47 U*
Zinc	ug/L	4.62 U*	6.15 U*	4.98 U*	5.57 U*	6.14 U*	7.57 U*	5.35 U*	3.80 U*	11.5 U*	4.12 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.414 J
Arsenic	ug/L	0.961 J	0.946 J	0.939 J	0.861 J	0.811 J	0.823 J	0.877 J	1.07 J	1.18 J	1.12 J
Barium	ug/L	21.0	22.4	26.0	26.1	25.1	25.3	25.5	22.9 J	23.3 J	23.2 J
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	38.6 J	<38.6	<38.6	<38.6	<38.6	41.0 J	<38.6	42.3 J
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,000	18,600	23,100	22,300	22,300	22,300	22,000	20,400	20,100	20,700
Chromium	ug/L	9.35 U*	2.67 U*	1.70 J	2.00	1.70 J	1.70 J	1.97 J	<1.53	<1.53	3.67 U*
Cobalt	ug/L	0.154 J	0.0860 J	0.139 J	0.123 J	0.104 J	0.0990 J	0.102 J	<0.0750	<0.0750	<0.0750
Copper	ug/L	1.11 J	<0.627	0.742 J	0.783 J	0.698 J	0.784 J	0.790 J	0.650 J	<0.627	1.52 J
Iron	ug/L	44.8 J	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	3.50 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,030	4,130	5,220	5,130	5,100	5,110	5,040	4,170	4,180	4,290
Manganese	ug/L	1.60 J	67.7	45.2	43.2	42.6	36.4	38.0	<1.35	17.3	<1.35
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	1.37 J	0.683 J	<0.610	<0.610	<0.610	<0.610	<0.610	0.613 J	<0.610	0.653 J
Nickel	ug/L	5.50 J	1.51	0.420 J	0.409 J	0.392 J	0.391 J	0.415 J	0.476 J	0.339 J	1.08 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.79 U*	1.56 U*	1.79	1.77	1.77	1.84	1.84	1.77 U*	1.85 U*	2.32 U*
Zinc	ug/L	4.50 U*	4.66 U*	3.56 J	3.60 J	3.73 J	3.45 J	<3.22	3.92 U*	3.89 U*	3.61 U*
Radiological Parameters											
Radium-226	pCi/L	0.0520 +/-(0.0904)UJ	0.0235 +/-(0.0705)UJ	-0.00722 +/-(0.0790)U	-0.0262 +/-(0.0609)U	0.0345 +/-(0.0848)U	-0.00374 +/-(0.0629)U	-0.0429 +/-(0.0711)U	-0.0925 +/-(0.0703)UJ	-0.0853 +/-(0.0728)UJ	-0.0605 +/-(0.0740)UJ
Radium-228	pCi/L	0.129 +/-(0.257)U	0.194 +/-(0.261)U	0.0561 +/-(0.211)U	0.387 +/-(0.234)	0.0316 +/-(0.237)U	0.126 +/-(0.223)U	0.172 +/-(0.232)U	0.262 +/-(0.383)U	0.430 +/-(0.281)U	0.198 +/-(0.267)U
Radium-226+228	pCi/L	0.181 +/-(0.272)UJ	0.218 +/-(0.270)UJ	0.0561 +/-(0.225)U	0.387 +/-(0.242)J	0.0661 +/-(0.252)U	0.126 +/-(0.232)U	0.172 +/-(0.243)U	0.262 +/-(0.389)UJ	0.430 +/-(0.290)UJ	0.198 +/-(0.277)UJ
Anions											
Chloride	mg/L	5.27	5.39	7.16	7.18	7.18	7.20	7.21	6.14	5.55	6.04
Fluoride	mg/L	0.0655 J	0.0654 J	0.0661 J	0.0679 J	0.0675 J	0.0684 J	0.0678 J	0.0684 J	0.0694 J	0.0705 J
Sulfate	mg/L	6.47	6.51	10.2	9.79	9.70	9.87	9.88	7.85	6.88	7.64
General Chemistry											
Hardness (as CaCO3)	mg/L	62.2	64.9	78.1	77.7	78.1	77.0	75.9	68.8	69.0	68.8
Total Dissolved Solids	mg/L	124	138	58.0	108	57.0	110	117	95.0	96.0	96.0
Total Suspended Solids	mg/L	7.90	13.8	9.30	17.2	22.0	11.1	12.2	6.80	8.10	6.80

See last page for notes.

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

Sample Location		STR-IC02								STR-BH01	
Sample Date		30-Jul-2019	30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019	31-Jul-2019	31-Jul-2019
Sample ID		JOF-STR-IC02-CC-MID-20190730	JOF-STR-IC02-CC-BOT-20190730	JOF-STR-IC02-RB-MID-20190730	JOF-STR-IC02-LB-MID-20191119	JOF-STR-IC02-CC-SUR-20191119	JOF-STR-IC02-CC-BOT-20191119	JOF-STR-IC02-RB-SUR-20191119	JOF-STR-IC02-RB-BOT-20191119	JOF-STR-BH01-LB-SUR-20190731	JOF-STR-DUP02-20190731
Parent Sample ID											JOF-STR-BH01-LB-SUR-20190731
Sample Depth		2 m	3.8 m	1 m	0.7 m	0.5 m	2.9 m	0.5 m	2.3 m	0.5 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.378 UJ	<0.378	<0.378	<0.378
Arsenic	ug/L	1.15	1.16	1.12	0.874 U*	1.06 U*	0.949 U*	0.937 U*	0.920 U*	0.730 J	0.736 J
Barium	ug/L	25.6	23.9	24.5	29.8	29.7	29.7	30.2	30.9	21.9	21.0
Beryllium	ug/L	<0.182	0.237 J	<0.182	<0.182	0.223 U*	0.183 U*	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	50.8 U*	55.5 U*	39.8 J	47.6 J	61.6 J	44.0 J	42.3 J	<38.6	<38.6
Cadmium	ug/L	<0.125	0.146 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	19,800	18,100	18,600	22,600	22,500	22,500	23,000	22,300	17,900	17,500
Chromium	ug/L	4.31 U*	1.65 U*	3.27 U*	1.96 U*	2.00 U*	2.45 U*	1.97 U*	1.84 U*	<1.53	4.56 U*
Cobalt	ug/L	0.191 J	0.286 J	0.227 J	0.497 J	0.438 U*	0.394 U*	0.427 U*	0.412 U*	<0.0750	0.125 J
Copper	ug/L	1.06 J	0.945 J	0.866 J	1.23 U*	1.17 U*	1.14 U*	1.14 U*	1.01 U*	0.756 J	8.74 J
Iron	ug/L	170	207	158	546	327	340	382	382	49.6 J	70.0
Lead	ug/L	0.148 J	0.274 J	0.188 J	0.403 U*	0.332 U*	0.318 U*	0.347 U*	0.332 U*	<0.128	0.426 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	3.71 J	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,210	4,000	4,100	5,120	5,180	5,110	5,290	5,160	4,180	4,070
Manganese	ug/L	114	117	131	113	101	105	103	112	40.2	39.6
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	0.802 J	0.696 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	1.26 U*
Nickel	ug/L	1.79 U*	0.863 U*	1.53 U*	0.728 J	0.626 J	0.725 J	0.745 J	0.717 J	0.456 U*	2.96 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	0.256 U*	0.179 U*	<0.148	0.220 U*	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.44 U*	1.92 U*	1.73 U*	2.82 U*	2.24 U*	2.08 U*	2.14 U*	2.15 U*	<0.991	<0.991
Zinc	ug/L	3.65 U*	4.72 U*	4.33 U*	4.81 U*	4.06 U*	4.96 U*	4.70 U*	4.57 U*	3.52 U*	8.05 U*
Dissolved Metals											
Antimony	ug/L	<0.378	0.835 J	0.387 J	<0.378	<0.378	<0.378	3.31 J	<0.378	<0.378	<0.378
Arsenic	ug/L	0.956 J	1.35	1.02	0.760 J	0.961 J	0.880 J	0.911 J	0.907 J	0.667 J	0.797 J
Barium	ug/L	21.9 J	22.2	22.2	25.7	24.7	27.7	25.9	24.9	19.6	20.8
Beryllium	ug/L	<0.182	0.369 J	<0.182	<0.182	0.292 J	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	75.6 J	49.6 J	39.9 J	65.4 J	65.4 J	41.4 J	40.9 J	<38.6	<38.6
Cadmium	ug/L	<0.125	0.204 J	<0.125	<0.125	0.163 J	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	19,400	19,200	19,100	23,200	21,600	23,100	22,500	21,600	17,600	18,100
Chromium	ug/L	1.81 U*	2.09 U*	3.53 U*	1.71 J	1.88 J	1.96 J	1.82 J	2.03	<1.53	4.73 U*
Cobalt	ug/L	<0.0750	0.195 J	0.116 J	0.113 J	0.150 J	0.123 J	0.115 J	0.102 J	<0.0750	0.0830 J
Copper	ug/L	0.650 J	1.15 J	0.724 J	0.877 J	1.13 J	0.901 J	1.01 J	0.782 J	0.848 J	2.00
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	28.0 J
Lead	ug/L	<0.128	0.192 J	<0.128	<0.128	0.145 J	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	4.12 U*	<3.39	<3.39	3.78 J	<3.39	3.71 J	<3.39	<3.39	<3.39
Magnesium	ug/L	4,050	4,260	4,190	5,210	4,970	5,200	5,120	4,920	4,130	4,200
Manganese	ug/L	<1.35	<1.35	<1.35	37.9	33.1	54.8	30.8	38.2	1.44 J	1.47 J
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	0.708 J	0.797 J	<0.610	<0.610	<0.610	<0.610	<0.610	0.717 U*	0.947 U*
Nickel	ug/L	0.602 J	0.722 J	1.77	0.476 J	0.427 J	0.443 J	0.411 J	0.378 J	1.25 J	3.64 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	0.404 J	<0.148	<0.148	0.324 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.71 U*	2.05 U*	1.81 U*	2.35	1.78	1.83	1.73	1.88	<0.991	<0.991
Zinc	ug/L	<3.22	4.63 U*	4.12 U*	3.73 J	<3.22	3.90 J	9.53	3.92 J	<3.22	<3.22
Radiological Parameters											
Radium-226	pCi/L	0.0748 +/-(0.104)UJ	0.0770 +/-(0.102)UJ	0.0801 +/-(0.102)UJ	0.0769 +/-(0.0837)U	-0.00702 +/-(0.0715)U	0.0231 +/-(0.0576)U	0.0548 +/-(0.0590)U	-0.0737 +/-(0.0500)U	-0.0662 +/-(0.118)U	-0.0461 +/-(0.0960)U
Radium-228	pCi/L	0.201 +/-(0.270)U	0.419 +/-(0.287)U	-0.0685 +/-(0.210)U	0.142 +/-(0.278)U	0.218 +/-(0.295)U	0.339 +/-(0.272)U	0.00211 +/-(0.230)U	0.352 +/-(0.266)U	0.381 +/-(0.311)U	-0.0835 +/-(0.256)U
Radium-226+228	pCi/L	0.276 +/-(0.289)UJ	0.496 +/-(0.305)UJ	0.0801 +/-(0.233)UJ	0.219 +/-(0.290)U	0.218 +/-(0.304)U	0.362 +/-(0.278)U	0.0569 +/-(0.237)U	0.352 +/-(0.271)U	0.381 +/-(0.333)U	0.000 +/-(0.273)U
Anions											
Chloride	mg/L	5.34	5.10	5.38	7.23	7.07	7.95	6.90	7.34	4.75	4.74
Fluoride	mg/L	0.0681 J	0.0671 J	0.0693 J	0.0671 J	0.0628 J	0.0659 J	0.0696 J	0.0679 J	0.0659 J	0.0678 J
Sulfate	mg/L	6.91	6.63	6.82	9.90	9.74	10.9	9.56	10.1	7.71	7.78
General Chemistry											
Hardness (as CaCO3)	mg/L	66.7	61.7	63.4	77.5	77.4	77.3	79.2	77.0	61.9	60.4
Total Dissolved Solids	mg/L	97.0	93.0	91.0	114	112	118	98.0	109	83.0	91.0
Total Suspended Solids	mg/L	5.90	7.40	8.00	7.60	6.80	6.60	6.90	6.10	4.30	3.80

See last page for notes.

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

Sample Location		STR-BH01									
Sample Date		31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	20-Nov-2019	20-Nov-2019
Sample ID		JOF-STR-BH01-LB-MID-20190731	JOF-STR-BH01-LB-BOT-20190731	JOF-STR-BH01-CC-SUR-20190731	JOF-STR-BH01-CC-MID-20190731	JOF-STR-BH01-CC-BOT-20190731	JOF-STR-BH01-RB-SUR-20190731	JOF-STR-BH01-RB-MID-20190731	JOF-STR-BH01-RB-BOT-20190731	JOF-STR-BH01-LB-SUR-20191120	JOF-STR-DUP03-20191120
Parent Sample ID											JOF-STR-BH01-LB-SUR-20191120
Sample Depth		2.3 m	4.1 m	0.5 m	2.5 m	4.6 m	0.5 m	2.4 m	4.3 m	0.5 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.882 J	0.975 J	0.786 J	0.831 J	1.01	0.784 J	1.12	1.10	0.919 U*	0.741 U*
Barium	ug/L	21.4	26.1	23.8	23.1	25.3	22.8	21.1	22.5	27.5	26.8
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.342 U*	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	48.7 U*	<38.6	52.7 J	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.197 U*	<0.125
Calcium	ug/L	17,500	18,000	18,700	18,400	18,700	18,500	17,400	17,500	22,000	22,700
Chromium	ug/L	<1.53	<1.53	<1.53	1.71 U*	2.34 U*	<1.53	1.69 U*	1.80 U*	<1.53	1.70 U*
Cobalt	ug/L	0.0880 J	0.245 J	0.0950 J	0.0860 J	0.135 J	0.0920 J	0.135 J	0.139 J	0.266 U*	0.126 U*
Copper	ug/L	0.679 J	1.00 J	0.701 J	0.765 J	0.971 J	0.816 J	1.14 J	1.23 J	0.833 J	0.909 J
Iron	ug/L	47.6 J	207	66.5	78.1	165	59.4	83.2	100	130	179
Lead	ug/L	<0.128	0.217 J	<0.128	<0.128	0.143 J	<0.128	<0.128	<0.128	0.246 U*	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	3.56 U*	<3.39	<3.39	<3.39
Magnesium	ug/L	4,070	4,300	4,000	3,960	4,030	3,900	3,930	3,970	5,050	5,480
Manganese	ug/L	40.1	267	41.7	44.4	117	46.5	53.2	68.5	44.9	44.5
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	0.681 U*	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	0.843 J	0.680 J
Nickel	ug/L	0.631 U*	1.02 U*	0.378 U*	0.344 U*	0.468 U*	0.518 U*	0.361 U*	0.409 U*	0.547 J	0.444 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	0.177 UJ	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.418 U*	<0.148
Vanadium	ug/L	<0.991	1.10 U*	1.42 U*	1.91 U*	2.43 U*	1.48 U*	2.25 U*	2.24 U*	<0.991	1.97 U*
Zinc	ug/L	<3.22	4.30 U*	<3.22	3.27 U*	<3.22	<3.22	3.98 U*	4.09 U*	4.01 U*	3.83 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	0.388 J	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.800 J	0.779 J	0.749 J	0.931 J	0.946 J	0.864 J	0.985 J	1.07	0.700 J	0.656 J
Barium	ug/L	19.9	22.8	21.3	22.4	24.5	21.7	20.1	20.6	26.0	24.9
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	39.8 J	<38.6	42.9 J	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	17,300	17,900	18,100	18,600	18,800	18,600	17,200	17,600	22,200	22,100
Chromium	ug/L	<1.53	<1.53	<1.53	1.88 U*	2.42 U*	1.65 U*	<1.53	1.53 U*	<1.53	1.69 J
Cobalt	ug/L	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	<0.0750	0.0810 J	0.127 J	<0.0750
Copper	ug/L	1.01 J	<0.627	<0.627	0.799 J	0.735 J	<0.627	0.931 J	0.934 J	0.686 J	0.723 J
Iron	ug/L	27.0 J	<19.5	<19.5	40.9 J	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,050	4,220	3,890	4,000	4,040	4,010	3,900	3,960	5,090	5,310
Manganese	ug/L	20.0	140	<1.35	24.1	3.31 J	<1.35	3.38 J	7.83	26.5	25.1
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	0.622 U*	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	0.736 J	0.656 J
Nickel	ug/L	<0.336	0.350 J	<0.336	0.364 J	0.385 J	<0.336	<0.336	0.438 J	0.384 J	<0.336
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	0.177 UJ	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.179 J	<0.148
Vanadium	ug/L	<0.991	<0.991	1.40 U*	2.08 U*	2.16 U*	1.83 U*	1.76 U*	1.71 U*	<0.991	1.90
Zinc	ug/L	10.6 U*	3.69 U*	<3.22	<3.22	<3.22	<3.22	4.24 U*	<3.22	3.25 J	3.39 J
Radiological Parameters											
Radium-226	pCi/L	-0.105 +/-(0.113)U	0.0105 +/-(0.115)U	-0.179 +/-(0.0867)U	-0.112 +/-(0.130)U	-0.252 +/-(0.0834)U	0.0153 +/-(0.128)U	-0.0105 +/-(0.118)U	0.0455 +/-(0.134)U	0.0251 +/-(0.0577)U	-0.0424 +/-(0.0449)U
Radium-228	pCi/L	-0.0766 +/-(0.385)U	0.622 +/-(0.429)U	0.124 +/-(0.303)U	0.634 +/-(0.390)	0.151 +/-(0.285)U	0.00969 +/-(0.263)U	-0.0633 +/-(0.281)U	0.246 +/-(0.225)U	0.144 +/-(0.278)U	0.103 +/-(0.208)U
Radium-226+228	pCi/L	0.000 +/-(0.401)U	0.632 +/-(0.444)U	0.124 +/-(0.315)U	0.634 +/-(0.411)J	0.151 +/-(0.297)U	0.0249 +/-(0.292)U	0.000 +/-(0.305)U	0.292 +/-(0.262)U	0.169 +/-(0.284)U	0.103 +/-(0.213)U
Anions											
Chloride	mg/L	4.75	4.74	4.79	4.76	4.76	4.79	4.82	4.08	5.90 J	7.64 J
Fluoride	mg/L	0.0687 J	0.0656 J	0.0660 J	0.0667 J	0.0666 J	0.0628 J	0.0644 J	0.0585 J	0.0681 J	0.0370 J
Sulfate	mg/L	7.79	7.86	7.79	7.89	7.71	7.86	7.96	6.09	9.49 J	12.1 J
General Chemistry											
Hardness (as CaCO3)	mg/L	60.4	62.7	63.1	62.2	63.2	62.3	59.5	60.0	75.8	79.3
Total Dissolved Solids	mg/L	97.0	91.0	83.0	149	155	141	72.0	102	134 J	54.0 J
Total Suspended Solids	mg/L	3.90	10.2	3.90	4.00	4.50	3.90	4.10	4.40	3.00	3.30

See last page for notes.

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

Sample Location		STR-BH01							STR-BH02		
Sample Date		20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019
Sample ID		JOF-STR-BH01-LB-BOT-20191120	JOF-STR-BH01-CC-SUR-20191120	JOF-STR-BH01-CC-MID-20191120	JOF-STR-BH01-CC-BOT-20191120	JOF-STR-BH01-RB-SUR-20191120	JOF-STR-BH01-RB-MID-20191120	JOF-STR-BH01-RB-BOT-20191120	JOF-STR-BH02-LB-SUR-20190731	JOF-STR-BH02-LB-BOT-20190731	JOF-STR-BH02-CC-SUR-20190731
Parent Sample ID											
Sample Depth		1.9 m	0.5 m	2 m	3.9 m	0.5 m	2 m	3.5 m	0.5 m	2.1 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.788 U*	0.865 U*	0.921 U*	0.892 U*	0.909 U*	0.812 U*	0.793 U*	0.788 J	0.920 J	0.931 J
Barium	ug/L	29.4	26.9	27.6	28.6	26.9	26.4	26.4	22.7	23.5	23.3
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	45.6 J	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	22,800	22,300	22,400	22,400	21,600	22,500	22,600	18,700	18,600	18,400
Chromium	ug/L	<1.53	<1.53	1.92 U*	2.05 U*	2.10 U*	1.59 U*	2.50 U*	<1.53	2.70 U*	2.87 U*
Cobalt	ug/L	0.295 U*	0.173 U*	0.170 U*	0.197 U*	0.159 U*	0.146 U*	0.133 U*	0.103 J	0.117 J	0.0930 J
Copper	ug/L	0.881 J	0.947 J	0.879 J	0.909 J	0.866 J	0.985 J	1.08 J	0.764 J	0.811 J	0.849 J
Iron	ug/L	292	122	135	183	120	129	170	96.5	119	84.1
Lead	ug/L	0.267 U*	0.134 U*	0.139 U*	0.177 U*	<0.128	0.146 U*	0.144 U*	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	5,150	5,170	5,210	5,270	5,020	5,480	5,430	4,060	4,060	4,030
Manganese	ug/L	72.6	37.7	38.4	49.0	36.6	36.3	40.7	44.7	46.8	40.8
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	0.658 J	0.620 J	<0.610	<0.610	<0.610	0.636 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.587 J	0.501 J	0.473 J	0.546 J	0.510 J	0.470 J	0.774 J	0.459 U*	0.714 U*	0.783 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	0.177 UJ	0.177 UJ	0.177 UJ	0.177 UJ	0.177 UJ	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	0.180 U*	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.06 U*	1.64 U*	1.97 U*	2.15 U*	2.06 U*	1.77 U*	2.07 U*	1.53 U*	2.24 U*	2.49 U*
Zinc	ug/L	4.49 U*	3.40 U*	5.40 U*	5.13 U*	5.02 U*	4.80 U*	3.83 U*	3.38 U*	3.83 U*	3.35 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	0.531 J	<0.378
Arsenic	ug/L	0.890 J	0.828 J	0.782 J	0.825 J	0.887 J	0.691 J	0.674 J	0.845 J	1.07	0.858 J
Barium	ug/L	25.7	25.1	26.2	26.1	26.9	24.7	23.5	21.7	22.1	21.7
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.291 J	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	44.1 J	<38.6
Cadmium	ug/L	0.125 J	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	21,600	21,200	22,100	21,800	22,400	22,600	21,500	18,900	19,100	18,700
Chromium	ug/L	2.25	1.78 J	1.84 J	1.76 J	1.78 J	1.85 J	1.60 J	1.78 U*	3.19 U*	3.97 U*
Cobalt	ug/L	0.115 J	0.115 J	0.0910 J	0.104 J	0.105 J	<0.0750	<0.0750	<0.0750	0.121 J	<0.0750
Copper	ug/L	0.821 J	0.787 J	0.734 J	0.682 J	0.711 J	0.835 J	0.839 J	<0.627	0.789 J	0.749 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	4.18 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	5,020	4,930	5,080	5,000	5,240	5,410	5,170	4,060	4,100	4,020
Manganese	ug/L	26.1	24.1	24.3	25.5	26.4	24.2	23.0	1.67 J	2.22 J	<1.35
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	0.665 J	0.612 J	0.614 J	<0.610	0.612 J	<0.610	<0.610	<0.610	0.853 J	<0.610
Nickel	ug/L	0.379 J	<0.336	0.483 J	0.375 J	0.375 J	0.383 J	0.430 J	<0.336	1.24 U*	1.38 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	0.177 UJ	0.177 UJ	0.177 UJ	0.177 UJ	0.177 UJ	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	0.257 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	0.185 J	<0.148
Vanadium	ug/L	1.94	1.82	1.83	1.80	1.80	1.75	1.70	1.96 U*	1.97 U*	1.62 U*
Zinc	ug/L	<3.22	<3.22	3.41 J	4.28 J	<3.22	4.28 J	3.94 J	5.33 U*	4.23 U*	<3.22
Radiological Parameters											
Radium-226	pCi/L	-0.0648 +/-(0.0511)U	-0.0178 +/-(0.0453)U	-0.0116 +/-(0.0653)U	0.0131 +/-(0.0624)U	0.0334 +/-(0.0707)U	0.0309 +/-(0.0777)U	-0.0523 +/-(0.0679)U	-0.0890 +/-(0.0943)U	-0.00772 +/-(0.103)U	0.0505 +/-(0.149)U
Radium-228	pCi/L	0.122 +/-(0.239)U	-0.00204 +/-(0.221)U	0.302 +/-(0.261)U	0.251 +/-(0.216)U	0.267 +/-(0.193)U	0.0598 +/-(0.222)U	0.199 +/-(0.221)U	-0.247 +/-(0.209)U	-0.248 +/-(0.264)U	0.305 +/-(0.270)U
Radium-226+228	pCi/L	0.122 +/-(0.244)U	0.000 +/-(0.226)U	0.302 +/-(0.269)U	0.264 +/-(0.225)U	0.301 +/-(0.206)U	0.0907 +/-(0.235)U	0.199 +/-(0.231)U	0.000 +/-(0.229)U	0.000 +/-(0.283)U	0.355 +/-(0.308)U
Anions											
Chloride	mg/L	7.54	7.68	7.69	7.64	7.58	7.58	7.50	4.76	4.76	4.76
Fluoride	mg/L	0.0353 J	0.0387 J	0.0375 J	0.0336 J	0.0357 J	0.0396 J	0.0347 J	0.0620 J	0.0611 J	0.0674 J
Sulfate	mg/L	11.9	12.1	12.1	11.9	11.9	11.8	11.6	7.81	7.85	7.79
General Chemistry											
Hardness (as CaCO3)	mg/L	78.1	77.1	77.3	77.7	74.6	78.9	78.8	63.3	63.2	62.6
Total Dissolved Solids	mg/L	102	80.0	120	82.0	67.0	99.0	97.0	72.0	79.0	69.0
Total Suspended Solids	mg/L	4.20	2.00	2.60	3.20	1.60	1.70	1.90	4.20	4.20	3.70

See last page for notes.

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

Sample Location		STR-BH02									
Sample Date		31-Jul-2019	31-Jul-2019	31-Jul-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019
Sample ID		JOF-STR-BH02-CC-MID-20190731	JOF-STR-BH02-CC-BOT-20190731	JOF-STR-BH02-RB-MID-20190731	JOF-STR-BH02-LB-MID-20191120	JOF-STR-BH02-CC-SUR-20191120	JOF-STR-DUP01-20191120	JOF-STR-BH02-CC-MID-20191120	JOF-STR-BH02-CC-BOT-20191120	JOF-STR-BH02-RB-SUR-20191120	JOF-STR-BH02-RB-BOT-20191120
Parent Sample ID							JOF-STR-BH02-CC-SUR-20191120				
Sample Depth		3.5 m	6.2 m	0.9 m	0.8 m	0.5 m	0.5 m	2.5 m	5 m	0.5 m	1.7 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.842 J	1.28	0.833 J	0.847 U*	0.916 U*	0.646 U*	0.953 U*	0.902 U*	0.902 U*	0.887 U*
Barium	ug/L	23.4	28.2	23.5	27.0	27.3	25.9	27.9	29.0	29.3	28.0
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	0.202 U*	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	42.5 J	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,700	18,800	19,000	22,200	22,000	22,400	22,000	22,700	23,100	22,300
Chromium	ug/L	1.91 U*	<1.53	22.4	1.60 U*	2.28 U*	1.53 U*	2.33 U*	1.92 U*	1.78 U*	1.88 U*
Cobalt	ug/L	0.0940 J	0.243 J	0.218 J	0.195 U*	0.194 U*	0.126 U*	0.207 U*	0.226 U*	0.191 U*	0.185 U*
Copper	ug/L	0.853 J	0.988 J	1.48 J	0.809 J	0.979 J	0.864 J	0.910 J	0.909 J	0.892 J	0.840 J
Iron	ug/L	106	272	198	144	166	169	170	175	171	166
Lead	ug/L	<0.128	0.196 J	<0.128	<0.128	0.178 U*	0.133 U*	0.181 U*	0.134 U*	0.155 U*	0.142 U*
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,100	4,120	4,130	5,110	5,080	5,380	5,060	5,310	5,290	5,250
Manganese	ug/L	46.5	425	49.3	40.5	37.5	35.7	37.0	44.0	41.6	41.6
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	1.58 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.510 U*	0.634 U*	5.37	0.432 J	0.502 J	0.422 J	0.512 J	0.577 J	0.526 J	0.492 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	0.177 UJ	0.177 UJ	<0.177	0.177 UJ	0.177 UJ	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	0.205 U*	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.88 U*	2.06 U*	1.83 U*	1.83 U*	2.15 U*	1.79 U*	2.37 U*	2.01 U*	1.91 U*	2.11 U*
Zinc	ug/L	3.48 U*	4.65 U*	3.32 U*	4.14 U*	3.69 U*	4.32 U*	3.79 U*	3.71 U*	4.67 U*	4.60 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.766 J	1.18	0.856 J	0.994 J	1.04	0.679 J	0.817 J	0.808 J	0.904 J	0.835 J
Barium	ug/L	22.3	27.1	21.4	27.8	26.6	24.3	26.3	26.7	26.2	26.6
Beryllium	ug/L	<0.182	<0.182	<0.182	0.305 J	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	51.6 J	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	0.151 J	0.163 J	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,700	18,700	18,400	22,000	22,100	22,200	22,000	22,100	21,900	22,400
Chromium	ug/L	2.39 U*	4.19 U*	2.39 U*	2.22	1.87 J	1.66 J	1.86 J	1.73 J	2.23	1.83 J
Cobalt	ug/L	<0.0750	0.0900 J	<0.0750	0.141 J	0.228 J	<0.0750	0.100 J	0.135 J	0.103 J	0.119 J
Copper	ug/L	0.717 J	0.802 J	0.835 J	0.811 J	0.879 J	0.728 J	0.772 J	0.675 J	0.725 J	0.779 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	0.150 J	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	3.57 J	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,060	4,100	3,960	5,120	5,070	5,270	5,080	5,110	5,040	5,220
Manganese	ug/L	<1.35	305	<1.35	26.5	23.4	22.4	18.4	26.8	24.4	25.0
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	0.658 J	0.820 J	<0.610	0.658 J	0.640 J	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	1.01 U*	1.56 U*	0.598 U*	0.429 J	0.561 J	0.363 J	0.365 J	0.484 J	0.397 J	0.377 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	0.177 UJ	0.177 UJ	<0.177	0.177 UJ	0.177 UJ	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	0.310 J	0.286 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.46 U*	2.25 U*	2.08 U*	2.16	1.93	1.84	1.97	1.74	2.09	2.01
Zinc	ug/L	<3.22	3.88 U*	8.94 U*	3.61 J	3.27 J	3.53 J	<3.22	3.50 J	3.50 J	3.39 J
Radiological Parameters											
Radium-226	pCi/L	-0.0267 +/-(0.119)U	-0.0332 +/-(0.135)U	-0.118 +/-(0.122)U	0.0618 +/-(0.0605)U	-0.0210 +/-(0.0631)U	-0.0731 +/-(0.0666)U	0.0466 +/-(0.0641)U	-0.0381 +/-(0.0509)U	0.0431 +/-(0.0848)U	0.0201 +/-(0.0712)U
Radium-228	pCi/L	-0.0827 +/-(0.257)U	0.257 +/-(0.271)U	0.388 +/-(0.318)U	0.00828 +/-(0.226)U	0.0323 +/-(0.236)U	0.258 +/-(0.219)U	0.136 +/-(0.341)U	0.247 +/-(0.241)U	-0.0127 +/-(0.245)U	-0.0354 +/-(0.309)U
Radium-226+228	pCi/L	0.000 +/-(0.283)U	0.257 +/-(0.303)U	0.388 +/-(0.341)U	0.0701 +/-(0.234)U	0.0323 +/-(0.244)U	0.258 +/-(0.229)U	0.183 +/-(0.347)U	0.247 +/-(0.246)U	0.0431 +/-(0.259)U	0.0201 +/-(0.317)U
Anions											
Chloride	mg/L	4.76	4.83	4.80	6.29	5.88 J	7.65 J	5.73	5.90	5.94	5.94
Fluoride	mg/L	0.0671 J	0.0655 J	0.0699 J	0.0663 J	0.0681 J	0.0400 J	0.0657 J	0.0661 J	0.0650 J	0.0682 J
Sulfate	mg/L	7.75	7.89	7.98	9.20	9.39 J	12.1 J	9.14	9.58	9.41	9.52
General Chemistry											
Hardness (as CaCO3)	mg/L	63.5	64.0	64.4	76.4	75.8	78.2	75.6	78.5	79.4	77.4
Total Dissolved Solids	mg/L	82.0	77.0	68.0	78.0	165	146	173	210	177	184
Total Suspended Solids	mg/L	3.50	7.50	3.50	2.50	2.50	2.60	3.80	2.40	2.40	2.50

See last page for notes.

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

Sample Location		STR-BH03									
Sample Date		31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019
Sample ID		JOF-STR-BH03-LB-SUR-20190731	JOF-STR-BH03-LB-BOT-20190731	JOF-STR-BH03-CC-SUR-20190731	JOF-STR-BH03-CC-MID-20190731	JOF-STR-BH03-CC-BOT-20190731	JOF-STR-BH03-RB-SUR-20190731	JOF-STR-BH03-RB-BOT-20190731	JOF-STR-BH03-LB-SUR-20191120	JOF-STR-BH03-LB-BOT-20191120	JOF-STR-BH03-CC-SUR-20191120
Parent Sample ID											
Sample Depth		0.5 m	2.6 m	0.5 m	2 m	3.8 m	0.5 m	3.4 m	0.5 m	2 m	0.5 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	2.78	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.910 J	0.903 J	1.18	1.02	0.974 J	0.903 J	0.885 J	1.05 U*	0.910 U*	0.847 U*
Barium	ug/L	24.0	23.4	21.2	22.6	24.0	22.9	23.3	28.3	26.7	27.6
Beryllium	ug/L	<0.182	<0.182	0.413 J	0.212 J	<0.182	<0.182	<0.182	0.341 U*	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	51.1 J	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.148 U*	<0.125	<0.125
Calcium	ug/L	18,000	17,900	19,500	18,400	18,200	18,700	19,100	22,000	21,500	22,200
Chromium	ug/L	5.76 U*	1.74 U*	<1.53	5.71 U*	1.87 U*	5.10 U*	1.86 U*	2.48 U*	2.27 U*	1.91 U*
Cobalt	ug/L	0.167 J	0.153 J	0.146 J	0.189 J	0.151 J	0.142 J	0.227 J	0.236 U*	0.192 U*	0.174 U*
Copper	ug/L	1.15 J	0.873 J	0.971 J	0.982 J	0.794 J	0.920 J	0.770 J	0.974 J	0.929 J	0.903 J
Iron	ug/L	186	185	89.1	143	187	130	143	197	177	169
Lead	ug/L	0.178 J	0.137 J	0.156 J	0.172 J	0.196 J	0.128 J	<0.128	0.247 U*	0.167 U*	0.139 U*
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	3.66 J	<3.39	<3.39
Magnesium	ug/L	4,140	4,180	4,980	4,030	4,030	4,060	4,150	5,120	5,000	5,150
Manganese	ug/L	51.5	50.7	54.9	53.0	74.8	53.0	72.7	29.7	32.1	40.3
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	1.58 J	0.961 J	<0.610	0.815 J	<0.610	0.633 J	<0.610	<0.610
Nickel	ug/L	2.59	0.745 U*	0.614 U*	2.40 U*	0.507 U*	1.81 U*	0.613 U*	0.536 J	0.436 J	0.494 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	0.977 J	<0.148	<0.148	<0.148	<0.148	0.362 U*	<0.148	<0.148
Vanadium	ug/L	1.90 U*	1.82 U*	<0.991	2.00 U*	2.13 U*	2.01 U*	1.85 U*	2.24 U*	2.17 U*	2.00 U*
Zinc	ug/L	5.54 U*	4.53 U*	4.58 U*	3.51 U*	4.15 U*	4.80 U*	4.51 U*	4.03 U*	4.45 U*	4.46 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	0.610 J	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.817 J	0.857 J	0.810 J	0.875 J	0.910 J	0.824 J	0.862 J	0.805 J	0.783 J	0.839 J
Barium	ug/L	23.9	22.8	19.9	22.0	24.6	20.8	21.7	24.9	27.1	25.2
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	18,000	17,700	19,300	18,400	18,500	18,300	18,500	21,100	22,000	21,900
Chromium	ug/L	3.89 U*	1.86 U*	<1.53	<1.53	2.10 U*	1.60 U*	4.39 U*	1.68 J	<1.53	1.54 J
Cobalt	ug/L	0.156 J	0.112 J	<0.0750	<0.0750	<0.0750	<0.0750	0.114 J	0.103 J	0.102 J	0.0980 J
Copper	ug/L	1.23 J	0.700 J	2.19	0.669 J	0.798 J	0.726 J	1.09 J	0.687 J	0.878 J	0.687 J
Iron	ug/L	198	88.0	<19.5	<19.5	<19.5	<19.5	26.6 J	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	4,170	4,160	4,980	4,030	4,140	3,930	3,980	4,890	5,130	5,040
Manganese	ug/L	35.5	28.5	2.39 J	<1.35	6.82	<1.35	12.4	13.9	15.8	21.8
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	0.757 J	<0.610	0.641 J	<0.610	<0.610	<0.610	0.863 J	<0.610	<0.610	<0.610
Nickel	ug/L	2.00	0.566 J	0.628 J	<0.336	0.388 U*	0.339 U*	2.03 U*	<0.336	0.386 J	0.391 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	0.193 J	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.76 U*	1.75 U*	<0.991	1.61 U*	2.04 U*	1.68 U*	1.68 U*	1.76	1.60	1.63
Zinc	ug/L	4.53 U*	4.38 U*	<3.22	3.97 U*	5.30 U*	3.35 U*	<3.22	<3.22	3.81 J	4.41 J
Radiological Parameters											
Radium-226	pCi/L	-0.0558 +/-(0.0728)UJ	-0.0617 +/-(0.0713)UJ	0.0612 +/-(0.127)U	-0.112 +/-(0.101)U	-0.150 +/-(0.128)U	-0.0268 +/-(0.115)U	0.0669 +/-(0.131)U	0.00819 +/-(0.0697)U	-0.0248 +/-(0.0657)U	-0.0191 +/-(0.0604)U
Radium-228	pCi/L	0.243 +/-(0.289)U	-0.0362 +/-(0.218)U	0.250 +/-(0.279)U	0.191 +/-(0.269)U	-0.273 +/-(0.232)U	0.00471 +/-(0.213)U	0.0354 +/-(0.276)U	0.325 +/-(0.248)U	0.0516 +/-(0.220)U	0.0680 +/-(0.217)U
Radium-226+228	pCi/L	0.243 +/-(0.298)UJ	0.000 +/-(0.229)UJ	0.312 +/-(0.307)U	0.191 +/-(0.287)U	0.000 +/-(0.265)U	0.00471 +/-(0.242)U	0.102 +/-(0.306)U	0.334 +/-(0.258)U	0.0516 +/-(0.230)U	0.0680 +/-(0.225)U
Anions											
Chloride	mg/L	4.11	4.12	4.86	4.81	4.80	4.82	4.86	6.11	6.16	6.31
Fluoride	mg/L	0.0606 J	0.0561 J	0.0688 J	0.0637 J	0.0674 J	0.0666 J	0.0675 J	0.0673 J	0.0670 J	0.0681 J
Sulfate	mg/L	5.99	5.94	7.96	7.67	7.61	8.17	8.54	8.87	8.96	9.31
General Chemistry											
Hardness (as CaCO3)	mg/L	61.9	62.0	69.1	62.7	62.1	63.5	64.8	75.9	74.2	75.4
Total Dissolved Solids	mg/L	55.0	81.0	73.0	76.0	75.0	86.0	84.0	83.0	71.0	70.0
Total Suspended Solids	mg/L	5.60	5.40	3.40	4.00	6.00	3.90	4.30	3.20	3.00	2.10

See last page for notes.

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

Sample Location		STR-BH03				STR-CV01					
Sample Date		20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	30-Jul-2019	30-Jul-2019	30-Jul-2019	19-Nov-2019	19-Nov-2019	19-Nov-2019
Sample ID		JOF-STR-BH03-CC-MID-20191120	JOF-STR-BH03-CC-BOT-20191120	JOF-STR-BH03-RB-SUR-20191120	JOF-STR-BH03-RB-BOT-20191120	JOF-STR-CV01-LB-MID-20190730	JOF-STR-CV01-CC-MID-20190730	JOF-STR-CV01-RB-MID-20190730	JOF-STR-CV01-LB-SUR-20191119	JOF-STR-DUP04-20191119	JOF-STR-CV01-CC-SUR-20191119
Parent Sample ID										JOF-STR-CV01-LB-SUR-20191119	
Sample Depth		1.8 m	3.1 m	0.5 m	2 m	0.6 m	0.6 m	0.7 m	0.2 m	0.2 m	0.4 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	0.875 U*	0.907 U*	0.857 U*	0.824 U*	1.10	0.939 J	1.21	0.810 J	0.805 J	0.794 J
Barium	ug/L	27.7	27.4	27.7	27.7	25.2	24.2	28.9	26.3	25.2	22.8
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	0.249 J	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	21,800	21,800	22,400	22,000	19,000	19,100	18,400	21,100	21,200	20,400
Chromium	ug/L	1.76 U*	2.01 U*	<1.53	1.75 U*	1.57 U*	<1.53	2.24 U*	1.85 J	1.70 J	1.90 J
Cobalt	ug/L	0.184 U*	0.203 U*	0.195 U*	0.223 U*	0.351 J	0.216 J	0.488 J	0.436 U*	0.367 J	0.435 U*
Copper	ug/L	0.970 J	0.848 J	0.785 J	0.790 J	0.948 J	0.777 J	1.03 J	1.04 J	1.03 J	1.02 J
Iron	ug/L	170	177	157	168	511	257	693	587	494	1,040
Lead	ug/L	0.165 U*	0.156 U*	0.136 U*	<0.128	0.409 J	0.239 J	0.512 J	0.504 U*	0.434 J	0.375 U*
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	4.96 U*	24.3	26.7	53.4
Magnesium	ug/L	5,070	5,050	5,190	5,090	3,990	4,010	3,900	4,700	4,810	4,620
Manganese	ug/L	39.4	40.9	39.5	42.5	149	123	341	249	245	355
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.525 J	0.454 J	0.521 J	0.562 J	0.669 U*	0.465 U*	0.834 U*	0.683 U*	0.643 U*	0.824 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	0.154 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	2.01 U*	2.10 U*	1.74 U*	1.95 U*	2.32 U*	1.85 U*	2.76 U*	2.27	2.23	2.13
Zinc	ug/L	3.83 U*	4.22 U*	5.04 U*	4.37 U*	3.95 U*	3.57 U*	4.08 U*	4.96 U*	7.08 U*	7.23 U*
Dissolved Metals											
Antimony	ug/L	<0.378	<0.378	<0.378	<0.378	0.473 J	0.468 J	0.458 J	<0.378	<0.378	<0.378
Arsenic	ug/L	0.805 J	0.807 J	0.791 J	0.833 J	1.01	1.01	1.07	0.638 J	0.680 J	0.617 J
Barium	ug/L	25.7	33.7	26.4	26.2	19.2	20.4	18.3	22.1	20.8	19.1
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	0.374 J	<0.182	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	38.6 J	<38.6	<38.6	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	21,600	22,200	22,300	22,100	18,800	19,200	18,700	21,500	20,900	20,100
Chromium	ug/L	<1.53	1.91 J	2.88	1.98 J	<1.53	1.95 U*	2.14 U*	<1.53	<1.53	<1.53
Cobalt	ug/L	0.103 J	0.100 J	0.125 J	0.122 J	0.154 J	0.0760 J	0.0850 J	0.113 U*	0.103 J	0.173 U*
Copper	ug/L	0.633 J	0.707 J	0.695 J	1.03 J	0.693 J	0.664 J	0.690 J	0.660 J	0.847 J	0.713 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	0.144 J	<0.128	<0.128	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	5.06 U*	15.0	15.0	50.9
Magnesium	ug/L	4,990	5,060	5,110	5,060	3,950	4,040	3,950	4,770	4,670	4,460
Manganese	ug/L	23.8	23.3	25.5	27.4	6.62	3.36 J	21.0	87.2	86.8	261
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	0.673 J	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.411 J	0.422 J	1.11	0.400 J	0.384 J	0.338 J	0.410 J	<0.336	<0.336	0.415 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	0.234 J	<0.148	<0.148	<0.148	<0.148	<0.148
Vanadium	ug/L	1.51	1.83	1.72	1.82	1.67 U*	2.01 U*	2.25 U*	1.42	1.67	1.49
Zinc	ug/L	3.98 J	3.91 J	3.32 J	8.37	<3.22	<3.22	3.54 U*	4.15 U*	<3.22	<3.22
Radiological Parameters											
Radium-226	pCi/L	-0.0417 +/-(0.0691)U	0.0413 +/-(0.0684)U	0.00567 +/-(0.0700)U	-0.0359 +/-(0.0704)U	-0.0971 +/-(0.0870)U	-0.0159 +/-(0.127)U	0.0254 +/-(0.109)U	-0.0346 +/-(0.0569)U	0.0801 +/-(0.0780)U	0.0192 +/-(0.0868)U
Radium-228	pCi/L	0.132 +/-(0.228)U	0.0893 +/-(0.228)U	-0.0214 +/-(0.224)U	0.00215 +/-(0.231)U	0.127 +/-(0.230)U	0.0467 +/-(0.240)U	0.183 +/-(0.214)U	0.235 +/-(0.275)U	0.0383 +/-(0.226)U	0.0941 +/-(0.287)U
Radium-226+228	pCi/L	0.132 +/-(0.238)U	0.131 +/-(0.238)U	0.00567 +/-(0.235)U	0.00215 +/-(0.241)U	0.127 +/-(0.246)U	0.0467 +/-(0.272)U	0.208 +/-(0.240)U	0.235 +/-(0.281)U	0.118 +/-(0.239)U	0.113 +/-(0.300)U
Anions											
Chloride	mg/L	6.30	6.44	5.91	5.93	3.85	3.76	3.95	7.40	7.21	7.93
Fluoride	mg/L	0.0663 J	0.0690 J	0.0682 J	0.0668 J	0.0621 J	0.0587 J	0.0617 J	0.0738 J	0.0768 J	0.0799 J
Sulfate	mg/L	9.23	9.43	9.74	9.75	5.66	5.58	5.86	11.7	11.7	13.9
General Chemistry											
Hardness (as CaCO3)	mg/L	75.3	75.3	77.3	76.0	64.0	64.1	62.1	72.2	72.8	69.9
Total Dissolved Solids	mg/L	28.0	41.0	43.0	59.0	82.0	94.0	81.0	103	88.0	113
Total Suspended Solids	mg/L	2.70	3.00	2.20	1.60	13.5	9.40	25.6	6.90	6.30	8.40

See last page for notes.

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

Sample Location		STR-CV01	STR-CV02							STR-CV03	
Sample Date		19-Nov-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	31-Jul-2019	20-Nov-2019	20-Nov-2019	31-Jul-2019	31-Jul-2019
Sample ID		JOF-STR-CV01-RB-SUR-20191119	JOF-STR-CV02-LB-SUR-20190731	JOF-STR-DUP01-20190731	JOF-STR-CV02-LB-BOT-20190731	JOF-STR-CV02-CC-MID-20190731	JOF-STR-CV02-RB-MID-20190731	JOF-STR-CV02-LB-MID-20191120	JOF-STR-CV02-CC-SUR-20191120	JOF-STR-CV03-LB-SUR-20190731	JOF-STR-CV03-LB-BOT-20190731
Parent Sample ID				JOF-STR-CV02-LB-SUR-20190731							
Sample Depth		0.2 m	0.5 m	0.5 m	1.8 m	0.8 m	0.7 m	0.7 m	0.1 m	0.5 m	2 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Total Metals											
Antimony	ug/L	<0.378	0.880 U*	<0.378	<0.378	0.409 U*	<0.378	<0.378	<0.378	0.688 U*	0.473 U*
Arsenic	ug/L	0.784 J	1.54 U*	1.53 U*	1.53 U*	1.94 U*	1.76 U*	0.750 J	0.699 J	1.66 U*	1.43 U*
Barium	ug/L	23.8	37.0	32.0	33.4	47.3	51.3	27.5	27.7	28.1	29.4
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	<0.182	0.396 J	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	50.2 U*	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.228 J	<0.125
Calcium	ug/L	20,300	16,700	16,400	16,300	16,700	18,000	17,200	16,000	16,700	17,100
Chromium	ug/L	1.67 J	3.42 U*	3.34 U*	3.67 U*	3.67 U*	<1.53	1.89 U*	2.15 U*	2.82 U*	3.15 U*
Cobalt	ug/L	0.524 U*	0.315 J	0.305 J	0.333 J	0.540	0.588	0.385 U*	0.380 U*	0.416 J	0.388 J
Copper	ug/L	1.01 J	1.22 J	0.986 J	1.01 J	1.16 J	0.937 J	1.11 J	1.12 J	0.981 J	0.998 J
Iron	ug/L	597	472	427	571	879	1,120	906	812	431	1,170
Lead	ug/L	0.553 U*	0.266 J	0.226 J	0.308 J	0.418 J	0.732 J	0.403 U*	0.428 U*	0.446 J	0.327 J
Lithium	ug/L	52.7	5.78 U*	4.90 U*	4.74 U*	6.95 U*	<3.39	3.98 J	4.55 J	3.93 U*	<3.39
Magnesium	ug/L	4,570	3,990	3,940	3,940	3,940	4,850	4,310	4,150	3,840	3,970
Manganese	ug/L	385	236	234	274	391	472	98.2	92.2	186	196
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	0.623 J	<0.610	<0.610	0.745 J	<0.610
Nickel	ug/L	0.847 U*	0.838 U*	0.762 U*	0.857 U*	1.08 U*	1.34 U*	1.44 U*	1.44 U*	1.25 U*	1.21 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	0.225 J	<0.148	<0.148	0.402 J	0.192 J
Vanadium	ug/L	2.20	3.25 U*	3.08 U*	3.43 U*	3.50 U*	2.21 U*	2.18	2.32	2.70 U*	2.77 U*
Zinc	ug/L	4.69 U*	5.15 U*	4.42 U*	5.08 U*	5.51 U*	4.15 U*	4.96 U*	5.42 U*	4.57 U*	4.39 U*
Dissolved Metals											
Antimony	ug/L	<0.378	0.630 J	<0.378	<0.378	<0.378	1.47 J	<0.378	<0.378	0.555 J	0.450 J
Arsenic	ug/L	0.681 J	1.17	1.13	1.23	1.19	1.06	0.459 J	0.547 J	1.19	1.23
Barium	ug/L	18.0	19.9	19.5	19.9	18.7	19.0	21.9	21.8	19.4	19.4
Beryllium	ug/L	<0.182	<0.182	<0.182	<0.182	<0.182	0.421 J	<0.182	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	<38.6	46.1 J	39.4 J	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	0.143 U*	<0.125	<0.125
Calcium	ug/L	19,900	16,600	16,200	16,400	16,200	18,100	17,100	15,800	16,900	16,900
Chromium	ug/L	<1.53	2.88 U*	2.98 U*	3.33 U*	3.34 U*	<1.53	<1.53	1.55 J	2.62 U*	3.14 U*
Cobalt	ug/L	0.165 U*	<0.0750	<0.0750	<0.0750	<0.0750	0.0760 J	0.131 U*	0.167 U*	0.110 J	0.130 J
Copper	ug/L	0.707 J	1.32 J	0.660 J	0.710 J	<0.627	<0.627	0.799 J	0.849 J	<0.627	4.02 J
Iron	ug/L	<19.5	<19.5	<19.5	<19.5	<19.5	37.2 J	87.4	102	<19.5	<19.5
Lead	ug/L	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	<0.128	0.153 U*	<0.128	0.172 J
Lithium	ug/L	54.1	4.85 U*	4.36 U*	4.26 U*	5.60 U*	<3.39	3.54 J	5.24	<3.39	<3.39
Magnesium	ug/L	4,390	3,980	3,900	3,950	3,800	4,830	4,300	4,070	3,850	3,950
Manganese	ug/L	248	2.67 J	2.17 J	21.8	1.65 J	7.50	26.9 U*	16.5 U*	<1.35	3.63 J
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	1.26 J	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.443 U*	0.434 J	0.367 J	0.380 J	0.554 J	0.683 J	0.948 U*	1.16 U*	0.643 J	0.548 J
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	0.177 UJ	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	<0.148	<0.148	1.08	<0.148	0.225 U*	0.230 J	<0.148
Vanadium	ug/L	1.39	2.29 U*	2.36 U*	2.58 U*	2.31 U*	<0.991	1.17	1.40	1.92 U*	2.08 U*
Zinc	ug/L	<3.22	4.41 U*	<3.22	3.98 U*	3.89 U*	3.68 U*	3.50 U*	3.45 U*	<3.22	5.57 U*
Radiological Parameters											
Radium-226	pCi/L	0.0482 +/-(0.0823)U	0.104 +/-(0.116)U	-0.0319 +/-(0.167)U	0.0207 +/-(0.135)U	-0.0157 +/-(0.137)U	-0.0579 +/-(0.123)U	-0.0241 +/-(0.0784)U	-0.0552 +/-(0.0739)U	-0.0594 +/-(0.120)U	-0.0232 +/-(0.0942)U
Radium-228	pCi/L	0.783 +/-(0.316)J	0.406 +/-(0.257)J	0.0319 +/-(0.250)UJ	0.272 +/-(0.243)U	0.701 +/-(0.302)	0.0294 +/-(0.299)U	-0.0460 +/-(0.231)U	0.180 +/-(0.276)U	-0.0485 +/-(0.236)U	0.202 +/-(0.220)U
Radium-226+228	pCi/L	0.832 +/-(0.327)J	0.510 +/-(0.282)J	0.0319 +/-(0.301)UJ	0.293 +/-(0.278)U	0.701 +/-(0.332)J	0.0294 +/-(0.323)U	0.000 +/-(0.244)U	0.180 +/-(0.286)U	0.000 +/-(0.265)U	0.202 +/-(0.239)U
Anions											
Chloride	mg/L	7.80	4.39	4.36	4.24	4.74	4.64	13.2	14.8	3.75	3.63
Fluoride	mg/L	0.0752 J	0.0642 J	0.0652 J	0.0643 J	0.0699 J	0.0687 J	0.0338 J	0.0366 J	0.0662 J	0.0612 J
Sulfate	mg/L	13.7	5.91	5.71	5.64	5.88	5.68	16.6	18.4	5.93	5.50
General Chemistry											
Hardness (as CaCO3)	mg/L	69.4	58.1	57.1	57.0	57.9	65.0	60.6	57.1	57.6	59.0
Total Dissolved Solids	mg/L	126	79.0	85.0	75.0	70.0	86.0	90.0	80.0	66.0	70.0
Total Suspended Solids	mg/L	10.6	9.20	9.30	12.8	17.0	37.2	11.5	12.7	11.4	12.4

See last page for notes.

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

Sample Location		STR-CV03						
Sample Date		31-Jul-2019	31-Jul-2019	31-Jul-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019	20-Nov-2019
Sample ID		JOF-STR-CV03-CC-MID-20190731	JOF-STR-CV03-RB-SUR-20190731	JOF-STR-CV03-RB-BOT-20190731	JOF-STR-CV03-LB-SUR-20191120	JOF-STR-CV03-CC-MID-20191120	JOF-STR-CV03-RB-MID-20191120	JOF-STR-DUP02-20191120
Parent Sample ID								JOF-STR-CV03-RB-MID-20191120
Sample Depth		0.8 m	0.5 m	2.1 m	0.1 m	0.8 m	0.8 m	0.8 m
Sample Type		Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample
Level of Review[1]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units							
Total Metals								
Antimony	ug/L	0.442 U*	<0.378	<0.378	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.49 U*	1.51 U*	1.47 U*	0.725 J	0.596 J	0.611 J	0.590 J
Barium	ug/L	30.5	32.9	34.0	22.2	21.0	20.8	20.9
Beryllium	ug/L	<0.182	<0.182	<0.182	0.431 U*	<0.182	0.236 J	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	53.6 J	<38.6	39.8 J	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	0.160 U*	<0.125	0.141 J	<0.125
Calcium	ug/L	16,700	16,800	16,900	15,800	14,000	13,800	14,100
Chromium	ug/L	3.79 U*	3.14 U*	3.01 U*	<1.53	<1.53	1.81 U*	1.53 U*
Cobalt	ug/L	0.319 J	0.298 J	0.354 J	0.242 U*	0.192 U*	0.240 J	0.185 J
Copper	ug/L	0.767 J	0.665 J	0.815 J	0.947 J	0.866 J	1.17 J	1.14 J
Iron	ug/L	457	478	653	300	248	338	318
Lead	ug/L	0.290 J	0.271 J	0.356 J	0.349 U*	0.232 U*	0.322 J	0.250 J
Lithium	ug/L	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	3,770	3,870	3,870	3,760	3,360	3,280	3,420
Manganese	ug/L	201	213	235	62.4	45.7	49.7	49.3
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	1.19 U*	1.08 U*	1.31 U*	0.783 U*	0.886 U*	0.958 U*	0.822 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	0.366 U*	<0.148	0.227 J	<0.148
Vanadium	ug/L	2.91 U*	2.70 U*	2.86 U*	1.70	1.56	1.85	1.71
Zinc	ug/L	5.36 U*	5.01 U*	5.96 U*	5.73 U*	3.94 U*	4.66 U*	3.96 U*
Dissolved Metals								
Antimony	ug/L	<0.378	<0.378	1.16 J	<0.378	<0.378	<0.378	<0.378
Arsenic	ug/L	1.12	1.05	1.21	0.565 J	0.470 J	0.460 J	0.401 J
Barium	ug/L	17.6	17.2	17.2	19.0	18.5	18.1	17.6
Beryllium	ug/L	<0.182	<0.182	<0.182	0.206 U*	<0.182	<0.182	<0.182
Boron	ug/L	<38.6	<38.6	<38.6	40.1 J	<38.6	<38.6	<38.6
Cadmium	ug/L	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125	<0.125
Calcium	ug/L	16,800	16,500	15,400	15,500	14,000	13,900	13,700
Chromium	ug/L	2.60 U*	2.76 U*	2.99 U*	<1.53	<1.53	<1.53	<1.53
Cobalt	ug/L	<0.0750	<0.0750	<0.0750	0.113 U*	0.0890 U*	<0.0750	<0.0750
Copper	ug/L	<0.627	<0.627	0.795 J	0.767 J	0.679 J	0.984 J	0.939 J
Iron	ug/L	<19.5	<19.5	<19.5	30.5 J	34.9 J	27.2 J	28.7 J
Lead	ug/L	<0.128	<0.128	<0.128	0.146 U*	<0.128	<0.128	<0.128
Lithium	ug/L	<3.39	<3.39	5.64 U*	<3.39	<3.39	<3.39	<3.39
Magnesium	ug/L	3,810	3,760	3,510	3,670	3,250	3,360	3,300
Manganese	ug/L	<1.35	<1.35	3.67 J	10.5 U*	<1.35	2.05 U*	1.85 U*
Mercury	ug/L	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101	<0.101
Molybdenum	ug/L	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610	<0.610
Nickel	ug/L	0.677 J	0.723 J	0.598 J	0.547 U*	0.646 U*	0.592 U*	0.531 U*
Selenium	ug/L	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51	<1.51
Silver	ug/L	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177	<0.177
Thallium	ug/L	<0.148	<0.148	<0.148	0.207 U*	<0.148	<0.148	<0.148
Vanadium	ug/L	1.87 U*	1.80 U*	2.21 U*	1.35	1.18	1.35	1.22
Zinc	ug/L	3.31 U*	3.86 U*	3.86 U*	<3.22	<3.22	<3.22	<3.22
Radiological Parameters								
Radium-226	pCi/L	-0.0201 +/-(0.0849)U	0.0886 +/-(0.132)U	0.0779 +/-(0.117)U	0.000851 +/-(0.0798)U	0.0153 +/-(0.0553)U	-0.0508 +/-(0.0542)U	-0.00455 +/-(0.0423)U
Radium-228	pCi/L	0.478 +/-(0.281)	-0.0582 +/-(0.218)U	0.119 +/-(0.224)U	0.165 +/-(0.289)U	0.412 +/-(0.254)	-0.0755 +/-(0.273)U	0.0599 +/-(0.226)U
Radium-226+228	pCi/L	0.478 +/-(0.294)J	0.0886 +/-(0.255)U	0.197 +/-(0.253)U	0.166 +/-(0.300)U	0.427 +/-(0.260)J	0.000 +/-(0.278)U	0.0599 +/-(0.230)U
Anions								
Chloride	mg/L	3.56	3.48	3.47	6.32	6.14	5.97	5.93
Fluoride	mg/L	0.0621 J	0.0602 J	0.0606 J	0.0377 J	0.0305 J	0.0321 J	0.0335 J
Sulfate	mg/L	5.52	5.41	5.47	12.5	12.8	12.5	12.4
General Chemistry								
Hardness (as CaCO3)	mg/L	57.2	58.0	58.1	55.0	48.5	47.9	49.4
Total Dissolved Solids	mg/L	76.0	78.0	85.0	64.0	40.0	22.0 J	43.0 J
Total Suspended Solids	mg/L	11.3	10.5	14.0	10.8	8.90	11.1	10.9

Notes:

<	Analyte was not detected at a concentration greater than the laboratory reporting limit.
ID	Identification
J	Quantitation is approximate due to limitations identified during data validation.
m	meter
mg/L	milligrams per Liter
ug/L	micrograms per Liter
pCi/L	picocuries per Liter
U	Not detected
U*	This result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level.
UJ	This compound was not detected, but the reporting or detection limit should be considered estimated due to a bias identified during data validation.

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

APPENDIX J.3

TECHNICAL EVALUATION OF SEDIMENT AND BENTHIC INVERTEBRATE DATA

TENNESSEE VALLEY AUTHORITY

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

Johnsonville Fossil Plant

New Johnsonville, Tennessee

Tennessee Valley Authority

TVA

Title and Approval Page

Title of Document:	Appendix J.3 – Technical Evaluation of Sediment and Benthic Macroinvertebrate Data Johnsonville Fossil Plant Tennessee Valley Authority New Johnsonville, Tennessee
Prepared By:	Tennessee Valley Authority
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TVA Limnologist, Fisheries & Aquatic Monitoring	1-31-24 Date
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TVA

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Acronyms and Abbreviations

ATL	Alternate Thermal Limit
BIP	Balanced Indigenous Population
CARA	Corrective Action and Risk Assessment
CBR	Critical Body Residue
CCR	Coal Combustion Residuals
CCR Parameters	Constituents listed in Appendices III and IV of 40 CFR 257 and five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04
CCR Rule	Title 40, Code of Federal Regulations, Part 257
CFR	Code of Federal Regulations
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
JOF Plant	Johnsonville Fossil Plant
LOAEL	Lowest Observed Adverse Effect Level
mg/kg	milligrams per kilogram
NOAEL	No Observed Adverse Effect Level
NPDES	National Pollutant Discharge Elimination System
%	Percent
PLM	Polarized Light Microscopy
RBI	Reservoir Benthic Index
REH	Reservoir Ecological Health
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

Chapter 1 Introduction

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

Chapter 2 Sediment, Benthic Macroinvertebrates, and Mayfly Investigation

The purpose of the sediment and benthic macroinvertebrate investigations was to characterize concentrations of Coal Combustion Residuals (CCR)-related constituents in sediments and mayfly (*Hexagenia* spp.) tissues and to evaluate potential ecological impacts through multi-metric analysis of benthic macroinvertebrate community composition in the vicinity of the CCR management units[1] at the JOF 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 JOF Plant CCR management units.

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

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

2.1 Historical Studies

Historically, TVA has conducted biological assessments by periodically monitoring aquatic communities (fish and benthic macroinvertebrates) near the JOF Plant to evaluate their status upstream and downstream of the plant's thermal discharge. This monitoring was conducted to support continuance of the JOF Plant Alternate Thermal Limit (ATL) for the thermal discharge established under the National Pollutant Discharge Elimination System (NPDES) permit for the facility (NPDES Permit Number TN0005444) (TDEC 2011). Prior to becoming inactive in 2017, renewal of the permit was based on successful demonstration, in accordance with Section 316(a) [2] of the federal Clean Water Act (CWA), that a balanced indigenous population (BIP[3]) of fish and wildlife is present and being maintained in the Tennessee River (Kentucky Reservoir) downstream of the plant. The primary focus of the biological assessments conducted by TVA in accordance with the CWA consisted of collecting and analyzing biological data from fish (Appendix J.5) and benthic macroinvertebrate communities to characterize the compositions of those communities upstream and downstream of the JOF Plant.

[1] The term "CCR management unit" is used in this document generally and is not intended to be a designation under federal or state regulations.

[2] 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.

[3] 40 C.F.R. § 125.71(c) (2021).

Historical sediment sampling information and benthic macroinvertebrate assessments are summarized in Chapters 2.1.1 and 2.1.2 below, respectively.

2.1.1 Historical Sediment Studies

From 1990 to 2015, sediment samples were collected from two established locations in the Tennessee River, at Tennessee River Mile (TRM) 23.0 and 85.0 as part of the TVA Reservoir Ecological Health (REH) program (formerly known as the Vital Signs monitoring program). These samples were collected downstream from the JOF Plant (TRM 99.0) (TVA 2017). From 1993 to 2015, sediment samples also were collected from a location in the Big Sandy River Embayment, more than 30 miles downstream from the JOF Plant. In 2003 and 2006, sediment samples were collected from seven additional embayments located upstream and downstream from the JOF Plant. The nearest of those is the Birdsong Creek Embayment, approximately five miles upstream (TVA 2017). Sediment samples were analyzed for multiple parameters including some CCR Parameters (arsenic, cadmium, calcium, chromium, copper, lead, mercury, nickel, selenium, and zinc).

2.1.2 Historical Benthic Macroinvertebrate Studies

Biological community monitoring of the Tennessee River near the JOF Plant was performed in autumn 2010 and in summer and autumn 2011 to determine if CWA Section 316(a) ATLs established for the JOF Plant thermal discharge were protective of a BIP of aquatic life (TVA 2011 and 2012). Samples were collected from Tennessee River transects upstream and downstream of the JOF Plant to evaluate fish, benthic invertebrate, and shoreline wildlife communities; shoreline aquatic and river bottom habitats; thermal plume intensity and extent (2011 only); and general water quality parameters. In 2010, benthic invertebrate community data were collected from transects established across the main channel of the Tennessee River upstream and downstream of the JOF Plant at TRMs 106.3 and 97.2, respectively. In 2011, additional upstream and downstream transects were added at TRMs 103.6 and 94.3, respectively. The resulting aquatic community data were evaluated using community characteristics/metrics and statistical diversity comparisons. Benthic invertebrate community data were evaluated using Reservoir Benthic Index (RBI) methodology; results rated from “Good” to “Excellent” at both upstream and downstream transects. These studies found that upstream and downstream aquatic communities near the JOF Plant were ecologically similar. As such, TVA concluded that the JOF Plant thermal effluent was not adversely affecting downstream fish, benthic invertebrate, and wildlife communities (TVA 2011 and 2012). TVA also provides benthic community RBI scores for the Kentucky Reservoir collected as part of the REH program. However, these data were collected at the reservoir inflow (TRM 200), transition (TRM 85), forebay (TRM 23), and Big Sandy River Embayment. Due to their distance from the JOF Plant, these locations were not appropriate for BIP assessment in relation to JOF Plant operations (TVA 2012).

In 2009, a mussel and habitat survey was conducted along a dike supporting the northeastern margin of the JOF Plant Active Ash Pond 2 (Third Rock 2011). This assessment was conducted prior to 2010 dike maintenance activities impacting a potential habitat for the federally endangered pink mucket (*Lampsilis abrupta*) and federal candidate slabside pearly mussel (*Lexingtonia dolabelloides*). Follow-up surveys were conducted in 2011 and 2013 after maintenance activities (Third Rock 2011 and 2013). The surveys characterized mussel species composition, relative abundance, catch per unit effort, population age and size profiles, and distribution. Results indicated the northeastern dike maintenance area was a high-quality mussel habitat. During the surveys, up to 20 mussel species were identified; however, federally threatened or endangered species were not encountered (Third Rock 2011 and 2013).

2.1.3 Historical Mayfly Tissue Studies

Mayfly sampling during previous studies were limited to those collected as part of the overall benthic community RBI sampling conducted to satisfy CWA Section 316(a) monitoring requirements. Mayflies were not historically collected for bioaccumulation analysis for the 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, or strontium (CCR Parameters).

2.2 TDEC Order Investigation Activities

2.2.1 2019 Activities

The objectives of the TDEC Order benthic investigation were to characterize sediment chemistry, benthic macroinvertebrate community composition, and benthic macroinvertebrate bioaccumulation in surface streams in proximity to the JOF Plant CCR management units to evaluate if CCR material and/or dissolved CCR constituents have moved into surface water, potentially impacting aquatic life. TVA performed EI sample collection activities in waterbodies proximate to the JOF Plant, including the Tennessee River, the Intake Channel, the Boat Harbor, and three coves. The EI activities were conducted in general accordance with the *Environmental Investigation Plan (EIP)* (TVA 2018), *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>

During January and March 2019, sediment samples were collected from transects in the Tennessee River mainstem (TR01 through TR08), the Intake Channel (IC1 and IC02), the Boat Harbor (BH01 through BH03), and at the mouth of each of three coves inflowing to the Tennessee River (CV01, CV02, and CV03). Exhibit J.3-1 illustrates the sample locations.

Attempts were made to collect sediment samples from the left descending bank, center channel, and the right descending bank at each transect, however insufficient sediment for sample collection was encountered at some locations. Surface sediment samples (depths of 0-0.5 feet) were collected from each of the sampling points, except as shown on Exhibit J.3-1. Deeper sediment intervals (up to 5.7 feet) were sampled where more sediment accumulation was present.

<u>Benthic Macroinvertebrates</u>

Benthic macroinvertebrate sampling was conducted within the Tennessee River and its adjacent coves in the vicinity of the JOF Plant, the Intake Channel, and the Boat Harbor for the TDEC Order EI, as shown on Exhibits J.3-2 and J.3-2a. The Tennessee River was sampled at 11 transect locations: three upstream control locations (TR09, TR10 and TR01), five adjacent to the JOF Plant (TR02 through TR06), and three downstream of the JOF Plant (TR07, TR08, and TR11). The Intake Channel and Boat Harbor adjacent to the JOF Plant were sampled at three transect locations each (BH01 through BH03 and IC01 through IC03, respectively). One transect was sampled at the mouth of each of three coves inflowing to the Tennessee River (CV01, CV02, and CV03). These cove sampling locations represent control conditions

for comparison to results from the Intake Channel and Boat Harbor, as they share similar habitat characteristics that may affect benthic community composition, and by extension, metric outcomes.

Sampling was performed between October 15 and 17, 2019, along transects, each composed of five samples/grabs, using a Ponar dredge sampling device, as described in the SAR (Appendix J.4). Results for each of the five grab samples from each transect were composited to minimize the effects of intra-transect habitat heterogeneity and to capture a comprehensive cross-section of the community (as discussed in Chapter 3.2.1).

Mayfly Tissue

For the TDEC Order EI, mayfly tissue samples were collected in June 2019 from three areas (reaches) of the Tennessee River upstream, adjacent, and downstream relative to the CCR management units, and from the Intake Channel and Boat Harbor adjacent to the CCR management units. The sample reaches are shown on Exhibit J.3-3.

2.2.2 2021 Activities

During the 2019 sampling and analysis of biota and sediments collected from the Boat Harbor as part of implementation of the JOF Plant EIP, a bluegill (*Lepomis macrochirus*) composite liver sample was reported to have an atypically higher copper concentration than was observed at the other locations. In addition, several sediment samples collected from the Boat Harbor also had comparatively elevated copper concentrations, as did the sample of non-depurated mayfly (*Hexagenia* spp.) nymphs collected from the Boat Harbor. Copper concentrations reported for both mayfly nymphs and adults were below the applicable screening levels (i.e., the “no observed adverse effect” level (NOAEL)) for Critical Body Residues (CBR).

Because of these anomalous results, further investigation of copper concentrations in biota and sediments from the JOF Plant Boat Harbor and Intake Channel was conducted. A *Fish Tissue and Benthic Sampling and Analysis Plans (SAPs) Addendum I* (Stantec 2021) was prepared to describe the collection and testing of additional composited bluegill tissue samples, composited mayfly nymph samples, and sediment samples to support further evaluation of copper concentrations in biota and sediments in the Boat Harbor.

The supplemental sampling described in the *Fish Tissue and Benthic SAPs Addendum I* was conducted in June and July 2021. In accordance with the Addendum, the collected composite mayfly samples and sediment samples were retained pending the results of the fish tissue samples as the ultimate line of evidence that might demonstrate potential impacts. Because the total copper concentrations measured from the fish tissue samples collected in July 2021 were not determined to be elevated, the mayfly samples and sediment samples were not analyzed.

Descriptions of sample location selection, collection methodologies, analyses, and quality assurance/quality control for the 2021 investigation and the fish tissue sampling results are provided in the *Fish Tissue and Benthic Sampling and Analysis Report (SAR) Addendum* included in Appendix J.7.

Chapter 3 Results and Discussion

Data for the EI were collected along sample transects in the Tennessee River, the Intake Channel, the Boat Harbor, and three coves proximate to the JOF 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 (Table 1-3 and Appendix A.2) were used to evaluate whether identified CCR constituent concentrations in sediment samples may be indicative of potential impacts to aquatic life. Acute ESVs are concentrations of CCR Parameters that are protective of aquatic organisms for short-term exposure (typically a period of days), and chronic ESVs are protective of aquatic organisms for long-term exposure (typically the duration of an entire life cycle, although that can vary by species).

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

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

3.1 Sediment

A total of 41 shallow sediment samples (23 from the Tennessee River including the three coves, 9 from the Intake Channel, and 9 from the Boat Harbor), 36 deeper sediment samples (16 from the Tennessee River including the three coves, 7 from the Intake Channel, and 13 from the Boat Harbor), and five duplicate samples were collected from the water bodies proximal to the JOF Plant and submitted for laboratory analysis in 2019 as described in Chapter 2.2. Both the shallow and deeper sediment samples collected were analyzed for percent (%) ash. The shallow sediment samples were analyzed by an accredited laboratory for the following CCR-related constituents, hereafter referred to collectively as “CCR Parameters,” and the deeper sediments were retained for later analysis if required.

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

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

3.1.1 Exploratory Data Analysis

Based on the phased approach proposed in the *Benthic SAP*, the 41 shallow sediment samples, 36 deeper sediment samples, and five duplicate samples were analyzed using Polarized Light Microscopy (PLM) for % ash. The 41 sediment samples collected from the upper 6-inches at each location and the five duplicate samples were also analyzed for the CCR Parameters as part of Phase 1. The 36 deeper sediment samples collected for the analysis of CCR Parameters were retained for possible future analysis, pending the results of the PLM analysis. None of the PLM results for sediment samples collected from the Tennessee River, Intake Channel, and Boat Harbor were above the 20% ash threshold defined for the EAR (Table 1-3 and Appendix A.2) that would trigger additional analyses.

The Phase 1 exploratory data analysis (Appendix E.6) showed that none of the CCR Parameters were present at concentrations above the TDEC-approved acute ESVs. Concentrations of seven CCR Parameters were above the chronic ESVs for one or more locations, as discussed below. Concentrations of the remaining CCR Parameters were below their respective chronic and acute ESVs in the Phase 1 sediment samples. Additional information regarding the procedures used for the exploratory data analysis used for the JOF Plant sediment investigation is provided in Appendix E.6. Below is a summary of the sample locations and CCR Parameters that were detected at concentrations above their respective ESVs:

- Arsenic concentrations were reported at or above the chronic ESV in one sample collected from the Intake Channel, in two samples collected from the Boat Harbor (and in a duplicate sample from one of the Boat Harbor locations), in one sample collected from a cove on the west side of the Tennessee River (and in the duplicate sample from this location), and in one sample collected from a cove on the east side of the Tennessee River upstream from the Plant. Arsenic concentrations were below the chronic and acute ESVs in the remaining 37 shallow sediment samples and three duplicate samples analyzed for the CCR Parameters.

- One barium concentration was reported above the chronic ESV in one sample collected from the cove on the east side of the Tennessee River upstream from the Plant. Barium concentrations were below the chronic and acute ESVs in the remaining 40 shallow sediment samples and five duplicate samples analyzed for the CCR Parameters.

- Beryllium concentrations were reported above the chronic ESV in one sample collected from the Intake Channel (and in the duplicate sample from this location), in one sample collected from the Boat Harbor (and in the duplicate sample from this location), in five samples collected from coves on the west side of the Tennessee River (and in a duplicate sample from one of the cove locations), in two samples collected from a cove on the east side of the Tennessee River upstream from the JOF Plant, and in one sample collected from a location in the Tennessee River upstream from the JOF Plant. Beryllium concentrations were below the chronic and acute ESVs in the remaining 31 shallow sediment samples and two duplicate samples analyzed for the CCR Parameters.

- Copper concentrations were reported above the chronic ESV in six samples collected from the Boat Harbor. Copper concentrations were below the chronic and acute ESVs in the remaining 35 shallow sediment samples and five duplicate samples analyzed for the CCR Parameters.

- One mercury concentration was reported above the chronic ESV in one sample collected from the Boat Harbor. Mercury concentrations were below the chronic and acute ESVs in the remaining 40 shallow sediment samples and five duplicate samples analyzed for the CCR Parameters.

- Nickel concentrations were reported above the chronic ESV in two samples collected from a cove on the west side of the Tennessee River. Nickel concentrations were below the chronic and acute ESVs in the remaining 39 shallow sediment samples and five duplicate samples analyzed for the CCR Parameters.
- Selenium concentrations were reported above the chronic ESV in one sample collected from the Intake Channel, in two samples collected from the Boat Harbor, in five samples collected from coves on the west side of the Tennessee River (and in a duplicate sample from one of these locations), and in one sample collected from a location in the Tennessee River upstream from the Plant. Selenium concentrations were below the chronic and acute ESVs in the remaining 32 shallow sediment samples and four duplicate samples analyzed for the CCR Parameters.

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 JOF 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 JOF Plant CCR management units. If present, the degree of degradation at adjacent and downstream sampling stations may indicate that further evaluation of potential impacts using multiple lines of evidence (i.e., results of surface stream sampling, benthic sediment sampling, and mayfly and fish tissue analyses) are necessary, as discussed in Chapter 7.0 of the EAR.

3.2.1 Metric Computations

Benthic macroinvertebrate samples were processed by a qualified laboratory to generate complete taxa lists and individual taxon counts for each sampling location. These community composition data were then used to calculate RBI and supplemental metrics for comparative analysis of conditions upstream, adjacent, and downstream of the JOF Plant within the Tennessee River, three cove inflows to the Tennessee River in the vicinity of the JOF Plant, the Intake Channel, and the Boat Harbor.

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

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

Reservoir Benthic Index (RBI)

The RBI was developed by TVA 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 JOF 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 and TDEC-approved categorical value ranges (TVA 2012, Table 5). The seven adjusted scores are then summed to produce an 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 Johnsonville Fossil Plant Discharge: Summer and Autumn 2011* (2012), 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 RBI were also included in this analysis as stand-alone indicators of biological health. The following supplemental metrics were applied:

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

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

x_i = number of individuals in taxon

t_i = tolerance value of taxon

n = total abundance of sample

S = total number of taxa

HBI scores fall into seven categorical ratings that reflect ecological conditions designed for use in wadable streams. While these categories may not be accurately descriptive of conditions in reservoir-associated systems, such as the Tennessee River, the value ranges in each category are shown in the figures referenced in the following chapters to help evaluate meaningful differences during comparative analysis. Categorical titles, as

listed below, have not been labeled or discussed for the figures referenced in Chapter 3.2.1.2, as they do not accurately describe conditions for this application. The score ranges within each category remain applicable, however, having been established based on rigorous empirical data and statistical analyses in the development of the HBI model to represent significant differences in community sensitivity (Hilsenhoff 1987). The HBI categories are as follows:

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

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

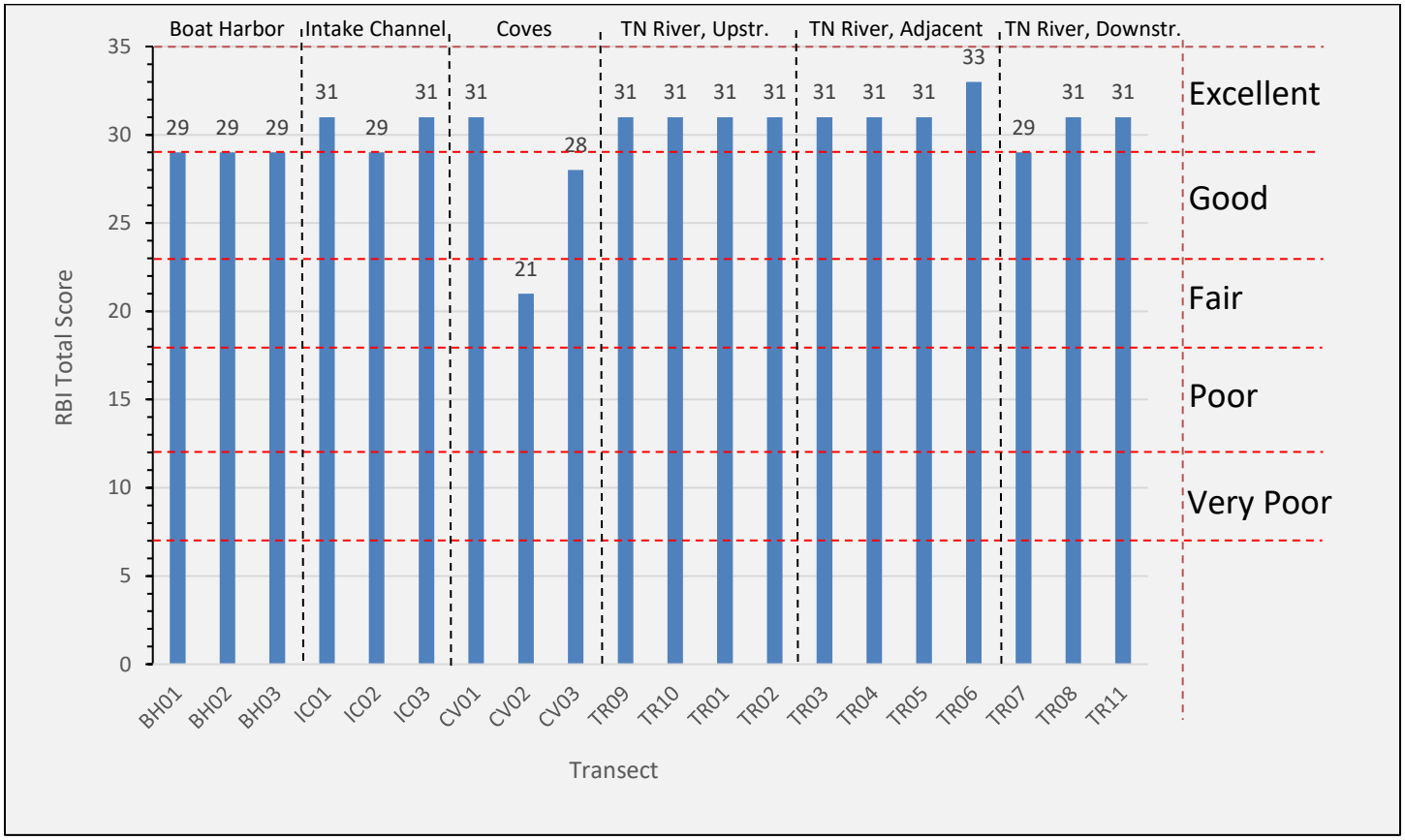
Additionally, functional feeding groups were assigned to each taxon, and community distributions were calculated as relative abundance (%). Taxa lists, the metrics described above, and feeding group distributions are included on benthic community summary sheets in Attachment J.3-A along with a summary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

The following subsections summarize the results of the RBI applied to the Tennessee River and coves, Boat Harbor, and Intake Channel. 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

Reservoir Biotic Index

Figure J.3-1 presents the RBI Total Scores and associated categorical ratings from the October 2019 (Low Pool) macroinvertebrate survey on the Tennessee River, its adjacent coves in the vicinity of the JOF Plant, the Intake Channel, and the Boat Harbor. 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. RBI Results Summary, 2019

<u>Tennessee River - RBI</u>

Moving from upstream to downstream, transects TR03 through TR06 represent potentially impacted locations adjacent to the JOF Plant CCR management units, and transects TR07, TR08, and TR11 represent downstream potential impact areas. Control locations were established upstream of the plant at transects TR09, TR10, TR02, and TR01.

As summarized in Figure J.3-1, biological integrity is similar for transects adjacent to and downstream of the JOF Plant CCR management units, as compared to upstream controls. Results were within the 'Excellent' range across all upstream, adjacent, and downstream sampling transects, with the exception of downstream transect TR07, which was within 'Good' and one point away from 'Excellent.' Also excepting TR07, all seven adjacent and downstream transect RBI Total Scores were equivalent to or higher than the three upstream control locations, demonstrating a high degree of consistency in the health of benthic communities throughout the study area. The slightly lower RBI Total Score at TR07 is likely due to natural variations and does not appear to indicate any local impacts to aquatic biology resulting from the JOF Plant CCR management units.

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.

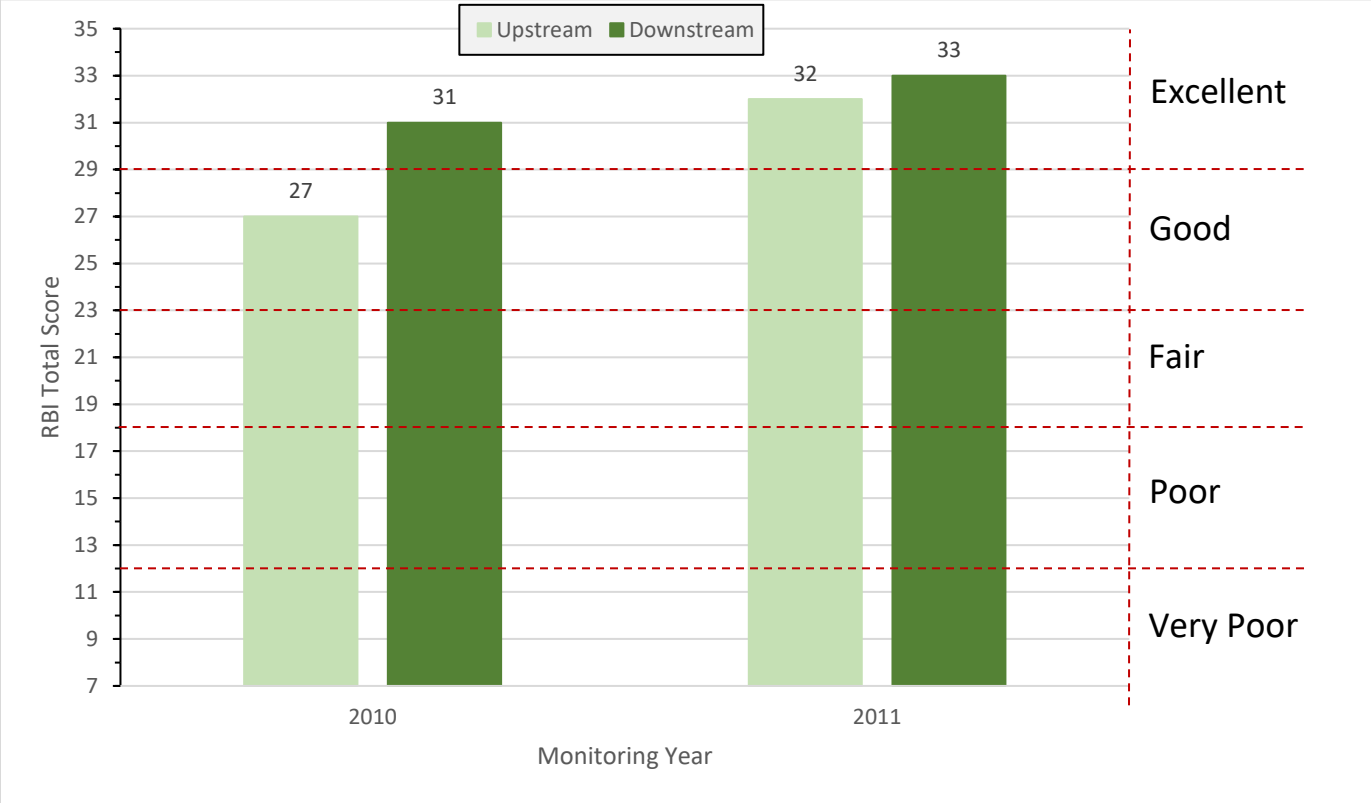


Figure J.3-2. Tennessee River Historical RBI Results Summary, 2010-2011

The historical data demonstrate a positive relationship in which average upstream and downstream RBI Total Scores improved slightly from 2010 to 2011, and categorically (by rating), biological integrity downstream of the JOF Plant remained consistently within the 'Excellent' range over this time. During both monitoring years, downstream values were higher than at upstream controls, further supporting the conclusion that no potential impacts from the JOF Plant CCR management units were observable in local benthic communities. In comparison, results generated from 2019 EIP data (Figure J.3-1) show similar relationships over time and similarly high relative ratings; however, as previously discussed, these total score values cannot be directly compared due to differences in methodology. In summary, neither the EI data collected in 2019 nor historical data suggest potential impacts on benthic macroinvertebrate communities from the JOF Plant CCR management units.

<u>Intake Channel and Coves - RBI</u>

Although the Intake Channel is a manmade backwater area within the Tennessee River fed from upstream of the Plant, metric analysis of its benthic communities evaluates potential impacts from Active Ash Pond 2 on its left bank and plant-associated activities on its right bank. As performed in the Boat Harbor benthic analysis, Intake Channel results are compared to control conditions established in the three sampled coves, which are suitable for their similarity in habitat conditions. As previously discussed, potential impacts to Intake Channel benthic communities should only be evaluated in the context of the cove controls, and conclusions should not be drawn in comparison to Tennessee River results.

Within the Intake Channel, transects IC01 through IC03 represent potentially impacted locations adjacent to the JOF Plant CCR management units. Cove transects CV01 through CV03 represent background control conditions presumably

unimpacted by JOF plant-related influences, including CCR materials. Historical benthic macroinvertebrate monitoring was not performed within the Intake Channel for comparison to the EI results.

As summarized in Figure J.3-1, biological integrity in the Intake Channel was similar to the Boat Harbor, with equivalent or slightly higher RBI Total scores, which ranged from 29 to 31. Results were within the 'Excellent' range at two of the three sampling locations (IC01 and IC03), and IC02 scored at the top of the 'Good' range, one point below the threshold for 'Excellent.' These findings demonstrate a high degree of ecological health consistently distributed throughout the study reach. In comparison to the cove control locations, RBI scores from the Intake Channel were similar to CV01 and CV03 (31 and 28 respectively) but were substantially higher than the RBI score at CV02 (21). In review of the complete RBI data set presented in Figure J.3-1, the comparatively lower score and 'Fair' rating at transect CV02 appears to reflect greater environmental stress uncharacteristic of the benthic communities elsewhere in the study area. Therefore, CV02 may be limited in its representativeness as a control. Excluding this sampling location, the data demonstrate very consistent biological integrity throughout the study area and support the conclusion that the JOF Plant CCR management units have not adversely impacted benthic communities within the Intake Channel.

Boat Harbor and Coves - RBI

Spatial comparisons of transects within the Boat Harbor can be used to observe patterns and possible trends reflective of changes in biological integrity proximal to a potential impact source as results are compared to control conditions established in the three sampled coves. These cove control locations were selected to represent similar habitat conditions to those observed in the Boat Harbor, which is critical for comparison of RBI results, as habitat quality and availability may have significant effects on benthic community composition and density, and backwater/slow water conditions would be expected to favor more tolerant organisms. Independent of any CCR impacts, these habitat factors would likely reduce RBI scores. For this reason, potential impacts to the Boat Harbor (and Intake Channel) benthic communities should only be evaluated in the context of the cove controls, and conclusions should not be drawn in comparison to Tennessee River results.

Within the Boat Harbor, transects BH01 through BH03 represent potentially impacted locations adjacent to the JOF Plant CCR management units. Cove transects CV01 through CV03 represent background control conditions presumably unimpacted by plant-related influences, including CCR materials. Historical benthic macroinvertebrate monitoring was not recently performed within the Boat Harbor; however, thermal effluent studies from 1973, 1974, and 1975 found that discharges from the JOF Plant did not alter the indigenous benthic macroinvertebrate communities inhabiting the Kentucky Reservoir, including a sampling station located within the Boat Harbor.

Similar to the results from the Tennessee River, RBI scores in the Boat Harbor were generally higher than their unimpacted controls and reflected consistent conditions throughout the study reach. All three transects within the Boat Harbor scored 29 out of a possible 35 points, within the 'Good' range and only one point below the threshold into the 'Excellent' category. Compared to the three cove control locations, the Boat Harbor RBI Total Scores were higher than two of the three control locations (CV03, and CV02 by a large margin) and scored slightly lower than CV01. Categorically, the Boat Harbor's biological integrity rating ranked in the middle of the cove results, with CV03 also rated as 'Good,' CV02 rated as 'Fair,' and CV01 rated as 'Excellent.' However, RBI scores throughout the Boat Harbor (29.0) were greater than the mean score among the three Cove control locations (26.7) and were similar to the mean score if CV02 is excluded as an outlier (29.5). Additionally, as discussed for the Intake Channel, excluding the uncharacteristic control at CV02 demonstrates very consistent biological integrity not only within the Boat Harbor, but comprehensively throughout the

study area (Boat Harbor, Intake Channel, Tennessee River, and coves). These multi-metric findings indicate that JOF Plant CCR management units have not had adverse impacts on benthic communities in the Boat Harbor, despite being immediately adjacent to Active Ash Pond 2 on its left descending bank and the former Coal Yard on its right descending bank (Exhibit J.3-2a).

3.2.1.2 Key RBI Component Metrics and Supplemental Metrics

Total Taxa Richness

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 summarized in Figure J.3-3.

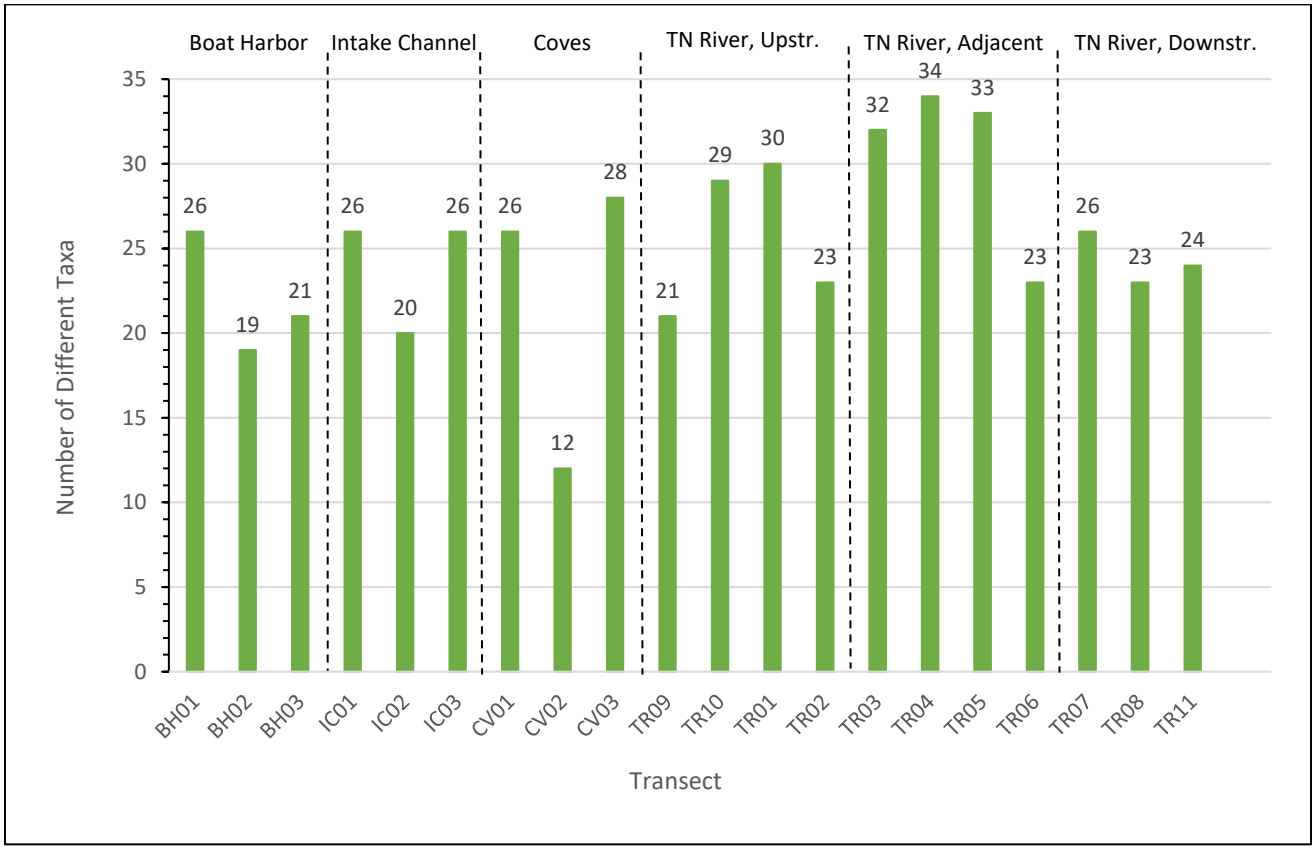


Figure J.3-3. Total Taxa Richness Summary, 2019

Within the Tennessee River (Figure J.3-3), transects located adjacent to the JOF Plant had the greatest TTR within the study area (TR03, TR04, TR05), including controls. Less rich adjacent communities (TR02 and TR06) and all three Tennessee River downstream communities (TR07, TR08, TR11) were similarly rich to the upstream control locations, falling centrally in the control range from 21 to 30. The Intake Channel and Boat Harbor had similar ranges in TTR, as

well, and were consistent with the ranges across the cove control transects. As previously discussed, the CV02 control appears to be somewhat degraded in comparison to the rest of the study area, and it had the lowest TTR by a considerable margin.

Although TTR ranges were generally aligned between potential impact areas and their respective controls, values within those ranges were relatively variable and did not follow a clear pattern, nor did they indicate localized stressors in any particular area in the context of the RBI previously discussed. Based on this corroborative evidence, it is likely that the variation in richness is naturally occurring as a result of local habitat differences among sampling transects, and there is no evidence to suggest any connection to CCR or the JOF Plant. In general, TTR ranges for the study segments and their respective controls reflect similar levels of environmental stress across the greater study area, and depict rich, healthy communities that do not appear to be constrained by influences from the JOF Plant CCR management units.

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, Intake Channel, Boat Harbor, and coves, respectively. Dashed red lines represent categorical breaks (e.g., Excellent, Good, Fair, etc.) to help visualize significant differences among locations, as described in Chapter 3.2.1.

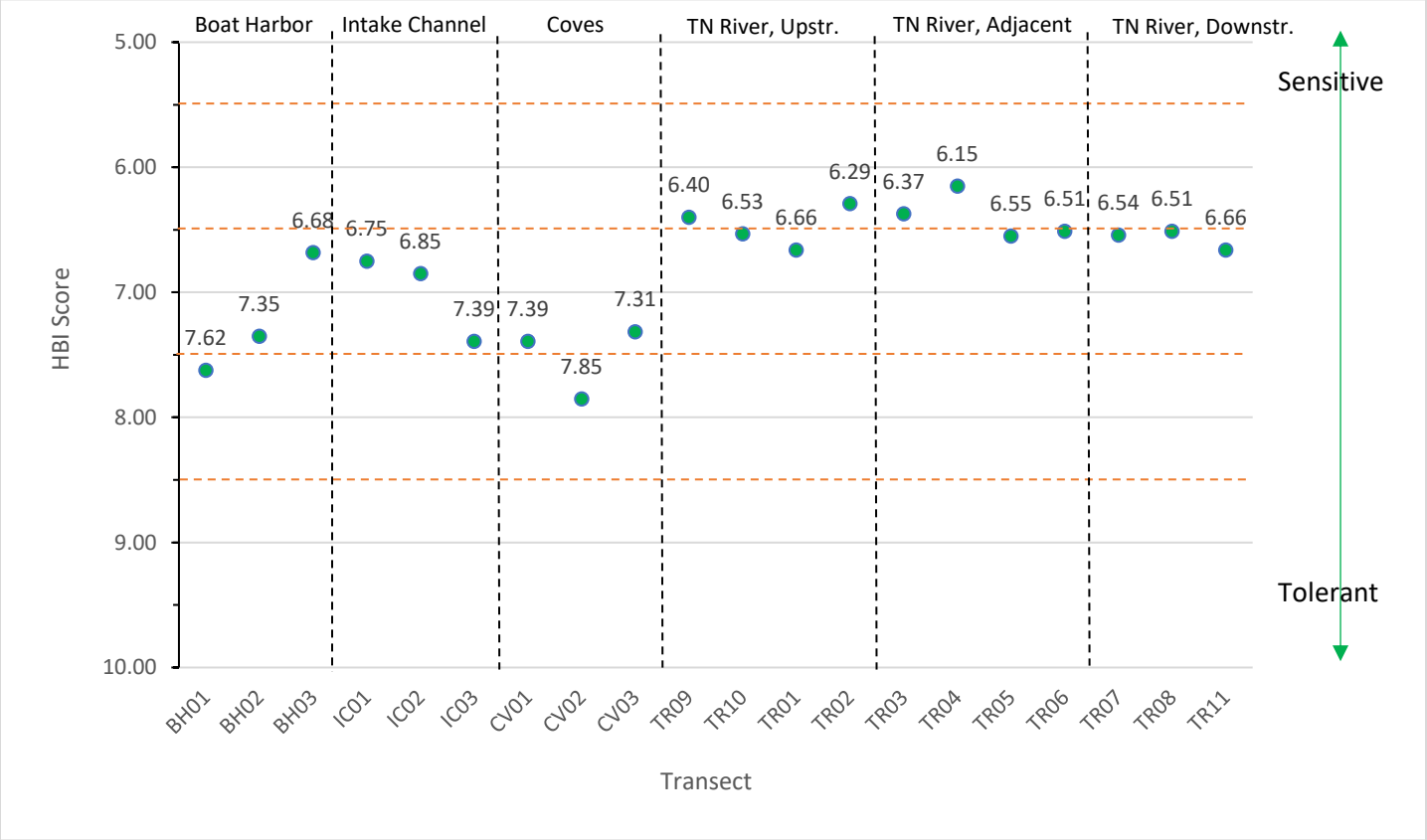


Figure J.3-4. HBI Results Summary, 2019

Spatial relationships for the HBI in the Tennessee River support the RBI conclusions previously discussed – ecological health appears to be consistent with unimpacted upstream controls throughout the study area. Specific to the HBI metric, adjacent and downstream benthic communities were similarly sensitive to environmental stress compared to upstream control communities, which scored transitionally between two categories (red dashed lines). The two upstream-most transects adjacent to the JOF Plant (TR03 and TR04) were slightly less tolerant than the farther upstream control transects (TR09, TR10, and TR01) and were similar to the nearest control at TR02. HBI values at adjacent transects TR05 and TR06 and the three downstream transects (TR07, TR08, and TR11) were near the mean value among these controls (HBI control mean = 6.47), demonstrating consistent conditions upstream, adjacent, and downstream of the JOF Plant.

The benthic community in the Intake Channel demonstrated increasing HBI scores moving from upstream to downstream, reflecting higher community stress tolerance deeper into the impounded backwater area ultimately leading up to the intake structure. Similar to the Boat Harbor, the relationship between community stress tolerance and proximity to the Tennessee River is likely related to a change in physical habitat conditions and flow velocities. IC01 is located adjacent to the confluence, which would allow greater potential for colonization by organisms typically inhabiting the mainstem system. Additionally, this confluence area draws oxygenated, free-flowing water from reaches upstream of the JOF Plant. Areas deeper within the Intake Channel are likely to be negatively affected by influences of the downstream impoundment, including slower flow velocities and sediment deposition. Although the farthest downstream community,

located at IC03, was more tolerant than those at IC01 and IC02, it was consistent with the most sensitive of the three control cove communities (IC03 = 7.39, CV01 = 7.39, CV03 = 7.31). More broadly, the data show that all three transect communities sampled from the Intake Channel were equivalently or more sensitive than benthic communities in the three control coves. Therefore, stressors appear to be less severe within the Intake Channel than within unimpacted areas of similar habitat. These results do not reflect any potential impacts associated with the JOF Plant CCR management units.

Within the Boat Harbor, transects BH01 and BH02 scored consistently with the HBI scores for the control coves. Transect BH03, farthest downstream, showed a notably more sensitive community that was more in line with HBI scores from locations on the Tennessee River mainstem. These results are likely due to its position immediately upstream of the confluence. Conditions may support less tolerant organisms here, in part due to the mixing of slow backwater in the Boat Harbor with free-flowing water from the Tennessee River. The close proximity would also promote access by source populations of more sensitive taxa typically inhabiting the mainstem's more diverse, higher quality physical habitat.

3.3 Mayfly Tissue

In June 2019, composite samples of mayfly (*Hexagenia* spp.*)* nymphs were collected from random locations in the Intake Channel adjacent to the Plant, in the Boat Harbor adjacent to the JOF Plant, and in three separate reaches of the Tennessee River (upstream, adjacent, and downstream of the JOF Plant), as shown on Exhibit J.3-3 In accordance with the SAP, a portion of the mayfly nymphs collected from each reach had their digestive systems depurated prior to preparing the composite samples for laboratory analysis. The remaining non-depurated mayfly nymphs from each reach were prepared as separate composite samples. Composite samples of mayfly adults were collected from random locations in the same reaches in the Tennessee River, Intake Channel, and Boat Harbor. The adult mayflies were sorted based on gender, and separate composite samples of male and female imagos were generated for each sampling reach.

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

For mayfly tissue samples collected in the Tennessee River, the only constituents identified for further evaluation based on sediment or surface stream sampling results above their respective ESVs were beryllium, cadmium, copper, and selenium (Appendix E.7). In addition, mercury and selenium were reviewed due to their potential to bioaccumulate in the tissues of aquatic organisms. The depurated and non-depurated results were compared to CBR values for NOAELs and Lowest Observed Adverse Effect Levels (LOAELs), except for beryllium, for which NOAELs and LOAELs are not available.

None of the Tennessee River composite mayfly sample concentrations were above the NOAEL or LOAEL for beryllium, cadmium, copper, or mercury.

- In the depurated mayfly nymph composite tissue samples, selenium concentrations were above the NOAEL. In the non-depurated mayfly nymph composite tissue samples and male and female adult mayfly samples selenium concentrations were above both the NOAEL and LOAEL.

For mayfly tissue samples collected in the Intake Channel, the constituents identified for further evaluation based on sediment or surface stream sampling results above their respective ESVs were arsenic, beryllium, copper, and selenium

(Appendix E.7). In addition, mercury and selenium were reviewed due to their potential to bioaccumulate in the tissues of aquatic organisms. The depurated and non-depurated results were compared to CBR values for NOAELs and LOAELs, except for beryllium, for which NOAELs and LOAELs are not available.

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

- Arsenic concentrations in the depurated mayfly nymph composite tissue sample and male and female adult mayfly composite tissue sample were above the NOAEL for arsenic. The arsenic concentration in the non-depurated mayfly nymph composite tissue sample was above both the NOAEL and LOAEL.
- The selenium concentration in the depurated mayfly nymph composite tissue sample was above the NOAEL for selenium. Selenium concentrations in the non-depurated mayfly nymph composite tissue sample and the male and female adult mayfly composite tissue sample were above both the NOAEL and LOAEL.

For mayfly tissue samples collected in the Boat Harbor, the constituents identified for further evaluation based on sediment or surface stream sampling results above their respective ESVs were arsenic, beryllium, copper, mercury, and selenium (Appendix E.7). In addition, mercury and selenium were reviewed due to their potential to bioaccumulate in the tissues of aquatic organisms. The depurated and non-depurated results were compared to CBR values for NOAELs and LOAELs, except for beryllium, for which NOAELs and LOAELs are not available.

None of the Boat Harbor composite mayfly sample concentrations were above the NOAEL or LOAEL for copper or mercury. Below is a summary of the constituents and sample locations with results above NOAELs/LOAELs in the Boat Harbor adjacent to the JOF Plant CCR management units:

- Arsenic concentrations in the depurated mayfly nymph composite tissue sample and male and female adult mayfly composite tissue sample were above the NOAEL for arsenic. The arsenic concentration in the non-depurated mayfly nymph composite tissue sample was above both the NOAEL and LOAEL.
- The selenium concentration in the depurated mayfly nymph composite tissue sample was above the NOAEL for selenium. Selenium concentrations in the non-depurated mayfly nymph composite tissue sample and the male and female adult mayfly composite tissue sample were above both the NOAEL and LOAEL.

Chapter 4 Summary

The following chapters summarize the evaluation findings presented in this appendix for sediment, benthic macroinvertebrate, and mayfly tissue based on historical information and EI sampling results. These data are further evaluated in the context of other environmental data in Appendices J.1 and J.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 JOF Plant, including a map depicting the location of CCR material in the stream, if identified during the investigation. Exhibit J.3-4 shows the distribution of CCR Parameter results at or above their respective chronic ESVs for the sediment samples collected in 2019, as described below and in Chapter 3.1.

The PLM sample analysis results summarized in Chapter 3.1.1 above indicate very little CCR material is present in the Tennessee River, Intake Channel, or Boat Harbor. In the Tennessee River, Intake Channel, and Boat Harbor, % ash results were either not detected or detected at very low levels (i.e., between 1% and 8% ash), with very little variation in results among sample locations.

Sediment sampling results for most CCR Parameters were below their respective ESVs. In the Tennessee River, the concentrations of beryllium (1.38 milligrams per kilogram [mg/kg]) and selenium (2.14 mg/kg) for one upstream location (TR03) were slightly above their respective chronic ESVs of 1.2 mg/kg and 2.0 mg/kg. In addition, the following CCR Parameters were detected at concentrations above their chronic ESVs in sediment samples collected from coves (which are considered representative of control conditions for comparison to results from the Boat Harbor and Intake Channel) along the Tennessee River:

- Arsenic, barium and beryllium were detected at concentrations above their respective chronic ESVs in one or more sample collected from transect CV01 in a cove on the east side of the Tennessee River upstream from the Plant.
- Arsenic, beryllium, and selenium were detected at concentrations above their respective chronic ESVs in one or more sample collected from transect CV02 in a cove on the west side of the Tennessee River.
- Beryllium, nickel, and selenium were detected at concentrations above their respective chronic ESVs in one or more sample collected from transect CV03 in a cove on the west side of the Tennessee River.

In the Intake Channel, the concentrations of arsenic (29.5 mg/kg), beryllium (3.06 mg/kg), and selenium (2.45 mg/kg) for one location (IC01) were above their respective chronic ESVs of 9.8 mg/kg, 1.2 mg/kg, and 2.0 mg/kg.

Sediment sampling results for most CCR Parameters were below their respective ESVs in the Boat Harbor as well. The concentration of mercury (0.182 mg/kg) was slightly above its chronic ESV (0.18 mg/kg) for one location (BH01). The concentrations of arsenic (12.6 mg/kg), beryllium (1.43 mg/kg), and selenium (2.07 mg/kg) for one location (BH02) were above their respective chronic ESVs of 9.8 mg/kg, 1.2 mg/kg, and 2.0 mg/kg. The concentration of arsenic (9.78 mg/kg) for one location (BH03) was considered equivalent to its chronic ESV of 9.8 mg/kg. The concentrations of copper in BH01 (51.5 mg/kg in the right bank sample, 40.3 mg/kg in the left bank sample, and 44.9 mg/kg in the center channel sample),

BH02 (34.5 mg/kg in the left bank sample), and BH03 (35.2 mg/kg in the right bank sample and 34.9 in the center channel sample) were above its chronic ESV (31.6 mg/kg).

In summary, ash was either not detected or detected at very low levels (i.e., between 1% and 8%), with very little variation in results among sample locations. CCR Parameter concentrations in sediment samples from the Tennessee River were below chronic ESVs, except for beryllium and selenium concentrations in a single sediment sample (TR03) from an upstream control location. These results indicate that sediment quality in the Tennessee River adjacent and downstream of the JOF Plant are within ranges that are protective of aquatic life. Sediment sampling results above chronic ESVs were identified for mercury at the BH01 location in the Boat Harbor, for barium at the CV01 location in a cove on the east side of the Tennessee River upstream from the Plant, and for nickel at two CV03 locations in a cove on the west side of the Tennessee River. Sediment sampling results above chronic ESVs for copper were identified for several locations in the Boat Harbor. Sediment sampling results above chronic ESVs were identified for arsenic, barium, and/or selenium at several locations within the Intake Channel, Boat Harbor, and all three coves (which are representative of control conditions for comparison to results from the Intake Channel and Boat Harbor, as they share similar habitat characteristics). Further evaluation of the CCR Parameters detected in sediment samples above ESVs will be completed in the CARA Plan.

4.2 Benthic Macroinvertebrate Community Analysis

Generally, the benthic macroinvertebrate community metrics were corroborative and demonstrated spatially consistent relationships among indicators. The RBI results for the Tennessee River, the Intake Channel, and the Boat Harbor, representative of overall biological integrity, generally showed similarly healthy communities in comparison to their respective unimpacted control locations (and frequently had higher RBI scores than controls). Historical data were also consistent with the 2019 EI results, demonstrating little change in biological integrity since 2010. The RBI multi-metric does not reflect potential impacts associated with JOF Plant CCR management units.

The select component and supplemental metrics included in the Benthic Community Analysis discussion in Chapter 3.2 corroborate the findings of the RBI evaluation. In the Tennessee River, benthic communities adjacent to the CCR management units were the richest within the study area (TR03, TR04, and TR05), including upstream control locations. The remaining adjacent and downstream communities in the Tennessee River were similarly rich compared to the controls. The Intake Channel and Boat Harbor had similar TTR ranges to each other and were also within ranges of richness values calculated for the three control cove transects. Although average TTR values in the Intake Channel and Boat Harbor were lower than the average Tennessee River community richness, this relationship is likely primarily explained by physical habitat differences: the slow backwater conditions of the Intake Channel and Boat Harbor versus the free-flowing riverine conditions in the Tennessee River. The consistency between potential impact areas and their respective controls do not suggest that potential impacts from the JOF Plant CCR management units have occurred, nor do they demonstrate degradation of the benthic community in adjacent and downstream waters from other potential stressors.

Community sensitivity, examined through the HBI provided corroborative evidence for the findings of the RBI and TTR metric analyses. Similar to RBI and TTR indicators, the HBI results further demonstrate that the healthiest benthic communities in the study area are located in areas adjacent to the JOF Plant, corresponding to the highest level of community stress sensitivity. In the Tennessee River, the Intake Channel, and the Boat Harbor, HBI scores were aligned with those calculated for their respective controls and frequently reflected higher environmental stress levels at the control

locations than adjacent and downstream of the plant. HBI results provide no evidence suggesting potential impacts associated with the JOF Plant CCR management units.

In summary, benthic communities within adjacent and downstream areas of the Tennessee River, the Intake Channel, and the Boat Harbor appear to be at least as healthy, rich, and sensitive as their respective unimpacted control locations. Therefore, none of the metrics included in the EI benthic community evaluation suggest potential impacts associated with the JOF Plant CCR management units.

4.3 Mayfly Tissue

The distribution of mayfly tissue results above their respective CBR values, as described below and in Chapter 3.3, is illustrated on Exhibit J.3-5.

For the Intake Channel and Boat Harbor, no spatial comparisons can be made because samples were collected at adjacent locations only. For mayfly composite tissue samples collected in the Tennessee River, concentrations greater than or equal to the applicable NOAEL and/or LOAEL were observed for selenium; however, there was generally minimal variability in selenium concentrations between the upstream, adjacent, and downstream sampling reaches within the Tennessee River, which suggests that concentrations greater than NOAELs and/or LOAELs in adjacent or downstream samples are not related to JOF Plant CCR management unit activities. In addition, selenium concentrations at the Tennessee River sampling locations were similar to those reported at the Boat Harbor and Intake Channel sampling locations. The benthic macroinvertebrate community sampling results indicate bioaccumulation of these CCR Parameter metals is not impacting benthic macroinvertebrate populations in the Tennessee River, Intake Channel, or Boat Harbor. Further evaluation of the ecological implications of the mayfly tissue concentrations will be completed in the CARA Plan.

Chapter 5 References

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TABLES

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-BH01-CC			SED-BH01-LB		
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19
Sample ID						JOF-SED-BH01-CORCC-0.0/0.5-20190122	JOF-SED-BH01-CORCC-0.0/0.5-20190122	JOF-SED-BH01-CORCC-0.5/1.6-20190122	JOF-SED-BH01-CORLB-0.0/0.5-20190122	JOF-SED-BH01-CORLB-0.0/0.5-20190122	JOF-SED-BH01-CORLB-0.5/1.5-20190122
Parent Sample ID											
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.6 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC						
PLM											
% ASH	%	20[E]	40[F]	n/v	n/v	4	-	4	8	-	6
Total Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.208 J	-	-	0.246 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	6.82	-	-	9.19	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	162 J	-	-	112 J	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.925	-	-	0.924	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	4.83 J	-	-	8.96	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.318	-	-	0.286	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	3,520 J	-	-	7,910 J	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	17.4	-	-	15.5	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	12.3 J	-	-	10.4 J	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	**44.9[AC]**	-	-	**40.3[AC]**	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	19.9	-	-	16.8	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	11.9 J	-	-	9.82 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.131	-	-	**0.182[AC]**	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.01	-	-	1.47	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	15.7 J	-	-	15.8 J	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	1.05 J	-	-	1.04 J	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0725 J	-	-	0.0768 J	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	26.8	-	-	27.9	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.242	-	-	0.258	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	22.7 J	-	-	23.9 J	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	78.0 J	-	-	72.4 J	-
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.63 +/-(0.356)	-	-	1.39 +/-(0.331)	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	0.765 +/-(0.516)	-	-	0.391 +/-(0.208)U	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.40 +/-(0.627)	-	-	1.78 +/-(0.391)J	-
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<7.48	-	-	<6.67	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.31 UJ	-	-	1.17 UJ	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	36.4	-	-	28.4	-
General Chemistry											
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.4	-	-	7.4	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-BH01-RB		SED-BH02-CC				
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	24-Jan-19	24-Jan-19	24-Jan-19	24-Jan-19	24-Jan-19
Sample ID						JOF-SED-BH01-CORRB-0.0/0.5-20190122	JOF-SED-BH01-CORRB-0.0/0.5-20190122	JOF-SED-BH02-CORCC-0.0/0.5-20190124	JOF-SED-BH02-CORCC-0.0/0.5-20190124	JOF-SED-BH02-CORCC-0.5/1.7-20190124	JOF-SED-BH02-CORCC-1.7/3.0-20190124	JOF-SED-BH02-CORCC-3.0/3.7-20190124
Parent Sample ID												
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.7 ft	1.7 - 3 ft	3 - 3.7 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	2	-	1	-	1	1	1
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.292 J	-	0.154 J	-	-	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	8.46 J	-	6.12 J	-	-	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	168 J	-	152 J	-	-	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.994 J	-	1.16	-	-	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	8.29 J	-	3.19 J	-	-	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.326 J	-	0.231	-	-	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	4,660 J	-	2,990	-	-	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	17.7 J	-	17.6	-	-	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	11.3 J	-	11.4	-	-	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	**51.5 J[AC]**	-	25.2	-	-	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	19.4 J	-	16.8	-	-	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	10.3 J	-	14.4 J	-	-	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.154 J	-	0.0854	-	-	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.71 J	-	1.06	-	-	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	16.5 J	-	18.7	-	-	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.833 J	-	**2.07 J[A]**	-	-	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0655 J	-	0.0597 J	-	-	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	27.8 J	-	26.6 J	-	-	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.234 J	-	0.266	-	-	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	22.5 J	-	26.9	-	-	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	84.6 J	-	74.1	-	-	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.70 +/-(0.403)	-	1.61 +/-(0.359)J	-	-	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.75 +/-(0.450)	-	1.14 +/-(0.370)J	-	-	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.45 +/-(0.604)	-	2.75 +/-(0.516)J	-	-	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	8.98 UJ	-	<7.17	-	-	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.57 UJ	-	2.37 J	-	-	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	48.7 J	-	66.5	-	-	-
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.9	-	7.5	-	-	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-BH02-LB			SED-BH02-LB	
Sample Date		Freshwater Sediment		Sediment Quality		24-Jan-19	24-Jan-19	24-Jan-19	24-Jan-19	24-Jan-19
Sample ID						JOF-SED-BH02-CORLB-0.0/0.5-20190124	JOF-SED-BH02-CORLB-0.0/0.5-20190124	JOF-SED-BH02-CORLB-0.5/3.0-20190124	JOF-SED-BH02-CORLB-3.0/4.7-20190124	JOF-SED-BH02-CORLB-4.7/5.7-20190124
Parent Sample ID										
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 3 ft	3 - 4.7 ft	4.7 - 5.7 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC					
PLM										
% ASH	%	20[E]	40[F]	n/v	n/v	1	-	1	6	1
Total Metals										
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.206 J	-	-	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	8.20 J	-	-	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	96.8 J	-	-	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	1.14	-	-	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	7.10	-	-	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.259 J	-	-	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	2,020	-	-	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	16.4	-	-	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	10.5	-	-	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	**34.5[AC]**	-	-	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	12.7 J	-	-	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	9.88 J	-	-	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.120	-	-	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.754	-	-	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	15.4	-	-	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	1.63 J	-	-	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0779 J	-	-	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	18.0 J	-	-	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.171 J	-	-	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	24.0	-	-	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	68.7	-	-	-
Radiological Parameters										
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.23 +/-(0.293)J	-	-	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.11 +/-(0.333)J	-	-	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.34 +/-(0.444)J	-	-	-
Anions										
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<6.36	-	-	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.11 UJ	-	-	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	87.7	-	-	-
General Chemistry										
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.5	-	-	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-BH02-RB				SED-BH03-CC		
Sample Date		Freshwater Sediment		Sediment Quality		24-Jan-19	24-Jan-19	24-Jan-19	24-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19
Sample ID						JOF-SED-BH02-CORRB-0.0/0.5-20190124	JOF-SED-BH02-CORRB-0.0/0.5-20190124	JOF-SED-BH02-DUP01-20190124	JOF-SED-BH02-DUP01-20190124	JOF-SED-BH03-CORCC-0.0/0.5-20190122	JOF-SED-BH03-CORCC-0.0/0.5-20190122	JOF-SED-BH03-CORCC-0.5/2.5-20190122
Parent Sample ID								JOF-SED-BH02-CORRB-0.0/0.5-20190124	JOF-SED-BH02-CORRB-0.0/0.5-20190124			
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	1	-	4	-	<1	-	4
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.248 J	-	0.424 J	-	0.157 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	**12.6 J[AC]**	-	**16.7 J[AC]**	-	6.95 J	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	174 J	-	159 J	-	135 J	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	**1.43 J[A]**	-	**1.29 J[A]**	-	0.868	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	9.50 J	-	6.88 J	-	4.71 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.279 J	-	0.261 J	-	0.277	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	4,450 J	-	3,740 J	-	2,800 J	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	19.6 J	-	22.8 J	-	17.0	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	17.0 J	-	16.8 J	-	12.5 J	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	28.9 J	-	30.5 J	-	**34.9[AC]**	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	18.9 J	-	18.5 J	-	16.9 J	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	12.6 J	-	13.2 J	-	11.3 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0973 J	-	0.0758 J	-	0.146	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.39 J	-	1.33 J	-	0.961 J	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	19.7 J	-	21.4 J	-	16.7 J	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	**2.71 J[A]**	-	1.99 J	-	0.980 J	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0448 J	-	0.0385 J	-	0.0781 J	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	34.7 J	-	31.5 J	-	24.7 J	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.273 J	-	0.242 J	-	0.253 J	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	27.7 J	-	27.3 J	-	24.9 J	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	79.1 J	-	81.5 J	-	73.4 J	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.82 +/-(0.454)J	-	1.69 +/-(0.422)J	-	1.49 +/-(0.330)	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.50 +/-(0.415)J	-	1.88 +/-(0.487)J	-	1.54 +/-(0.326)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.32 +/-(0.615)J	-	3.57 +/-(0.644)J	-	3.03 +/-(0.464)	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	10.8 UJ	-	9.01 UJ	-	<7.20	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.90 UJ	-	1.66 J	-	1.26 UJ	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	85.1 J	-	79.0 J	-	31.3	-
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.5	-	7.6	-	7.4	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-BH03-LB			
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19
Sample ID						JOF-SED-BH03-CORLB-0.0/0.5-20190122	JOF-SED-BH03-CORLB-0.0/0.5-20190122	JOF-SED-BH03-CORLB-0.5/2.5-20190122	JOF-SED-BH03-CORLB-2.5/4.1-20190122
Parent Sample ID									
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.5 ft	2.5 - 4.1 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units					Final-Verified	Validated	Final-Verified	Final-Verified
		Screening Values		Assessment Guidelines					
		Chronic	Acute	TEC	PEC				
PLM									
% ASH	%	20[E]	40[F]	n/v	n/v	2	-	<1	3
Total Metals									
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.165 J	-	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	5.96 J	-	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	155 J	-	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.962	-	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.94 J	-	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.325	-	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	3,200 J	-	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	18.6	-	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	13.4 J	-	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	31.2	-	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	17.7	-	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	12.2 J	-	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.112	-	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.908 J	-	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	17.2 J	-	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.956 J	-	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0696 J	-	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	24.7 J	-	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.249	-	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	27.3 J	-	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	75.4 J	-	-
Radiological Parameters									
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.57 +/-(0.351)	-	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.66 +/-(0.448)	-	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.23 +/-(0.569)	-	-
Anions									
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<7.54	-	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.32 UJ	-	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	39.1	-	-
General Chemistry									
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.3	-	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-BH03-RB				SED-CV01-CC	
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19
Sample ID						JOF-SED-BH03-CORRB-0.0/0.5-20190122	JOF-SED-BH03-CORRB-0.0/0.5-20190122	JOF-SED-BH03-CORRB-0.5/3.0-20190122	JOF-SED-BH03-CORRB-3.0/5.5-20190122	JOF-SED-CV01-CORCC-0.0/0.5-20190122	JOF-SED-CV01-CORCC-0.0/0.5-20190122
Parent Sample ID											
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 3 ft	3 - 5.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute	TEC	PEC						
PLM											
% ASH	%	20[E]	40[F]	n/v	n/v	3	-	1	5	1	-
Total Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.239 J	-	-	-	0.445 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	**9.78 J**	-	-	-	**29.3[AC]**
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	131 J	-	-	-	**795 J[A]**
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.894	-	-	-	**3.15[A]**
Boron	mg/kg	n/v	n/v	n/v	n/v	-	10.6	-	-	-	1.84 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.311	-	-	-	0.519
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	5,460 J	-	-	-	3,770 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	16.1	-	-	-	17.9
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	12.7 J	-	-	-	48.6 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	**35.2[AC]**	-	-	-	9.73
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	21.1	-	-	-	34.3
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	9.38 J	-	-	-	21.8 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.150	-	-	-	0.0593
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	2.19 J	-	-	-	2.03
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	16.2 J	-	-	-	21.4 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	1.12 J	-	-	-	0.590 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0700 J	-	-	-	0.0583 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	31.1	-	-	-	32.6
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.479	-	-	-	0.273
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	25.3 J	-	-	-	33.1 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	74.1 J	-	-	-	59.0 J
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.28 +/-(0.344)	-	-	-	3.91 +/-(0.624)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.37 +/-(0.345)	-	-	-	1.90 +/-(0.474)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.65 +/-(0.487)	-	-	-	5.81 +/-(0.784)
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	23.5	-	-	-	<6.73
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.26 UJ	-	-	-	1.18 UJ
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	55.3	-	-	-	31.9
General Chemistry											
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.3	-	-	-	7.5

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		SED-CV01-LB		SED-CV01-LB		SED-CV01-RB	
Sample Date						22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19
Sample ID						JOF-SED-CV01-CORLB-0.0/0.5-20190122	JOF-SED-CV01-CORLB-0.0/0.5-20190122	JOF-SED-CV01-CORLB-0.5/2.0-20190122	JOF-SED-CV01-CORLB-2.0/3.8-20190122	JOF-SED-CV01-CORRB-0.0/0.5-20190122	JOF-SED-CV01-CORRB-0.0/0.5-20190122
Parent Sample ID											
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 2 ft	2 - 3.8 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute	TEC	PEC						
PLM											
% ASH	%	20[E]	40[F]	n/v	n/v	<1	-	<1	<1	1	-
Total Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.163 J	-	-	-	0.122 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	3.72	-	-	-	9.13 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	128 J	-	-	-	159 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.981	-	-	-	**1.21[A]**
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.52 J	-	-	-	1.78 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.268	-	-	-	0.216
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	2,860 J	-	-	-	2,250
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	14.0	-	-	-	12.4
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	11.0 J	-	-	-	15.4
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	11.6	-	-	-	9.76
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	13.4	-	-	-	17.1
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	16.2 J	-	-	-	21.7 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0905	-	-	-	0.0657
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.811	-	-	-	0.838
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	10.3 J	-	-	-	15.2
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.513 J	-	-	-	1.59 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0727 J	-	-	-	0.0443 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	21.5	-	-	-	16.7 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.175	-	-	-	0.196
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	16.7 J	-	-	-	21.2
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	43.4 J	-	-	-	48.7
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.53 +/-(0.359)	-	-	-	1.17 +/-(0.243)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.48 +/-(0.324)	-	-	-	1.45 +/-(0.321)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.01 +/-(0.484)	-	-	-	2.62 +/-(0.403)
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<7.26	-	-	-	<6.76
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.27 UJ	-	-	-	1.70 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	123	-	-	-	101
General Chemistry											
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.4	-	-	-	7.5

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-CV02-CC			SED-CV02-LB		
Sample Date		Freshwater Sediment		Sediment Quality		23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19
Sample ID						JOF-SED-CV02-CORCC-0.0/0.5-20190123	JOF-SED-CV02-CORCC-0.0/0.5-20190123	JOF-SED-CV02-CORCC-0.5/1.6-20190123	JOF-SED-CV02-CORLB-0.0/0.5-20190123	JOF-SED-CV02-CORLB-0.0/0.5-20190123	JOF-SED-CV02-CORLB-0.5/2.5-20190123
Parent Sample ID											
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.6 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified
		Chronic	Acute	TEC	PEC						
PLM											
% ASH	%	20[E]	40[F]	n/v	n/v	<1	-	1	3	-	<1
Total Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.260 J	-	-	0.272 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	6.89 J	-	-	6.83 J	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	122 J	-	-	137 J	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	**1.22 J[A]**	-	-	**1.35 J[A]**	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	4.11 J	-	-	4.38 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.345 J	-	-	0.281 J	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	1,990 J	-	-	1,850 J	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	19.6 J	-	-	21.5 J	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	11.6 J	-	-	11.5 J	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	15.8 J	-	-	17.1 J	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	20.5 J	-	-	24.6 J	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	17.4 J	-	-	19.4 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0869 J	-	-	0.160 J	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.24 J	-	-	1.60 J	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	16.2 J	-	-	17.2 J	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	**2.39 J[A]**	-	-	**2.65 J[A]**	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0753 J	-	-	0.135 J	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	17.1 J	-	-	18.5 J	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.310 J	-	-	0.353 J	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	35.9 J	-	-	37.5 J	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	69.6 J	-	-	73.0 J	-
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.34 +/-(0.259)J	-	-	1.51 +/-(0.303)J	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.05 +/-(0.233)J	-	-	1.67 +/-(0.365)J	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.39 +/-(0.348)J	-	-	3.18 +/-(0.474)J	-
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	10.1 UJ	-	-	9.34 UJ	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.78 UJ	-	-	1.64 UJ	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	462 J	-	-	81.6 J	-
General Chemistry											
pH (lab)	SU	n/v	n/v	n/v	n/v	-	6.9	-	-	7.2	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-CV02-RB				SED-CV03-CC	
Sample Date		Freshwater Sediment		Sediment Quality		23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19
Sample ID						JOF-SED-CV02-CORRB-0.0/0.5-20190123	JOF-SED-CV02-CORRB-0.0/0.5-20190123	JOF-SED-CV02-DUP01-20190123	JOF-SED-CV02-DUP01-20190123	JOF-SED-CV03-CORCC-0.0/0.5-20190123	JOF-SED-CV03-CORCC-0.0/0.5-20190123
Parent Sample ID								JOF-SED-CV02-CORRB-0.0/0.5-20190123	JOF-SED-CV02-CORRB-0.0/0.5-20190123		
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						Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated
		Chronic	Acute	TEC	PEC						
PLM											
% ASH	%	20[E]	40[F]	n/v	n/v	1	-	<1	-	<1	-
Total Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.309 J	-	0.311 J	-	0.279 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	**18.5 J[AC]**	-	**15.2 J[AC]**	-	6.59 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	90.4 J	-	91.5 J	-	142 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	**1.92[A]**	-	**1.82[A]**	-	**1.44 J[A]**
Boron	mg/kg	n/v	n/v	n/v	n/v	-	1.91 J	-	2.76 J	-	4.28 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.310	-	0.253 J	-	0.321 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	1,750	-	1,550	-	2,380 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	36.2	-	33.0	-	19.6 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	16.3	-	15.5	-	13.4 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	12.4	-	11.9	-	19.7 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	32.9 J	-	34.1 J	-	20.1 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	11.6 J	-	11.9 J	-	17.6 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0835	-	0.0802	-	0.111 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.77	-	1.44 J	-	1.67 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	13.0	-	13.6	-	**23.2 J[AC]**
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	**2.86 J[A]**	-	**2.67 J[A]**	-	**2.35 J[A]**
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.193	-	0.0716 J	-	0.0681 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	11.9 J	-	12.6 J	-	21.7 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.241 J	-	0.225 J	-	0.383 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	59.7	-	58.1	-	33.9 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	53.7	-	60.0	-	85.3 J
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.989 +/-(0.249)	-	1.33 +/-(0.311)	-	1.85 +/-(0.359)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.29 +/-(0.317)J	-	1.64 +/-(0.433)J	-	1.19 +/-(0.405)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.28 +/-(0.403)J	-	2.97 +/-(0.533)J	-	3.04 +/-(0.541)J
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<7.48	-	<7.59	-	12.5 UJ
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.31 UJ	-	1.33 UJ	-	2.19 UJ
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	47.5	-	57.7	-	185 J
General Chemistry											
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.0	-	7.1	-	7.1

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-CV03-LB				SED-CV03-RB	
Sample Date		Freshwater Sediment		Sediment Quality		23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19	23-Jan-19
Sample ID						JOF-SED-CV03-CORLB-0.0/0.5-20190123	JOF-SED-CV03-CORLB-0.0/0.5-20190123	JOF-SED-CV03-CORLB-0.5/2.5-20190123	JOF-SED-CV03-CORLB-2.5/5.3-20190123	JOF-SED-CV03-CORRB-0.0/0.5-20190123	JOF-SED-CV03-CORRB-0.0/0.5-20190123
Parent Sample ID											
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.5 ft	2.5 - 5.3 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Validated
		Chronic	Acute	TEC	PEC						
PLM											
% ASH	%	20[E]	40[F]	n/v	n/v	<1	-	<1	<1	<1	-
Total Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.196 J	-	-	-	0.287 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	4.91 J	-	-	-	5.49 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	139 J	-	-	-	121 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	1.12 J	-	-	-	**1.24 J[A]**
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.23 J	-	-	-	3.54 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.337 J	-	-	-	0.372 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	1,990 J	-	-	-	1,760 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	19.5 J	-	-	-	18.3 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	12.7 J	-	-	-	12.0 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	18.3 J	-	-	-	18.7 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	20.4 J	-	-	-	19.9 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	14.4 J	-	-	-	16.4 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.138 J	-	-	-	0.109 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.79 J	-	-	-	1.82 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	21.9 J	-	-	-	**23.1 J[AC]**
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.962 J	-	-	-	**2.07 J[A]**
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0854 J	-	-	-	0.0757 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	18.7 J	-	-	-	20.3 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.352 J	-	-	-	0.414 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	33.7 J	-	-	-	33.7 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	76.2 J	-	-	-	80.7 J
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.64 +/-(0.307)J	-	-	-	1.53 +/-(0.279)J
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.48 +/-(0.293)	-	-	-	1.31 +/-(0.307)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.12 +/-(0.424)J	-	-	-	2.84 +/-(0.415)J
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	10.4 UJ	-	-	-	9.77 UJ
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.82 UJ	-	-	-	1.71 UJ
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	283 J	-	-	-	190 J
General Chemistry											
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.2	-	-	-	7.2

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-CV03-RB		SED-IC01-CC				
Sample Date		Freshwater Sediment		Sediment Quality		23-Jan-19	23-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	24-Jan-19	24-Jan-19
Sample ID						JOF-SED-CV03-CORRB-0.5/1.5-20190123	JOF-SED-CV03-CORRB-1.5/2.7-20190123	JOF-SED-IC01-CORCC-0.0/0.5-20190122	JOF-SED-IC01-CORCC-0.5/1.6-20190122	JOF-SED-IC01-CORCC-0.0/0.5-20190124	JOF-SED-IC01-CORCC-0.0/0.5-20190124	
Parent Sample ID												
Sample Depth						0.5 - 1.5 ft	1.5 - 2.7 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.6 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Validated
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	<1	4	1	-	3	1	-
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	-	-	0.205 J	-	-	0.143 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	-	-	5.32	-	-	5.97 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	-	-	119 J	-	-	137 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	-	-	0.967	-	-	0.873
Boron	mg/kg	n/v	n/v	n/v	n/v	-	-	-	2.22 J	-	-	2.08 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	-	-	0.271	-	-	0.278 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	2,310 J	-	-	3,690
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	-	-	15.1	-	-	15.2
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	-	-	11.1 J	-	-	12.6
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	-	-	12.7	-	-	13.1
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	-	-	13.9	-	-	13.5 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	11.5 J	-	-	12.2 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	-	-	0.0986	-	-	0.0978
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	-	-	0.901	-	-	0.685 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	-	-	9.80 J	-	-	14.9
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	-	-	0.697 J	-	-	1.67 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	-	-	0.0717 J	-	-	0.0462 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	16.9	-	-	22.4 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	-	-	0.224	-	-	0.208 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	-	-	18.6 J	-	-	21.6
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	-	-	44.9 J	-	-	57.9
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	-	-	1.40 +/-(0.323)	-	-	1.02 +/-(0.281)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	-	-	1.56 +/-(0.409)	-	-	1.30 +/-(0.312)J
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	-	-	2.96 +/-(0.521)	-	-	2.32 +/-(0.420)J
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	<6.94	-	-	<7.63
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	1.22 UJ	-	-	1.34 UJ
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	-	-	67.7	-	-	61.2
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	-	-	-	7.3	-	-	7.8

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-IC01-LB					
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	24-Jan-19	24-Jan-19
Sample ID						JOF-SED-IC01-CORLB-0.0/0.5-20190122	JOF-SED-IC01-CORLB-0.0/0.5-20190122	JOF-SED-IC01-DUP01-20190122	JOF-SED-IC01-DUP01-20190122	JOF-SED-IC01-CORLB-0.0/0.5-20190124	JOF-SED-IC01-CORLB-0.0/0.5-20190124
Parent Sample ID								JOF-SED-IC01-CORLB-0.0/0.5-20190122	JOF-SED-IC01-CORLB-0.0/0.5-20190122		
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						Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Validated
		Chronic	Acute	TEC	PEC						
PLM											
% ASH	%	20[E]	40[F]	n/v	n/v	<1	-	1	-	1	-
Total Metals											
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.389 J	-	0.167 J	-	0.172 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	**29.5 J[AC]**	-	8.54 J	-	7.08 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	175 J	-	138 J	-	126 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	**3.06 J[A]**	-	**1.36 J[A]**	-	1.18 J
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.36 J	-	1.44 J	-	2.43 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.899 J	-	0.267 J	-	0.314 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	3,500 J	-	2,590 J	-	2,670 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	20.7 J	-	17.2	-	16.7 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	41.0 J	-	16.7 J	-	16.4 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	12.8 J	-	9.38	-	12.4 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	31.8 J	-	18.4 J	-	15.5 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	12.8 J	-	9.98 J	-	13.3 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.102 J	-	0.0774	-	0.104 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	1.77 J	-	0.762 J	-	0.732 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	15.7 J	-	12.6 J	-	16.1 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.802 J	-	0.721 J	-	**2.45 J[A]**
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0733 J	-	0.0482 J	-	0.0440 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	21.6 J	-	18.0 J	-	21.1 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.311 J	-	0.247 J	-	0.273 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	29.2 J	-	21.9 J	-	24.8 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	51.9 J	-	44.2 J	-	57.0 J
Radiological Parameters											
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.47 +/-(0.305)	-	1.41 +/-(0.440)	-	1.60 +/-(0.360)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.32 +/-(0.367)	-	1.56 +/-(0.391)	-	1.76 +/-(0.542)J
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.79 +/-(0.477)	-	2.97 +/-(0.589)	-	3.36 +/-(0.651)J
Anions											
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	7.87 UJ	-	<6.84	-	7.82 UJ
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.38 UJ	-	1.20 UJ	-	1.37 UJ
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	47.0 J	-	39.9	-	45.6 J
General Chemistry											
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.5	-	7.5	-	7.6

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-IC01-RB					SED-IC02-CC	
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	22-Jan-19	24-Jan-19	24-Jan-19	22-Jan-19	22-Jan-19
Sample ID						JOF-SED-IC01-CORRB-0.0/0.5-20190122	JOF-SED-IC01-CORRB-0.0/0.5-20190122	JOF-SED-IC01-CORRB-0.5/1.5-20190122	JOF-SED-IC01-CORRB-0.0/0.5-20190124	JOF-SED-IC01-CORRB-0.0/0.5-20190124	JOF-SED-IC02-CORCC-0.0/0.5-20190122	JOF-SED-IC02-CORCC-0.0/0.5-20190122
Parent Sample ID												
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Validated
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	1	-	2	1	-	5	-
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.138 J	-	-	0.261 J	-	0.191 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	3.74	-	-	9.05 J	-	4.49
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	92.6 J	-	-	159 J	-	125 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.810	-	-	1.00 J	-	1.05
Boron	mg/kg	n/v	n/v	n/v	n/v	-	1.67 J	-	-	2.43 J	-	1.96 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.148	-	-	0.332 J	-	0.275
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	1,430 J	-	-	5,570 J	-	2,150 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	12.4	-	-	17.2 J	-	16.8
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	8.26 J	-	-	21.3 J	-	9.92 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	9.88	-	-	17.0 J	-	11.0
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	10.6	-	-	16.4 J	-	14.5
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	7.50 J	-	-	10.7 J	-	9.78 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.0644	-	-	0.107 J	-	0.122
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.855	-	-	1.19 J	-	0.979
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	8.19 J	-	-	20.3 J	-	13.3 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.354 J	-	-	1.92 J	-	0.657 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0562 J	-	-	0.0575 J	-	0.0656 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	11.2	-	-	26.3 J	-	17.4
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.172	-	-	0.213 J	-	0.222
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	14.8 J	-	-	25.1 J	-	21.4 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	32.9 J	-	-	66.7 J	-	47.0 J
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	0.942 +/-(0.258)	-	-	0.965 +/-(0.255)J	-	1.28 +/-(0.319)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.39 +/-(0.397)	-	-	1.35 +/-(0.326)J	-	2.03 +/-(0.446)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	2.33 +/-(0.473)	-	-	2.32 +/-(0.414)J	-	3.31 +/-(0.548)
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	<5.81	-	-	31.0 J	-	<6.48
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.67 J	-	-	2.21 J	-	1.18 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	28.3	-	-	47.8 J	-	34.7
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.3	-	-	7.6	-	7.6

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-IC02-CC		SED-IC02-LB				
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19	22-Jan-19
Sample ID						JOF-SED-IC02-CORCC-0.5/3.0-20190122	JOF-SED-IC02-CORCC-3.0/5.4-20190122	JOF-SED-IC02-CORLB-0.0/0.5-20190122	JOF-SED-IC02-CORLB-0.0/0.5-20190122	JOF-SED-IC02-CORLB-0.5/2.0-20190122	JOF-SED-IC02-CORLB-2.0/3.0-20190122	JOF-SED-IC02-CORLB-3.0/3.7-20190122
Parent Sample ID												
Sample Depth						0.5 - 3 ft	3 - 5.4 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 2 ft	2 - 3 ft	3 - 3.7 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	2	2	2	-	2	4	1
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	-	-	0.286 J	-	-	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	-	-	5.02	-	-	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	-	-	121 J	-	-	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	-	-	0.983	-	-	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	-	-	2.55 J	-	-	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	-	-	0.280	-	-	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	2,350 J	-	-	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	-	-	16.3	-	-	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	-	-	11.8 J	-	-	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	-	-	12.6	-	-	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	-	-	14.8	-	-	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	12.2 J	-	-	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	-	-	0.106	-	-	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	-	-	1.01	-	-	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	-	-	10.3 J	-	-	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	-	-	0.627 J	-	-	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	-	-	0.0714 J	-	-	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	-	-	17.5	-	-	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	-	-	0.237	-	-	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	-	-	19.9 J	-	-	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	-	-	48.4 J	-	-	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	-	-	1.11 +/-(0.300)	-	-	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	-	-	1.10 +/-(0.318)	-	-	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	-	-	2.21 +/-(0.437)	-	-	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	<7.01	-	-	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	-	-	1.23 UJ	-	-	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	-	-	67.3	-	-	-
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	-	-	-	7.5	-	-	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-IC02-RB		SED-TR01-LB			SED-TR02-LB	
Sample Date		Freshwater Sediment		Sediment Quality		22-Jan-19	22-Jan-19	20-Mar-19	20-Mar-19	20-Mar-19	20-Mar-19	20-Mar-19
Sample ID						JOF-SED-IC02-CORRB-0.0/0.7-20190122	JOF-SED-IC02-CORRB-0.0/0.7-20190122	JOF-SED-TR01-CORLB-0.0/0.5-20190320	JOF-SED-TR01-CORLB-0.5/1.5-20190320	JOF-SED-TR01-CORLB-1.5/2.4-20190320	JOF-SED-TR02-CORLB-0.0/0.5-20190320	JOF-SED-TR02-CORLB-0.5/2.3-20190320
Parent Sample ID												
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.5 ft	1.5 - 2.4 ft	0 - 0.5 ft	0.5 - 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
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	1	-	<1	1	<1	4	3
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	-	0.191 J	0.0964 J	-	-	0.0858 J	-
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	-	5.67 J	2.10	-	-	2.49	-
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	-	168 J	68.3	-	-	54.4	-
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	-	0.856 J	0.543	-	-	0.467	-
Boron	mg/kg	n/v	n/v	n/v	n/v	-	2.11 J	1.38 J	-	-	1.01 J	-
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	-	0.293 J	0.163	-	-	0.174	-
Calcium	mg/kg	n/v	n/v	n/v	n/v	-	2,690 J	1,500 J	-	-	1,120 J	-
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	-	15.2 J	10.6	-	-	9.62	-
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	-	14.9 J	7.26	-	-	6.90	-
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	-	13.9 J	7.38	-	-	6.02	-
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	-	16.0 J	7.73	-	-	11.4	-
Lithium	mg/kg	n/v	n/v	n/v	n/v	-	12.1 J	7.59 J	-	-	5.98 J	-
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	-	0.119 J	0.0534	-	-	0.0544	-
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	-	0.925 J	0.360 J	-	-	0.403	-
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	-	15.5 J	8.93	-	-	7.68	-
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	-	0.767 J	0.850	-	-	0.698	-
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	-	0.0660 J	0.0391 J	-	-	0.0383 J	-
Strontium	mg/kg	n/v	n/v	n/v	n/v	-	22.9 J	8.12	-	-	6.16	-
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	-	0.227 J	0.133	-	-	0.118	-
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	-	21.4 J	14.2	-	-	12.3	-
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	-	57.2 J	37.7	-	-	33.0	-
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	-	1.46 +/-(0.318)	1.04 +/-(0.245)	-	-	1.22 +/-(0.303)	-
Radium-228	pCi/g	n/v	n/v	n/v	n/v	-	1.74 +/-(0.495)	1.05 +/-(0.306)	-	-	1.35 +/-(0.382)	-
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	-	3.20 +/-(0.588)	2.09 +/-(0.392)	-	-	2.57 +/-(0.488)	-
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	-	8.14 UJ	<5.57	-	-	<5.12	-
Fluoride	mg/kg	n/v	n/v	n/v	n/v	-	1.43 UJ	0.976 UJ	-	-	0.898 UJ	-
Sulfate	mg/kg	n/v	n/v	n/v	n/v	-	56.6 J	30.3	-	-	21.6	-
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	-	7.7	7.5	-	-	7.2	-

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-TR02-RB			SED-TR03-LB		SED-TR03-RB	SED-TR04-LB
Sample Date		Freshwater Sediment		Sediment Quality		20-Mar-19	20-Mar-19	20-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19
Sample ID						JOF-SED-TR02-CORRB-0.0/0.5-20190320	JOF-SED-TR02-CORRB-0.5/1.5-20190320	JOF-SED-TR02-CORRB-1.5/2.7-20190320	JOF-SED-TR03-CORLB-0.0/0.5-20190319	JOF-SED-TR03-DUP02-20190319	JOF-SED-TR03-CORRB-0.0/0.5-20190319	JOF-SED-TR04-CORLB-0.0/0.5-20190319
Parent Sample ID										JOF-SED-TR03-CORLB-0.0/0.5-20190319		
Sample Depth						0 - 0.5 ft	0.5 - 1.5 ft	1.5 - 2.7 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	1	3	8	5 J	1 J	8	3
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.0771 J	-	-	0.260 J	0.0982 J	0.148 J	0.164 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	1.93	-	-	7.03 J	3.04 J	4.85	5.16 J
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	55.0	-	-	185 J	80.4 J	103	142 J
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.423	-	-	**1.38 J[A]**	0.579 J	0.983	0.949 J
Boron	mg/kg	n/v	n/v	n/v	n/v	<0.975	-	-	5.26 J	1.73 J	2.17 J	2.70 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.150	-	-	0.332	0.165	0.227	0.246 J
Calcium	mg/kg	n/v	n/v	n/v	n/v	1,770 J	-	-	4,480 J	1,960 J	4,390 J	29,700 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	7.86	-	-	25.2 J	11.2 J	15.4	16.8 J
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	5.73	-	-	16.7 J	7.36 J	10.1	10.9 J
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	5.26	-	-	17.2 J	7.38 J	10.2	11.9 J
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	6.03	-	-	21.4 J	9.47 J	13.2	14.6 J
Lithium	mg/kg	n/v	n/v	n/v	n/v	4.96 J	-	-	17.1 J	7.41 J	8.88 J	12.1 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0442	-	-	0.0501	0.0493	0.0531	0.0913 J
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	0.324 J	-	-	0.995	0.377 J	0.968	0.683 J
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	6.79	-	-	20.4 J	9.10 J	12.3	13.6 J
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	0.638	-	-	**2.14[A]**	0.769	1.08	1.39 J
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0400 J	-	-	0.0917 J	0.0459 J	0.0446 J	0.0560 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	9.11	-	-	21.3 J	9.40 J	19.3	32.4 J
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.0989	-	-	0.275	0.122	0.159	0.198 J
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	10.0	-	-	32.7 J	14.7 J	21.0	23.5 J
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	27.3	-	-	87.9 J	39.4 J	46.5	62.1 J
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	0.960 +/-(0.255)	-	-	1.01 +/-(0.291)	0.989 +/-(0.314)	1.13 +/-(0.258)	1.38 +/-(0.351)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.20 +/-(0.364)	-	-	1.48 +/-(0.405)	1.44 +/-(0.425)	1.45 +/-(0.309)	1.82 +/-(0.401)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	2.16 +/-(0.444)	-	-	2.49 +/-(0.499)	2.43 +/-(0.528)	2.58 +/-(0.403)	3.20 +/-(0.533)
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	<5.55	-	-	<6.46	6.72 J	<6.88	9.33 J
Fluoride	mg/kg	n/v	n/v	n/v	n/v	0.972 UJ	-	-	1.15 J	1.12 UJ	1.42 J	1.51 UJ
Sulfate	mg/kg	n/v	n/v	n/v	n/v	20.7	-	-	26.4	15.4 J	22.5	27.9 J
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	7.5	-	-	7.2	7.5	7.5	7.8

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location						SED-TR04-RB	SED-TR05-LB				SED-TR05-RB	SED-TR06-RB
Sample Date						19-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19
Sample ID		Freshwater Sediment		Sediment Quality		JOF-SED-TR04-CORRB-0.0/0.5-20190319	JOF-SED-TR05-CORLB-0.0/0.5-20190319	JOF-SED-TR05-CORLB-0.5/2.2-20190319	JOF-SED-TR05-CORLB-2.2/3.6-20190319	JOF-SED-TR05-DUP01-20190319	JOF-SED-TR05-CORRB-0.0/0.5-20190319	JOF-SED-TR06-CORRB-0.0/0.5-20190319
Parent Sample ID										JOF-SED-TR05-CORLB-0.0/0.5-20190319		
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0.5 - 2.2 ft	2.2 - 3.6 ft	0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Field Duplicate Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC							
PLM												
% ASH	%	20[E]	40[F]	n/v	n/v	4	4 J	1	6 J	2 J	2	5
Total Metals												
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.0906 J	0.165 J	-	-	0.183 J	0.137 J	0.135 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	3.30	4.28	-	-	4.56	4.41	4.74
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	66.9	127	-	-	136	107	105
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.608	0.990	-	-	1.03	1.15	0.901
Boron	mg/kg	n/v	n/v	n/v	n/v	<1.01	2.32 J	-	-	2.73 J	1.56 J	2.24 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.125	0.257	-	-	0.282	0.131	0.204
Calcium	mg/kg	n/v	n/v	n/v	n/v	5,440 J	2,290 J	-	-	2,420 J	4,370 J	4,160 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	12.4	16.7	-	-	18.2	16.1	14.0
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	6.43	11.4	-	-	12.4	13.6	9.65
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	4.88	12.9	-	-	13.8	11.1	9.00
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	6.89	14.3	-	-	14.7	14.7	13.5
Lithium	mg/kg	n/v	n/v	n/v	n/v	5.85 J	12.0 J	-	-	13.4 J	10.5 J	8.51 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0309	0.105	-	-	0.115	0.0673	0.0619
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	0.372 J	0.611	-	-	0.645	0.909	0.686
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	6.84	14.6	-	-	15.8	14.7	12.0
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	1.09	1.39	-	-	1.48	1.57	1.16
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0569 J	0.0614 J	-	-	0.0655 J	0.0465 J	0.0605 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	11.2	14.7	-	-	16.0	14.8	18.4
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.116	0.209	-	-	0.220	0.242	0.164
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	13.3	23.5	-	-	25.8	24.1	18.4
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	25.4	60.9	-	-	66.0	46.7	46.1
Radiological Parameters												
Radium-226	pCi/g	n/v	n/v	n/v	n/v	0.873 +/-(0.236)	1.73 +/-(0.410)	-	-	1.80 +/-(0.441)	1.39 +/-(0.271)	1.19 +/-(0.288)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.23 +/-(0.269)	1.97 +/-(0.538)	-	-	1.75 +/-(0.468)	1.57 +/-(0.335)	0.354 +/-(0.456)U
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	2.10 +/-(0.358)	3.70 +/-(0.676)	-	-	3.55 +/-(0.643)	2.96 +/-(0.431)	1.54 +/-(0.539)J
Anions												
Chloride	mg/kg	n/v	n/v	n/v	n/v	5.91 J	<7.01	-	-	<7.66	<5.57	<6.84
Fluoride	mg/kg	n/v	n/v	n/v	n/v	0.973 UJ	1.23 UJ	-	-	1.34 UJ	2.72 J	1.50 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	15.3	63.6	-	-	62.0	26.2	36.5
General Chemistry												
pH (lab)	SU	n/v	n/v	n/v	n/v	7.5	7.2	-	-	7.1	6.9	7.5

See last page for notes.

Table J.3-1 - Sediment Analytical Results
Johnsonville Fossil Plant

Sample Location		Freshwater Sediment		Sediment Quality		SED-TR07-LB	SED-TR07-RB	SED-TR08-LB		SED-TR08-RB
Sample Date						19-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19	19-Mar-19
Sample ID						JOF-SED-TR07-CORLB-0.0/0.5-20190319	JOF-SED-TR07-CORRB-0.0/0.5-20190319	JOF-SED-TR08-CORLB-0.0/0.5-20190319	JOF-SED-TR08-CORLB-0.5/1.5-20190319	JOF-SED-TR08-CORRB-0.0/0.5-20190319
Parent Sample ID										
Sample Depth						0 - 0.5 ft	0 - 0.5 ft	0 - 0.5 ft	0.5 - 1.5 ft	0 - 0.5 ft
Sample Type						Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample	Normal Environmental Sample
Level of Review	Units	Screening Values		Assessment Guidelines		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
		Chronic	Acute	TEC	PEC					
PLM										
% ASH	%	20[E]	40[F]	n/v	n/v	1	6	3	4	8
Total Metals										
Antimony	mg/kg	2[A]	25[B]	n/v	n/v	0.166 J	0.194 J	0.0701 J	-	0.123 J
Arsenic	mg/kg	9.8[A]	33[B]	9.8[C]	33[D]	4.03	5.55	1.78	-	3.66
Barium	mg/kg	240[A]	22,925[B]	n/v	n/v	109	109	54.1	-	92.8
Beryllium	mg/kg	1.2[A]	42[B]	n/v	n/v	0.869	1.00	0.430	-	0.725
Boron	mg/kg	n/v	n/v	n/v	n/v	1.87 J	10.7	1.40 J	-	2.52 J
Cadmium	mg/kg	1[A]	5[B]	1[C]	5[D]	0.222	0.334	0.106	-	0.187
Calcium	mg/kg	n/v	n/v	n/v	n/v	1,860 J	2,760 J	1,020 J	-	2,660 J
Chromium	mg/kg	43.4[A]	111[B]	43[C]	110[D]	12.8	16.4	9.51	-	21.0
Cobalt	mg/kg	50[A]	n/v	50[C]	n/v	9.21	10.7	6.17	-	8.51
Copper	mg/kg	31.6[A]	149[B]	32[C]	150[D]	11.1	20.3	5.87	-	8.69
Lead	mg/kg	35.8[A]	128[B]	36[C]	130[D]	16.6	14.9	6.27	-	11.9
Lithium	mg/kg	n/v	n/v	n/v	n/v	8.06 J	10.2 J	6.02 J	-	8.54 J
Mercury	mg/kg	0.18[A]	1.1[B]	0.18[C]	1.1[D]	0.0652	0.107	0.0356	-	0.0559
Molybdenum	mg/kg	38[A]	69,760[B]	n/v	n/v	0.536	1.29	0.268 J	-	0.798
Nickel	mg/kg	22.7[A]	48.6[B]	23[C]	49[D]	11.4	14.8	7.70	-	11.4
Selenium	mg/kg	2[A]	2.9[B]	n/v	n/v	1.21	1.42	0.531	-	0.965
Silver	mg/kg	1[A]	2.2[B]	n/v	n/v	0.0429 J	0.0566 J	0.0819	-	0.0478 J
Strontium	mg/kg	n/v	n/v	n/v	n/v	11.7	16.6	5.29	-	15.3
Thallium	mg/kg	1.2[A]	10[B]	n/v	n/v	0.150	0.212	0.112	-	0.162
Vanadium	mg/kg	66[A]	564[B]	n/v	n/v	18.8	25.4	11.8	-	26.4
Zinc	mg/kg	121[A]	459[B]	120[C]	460[D]	47.0	66.4	31.7	-	45.2
Radiological Parameters										
Radium-226	pCi/g	n/v	n/v	n/v	n/v	1.32 +/-(0.372)	1.59 +/-(0.334)	0.877 +/-(0.238)	-	1.41 +/-(0.296)
Radium-228	pCi/g	n/v	n/v	n/v	n/v	1.29 +/-(0.477)	1.54 +/-(0.339)	1.19 +/-(0.357)	-	1.45 +/-(0.370)
Radium-226+228	pCi/g	90[A]	90[B]	n/v	n/v	2.61 +/-(0.605)	3.13 +/-(0.476)	2.07 +/-(0.429)	-	2.86 +/-(0.474)
Anions										
Chloride	mg/kg	n/v	n/v	n/v	n/v	<5.27	15.6 J	<5.03	-	<6.32
Fluoride	mg/kg	n/v	n/v	n/v	n/v	1.73 J	1.31 J	0.881 UJ	-	1.28 J
Sulfate	mg/kg	n/v	n/v	n/v	n/v	22.2	163	27.6	-	28.4
General Chemistry										
pH (lab)	SU	n/v	n/v	n/v	n/v	7.1	6.6	6.9	-	7.4

Notes:

n/v	No standard/guideline value
PEC	Probable Effect Concentration
TEC	Threshold Effect Concentration
[A]	Freshwater Sediment Screening Values - Chronic
[B]	Freshwater Sediment Screening Values - Acute
[C]	Sediment Quality Assessment Guidelines - TEC
[D]	Sediment Quality Assessment Guidelines - PEC
[E]	Trigger for Phase 2 sampling
[F]	Threshold value for potential effects to benthic fauna
6.5[A]	Concentration is greater than or equal to the indicated standard.
15.2	measured concentration did not exceed the indicated standard
<0.03	analyte was not detected at a concentration greater than the Method Detection Limit
ft	feet
ID	identification
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	picoCurie per gram
PLM	Polarized Light Microscopy - analysis for % ash
SU	Standard Unit

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

Table J.3-2 - Mayfly Analytical Results
Johnsonville Fossil Plant

Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Arsenic mg/kg NOAEL / LOAEL 0.0249[A] / 0.249[B]	Beryllium mg/kg n/v	Cadmium mg/kg NOAEL / LOAEL 15.6[A] / 156[B]	Copper mg/kg NOAEL / LOAEL 26[A] / 260[B]	Mercury mg/kg NOAEL / LOAEL 2.7[A] / 27[B]	Selenium mg/kg NOAEL / LOAEL 0.051[A] / 0.51[B]
JOF-BH	6-Jun-19	JOF-MFN-BH-20190606		Normal Environmental Sample	Validated	**0.73[AB]**	0.068 J	1.2	4.3	0.0091 J	**0.62[AB]**
	6-Jun-19	JOF-MFP-BH-20190606		Normal Environmental Sample	Validated	**0.099[A]**	<0.032	0.76	2.3	<0.0070	**0.37[A]**
	12-Jun-19	JOF-MFA-BH-FI-20190612		Normal Environmental Sample	Validated	***<0.030***	<0.033	0.28	5.0	0.019 J	**0.89[AB]**
	12-Jun-19	JOF-MFA-BH-MI-20190612		Normal Environmental Sample	Validated	***<0.029***	<0.032	0.29	6.6	0.024 J	**0.76[AB]**
	12-Jun-19	JOF-MFA-DUP01-20190612	JOF-MFA-BH-MI-20190612	Field Duplicate Sample	Validated	***<0.029***	<0.032	0.32	6.9	0.020 J	**0.72[AB]**
JOF-IC	6-Jun-19	JOF-MFN-IC-20190606		Normal Environmental Sample	Validated	**1.1[AB]**	0.082 J	1.1	2.7	0.013 J	**0.79[AB]**
	6-Jun-19	JOF-MFP-IC-20190606		Normal Environmental Sample	Validated	**0.099[A]**	<0.033	1.2	1.9	0.0089 J	**0.50[A]**
	12-Jun-19	JOF-MFA-IC-FI-20190612		Normal Environmental Sample	Validated	***<0.029***	<0.031	0.23	4.6	0.019 J	**1.1[AB]**
	12-Jun-19	JOF-MFA-DUP02-20190612	JOF-MFA-IC-MI-20190612	Field Duplicate Sample	Validated	***<0.029***	<0.031	0.32	7.1	0.020 J	**0.73[AB]**
	12-Jun-19	JOF-MFA-IC-MI-20190612		Normal Environmental Sample	Validated	***<0.030***	<0.033	0.27	6.3	0.023 J	**0.83[AB]**
JOF-TRA	6-Jun-19	JOF-MFN-TRA-20190606		Normal Environmental Sample	Validated	**0.64[AB]**	0.071 J	1.1	2.4	0.014 J	**0.70[AB]**
	6-Jun-19	JOF-MFN-DUP01-20190606	JOF-MFN-TRA-20190606	Field Duplicate Sample	Validated	**0.67[AB]**	0.078 J	0.98	2.9	0.010 J	**0.80[AB]**
	6-Jun-19	JOF-MFP-TRA-20190606		Normal Environmental Sample	Validated	**0.082 J[A]**	<0.033	0.88	2.1	0.0082 J	**0.46[A]**
	6-Jun-19	JOF-MFP-DUP01-20190606	JOF-MFP-TRA-20190606	Field Duplicate Sample	Validated	**0.078 J[A]**	<0.032	1.1	1.9	0.0084 J	**0.39[A]**
	12-Jun-19	JOF-MFA-TRA-FI-20190612		Normal Environmental Sample	Validated	***<0.030***	<0.032	0.23	4.3	0.022 J	**1.2[AB]**
	12-Jun-19	JOF-MFA-TRA-MI-20190612		Normal Environmental Sample	Validated	***<0.030***	<0.033	0.23	6.3	0.017 J	**0.93[AB]**
JOF-TRD	6-Jun-19	JOF-MFN-TRD-20190606		Normal Environmental Sample	Validated	**0.73[AB]**	0.071 J	0.94	2.8	0.014 J	**0.61[AB]**
	6-Jun-19	JOF-MFP-TRD-20190606		Normal Environmental Sample	Validated	**0.056 J[A]**	<0.032	0.88	1.8	0.011 J	**0.36[A]**
	12-Jun-19	JOF-MFA-TRD-FI-20190612		Normal Environmental Sample	Validated	***<0.029***	<0.032	0.25	5.1	0.021 J	**0.77[AB]**
	12-Jun-19	JOF-MFA-TRD-MI-20190612		Normal Environmental Sample	Validated	***<0.030***	<0.033	0.26	6.8	0.023 J	**0.65[AB]**
JOF-TRU	6-Jun-19	JOF-MFN-TRU-20190606		Normal Environmental Sample	Validated	**0.55[AB]**	0.051 J	0.64	3.0	0.013 J	**0.59[AB]**
	6-Jun-19	JOF-MFP-TRU-20190606		Normal Environmental Sample	Validated	**0.080 J[A]**	<0.033	0.54	1.6	0.0080 J	**0.32[A]**
	12-Jun-19	JOF-MFA-TRU-FI-20190612		Normal Environmental Sample	Validated	***<0.030***	<0.033	0.21	4.5	0.026	**0.91[AB]**
	12-Jun-19	JOF-MFA-TRU-MI-20190612		Normal Environmental Sample	Validated	***<0.030***	<0.033	0.17	6.0	0.025	**0.84[AB]**

Notes:

[A]	Critical Body Residue NOAEL
[B]	Critical Body Residue LOAEL
NOAEL	No Observed Adverse Effect Level
LOAEL	Lowest Observed Adverse Effect Level
6.5[A]	concentration is greater than or equal to the indicated standard.
15.2	measured concentration did not exceed the indicated standard
<0.03	analyte was not detected at a concentration greater than the laboratory reporting limit.
%	percent
ID	identification
J	quantitation is approximate due to limitations identified during data validation
n/v	no standard/guideline value.
U*	result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level
mg/kg	milligrams per kilogram

1. Level of review is defined in the Quality Assurance Project Plan.
2. Mayfly tissue sampling results were evaluated using Critical Body Residue (CBR) values for the CCR parameters detected above ESVs in surface stream water and sediment samples (see Chapters 3.3 and 4.3).

Stantec

EXHIBITS

Exhibit No.

J.3-1

Title

Sediment Sampling Locations

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-04-24
Technical Review by BL on 2023-04-24

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

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

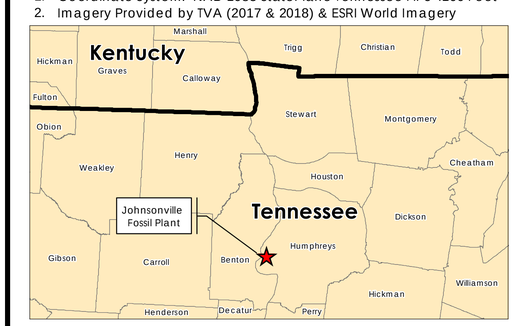
Legend

- Sediment Sampling Locations - Collected
- Sediment Sampling Locations - Attempted: Insufficient Sediment for Sampling
- Sediment Sampling Location Transects
- Surface Stream Flow
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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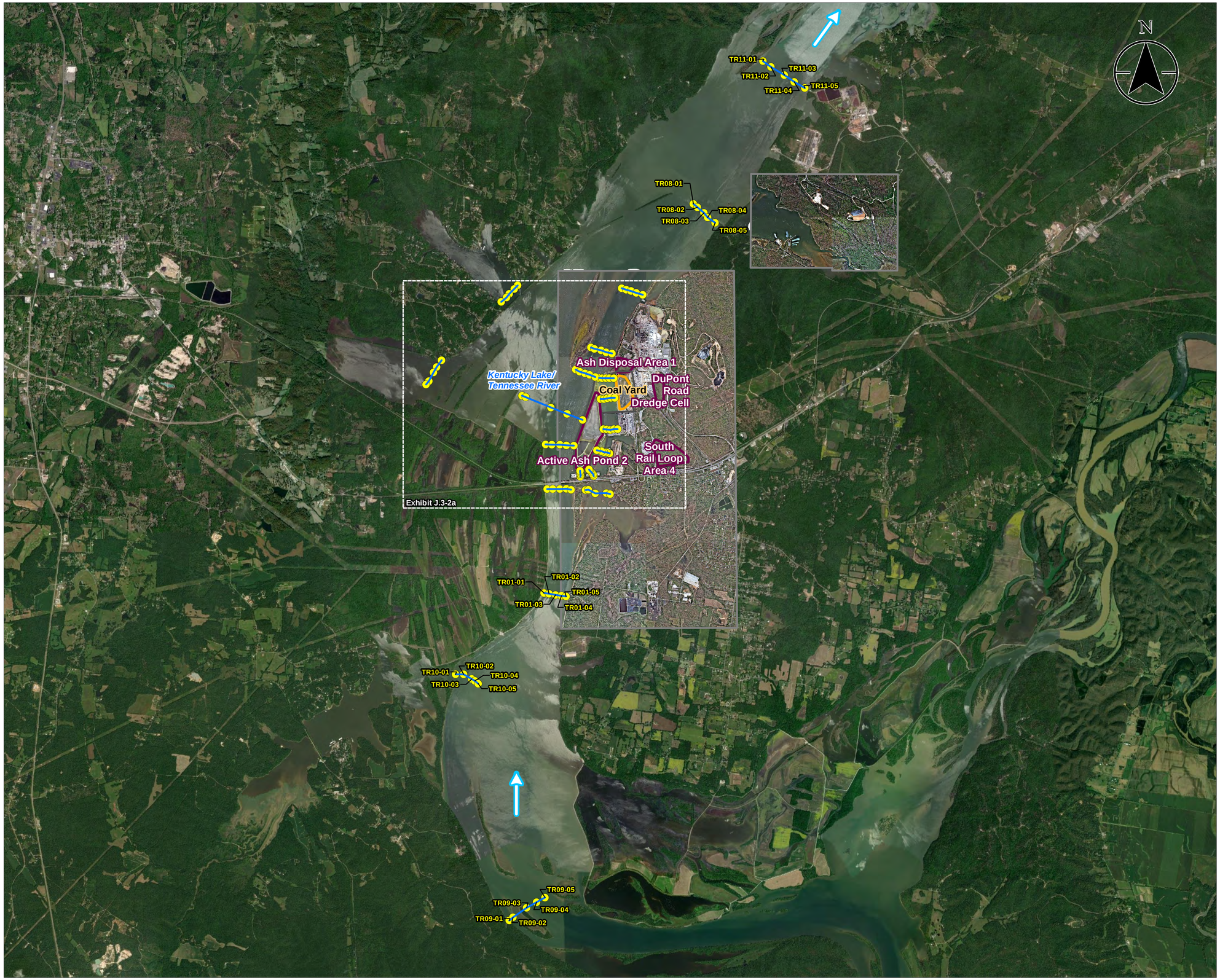

Exhibit No.

J.3-2

Title

Benthic Macroinvertebrate Sampling Locations

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-04-24
Technical Review by BL on 2023-04-24

0 3,000 6,000 9,000 12,000 Feet

1:36,000 (At original document size of 22x34)

Legend

- Benthic Invertebrate Community Sampling Locations
- Benthic Invertebrate Community Sampling Locations - Transect
- Surface Stream Flow
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery

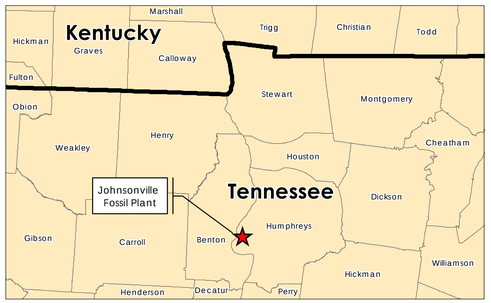

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Exhibit No.

J.3-2a

Title

Benthic Macroinvertebrate Sampling Locations

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-04-24
Technical Review by BL on 2023-04-24

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

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

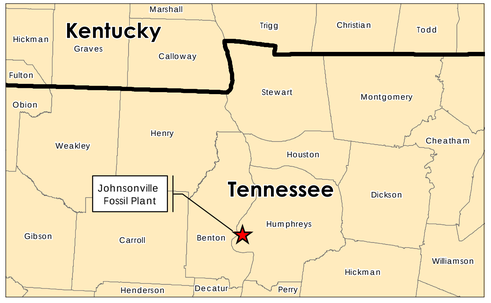
Legend

- Benthic Invertebrate Community Sampling Locations
- Benthic Invertebrate Community Sampling Locations - Transect
- Surface Stream Flow
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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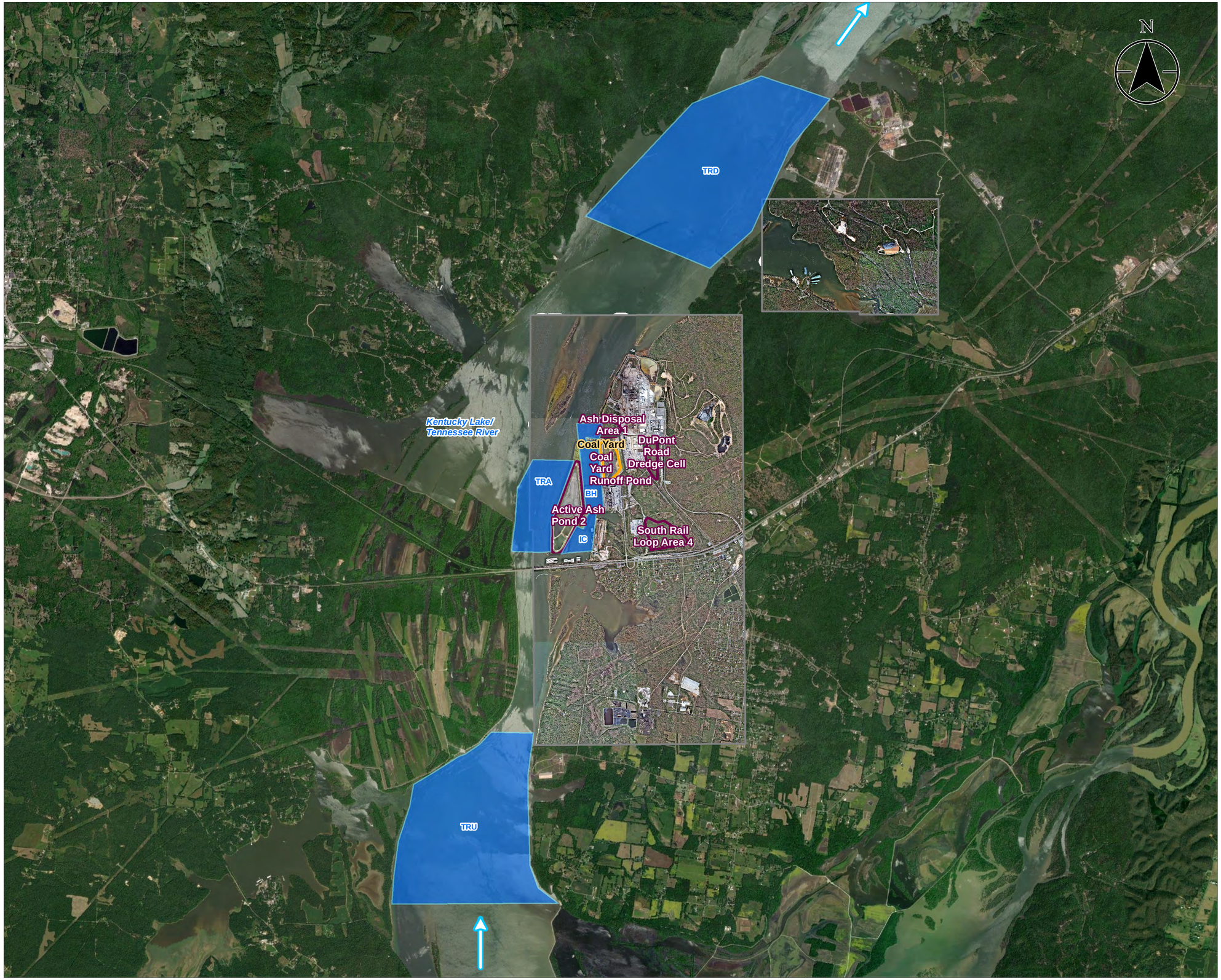


Exhibit No.

J.3-3

Title

Mayfly Sampling Reaches

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by DMB on 2023-04-24
Technical Review by BL on 2023-04-24

0 2,500 5,000 7,500 10,000 Feet

1:30,000 (At original document size of 22x34)

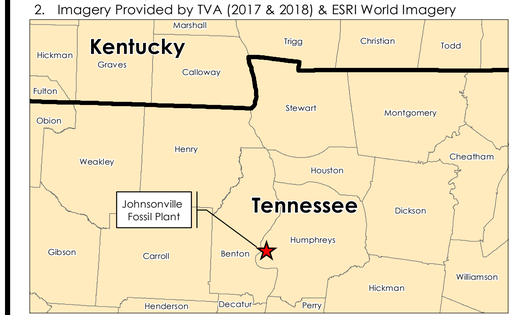
Legend

- Surface Stream Flow
- Mayfly Sampling Locations
  - TRU – Tennessee River Upstream
  - TRA – Tennessee River Adjacent
  - TRD – Tennessee River Downstream
  - IC – Intake Channel
  - BH – Boat Harbor
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

CCR: Coal combustion residuals

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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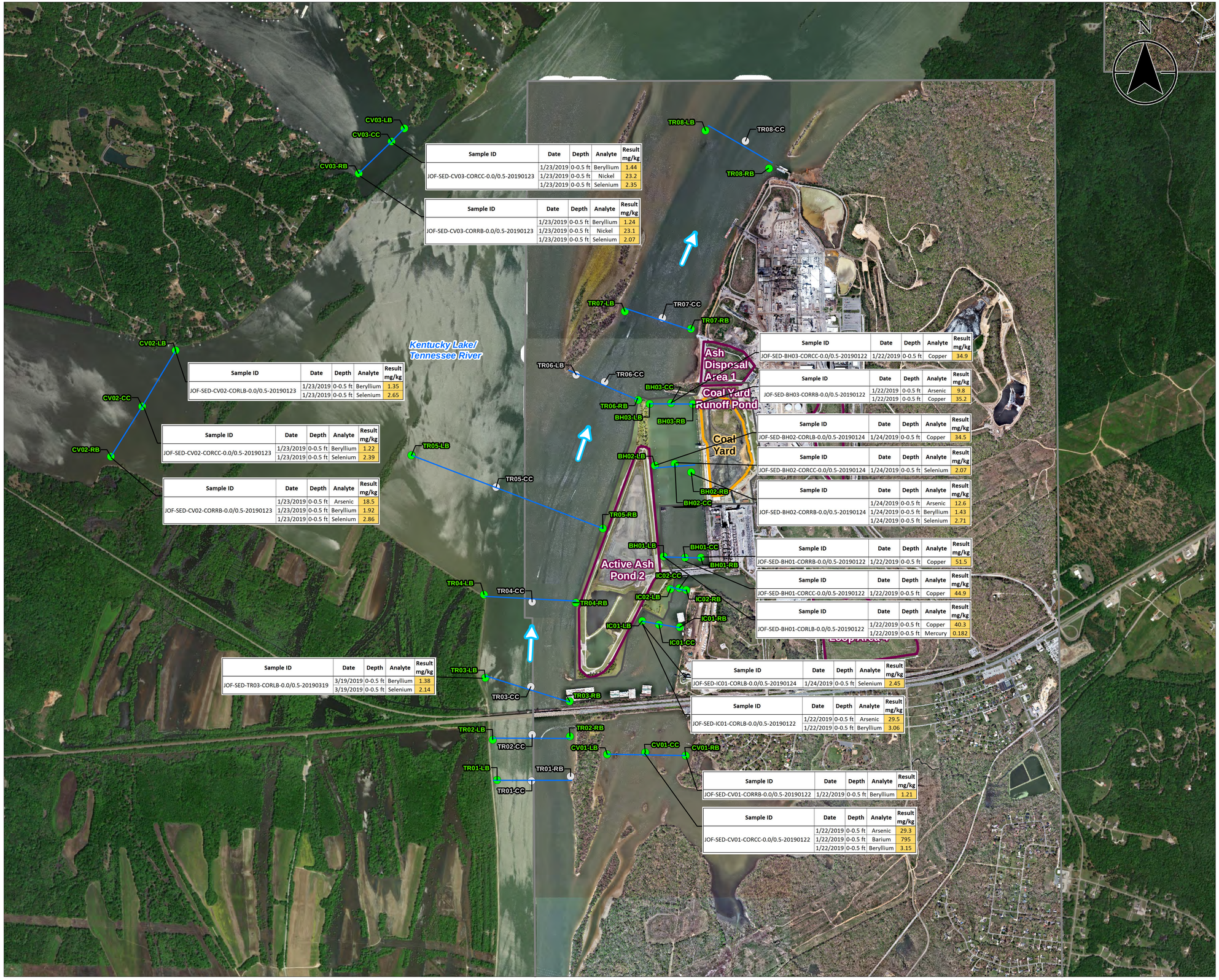


Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-CV03-CORCC-0.0/0.5-20190123	1/23/2019	0-0.5 ft	Beryllium	1.44
	1/23/2019	0-0.5 ft	Nickel	23.2
	1/23/2019	0-0.5 ft	Selenium	2.35

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-CV03-CORRB-0.0/0.5-20190123	1/23/2019	0-0.5 ft	Beryllium	1.24
	1/23/2019	0-0.5 ft	Nickel	23.1
	1/23/2019	0-0.5 ft	Selenium	2.07

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-CV02-CORLB-0.0/0.5-20190123	1/23/2019	0-0.5 ft	Beryllium	1.35
	1/23/2019	0-0.5 ft	Selenium	2.65

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-CV02-CORCC-0.0/0.5-20190123	1/23/2019	0-0.5 ft	Beryllium	1.22
	1/23/2019	0-0.5 ft	Selenium	2.39

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-CV02-CORRB-0.0/0.5-20190123	1/23/2019	0-0.5 ft	Arsenic	18.5
	1/23/2019	0-0.5 ft	Beryllium	1.92
	1/23/2019	0-0.5 ft	Selenium	2.86

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-TR03-CORLB-0.0/0.5-20190319	3/19/2019	0-0.5 ft	Beryllium	1.38
	3/19/2019	0-0.5 ft	Selenium	2.14

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH03-CORCC-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Copper	34.9

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH03-CORRB-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Arsenic	9.8
	1/22/2019	0-0.5 ft	Copper	35.2

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH02-CORLB-0.0/0.5-20190124	1/24/2019	0-0.5 ft	Copper	34.5

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH02-CORCC-0.0/0.5-20190124	1/24/2019	0-0.5 ft	Selenium	2.07

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH02-CORRB-0.0/0.5-20190124	1/24/2019	0-0.5 ft	Arsenic	12.6
	1/24/2019	0-0.5 ft	Beryllium	1.43
	1/24/2019	0-0.5 ft	Selenium	2.71

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH01-CORRB-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Copper	51.5

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH01-CORCC-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Copper	44.9

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-BH01-CORLB-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Copper	40.3
	1/22/2019	0-0.5 ft	Mercury	0.182

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-IC01-CORLB-0.0/0.5-20190124	1/24/2019	0-0.5 ft	Selenium	2.45

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-IC01-CORLB-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Arsenic	29.5
	1/22/2019	0-0.5 ft	Beryllium	3.06

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-CV01-CORRB-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Beryllium	1.21

Sample ID	Date	Depth	Analyte	Result mg/kg
JOF-SED-CV01-CORCC-0.0/0.5-20190122	1/22/2019	0-0.5 ft	Arsenic	29.3
	1/22/2019	0-0.5 ft	Barium	795
	1/22/2019	0-0.5 ft	Beryllium	3.15

Exhibit No.

J.3-4

Title

Sediment Sampling Results above Ecological Screening Values

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-04-24
Technical Review by JC on 2023-04-24

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

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

Legend

- Sediment Sampling Locations - Collected
- Sediment Sampling Locations - Attempted: Insufficient Sediment for Sampling
- Sediment Sampling Location Transects
- Surface Stream Flow
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Abbreviations:

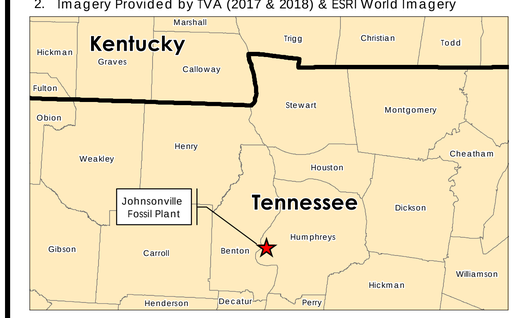
CC - Center Channel
RB- Right Bank
LB- Left Bank
mg/kg - milligrams per kilogram
ESV - Ecological Screening Level
CCR - Coal combustion residuals

Legend
Concentration > Chronic ESV
Concentration > Acute ESV

Chronic Ecological Screening Values	
Arsenic	9.8 mg/kg
Beryllium	1.2 mg/kg
Copper	31.6 mg/kg
Mercury	0.18 mg/kg
Selenium	2 mg/kg

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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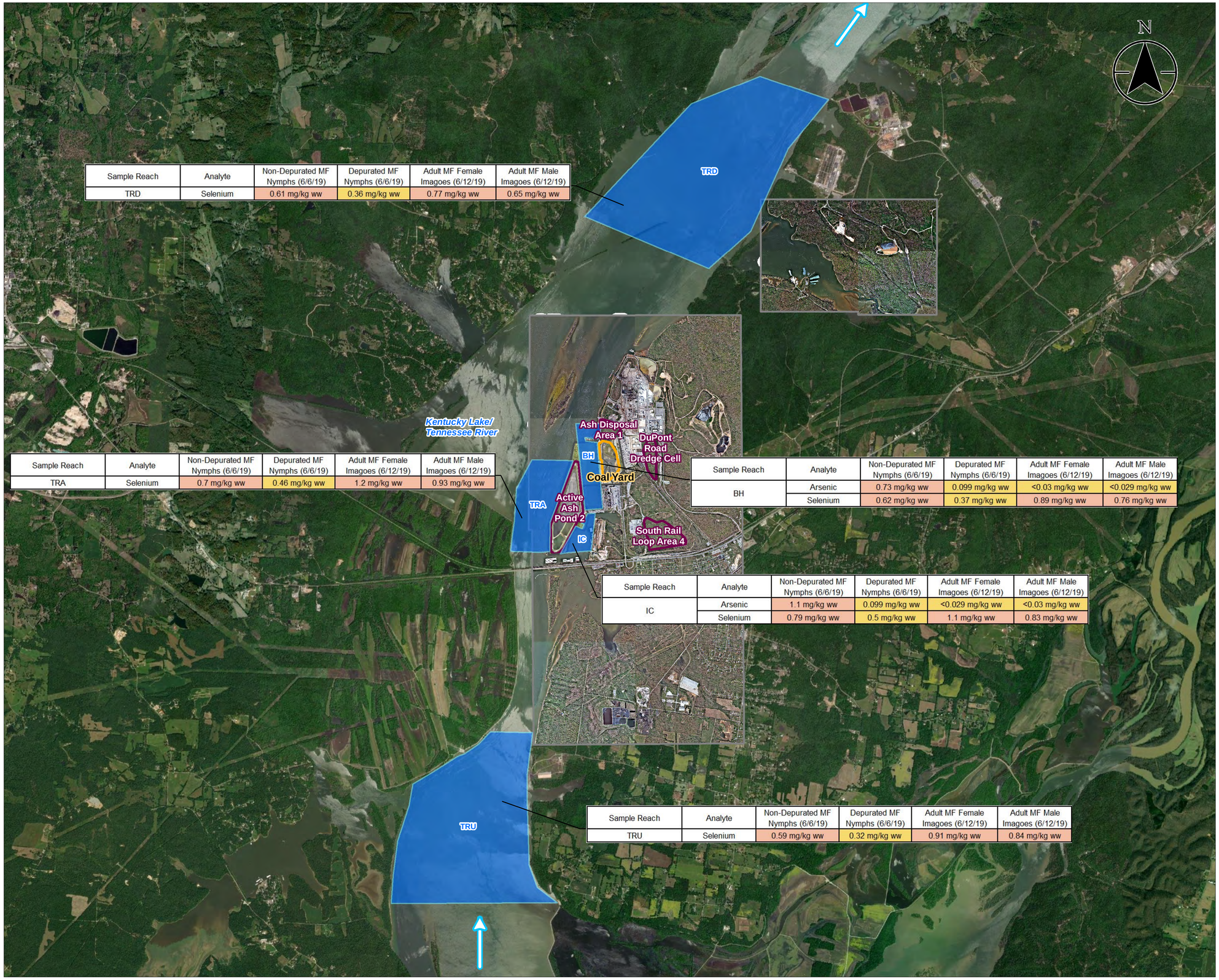


Sample Reach	Analyte	Non-Depurated MF Nymphs (6/6/19)	Depurated MF Nymphs (6/6/19)	Adult MF Female Imagoes (6/12/19)	Adult MF Male Imagoes (6/12/19)
TRD	Selenium	0.61 mg/kg ww	0.36 mg/kg ww	0.77 mg/kg ww	0.65 mg/kg ww

Sample Reach	Analyte	Non-Depurated MF Nymphs (6/6/19)	Depurated MF Nymphs (6/6/19)	Adult MF Female Imagoes (6/12/19)	Adult MF Male Imagoes (6/12/19)
TRA	Selenium	0.7 mg/kg ww	0.46 mg/kg ww	1.2 mg/kg ww	0.93 mg/kg ww

Sample Reach	Analyte	Non-Depurated MF Nymphs (6/6/19)	Depurated MF Nymphs (6/6/19)	Adult MF Female Imagoes (6/12/19)	Adult MF Male Imagoes (6/12/19)
BH	Arsenic	0.73 mg/kg ww	0.099 mg/kg ww	<0.03 mg/kg ww	<0.029 mg/kg ww
	Selenium	0.62 mg/kg ww	0.37 mg/kg ww	0.89 mg/kg ww	0.76 mg/kg ww

Sample Reach	Analyte	Non-Depurated MF Nymphs (6/6/19)	Depurated MF Nymphs (6/6/19)	Adult MF Female Imagoes (6/12/19)	Adult MF Male Imagoes (6/12/19)
IC	Arsenic	1.1 mg/kg ww	0.099 mg/kg ww	<0.029 mg/kg ww	<0.03 mg/kg ww
	Selenium	0.79 mg/kg ww	0.5 mg/kg ww	1.1 mg/kg ww	0.83 mg/kg ww

Sample Reach	Analyte	Non-Depurated MF Nymphs (6/6/19)	Depurated MF Nymphs (6/6/19)	Adult MF Female Imagoes (6/12/19)	Adult MF Male Imagoes (6/12/19)
TRU	Selenium	0.59 mg/kg ww	0.32 mg/kg ww	0.91 mg/kg ww	0.84 mg/kg ww

Exhibit No.

J.3-5

Title

Mayfly Sampling Results above Critical Body Residue Values

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by DMB on 2023-04-24
Technical Review by BL on 2023-04-24

0 2,500 5,000 7,500 10,000 Feet

1:30,000 (At original document size of 22x34)

Legend

Surface Stream Flow

Mayfly Sampling Locations
TRU – Tennessee River Upstream
TRA – Tennessee River Adjacent
TRD – Tennessee River Downstream
IC – Intake Channel
BH – Boat Harbor

2017 Imagery Boundary

2018 Imagery Boundary

CCR Unit Area (Approximate)

Coal Yard (Approximate)

Concentration > CBR NOAEL
Concentration > CBR LOAEL

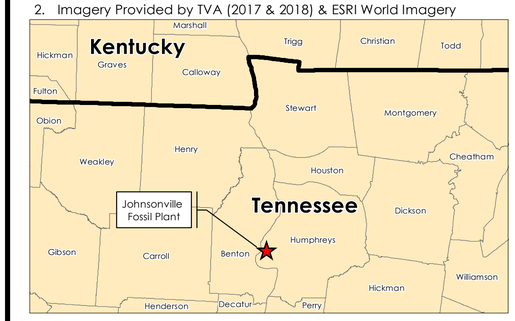
Abbreviations:

mg/kg ww	Milligrams per kilogram wet weight
CCR	Coal combustion residuals
CBR	Critical body residue
NOAEL	No observed adverse effect level
LOAEL	Lowest observed adverse effect level
MF	Mayflies

	Critical Body Residue	
	NOAEL	LOAEL
	(mg/kg - ww)	(mg/kg - ww)
Arsenic	0.0249	0.249
Selenium	0.051	0.51

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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ATTACHMENT J.3-A - BENTHIC COMMUNITY SUMMARY SHEETS

Johnsonville Fossil Plant
Waterbody: Boat Harbor
Site: MAC-BH01 (Boat Harbor 0.8) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	14
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	15
Bivalvia	Unionidae	Amblema plicata	CF	6	2
Bivalvia	Unionidae	Plectomerus dombeyanus	CF	6	1
Bivalvia	Unionidae	Pleurobema sintoxia	CF	6	1
Bivalvia	Unionidae	Quadrula quadrula	CF	6	1
Bivalvia	Unionidae	Reginaia ebena	CF	6	1
Diptera	Chaoboridae	Chaoborus sp.	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	7
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	1
Diptera	Chironomidae	Chironomus sp.	CG	9.3	11
Diptera	Chironomidae	Coelotanypus sp.	CG	8	16
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	2
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	2
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	7
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	3
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	10
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	1
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	2
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	1
Hirudinea	-	Hirudinea	PR	8	2
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	1
Oligochaeta	Naididae	Dero sp.	CG	9.8	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	21
Trichoptera	Hydropsychidae	Hydropsyche sp.	CF	4.3	1
			Total Organisms Collected		**127**

Reservoir Benthic Index

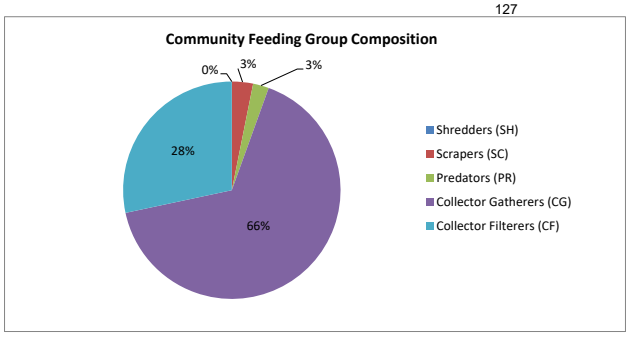
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	26	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	18.9	3	
Percent Top Two Dominant Taxa (Genus)	29.1	5	(Tubificinae, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	53	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**29**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.62	Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	99.2	
Percent EPT-H	7.9	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	4	3
Predators (PR)	3	2
Collector Gatherers (CG)	84	66
Collector Filterers (CF)	36	28
	127	100



Johnsonville Fossil Plant
Waterbody: Boat Harbor
Site: MAC-BH02 (Boat Harbor 0.4) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	16
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	13
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	3
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	7
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	8
Diptera	Chironomidae	Chironomus sp.	CG	9.3	14
Diptera	Chironomidae	Coelotanypus sp.	CG	8	23
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	5
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	10
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	10
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	1
Hirudinea	-	Hirudinea	PR	8	1
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	2
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	2
Oligochaeta	Naididae	Tubificinae whc	CG	10	2
Oligochaeta	Naididae	Tubificinae wohc	CG	10	6
Trichoptera	Philopotamidae	Chimarra aterrima	CF	3.3	1
			Total Organisms Collected		**127**

Reservoir Benthic Index

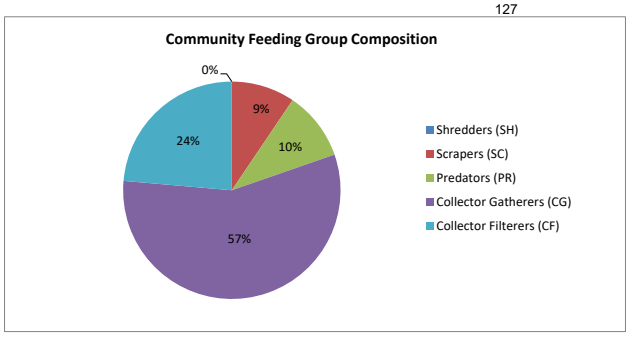
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	19	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	80.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	7.9	5	
Percent Top Two Dominant Taxa (Genus)	30.7	5	(Coelotanypus, Corbicula)
Total Abundance Less Chironomidae and Oligochaeta	65	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**29**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.35	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	8.7	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	12	9
Predators (PR)	13	10
Collector Gatherers (CG)	72	57
Collector Filterers (CF)	30	24
	127	100



Johnsonville Fossil Plant
Waterbody: Boat Harbor
Site: MAC-BH03 (Boat Harbor 0.15) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	40
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	55
Bivalvia	Unionidae	Amblema plicata	CF	6	2
Bivalvia	Unionidae	Quadrula apiculata	CF	6	2
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	3
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	18
Diptera	Chironomidae	Chironomus sp.	CG	9.3	9
Diptera	Chironomidae	Coelotanypus sp.	CG	8	43
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	1
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	4
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	57
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	16
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	1
Gastropoda	Viviparidae	Lioplax sulculosa	SC	6	2
Hirudinea	Glossiphoniidae	Helobdella stagnalis	PR	9.3	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	2
Oligochaeta	Naididae	Tubificinae whc	CG	10	2
Oligochaeta	Naididae	Tubificinae wohc	CG	10	8
			Total Organisms Collected		**270**

Reservoir Benthic Index

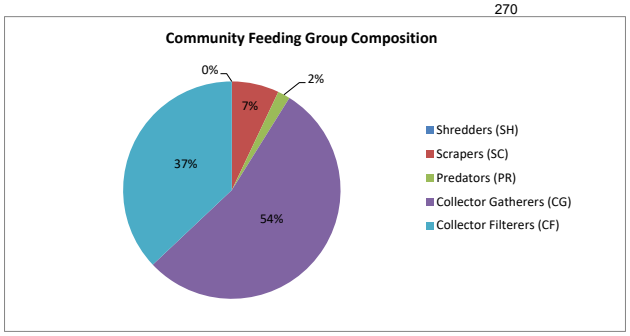
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	21	5	
EPT Richness (Genus)	1	3	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	4.4	5	
Percent Top Two Dominant Taxa (Genus)	41.5	5	(Hexagenia, Musculium)
Total Abundance Less Chironomidae and Oligochaeta	181	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**29**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.68	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	99.6	
Percent EPT-H	21.1	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	19	7
Predators (PR)	5	2
Collector Gatherers (CG)	146	54
Collector Filterers (CF)	100	37
	270	100



Johnsonville Fossil Plant
Waterbody: Indian Creek
Site: MAC-CV01 (Indian Creek 0.25) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Corophiidae	Apocorophium lacustre	CG	7.2	1
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	17
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	158
Bivalvia	Unionidae	Potamilus alatus	CF	6	1
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	24
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	1
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	2
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	12
Diptera	Chironomidae	Chironomus sp.	CG	9.3	9
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	115
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	1
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	14
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	2
Diptera	Chironomidae	Rheotanytarsus sp.	CG	4.7	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	18
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	8
Gastropoda	Viviparidae	Campeloma decisum	SC	5.8	2
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	2
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	5
Trichoptera	Polycentropodidae	Neureclipsis sp.	CF	4	1
			Total Organisms Collected		**402**

Reservoir Benthic Index

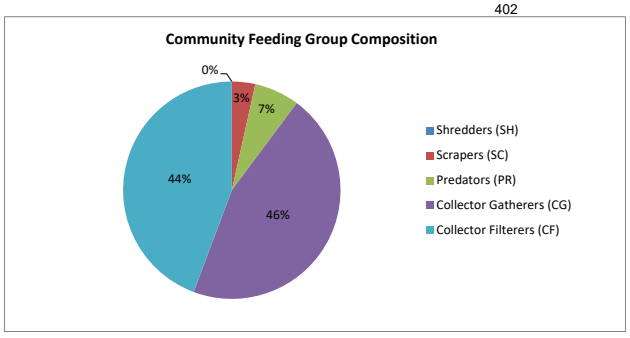
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	26	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	1.7	5	
Percent Top Two Dominant Taxa (Genus)	67.9	5	(Coelotanypus, Musculium)
Total Abundance Less Chironomidae and Oligochaeta	238	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.39	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	4.7	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	14	3
Predators (PR)	27	7
Collector Gatherers (CG)	183	46
Collector Filterers (CF)	178	44
	402	100



Johnsonville Fossil Plant
Waterbody: Cypress Creek
Site: MAC-CV02 (Cypress Creek 8.0) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	2
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	22
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	1
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	11
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	1
Diptera	Chironomidae	Chironomus sp.	CG	9.3	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	70
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	2
Diptera	Chironomidae	Procladius sp.	CG	8.8	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	1
Hirudinea	Glossiphoniidae	Helobdella stagnalis	PR	9.3	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	2
			Total Organisms Collected		**117**

Reservoir Benthic Index

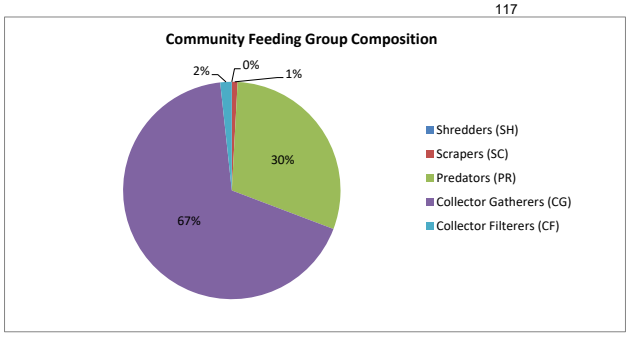
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	12	5	
EPT Richness (Genus)	0	1	
Percent Grabs Containing Long Lived Organisms	20.0	1	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	1.7	5	
Percent Top Two Dominant Taxa (Genus)	78.6	3	(Coelotanypus, Ceratopogonidae)
Total Abundance Less Chironomidae and Oligochaeta	38	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**21**	**FAIR**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.85	Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	0.0	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	1	1
Predators (PR)	35	30
Collector Gatherers (CG)	79	68
Collector Filterers (CF)	2	2
	117	100



Johnsonville Fossil Plant
Waterbody: Beaverdam Creek
Site: MAC-CV03 (Beaverdam Creek 0.1) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Sphaeriidae	Eupera cubensis	CF	5.7	1
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	2
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	10
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	5
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	6
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	2
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	1
Diptera	Chironomidae	Chironomus sp.	CG	9.3	2
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	32
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	3
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	105
Diptera	Chironomidae	Dicrotendipes simpsoni	CG	7.2	1
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	2
Diptera	Chironomidae	Glyptotendipes sp.	CG	8.6	3
Diptera	Chironomidae	Parachironomus sp.	CG	8	1
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	4
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	3
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	1
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	2
Gastropoda	Viviparidae	Viviparus sp.	SC	6	2
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	1
Megaloptera	Sialidae	Sialis sp.	PR	7	1
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	1
Oligochaeta	Naididae	Dero sp.	CG	9.8	2
Oligochaeta	Naididae	Naidinae	CG	8	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	2
Trichoptera	Hydroptilidae	Orthotrichia sp.	CG	8.3	3
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	4
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	11
			Total Organisms Collected		**217**

Reservoir Benthic Index

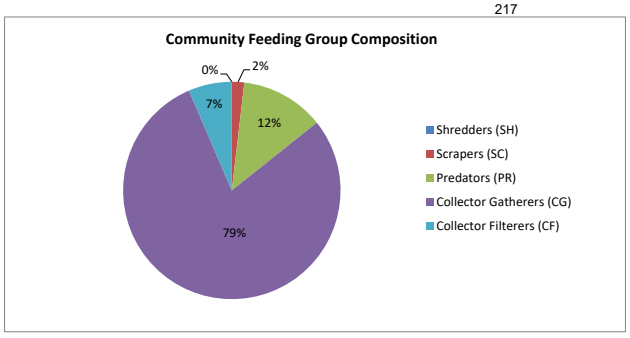
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	28	5	
EPT Richness (Genus)	4	5	
Percent Grabs Containing Long Lived Organisms	60.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	2.8	5	
Percent Top Two Dominant Taxa (Genus)	64.5	5	(Tubificinae, Chaoborus)
Total Abundance Less Chironomidae and Oligochaeta	49	0	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**28**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.31	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	8.8	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	4	2
Predators (PR)	27	12
Collector Gatherers (CG)	172	79
Collector Filterers (CF)	14	6
	217	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-IC01 (Intake Channel 0.15) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	5
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	17
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	31
Bivalvia	Unionidae	Amblema plicata	CF	6	2
Bivalvia	Unionidae	Obliquaria reflexa	CF	6	4
Bivalvia	Unionidae	Plectomerus dombeyanus	CF	6	2
Bivalvia	Unionidae	Pleurobema sintoxia	CF	6	2
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	5
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	11
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	5
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	14
Diptera	Chironomidae	Ablabesmyia mallochi	CG	7.1	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	48
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	3
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	2
Diptera	Chironomidae	Procladius sp.	CG	8.8	3
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	38
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	6
Gastropoda	Viviparidae	Campeloma decisum	SC	5.8	1
Gastropoda	Viviparidae	Lioplax sulculosa	SC	6	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	9
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	3
Oligochaeta	Naididae	Limnodrilus sp.	CG	9.5	1
Oligochaeta	Naididae	Naididae	CG	8	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	6
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	1
			Total Organisms Collected		**227**

Reservoir Benthic Index

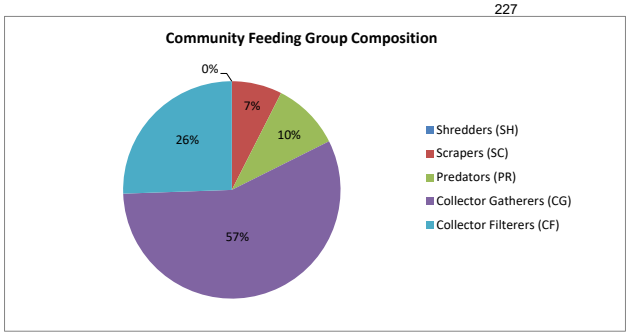
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	26	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	6.2	5	
Percent Top Two Dominant Taxa (Genus)	37.9	5	(Coelotanypus, Hexagenia)
Total Abundance Less Chironomidae and Oligochaeta	141	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.75	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	1.3	
Percent EPT-H	17.2	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	17	7
Predators (PR)	23	10
Collector Gatherers (CG)	129	57
Collector Filterers (CF)	58	26
	227	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-IC02 (Intake Channel 0.3) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	102
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	1
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	2
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	2
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	2
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	5
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	9
Diptera	Chironomidae	Chironomus sp.	CG	9.3	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	36
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	1
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	1
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	4
Diptera	Chironomidae	Procladius sp.	CG	8.8	3
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	12
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	5
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	12
Hirudinea	Glossiphoniidae	Placobdella translucens	PR	8.55	1
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	6
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	2
			Total Organisms Collected		**211**

Reservoir Benthic Index

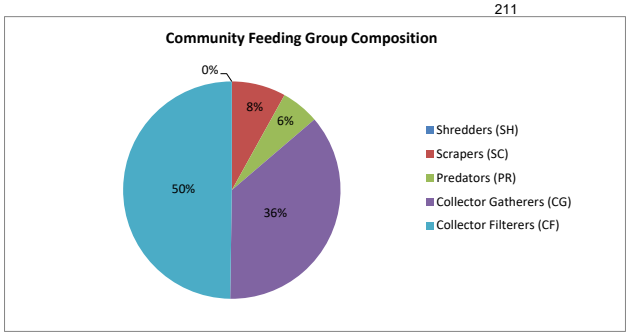
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	20	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	80.0	3	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	4.3	5	
Percent Top Two Dominant Taxa (Genus)	65.4	5	(Corbicula, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	146	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**29**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.85	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	6.6	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	17	8
Predators (PR)	12	6
Collector Gatherers (CG)	77	36
Collector Filterers (CF)	105	50
	211	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-IC03 (Intake Channel 0.67) - Transition
Date: 10/16/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	18
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	51
Bivalvia	Unionidae	Amblema plicata	CF	6	2
Bivalvia	Unionidae	Cyclonaias pustulosa	CF	6	1
Bivalvia	Unionidae	Obliquaria reflexa	CF	6	3
Bivalvia	Unionidae	Plectomerus dombeyanus	CF	6	1
Bivalvia	Unionidae	Pleurobema sintoxia	CF	6	3
Bivalvia	Unionidae	Quadrula apiculata	CF	6	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	1
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	3
Diptera	Chironomidae	Chironomus sp.	CG	9.3	5
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	74
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	2
Diptera	Chironomidae	Procladius sp.	CG	8.8	4
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	2
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	4
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	2
Gastropoda	Viviparidae	Campeloma decisum	SC	5.8	1
Gastropoda	Viviparidae	Lioplax sp.	SC	6	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Trichoptera	Hydropsychidae	Cheumatopsyche sp.	CF	6.6	1
Trichoptera	Polycentropodidae	Polycentropodidae	CF	3.68	1
			Total Organisms Collected		**187**

Reservoir Benthic Index

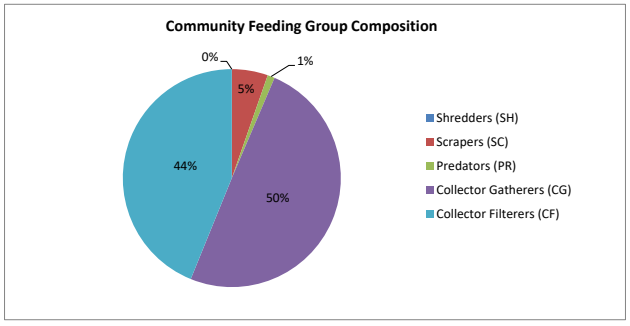
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	26	5	
EPT Richness (Genus)	3	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	0.5	5	
Percent Top Two Dominant Taxa (Genus)	66.8	5	(Coelotanypus, Musculium)
Total Abundance Less Chironomidae and Oligochaeta	96	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	7.39	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	1.6	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	10	5
Predators (PR)	2	1
Collector Gatherers (CG)	93	50
Collector Filterers (CF)	82	44
	187	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR01 (TRM 101.9) - Transition
Date: 10/15/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Crangonyctidae	Crangonyx sp.	CG	7.2	5
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	2
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	104
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	6
Bivalvia	Unionidae	Amblema plicata	CF	6	1
Bivalvia	Unionidae	Ellipsaria lineolata	CF	6	1
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	3
Bivalvia	Unionidae	Unionidae	CF	6	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	9
Diptera	Chironomidae	Chironomus sp.	CG	9.3	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	42
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	2
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	11
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	2
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	1
Diptera	Chironomidae	Stempellina sp. A	CG	0	3
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	35
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	7
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	7
Gastropoda	Viviparidae	Campeloma decisum	SC	5.8	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	2
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	1
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	2
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	3
Oligochaeta	Naididae	Tubificinae wohc	CG	10	15
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	1
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	8
Tricladida	Planariidae	Girardia tigrina	CG	7.1	2
			Total Organisms Collected		**283**

Reservoir Benthic Index

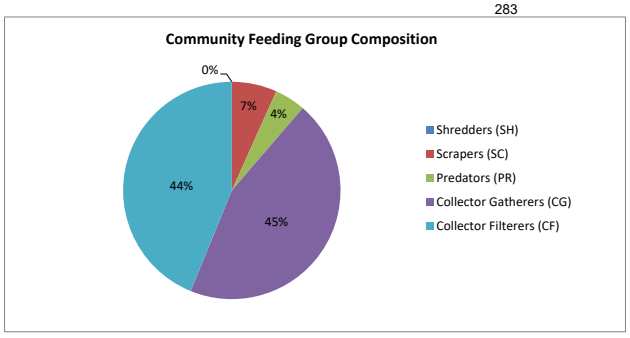
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	30	5	
EPT Richness (Genus)	3	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	7.1	5	
Percent Top Two Dominant Taxa (Genus)	51.6	5	(Corbicula, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	200	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.66	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	2	
Percent Tolerant Taxa (TV > 3)	98.6	
Percent EPT-H	15.5	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	19	7
Predators (PR)	13	5
Collector Gatherers (CG)	127	45
Collector Filterers (CF)	124	44
	283	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR02 (TRM 100.6) - Transition
Date: 10/15/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Corophiidae	Apocorophium lacustre	CG	7.2	1
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	6
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	124
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	7
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	5
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	20
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	3
Diptera	Chironomidae	Coelotanypus sp.	CG	8	36
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	1
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	6
Diptera	Chironomidae	Procladius sp.	CG	8.8	4
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	77
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	8
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	9
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	2
Gastropoda	Viviparidae	Lioplax sulculosa	SC	6	2
Odonata/Anisoptera	Gomphidae	Gomphidae	PR	4	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	2
Oligochaeta	Naididae	Tubificinae wohc	CG	10	10
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	2
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	1
Tricladida	Planariidae	Girardia tigrina	CG	7.1	3
			Total Organisms Collected		**331**

Reservoir Benthic Index

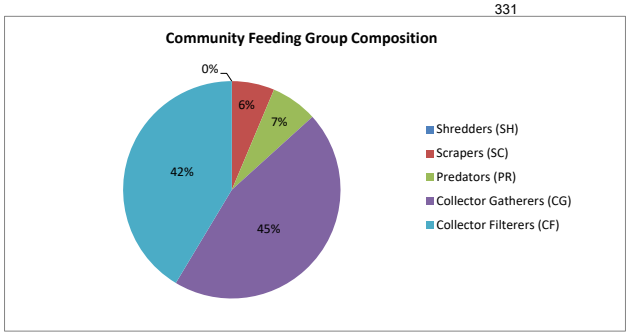
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	23	5	
EPT Richness (Genus)	3	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	3.9	5	
Percent Top Two Dominant Taxa (Genus)	60.7	5	(Corbicula, Hexagenia)
Total Abundance Less Chironomidae and Oligochaeta	268	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**Excellent**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.29	Fair
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	24.2	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	21	6
Predators (PR)	23	7
Collector Gatherers (CG)	150	45
Collector Filterers (CF)	137	41
	331	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR03 (TRM 100.05) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	9
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	35
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	5
Bivalvia	Unionidae	Amblema plicata	CF	6	1
Bivalvia	Unionidae	Ellipsaria lineolata	CF	6	1
Bivalvia	Unionidae	Megalonaias nervosa	CF	6	1
Bivalvia	Unionidae	Plectomerus dombeyanus	CF	6	2
Bivalvia	Unionidae	Quadrula apiculata	CF	6	1
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	1
Coleoptera	Elmidae	Stenelmis sp.	SC	5.6	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	2
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	3
Diptera	Chironomidae	Ablabesmyia mallochi	CG	7.1	1
Diptera	Chironomidae	Chironomus sp.	CG	9.3	1
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	2
Diptera	Chironomidae	Coelotanypus sp.	CG	8	24
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	2
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	39
Diptera	Chironomidae	Procladius sp.	CG	8.8	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Diptera	Chironomidae	Thienemanniella xena	CG	6.4	2
Ephemerellidae	Caenidae	Caenis sp.	CG	6.8	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	59
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	3
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	5
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	4
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	3
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	9
Trichoptera	Hydroptilidae	Hydroptila sp.	SC	6.5	4
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	2
Tricladida	Planariidae	Girardia tigrina	CG	7.1	11
			Total Organisms Collected		**238**

Reservoir Benthic Index

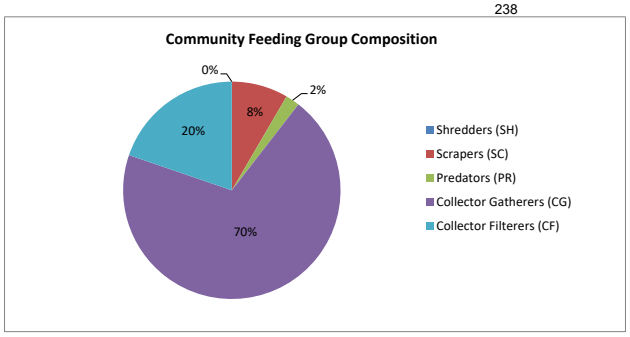
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	32	5	
EPT Richness (Genus)	4	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	4.2	5	
Percent Top Two Dominant Taxa (Genus)	41.2	5	(Hexagenia, Dicrotendipes)
Total Abundance Less Chironomidae and Oligochaeta	152	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.37	Fair
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	27.7	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	20	8
Predators (PR)	5	2
Collector Gatherers (CG)	166	70
Collector Filterers (CF)	47	20
	238	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR04 (TRM 99.65) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	18
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	73
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	7
Bivalvia	Unionidae	Plectomerus dombeyanus	CF	6	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	1
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	14
Diptera	Chironomidae	Axarus sp.	CG	2	2
Diptera	Chironomidae	Chironomus sp.	CG	9.3	2
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	3
Diptera	Chironomidae	Coelotanypus sp.	CG	8	62
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	2
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	24
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	1
Diptera	Chironomidae	Orthocladiinae	CG	5.3	1
Diptera	Chironomidae	Polypedilum scalaenum gp.	CG	6.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	6
Diptera	Chironomidae	Stictochironomus caffrarius gp.	CG	5.4	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Diptera	Chironomidae	Tvetenia paucunca	CG	3.55	2
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	96
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	14
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	27
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	17
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	4
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	2
Oligochaeta	Naididae	Nais sp.	CG	8.7	1
Oligochaeta	Naididae	Ophidonais serpentina	CG	2	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	9
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	2
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	1
Trichoptera	Polycentropodidae	Polycentropodidae	CF	3.68	1
Tricladida	Planariidae	Girardia tigrina	CG	7.1	1
			Total Organisms Collected		**402**

Reservoir Benthic Index

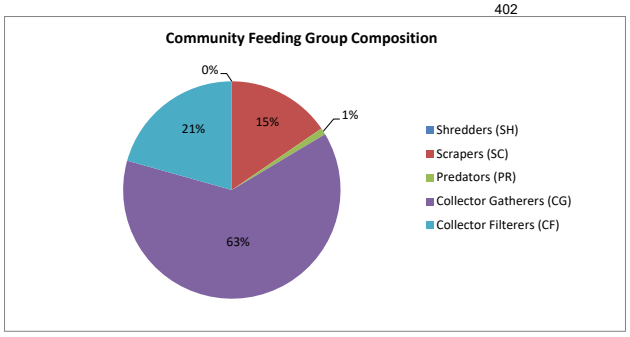
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	34	5	
EPT Richness (Genus)	4	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	4.0	5	
Percent Top Two Dominant Taxa (Genus)	42.0	5	(Hexagenia, Corbicula)
Total Abundance Less Chironomidae and Oligochaeta	264	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.15	Fair
Intolerant Taxa Richness (TV ≤ 3)	3	
Percent Tolerant Taxa (TV > 3)	99.0	
Percent EPT-H	24.9	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	62	15
Predators (PR)	4	1
Collector Gatherers (CG)	253	63
Collector Filterers (CF)	83	21
	402	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR05 (TRM 99.1) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	13
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	207
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	1
Bivalvia	Unionidae	Amblema plicata	CF	6	2
Bivalvia	Unionidae	Cyclonaias pustulosa	CF	6	1
Bivalvia	Unionidae	Plectomerus dombeyanus	CF	6	1
Bivalvia	Unionidae	Quadrula quadrula	CF	6	2
Bivalvia	Unionidae	Reginaia ebena	CF	6	1
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	1
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	2
Diptera	Chironomidae	Chironomus sp.	CG	9.3	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	17
Diptera	Chironomidae	Cricotopus sp.	CG	7.44	1
Diptera	Chironomidae	Cricotopus trifascia	CG	7.44	1
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	4
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	5
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	1
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	3
Diptera	Chironomidae	Thienemanniella xena	CG	6.4	1
Diptera	Chironomidae	Xenochironomus xenolabis	CG	6.6	1
Diptera	Chironomidae	Zavrelimyia sp.	CG	8.6	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	27
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	2
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	1
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	7
Gastropoda	Viviparidae	Campeloma decisum	SC	5.8	1
Gastropoda	Viviparidae	Lioplax sulculosa	SC	6	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	1
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	1
Oligochaeta	Naididae	Aulodrilus pigueti	CG	7	1
Oligochaeta	Naididae	Naididae	CG	8	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	4
Trichoptera	Hydroptilidae	Hydroptila sp.	SC	6.5	1
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	5
			Total Organisms Collected		**323**

Reservoir Benthic Index

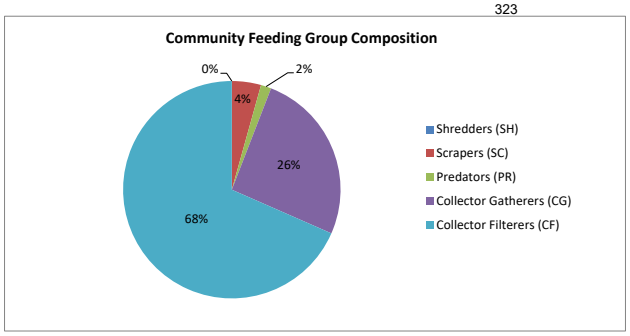
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	33	5	
EPT Richness (Genus)	3	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	1.9	5	
Percent Top Two Dominant Taxa (Genus)	72.4	5	(Corbicula, Hexagenia)
Total Abundance Less Chironomidae and Oligochaeta	280	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.55	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	99.7	
Percent EPT-H	10.2	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	14	4
Predators (PR)	5	2
Collector Gatherers (CG)	83	26
Collector Filterers (CF)	221	68
	323	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR06 (TRM 98.75) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	23
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	226
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	6
Bivalvia	Unionidae	Cyclonaias pustulosa	CF	6	1
Bivalvia	Unionidae	Quadrula quadrula	CF	6	1
Bivalvia	Unionidae	Unionidae	CF	6	2
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	1
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	5
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	17
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	5
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	3
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	4
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	2
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	42
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	6
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	9
Gastropoda	Viviparidae	Campeloma decisum	SC	5.8	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Oligochaeta	Naididae	Piguetiella michiganensis	CG	6	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	13
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	1
Tricladida	Planariidae	Girardia tigrina	CG	7.1	4
			Total Organisms Collected		**377**

Reservoir Benthic Index

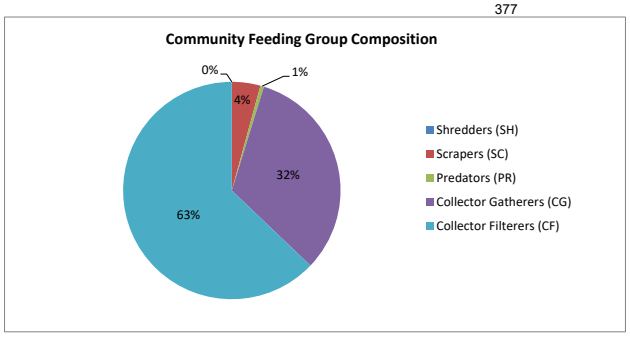
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	23	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	4.0	5	
Percent Top Two Dominant Taxa (Genus)	71.1	5	(Corbicula, Hexagenia)
Total Abundance Less Chironomidae and Oligochaeta	324	3	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**33**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.51	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	99.7	
Percent EPT-H	11.4	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	16	4
Predators (PR)	2	1
Collector Gatherers (CG)	122	32
Collector Filterers (CF)	237	63
	377	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR07 (TRM 97.9) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	11
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	111
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	9
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	1
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	1
Diptera	Chironomidae	Chironomus sp.	CG	9.3	1
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	19
Diptera	Chironomidae	Coelotanypus sp.	CG	8	11
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	7
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	25
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	3
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	3
Diptera	Chironomidae	Procladius sp.	CG	8.8	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	33
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	11
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	12
Gastropoda	Viviparidae	Lioplax sulculosa	SC	6	7
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	2
Hirudinea	Glossiphoniidae	Actinobdella inequiannulata	PR	8.6	1
Hirudinea	Glossiphoniidae	Helobdella elongata	PR	9.3	1
Oligochaeta	Naididae	Dero sp.	CG	9.8	2
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	2
Oligochaeta	Naididae	Naididae	CG	8	1
Oligochaeta	Naididae	Nais sp.	CG	8.7	1
Oligochaeta	Naididae	Tubificinae whc	CG	10	2
Oligochaeta	Naididae	Tubificinae wohc	CG	10	20
			Total Organisms Collected		**301**

Reservoir Benthic Index

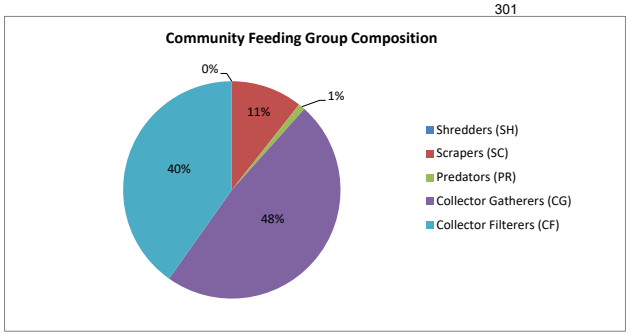
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	26	5	
EPT Richness (Genus)	1	3	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	9.3	5	
Percent Top Two Dominant Taxa (Genus)	47.8	5	(Corbicula, Hexagenia)
Total Abundance Less Chironomidae and Oligochaeta	200	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**29**	**GOOD**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.54	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	11.0	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	32	11
Predators (PR)	3	1
Collector Gatherers (CG)	145	48
Collector Filterers (CF)	121	40
	301	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR08 (TRM 96.6) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Corophiidae	Apocorophium lacustre	CG	7.2	17
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	14
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	70
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	39
Bivalvia	Unionidae	Megalonaias nervosa	CF	6	1
Bivalvia	Unionidae	Quadrula quadrula	CF	6	1
Diptera	Ceratopogonidae	Ceratopogonidae	PR	6.8	2
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	2
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	1
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	7
Diptera	Chironomidae	Coelotanypus sp.	CG	8	23
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	8
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	38
Diptera	Chironomidae	Epoicocladius flavens	CG	0.1	5
Diptera	Chironomidae	Thienemanniella xena	CG	6.4	1
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	36
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	4
Gastropoda	Viviparidae	Lioplax sulculosa	SC	6	3
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	1
Odonata/Anisoptera	Gomphidae	Phanogomphus sp.	PR	4	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	3
Trichoptera	Hydroptilidae	Hydroptila sp.	SC	6.5	9
Tricladida	Planariidae	Girardia tigrina	CG	7.1	2
			Total Organisms Collected		**290**

Reservoir Benthic Index

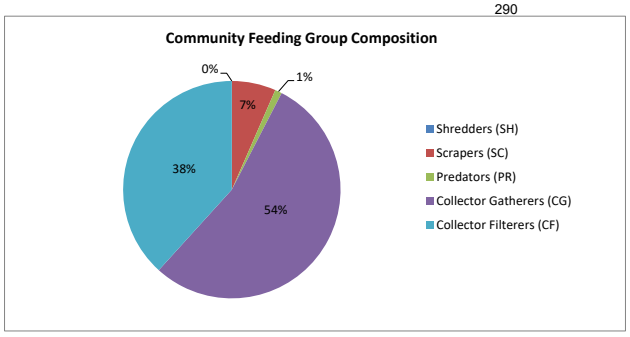
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	23	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	1.0	5	
Percent Top Two Dominant Taxa (Genus)	37.6	5	(Corbicula, Musculium)
Total Abundance Less Chironomidae and Oligochaeta	202	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**Excellent**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.51	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	98.3	
Percent EPT-H	15.5	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	19	7
Predators (PR)	3	1
Collector Gatherers (CG)	157	54
Collector Filterers (CF)	111	38
	290	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR09 (TRM 106.75) - Transition
Date: 10/15/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	7
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	61
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	6
Bivalvia	Unionidae	Amblema plicata	CF	6	1
Bivalvia	Unionidae	Truncilla donaciformis	CF	6	1
Bivalvia	Unionidae	Unionidae	CF	6	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	3
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	1
Diptera	Chironomidae	Ablabesmyia rhamphe gp.	CG	7.1	1
Diptera	Chironomidae	Coelotanypus sp.	CG	8	19
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	2
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	11
Diptera	Chironomidae	Procladius sp.	CG	8.8	5
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	17
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	9
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	18
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	11
Gastropoda	Pleuroceridae	Pleurocera canaliculata moriforme	SC	6	4
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	2
Isopoda	Asellidae	Lirceus sp.	CG	7.4	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	5
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	5
			Total Organisms Collected		**193**

Reservoir Benthic Index

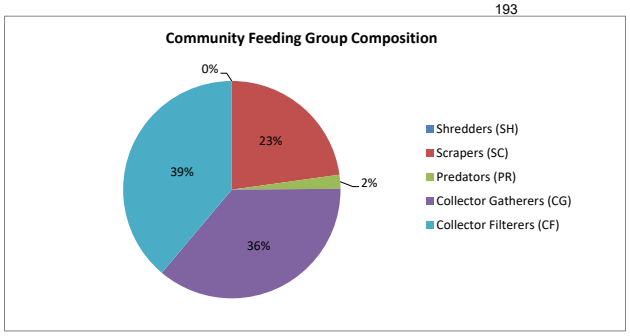
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	21	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	3.1	5	
Percent Top Two Dominant Taxa (Genus)	41.5	5	(Corbicula, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	148	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.40	Fair
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	11.4	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	44	23
Predators (PR)	4	2
Collector Gatherers (CG)	70	36
Collector Filterers (CF)	75	39
	193	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR10 (TRM 103.4) - Transition
Date: 10/15/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Corophiidae	Apocorophium lacustre	CG	7.2	1
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	5
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	47
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	3
Bivalvia	Unionidae	Cyclonaias pustulosa	CF	6	1
Bivalvia	Unionidae	Plectomerus dombeyanus	CF	6	1
Diptera	Ceratopogonidae	Probezzia sp.	PR	6.8	6
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	1
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	1
Diptera	Chironomidae	Cladotanytarsus sp.	CG	4	3
Diptera	Chironomidae	Coelotanypus sp.	CG	8	50
Diptera	Chironomidae	Cricotopus sp.	CG	7.44	1
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	4
Diptera	Chironomidae	Polypedilum halterale gp.	CG	6.1	1
Diptera	Chironomidae	Procladius sp.	CG	8.8	6
Diptera	Chironomidae	Stempellina sp.	CG	0	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	3
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	44
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	2
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	Lioplax sulculosa	SC	6	2
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	2
Oligochaeta	Naididae	Tubificinae wohc	CG	10	5
Trichoptera	Leptoceridae	Oecetis sp.	PR	5.1	2
Tricladida	Planariidae	Girardia tigrina	CG	7.1	2
			Total Organisms Collected		**201**

Reservoir Benthic Index

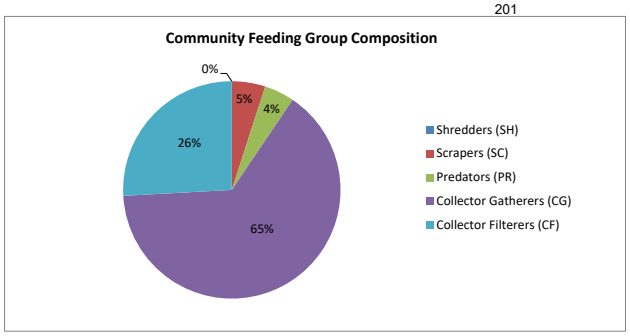
Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	29	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	4.0	5	
Percent Top Two Dominant Taxa (Genus)	48.3	5	(Coelotanypus, Corbicula)
Total Abundance Less Chironomidae and Oligochaeta	123	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**EXCELLENT**

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.53	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	1	
Percent Tolerant Taxa (TV > 3)	99.5	
Percent EPT-H	22.9	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	10	5
Predators (PR)	9	4
Collector Gatherers (CG)	130	65
Collector Filterers (CF)	52	26
	201	100



Johnsonville Fossil Plant
Waterbody: Tennessee River
Site: MAC-TR11 (TRM 94.5) - Transition
Date: 10/17/2019

Taxa List

Order/Major Group	Family	Genus species/Final ID	Feeding Group	Tolerance (NCBI)	Quantity
Amphipoda	Corophiidae	Apocorophium lacustre	CG	7.2	9
Amphipoda	Gammaridae	Gammarus sp.	CG	7.1	17
Bivalvia	Corbiculidae	Corbicula fluminea	CF	6.6	114
Bivalvia	Sphaeriidae	Musculium transversum	CF	7.5	6
Diptera	Chaoboridae	Chaoborus punctipennis	PR	8.5	2
Diptera	Chironomidae	Ablabesmyia annulata	CG	7.1	4
Diptera	Chironomidae	Coelotanypus sp.	CG	8	35
Diptera	Chironomidae	Cryptochironomus sp.	CG	6.4	1
Diptera	Chironomidae	Dicrotendipes neomodestus	CG	7.2	7
Diptera	Chironomidae	Dicrotendipes sp.	CG	7.2	2
Diptera	Chironomidae	Procladius sp.	CG	8.8	1
Diptera	Chironomidae	Tanytarsus sp.	CG	6.6	3
Ephemeroptera	Ephemeridae	Hexagenia sp.	CG	4.4	24
Gastropoda	Hydrobiidae	Amnicola limosa	SC	4.1	3
Gastropoda	Hydrobiidae	Somatogyrus sp.	SC	4.1	2
Gastropoda	Pleuroceridae	Pleurocera canaliculata	SC	6	11
Gastropoda	Viviparidae	Lioplax sulculosa	SC	6	1
Gastropoda	Viviparidae	Viviparus subpurpureus	SC	6	4
Hirudinea	Glossiphoniidae	Helobdella stagnalis	PR	9.3	1
Odonata/Anisoptera	Gomphidae	Stylurus sp.	PR	4	1
Oligochaeta	Naididae	Branchiura sowerbyi	CG	8.6	1
Oligochaeta	Naididae	Limnodrilus hoffmeisteri	CG	9.5	1
Oligochaeta	Naididae	Tubificinae wohc	CG	10	1
Trichoptera	Polycentropodidae	Cyrnellus fraternus	CF	6.8	2
Tricladida	Planariidae	Girardia tigrina	CG	7.1	1
			Total Organisms Collected		**254**

Reservoir Benthic Index

Component Metrics	Value	Index Score	
Total Taxa Richness (Genus)	24	5	
EPT Richness (Genus)	2	5	
Percent Grabs Containing Long Lived Organisms	100.0	5	Includes: Corbicula, Hexagenia, Unionidae/Dreissenidae, Gastropoda
Percent Oligochaeta	1.2	5	
Percent Top Two Dominant Taxa (Genus)	58.7	5	(Corbicula, Coelotanypus)
Total Abundance Less Chironomidae and Oligochaeta	198	1	
Percent Grabs Containing No Organisms	0.0	5	
IBI Score		**31**	**Excellent**

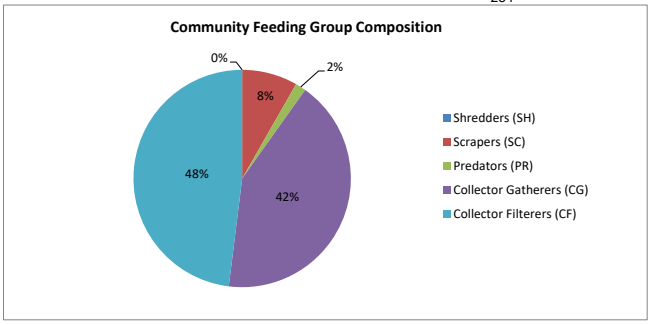
If you

Supplemental Metric Computations

Water Quality Metrics	Value	
Hilsenhoff Biotic Index (HBI)	6.66	Fairly Poor
Intolerant Taxa Richness (TV ≤ 3)	0	
Percent Tolerant Taxa (TV > 3)	100.0	
Percent EPT-H	10.2	

Feeding Group Community Distribution

Feeding Group	Quantity	Rel. Abundance (%)
Shredders (SH)	0	0
Scrapers (SC)	21	8
Predators (PR)	4	2
Collector Gatherers (CG)	107	42
Collector Filterers (CF)	122	48
	254	100



APPENDIX J.4

BENTHIC INVESTIGATION SAMPLING AND ANALYSIS REPORT

Johnsonville Fossil Plant - Benthic Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Johnsonville Fossil Plant
New Johnsonville, Tennessee

April 16, 2021

Prepared by:

Tennessee Valley Authority

Revision Record

Revision	Description	Date
0	Submittal to TDEC	April 16, 2021

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APPENDIX C – PHOTOGRAPHIC LOGS

Attachment C.1 – Photographic Logs of Sediment Samples
Attachment C.2 – Photographic Logs of Benthic Invertebrate Community Substrate Samples

Abbreviations

^{o}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
JOF Plant	Johnsonville Fossil Plant
PLM	Polarized Light Microscopy
PPE	Personal Protective Equipment
QAPP	Quality Assurance Project Plan
QC	Quality Control
RJ Lee	RJ Lee Group, Inc.
SAP	Sampling and Analysis Plan
SAR	Sampling and Analysis Report
SOP	Standard Operating Procedure
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner's Order No. OGC15-0177
TestAmerica	Eurofins TestAmerica Inc.
TI	Technical Instruction
TVA	Tennessee Valley Authority

1.0 INTRODUCTION

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

The purpose of the benthic investigation is to characterize sediment chemistry, benthic macroinvertebrate (invertebrate) communities, and benthic invertebrate (mayfly) bioaccumulation in the vicinity of the JOF 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 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 JOF 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 evaluated and 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:

- *Benthic SAP* (Stantec 2018a)
- *Environmental Investigation Plan (EIP)* (Stantec 2018b)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. 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 during the weeks of January 21, 2019, and March 18, 2019. Benthic invertebrate community sampling was conducted the week of October 14, 2019. Mayfly nymph sampling and processing was conducted June 6 through June 8, 2019. Adult mayflies were collected June 11 and 12, 2019, and processed between June 24, 2019 and August 9, 2019. TVA personnel performed the sample collection 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 mayflies was performed by Pace Analytical, Green Bay, Wisconsin. Quantitative analysis of benthic invertebrate community samples was performed by Pennington and

Associates, Inc. in Cookeville, Tennessee. TVA performed verification of quantitative benthic invertebrate community data. Additional Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The primary objectives of the investigation conducted pursuant to the Benthic SAP are to characterize sediment chemistry, benthic invertebrate communities, and benthic invertebrate bioaccumulation in the Tennessee River adjacent to the JOF 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, adjacent, and downstream of the 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 6 inches) and sediments collected from deeper strata for percentage ash
    - Analyze surficial sediment samples for CCR-related constituents
    - Retain sediment sampled from deeper strata for analysis of CCR-related constituents, pending the results of Phase 1 analyses
- Collect quantitative samples of benthic invertebrate populations to assess the condition of the benthic communities
- Collect composite samples of mayfly nymphs and composite samples of mayfly adults for analysis of CCR constituents to evaluate potential bioaccumulation.

Phase 2

- Perform chemical analyses of retained sediment samples from any deeper strata where ash content exceeded 20% 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 16 transect locations, benthic invertebrate populations from 20 transect locations, and mayflies from five 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% in the sediment samples collected within the JOF Plant study area.

3.0 FIELD ACTIVITIES

Sediment sampling was conducted during the weeks of January 21, 2019, and March 18, 2019. Benthic invertebrate community sampling was conducted the week of October 14, 2019. Mayfly nymph sampling and processing was conducted June 6 through June 8, 2019. Adult mayflies were collected June 11 and 12, 2019, and processed between June 24, 2019 and August 9, 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 January 24, 2019 and obtained split samples from surficial sediments collected at each station on transects SED-BH02 and SED-IC01.

During the benthic investigation, TVA:

- Verified and documented sampling locations using the global positioning system (GPS)
- Collected sediment samples from 16 transects
- Collected quantitative benthic invertebrate community samples from 20 transects
- Collected mayfly nymphs from five sampling reaches and generated composite samples of non-depurated nymphs and composite samples of depurated mayfly nymphs for each sampling reach
- Collected adult mayflies from five sampling reaches and generated composite samples of adult male imagoes and composite samples of adult female imagoes for each sampling reach
- Collected quality control (QC) samples including four sediment matrix spike/matrix spike duplicate/lab duplicates, three replicate samples, five field duplicates, five field banks, and five equipment blanks; and four mayfly field duplicates and two equipment blanks
- Shipped the sediment samples to TestAmerica and RJ Lee, and the mayfly samples to Pace Analytical via commercial courier service for analysis
- Conveyed the benthic community samples to Pennington and Associates, Inc. for quantitative analysis.

Details on each activity are presented in the sections below.

3.1 SAMPLING LOCATIONS

The sediment, benthic invertebrate community, and mayfly sampling locations and the TDEC Order CCR units at the JOF Plant (Active Ash Pond 2, Ash Pond Disposal Area 1, DuPont Road Dredge Cell, and

South Rail Loop Area 4) are shown on Exhibits A.1, A.2, A.2a, and A.3 (Appendix A). Tables B.1 through B.3 (Appendix B) provide summaries of the sampling locations. Table B.4 summarizes the corresponding sampling locations for the Surface Stream, Benthic, and Fish Tissue SAPs.

Sediment

Sediment sampling was conducted at 16 transect locations under the benthic investigation scope of work (Exhibit A.1). These locations were selected to generally coincide with the surface stream sampling locations (Stantec 2018c). Sampling locations consisted of eight transects on the mainstream of the Tennessee River and three in associated coves, two transects in the Intake Channel, and three transects in the Boat Harbor. Sample transects were established across the width of the stream perpendicular to the direction of flow. Along each transect, attempts were made to collect samples at center channel, left bank, and right bank stations. “Left bank” and “right bank” were determined with a downstream-facing orientation. In total, sediments were obtained from 38 of the 48 sediment sampling stations proposed in the SAP. Additional information regarding samples that were not collected is provided in Section 3.6.1, Variations in Scope.

Benthic Invertebrate Community

Benthic invertebrate community sampling was conducted at 20 transect locations as shown on Exhibits A.2 and A.2a. These locations were selected to generally coincide with the sediment and surface stream sample locations or with historical biological monitoring locations used to support continuance of the JOF Thermal Limit site discharge National Pollutant Discharge Elimination System permit. Sample transects were established across the width of the stream perpendicular to the direction of flow, and discrete grab samples were collected from five equally-spaced locations along each transect.

Mayfly

Mayfly nymph and adult sample locations were randomly selected within the five sampling reaches depicted on Exhibit A.3. These areas represent background and onsite conditions and coincide with the fish tissue sampling areas (Stantec 2018d), and also incorporate many of the sediment and benthic invertebrate community sample transects.

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, QAPP or SOPs 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 sample identification (ID), collection date and time, waypoint ID, visual assessments of substrate composition, and photograph ID for specimens not retained (i.e., native freshwater mussels).

3.2.1.3 Benthic Invertebrate Bioaccumulation Field Form and Sample Custody Record

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

3.2.1.4 TVA Biota Field Chain-of-Custody

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

3.2.1.5 Laboratory Chain-of-Custody

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

3.2.2 Photographs

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

3.3 SAMPLING METHODS

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

3.3.1 Sediment Sampling

Sediment sampling was conducted at 16 transect locations under Phase 1 of the benthic investigation scope of work (Exhibit A.1). Sediment samples were collected in accordance with ENV-TI-05.80.50, *Soil and Sediment Sampling* and ENV-TI-05.80.04, *Field Sampling Quality Control*. The analytical samples collected, including field duplicates and replicate samples, are listed in Table B.5 (Appendix B). Split samples collected by CEC during this investigation are also identified in Table B.5.

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

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

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

Sediments were homogenized in the field using new, certified clean scoops and decontaminated plastic bowls. Scoops were treated as single-use and were discarded after each sample collection.

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

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

Sediment samples collected from deeper strata for the analysis of CCR Parameters were held pending the results of the Phase 1 analyses. Phase 2 was not implemented since ash content did not exceed 20% in the sediment samples collected within the JOF Plant study area; therefore, sediments collected from deeper strata were not analyzed for CCR Parameters other than percent ash.

Laboratory analysis of CCR Parameters was performed by TestAmerica in Pittsburgh, Pennsylvania and St. Louis, Missouri (radium samples only). RJ Lee in Monroeville, Pennsylvania performed PLM analysis to determine percent ash. Sediment analytical data are presented in Tables B.7 and B.8.

3.3.2 Benthic Invertebrate Community Sampling

Quantitative benthic invertebrate community samples were collected at 20 transect locations under Phase 1 of the benthic investigation scope of work (Exhibits A.2 and A.2a). Benthic invertebrate community samples were collected in accordance with TVA-KIF-SOP-35, *Standard Operating Procedure for: Reservoir Benthic Macroinvertebrate Sampling.* A list of the benthic community samples collected is provided in Table B.9.

Benthic community sampling transects were established perpendicular to the direction of flow and five grab samples were collected along each transect using a standard Ponar dredge. Care was taken to collect samples only from the permanently wetted bottom portion of the reservoir (i.e., below the elevation of the minimum winter pool level). For each sample, water depth and a visual assessment of substrate composition were recorded. Sampling personnel also recorded the estimated percentage of the dredge that was filled with substrate when the sample was retrieved (i.e., % Dredge Full). The field data are provided in Table B.9.

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 practical taxonomic level. The benthic invertebrate taxonomic data are provided in Table B.10.

3.3.3 Mayfly Sampling

Samples of mayfly adults and nymphs were collected from the five river reaches specified under Phase 1 of the benthic investigation scope of work (Exhibit A.3). Mayfly samples were collected in accordance with TVA-KIF-SOP-29, *Standard Operating Procedure for: Mayfly Sampling* and ENV-TI-05.80.04, *Field Sampling Quality Control*. The analytical samples collected, including field duplicates, are listed in Table B.11.

Mayfly nymphs were collected by taking multiple random Ponar or Peterson grabs of sediment within a sample reach and selectively removing the organisms. Each sediment grab was emptied onto a stainless steel, Nitex, or Teflon screen then rinsed with river water to remove fine sediments and expose the nymphs. The nymphs were then removed from the screen using decontaminated stainless steel forceps and placed into a clean plastic container filled with surface water from the sampling location to allow preliminary removal of substrate adhering to the organisms. Nymphs that appeared damaged (i.e., severed head/abdomen) were discarded. Undamaged nymphs collected from an area were randomly sorted into composite samples, with a minimum of 50 to 75 nymphs for each depurated (i.e., held 48-hrs to allow evacuation of digestive system contents) and non-depurated sample. Additional nymphs were collected to form duplicate and archived samples.

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

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

Mayfly samples were submitted to Pace Analytical in Green Bay, Wisconsin, to be analyzed for percent moisture and CCR Parameters. As specified in the SAP, the mayfly tissue analysis did not include chloride, fluoride, pH, sulfate, or radium. The analytical data for mayflies are presented in Table B.12.

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 JOF Plant-specific waste management plan, and local, state, and federal regulations. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite or at another TVA facility.

3.5 SAMPLE SHIPMENT

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

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

3.6 VARIATIONS

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

3.6.1 Variations in Scope

Variations in scope are provided below.

- Sediment samples were not obtained at 10 of the 48 sediment sampling stations proposed in the SAP. Depositional sediments were sparse in the main channel of the Tennessee River, which accounted for seven of the 10 stations where sediment samples were not collected. Substrates in the main river channel were predominantly comprised of varying proportions of cobble, gravel, sands, and/or mollusk shells. Three of the 10 stations at which depositional sediments were not collected were TR01-RB, TR05-CC, and TR06-LB. These stations were located on overbanks immediately adjacent to the main river channel. The substrate in these areas was predominantly hardpan clay, indicating that river velocities prevent depositional sediments from accumulating on these overbanks. The intent of the SAP was to collect samples representative of the sediments at each location. A lack of samples from areas of the river with limited deposition does not affect the ability to characterize the sediments within the JOF Plant study area; thus, the samples collected from 38 stations were sufficient to meet the overall intent of the SAP.

- Replicate samples of surficial sediments were collected at each station on transect SED-IC01. TVA initially sampled transect SED-IC01 on January 22, 2019. On January 24, CEC accompanied TVA to obtained split samples. Because high flows precluded sampling in the mainstream of the Tennessee River; split samples were obtained from surficial sediments collected at each station on transects SED-BH02 and SED-IC01. Consequently, sediment samples collected on transect SED-IC01 on both January 22 and January 24 were submitted to TestAmerica and RJ Lee, to be analyzed for CCR parameters.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- Adult mayflies were sorted by gender and life stage (i.e., subimago and imago). These distinctions were not specified in the SAP. However, studies have shown that constituent concentrations can differ between the genders and life stages of adult mayflies (Arcadis 2016). Therefore, to reduce the possibility of spatial differences in constituent concentrations due to

differing compositions of gender and life stages among samples, two sample types — composites of male imagoes and composites of female imagoes — were submitted from each sample reach for analysis.

- Equipment blanks were collected during the mayfly nymph sampling event as specified in the QAPP. However, the JOF Plant and Cumberland Fossil Plant mayfly nymphs were processed concurrently and the collected equipment blanks were submitted to Pace Analytical under Cumberland Fossil Plant sample IDs. The results of the equipment blanks were evaluated to assess decontamination procedures and were used to evaluate sample data usability during the data validation/verification process performed by EnvStds.
- 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), 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 JOF Plant. The scope of work during this investigation included Phase 1 sediment sampling at 16 transect locations, benthic invertebrate community sampling at 20 transect locations, and mayfly sampling in five river reaches. Sediment, benthic invertebrate community and mayfly sampling locations are summarized in Tables B.1 through B.3, and depicted on Exhibits A.1 through A.3, respectively. Phase 2 was not implemented since ash content did not exceed 20% in the sediment samples collected within the JOF Plant study area.

A summary of sediment samples collected, including field duplicates and replicate samples, is presented in Table B.5. Sediment field data are presented in Table B.6. Sediment analytical data for CCR Parameters are presented in Tables B.7 and B.8. Analytical data were reported by TestAmerica, and data verification or validation was performed by EnvStds.

The benthic community field data are presented in Table B.9, and the taxonomic dataset is presented in Table B.10. Quantitative benthic invertebrate community data were reported by Pennington and Associates, Inc. and verified by TVA.

A summary of invertebrate bioaccumulation (mayfly) samples collected, along with field duplicates, is presented in Table B.11. Mayfly analytical data for percent moisture and CCR Parameters, excluding chloride, fluoride, pH, sulfate, and radium are presented in Tables B.12. Analytical data were reported by Pace Analytical, and data verification or validation was performed by EnvStds.

TVA has completed the benthic investigation at the JOF Plant in New Johnsonville, 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 event 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

Arcadis. 2016. *Updated Data Analysis and Temporal Trend Evaluations in Biota: 2009 – 2015, Kingston Ash Recovery Project.* Prepared for Tennessee Valley Authority. October 18, 2016.

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Stantec Consulting Services Inc. (Stantec). 2018a. *Benthic Sampling and Analysis Plan (SAP), Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec 2018c. *Surface Stream Sampling and Analysis Plan (SAP), Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec 2018d. *Fish Tissue Sampling and Analysis Plan (SAP), Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

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

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

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

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

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

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

TVA. ENV-TI-05.80.50, *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

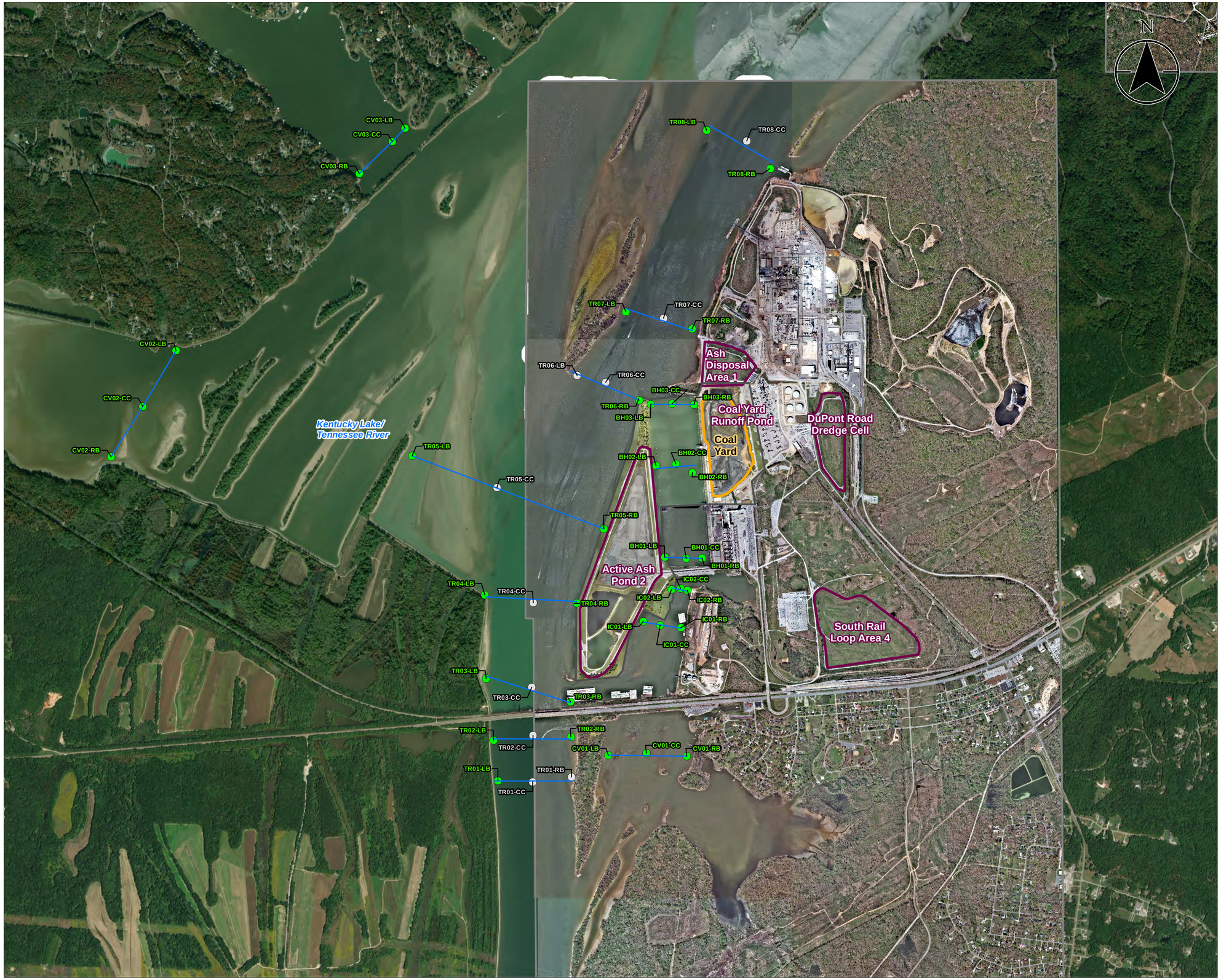


Exhibit No.

A.1

Title

Sediment Sampling Locations

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2021-04-12
Technical Review by JS on 2021-04-12

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

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

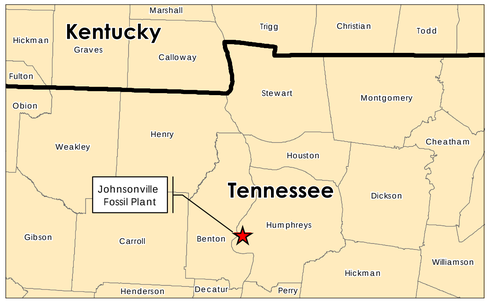
Legend

Legend

- Sediment Sample Locations - Collected
- Sediment Sample Locations - Attempted: Insufficient Sediment for Sampling
- Sediment Sample Location Transects
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



Stantec TVA

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U:\TVA\EIP\175568286_JOF_Phase2\gis\mxd\Env_SARS\JOF_ExhibitA1_Sediment_Sampling_Locations.mxd Revised: 2021-04-12 By: mbough

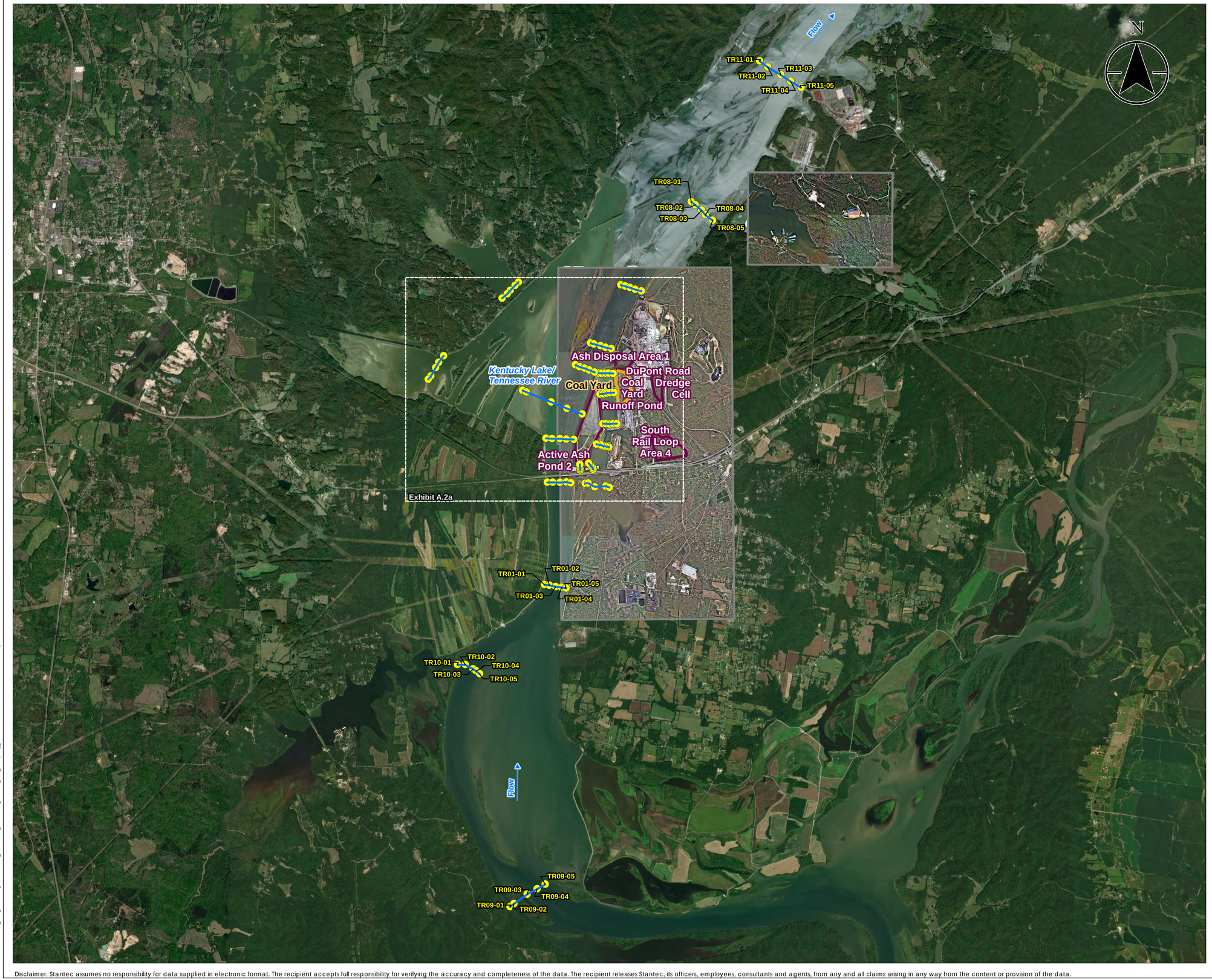


Exhibit No.

A.2

Title

Benthic Invertebrate Community Sampling Locations

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2021-01-13
Technical Review by AT on 2021-01-13

0 3,000 6,000 9,000 12,000 Feet

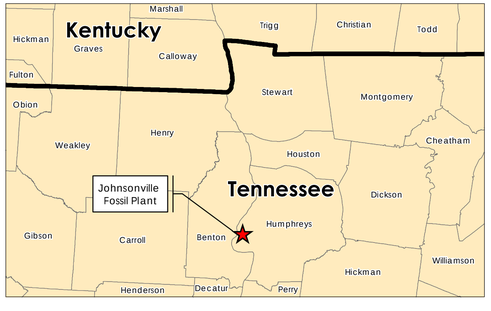
1:36,000 (At original document size of 22x34)

Legend

- Benthic Invertebrate Community Sampling Locations
- Benthic Invertebrate Community Sampling Locations - Transect
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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U:\TVA-EIP\175568286_JOF_Phase2\gis\mxd\Env_SARS\JOF_ExhibitA.2_Benthic_Inv_Sampling_Locations.mxd Revised: 2021-01-13 By: tblackman

Exhibit No.

A.2a

Title

Benthic Invertebrate Community Sampling Locations

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2021-01-13
Technical Review by AT on 2021-01-13

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

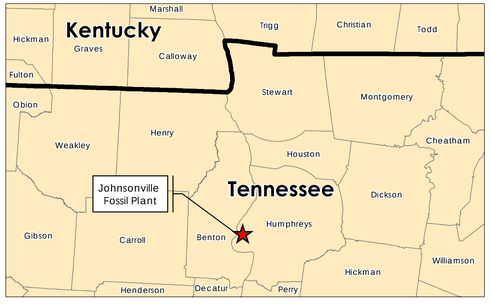
1:8,400 (At original document size of 22x34)

Legend

- Benthic Invertebrate Community Sampling Locations
- Benthic Invertebrate Community Sampling Locations - Transect
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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U:\TVA-EIP\175568286_JOF_Phase2\gis\mxd\Env_SARS\JOF_ExhibitA.2a_Benthic_Inv1_Sampling_Locations.mxd Revised: 2021-01-13 By: tblackman

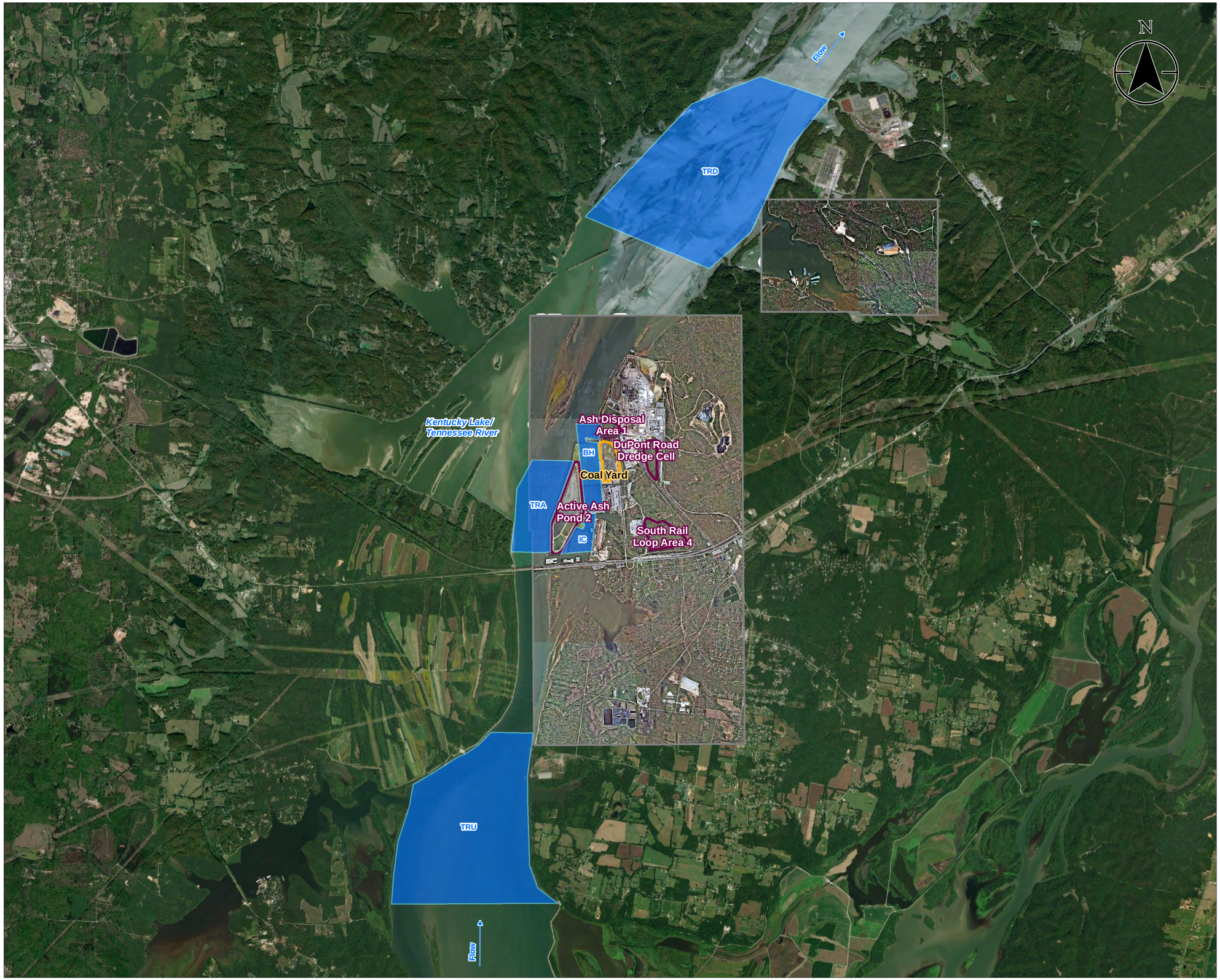


Exhibit No.

A.3

Title

Mayfly Sampling Reaches

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by LMB on 2021-04-15
Technical Review by ZW on 2021-04-15

0 2,500 5,000 7,500 10,000 Feet

1:30,000 (At original document size of 22x34)

Legend

Mayfly Sampling Locations
- TRU – Tennessee River Upstream
- TRA – Tennessee River Adjacent
- TRD – Tennessee River Downstream
- IC – Intake Channel
- BH – Boat Harbor

2017 Imagery Boundary

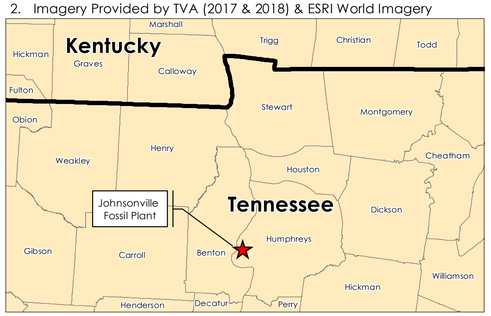
2018 Imagery Boundary

CCR Unit Area (Approximate)

Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



Stantec TVA

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U:\TVA-EIP\175568286_JOF_Phase2\gis\mxd\Env_SARS\JOF_Exhibit A.3_Mayfly_Sampling_Reach.mxd Revised: 2021-04-15 By: mbough

APPENDIX B - TABLES

TABLE B.1 – Sediment Sampling Locations
Johnsonville Fossil Plant

Transect Location ID	Description
SED-TR01	Tennessee River Upstream of Plant (Background)
SED-TR02	Tennessee River Upstream of Plant (Background)
SED-TR03	Tennessee River Upstream of Plant (Background)
SED-TR04	Tennessee River on West Side of Ash Pond 2
SED-TR05	Tennessee River on West Side of Ash Pond 2
SED-TR06	Tennessee River at Northern End of Ash Pond 2 and Southern End of Ash Pond 1
SED-TR07	Tennessee River at Northern End of Ash Pond 1
SED-TR08	Tennessee River Downstream from Ash Ponds
SED-IC01	Intake Channel Adjacent to Ash Pond 2
SED-IC02	Intake Channel Adjacent to Ash Pond 2
SED-BH01	Boat Harbor Adjacent to Ash Pond 2
SED-BH02	Boat Harbor Adjacent to Ash Pond 2
SED-BH03	Boat Harbor North of Ash Pond 2
SED-CV01	Cove on East Side of Tennessee River Upstream from Plant (Indian Creek)
SED-CV02	Cove on West Side of Tennessee River (Cypress Creek)
SED-CV03	Cove on West Side of Tennessee River (Beaverdam Creek)

Notes:

ID Identification

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

Transect Location ID	Description
MAC-TR01	Tennessee River Upstream of Plant (Background)
MAC-TR02	Tennessee River Upstream of Plant (Background)
MAC-TR03	Tennessee River on West Side of Ash Pond 2 at NPDES Outfall
MAC-TR04	Tennessee River on West Side of Ash Pond 2
MAC-TR05	Tennessee River at Northern End of Ash Pond 2 and Southern End of Ash Pond 1
MAC-TR06	Tennessee River at Northern End of Ash Pond 1
MAC-TR07	Tennessee River Downstream from Ash Ponds
MAC-TR08	Tennessee River Downstream from Plant
MAC-TR09	Tennessee River Upstream from Plant
MAC-TR10	Tennessee River Upstream from Plant
MAC-TR11	Tennessee River Downstream from Plant
MAC-CV01	Cove on East Side of Tennessee River Upstream from Plant (Indian Creek)
MAC-CV02	Cove on West Side of Tennessee River (Cypress Creek)
MAC-CV03	Cove on West Side of Tennessee River (Beaverdam Creek)
MAC-IC01	Intake Channel Adjacent to Ash Pond 2
MAC-IC02	Intake Channel Adjacent to Ash Pond 2
MAC-IC03	Intake Channel Adjacent to Ash Pond 2
MAC-BH01	Boat Harbor Adjacent to Ash Pond 2
MAC-BH02	Boat Harbor Adjacent to Ash Pond 2
MAC-BH03	Boat Harbor Downstream from Ash Pond 2

Notes:

ID Identification

TABLE B.3 – Mayfly Sampling Reaches
Johnsonville Fossil Plant

Sample Reach ID	Description
TRU	Tennessee River Upstream from Plant
TRA	Tennessee River Adjacent to Plant
TRD	Tennessee River Downstream from Plant
IC	Intake Channel
BH	Boat Harbor

Notes:

ID Identification

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

Corresponding Sampling Locations				
Surface Stream	**Sediment**	**Benthic Community**	**Mayfly**	**Fish Tissue**
–	–	MAC-TR01	–	–
STR-TR01	SED-TR01	–	–	–
STR-TR02	SED-TR02	MAC-TR02	–	–
STR-TR03	SED-TR03	–	–	–
STR-TR04	SED-TR04	MAC-TR03	TRA	TRA
STR-TR05	SED-TR05	MAC-TR04		
STR-TR06	SED-TR06	MAC-TR05	–	–
STR-TR07	SED-TR07	MAC-TR06	–	–
STR-TR08	SED-TR08	MAC-TR07	–	–
–	–	MAC-TR08	–	–
–	–	MAC-TR09	–	–
–	–	MAC-TR10	TRU	TRU
–	–	MAC-TR11	TRD	TRD
STR-CV01	SED-CV01	MAC-CV01	–	–
STR-CV02	SED-CV02	MAC-CV02	–	–
STR-CV03	SED-CV03	MAC-CV03	–	–
–	–	MAC-IC01	–	–
–	–	MAC-IC02	–	–
STR-IC01	SED-IC01	MAC-IC03	IC	IC
STR-IC02	SED-IC02	–		
STR-BH01	SED-BH01	MAC-BH01	BH	BH
STR-BH02	SED-BH02	MAC-BH02		
STR-BH03	SED-BH03	MAC-BH03		

Notes:

– Not applicable

TABLE B.5 – Summary of Sediment Samples
Johnsonville Fossil Plant
January and March 2019

					Analysis Type					
Location ID	Station ID[1]	Sample ID	Parent Sample ID	Sample Type[2]	% ASH	Total Metals	Total Mercury	Anions	pH (Laboratory)	Radium-226, Radium-228, Radium-226+228
SED-TR01	LB	JOF-SED-TR01-CORLB-0.0/0.5-20190320		N	x	x	x	x	x	x
	LB	JOF-SED-TR01-CORLB-0.5/1.5-20190320		N	x					
	LB	JOF-SED-TR01-CORLB-1.5/2.4-20190320		N	x					
SED-TR02	LB	JOF-SED-TR02-CORLB-0.0/0.5-20190320		N	x	x	x	x	x	x
	LB	JOF-SED-TR02-CORLB-0.5/2.3-20190320		N	x					
	RB	JOF-SED-TR02-CORRB-0.0/0.5-20190320		N	x	x	x	x	x	x
	RB	JOF-SED-TR02-CORRB-0.5/1.5-20190320		N	x					
	RB	JOF-SED-TR02-CORRB-1.5/2.7-20190320		N	x					
SED-TR03	LB	JOF-SED-TR03-CORLB-0.0/0.5-20190319		N	x	x	x	x	x	x
	LB	JOF-SED-TR03-DUP02-20190319	JOF-SED-TR03-CORLB-0.0/0.5-20190319	FD	x	x	x	x	x	x
	RB	JOF-SED-TR03-CORRB-0.0/0.5-20190319		N	x	x	x	x	x	x
SED-TR04	LB	JOF-SED-TR04-CORLB-0.0/0.5-20190319		N	x	x	x	x	x	x
	RB	JOF-SED-TR04-CORRB-0.0/0.5-20190319		N	x	x	x	x	x	x
SED-TR05	LB	JOF-SED-TR05-CORLB-0.0/0.5-20190319		N	x	x	x	x	x	x
	LB	JOF-SED-TR05-CORLB-0.5/2.2-20190319		N	x					
	LB	JOF-SED-TR05-CORLB-2.2/3.6-20190319		N	x					
	LB	JOF-SED-TR05-DUP01-20190319	JOF-SED-TR05-CORLB-0.0/0.5-20190319	FD	x	x	x	x	x	x
	RB	JOF-SED-TR05-CORRB-0.0/0.5-20190319		N	x	x	x	x	x	x
SED-TR06	RB	JOF-SED-TR06-CORRB-0.0/0.5-20190319		N	x	x	x	x	x	x
SED-TR07	LB	JOF-SED-TR07-CORLB-0.0/0.5-20190319		N	x	x	x	x	x	x
	RB	JOF-SED-TR07-CORRB-0.0/0.5-20190319		N	x	x	x	x	x	x
SED-TR08	LB	JOF-SED-TR08-CORLB-0.0/0.5-20190319		N	x	x	x	x	x	x
	LB	JOF-SED-TR08-CORLB-0.5/1.5-20190319		N	x					
	RB	JOF-SED-TR08-CORRB-0.0/0.5-20190319		N	x	x	x	x	x	x
SED-IC01	LB	JOF-SED-IC01-CORLB-0.0/0.5-20190122		N	x	x	x	x	x	x
	LB	JOF-SED-IC01-CORLB-0.0/0.5-20190124		RS[3]	x	x	x	x	x	x
	LB	JOF-SED-IC01-DUP01-20190122	JOF-SED-IC01-CORLB-0.0/0.5-20190122	FD	x	x	x	x	x	x
	CC	JOF-SED-IC01-CORCC-0.0/0.5-20190122		N	x	x	x	x	x	x
	CC	JOF-SED-IC01-CORCC-0.0/0.5-20190124		RS[3]	x	x	x	x	x	x
	CC	JOF-SED-IC01-CORCC-0.5/1.6-20190122		N	x					
	RB	JOF-SED-IC01-CORRB-0.0/0.5-20190122		N	x	x	x	x	x	x
	RB	JOF-SED-IC01-CORRB-0.0/0.5-20190124		RS[3]	x	x	x	x	x	x
	RB	JOF-SED-IC01-CORRB-0.5/1.5-20190122		N	x					

See notes on last page.

TABLE B.5 – Summary of Sediment Samples
Johnsonville Fossil Plant
January and March 2019

					Analysis Type					
Location ID	Station ID[1]	Sample ID	Parent Sample ID	Sample Type[2]	% ASH	Total Metals	Total Mercury	Anions	pH (Laboratory)	Radium-226, Radium-228, Radium-226+228
SED-IC02	LB	JOF-SED-IC02-CORLB-0.0/0.5-20190122		N	x	x	x	x	x	x
	LB	JOF-SED-IC02-CORLB-0.5/2.0-20190122		N	x					
	LB	JOF-SED-IC02-CORLB-2.0/3.0-20190122		N	x					
	LB	JOF-SED-IC02-CORLB-3.0/3.7-20190122		N	x					
	CC	JOF-SED-IC02-CORCC-0.0/0.5-20190122		N	x	x	x	x	x	x
	CC	JOF-SED-IC02-CORCC-0.5/3.0-20190122		N	x					
	CC	JOF-SED-IC02-CORCC-3.0/5.4-20190122		N	x					
	RB	JOF-SED-IC02-CORRB-0.0/0.7-20190122		N	x	x	x	x	x	x
SED-BH01	LB	JOF-SED-BH01-CORLB-0.0/0.5-20190122		N	x	x	x	x	x	x
	LB	JOF-SED-BH01-CORLB-0.5/1.5-20190122		N	x					
	CC	JOF-SED-BH01-CORCC-0.0/0.5-20190122		N	x	x	x	x	x	x
	CC	JOF-SED-BH01-CORCC-0.5/1.6-20190122		N	x					
	RB	JOF-SED-BH01-CORRB-0.0/0.5-20190122		N	x	x	x	x	x	x
SED-BH02	LB	JOF-SED-BH02-CORLB-0.0/0.5-20190124		N[3]	x	x	x	x	x	x
	LB	JOF-SED-BH02-CORLB-0.5/3.0-20190124		N	x					
	LB	JOF-SED-BH02-CORLB-3.0/4.7-20190124		N	x					
	LB	JOF-SED-BH02-CORLB-4.7/5.7-20190124		N	x					
	CC	JOF-SED-BH02-CORCC-0.0/0.5-20190124		N[3]	x	x	x	x	x	x
	CC	JOF-SED-BH02-CORCC-0.5/1.7-20190124		N	x					
	CC	JOF-SED-BH02-CORCC-1.7/3.0-20190124		N	x					
	CC	JOF-SED-BH02-CORCC-3.0/3.7-20190124		N	x					
	RB	JOF-SED-BH02-CORRB-0.0/0.5-20190124		N[3]	x	x	x	x	x	x
	RB	JOF-SED-BH02-DUP01-20190124	JOF-SED-BH02-CORRB-0.0/0.5-20190124	FD	x	x	x	x	x	x
SED-BH03	LB	JOF-SED-BH03-CORLB-0.0/0.5-20190122		N	x	x	x	x	x	x
	LB	JOF-SED-BH03-CORLB-0.5/2.5-20190122		N	x					
	LB	JOF-SED-BH03-CORLB-2.5/4.1-20190122		N	x					
	CC	JOF-SED-BH03-CORCC-0.0/0.5-20190122		N	x	x	x	x	x	x
	CC	JOF-SED-BH03-CORCC-0.5/2.5-20190122		N	x					
	RB	JOF-SED-BH03-CORRB-0.0/0.5-20190122		N	x	x	x	x	x	x
	RB	JOF-SED-BH03-CORRB-0.5/3.0-20190122		N	x					
	RB	JOF-SED-BH03-CORRB-3.0/5.5-20190122		N	x					

See notes on last page.

TABLE B.5 – Summary of Sediment Samples
Johnsonville Fossil Plant
January and March 2019

					Analysis Type					
Location ID	Station ID[1]	Sample ID	Parent Sample ID	Sample Type[2]	% ASH	Total Metals	Total Mercury	Anions	pH (Laboratory)	Radium-226, Radium-228, Radium-226+228
SED-CV01	LB	JOF-SED-CV01-CORLB-0.0/0.5-20190122		N	x	x	x	x	x	x
	LB	JOF-SED-CV01-CORLB-0.5/2.0-20190122		N	x					
	LB	JOF-SED-CV01-CORLB-2.0/3.8-20190122		N	x					
	CC	JOF-SED-CV01-CORCC-0.0/0.5-20190122		N	x	x	x	x	x	x
	RB	JOF-SED-CV01-CORRB-0.0/0.5-20190122		N	x	x	x	x	x	x
SED-CV02	LB	JOF-SED-CV02-CORLB-0.0/0.5-20190123		N	x	x	x	x	x	x
	LB	JOF-SED-CV02-CORLB-0.5/2.5-20190123		N	x					
	CC	JOF-SED-CV02-CORCC-0.0/0.5-20190123		N	x	x	x	x	x	x
	CC	JOF-SED-CV02-CORCC-0.5/1.6-20190123		N	x					
	RB	JOF-SED-CV02-CORRB-0.0/0.5-20190123		N	x	x	x	x	x	x
	RB	JOF-SED-CV02-DUP01-20190123	JOF-SED-CV02-CORRB-0.0/0.5-20190123	FD	x	x	x	x	x	x
SED-CV03	LB	JOF-SED-CV03-CORLB-0.0/0.5-20190123		N	x	x	x	x	x	x
	LB	JOF-SED-CV03-CORLB-0.5/2.5-20190123		N	x					
	LB	JOF-SED-CV03-CORLB-2.5/5.3-20190123		N	x					
	CC	JOF-SED-CV03-CORCC-0.0/0.5-20190123		N	x	x	x	x	x	x
	RB	JOF-SED-CV03-CORRB-0.0/0.5-20190123		N	x	x	x	x	x	x
	RB	JOF-SED-CV03-CORRB-0.5/1.5-20190123		N	x					
	RB	JOF-SED-CV03-CORRB-1.5/2.7-20190123		N	x					

Notes:

% Ash	Polarized Light Microscopy (PLM)
Total Metals	SW-846 6020A
Total Mercury	SW-846 7471B
Anions	SW-846 9056A
pH (laboratory)	SW-846 9045D
Radium-226, Radium-228, Radium-226+228	SW-846 901.1
ID	Identification

1. Station ID: LB=Left Bank, CC=Center Channel, RB=Right Bank (left bank and right bank determined with a downstream-facing orientation)
2. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate, RS=Replicate Sample (a second sample collected independently and from the same area as a Normal sample)
3. Split Sample: A field sample split into separate aliquots for TVA and TDEC, and analyzed by independent laboratories.

TABLE B.6 – Sediment Sampling Field Data
Johnsonville Fossil Plant
January and March 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizon (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-TR01-LB	3/20/2019	8.3	Vibecore	2.4	JOF-SED-TR01-CORLB-0.0/0.5-20190320	0.0 – 0.5	1-4	Gray fines mixed with some sand. Core uniform in color and texture. Core sectioned at 1.5 ft.
					JOF-SED-TR01-CORLB-0.5/1.5-20190320	0.5 – 1.5		
					JOF-SED-TR01-CORLB-1.5/2.4-20190320	1.5 – 2.4		
SED-TR01-CC	3/20/2019	45.5	Ponar	–	No Sample	–	N/A	Cobble and gravel. Several Ponar deployments. No depositional sediments.
SED-TR01-RB	3/20/2019	4.5	Vibecore	0.9	No Sample	–	6-8	Parent material
			Ponar	–	No Sample	–	N/A	Thin surface layer of sand and *Corbicula* or aqueous fines and *Corbicula* overlaying hardpan clay. Several Ponar deployments. Insufficient depositional sediments to form a sample.
SED-TR02-LB	3/20/2019	5.0	Vibecore	2.3	JOF-SED-TR02-CORLB-0.0/0.5-20190320	0.0 – 0.5	9-10	Sandy-silt (fines)
					JOF-SED-TR02-CORLB-0.5/2.3-20190320	0.5 – 2.3		Sandy-silt (fines); increased composition of sand below surface strata
SED-TR02-CC	3/20/2019	51.2	Ponar	–	No Sample	–	11	Gravel
SED-TR02-RB	3/20/2019	3.8	Vibecore	2.7	JOF-SED-TR02-CORRB-0.0/0.5-20190320	0.0 – 0.5	12-14	Shallow surface layer of brown fines overlaying gray fines; surficial sediments more consolidated than lower core. Core color largely uniform.
					JOF-SED-TR02-CORRB-0.5/1.5-20190320	0.5 – 1.5		Gray fines with increased composition of sand.
					JOF-SED-TR02-CORRB-1.5/2.7-20190320	1.5 – 2.7		
SED-TR03-LB	3/19/2019	3.6	Ponar	–	JOF-SED-TR03-CORLB-0.0/0.5-20190319	0.0 – 0.5	15	Brown fines; composite of two Ponar grabs to obtain sufficient sample volume for duplicate.
					JOF-SED-TR03-DUP02-20190319	0.0 – 0.5		
SED-TR03-CC	3/19/2019	57.6	Ponar	–	No Sample	–	16	Cobble and gravel; two Ponar deployments
SED-TR03-RB	3/19/2019	10.0	Vibecore	0.5	No Sample	–	17-19	Upper core (0.2 ft) mix of consolidated fines, *Corbicula* shell, and gravel. Lower core (0.3 ft) parent material.
			Ponar	–	JOF-SED-TR03-CORRB-0.0/0.5-20190319	0.0 – 0.5	20	Thin surface layer of brown fines overlaying gray-brown fines. Composite of three Ponar grabs to obtain sufficient sample volume.
SED-TR04-LB	3/19/2019	4.4	Vibecore	0.5	No Sample	–	N/A	Shallow layer of fines overlaying parent material.
		4.4	Ponar	–	No Sample	–	N/A	Insufficient depositional sediments to form a sample. Core largely parent material.
		N/A	Ponar	–	JOF-SED-TR04-CORLB-0.0/0.5-20190319	0.0 – 0.5	22	Brown fines mixed with *Corbicula*. Sample collected at a location offset ~100 ft downstream from the proposed sample location. Composite of three Ponar grabs to obtain sufficient sample volume.
SED-TR04-CC	3/19/2019	49.9	Ponar	–	No Sample	–	23	Gravel
SED-TR04-RB	3/19/2019	5.0	Vibecore	0.9	No Sample	–	24-26	Parent material
			Ponar	–	JOF-SED-TR04-CORRB-0.0/0.5-20190319	0.0 – 0.5	27	Brown and gray-brown fines mixed with sand. Composite of three Ponar grabs to obtain sufficient sample volume.

See notes on final page.

TABLE B.6 – Sediment Sampling Field Data
Johnsonville Fossil Plant
January and March 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizon (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-TR05-LB	3/19/2019	5.1	Vibecore	4.1	JOF-SED-TR05-CORLB-0.0/0.5-20190319	0.0 – 0.5	28-31	Shallow surface layer of brown fines overlaying gray fines.
					JOF-SED-TR05-DUP01-20190319	0.0 – 0.5		
					JOF-SED-TR05-CORLB-0.5/2.2-20190319	0.5 – 2.2		Gray fines
					JOF-SED-TR05-CORLB-2.2/3.6-20190319	2.2 – 3.6		
					–	3.6 – 4.1		Parent material
SED-TR05-CC	3/19/2019	7.1	Vibecore	1.1	No Sample	–	32-37	Mollusk/mollusk shell and sand overlaying parent material.
		7.1-7.2	Ponar	–	No Sample	–	N/A	Insufficient recovery of depositional sediments to form a sample. Multiple Ponar deployments. Sampled on the overbank near the main channel and at several locations along approximately 700 ft of the sample transect while moving toward site TR05-LB.
SED-TR05-RB	3/19/2019	4.0	Vibecore	1.4	JOF-SED-TR05-CORRB-0.0/0.5-20190319	0.0 – 0.5	38-40	Surface layer of mollusk/mollusk shell (*Corbicula*) mixed with brown fines, overlaying gray fines.
					–	0.8 – 1.4		Parent material
SED-TR06-LB	3/19/2019	4.0	Vibecore	–	No Sample	–	N/A	No substrate obtained.
		4.0	Ponar	–	No Sample	–	41	Mollusk/mollusk shell
SED-TR06-CC	3/19/2019	60.0	Ponar	–	No Sample	–	N/A	Two Ponar deployments at TR06-CC with no depositional sediments. Additional Ponar deployments within a broad area around TR06-CC (water depths 4.5 to 60 ft); insufficient depositional sediments to form a sample.
SED-TR06-RB	3/19/2019	20.1	Vibecore	–	No Sample	–	N/A	Two Vibecore deployments. No depositional sediments obtained.
		7.0-20.1	Ponar	–	JOF-SED-TR06-CORRB-0.0/0.5-20190319	0.0 – 0.5	43-47	Light-brown, unconsolidated fines containing *Corbicula* and/or freshwater mussels. Multiple Ponar deployments. Composite of three Ponar grabs to obtained sufficient sample volume.
SED-TR07-LB	3/19/2019	7.5	Vibecore	1.1	JOF-SED-TR07-CORLB-0.0/0.5-20190319	0.0 – 0.5	48-50	Gray fines with sand
					–	0.5 – 0.9		Parent material
SED-TR07-CC	3/19/2019	51.2	Ponar	–	No Sample	–	51-52	Mollusk/mollusk shell. Three Ponar deployments; third deployment was offset approximately 800ft downstream from sample transect; water depth 49.2 ft.
SED-TR07-RB	3/19/2019	5.5	Vibecore	1.0	JOF-SED-TR07-CORRB-0.0/0.5-20190319	0.0 – 0.5	53-55	Surface layer (0.0-0.15 ft) of *Corbicula* mixed with light-brown fines, overlaying gray-brown fines containing streaks of black.
					–	0.75 – 1.0		Parent material
SED-TR08-LB	3/19/2019	5.0	Vibecore	1.8	JOF-SED-TR08-CORLB-0.0/0.5-20190319	0.0 – 0.5	56-58	Gray fines with some sand
					JOF-SED-TR08-CORLB-0.5/1.5-20190319	0.5 – 1.5		Gray fines; more dense than surficial sediments
					–	1.5 – 1.8		Parent material
SED-TR08-CC	3/19/2019	50.2	Ponar	–	No Sample	–	59	Gravel, shell, and live mollusk

See notes on final page.

TABLE B.6 – Sediment Sampling Field Data
Johnsonville Fossil Plant
January and March 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizon (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-TR08-RB	3/19/2019	4.2-5.5	Vibecore	–	No Sample	–	60-62	Mollusk shell overlaying hardpan clay. Two Vibecore deployments.
		16.4	Ponar	–	JOF-SED-TR08-CORRB-0.0/0.5-20190319	0.0 – 0.5	63-64	Gray-brown fines mixed with sand (Photograph ID 64). Additional Ponar deployments at water depths ranging from 5.5 to 16.6 ft yielded insufficient depositional sediments to form a sample. Substrates: mollusk/mollusk shell and hardpan clay, and mollusk/mollusk shell mixed with sand (Photograph ID 63).
SED-IC01-LB	1/22/2019	4.0	Vibecore	0.7	–	–	65	Insufficient depositional sediments to form a sample. Core largely parent material.
		4.0	Ponar	–	JOF-SED-IC01-CORLB-0.0/0.5-20190122	0.0 – 0.5	66	Gray fines mixed with gravel and mollusk shell (*Corbicula*)
			Ponar	–	JOF-SED-IC01-DUP01-20190122	0.0 – 0.5		
SED-IC01-LB	1/24/2019	5.0	Ponar	–	JOF-SED-IC01-CORLB-0.0/0.5-20190124	0.0 – 0.5	67	Thin surface layer of light-brown fines overlaying gray fines
SED-IC01-CC	1/22/2019	5.0	Vibecore	1.9	JOF-SED-ICO1-CORCC-0.0/0.5-20190122	0.0 – 0.5	68-69	Light-gray fines
					JOF-SED-ICO1-CORCC-0.5/1.6-20190122	0.5 – 1.6		
					–	1.6 – 1.9		Parent material
SED-IC01-CC	1/24/2019	4.4	Ponar	–	JOF-SED-IC01-CORCC-0.0/0.5-20190124	0.0 – 0.5	70	Light-brown, thin surface layer of unconsolidated fines overlaying brownish-gray fines
SED-IC01-RB	1/22/2019	15.1	Vibecore	1.9	JOF-SED-IC01-CORRB-0.0/0.5-20190122	0.0 – 0.5	71-72	Gray fines
					JOF-SED-IC01-CORRB-0.5/1.5-20190122	0.5 – 1.5		
					–	1.5 – 1.9		Parent material
SED-IC01-RB	1/24/2019	15.4	Ponar	–	JOF-SED-IC01-CORRB-0.0/0.5-20190124	0.0 – 0.5	73	Fines mixed with sand
SED-IC02-LB	1/22/2019	7.9	Vibecore	3.7	JOF-SED-IC02-CORLB-0.0/0.5-20190122	0.0 – 0.5	74-76	Surface layer (0.0-0.2) of fines mixed with mollusk/mollusk shell (*Corbicula*) overlaying gray fines.
					JOF-SED-IC02-CORLB-0.5/2.0-20190122	0.5 – 2.0		
					JOF-SED-IC02-CORLB-2.0/3.0-20190122	2.0 – 3.0		Higher composition of sand; layers with varying proportions of fines and sand.
					JOF-SED-IC02-CORLB-3.0/3.7-20190122	3.0 – 3.7		
SED-IC02-CC	1/22/2019	13.0	Vibecore	5.4	JOF-SED-IC02-CORCC-0.0/0.5-20190122	0.0 – 0.5	77-80	Light-gray fines; extremely smooth texture. Core uniform in color and texture. Core sectioned at 3.0 ft.
					JOF-SED-IC02-CORCC-0.5/3.0-20190122	0.5 – 3.0		
					JOF-SED-IC02-CORCC-3.0/5.4-20190122	3.0 – 5.4		
SED-IC02-RB	1/22/2019	14.6	Vibecore	1.1	JOF-SED-IC02-CORRB-0.0/0.7-20190122	0.0 – 0.7	81-84	Gray to brownish-gray fines. Composite of upper 0.7 ft of core.
					–	0.7 – 1.1		Parent material
SED-BH01-LB	1/22/2019	14.9	Vibecore	1.5	JOF-SED-BH01-CORLB-0.0/0.5-20190122	0.0 – 0.5	85-87	Gray fines mixed with coal gravel and small grains of coal.
					JOF-SED-BH01-CORLB-0.5/1.5-20190122	0.5 – 1.5		

See notes on final page.

TABLE B.6 – Sediment Sampling Field Data
Johnsonville Fossil Plant
January and March 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizon (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-BH01-CC	1/22/2019	16.6	Vibecore	1.6	JOF-SED-BH01-CORCC-0.0/0.5-20190122	0.0 – 0.5	88-89	Gray fines with small grains of coal
					JOF-SED-BH01-CORCC-0.5/1.6-20190122	0.5 – 1.6		
SED-BH01-RB	1/22/2019	16.0	Vibecore	–	No Sample	–	N/A	No substrate obtained. Two Vibecore deployments.
		16.0	Ponar	–	No Sample	–	N/A	Two to three inch rocks mixed with mollusk shell and limited fines. Two Ponar deployments.
		16.0	Ponar	–	JOF-SED-BH01-CORRB-0.0/0.5-20190122	0.0 – 0.5	N/A	Collected full Ponar; substrate description not available
SED-BH02-LB	1/24/2019	10.2	Vibecore	5.7	JOF-SED-BH02-CORLB-0.0/0.5-20190124	0.0 – 0.5	91-94	Gray fines
					JOF-SED-BH02-CORLB-0.5/3.0-20190124	0.5 – 3.0		
					JOF-SED-BH02-CORLB-3.0/4.7-20190124	3.0 – 4.7		Gray fines that appear to be peppered with small grains of coal
					JOF-SED-BH02-CORLB-4.7/5.7-20190124	4.7 – 5.7		Light-gray, smooth textured fines
SED-BH02-CC	1/24/2019	21.0	Vibecore	3.7	JOF-SED-BH02-CORCC-0.0/0.5-20190124	0.0 – 0.5	95-98	Light-gray, smooth textured fines
					JOF-SED-BH02-CORCC-0.5/1.7-20190124	0.5 – 1.7		Light-gray, smooth textured fines; more dense than surficial sediments
					JOF-SED-BH02-CORCC-1.7/3.0-20190124	1.7 – 3.0		
					JOF-SED-BH02-CORCC-3.0/3.7-20190124	3.0 – 3.7		Smooth textured fines; lighter shade of gray than other strata.
SED-BH02-RB	1/24/2019	14.4-19.2	Vibecore	0.9-1.3	No Sample	–	99, 101-104	Coal, or coal and gravel overlaying dense parent material. Three Vibecore deployments (Photograph IDs 98 and 100-103; denoted as Location IDs "SED-BH02-RB a", "SED-BH02-RB c", and "SED-BH02-RB d" in photographic log).
		19.3	Ponar	–	JOF-SED-BH02-CORRB-0.0/0.5-20190124	0.0 – 0.5	100 and 105	Shallow surface layer of light-brown fines overlaying gray fines. Composite of three Ponar grabs (Photograph ID 105; denoted as Location ID "SED-BH02-RB"). Additional Ponar deployments at water depths of 14.4 and 19.2 ft yielded coal, coal and gravel, and coal and *Corbicula* (one photograph available: Photograph ID 100; denoted as location "SED-BH02-RB b" in photographic log).
					JOF-SED-BH02-DUP01-20190124	0.0 – 0.5		
SED-BH03-LB	1/22/2019	14.3	Vibecore	4.1	JOF-SED-BH03-CORLB-0.0/0.5-20190122	0.0 – 0.5	106-109	Gray fines; core uniform in appearance. Core sectioned at 2.5 ft.
					JOF-SED-BH03-CORLB-0.5/2.5-20190122	0.5 – 2.5		
					JOF-SED-BH03-CORLB-2.5/4.1-20190122	2.5 – 4.1		
SED-BH03-CC	1/22/2019	15.3	Vibecore	2.5	JOF-SED-BH03-CORCC-0.0/0.5-20190122	0.0 – 0.5	110-112	Light-gray-brown fines with the appearance of fine coal gravel/fragments mixed throughout.
					JOF-SED-BH03-CORCC-0.5/2.5-20190122	0.5 – 2.5		
SED-BH03-RB	1/22/2019	11.1	Vibecore	5.5	JOF-SED-BH03-CORRB-0.0/0.5-20190122	0.0 – 0.5	113-115	Light-gray fines; core uniform in appearance. Core sectioned at 3.0 ft.
					JOF-SED-BH03-CORRB-0.5/3.0-20190122	0.5 – 3.0		
					JOF-SED-BH03-CORRB-3.0/5.5-20190122	3.0 – 5.5		
SED-CV01-LB	1/22/2019	3.2	Vibecore	3.8	JOF-SED-CV01-CORLB-0.0/0.5-20190122	0.0 – 0.5	116-117	Gray fines; core uniform color and texture. Core sectioned at 2.0 ft.
					JOF-SED-CV01-CORLB-0.5/2.0-20190122	0.5 – 2.0		
					JOF-SED-CV01-CORLB-2.0/3.8-20190122	2.0 – 3.8		

See notes on final page.

TABLE B.6 – Sediment Sampling Field Data
Johnsonville Fossil Plant
January and March 2019

Location ID	Sample Date	Water Depth (ft)	Gear Type	Core Depth (ft)	Sample ID	Horizon (ft)	Photograph ID[1]	Sediment/Sampling Description
SED-CV01-CC	1/22/2019	2.4	Vibecore	–	No Sample	–	N/A	Shallow surface layer of fines overlaying hardpan clay.
		2.4	Ponar	–	JOF-SED-CV01-CORCC-0.0/0.5-20190122	0.0 – 0.5	N/A	Fines mixed with small gravel and mollusk shell. Composite of three Ponars grabs to obtain sufficient sample volume.
SED-CV01-RB	1/22/2019	2.3	Vibecore	1.0	JOF-SED-CV01-CORRB-0.0/0.5-20190122	0.0 – 0.5	119-120	Gray fines
					–	0.5 – 1.0		Parent material
SED-CV02-LB	1/23/2019	5.7	Vibecore	2.8	JOF-SED-CV02-CORLB-0.0/0.5-20190123	0.0 – 0.5	121-124	Gray fines
					JOF-SED-CV02-CORLB-0.5/2.5-20190123	0.5 – 2.5		Light-brownish-gray fines
					–	2.5 – 2.8		Parent material
SED-CV02-CC	1/23/2019	4.0	Vibecore	2.5	JOF-SED-CV02-CORCC-0.0/0.5-20190123	0.0 – 0.5	125-127	Shallow surface layer of brown fines overlaying gray fines.
					JOF-SED-CV02-CORCC-0.5/1.6-20190123	0.5 – 1.6		Gray fines
					–	1.6 – 2.5		Parent material
SED-CV02-RB	1/23/2019	2.5	Vibecore	–	No Sample	–	N/A	Shallow surface layer of fines overlaying parent material.
		2.5	Ponar	–	JOF-SED-CV02-CORRB-0.0/0.5-20190123	0.0 – 0.5	N/A	Thin surface layer of brown fines overlaying gray fines.
					JOF-SED-CV02-DUP01-20190123	0.0 – 0.5		
SED-CV03-LB	1/23/2019	8.3	Vibecore	5.3	JOF-SED-CV03-CORLB-0.0/0.5-20190123	0.0 – 0.5	129-132	Gray fines; core uniform in appearance. Core sectioned at 2.5 ft.
					JOF-SED-CV03-CORLB-0.5/2.5-20190123	0.5 – 2.5		
					JOF-SED-CV03-CORLB-2.5/5.3-20190123	2.5 – 5.3		
SED-CV03-CC	1/23/2019	3.7	Vibecore	–	No Sample	–	N/A	Hardpan clay
		8.0	Ponar	–	JOF-SED-CV03-CORCC-0.0/0.5-20190123	0.0 – 0.5	N/A	Sediment description not available. Sample collected in creek channel. Three additional Ponar deployments in water depths ranging from 3.7 to 5.5 ft yielded limited fines mixed with gravel and hardpan clay.
SED-CV03-RB	1/23/2019	7.4	Vibecore	3.4	JOF-SED-CV03-CORRB-0.0/0.5-20190123	0.0 – 0.5	134-136	Gray fines; core uniform in appearance. Core sectioned at 1.5 ft.
					JOF-SED-CV03-CORRB-0.5/1.5-20190123	0.5 – 1.5		
					JOF-SED-CV03-CORRB-1.5/2.7-20190123	1.5 – 2.7		
					–	2.7 – 3.4		Parent material

Notes:

ft feet
N/A Not available

1. See Photographic Logs of Sediment Samples, Attachment C.1 in Appendix C.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-TR01-LB			SED-TR02-LB		SED-TR02-RB			SED-TR03-LB		SED-TR03-RB
Sample Date		20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019
Sample ID		JOF-SED-TR01-CORLB-0.0/0.5-20190320	JOF-SED-TR01-CORLB-0.5/1.5-20190320	JOF-SED-TR01-CORLB-1.5/2.4-20190320	JOF-SED-TR02-CORLB-0.0/0.5-20190320	JOF-SED-TR02-CORLB-0.5/2.3-20190320	JOF-SED-TR02-CORRB-0.0/0.5-20190320	JOF-SED-TR02-CORRB-0.5/1.5-20190320	JOF-SED-TR02-CORRB-1.5/2.7-20190320	JOF-SED-TR03-CORLB-0.0/0.5-20190319	JOF-SED-TR03-DUP02-20190319	JOF-SED-TR03-CORRB-0.0/0.5-20190319
Sample Depth (ft)		0.0 - 0.5	0.5 - 1.5	1.5 - 2.4	0.0 - 0.5	0.5 - 2.3	0.0 - 0.5	0.5 - 1.5	1.5 - 2.7	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	FD	N
Parent Sample ID											JOF-SED-TR03-CORLB-0.0/0.5-20190319	
Level of Review[2 3]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units											
PLM												
% ASH	%	<1	1	<1	4	3	1	3	8	5 J	1 J	8
Total Metals												
Antimony	mg/kg	0.0964 J	-	-	0.0858 J	-	0.0771 J	-	-	0.260 J	0.0982 J	0.148 J
Arsenic	mg/kg	2.10	-	-	2.49	-	1.93	-	-	7.03 J	3.04 J	4.85
Barium	mg/kg	68.3	-	-	54.4	-	55.0	-	-	185 J	80.4 J	103
Beryllium	mg/kg	0.543	-	-	0.467	-	0.423	-	-	1.38 J	0.579 J	0.983
Boron	mg/kg	1.38 J	-	-	1.01 J	-	< 0.975	-	-	5.26 J	1.73 J	2.17 J
Cadmium	mg/kg	0.163	-	-	0.174	-	0.150	-	-	0.332	0.165	0.227
Calcium	mg/kg	1500 J	-	-	1120 J	-	1770 J	-	-	4480 J	1960 J	4390 J
Chromium	mg/kg	10.6	-	-	9.62	-	7.86	-	-	25.2 J	11.2 J	15.4
Cobalt	mg/kg	7.26	-	-	6.90	-	5.73	-	-	16.7 J	7.36 J	10.1
Copper	mg/kg	7.38	-	-	6.02	-	5.26	-	-	17.2 J	7.38 J	10.2
Lead	mg/kg	7.73	-	-	11.4	-	6.03	-	-	21.4 J	9.47 J	13.2
Lithium	mg/kg	7.59 J	-	-	5.98 J	-	4.96 J	-	-	17.1 J	7.41 J	8.88 J
Mercury	mg/kg	0.0534	-	-	0.0544	-	0.0442	-	-	0.0501	0.0493	0.0531
Molybdenum	mg/kg	0.360 J	-	-	0.403	-	0.324 J	-	-	0.995	0.377 J	0.968
Nickel	mg/kg	8.93	-	-	7.68	-	6.79	-	-	20.4 J	9.10 J	12.3
Selenium	mg/kg	0.850	-	-	0.698	-	0.638	-	-	2.14	0.769	1.08
Silver	mg/kg	0.0391 J	-	-	0.0383 J	-	0.0400 J	-	-	0.0917 J	0.0459 J	0.0446 J
Strontium	mg/kg	8.12	-	-	6.16	-	9.11	-	-	21.3 J	9.40 J	19.3
Thallium	mg/kg	0.133	-	-	0.118	-	0.0989	-	-	0.275	0.122	0.159
Vanadium	mg/kg	14.2	-	-	12.3	-	10.0	-	-	32.7 J	14.7 J	21.0
Zinc	mg/kg	37.7	-	-	33.0	-	27.3	-	-	87.9 J	39.4 J	46.5
Anions												
Chloride	mg/kg	< 5.57	-	-	< 5.12	-	< 5.55	-	-	< 6.46	6.72 J	< 6.88
Fluoride	mg/kg	0.976 UJ	-	-	0.898 UJ	-	0.972 UJ	-	-	1.15 J	1.12 UJ	1.42 J
Sulfate	mg/kg	30.3	-	-	21.6	-	20.7	-	-	26.4	15.4 J	22.5
General Chemisty												
pH (lab)	SU	7.5	-	-	7.2	-	7.5	-	-	7.2	7.5	7.5

See notes on last page.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-TR04-LB	SED-TR04-RB	SED-TR05-LB				SED-TR05-RB	SED-TR06	SED-TR07-LB	SED-TR07-RB
Sample Date		19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019
Sample ID		JOF-SED-TR04-CORLB-0.0/0.5-20190319	JOF-SED-TR04-CORRB-0.0/0.5-20190319	JOF-SED-TR05-CORLB-0.0/0.5-20190319	JOF-SED-TR05-DUP01-20190319	JOF-SED-TR05-CORLB-0.5/2.2-20190319	JOF-SED-TR05-CORLB-2.2/3.6-20190319	JOF-SED-TR05-CORRB-0.0/0.5-20190319	JOF-SED-TR06-CORRB-0.0/0.5-20190319	JOF-SED-TR07-CORLB-0.0/0.5-20190319	JOF-SED-TR07-CORRB-0.0/0.5-20190319
Sample Depth (ft)		0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 2.2	2.2 - 3.6	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
Sample Type[1]		N	N	N	FD	N	N	N	N	N	N
Parent Sample ID					JOF-SED-TR05-CORLB-0.0/0.5-20190319						
Level of Review[2 3]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
PLM											
% ASH	%	3	4	4 J	2 J	1	6 J	2	5	1	6
Total Metals											
Antimony	mg/kg	0.164 J	0.0906 J	0.165 J	0.183 J	-	-	0.137 J	0.135 J	0.166 J	0.194 J
Arsenic	mg/kg	5.16 J	3.30	4.28	4.56	-	-	4.41	4.74	4.03	5.55
Barium	mg/kg	142 J	66.9	127	136	-	-	107	105	109	109
Beryllium	mg/kg	0.949 J	0.608	0.990	1.03	-	-	1.15	0.901	0.869	1.00
Boron	mg/kg	2.70 J	< 1.01	2.32 J	2.73 J	-	-	1.56 J	2.24 J	1.87 J	10.7
Cadmium	mg/kg	0.246 J	0.125	0.257	0.282	-	-	0.131	0.204	0.222	0.334
Calcium	mg/kg	29700 J	5440 J	2290 J	2420 J	-	-	4370 J	4160 J	1860 J	2760 J
Chromium	mg/kg	16.8 J	12.4	16.7	18.2	-	-	16.1	14.0	12.8	16.4
Cobalt	mg/kg	10.9 J	6.43	11.4	12.4	-	-	13.6	9.65	9.21	10.7
Copper	mg/kg	11.9 J	4.88	12.9	13.8	-	-	11.1	9.00	11.1	20.3
Lead	mg/kg	14.6 J	6.89	14.3	14.7	-	-	14.7	13.5	16.6	14.9
Lithium	mg/kg	12.1 J	5.85 J	12.0 J	13.4 J	-	-	10.5 J	8.51 J	8.06 J	10.2 J
Mercury	mg/kg	0.0913 J	0.0309	0.105	0.115	-	-	0.0673	0.0619	0.0652	0.107
Molybdenum	mg/kg	0.683 J	0.372 J	0.611	0.645	-	-	0.909	0.686	0.536	1.29
Nickel	mg/kg	13.6 J	6.84	14.6	15.8	-	-	14.7	12.0	11.4	14.8
Selenium	mg/kg	1.39 J	1.09	1.39	1.48	-	-	1.57	1.16	1.21	1.42
Silver	mg/kg	0.0560 J	0.0569 J	0.0614 J	0.0655 J	-	-	0.0465 J	0.0605 J	0.0429 J	0.0566 J
Strontium	mg/kg	32.4 J	11.2	14.7	16.0	-	-	14.8	18.4	11.7	16.6
Thallium	mg/kg	0.198 J	0.116	0.209	0.220	-	-	0.242	0.164	0.150	0.212
Vanadium	mg/kg	23.5 J	13.3	23.5	25.8	-	-	24.1	18.4	18.8	25.4
Zinc	mg/kg	62.1 J	25.4	60.9	66.0	-	-	46.7	46.1	47.0	66.4
Anions											
Chloride	mg/kg	9.33 J	5.91 J	< 7.01	< 7.66	-	-	< 5.57	< 6.84	< 5.27	15.6 J
Fluoride	mg/kg	1.51 UJ	0.973 UJ	1.23 UJ	1.34 UJ	-	-	2.72 J	1.50 J	1.73 J	1.31 J
Sulfate	mg/kg	27.9 J	15.3	63.6	62.0	-	-	26.2	36.5	22.2	163
General Chemisty											
pH (lab)	SU	7.8	7.5	7.2	7.1	-	-	6.9	7.5	7.1	6.6

See notes on last page.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-TR08-LB		SED-TR08-RB	SED-IC01-LB			SED-IC01-CC			SED-IC01-RB		
Sample Date		19-Mar 2019	19-Mar 2019	19-Mar 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019
Sample ID		JOF-SED-TR08-CORLB-0.0/0.5-20190319	JOF-SED-TR08-CORLB-0.5/1.5-20190319	JOF-SED-TR08-CORRB-0.0/0.5-20190319	JOF-SED-IC01-CORLB-0.0/0.5-20190122	JOF-SED-IC01-DUP01-20190122	JOF-SED-IC01-CORLB-0.0/0.5-20190124	JOF-SED-IC01-CORCC-0.0/0.5-20190122	JOF-SED-IC01-CORCC-0.5/1.6-20190122	JOF-SED-IC01-CORCC-0.0/0.5-20190124	JOF-SED-IC01-CORRB-0.0/0.5-20190122	JOF-SED-IC01-CORRB-0.5/1.5-20190122	JOF-SED-IC01-CORRB-0.0/0.5-20190124
Sample Depth (ft)		0.0 - 0.5	0.5 - 1.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 1.6	0.0 - 0.5	0.0 - 0.5	0.5 - 1.5	0.0 - 0.5
Sample Type[1]		N	N	N	N	FD	RS	N	N	RS	N	N	RS
Parent Sample ID						JOF-SED-IC01-CORLB-0.0/0.5-20190122							
Level of Review[2 3]		Final-Verified	Final-Verified	Final-Verified	Validated	Validated	Validated	Validated	Final-Verified	Validated	Validated	Final-Verified	Validated
	Units												
PLM													
% ASH	%	3	4	8	<1	1	1	1	3	1	1	2	1
Total Metals													
Antimony	mg/kg	0.0701 J	-	0.123 J	0.389 J	0.167 J	0.172 J	0.205 J	-	0.143 J	0.138 J	-	0.261 J
Arsenic	mg/kg	1.78	-	3.66	29.5 J	8.54 J	7.08 J	5.32	-	5.97 J	3.74	-	9.05 J
Barium	mg/kg	54.1	-	92.8	175 J	138 J	126 J	119 J	-	137 J	92.6 J	-	159 J
Beryllium	mg/kg	0.430	-	0.725	3.06 J	1.36 J	1.18 J	0.967	-	0.873	0.810	-	1.00 J
Boron	mg/kg	1.40 J	-	2.52 J	2.36 J	1.44 J	2.43 J	2.22 J	-	2.08 J	1.67 J	-	2.43 J
Cadmium	mg/kg	0.106	-	0.187	0.899 J	0.267 J	0.314 J	0.271	-	0.278 J	0.148	-	0.332 J
Calcium	mg/kg	1020 J	-	2660 J	3500 J	2590 J	2670 J	2310 J	-	3690	1430 J	-	5570 J
Chromium	mg/kg	9.51	-	21.0	20.7 J	17.2	16.7 J	15.1	-	15.2	12.4	-	17.2 J
Cobalt	mg/kg	6.17	-	8.51	41.0 J	16.7 J	16.4 J	11.1 J	-	12.6	8.26 J	-	21.3 J
Copper	mg/kg	5.87	-	8.69	12.8 J	9.38	12.4 J	12.7	-	13.1	9.88	-	17.0 J
Lead	mg/kg	6.27	-	11.9	31.8 J	18.4 J	15.5 J	13.9	-	13.5 J	10.6	-	16.4 J
Lithium	mg/kg	6.02 J	-	8.54 J	12.8 J	9.98 J	13.3 J	11.5 J	-	12.2 J	7.50 J	-	10.7 J
Mercury	mg/kg	0.0356	-	0.0559	0.102 J	0.0774	0.104 J	0.0986	-	0.0978	0.0644	-	0.107 J
Molybdenum	mg/kg	0.268 J	-	0.798	1.77 J	0.762 J	0.732 J	0.901	-	0.685 J	0.855	-	1.19 J
Nickel	mg/kg	7.70	-	11.4	15.7 J	12.6 J	16.1 J	9.80 J	-	14.9	8.19 J	-	20.3 J
Selenium	mg/kg	0.531	-	0.965	0.802 J	0.721 J	2.45 J	0.697 J	-	1.67 J	0.354 J	-	1.92 J
Silver	mg/kg	0.0819	-	0.0478 J	0.0733 J	0.0482 J	0.0440 J	0.0717 J	-	0.0462 J	0.0562 J	-	0.0575 J
Strontium	mg/kg	5.29	-	15.3	21.6 J	18.0 J	21.1 J	16.9	-	22.4 J	11.2	-	26.3 J
Thallium	mg/kg	0.112	-	0.162	0.311 J	0.247 J	0.273 J	0.224	-	0.208 J	0.172	-	0.213 J
Vanadium	mg/kg	11.8	-	26.4	29.2 J	21.9 J	24.8 J	18.6 J	-	21.6	14.8 J	-	25.1 J
Zinc	mg/kg	31.7	-	45.2	51.9 J	44.2 J	57.0 J	44.9 J	-	57.9	32.9 J	-	66.7 J
Anions													
Chloride	mg/kg	< 5.03	-	< 6.32	7.87 UJ	< 6.84	7.82 UJ	< 6.94	-	< 7.63	< 5.81	-	31.0 J
Fluoride	mg/kg	0.881 UJ	-	1.28 J	1.38 UJ	1.20 UJ	1.37 UJ	1.22 UJ	-	1.34 UJ	1.67 J	-	2.21 J
Sulfate	mg/kg	27.6	-	28.4	47.0 J	39.9	45.6 J	67.7	-	61.2	28.3	-	47.8 J
General Chemisty													
pH (lab)	SU	6.9	-	7.4	7.5	7.5	7.6	7.3	-	7.8	7.3	-	7.6

See notes on last page.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-IC02-LB				SED-IC02-CC			SED-IC02-RB	SED-BH01-LB	
Sample Date		22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019
Sample ID		JOF-SED-IC02-CORLB-0.0/0.5-20190122	JOF-SED-IC02-CORLB-0.5/2.0-20190122	JOF-SED-IC02-CORLB-2.0/3.0-20190122	JOF-SED-IC02-CORLB-3.0/3.7-20190122	JOF-SED-IC02-CORCC-0.0/0.5-20190122	JOF-SED-IC02-CORCC-0.5/3.0-20190122	JOF-SED-IC02-CORCC-3.0/5.4-20190122	JOF-SED-IC02-CORRB-0.0/0.7-20190122	JOF-SED-BH01-CORLB-0.0/0.5-20190122	JOF-SED-BH01-CORLB-0.5/1.5-20190122
Sample Depth (ft)		0.0 - 0.5	0.5 - 2.0	2.0 - 3.0	3.0 - 3.7	0.0 - 0.5	0.5 - 3.0	3.0 - 5.4	0.0 - 0.7	0.0 - 0.5	0.5 - 1.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	N
Parent Sample ID											
Level of Review[2 3]		Validated	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Validated	Validated	Final-Verified
	Units										
PLM											
% ASH	%	2	2	4	1	5	2	2	1	8	6
Total Metals											
Antimony	mg/kg	0.286 J	-	-	-	0.191 J	-	-	0.191 J	0.246 J	-
Arsenic	mg/kg	5.02	-	-	-	4.49	-	-	5.67 J	9.19	-
Barium	mg/kg	121 J	-	-	-	125 J	-	-	168 J	112 J	-
Beryllium	mg/kg	0.983	-	-	-	1.05	-	-	0.856 J	0.924	-
Boron	mg/kg	2.55 J	-	-	-	1.96 J	-	-	2.11 J	8.96	-
Cadmium	mg/kg	0.280	-	-	-	0.275	-	-	0.293 J	0.286	-
Calcium	mg/kg	2350 J	-	-	-	2150 J	-	-	2690 J	7910 J	-
Chromium	mg/kg	16.3	-	-	-	16.8	-	-	15.2 J	15.5	-
Cobalt	mg/kg	11.8 J	-	-	-	9.92 J	-	-	14.9 J	10.4 J	-
Copper	mg/kg	12.6	-	-	-	11.0	-	-	13.9 J	40.3	-
Lead	mg/kg	14.8	-	-	-	14.5	-	-	16.0 J	16.8	-
Lithium	mg/kg	12.2 J	-	-	-	9.78 J	-	-	12.1 J	9.82 J	-
Mercury	mg/kg	0.106	-	-	-	0.122	-	-	0.119 J	0.182	-
Molybdenum	mg/kg	1.01	-	-	-	0.979	-	-	0.925 J	1.47	-
Nickel	mg/kg	10.3 J	-	-	-	13.3 J	-	-	15.5 J	15.8 J	-
Selenium	mg/kg	0.627 J	-	-	-	0.657 J	-	-	0.767 J	1.04 J	-
Silver	mg/kg	0.0714 J	-	-	-	0.0656 J	-	-	0.0660 J	0.0768 J	-
Strontium	mg/kg	17.5	-	-	-	17.4	-	-	22.9 J	27.9	-
Thallium	mg/kg	0.237	-	-	-	0.222	-	-	0.227 J	0.258	-
Vanadium	mg/kg	19.9 J	-	-	-	21.4 J	-	-	21.4 J	23.9 J	-
Zinc	mg/kg	48.4 J	-	-	-	47.0 J	-	-	57.2 J	72.4 J	-
Anions											
Chloride	mg/kg	< 7.01	-	-	-	< 6.48	-	-	8.14 UJ	< 6.67	-
Fluoride	mg/kg	1.23 UJ	-	-	-	1.18 J	-	-	1.43 UJ	1.17 UJ	-
Sulfate	mg/kg	67.3	-	-	-	34.7	-	-	56.6 J	28.4	-
General Chemisty											
pH (lab)	SU	7.5	-	-	-	7.6	-	-	7.7	7.4	-

See notes on last page.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-BH01-CC		SED-BH01-RB	SED-BH02-LB				SED-BH02-CC			
Sample Date		22-Jan 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019
Sample ID		JOF-SED-BH01-CORCC-0.0/0.5-20190122	JOF-SED-BH01-CORCC-0.5/1.6-20190122	JOF-SED-BH01-CORRB-0.0/0.5-20190122	JOF-SED-BH02-CORLB-0.0/0.5-20190124	JOF-SED-BH02-CORLB-0.5/3.0-20190124	JOF-SED-BH02-CORLB-3.0/4.7-20190124	JOF-SED-BH02-CORLB-4.7/5.7-20190124	JOF-SED-BH02-CORCC-0.0/0.5-20190124	JOF-SED-BH02-CORCC-0.5/1.7-20190124	JOF-SED-BH02-CORCC-1.7/3.0-20190124	JOF-SED-BH02-CORCC-3.0/3.7-20190124
Sample Depth (ft)		0.0 - 0.5	0.5 - 1.6	0.0 - 0.5	0.0 - 0.5	0.5 - 3.0	3.0 - 4.7	4.7 - 5.7	0.0 - 0.5	0.5 - 1.7	1.7 - 3.0	3.0 - 3.7
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID												
Level of Review[2 3]		Validated	Final-Verified	Validated	Validated	Final-Verified	Final-Verified	Final-Verified	Validated	Final-Verified	Final-Verified	Final-Verified
	Units											
PLM												
% ASH	%	4	4	2	1	1	6	1	1	1	1	1
Total Metals												
Antimony	mg/kg	0.208 J	-	0.292 J	0.206 J	-	-	-	0.154 J	-	-	-
Arsenic	mg/kg	6.82	-	8.46 J	8.20 J	-	-	-	6.12 J	-	-	-
Barium	mg/kg	162 J	-	168 J	96.8 J	-	-	-	152 J	-	-	-
Beryllium	mg/kg	0.925	-	0.994 J	1.14	-	-	-	1.16	-	-	-
Boron	mg/kg	4.83 J	-	8.29 J	7.10	-	-	-	3.19 J	-	-	-
Cadmium	mg/kg	0.318	-	0.326 J	0.259 J	-	-	-	0.231	-	-	-
Calcium	mg/kg	3520 J	-	4660 J	2020	-	-	-	2990	-	-	-
Chromium	mg/kg	17.4	-	17.7 J	16.4	-	-	-	17.6	-	-	-
Cobalt	mg/kg	12.3 J	-	11.3 J	10.5	-	-	-	11.4	-	-	-
Copper	mg/kg	44.9	-	51.5 J	34.5	-	-	-	25.2	-	-	-
Lead	mg/kg	19.9	-	19.4 J	12.7 J	-	-	-	16.8	-	-	-
Lithium	mg/kg	11.9 J	-	10.3 J	9.88 J	-	-	-	14.4 J	-	-	-
Mercury	mg/kg	0.131	-	0.154 J	0.120	-	-	-	0.0854	-	-	-
Molybdenum	mg/kg	1.01	-	1.71 J	0.754	-	-	-	1.06	-	-	-
Nickel	mg/kg	15.7 J	-	16.5 J	15.4	-	-	-	18.7	-	-	-
Selenium	mg/kg	1.05 J	-	0.833 J	1.63 J	-	-	-	2.07 J	-	-	-
Silver	mg/kg	0.0725 J	-	0.0655 J	0.0779 J	-	-	-	0.0597 J	-	-	-
Strontium	mg/kg	26.8	-	27.8 J	18.0 J	-	-	-	26.6 J	-	-	-
Thallium	mg/kg	0.242	-	0.234 J	0.171 J	-	-	-	0.266	-	-	-
Vanadium	mg/kg	22.7 J	-	22.5 J	24.0	-	-	-	26.9	-	-	-
Zinc	mg/kg	78.0 J	-	84.6 J	68.7	-	-	-	74.1	-	-	-
Anions												
Chloride	mg/kg	< 7.48	-	8.98 UJ	< 6.36	-	-	-	< 7.17	-	-	-
Fluoride	mg/kg	1.31 UJ	-	1.57 UJ	1.11 UJ	-	-	-	2.37 J	-	-	-
Sulfate	mg/kg	36.4	-	48.7 J	87.7	-	-	-	66.5	-	-	-
General Chemisty												
pH (lab)	SU	7.4	-	7.9	7.5	-	-	-	7.5	-	-	-

See notes on last page.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-BH02-RB		SED-BH03-LB			SED-BH03-CC		SED-BH03-RB		
Sample Date		24-Jan 2019	24-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019
Sample ID		JOF-SED-BH02-CORRB-0.0/0.5-20190124	JOF-SED-BH02-DUP01-20190124	JOF-SED-BH03-CORLB-0.0/0.5-20190122	JOF-SED-BH03-CORLB-0.5/2.5-20190122	JOF-SED-BH03-CORLB-2.5/4.1-20190122	JOF-SED-BH03-CORCC-0.0/0.5-20190122	JOF-SED-BH03-CORCC-0.5/2.5-20190122	JOF-SED-BH03-CORRB-0.0/0.5-20190122	JOF-SED-BH03-CORRB-0.5/3.0-20190122	JOF-SED-BH03-CORRB-3.0/5.5-20190122
Sample Depth (ft)		0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 2.5	2.5 - 4.1	0.0 - 0.5	0.5 - 2.5	0.0 - 0.5	0.5 - 3.0	3.0 - 5.5
Sample Type[1]		N	FD	N	N	N	N	N	N	N	N
Parent Sample ID			JOF-SED-BH02-CORRB-0.0/0.5-20190124								
Level of Review[2 3]		Validated	Validated	Validated	Final-Verified	Final-Verified	Validated	Final-Verified	Validated	Final-Verified	Final-Verified
	Units										
PLM											
% ASH	%	1	4	2	<1	3	<1	4	3	1	5
Total Metals											
Antimony	mg/kg	0.248 J	0.424 J	0.165 J	-	-	0.157 J	-	0.239 J	-	-
Arsenic	mg/kg	12.6 J	16.7 J	5.96 J	-	-	6.95 J	-	9.78 J	-	-
Barium	mg/kg	174 J	159 J	155 J	-	-	135 J	-	131 J	-	-
Beryllium	mg/kg	1.43 J	1.29 J	0.962	-	-	0.868	-	0.894	-	-
Boron	mg/kg	9.50 J	6.88 J	2.94 J	-	-	4.71 J	-	10.6	-	-
Cadmium	mg/kg	0.279 J	0.261 J	0.325	-	-	0.277	-	0.311	-	-
Calcium	mg/kg	4450 J	3740 J	3200 J	-	-	2800 J	-	5460 J	-	-
Chromium	mg/kg	19.6 J	22.8 J	18.6	-	-	17.0	-	16.1	-	-
Cobalt	mg/kg	17.0 J	16.8 J	13.4 J	-	-	12.5 J	-	12.7 J	-	-
Copper	mg/kg	28.9 J	30.5 J	31.2	-	-	34.9	-	35.2	-	-
Lead	mg/kg	18.9 J	18.5 J	17.7	-	-	16.9 J	-	21.1	-	-
Lithium	mg/kg	12.6 J	13.2 J	12.2 J	-	-	11.3 J	-	9.38 J	-	-
Mercury	mg/kg	0.0973 J	0.0758 J	0.112	-	-	0.146	-	0.150	-	-
Molybdenum	mg/kg	1.39 J	1.33 J	0.908 J	-	-	0.961 J	-	2.19 J	-	-
Nickel	mg/kg	19.7 J	21.4 J	17.2 J	-	-	16.7 J	-	16.2 J	-	-
Selenium	mg/kg	2.71 J	1.99 J	0.956 J	-	-	0.980 J	-	1.12 J	-	-
Silver	mg/kg	0.0448 J	0.0385 J	0.0696 J	-	-	0.0781 J	-	0.0700 J	-	-
Strontium	mg/kg	34.7 J	31.5 J	24.7 J	-	-	24.7 J	-	31.1	-	-
Thallium	mg/kg	0.273 J	0.242 J	0.249	-	-	0.253 J	-	0.479	-	-
Vanadium	mg/kg	27.7 J	27.3 J	27.3 J	-	-	24.9 J	-	25.3 J	-	-
Zinc	mg/kg	79.1 J	81.5 J	75.4 J	-	-	73.4 J	-	74.1 J	-	-
Anions											
Chloride	mg/kg	10.8 UJ	9.01 UJ	< 7.54	-	-	< 7.20	-	23.5	-	-
Fluoride	mg/kg	1.90 UJ	1.66 J	1.32 UJ	-	-	1.26 UJ	-	1.26 UJ	-	-
Sulfate	mg/kg	85.1 J	79.0 J	39.1	-	-	31.3	-	55.3	-	-
General Chemisty											
pH (lab)	SU	7.5	7.6	7.3	-	-	7.4	-	7.3	-	-

See notes on last page.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-CV01-LB			SED-CV01-CC	SED-CV01-RB	SED-CV02-LB		SED-CV02-CC		SED-CV02-RB	
Sample Date		22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019
Sample ID		JOF-SED-CV01-CORLB-0.0/0.5-20190122	JOF-SED-CV01-CORLB-0.5/2.0-20190122	JOF-SED-CV01-CORLB-2.0/3.8-20190122	JOF-SED-CV01-CORCC-0.0/0.5-20190122	JOF-SED-CV01-CORRB-0.0/0.5-20190122	JOF-SED-CV02-CORLB-0.0/0.5-20190123	JOF-SED-CV02-CORLB-0.5/2.5-20190123	JOF-SED-CV02-CORCC-0.0/0.5-20190123	JOF-SED-CV02-CORCC-0.5/1.6-20190123	JOF-SED-CV02-CORRB-0.0/0.5-20190123	JOF-SED-CV02-DUP01-20190123
Sample Depth (ft)		0.0 - 0.5	0.5 - 2.0	2.0 - 3.8	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 2.5	0.0 - 0.5	0.5 - 1.6	0.0 - 0.5	0.0 - 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	FD
Parent Sample ID												JOF-SED-CV02-CORRB-0.0/0.5-20190123
Level of Review[2 3]		Validated	Final-Verified	Final-Verified	Validated	Validated	Validated	Final-Verified	Validated	Final-Verified	Validated	Validated
	Units											
PLM												
% ASH	%	<1	<1	<1	1	1	3	<1	<1	1	1	<1
Total Metals												
Antimony	mg/kg	0.163 J	-	-	0.445 J	0.122 J	0.272 J	-	0.260 J	-	0.309 J	0.311 J
Arsenic	mg/kg	3.72	-	-	29.3	9.13 J	6.83 J	-	6.89 J	-	18.5 J	15.2 J
Barium	mg/kg	128 J	-	-	795 J	159 J	137 J	-	122 J	-	90.4 J	91.5 J
Beryllium	mg/kg	0.981	-	-	3.15	1.21	1.35 J	-	1.22 J	-	1.92	1.82
Boron	mg/kg	2.52 J	-	-	1.84 J	1.78 J	4.38 J	-	4.11 J	-	1.91 J	2.76 J
Cadmium	mg/kg	0.268	-	-	0.519	0.216	0.281 J	-	0.345 J	-	0.310	0.253 J
Calcium	mg/kg	2860 J	-	-	3770 J	2250	1850 J	-	1990 J	-	1750	1550
Chromium	mg/kg	14.0	-	-	17.9	12.4	21.5 J	-	19.6 J	-	36.2	33.0
Cobalt	mg/kg	11.0 J	-	-	48.6 J	15.4	11.5 J	-	11.6 J	-	16.3	15.5
Copper	mg/kg	11.6	-	-	9.73	9.76	17.1 J	-	15.8 J	-	12.4	11.9
Lead	mg/kg	13.4	-	-	34.3	17.1	24.6 J	-	20.5 J	-	32.9 J	34.1 J
Lithium	mg/kg	16.2 J	-	-	21.8 J	21.7 J	19.4 J	-	17.4 J	-	11.6 J	11.9 J
Mercury	mg/kg	0.0905	-	-	0.0593	0.0657	0.160 J	-	0.0869 J	-	0.0835	0.0802
Molybdenum	mg/kg	0.811	-	-	2.03	0.838	1.60 J	-	1.24 J	-	1.77	1.44 J
Nickel	mg/kg	10.3 J	-	-	21.4 J	15.2	17.2 J	-	16.2 J	-	13.0	13.6
Selenium	mg/kg	0.513 J	-	-	0.590 J	1.59 J	2.65 J	-	2.39 J	-	2.86 J	2.67 J
Silver	mg/kg	0.0727 J	-	-	0.0583 J	0.0443 J	0.135 J	-	0.0753 J	-	0.193	0.0716 J
Strontium	mg/kg	21.5	-	-	32.6	16.7 J	18.5 J	-	17.1 J	-	11.9 J	12.6 J
Thallium	mg/kg	0.175	-	-	0.273	0.196	0.353 J	-	0.310 J	-	0.241 J	0.225 J
Vanadium	mg/kg	16.7 J	-	-	33.1 J	21.2	37.5 J	-	35.9 J	-	59.7	58.1
Zinc	mg/kg	43.4 J	-	-	59.0 J	48.7	73.0 J	-	69.6 J	-	53.7	60.0
Anions												
Chloride	mg/kg	< 7.26	-	-	< 6.73	< 6.76	9.34 UJ	-	10.1 UJ	-	< 7.48	< 7.59
Fluoride	mg/kg	1.27 UJ	-	-	1.18 UJ	1.70 J	1.64 UJ	-	1.78 UJ	-	1.31 UJ	1.33 UJ
Sulfate	mg/kg	123	-	-	31.9	101	81.6 J	-	462 J	-	47.5	57.7
General Chemisty												
pH (lab)	SU	7.4	-	-	7.5	7.5	7.2	-	6.9	-	7.0	7.1

See notes on last page.

TABLE B.7 – Sediment Analytical Results for Percent Ash, Metals, Anions, and General Chemistry
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-CV03-LB			SED-CV03-CC	SED-CV03-RB		
Sample Date		23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019
Sample ID		JOF-SED-CV03-CORLB-0.0/0.5-20190123	JOF-SED-CV03-CORLB-0.5/2.5-20190123	JOF-SED-CV03-CORLB-2.5/5.3-20190123	JOF-SED-CV03-CORCC-0.0/0.5-20190123	JOF-SED-CV03-CORRB-0.0/0.5-20190123	JOF-SED-CV03-CORRB-0.5/1.5-20190123	JOF-SED-CV03-CORRB-1.5/2.7-20190123
Sample Depth (ft)		0.0 - 0.5	0.5 - 2.5	2.5 - 5.3	0.0 - 0.5	0.0 - 0.5	0.5 - 1.5	1.5 - 2.7
Sample Type[1]		N	N	N	N	N	N	N
Parent Sample ID								
Level of Review[2 3]		Validated	Final-Verified	Final-Verified	Validated	Validated	Final-Verified	Final-Verified
	Units							
PLM								
% ASH	%	<1	<1	<1	<1	<1	<1	4
Total Metals								
Antimony	mg/kg	0.196 J	-	-	0.279 J	0.287 J	-	-
Arsenic	mg/kg	4.91 J	-	-	6.59 J	5.49 J	-	-
Barium	mg/kg	139 J	-	-	142 J	121 J	-	-
Beryllium	mg/kg	1.12 J	-	-	1.44 J	1.24 J	-	-
Boron	mg/kg	2.23 J	-	-	4.28 J	3.54 J	-	-
Cadmium	mg/kg	0.337 J	-	-	0.321 J	0.372 J	-	-
Calcium	mg/kg	1990 J	-	-	2380 J	1760 J	-	-
Chromium	mg/kg	19.5 J	-	-	19.6 J	18.3 J	-	-
Cobalt	mg/kg	12.7 J	-	-	13.4 J	12.0 J	-	-
Copper	mg/kg	18.3 J	-	-	19.7 J	18.7 J	-	-
Lead	mg/kg	20.4 J	-	-	20.1 J	19.9 J	-	-
Lithium	mg/kg	14.4 J	-	-	17.6 J	16.4 J	-	-
Mercury	mg/kg	0.138 J	-	-	0.111 J	0.109 J	-	-
Molybdenum	mg/kg	1.79 J	-	-	1.67 J	1.82 J	-	-
Nickel	mg/kg	21.9 J	-	-	23.2 J	23.1 J	-	-
Selenium	mg/kg	0.962 J	-	-	2.35 J	2.07 J	-	-
Silver	mg/kg	0.0854 J	-	-	0.0681 J	0.0757 J	-	-
Strontium	mg/kg	18.7 J	-	-	21.7 J	20.3 J	-	-
Thallium	mg/kg	0.352 J	-	-	0.383 J	0.414 J	-	-
Vanadium	mg/kg	33.7 J	-	-	33.9 J	33.7 J	-	-
Zinc	mg/kg	76.2 J	-	-	85.3 J	80.7 J	-	-
Anions								
Chloride	mg/kg	10.4 UJ	-	-	12.5 UJ	9.77 UJ	-	-
Fluoride	mg/kg	1.82 UJ	-	-	2.19 UJ	1.71 UJ	-	-
Sulfate	mg/kg	283 J	-	-	185 J	190 J	-	-
General Chemisty								
pH (lab)	SU	7.2	-	-	7.1	7.2	-	-

Notes:

<	analyte was not detected at a concentration greater than the Method Detection Limit
-	parameter not analyzed / not available
%	percent
ft	feet
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
mg/kg	milligrams per kilogram
PLM	Polarized Light Microscopy - analysis for % 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, RS=Replicate Sample (a second sample collected independently and from the same area as a Normal Environmental sample)
2. Level of review is defined in the Quality Assurance Project Plan.
3. Level of review for % ash samples is Final-Verified
4. Non-detect (ND) results reported by RJ Lee Group for percent (%) ash expressed as <1 in table.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-TR01-LB			SED-TR02-LB		SED-TR02-RB			SED-TR03-LB		SED-TR03-RB
Sample Date		20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	20-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019
Sample ID		JOF-SED-TR01-CORLB-0.0/0.5-20190320	JOF-SED-TR01-CORLB-0.5/1.5-20190320	JOF-SED-TR01-CORLB-1.5/2.4-20190320	JOF-SED-TR02-CORLB-0.0/0.5-20190320	JOF-SED-TR02-CORLB-0.5/2.3-20190320	JOF-SED-TR02-CORRB-0.0/0.5-20190320	JOF-SED-TR02-CORRB-0.5/1.5-20190320	JOF-SED-TR02-CORRB-1.5/2.7-20190320	JOF-SED-TR03-CORLB-0.0/0.5-20190319	JOF-SED-TR03-DUP02-20190319	JOF-SED-TR03-CORRB-0.0/0.5-20190319
Sample Depth (ft)		0.0 - 0.5	0.5 - 1.5	1.5 - 2.4	0.0 - 0.5	0.5 - 2.3	0.0 - 0.5	0.5 - 1.5	1.5 - 2.7	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	FD	N
Parent Sample ID											JOF-SED-TR03-CORLB-0.0/0.5-20190319	
Level of Review[2]		Final-Verified	N/A	N/A	Final-Verified	N/A	Final-Verified	N/A	N/A	Final-Verified	Final-Verified	Final-Verified
	Units											
Radiological Parameters												
Radium-226	pCi/G	1.04 +/-(0.245)	–	–	1.22 +/-(0.303)	–	0.960 +/-(0.255)	–	–	1.01 +/-(0.291)	0.989 +/-(0.314)	1.13 +/-(0.258)
Radium-228	pCi/G	1.05 +/-(0.306)	–	–	1.35 +/-(0.382)	–	1.20 +/-(0.364)	–	–	1.48 +/-(0.405)	1.44 +/-(0.425)	1.45 +/-(0.309)
Radium-226+228	pCi/G	2.09 +/-(0.392)	–	–	2.57 +/-(0.488)	–	2.16 +/-(0.444)	–	–	2.49 +/-(0.499)	2.43 +/-(0.528)	2.58 +/-(0.403)

See notes on last page.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-TR04-LB	SED-TR04-RB	SED-TR05-LB				SED-TR05-RB	SED-TR06	SED-TR07-LB	SED-TR07-RB
Sample Date		19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019	19-Mar 2019
Sample ID		JOF-SED-TR04-CORLB-0.0/0.5-20190319	JOF-SED-TR04-CORRB-0.0/0.5-20190319	JOF-SED-TR05-CORLB-0.0/0.5-20190319	JOF-SED-TR05-DUP01-20190319	JOF-SED-TR05-CORLB-0.5/2.2-20190319	JOF-SED-TR05-CORLB-2.2/3.6-20190319	JOF-SED-TR05-CORRB-0.0/0.5-20190319	JOF-SED-TR06-CORRB-0.0/0.5-20190319	JOF-SED-TR07-CORLB-0.0/0.5-20190319	JOF-SED-TR07-CORRB-0.0/0.5-20190319
Sample Depth (ft)		0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 2.2	2.2 - 3.6	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5
Sample Type[1]		N	N	N	FD	N	N	N	N	N	N
Parent Sample ID					JOF-SED-TR05-CORLB-0.0/0.5-20190319						
Level of Review[2]		Final-Verified	Final-Verified	Final-Verified	Final-Verified	N/A	N/A	Final-Verified	Final-Verified	Final-Verified	Final-Verified
	Units										
Radiological Parameters											
Radium-226	pCi/G	1.38 +/-(0.351)	0.873 +/-(0.236)	1.73 +/-(0.410)	1.80 +/-(0.441)	–	–	1.39 +/-(0.271)	1.19 +/-(0.288)	1.32 +/-(0.372)	1.59 +/-(0.334)
Radium-228	pCi/G	1.82 +/-(0.401)	1.23 +/-(0.269)	1.97 +/-(0.538)	1.75 +/-(0.468)	–	–	1.57 +/-(0.335)	0.354 +/-(0.456) U	1.29 +/-(0.477)	1.54 +/-(0.339)
Radium-226+228	pCi/G	3.20 +/-(0.533)	2.10 +/-(0.358)	3.70 +/-(0.676)	3.55 +/-(0.643)	–	–	2.96 +/-(0.431)	1.54 +/-(0.539) J	2.61 +/-(0.605)	3.13 +/-(0.476)

See notes on last page.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-TR08-LB		SED-TR08-RB	SED-IC01-LB			SED-IC01-CC			SED-IC01-RB		
Sample Date		19-Mar 2019	19-Mar 2019	19-Mar 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019
Sample ID		JOF-SED-TR08-CORLB-0.0/0.5-20190319	JOF-SED-TR08-CORLB-0.5/1.5-20190319	JOF-SED-TR08-CORRB-0.0/0.5-20190319	JOF-SED-IC01-CORLB-0.0/0.5-20190122	JOF-SED-IC01-DUP01-20190122	JOF-SED-IC01-CORLB-0.0/0.5-20190124	JOF-SED-IC01-CORCC-0.0/0.5-20190122	JOF-SED-IC01-CORCC-0.5/1.6-20190122	JOF-SED-IC01-CORCC-0.0/0.5-20190124	JOF-SED-IC01-CORRB-0.0/0.5-20190122	JOF-SED-IC01-CORRB-0.5/1.5-20190122	JOF-SED-IC01-CORRB-0.0/0.5-20190124
Sample Depth (ft)		0.0 - 0.5	0.5 - 1.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 1.6	0.0 - 0.5	0.0 - 0.5	0.5 - 1.5	0.0 - 0.5
Sample Type[1]		N	N	N	N	FD	RS	N	N	RS	N	N	RS
Parent Sample ID						JOF-SED-IC01-CORLB-0.0/0.5-20190122							
Level of Review[2]		Final-Verified	N/A	Final-Verified	Validated	Validated	Validated	Validated	N/A	Validated	Validated	N/A	Validated
	Units												
Radiological Parameters													
Radium-226	pCi/G	0.877 +/-(0.238)	–	1.41 +/-(0.296)	1.47 +/-(0.305)	1.41 +/-(0.440)	1.60 +/-(0.360)	1.40 +/-(0.323)	–	1.02 +/-(0.281)	0.942 +/-(0.258)	–	0.965 +/-(0.255) J
Radium-228	pCi/G	1.19 +/-(0.357)	–	1.45 +/-(0.370)	1.32 +/-(0.367)	1.56 +/-(0.391)	1.76 +/-(0.542) J	1.56 +/-(0.409)	–	1.30 +/-(0.312) J	1.39 +/-(0.397)	–	1.35 +/-(0.326) J
Radium-226+228	pCi/G	2.07 +/-(0.429)	–	2.86 +/-(0.474)	2.79 +/-(0.477)	2.97 +/-(0.589)	3.36 +/-(0.651) J	2.96 +/-(0.521)	–	2.32 +/-(0.420) J	2.33 +/-(0.473)	–	2.32 +/-(0.414) J

See notes on last page.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-IC02-LB				SED-IC02-CC			SED-IC02-RB	SED-BH01-LB	
Sample Date		22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019
Sample ID		JOF-SED-IC02-CORLB-0.0/0.5-20190122	JOF-SED-IC02-CORLB-0.5/2.0-20190122	JOF-SED-IC02-CORLB-2.0/3.0-20190122	JOF-SED-IC02-CORLB-3.0/3.7-20190122	JOF-SED-IC02-CORCC-0.0/0.5-20190122	JOF-SED-IC02-CORCC-0.5/3.0-20190122	JOF-SED-IC02-CORCC-3.0/5.4-20190122	JOF-SED-IC02-CORRB-0.0/0.7-20190122	JOF-SED-BH01-CORLB-0.0/0.5-20190122	JOF-SED-BH01-CORLB-0.5/1.5-20190122
Sample Depth (ft)		0.0 - 0.5	0.5 - 2.0	2.0 - 3.0	3.0 - 3.7	0.0 - 0.5	0.5 - 3.0	3.0 - 5.4	0.0 - 0.7	0.0 - 0.5	0.5 - 1.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	N
Parent Sample ID											
Level of Review[2]		Validated	N/A	N/A	N/A	Validated	N/A	N/A	Validated	Validated	N/A
	Units										
Radiological Parameters											
Radium-226	pCi/G	1.11 +/-(0.300)	–	–	–	1.28 +/-(0.319)	–	–	1.46 +/-(0.318)	1.39 +/-(0.331)	–
Radium-228	pCi/G	1.10 +/-(0.318)	–	–	–	2.03 +/-(0.446)	–	–	1.74 +/-(0.495)	0.391 +/-(0.208) U	–
Radium-226+228	pCi/G	2.21 +/-(0.437)	–	–	–	3.31 +/-(0.548)	–	–	3.20 +/-(0.588)	1.78 +/-(0.391) J	–

See notes on last page.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-BH01-CC		SED-BH01-RB	SED-BH02-LB				SED-BH02-CC			
Sample Date		22-Jan 2019	22-Jan 2019	22-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019	24-Jan 2019
Sample ID		JOF-SED-BH01-CORCC-0.0/0.5-20190122	JOF-SED-BH01-CORCC-0.5/1.6-20190122	JOF-SED-BH01-CORRB-0.0/0.5-20190122	JOF-SED-BH02-CORLB-0.0/0.5-20190124	JOF-SED-BH02-CORLB-0.5/3.0-20190124	JOF-SED-BH02-CORLB-3.0/4.7-20190124	JOF-SED-BH02-CORLB-4.7/5.7-20190124	JOF-SED-BH02-CORCC-0.0/0.5-20190124	JOF-SED-BH02-CORCC-0.5/1.7-20190124	JOF-SED-BH02-CORCC-1.7/3.0-20190124	JOF-SED-BH02-CORCC-3.0/3.7-20190124
Sample Depth (ft)		0.0 - 0.5	0.5 - 1.6	0.0 - 0.5	0.0 - 0.5	0.5 - 3.0	3.0 - 4.7	4.7 - 5.7	0.0 - 0.5	0.5 - 1.7	1.7 - 3.0	3.0 - 3.7
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	N
Parent Sample ID												
Level of Review[2]		Validated	N/A	Validated	Validated	N/A	N/A	N/A	Validated	N/A	N/A	N/A
	Units											
Radiological Parameters												
Radium-226	pCi/G	1.63 +/-(0.356)	–	1.70 +/-(0.403)	1.23 +/-(0.293) J	–	–	–	1.61 +/-(0.359) J	–	–	–
Radium-228	pCi/G	0.765 +/-(0.516)	–	1.75 +/-(0.450)	1.11 +/-(0.333) J	–	–	–	1.14 +/-(0.370) J	–	–	–
Radium-226+228	pCi/G	2.40 +/-(0.627)	–	3.45 +/-(0.604)	2.34 +/-(0.444) J	–	–	–	2.75 +/-(0.516) J	–	–	–

See notes on last page.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-BH02-RB		SED-BH03-LB			SED-BH03-CC		SED-BH03-RB		
Sample Date		24-Jan 2019	24-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019
Sample ID		JOF-SED-BH02-CORRB-0.0/0.5-20190124	JOF-SED-BH02-DUP01-20190124	JOF-SED-BH03-CORLB-0.0/0.5-20190122	JOF-SED-BH03-CORLB-0.5/2.5-20190122	JOF-SED-BH03-CORLB-2.5/4.1-20190122	JOF-SED-BH03-CORCC-0.0/0.5-20190122	JOF-SED-BH03-CORCC-0.5/2.5-20190122	JOF-SED-BH03-CORRB-0.0/0.5-20190122	JOF-SED-BH03-CORRB-0.5/3.0-20190122	JOF-SED-BH03-CORRB-3.0/5.5-20190122
Sample Depth (ft)		0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 2.5	2.5 - 4.1	0.0 - 0.5	0.5 - 2.5	0.0 - 0.5	0.5 - 3.0	3.0 - 5.5
Sample Type[1]		N	FD	N	N	N	N	N	N	N	N
Parent Sample ID			JOF-SED-BH02-CORRB-0.0/0.5-20190124								
Level of Review[2]		Validated	Validated	Validated	N/A	N/A	Validated	Validated	Validated	N/A	N/A
	Units										
Radiological Parameters											
Radium-226	pCi/G	1.82 +/-(0.454) J	1.69 +/-(0.422) J	1.57 +/-(0.351)	–	–	1.49 +/-(0.330)	–	1.28 +/-(0.344)	–	–
Radium-228	pCi/G	1.50 +/-(0.415) J	1.88 +/-(0.487) J	1.66 +/-(0.448)	–	–	1.54 +/-(0.326)	–	1.37 +/-(0.345)	–	–
Radium-226+228	pCi/G	3.32 +/-(0.615) J	3.57 +/-(0.644) J	3.23 +/-(0.569)	–	–	3.03 +/-(0.464)	–	2.65 +/-(0.487)	–	–

See notes on last page.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-CV01-LB			SED-CV01-CC	SED-CV01-RB	SED-CV02-LB		SED-CV02-CC		SED-CV02-RB	
Sample Date		22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	22-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019
Sample ID		JOF-SED-CV01-CORLB-0.0/0.5-20190122	JOF-SED-CV01-CORLB-0.5/2.0-20190122	JOF-SED-CV01-CORLB-2.0/3.8-20190122	JOF-SED-CV01-CORCC-0.0/0.5-20190122	JOF-SED-CV01-CORRB-0.0/0.5-20190122	JOF-SED-CV02-CORLB-0.0/0.5-20190123	JOF-SED-CV02-CORLB-0.5/2.5-20190123	JOF-SED-CV02-CORCC-0.0/0.5-20190123	JOF-SED-CV02-CORCC-0.5/1.6-20190123	JOF-SED-CV02-CORRB-0.0/0.5-20190123	JOF-SED-CV02-DUP01-20190123
Sample Depth (ft)		0.0 - 0.5	0.5 - 2.0	2.0- 3.8	0.0 - 0.5	0.0 - 0.5	0.0 - 0.5	0.5 - 2.5	0.0 - 0.5	0.5 - 1.6	0.0 - 0.5	0.0 - 0.5
Sample Type[1]		N	N	N	N	N	N	N	N	N	N	FD
Parent Sample ID												JOF-SED-CV02-CORRB-0.0/0.5-20190123
Level of Review[2]		Validated	N/A	N/A	Validated	Validated	Validated	N/A	Validated	N/A	Validated	Validated
	Units											
Radiological Parameters												
Radium-226	pCi/G	1.53 +/-(0.359)	–	–	3.91 +/-(0.624)	1.17 +/-(0.243)	1.51 +/-(0.303) J	–	1.34 +/-(0.259) J	–	0.989 +/-(0.249)	1.33 +/-(0.311)
Radium-228	pCi/G	1.48 +/-(0.324)	–	–	1.90 +/-(0.474)	1.45 +/-(0.321)	1.67 +/-(0.365) J	–	1.05 +/-(0.233) J	–	1.29 +/-(0.317) J	1.64 +/-(0.433) J
Radium-226+228	pCi/G	3.01 +/-(0.484)	–	–	5.81 +/-(0.784)	2.62 +/-(0.403)	3.18 +/-(0.474) J	–	2.39 +/-(0.348) J	–	2.28 +/-(0.403) J	2.97 +/-(0.533) J

See notes on last page.

TABLE B.8 – Sediment Analytical Results for Radiological Parameters
Johnsonville Fossil Plant
January and March 2019

Sample Location		SED-CV03-LB			SED-CV03-CC	SED-CV03-RB		
Sample Date		23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019	23-Jan 2019
Sample ID		JOF-SED-CV03-CORLB-0.0/0.5-20190123	JOF-SED-CV03-CORLB-0.5/2.5-20190123	JOF-SED-CV03-CORLB-2.5/5.3-20190123	JOF-SED-CV03-CORCC-0.0/0.5-20190123	JOF-SED-CV03-CORRB-0.0/0.5-20190123	JOF-SED-CV03-CORRB-0.5/1.5-20190123	JOF-SED-CV03-CORRB-1.5/2.7-20190123
Sample Depth (ft)		0.0 - 0.5	0.5 - 2.5	2.5 - 5.3	0.0 - 0.5	0.0 - 0.5	0.5 - 1.5	1.5 - 2.7
Sample Type[1]		N	N	N	N	N	N	N
Parent Sample ID								
Level of Review[2]		Validated	N/A	N/A	Validated	N/A	Validated	N/A
	Units							
Radiological Parameters								
Radium-226	pCi/G	1.64 +/-(0.307) J	–	–	1.85 +/-(0.359) J	1.53 +/-(0.279) J	–	–
Radium-228	pCi/G	1.48 +/-(0.293)	–	–	1.19 +/-(0.405)	1.31 +/-(0.307)	–	–
Radium-226+228	pCi/G	3.12 +/-(0.424) J	–	–	3.04 +/-(0.541) J	2.84 +/-(0.415) J	–	–

Notes:

-	parameter not analyzed / not available
ft	feet
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
N/A	Not Applicable
pCi/g	picoCurie per gram

1. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate, RS=Replicate Sample (a second sample collected independently and from the same area as a Normal Environmental Sample)
2. Level of review is defined in the Quality Assurance Project Plan.

TABLE B.9 – Benthic Invertebrate Community Field Data
Johnsonville Fossil Plant
October 2019

Transect ID	Station ID	Collection Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[1]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	HP Clay
MAC-TR01	1	10/15/2019	JOF-MAC-TR01-BEN01-20191015	PO	6.4	80	65	--	--	5	--	--	--	30
MAC-TR01	2	10/15/2019	JOF-MAC-TR01-BEN02-20191015	PO	37.1	60	40	--	35	5	20	--	--	--
MAC-TR01	3	10/15/2019	JOF-MAC-TR01-BEN03-20191015	PO	58.5	20	30	--	--	70	--	--	--	--
MAC-TR01	4	10/15/2019	JOF-MAC-TR01-BEN04-20191015	PO	31.8	15	--	--	10	90	--	--	--	--
MAC-TR01	5	10/15/2019	JOF-MAC-TR01-BEN05-20191015	PO	6.1	40	--	--	--	25	--	--	--	75
MAC-TR02	1	10/15/2019	JOF-MAC-TR02-BEN01-20191015	PO	10.4	30	40	--	--	25	--	--	--	35
MAC-TR02	2	10/15/2019	JOF-MAC-TR02-BEN02-20191015	PO	36.5	80	50	--	50	--	--	--	--	--
MAC-TR02	3	10/15/2019	JOF-MAC-TR02-BEN03-20191015	PO	50.0	25	--	--	20	10	30	40	--	--
MAC-TR02	4	10/15/2019	JOF-MAC-TR02-BEN04-20191015	PO	41.4	35	--	--	20	--	80	--	--	--
MAC-TR02	5	10/15/2019	JOF-MAC-TR02-BEN05-20191015	PO	3.2	60	55	5	30	10	--	--	--	--
MAC-TR03	1	10/17/2019	JOF-MAC-TR03-BEN01-20191017	PO	3.4	30	10	--	--	90	--	--	--	--
MAC-TR03	2	10/17/2019	JOF-MAC-TR03-BEN02-20191017	PO	46.9	30	20	--	--	10	50	20	--	--
MAC-TR03	3	10/17/2019	JOF-MAC-TR03-BEN03-20191017	PO	45.5	35	65	--	--	5	30	--	--	--
MAC-TR03	4	10/17/2019	JOF-MAC-TR03-BEN04-20191017	PO	6.3	35	70	--	--	20	--	--	--	10
MAC-TR03	5	10/17/2019	JOF-MAC-TR03-BEN05-20191017	PO	7.5	60	80	--	--	20	--	--	--	--
MAC-TR04	1	10/17/2019	JOF-MAC-TR04-BEN01-20191017	PO	1.4	90	90	--	--	10	--	--	--	--
MAC-TR04	2	10/17/2019	JOF-MAC-TR04-BEN02-20191017	PO	1.5	70	90	5	--	5	--	--	--	--
MAC-TR04	3	10/17/2019	JOF-MAC-TR04-BEN03-20191017	PO	3.4	20	10	--	--	90	--	--	--	--
MAC-TR04	4	10/17/2019	JOF-MAC-TR04-BEN04-20191017	PO	44.3	50	50	--	--	25	25	--	--	--
MAC-TR04	5	10/17/2019	JOF-MAC-TR04-BEN05-20191017	PO	3.4	80	50	--	--	20	--	--	--	30
MAC-TR05	1	10/17/2019	JOF-MAC-TR05-BEN01-20191017	PO	1.5	20	--	--	--	15	--	--	--	85
MAC-TR05	2	10/17/2019	JOF-MAC-TR05-BEN02-20191017	PO	38.3	20	10	--	--	--	90	--	--	--
MAC-TR05	3	10/17/2019	JOF-MAC-TR05-BEN03-20191017	PO	46.9	40	60	--	--	10	30	--	--	--
MAC-TR05	4	10/17/2019	JOF-MAC-TR05-BEN04-20191017	PO	47.0	20	40	--	--	60	--	--	--	--
MAC-TR05	5	10/17/2019	JOF-MAC-TR05-BEN05-20191017	PO	15.3	50	50	--	--	50	--	--	--	--
MAC-TR06	1	10/17/2019	JOF-MAC-TR06-BEN01-20191017	PO	4.6	20	--	--	50	50	--	--	--	--
MAC-TR06	2	10/17/2019	JOF-MAC-TR06-BEN02-20191017	PO	38.8	20	40	--	--	30	30	--	--	--
MAC-TR06	3	10/17/2019	JOF-MAC-TR06-BEN03-20191017	PO	51.2	50	60	--	--	40	--	--	--	--
MAC-TR06	4	10/17/2019	JOF-MAC-TR06-BEN04-20191017	PO	39.6	20	40	--	--	60	--	--	--	--
MAC-TR06	5	10/17/2019	JOF-MAC-TR06-BEN05-20191017	PO	5.8	70	90	--	--	10	--	--	--	--

See notes on last page.

TABLE B.9 – Benthic Invertebrate Community Field Data
Johnsonville Fossil Plant
October 2019

Transect ID	Station ID	Collection Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[1]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	HP Clay
MAC-TR07	1	10/17/2019	JOF-MAC-TR07-BEN01-20191017	PO	5.5	10	10	--	--	90	--	--	--	--
MAC-TR07	2	10/17/2019	JOF-MAC-TR07-BEN02-20191017	PO	52.8	30	30	--	--	35	35	--	--	--
MAC-TR07	3	10/17/2019	JOF-MAC-TR07-BEN03-20191017	PO	45.8	30	30	--	--	35	35	--	--	--
MAC-TR07	4	10/17/2019	JOF-MAC-TR07-BEN04-20191017	PO	42.0	50	90	--	--	10	--	--	--	--
MAC-TR07	5	10/17/2019	JOF-MAC-TR07-BEN05-20191017	PO	5.4	15	20	--	--	80	--	--	--	--
MAC-TR08	1	10/17/2019	JOF-MAC-TR08-BEN01-20191017	PO	1.5	10	--	--	--	80	--	--	--	20
MAC-TR08	2	10/17/2019	JOF-MAC-TR08-BEN02-20191017	PO	39.9	20	30	--	--	35	35	--	--	--
MAC-TR08	3	10/17/2019	JOF-MAC-TR08-BEN03-20191017	PO	43.0	60	75	--	--	25	--	--	--	--
MAC-TR08	4	10/17/2019	JOF-MAC-TR08-BEN04-20191017	PO	34.4	60	70	--	--	30	--	--	--	--
MAC-TR08	5	10/17/2019	JOF-MAC-TR08-BEN05-20191017	PO	4.1	100	95	3	--	2	--	--	--	--
MAC-TR09	1	10/15/2019	JOF-MAC-TR09-BEN01-20191015	PO	18.0	30	40	--	--	--	10	--	--	50
MAC-TR09	2	10/15/2019	JOF-MAC-TR09-BEN02-20191015	PO	7.0	40	30	--	50	20	--	--	--	--
MAC-TR09	3	10/15/2019	JOF-MAC-TR09-BEN03-20191015	PO	4.8	35	10	--	80	10	--	--	--	--
MAC-TR09	4	10/15/2019	JOF-MAC-TR09-BEN04-20191015	PO	34.4	45	10	--	30	30	30	--	--	--
MAC-TR09	5	10/15/2019	JOF-MAC-TR09-BEN05-20191015	PO	16.4	40	30	--	--	15	--	--	--	55
MAC-TR10	1	10/15/2019	JOF-MAC-TR10-BEN01-20191015	PO	6.3	40	80	--	15	5	--	--	--	--
MAC-TR10	2	10/15/2019	JOF-MAC-TR10-BEN02-20191015	PO	31.3	30	--	--	40	60	--	--	--	--
MAC-TR10	3	10/15/2019	JOF-MAC-TR10-BEN03-20191015	PO	42.3	50	75	--	--	20	5	--	--	--
MAC-TR10	4	10/15/2019	JOF-MAC-TR10-BEN04-20191015	PO	33.1	50	--	--	90	10	--	--	--	--
MAC-TR10	5	10/15/2019	JOF-MAC-TR10-BEN05-20191015	PO	5.5	60	15	--	75	10	--	--	--	--
MAC-TR11	1	10/17/2019	JOF-MAC-TR11-BEN01-20191017	PO	3.3	30	60	--	--	40	--	--	--	--
MAC-TR11	2	10/17/2019	JOF-MAC-TR11-BEN02-20191017	PO	15.5	50	50	--	--	50	--	--	--	--
MAC-TR11	3	10/17/2019	JOF-MAC-TR11-BEN03-20191017	PO	4.5	15	--	--	--	50	--	--	--	50
MAC-TR11	4	10/17/2019	JOF-MAC-TR11-BEN04-20191017	PO	50.4	40	40	--	--	30	30	--	--	--
MAC-TR11	5	10/17/2019	JOF-MAC-TR11-BEN05-20191017	PO	4.4	30	70	--	--	30	--	--	--	--
MAC-IC01	1	10/16/2019	JOF-MAC-IC01-BEN01-20191016	PO	9.9	70	75	20	--	5	--	--	--	--
MAC-IC01	2	10/16/2019	JOF-MAC-IC01-BEN02-20191016	PO	14.9	60	80	15	--	5	--	--	--	--
MAC-IC01	3	10/16/2019	JOF-MAC-IC01-BEN03-20191016	PO	14.1	50	90	5	--	5	--	--	--	--
MAC-IC01	4	10/16/2019	JOF-MAC-IC01-BEN04-20191016	PO	13.8	100	88	10	--	2	--	--	--	--
MAC-IC01	5	10/16/2019	JOF-MAC-IC01-BEN05-20191016	PO	6.7	90	75	5	--	20	--	--	--	--

See notes on last page.

TABLE B.9 – Benthic Invertebrate Community Field Data
Johnsonville Fossil Plant
October 2019

Transect ID	Station ID	Collection Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[1]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	HP Clay
MAC-IC02	1	10/16/2019	JOF-MAC-IC02-BEN01-20191016	PO	8.0	40	--	--	--	40	--	--	--	60
MAC-IC02	2	10/16/2019	JOF-MAC-IC02-BEN02-20191016	PO	13.4	50	40	--	--	20	20	--	--	20
MAC-IC02	3	10/16/2019	JOF-MAC-IC02-BEN03-20191016	PO	13.6	60	75	--	--	5	--	--	--	20
MAC-IC02	4	10/16/2019	JOF-MAC-IC02-BEN04-20191016	PO	9.5	50	55	--	--	15	--	--	--	30
MAC-IC02	5	10/16/2019	JOF-MAC-IC02-BEN05-20191016	PO	1.6	80	40	--	--	30	30	--	--	--
MAC-IC03	1	10/16/2019	JOF-MAC-IC03-BEN01-20191016	PO	12.2	100	60	--	20	10	10	--	--	--
MAC-IC03	2	10/16/2019	JOF-MAC-IC03-BEN02-20191016	PO	13.0	100	98	1	--	1	--	--	--	--
MAC-IC03	3	10/16/2019	JOF-MAC-IC03-BEN03-20191016	PO	5.6	100	99	--	--	1	--	--	--	--
MAC-IC03	4	10/16/2019	JOF-MAC-IC03-BEN04-20191016	PO	1.8	35	50	--	10	10	--	--	--	30
MAC-IC03	5	10/16/2019	JOF-MAC-IC03-BEN05-20191016	PO	2.4	35	40	--	10	10	--	--	--	40
MAC-BH01	1	10/16/2019	JOF-MAC-BH01-BEN01-20191016	PO	13.4	80	88	10	--	2	--	--	--	--
MAC-BH01	2	10/16/2019	JOF-MAC-BH01-BEN02-20191016	PO	13.8	90	80	15	--	5	--	--	--	--
MAC-BH01	3	10/16/2019	JOF-MAC-BH01-BEN03-20191016	PO	15.0	100	98	1	--	1	--	--	--	--
MAC-BH01	4	10/16/2019	JOF-MAC-BH01-BEN04-20191016	PO	16.0	100	90	5	--	5	--	--	--	--
MAC-BH01	5	10/16/2019	JOF-MAC-BH01-BEN05-20191016	PO	17.7	50	--	30	50	20	--	--	--	--
MAC-BH02	1	10/16/2019	JOF-MAC-BH02-BEN01-20191016	PO	6.5	90	95	3	--	2	--	--	--	--
MAC-BH02	2	10/16/2019	JOF-MAC-BH02-BEN02-20191016	PO	20.9	100	95	3	--	2	--	--	--	--
MAC-BH02	3	10/16/2019	JOF-MAC-BH02-BEN03-20191016	PO	18.8	100	98	1	--	1	--	--	--	--
MAC-BH02	4	10/16/2019	JOF-MAC-BH02-BEN04-20191016	PO	16.3	70	55	5	--	--	40	--	--	--
MAC-BH02	5	10/16/2019	JOF-MAC-BH02-BEN05-20191016	PO	12.4	50	50	--	--	--	50	--	--	--
MAC-BH03	1	10/16/2019	JOF-MAC-BH03-BEN01-20191016	PO	16.3	100	98	1	--	1	--	--	--	--
MAC-BH03	2	10/16/2019	JOF-MAC-BH03-BEN02-20191016	PO	17.1	100	95	2	--	3	--	--	--	--
MAC-BH03	3	10/16/2019	JOF-MAC-BH03-BEN03-20191016	PO	13.0	100	98	1	--	1	--	--	--	--
MAC-BH03	4	10/16/2019	JOF-MAC-BH03-BEN04-20191016	PO	11.6	70	90	2	--	8	--	--	--	--
MAC-BH03	5	10/16/2019	JOF-MAC-BH03-BEN05-20191016	PO	8.0	70	90	2	--	8	--	--	--	--
MAC-CV01	1	10/17/2019	JOF-MAC-CV01-BEN01-20191017	PO	1.4	60	95	--	--	5	--	--	--	--
MAC-CV01	2	10/17/2019	JOF-MAC-CV01-BEN02-20191017	PO	1.5	100	95	2	--	3	--	--	--	--
MAC-CV01	3	10/17/2019	JOF-MAC-CV01-BEN03-20191017	PO	3.1	100	95	2	--	3	--	--	--	--
MAC-CV01	4	10/17/2019	JOF-MAC-CV01-BEN04-20191017	PO	1.9	100	98	1	--	1	--	--	--	--
MAC-CV01	5	10/17/2019	JOF-MAC-CV01-BEN05-20191017	PO	1.5	100	98	1	--	1	--	--	--	--

See notes on last page.

TABLE B.9 – Benthic Invertebrate Community Field Data
Johnsonville Fossil Plant
October 2019

Transect ID	Station ID	Collection Date	Sample ID	Gear	Water Depth (ft)	% Dredge Full	Substrate Percentages[1]							
							Fines (Silts & Clays)	Detritus	Sand	Mollusk Shell	Gravel	Cobble	Woody Debris	HP Clay
MAC-CV02	1	10/16/2019	JOF-MAC-CV02-BEN01-20191016	PO	4.3	100	98	2	--	--	--	--	--	--
MAC-CV02	2	10/16/2019	JOF-MAC-CV02-BEN02-20191016	PO	3.1	100	98	2	--	--	--	--	--	--
MAC-CV02	3	10/16/2019	JOF-MAC-CV02-BEN03-20191016	PO	1.1	30	--	--	--	10	--	--	--	90
MAC-CV02	4	10/16/2019	JOF-MAC-CV02-BEN04-20191016	PO	1.6	100	99	1	--	--	--	--	--	--
MAC-CV02	5	10/16/2019	JOF-MAC-CV02-BEN05-20191016	PO	1.0	100	99	1	--	--	--	--	--	--
MAC-CV03	1	10/16/2019	JOF-MAC-CV03-BEN01-20191016	PO	4.4	30	10	--	--	30	60	--	--	--
MAC-CV03	2	10/16/2019	JOF-MAC-CV03-BEN02-20191016	PO	7.1	100	98	2	--	--	--	--	--	--
MAC-CV03	3	10/16/2019	JOF-MAC-CV03-BEN03-20191016	PO	2.0	20	--	--	40	20	--	--	--	40
MAC-CV03	4	10/16/2019	JOF-MAC-CV03-BEN04-20191016	PO	1.9	20	--	--	40	20	--	--	--	40
MAC-CV03	5	10/16/2019	JOF-MAC-CV03-BEN05-20191016	PO	5.4	100	98	2	--	--	--	--	--	--

Notes:

% Dredge Full	Estimate of the volume of dredge filled with substrate
HP Clay	Hardpan Clay
PO	Ponar Dredge (Wildco™)
ID	Identification

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

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																																				
Transect ID	MAC-TR01					MAC-TR02					MAC-TR03					MAC-TR04					MAC-TR05					MAC-TR06					MAC-TR07				
Collection Date	10/15/2019					10/15/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019				
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																																			
Actinobdella inequiannulata			1																						1										1
Helobdella elongata	2												1																						1
Helobdella stagnalis																																			
Placobdella translucens																																			
OLIGOCHAETA																																			
TUBIFICIDA																																			
Naididae																								1							1				
Aulodrilus pigueti					1														1						1										
Branchiura sowerbyi	1						1							1		2																			
Dero sp.																															2				
Limnodrilus hoffmeisteri	2				1	1			1							1			1									1					1		1
Limnodrilus sp.																																			
Naidinae																																			
Nais sp.																		1													1				
Ophidonais serpentina																		1																	
Piguetiella michiganensis																												1							
Tubificinae w/ hair chaetae																															2				
Tubificinae w/out hair chaetae	10	1		1	3	2	1			7		2	6		1	1	3		4	1				1	3		9	4			3		15		2
INSECTA																																			
COLEOPTERA																																			
Elmidae																																			
Stenelmis sp.											1																								
DIPTERA																																			
Ceratopogonidae																								1											
Probezzia sp.	7	1			1	5			1	14				1	1		1								1					1					1
Chaoboridae																																			
Chaoborus punctipennis																1							1	1			1								
Chaoborus sp.																																			
Chironomidae																																			
Ablabesmyia annulata						1				2					3	10	3		1											5				1	
Ablabesmyia mallochi											1																								
Ablabesmyia rhamphe gp.																										1									1
Axarus sp.																2																			
Chironomus sp.		1													1	2									1						1				
Cladotanytarsus sp.											2					1		2													14				5
Coelotanypus sp.	14	12	7		9	3	8	4	7	14		1	14	2	7	16	30		9	7			6	4	7		8	3		6		1	2	8	
Cricotopus sp.																						1													
Cricotopus trifascia																							1												
Cryptochironomus sp.	1	1								1		1		1				1	1		1		1		2	2	2		1			2	1	4
Dicrotendipes neomodestus					11					6	35	1		3		3		21			3	2				2				1	20	1			4
Dicrotendipes simpsoni																																			
Dicrotendipes sp.			1		1																1										2	1			

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																																				
Transect ID	MAC-TR01					MAC-TR02					MAC-TR03					MAC-TR04					MAC-TR05					MAC-TR06					MAC-TR07				
Collection Date	10/15/2019					10/15/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019				
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)																																			
Epoicocladius flavens		1																	1					1					1						
Glyptotendipes sp.																																			
Orthocladiinae																	1																		
Parachironomus sp.																																			
Polypedilum halterale gp.																															3				
Polypedilum scalaenum gp.																	1																		
Procladius sp.	1						1		2	1			1			5			1				1	2				2	2			1			
Rheotanytarsus sp.																																			
Stempellina sp.																																			
Stempellina sp. A	3																																		
Stictochironomus caffrarius gp.																			1																
Tanytarsus sp.											1							1											1	1	1				
Thienemanniella xena											2											1													
Tvetenia paucunca																	1			1															
Xenochironomus xenolabis																									1										
Zavrelimyia sp.																							1												
EPHEMEROPTERA																																			
Caenidae																																			
Caenis sp.											1																								
Ephemeridae																																			
Hexagenia sp. <10mm	5	23			7	7	31	2	5	19		1	15	6	27	26	6		18	10	3		14	3	3		6	4		27		1	5	4	2
Hexagenia sp. >10mm						2	6			5					10	21	8		1	6		1	1		2					5			3	18	
MEGALOPTERA																																			
Sialidae																																			
Sialis sp.																																			
ODONATA																																			
Gomphidae										1																									
Phanogomphus sp.																																			
Stylurus sp.																																			
TRICHOPTERA																																			
Hydropsychidae																																			
Cheumatopsyche sp.																																			
Hydropsyche sp.																																			
Hydroptilidae																																			
Hydroptila sp.											4											1													
Orthotrichia sp.																																			
Leptoceridae																																			
Oecetis sp.					1				1	1			1	1			1		1																
Philopotamidae																																			
Chimarra aterrima																																			
Polycentropodidae																		1																	
Cyrnellus fraternus					8				1											1		1			4					1					
Neureclipsis sp.																																			

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																																				
Transect ID	MAC-TR01					MAC-TR02					MAC-TR03					MAC-TR04					MAC-TR05					MAC-TR06					MAC-TR07				
Collection Date	10/15/2019					10/15/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019				
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				1																							2								
Amblema plicata					1									1											2										
Ellipsaria lineolata				1										1																					
Fusconaia ebena																									1										
Megalonaias nervosa												1																							
Obliquaria reflexa																																			
Plectomerus dombeyanus														2						1					1										
Pleurobema sintoxia																																			
Potamilus alatus																																			
Quadrula apiculata											1																								
Quadrula pustulosa																									1		1								
Quadrula quadrula																									2			1							
Truncilla donaciformis	1			1	1	3	1			1					1						1														1
Corbiculidae																																			
Corbicula fluminea <10mm	43	3	2	25	3	4	1	20	19	62		1	5	5	5	16		1	2	23	28	12	55		2		103		1	16	3	2	4	26	19
Corbicula fluminea >10mm	7	1	11	7	2	7		2		9	6	1	1	2	9	8	3	1		19				95	15	11	13	68	9	5	2	28	13	12	2
Sphaeriidae																																			
Eupera cubensis																																			
Musculium transversum	2			2	2		1		2	4			1		4					7		1					1		1	4				3	6
GASTROPODA																																			
Viviparidae																																			
Campeloma decisum				1																					1		1								
Lioplax sp.																																			
Lioplax sulculosa										2											1													3	4
Viviparus sp.																																			
Viviparus subpurpureus				1	1										3	3		1							1						1			1	
Hydrobiidae																																			
Amnicola limosa	6				1	2				6					3	2	2			10					2	1				5					
Somatogyrus sp.				2			2		2	5	1		1		3	24			1	2		1					3	2		4	2	4		3	2
Pleuroceridae																																			
Pleurocera canaliculata	3				4					2	4					3	5	9			5				2						7				5
Pleurocera canaliculata moriforme																																			
NEMATODA																																			
PLATYHELMINTHES																																			
Planariidae																																			
Girardia tigrina			2					2	1		10	1							1							1			3						

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																																						
Transect ID	MAC-TR01					MAC-TR02					MAC-TR03					MAC-TR04					MAC-TR05					MAC-TR06					MAC-TR07				
Collection Date	10/15/2019					10/15/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019					10/17/2019				
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																																			
AMPHIPODA																																			
Corophiidae																																			
Apocorophium lacustre									1																										
Crangonyctidae																																			
Crangonyx sp.		5																																	
Gammaridae																																			
Gammarus sp.			1		1		1		4	1	2		7			5	2		9	2	1		7	2	3	2	7	11	2	1	1	1	8	1	
ISOPODA																																			
Asellidae																																			
Lirceus sp.																																			
CYCLOPOIDA																																			
Cyclopidae																																			
Mesocyclops edax																																			
OSTRACODA																																			
Candonidae																																			
Candona sp.									1																			1							
ARACHNIDA																																			
Acariformes										1																									
Trombidiformes																																			
Arrenuridae																																			
Arrenurus sp.															1																				
Krendowskiidae																																			
Krendowskia sp.										3																									
Lebertiidae																																			
Lebertia sp.																1																			
Limnesidae																																			
Limnesia sp.										1																1									
Sperchontidae																																			
Sperchon sp.																																			
Unionicolidae																																			
Neumania sp.										1																									
Unionicola sp.					1					1																									

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																				Tennessee River (Intake Channel)															
Transect ID	MAC-TR08					MAC-TR09					MAC-TR10					MAC-TR11					MAC-IC01					MAC-IC02					MAC-IC03				
Collection Date	10/17/2019					10/15/2019					10/15/2019					10/17/2019					10/16/2019					10/16/2019					10/16/2019				
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																																			
Actinobdella inequiannulata																								1											
Helobdella elongata																																			
Helobdella stagnalis																	1																		
Placobdella translucens																											1								
OLIGOCHAETA																																			
TUBIFICIDA																																			
Naididae																						1													
Aulodrilus pigueti																										1				1					
Branchiura sowerbyi															1					1	2														
Dero sp.																																			
Limnodrilus hoffmeisteri							1						1		1					1		1	1		1		1					1			
Limnodrilus sp.																					1														
Naidinae																																			
Nais sp.																																			
Ophidonais serpentina																																			
Piguetiella michiganensis																																			
Tubificinae w/ hair chaetae																									1										
Tubificinae w/out hair chaetae			2		1		2	1	2				3	1	1					1	1	2	2		1		3			3					
INSECTA																																			
COLEOPTERA																																			
Elmidae																																			
Stenelmis sp.																																			
DIPTERA																																			
Ceratopogonidae					2																	5					1	1			1				
Probezzia sp.						1	1	1			6													4	7					2					
Chaoboridae																																			
Chaoborus punctipennis										1				1			1		1		1	1	1	2			1	1	3		1				
Chaoborus sp.																																			
Chironomidae																																			
Ablabesmyia annulata			1		1					1				1		1				3		4	2	4	4			5	3	1	2	1			
Ablabesmyia mallochi																									2										
Ablabesmyia rhamphe gp.	1						1																												
Axarus sp.																																			
Chironomus sp.																											1		1		2	1	1		1
Cladotanytarsus sp.	7										2	1																							1
Coelotanypus sp.			8	7	8			1	5	13	13	9	13	10	5	4	9	6	2	14		14	13	8	13		1	5	30		20	17	23	1	13
Cricotopus sp.													1																						
Cricotopus trifascia																																			
Cryptochironomus sp.	6	1	1					1	1		1	1	1		1					1												2			
Dicrotendipes neomodestus	35	3					9	1	1							1		1		5										1					
Dicrotendipes simpsoni																																			
Dicrotendipes sp.																		2								1									

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																				Tennessee River (Intake Channel)															
Transect ID	MAC-TR08					MAC-TR09					MAC-TR10					MAC-TR11					MAC-IC01					MAC-IC02					MAC-IC03				
Collection Date	10/17/2019					10/15/2019					10/15/2019					10/17/2019					10/16/2019					10/16/2019					10/16/2019				
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)																																			
Epoicocladius flavens				1	4																			1	2										
Glyptotendipes sp.																																			
Orthocladiinae																																			
Parachironomus sp.																																			
Polypedilum halterale gp.											1													1	1					4					
Polypedilum scalaenum gp.																																			
Procladius sp.								1	1	3			3		3				1			2		1		1		2			3				1
Rheotanytarsus sp.																																			
Stempellina sp.											1																								
Stempellina sp. A																																			
Stictochironomus caffrarius gp.																																			
Tanytarsus sp.											1	2								3														1	
Thienemanniella xena	1																																		
Tvetenia paucunca																																			
Xenochironomus xenolabis																																			
Zavrelimyia sp.																																			
EPHEMEROPTERA																																			
Caenidae																																			
Caenis sp.																																			
Ephemeridae																																			
Hexagenia sp. <10mm				2	6			7	3	5	18	1	10	9	5	3	8	4		7		4	2	2	2				2	4	2				
Hexagenia sp. >10mm			3	8	17			1		1	1					1				1		4	2	15	7				4	2					
MEGALOPTERA																																			
Sialidae																																			
Sialis sp.																																			
ODONATA																																			
Gomphidae																																			
Phanogomphus sp.				1																															
Stylurus sp.																	1																		
TRICHOPTERA																																			
Hydropsychidae																																			
Cheumatopsyche sp.																															1				
Hydropsyche sp.																																			
Hydroptilidae																																			
Hydroptila sp.	9																																		
Orthotrichia sp.																																			
Leptoceridae																																			
Oecetis sp.											1		1											1					1	1					
Philopotamidae																																			
Chimarra aterrima																																			
Polycentropodidae																															1				
Cyrnellus fraternus									5											2															
Neureclipsis sp.																																			

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																				Tennessee River (Intake Channel)															
Transect ID	MAC-TR08					MAC-TR09					MAC-TR10					MAC-TR11					MAC-IC01					MAC-IC02					MAC-IC03				
Collection Date	10/17/2019					10/15/2019					10/15/2019					10/17/2019					10/16/2019					10/16/2019					10/16/2019				
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								1																												
Amblema plicata										1															2						2					
Ellipsaria lineolata																																				
Fusconaia ebena																																				
Megalonaias nervosa				1																																
Obliquaria reflexa																									4						3					
Plectomerus dombeyanus												1													2						1					
Pleurobema sintoxia																									2						2	1				
Potamilus alatus																																				
Quadrula apiculata																															1					
Quadrula pustulosa												1																			1					
Quadrula quadrula				1																																
Truncilla donaciformis							1																							2						
Corbiculidae																																				
Corbicula fluminea <10mm			2				1	9	3	6	1	1	4	3			7	18			1								1	45	1		1	2	
Corbicula fluminea >10mm	6	35	10	9	8	1	14	11	11	5	1	8	11	9	9	17	4	2	51	15		8	2	2	4	3		1		52	10			3	1
Sphaeriidae																																				
Eupera cubensis																																				
Musculium transversum			5	33	1	6					2	1				1	3	2			7	5	7	12						1	2	4	44		1
GASTROPODA																																				
Viviparidae																																				
Campeloma decisum													1												1						1					
Lioplax sp.																															1					
Lioplax sulculosa			2	1							1			1		1									1											
Viviparus sp.																																				
Viviparus subpurpureus					1		2				1					4					1	5	1		2						2					
Hydrobiidae																																				
Amnicola limosa					2		4	5			2									3	2	2		2		2				3						
Somatogyrus sp.							5		12	1		3					1			1													2		2
Pleuroceridae																																				
Pleurocera canaliculata					4	2	6	3							1	9			2									2	2	8	2					
Pleurocera canaliculata moriforme									4																											
NEMATODA								1									1					1			1											
PLATYHELMINTHES																																				
Planariidae																																				
Girardia tigrina	1	1											2							1																

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Mainstream)																				Tennessee River (Intake Channel)															
Transect ID	MAC-TR08					MAC-TR09					MAC-TR10					MAC-TR11					MAC-IC01					MAC-IC02					MAC-IC03				
Collection Date	10/17/2019					10/15/2019					10/15/2019					10/17/2019					10/16/2019					10/16/2019					10/16/2019				
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																																				
AMPHIPODA																																				
Corophiidae																																				
Apocorophium lacustre				17								1								9																
Crangonyctidae																																				
Crangonyx sp.																																				
Gammaridae																																				
Gammarus sp.	8		4	2					5	2		2	2	1		1		14		2		3			2											
ISOPODA																																				
Asellidae																																				
Lirceus sp.										1																										
CYCLOPOIDA																																				
Cyclopidae																																				
Mesocyclops edax																								2			2									
OSTRACODA																																				
Candonidae																																				
Candona sp.																																				
ARACHNIDA																																				
Acariformes																																				
Trombidiformes																																				
Arrenuridae																																				
Arrenurus sp.																								1									1			
Krendowskiidae																																				
Krendowskia sp.											1											1														
Lebertiidae																																				
Lebertia sp.																																				
Limnesidae																																				
Limnesia sp.																																				
Sperchontidae																																				
Sperchon sp.																									1											
Unionicolidae																																				
Neumania sp.											1																									
Unionicola sp.																																				

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Boat Harbor)															Indian Creek					Cypress Creek					Beaverdam Creek				
Transect ID	MAC-BH01					MAC-BH02					MAC-BH03					MAC-CV01					MAC-CV02					MAC-CV03				
Collection Date	10/16/2019					10/16/2019					10/16/2019					10/17/2019					10/16/2019					10/16/2019				
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
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
Taxa	Number of Organisms																													
ANNELIDA																														
HIRUDINEA			1	1				1																						
Glossiphoniidae																														
Actinobdella inequiannulata																														
Helobdella elongata										2																1				
Helobdella stagnalis															2								1							
Placobdella translucens																														
OLIGOCHAETA																														
TUBIFICIDA																														
Naididae																														
Aulodrilus pigueti					1																								1	
Branchiura sowerbyi								2								1														
Dero sp.					1																								2	
Limnodrilus hoffmeisteri				1										1	1		1													
Limnodrilus sp.																														
Naidinae																												1		
Nais sp.																														
Ophidonais serpentina																														
Piguetiella michiganensis																														
Tubificinae w/ hair chaetae										2					2															
Tubificinae w/out hair chaetae	2	2	2	3	12		1		3	2		1		1	6	2	1	1		1		2						1		1
INSECTA																														
COLEOPTERA																														
Elmidae																														
Stenelmis sp.																														
DIPTERA																														
Ceratopogonidae							3											1	14	9	2	7	1	5	7		6			4
Probezzia sp.												1			2	1								1						5
Chaoboridae																														
Chaoborus punctipennis							3	1	3							1		1			4	2		2	3		4			2
Chaoborus sp.	1																													
Chironomidae																														
Ablabesmyia annulata	3			3	1	5	1		1	1	4	6	4	1	3	7	1	2	1	1					1	2				
Ablabesmyia mallochi																														
Ablabesmyia rhamphe gp.					1																					1				
Axarus sp.																														
Chironomus sp.		2	3	6		2	8	1	1	2	1	1	3	3	1	1	2	1	5				2				1			1
Cladotanytarsus sp.																1													1	
Coelotanypus sp.	4	7	4	1		18	2		3		12	14	7	6	4	25	34	19	25	12	7	19		19	25	12	10			10
Cricotopus sp.																														
Cricotopus trifascia																														
Cryptochironomus sp.					2					1				1		1										2		1		
Dicrotendipes neomodestus																1	9	1		3			2			103			1	1
Dicrotendipes simpsoni																										1				
Dicrotendipes sp.				1	1															1						1	1			

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Boat Harbor)															Indian Creek					Cypress Creek					Beaverdam Creek				
Transect ID	MAC-BH01					MAC-BH02					MAC-BH03					MAC-CV01					MAC-CV02					MAC-CV03				
Collection Date	10/16/2019					10/16/2019					10/16/2019					10/17/2019					10/16/2019					10/16/2019				
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
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
Taxa	Number of Organisms																													
INSECTA (continued)																														
Chironomidae (continued)																														
Epoicocladius flavens	1										1																			
Glyptotendipes sp.																										3				
Orthocladiinae																														
Parachironomus sp.																												1		
Polypedilum halterale gp.																												3	1	
Polypedilum scalaenum gp.																													1	
Procladius sp.	3	1	1	1	1	2				3		1	1	1	1	2						1		1		3				
Rheotanytarsus sp.																		1												
Stempellina sp.																														
Stempellina sp. A																														
Stictochironomus caffrarius gp.																														
Tanytarsus sp.					3					1					1	1												1		
Thienemanniella xena																														
Tvetenia paucunca																														
Xenochironomus xenolabis																														
Zavrelimyia sp.																														
EPHEMEROPTERA																														
Caenidae																														
Caenis sp.																														
Ephemeridae																														
Hexagenia sp. <10mm						2				1	11	10	7			5			1								1			
Hexagenia sp. >10mm	1	3	2	4		5		1	1		9	12	2	3	3	11	1													
MEGALOPTERA																														
Sialidae																														
Sialis sp.																											1			
ODONATA																														
Gomphidae																														
Phanogomphus sp.																														
Stylurus sp.																														
TRICHOPTERA																														
Hydropsychidae																														
Cheumatopsyche sp.																														
Hydropsyche sp.		1																												
Hydroptilidae																														
Hydroptila sp.																														
Orthotrichia sp.																										3				
Leptoceridae																														
Oecetis sp.																										4				
Philopotamidae																														
Chimarra aterrima									1																					
Polycentropodidae																														
Cyrnellus fraternus																										11				
Neureclipsis sp.																	1													

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Boat Harbor)															Indian Creek					Cypress Creek					Beaverdam Creek				
Transect ID	MAC-BH01					MAC-BH02					MAC-BH03					MAC-CV01					MAC-CV02					MAC-CV03				
Collection Date	10/16/2019					10/16/2019					10/16/2019					10/17/2019					10/16/2019					10/16/2019				
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
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
Taxa	Number of Organisms																													
MOLLUSCA																														
BIVALVIA																														
Unionidae																														
Amblema plicata				2							1				1															
Ellipsaria lineolata																														
Fusconaia ebena				1																										
Megalonaias nervosa																														
Obliquaria reflexa																														
Plectomerus dombeyanus					1																									
Pleurobema sintoxia			1																											
Potamilus alatus																	1													
Quadrula apiculata												1			1															
Quadrula pustulosa																														
Quadrula quadrula			1																											
Truncilla donaciformis														1			1													
Corbiculidae																														
Corbicula fluminea <10mm	2			1	1	3					2	3	9	2	10	7	5													
Corbicula fluminea >10mm	1		2	1	6	6		2	4	1	1	2	4	3	4	3	2													
Sphaeriidae																														
Eupera cubensis																										1				
Musculium transversum		3	9	3		12				1	6	4	16	12	17	17	22	73	11	35		2				1	1			
GASTROPODA																														
Viviparidae																														
Campeloma decisum																	1	1												
Lioplax sp.																														
Lioplax sulculosa											1	1																		
Viviparus sp.																													2	
Viviparus subpurpureus					1			1										2												
Hydrobiidae																														
Amnicola limosa						7			1	2			6	3	7	1	1													
Somatogyrus sp.			1							1																				
Pleuroceridae																														
Pleurocera canaliculata	2										1					2	4	1		1			1					1	1	
Pleurocera canaliculata moriforme																														
NEMATODA																														
PLATYHELMINTHES																														
Planariidae																														
Girardia tigrina																														

See notes on last page.

TABLE B.10 – Benthic Invertebrate Taxonomic Dataset
Johnsonville Fossil Plant
October 2019

River	Tennessee River (Boat Harbor)															Indian Creek					Cypress Creek					Beaverdam Creek				
Transect ID	MAC-BH01					MAC-BH02					MAC-BH03					MAC-CV01					MAC-CV02					MAC-CV03				
Collection Date	10/16/2019					10/16/2019					10/16/2019					10/17/2019					10/16/2019					10/16/2019				
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
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
Taxa	Number of Organisms																													
CRUSTACEA																														
AMPHIPODA																														
Corophiidae																														
Apocorophium lacustre																1														
Crangonyctidae																														
Crangonyx sp.																														
Gammaridae																														
Gammarus sp.																														
ISOPODA																														
Asellidae																														
Lirceus sp.																														
CYCLOPOIDA																														
Cyclopidae																														
Mesocyclops edax		1				1	1		1										1			2								
OSTRACODA																														
Candonidae																														
Candona sp.																						3				2				
ARACHNIDA																														
Acariformes																														
Trombidiformes																														
Arrenuridae																														
Arrenurus sp.						2																								
Krendowskiidae																														
Krendowskia sp.																														
Lebertiidae																														
Lebertia sp.																														
Limnesidae																														
Limnesia sp.																	3			2										
Sperchontidae																														
Sperchon sp.																														
Unionicolidae																														
Neumania sp.															1					1						1				
Unionicola sp.																1														

Notes:

PO Ponar Dredge (Wildco™)
ID Identification

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. For the Intake Channel, downstream was defined based on exiting to the Tennessee River.

TABLE B.11 – Summary of Mayfly Samples
Johnsonville Fossil Plant
June 2019

Sampling Reach	Composite Type	Sample ID[1]	Parent Sample ID	Sample Type[2]	Sample Date	Laboratory Analysis		
						Total Metals	Total Mercury	% Moisture
Tennessee River Upstream (TRU)	Nymph Non-Depurated	JOF-MFN-TRU-20190606		N	6/6/2019	x	x	x
	Nymph Depurated	JOF-MFP-TRU-20190606		N	6/6/2019	x	x	x
	Adult Female Imago	JOF-MFA-TRU-FI-20190612		N	6/12/2019	x	x	x
	Adult Male Imago	JOF-MFA-TRU-MI-20190612		N	6/12/2019	x	x	x
Tenneessee River Adjacent (TRA)	Nymph Non-Depurated	JOF-MFN-TRA-20190606		N	6/6/2019	x	x	x
	Nymph Non-Depurated	JOF-MFN-DUP01-20190606	JOF-MFN-TRA-20190606	FD	6/6/2019	x	x	x
	Nymph Depurated	JOF-MFP-TRA-20190606		N	6/6/2019	x	x	x
	Nymph Depurated	JOF-MFP-DUP01-20190606	JOF-MFP-TRA-20190606	FD	6/6/2019	x	x	x
	Adult Female Imago	JOF-MFA-TRA-FI-20190612		N	6/12/2019	x	x	x
	Adult Male Imago	JOF-MFA-TRA-MI-20190612		N	6/12/2019	x	x	x
Tennessee River Downstream (TRD)	Nymph Non-Depurated	JOF-MFN-TRD-20190606		N	6/6/2019	x	x	x
	Nymph Depurated	JOF-MFP-TRD-20190606		N	6/6/2019	x	x	x
	Adult Female Imago	JOF-MFA-TRD-FI-20190612		N	6/12/2019	x	x	x
	Adult Male Imago	JOF-MFA-TRD-MI-20190612		N	6/12/2019	x	x	x
Intake Channel (IC)	Nymph Non-Depurated	JOF-MFN-IC-20190606		N	6/6/2019	x	x	x
	Nymph Depurated	JOF-MFP-IC-20190606		N	6/6/2019	x	x	x
	Adult Female Imago	JOF-MFA-IC-FI-20190612		N	6/12/2019	x	x	x
	Adult Male Imago	JOF-MFA-IC-MI-20190612		N	6/12/2019	x	x	x
	Adult Male Imago	JOF-MFA-DUP02-20190612	JOF-MFA-IC-MI-20190612	FD	6/12/2019	x	x	x
Boat Harbor (BH)	Nymph Non-Depurated	JOF-MFN-BH-20190606		N	6/6/2019	x	x	x
	Nymph Depurated	JOF-MFP-BH-20190606		N	6/6/2019	x	x	x
	Adult Female Imago	JOF-MFA-BH-FI-20190612		N	6/12/2019	x	x	x
	Adult Male Imago	JOF-MFA-BH-MI-20190612		N	6/12/2019	x	x	x
	Adult Male Imago	JOF-MFA-DUP01-20190612	JOF-MFA-BH-MI-20190612	FD	6/12/2019	x	x	x

Notes:

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

1. Sample Nomenclature
   - Sample Naming Convention for mayfly nymphs: Plant Acronym - Matrix Acronym - Sampling Reach Identifier - Sample Date
   - Sample Naming Convention for mayfly adults: Plant Acronym - Matrix Acronym - Sampling Reach Identifier - Sex and Development Stage - yyyymmdd
   - Sample Naming Convention for Duplicate Samples: Plant Acronym - Matrix Acronym - Duplicate Number - Sample Date
   - Matrix Acronym: MFN=Mayfly Nymph Non-Depurated, MFP=Mayfly Nymph Purged (Depurated), MFA=Mayfly Adult
   - Sex and Development Stage Acronym: FI=Female Imago, MI=Male Imago
2. Sample Type: N=Normal, FD=Field Duplicate

TABLE B.12 – Mayfly Analytical Results
Johnsonville Fossil Plant
June 2019

Location		JOF-TRU				JOF-TRA					
Sample Date		6/6/2019	6/6/2019	6/12/2019	6/12/2019	6/6/2019	6/6/2019	6/6/2019	6/6/2019	6/12/2019	6/12/2019
Sample ID		JOF-MFN-TRU-20190606	JOF-MFP-TRU-20190606	JOF-MFA-TRU-MI-20190612	JOF-MFA-TRU-FI-20190612	JOF-MFN-TRA-20190606	JOF-MFN-DUP01-20190606	JOF-MFP-TRA-20190606	JOF-MFP-DUP01-20190606	JOF-MFA-TRA-MI-20190612	JOF-MFA-TRA-FI-20190612
Sample Type[1]		N	N	N	N	N	FD	N	FD	N	N
Parent Sample ID							JOF-MFN-TRA-20190606		JOF-MFP-TRA-20190606		
Level of Review[2]		Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
	Units										
Percent Moisture											
% Moisture	%	80.6	84.1	73	65	81.7	82.4	84.9	84.8	72.5	63.5
Total Metals											
Antimony	mg/kg	< 0.021	< 0.021	< 0.021	< 0.021	0.025 J	0.023 J	< 0.021	< 0.020	< 0.021	< 0.021
Arsenic	mg/kg	0.55	0.080 J	< 0.030	< 0.030	0.64	0.67	0.082 J	0.078 J	< 0.030	< 0.030
Barium	mg/kg	10.1 J	1.9 J	0.16	0.078 J	13.0 J	14.9 J	1.3 J	1.2 J	0.19	0.12
Beryllium	mg/kg	0.051 J	< 0.033	< 0.033	< 0.033	0.071 J	0.078 J	< 0.033	< 0.032	< 0.033	< 0.032
Boron	mg/kg	< 0.70	< 0.69	< 0.69	< 0.69	< 0.68	< 0.69	< 0.69	< 0.68	< 0.70	< 0.68
Cadmium	mg/kg	0.64	0.54	0.17	0.21	1.1	0.98	0.88	1.1	0.23	0.23
Calcium	mg/kg	435 J	239 J	324 J	509 J	536 J	574 J	322 J	322 J	324 J	709 J
Chromium	mg/kg	1.2	0.13 J	0.11 J	0.13 J	1.5	1.6	0.16 J	0.16 J	3.3	0.17 J
Cobalt	mg/kg	1.2	0.44	0.52	0.62	1.1	1.3	0.39	0.37	0.29	0.62
Copper	mg/kg	3.0	1.6	6.0	4.5	2.4	2.9	2.1	1.9	6.3	4.3
Lead	mg/kg	0.90	0.092 J	< 0.030	< 0.030	1.1	1.3	0.088 J	0.085 J	< 0.030	< 0.029
Lithium	mg/kg	0.84	0.054 J	< 0.021	< 0.021	0.98	1.1	0.063 J	0.065 J	< 0.021	< 0.021
Mercury	mg/kg	0.013 J	0.0080 J	0.025	0.026	0.014 J	0.010 J	0.0082 J	0.0084 J	0.017 J	0.022 J
Molybdenum	mg/kg	0.17 J	0.11 J	0.10 J	0.12	0.14 J	0.15 J	0.11 J	0.098 J	0.098 J	0.13
Nickel	mg/kg	1.0	0.13 J	< 0.041	< 0.041	1.3	1.4	0.14 J	0.14	0.049 J	< 0.040
Selenium	mg/kg	0.59	0.32	0.84	0.91	0.70	0.80	0.46	0.39	0.93	1.2
Silver	mg/kg	< 0.022	< 0.011	0.023 J	0.016 J	< 0.022	< 0.022	< 0.011	< 0.011	0.022 J	0.015 J
Strontium	mg/kg	1.5	0.47 J	0.25 J	< 0.16	2.3	2.4	0.48 J	0.51 J	0.21 J	0.18 J
Thallium	mg/kg	< 0.013	< 0.013	< 0.013	< 0.013	0.022 U*	0.019 U*	< 0.013	< 0.013	< 0.013	< 0.013
Vanadium	mg/kg	1.9	0.17	< 0.033	< 0.033	2.3	2.6	0.18	0.18	< 0.033	0.054 J
Zinc	mg/kg	51.9	32.6	26.2	75.3	48.5	60.8	49.8	52.3	24.6	90.8

See notes on last page.

TABLE B.12 – Mayfly Analytical Results
Johnsonville Fossil Plant
June 2019

Location		JOF-TRD				JOF-IC				
Sample Date		6/6/2019	6/6/2019	6/12/2019	6/12/2019	6/6/2019	6/6/2019	6/12/2019	6/12/2019	6/12/2019
Sample ID		JOF-MFN-TRD-20190606	JOF-MFP-TRD-20190606	JOF-MFA-TRD-MI-20190612	JOF-MFA-TRD-FI-20190612	JOF-MFN-IC-20190606	JOF-MFP-IC-20190606	JOF-MFA-IC-MI-20190612	JOF-MFA-DUP02-20190612	JOF-MFA-IC-FI-20190612
Sample Type[1]		N	N	N	N	N	N	N	FD	N
Parent Sample ID									JOF-MFA-IC-MI-20190612	
Level of Review[2]		Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated	Validated
	Units									
Percent Moisture										
% Moisture	%	82.6	84.7	71.8	63.1	80.7	84.4	71.4	70.8	62.3
Total Metals										
Antimony	mg/kg	0.021 J	< 0.020	< 0.021	< 0.020	0.025 J	< 0.021	< 0.021	< 0.020	< 0.020
Arsenic	mg/kg	0.73	0.056 J	< 0.030	< 0.029	1.1	0.099	< 0.030	< 0.029	< 0.029
Barium	mg/kg	13.7 J	1.1 J	0.16	0.094 J	18.7 J	1.1 J	0.18	0.17	0.11
Beryllium	mg/kg	0.071 J	< 0.032	< 0.033	< 0.032	0.082 J	< 0.033	< 0.033	< 0.031	< 0.031
Boron	mg/kg	< 0.68	< 0.67	< 0.69	< 0.66	< 0.68	< 0.69	< 0.69	< 0.66	< 0.66
Cadmium	mg/kg	0.94	0.88	0.26	0.25	1.1	1.2	0.27	0.32	0.23
Calcium	mg/kg	529 J	337 J	244 J	495 J	628 J	462 J	311 J	399 J	632 J
Chromium	mg/kg	2.0	0.16 J	0.27 J	0.12 J	1.8	0.13 J	0.13 J	0.14 J	0.10 J
Cobalt	mg/kg	1.3	0.43	0.31	0.44	1.7	0.56	0.48	0.61	0.65
Copper	mg/kg	2.8	1.8	6.8	5.1	2.7	1.9	6.3	7.1	4.6
Lead	mg/kg	1.3	0.069 J	< 0.030	< 0.029	1.6	0.068 J	< 0.030	< 0.028	< 0.028
Lithium	mg/kg	1.0	0.049 J	< 0.021	< 0.020	1.3	0.049 J	< 0.021	< 0.020	< 0.020
Mercury	mg/kg	0.014 J	0.011 J	0.023 J	0.021 J	0.013 J	0.0089 J	0.023 J	0.020 J	0.019 J
Molybdenum	mg/kg	0.15 J	0.10 J	0.094 J	0.11	0.14 J	0.11 J	0.11 J	0.12	0.13
Nickel	mg/kg	1.5	0.12 J	< 0.041	< 0.039	1.8	0.14	< 0.041	< 0.039	< 0.039
Selenium	mg/kg	0.61	0.36	0.65	0.77	0.79	0.50	0.83	0.73	1.1
Silver	mg/kg	< 0.022	< 0.011	0.024 J	0.018 J	< 0.022	< 0.011	0.020 J	0.018 J	0.013 J
Strontium	mg/kg	2.3	0.51 J	0.23 J	< 0.15	3.1	0.72	0.25 J	0.29 J	< 0.15
Thallium	mg/kg	0.017 U*	< 0.013	< 0.013	< 0.012	0.021 U*	< 0.013	< 0.013	< 0.012	< 0.012
Vanadium	mg/kg	2.9	0.16	< 0.033	< 0.032	2.9	0.14	0.033 J	0.041 J	< 0.032
Zinc	mg/kg	53.6	45.7	25.6	77.4	53.7	71.8	27.4	28.0	81.2

See notes on last page.

TABLE B.12 – Mayfly Analytical Results
Johnsonville Fossil Plant
June 2019

Location		JOF-BH				
Sample Date		6/6/2019	6/6/2019	6/12/2019	6/12/2019	6/12/2019
Sample ID		JOF-MFN-BH-20190606	JOF-MFP-BH-20190606	JOF-MFA-BH-MI-20190612	JOF-MFA-DUP01-20190612	JOF-MFA-BH-FI-20190612
Sample Type[1]		N	N	N	FD	N
Parent Sample ID					JOF-MFA-BH-MI-20190612	
Level of Review[2]		Validated	Validated	Validated	Validated	Validated
	Units					
Percent Moisture						
% Moisture	%	80.7	84.3	71.1	71.6	62.8
Total Metals						
Antimony	mg/kg	< 0.020	< 0.020	< 0.020	< 0.020	< 0.021
Arsenic	mg/kg	0.73	0.099	< 0.029	< 0.029	< 0.030
Barium	mg/kg	14.2 J	1.5 J	0.18	0.17	0.098 J
Beryllium	mg/kg	0.068 J	< 0.032	< 0.032	< 0.032	< 0.033
Boron	mg/kg	< 0.66	< 0.68	< 0.66	< 0.67	< 0.70
Cadmium	mg/kg	1.2	0.76	0.29	0.32	0.28
Calcium	mg/kg	601 J	360 J	315 J	227 J	466 J
Chromium	mg/kg	1.4	0.17 J	0.13 J	0.10 J	0.15 J
Cobalt	mg/kg	1.7	0.65	0.44	0.41	0.62
Copper	mg/kg	4.3	2.3	6.6	6.9	5.0
Lead	mg/kg	1.3	0.11	< 0.029	< 0.029	< 0.030
Lithium	mg/kg	0.97	0.075 J	< 0.020	< 0.020	< 0.021
Mercury	mg/kg	0.0091 J	< 0.0070	0.024 J	0.020 J	0.019 J
Molybdenum	mg/kg	0.17 J	0.12	0.10 J	0.10 J	0.11 J
Nickel	mg/kg	1.5	0.19	< 0.039	< 0.040	< 0.041
Selenium	mg/kg	0.62	0.37	0.76	0.72	0.89
Silver	mg/kg	< 0.021	< 0.011	0.020 J	0.021 J	0.016 J
Strontium	mg/kg	2.5	0.68	0.24 J	0.26 J	< 0.16
Thallium	mg/kg	0.018 U*	< 0.013	< 0.012	< 0.013	< 0.013
Vanadium	mg/kg	2.2	0.19	< 0.032	< 0.032	< 0.033
Zinc	mg/kg	81.6	53.2	27.3	26.9	81.7

Notes:

<	analyte was not detected at a concentration greater than the Method Detection Limit
%	percent
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
mg/kg	milligrams per kilogram
U*	this result should be considered “not detected” because it was detected in an associated field or laboratory blank at a similar level

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

APPENDIX C – PHOTOGRAPHIC LOGS

ATTACHMENT C.1

Photographic Logs Of Sediment Samples

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 1

Photo Location:
SED-TR01-LB

Survey Date:
3/20/2019

Comments:
Core depth 2.4 feet.

Photograph ID: 2

Photo Location:
SED-TR01-LB

Survey Date:
3/20/2019

Comments:
Core depth 2.4 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 3

Photo Location:
SED-TR01-LB

Survey Date:
3/20/2019

Comments:
Core depth 2.4 feet. Sample intervals (feet): 0.0-0.5, 0.5-1.5, and 1.5-2.4.

Photograph ID: 4

Photo Location:
SED-TR01-LB

Survey Date:
3/20/2019

Comments:
Core depth 2.4 feet. Sample intervals (feet): 0.0-0.5, 0.5-1.5, and 1.5-2.4.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 5

Photo Location:
SED-TR01-CC

Survey Date:
3/20/2019

Comments:
Photo not available. Ponar grabs. Substrate cobble and gravel. No sample generated.

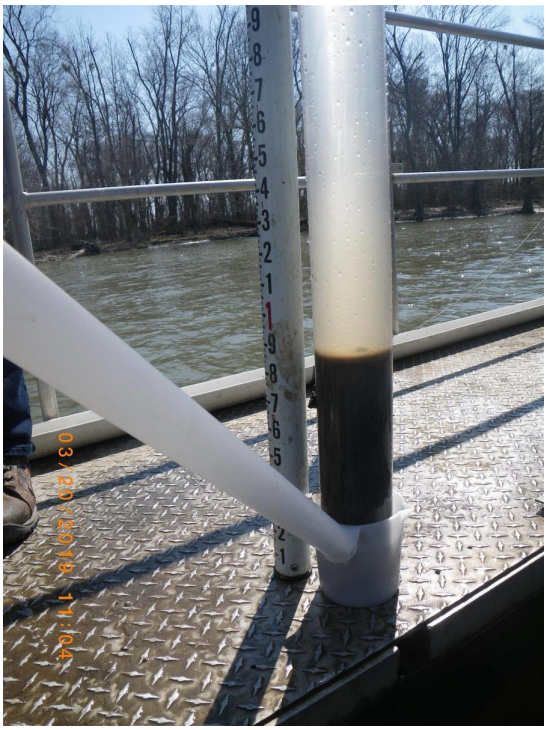
PHOTOGRAPH NOT AVAILABLE

Photograph ID: 6

Photo Location:
SED-TR01-RB

Survey Date:
3/20/2019

Comments:
Core depth 0.9 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 7

Photo Location:
SED-TR01-RB

Survey Date:
3/20/2019

Comments:
Core depth 0.9 feet.

Photograph ID: 8

Photo Location:
SED-TR01-RB

Survey Date:
3/20/2019

Comments:
Core depth 0.9 feet. No sample generated; parent material. Several Ponar deployments yielded insufficient depositional sediments to form a sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 9

Photo Location:
SED-TR02-LB

Survey Date:
3/20/2019

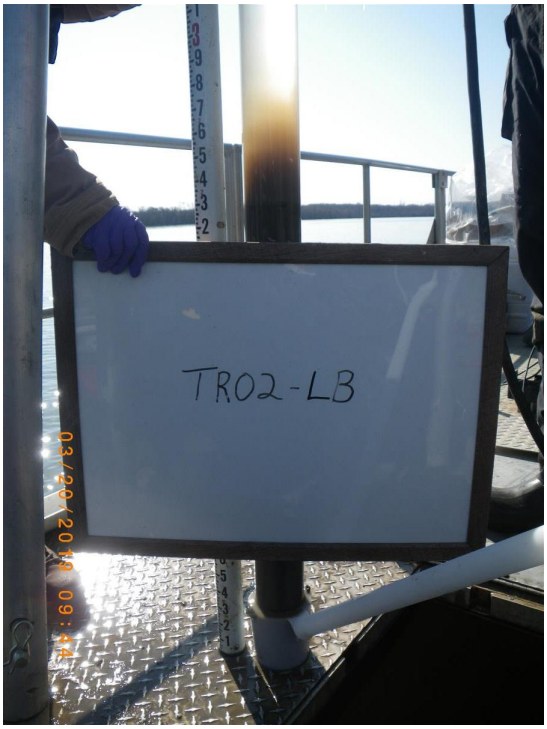
Comments:
Core depth 2.3 feet.

Photograph ID: 10

Photo Location:
SED-TR02-LB

Survey Date:
3/20/2019

Comments:
Core depth 2.3 feet. Photo of discharged core not available. Sample intervals (feet): 0.0-0.5 and 0.5-2.3.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 11

Photo Location:
SED-TR02-CC

Survey Date:
3/20/2019

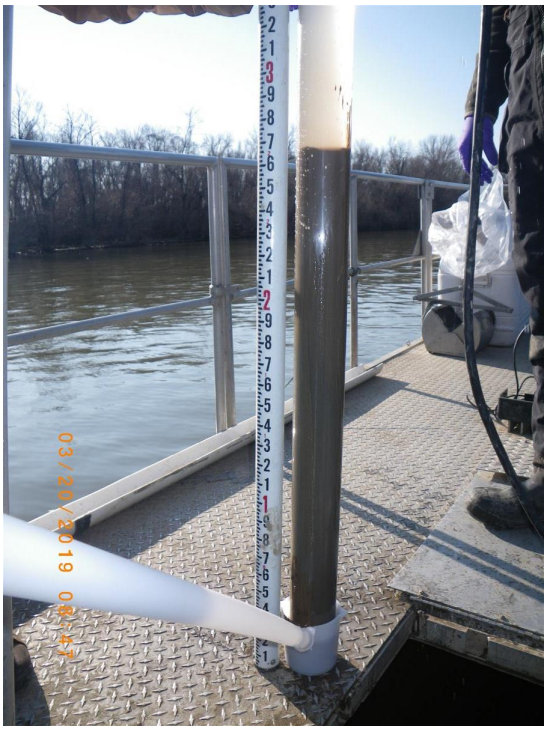
Comments:
Ponar grab. No depositional sediments. No sample generated.

Photograph ID: 12

Photo Location:
SED-TR02-RB

Survey Date:
3/20/2019

Comments:
Core depth 2.7 feet.



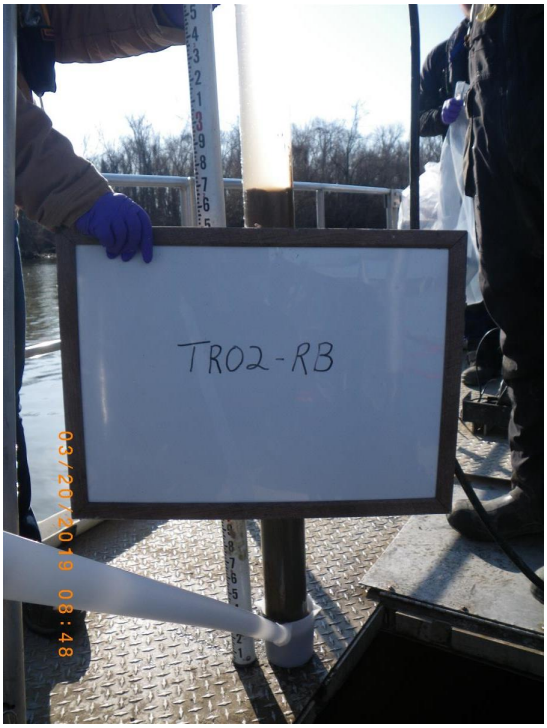
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 13

Photo Location:
SED-TR02-RB

Survey Date:
3/20/2019

Comments:
Core depth 2.7 feet.



Photograph ID: 14

Photo Location:
SED-TR02-RB

Survey Date:
3/20/2019

Comments:
Core depth 2.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-1.5, and
1.5-2.7.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 15

Photo Location:
SED-TR03-LB

Survey Date:
3/19/2019

Comments:
Composite of two Ponar grabs. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 16

Photo Location:
SED-TR03-CC

Survey Date:
3/19/2019

Comments:
Ponar grabs. No depositional sediments. No sample generated.

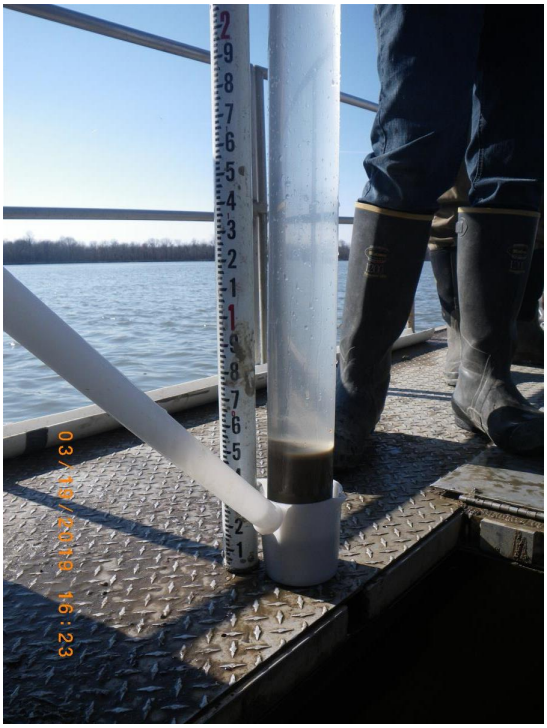
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 17

Photo Location:
SED-TR03-RB

Survey Date:
3/19/2019

Comments:
Core depth 0.5 feet.



Photograph ID: 18

Photo Location:
SED-TR03-RB

Survey Date:
3/19/2019

Comments:
(Whiteboard mislabeled in photo) Core depth 0.5 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 19

Photo Location:
SED-TR03-RB

Survey Date:
3/19/2019

Comments:
Core depth 0.5 feet. No sample generated. Limited depositional sediments overlaying parent material.

Photograph ID: 20

Photo Location:
SED-TR03-RB

Survey Date:
3/19/2019

Comments:
(Sample mislabeled in photo) Composite of three Ponar grabs. Surficial (0.0-0.5 feet) sediment sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 21

Photo Location:
SED-TR04-LB

Survey Date:
3/19/2019

Comments:
Photo not available. A sediment core (depth 0.5 feet) and a Ponar grab yielded insufficient depositional sediments to form a sample.

PHOTOGRAPH NOT AVAILABLE

Photograph ID: 22

Photo Location:
SED-TR04-LB

Survey Date:
3/19/2019

Comments:
Composite of three Ponar grabs. Surficial (0.0-0.5 feet) sediment sample collected approximately 100 feet downstream from the proposed sample location.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 23

Photo Location:
SED-TR04-CC

Survey Date:
3/19/2019

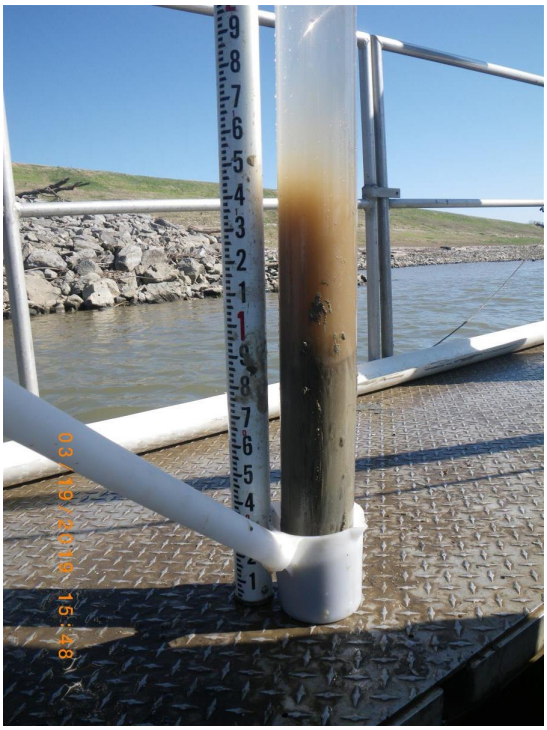
Comments:
Ponar grab. No depositional sediments. No sample generated.

Photograph ID: 24

Photo Location:
SED-TR04-RB

Survey Date:
3/19/2019

Comments:
Core depth 0.9 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 25

Photo Location:
SED-TR04-RB

Survey Date:
3/19/2019

Comments:
Core depth 0.9 feet.

Photograph ID: 26

Photo Location:
SED-TR04-RB

Survey Date:
3/19/2019

Comments:
Core depth 0.9 feet. Parent material. No sample generated.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 27

Photo Location:
SED-TR04-RB

Survey Date:
3/19/2019

Comments:
Composite of three Ponar grabs. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 28

Photo Location:
SED-TR05-LB

Survey Date:
3/19/2019

Comments:
Core depth 4.1 feet.

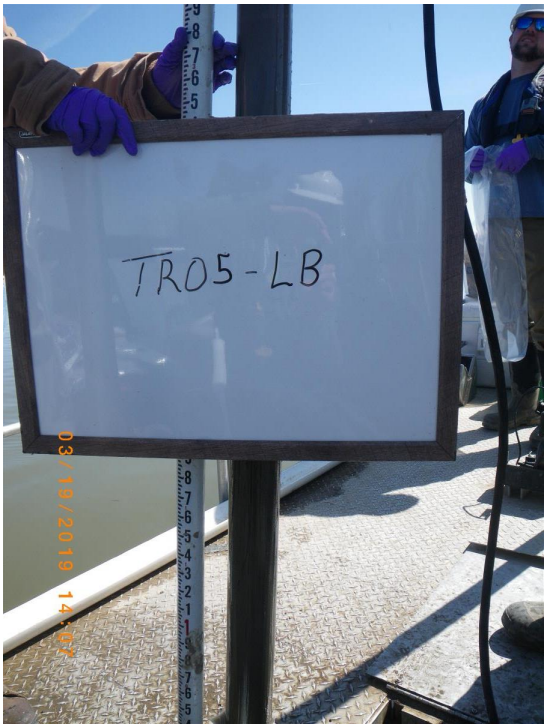
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 29

Photo Location:
SED-TR05-LB

Survey Date:
3/19/2019

Comments:
Core depth 4.1 feet.



Photograph ID: 30

Photo Location:
SED-TR05-LB

Survey Date:
3/19/2019

Comments:
Core depth 4.1 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.2, and 2.2-3.6. Parent material 3.6-4.1 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 31

Photo Location:
SED-TR05-LB

Survey Date:
3/19/2019

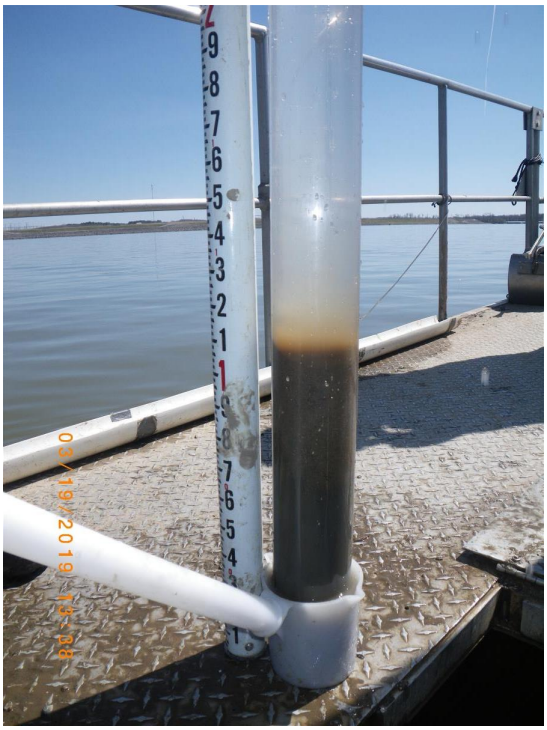
Comments:
Core depth 4.1 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.2, and 2.2-3.6. Parent material 3.6-4.1 feet.

Photograph ID: 32

Photo Location:
SED-TR05-CC

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 33

Photo Location:
SED-TR05-CC

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet.

Photograph ID: 34

Photo Location:
SED-TR05-CC

Survey Date:
3/19/2019

Comments:
Native mussel:
Plectomerus dombeyanus.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 35

Photo Location:
SED-TR05-CC

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet. No sample generated. Limited depositional sediments. Mollusk/mollusk shell and sand overlaying parent material.

Photograph ID: 36

Photo Location:
SED-TR05-CC

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet. No sample generated. Limited depositional sediments. Mollusk/mollusk shell and sand overlaying parent material.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 37

Photo Location:
SED-TR05-CC

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet. No sample generated. Limited depositional sediments. Mollusk/mollusk shell and sand overlaying parent material.

Photograph ID: 38

Photo Location:
SED-TR05-RB

Survey Date:
3/19/2019

Comments:
Core depth 1.4 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 39

Photo Location:
SED-TR05-RB

Survey Date:
3/19/2019

Comments:
Core depth 1.4 feet.

Photograph ID: 40

Photo Location:
SED-TR05-RB

Survey Date:
3/19/2019

Comments:
Core depth 1.4 feet. Sample interval (feet): 0.0-0.5. Parent material 0.8-1.4.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 41

Photo Location:
SED-TR06-LB

Survey Date:
3/19/2019

Comments:
Ponar grab. No depositional sediments. Vibecore did not obtain substrate. No sample generated.

Photograph ID: 42

Photo Location:
SED-TR06-CC

Survey Date:
3/19/2019

Comments:
Several Ponar grabs. Insufficient depositional sediments to form a sample. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 43

Photo Location:
SED-TR06-RB

Survey Date:
3/19/2019

Comments:
Composite of three Ponar grabs. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 44

Photo Location:
SED-TR06-RB

Survey Date:
3/19/2019

Comments:
Composite of three Ponar grabs. Surficial (0.0-0.5 feet) sediment sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 45

Photo Location:
SED-TR06-RB

Survey Date:
3/19/2019

Comments:
Native mussels: *Elliptio crassidens* and likely *Pleurobema sintoxia.*

Photograph ID: 46

Photo Location:
SED-TR06-RB

Survey Date:
3/19/2019

Comments:
Native mussels: *Elliptio crassidens* and likely *Pleurobema sintoxia.*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 47

Photo Location:
SED-TR06-RB

Survey Date:
3/19/2019

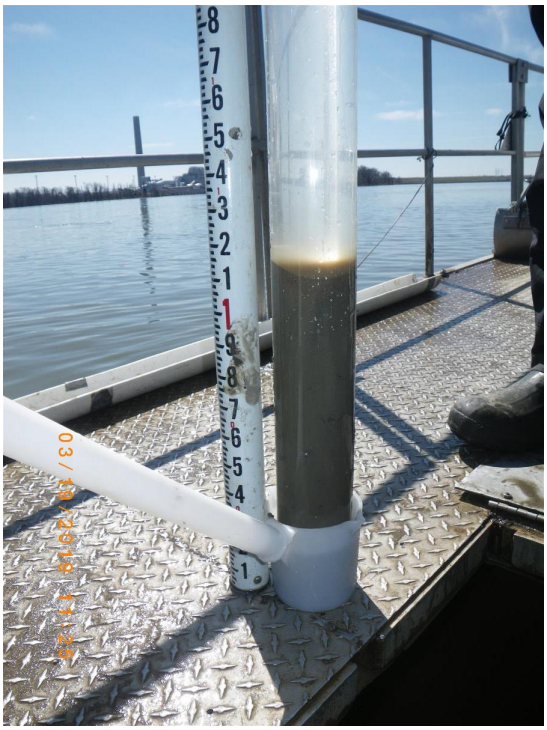
Comments:
Native mussel: *Obliquaria reflexa.*

Photograph ID: 48

Photo Location:
SED-TR07-LB

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet.



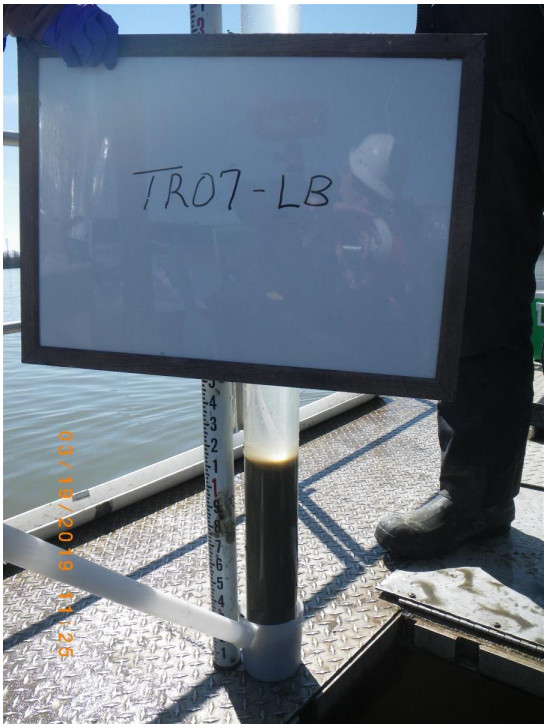
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 49

Photo Location:
SED-TR07-LB

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet.



Photograph ID: 50

Photo Location:
SED-TR07-LB

Survey Date:
3/19/2019

Comments:
Core depth 1.1 feet. Sample interval (feet): 0.0-0.5. Parent material 0.5-0.9.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 51

Photo Location:
SED-TR07-CC

Survey Date:
3/19/2019

Comments:
Ponar grab. No depositional sediments. No sample generated.

Photograph ID: 52

Photo Location:
SED-TR07-CC

Survey Date:
3/19/2019

Comments:
Ponar grab. No depositional sediments. No sample generated.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 53

Photo Location:
SED-TR07-RB

Survey Date:
3/19/2019

Comments:
Core depth 1.0 feet.

Photograph ID: 54

Photo Location:
SED-TR07-RB

Survey Date:
3/19/2019

Comments:
Core depth 1.0 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 55

Photo Location:
SED-TR07-RB

Survey Date:
3/19/2019

Comments:
Core depth 1.0 feet. Sample interval (feet): 0.0-0.5. Parent material 0.75-1.0.

Photograph ID: 56

Photo Location:
SED-TR08-LB

Survey Date:
3/19/2019

Comments:
Core depth 1.8 feet.

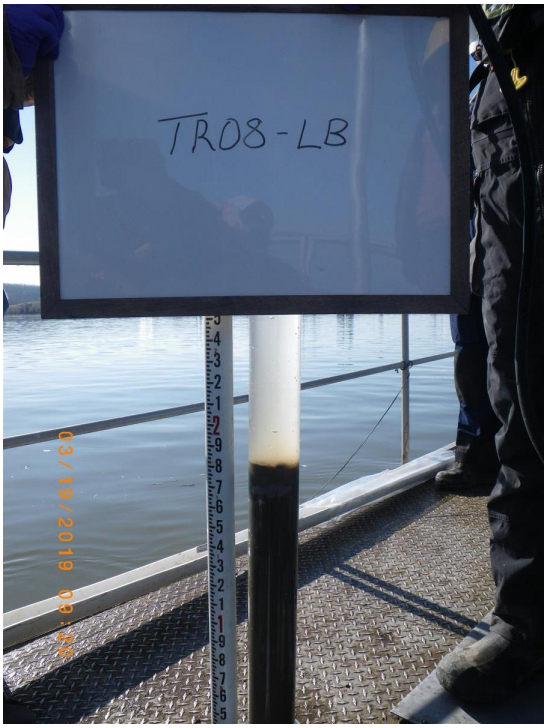
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 57

Photo Location:
SED-TR08-LB

Survey Date:
3/19/2019

Comments:
Core depth 1.8 feet.



Photograph ID: 58

Photo Location:
SED-TR08-LB

Survey Date:
3/19/2019

Comments:
Core depth 1.8 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.5. Parent material 1.5-1.8.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 59

Photo Location:
SED-TR08-CC

Survey Date:
3/19/2019

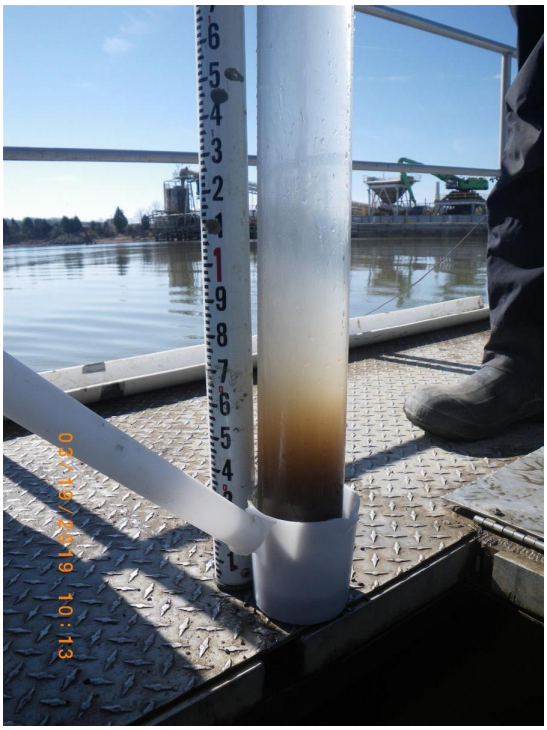
Comments:
Ponar grab. No depositional sediments. No sample generated.

Photograph ID: 60

Photo Location:
SED-TR08-RB

Survey Date:
3/19/2019

Comments:
Core insufficient recovery. Core discarded.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 61

Photo Location:
SED-TR08-RB

Survey Date:
3/19/2019

Comments:
Core insufficient recovery.
Core discarded.

Photograph ID: 62

Photo Location:
SED-TR08-RB

Survey Date:
3/19/2019

Comments:
Core insufficient recovery.
Core discarded.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 63

Photo Location:
SED-TR08-RB

Survey Date:
3/19/2019

Comments:
Ponar grab discarded. Substrate: limited depositional sediments; mollusk/mollusk shell mixed with sand and hardpan clay.

Photograph ID: 64

Photo Location:
SED-TR08-RB

Survey Date:
3/19/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 65

Photo Location:
SED-IC01-LB

Survey Date:
1/22/2019

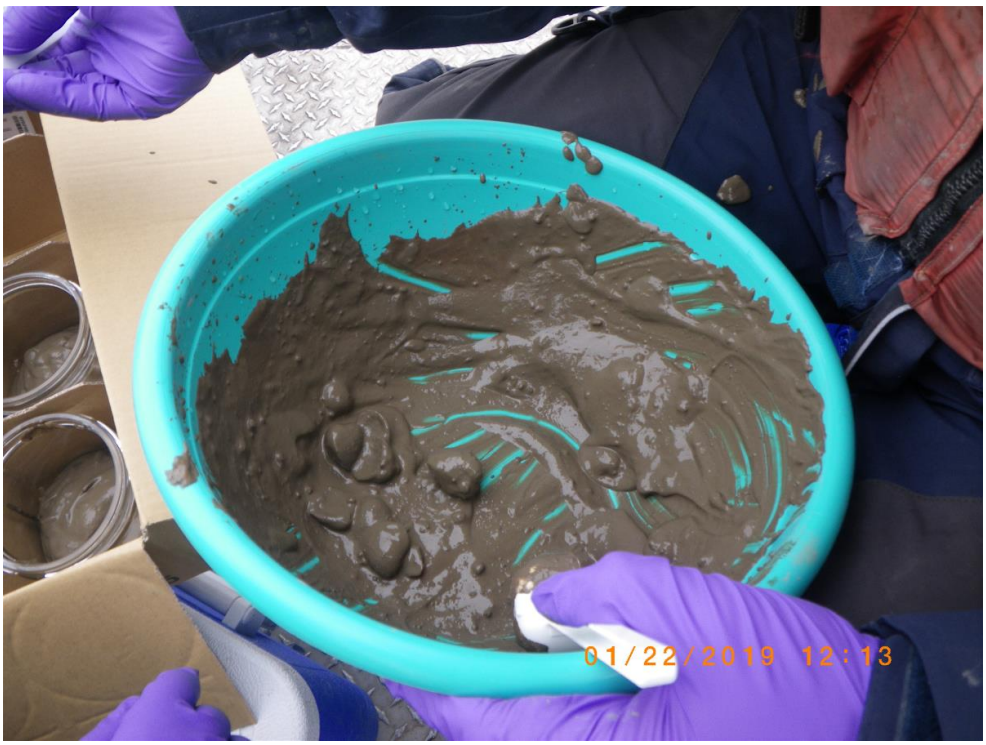
Comments:
Core depth 0.7 feet. Insufficient depositional sediments to form a sample. Core largely parent material.

Photograph ID: 66

Photo Location:
SED-IC01-LB

Survey Date:
1/22/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 67

Photo Location:
SED-IC01-LB

Survey Date:
1/24/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 68

Photo Location:
SED-IC01-CC

Survey Date:
1/22/2019

Comments:
Core depth 1.9 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 69

Photo Location:
SED-IC01-CC

Survey Date:
1/22/2019

Comments:
Core depth 1.9 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.6. Parent material 1.6-1.9.

Photograph ID: 70

Photo Location:
SED-IC01-CC

Survey Date:
1/24/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 71

Photo Location:
SED-IC01-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.9 feet.

Photograph ID: 72

Photo Location:
SED-IC01-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.9 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.5. Parent material 1.5-1.9.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 73

Photo Location:
SED-IC01-RB

Survey Date:
1/24/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 74

Photo Location:
SED-IC02-LB

Survey Date:
1/22/2019

Comments:
Core depth 3.7 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 75

Photo Location:
SED-IC02-LB

Survey Date:
1/22/2019

Comments:
Core depth 3.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-2.0, 2.0-3.0
and 3.0-3.7.

Photograph ID: 76

Photo Location:
SED-IC02-LB

Survey Date:
1/22/2019

Comments:
Core depth 3.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-2.0, 2.0-3.0
and 3.0-3.7.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 77

Photo Location:
SED-IC02-CC

Survey Date:
1/22/2019

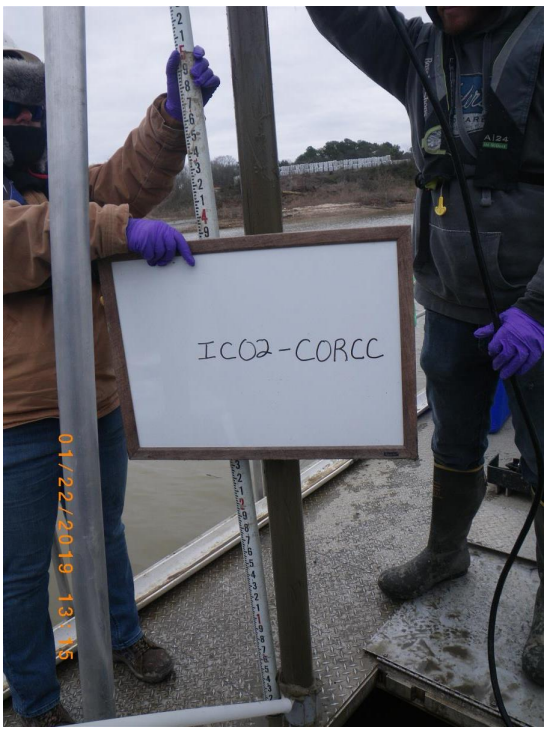
Comments:
Core depth 5.4 feet.

Photograph ID: 78

Photo Location:
SED-IC02-CC

Survey Date:
1/22/2019

Comments:
Core depth 5.4 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 79

Photo Location:
SED-IC02-CC

Survey Date:
1/22/2019

Comments:
Core depth 5.4 feet.
Sample intervals (feet):
0.0-0.5, 0.5-3.0, and
3.0-5.4.

Photograph ID: 80

Photo Location:
SED-IC02-CC

Survey Date:
1/22/2019

Comments:
Core depth 5.4 feet.
Sample intervals (feet):
0.0-0.5, 0.5-3.0, and
3.0-5.4.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 81

Photo Location:
SED-IC02-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.1 feet.

Photograph ID: 82

Photo Location:
SED-IC02-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.1 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 83

Photo Location:
SED-IC02-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.1 feet. Surficial sediments 0.0-0.7 feet. Parent material 0.7-1.1 feet.

Photograph ID: 84

Photo Location:
SED-IC02-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.1 feet. Surficial sediments 0.0-0.7 feet. Parent material 0.7-1.1 feet.

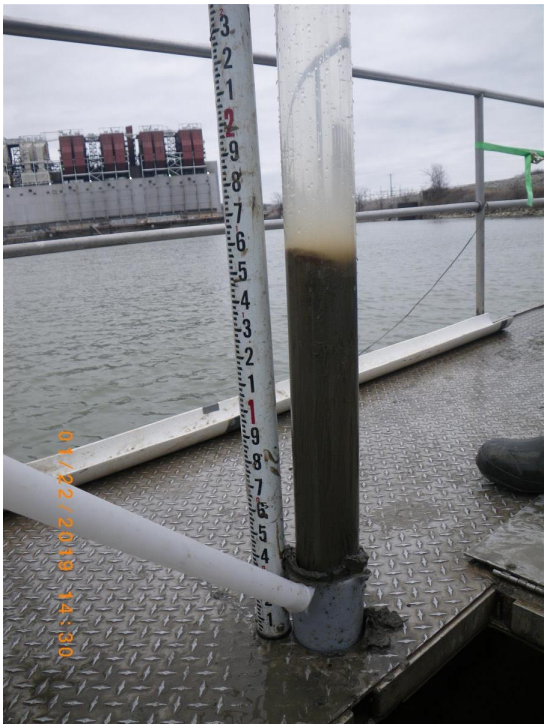
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 85

Photo Location:
SED-BH01-LB

Survey Date:
1/22/2019

Comments:
Core depth 1.5 feet.

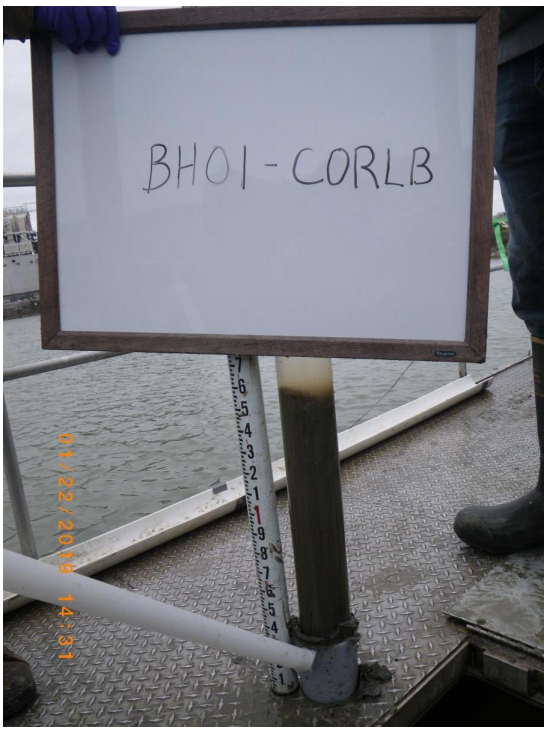


Photograph ID: 86

Photo Location:
SED-BH01-LB

Survey Date:
1/22/2019

Comments:
Core depth 1.5 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 87

Photo Location:
SED-BH01-LB

Survey Date:
1/22/2019

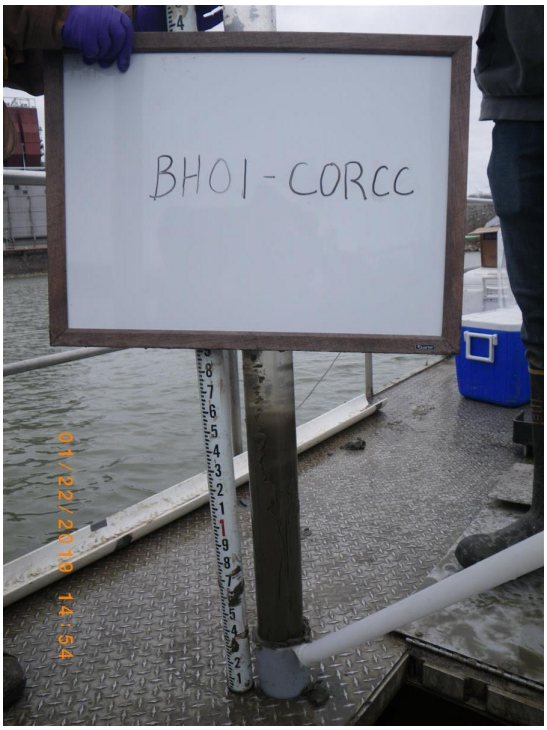
Comments:
Core depth 1.5 feet.
Sample intervals (feet)
0.0-0.5 and 0.5-1.5.

Photograph ID: 88

Photo Location:
SED-BH01-CC

Survey Date:
1/22/2019

Comments:
Core depth 1.6 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 89

Photo Location:
SED-BH01-CC

Survey Date:
1/22/2019

Comments:
Core depth 1.6 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.6.

Photograph ID: 90

Photo Location:
SED-BH01-RB

Survey Date:
1/22/2019

Comments:
Core deployments yielded insufficient recovery. Surficial (0.0-0.5 feet) sediment sample collected using a Ponar dredge. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 91

Photo Location:
SED-BH02-LB

Survey Date:
1/24/2019

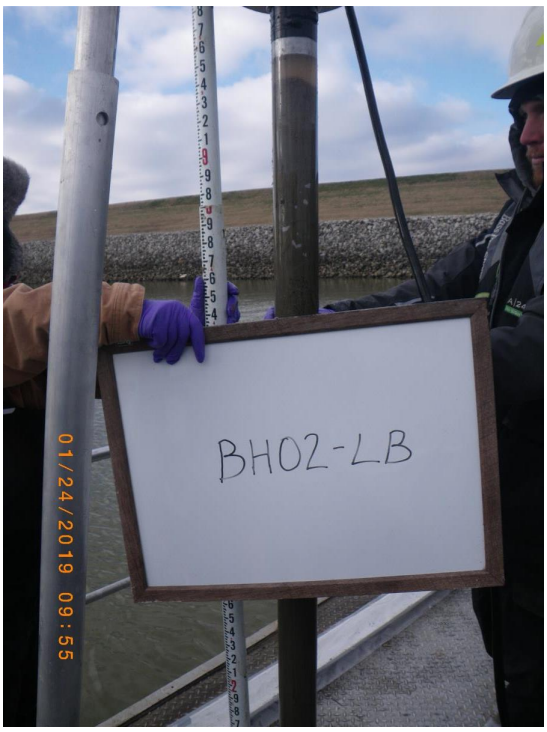
Comments:
Core depth 5.7 feet.

Photograph ID: 92

Photo Location:
SED-BH02-LB

Survey Date:
1/24/2019

Comments:
Core depth 5.7 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 93

Photo Location:
SED-BH02-LB

Survey Date:
1/24/2019

Comments:
Core depth 5.7 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.0, 3.0-4.7, and 4.7-5.7.

Photograph ID: 94

Photo Location:
SED-BH02-LB

Survey Date:
1/24/2019

Comments:
Core depth 5.7 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.0, 3.0-4.7, and 4.7-5.7.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 95

Photo Location:
SED-BH02-CC

Survey Date:
1/24/2019

Comments:
Core depth 3.7 feet.

Photograph ID: 96

Photo Location:
SED-BH02-CC

Survey Date:
1/24/2019

Comments:
Core depth 3.7 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 97

Photo Location:
SED-BH02-CC

Survey Date:
1/24/2019

Comments:
Core depth 3.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-1.7, 1.7-3.0, and 3.0-3.7.

Photograph ID: 98

Photo Location:
SED-BH02-CC

Survey Date:
1/24/2019

Comments:
Core depth 3.7 feet.
Sample intervals (feet):
0.0-0.5, 0.5-1.7, 1.7-3.0, and 3.0-3.7.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 99

Photo Location:
SED-BH02-RB a

Survey Date:
1/24/2019

Comments:
Core sample discarded.
Substrate: coal.

Photograph ID: 100

Photo Location:
SED-BH02-RB b

Survey Date:
1/24/2019

Comments:
Ponar grab discarded.
Substrate: coal.

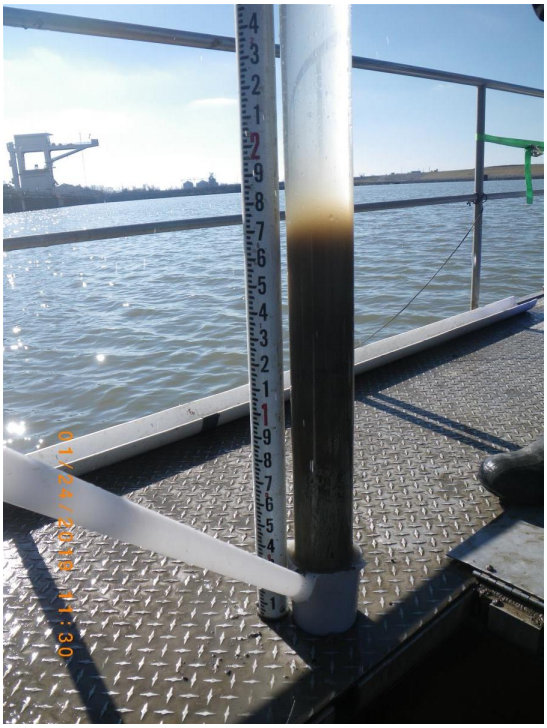
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 101

Photo Location:
SED-BH02-RB c

Survey Date:
1/24/2019

Comments:
Core depth 1.3 feet.

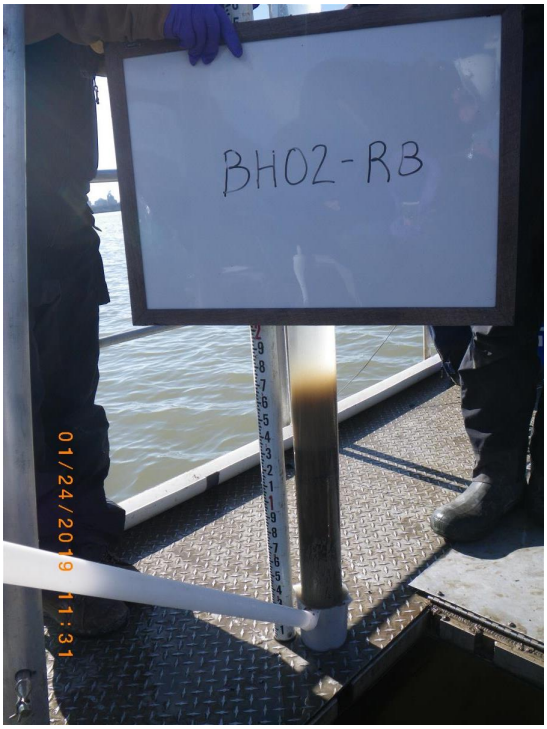


Photograph ID: 102

Photo Location:
SED-BH02-RB c

Survey Date:
1/24/2019

Comments:
Core depth 1.3 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 103

Photo Location:
SED-BH02-RB c

Survey Date:
1/24/2019

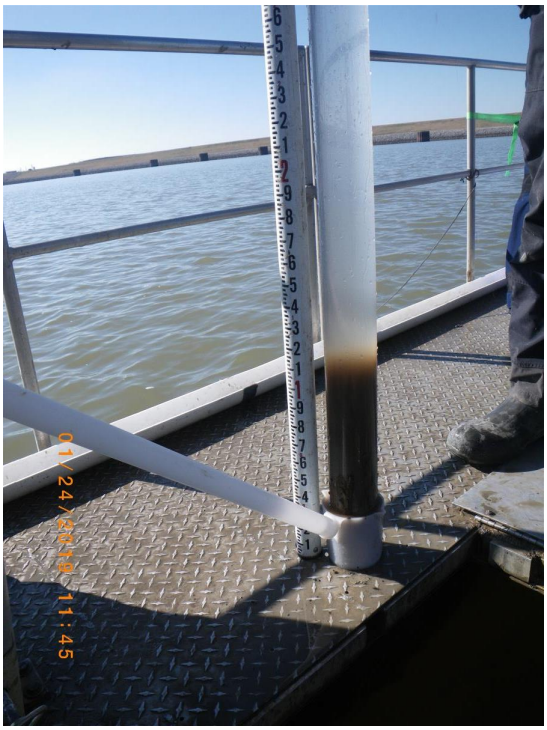
Comments:
Core depth 1.3 feet. Core discarded. Substrate: large fragments of coal overlaying parent material.

Photograph ID: 104

Photo Location:
SED-BH02-RB d

Survey Date:
1/24/2019

Comments:
Core depth 0.9 feet. Core discarded. Substrate: coal and gravel overlaying parent material.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 105

Photo Location:
SED-BH02-RB

Survey Date:
1/24/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample.

Photograph ID: 106

Photo Location:
SED-BH03-LB

Survey Date:
1/22/2019

Comments:
Core depth 4.1 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 107

Photo Location:
SED-BH03-LB

Survey Date:
1/22/2019

Comments:
(Incorrectly labeled on whiteboard) Core depth 4.1 feet.

Photograph ID: 108

Photo Location:
SED-BH03-LB

Survey Date:
1/22/2019

Comments:
Core depth 4.1 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.5, and 2.5-4.1.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 109

Photo Location:
SED-BH03-LB

Survey Date:
1/22/2019

Comments:
Core depth 4.1 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.5, and 2.5-4.1.

Photograph ID: 110

Photo Location:
SED-BH03-CC

Survey Date:
1/22/2019

Comments:
Core depth 2.5 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 111

Photo Location:
SED-BH03-CC

Survey Date:
1/22/2019

Comments:
Core depth 2.5 feet.

Photograph ID: 112

Photo Location:
SED-BH03-CC

Survey Date:
1/22/2019

Comments:
Core depth 2.5 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-2.5.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 113

Photo Location:
SED-BH03-RB

Survey Date:
1/22/2019

Comments:
Core depth 5.5 feet.

Photograph ID: 114

Photo Location:
SED-BH03-RB

Survey Date:
1/22/2019

Comments:
Core depth 5.5 feet.
Sample intervals (feet):
0.0-0.5, 0.5-3.0, and
3.0-5.5.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 115

Photo Location:
SED-BH03-RB

Survey Date:
1/22/2019

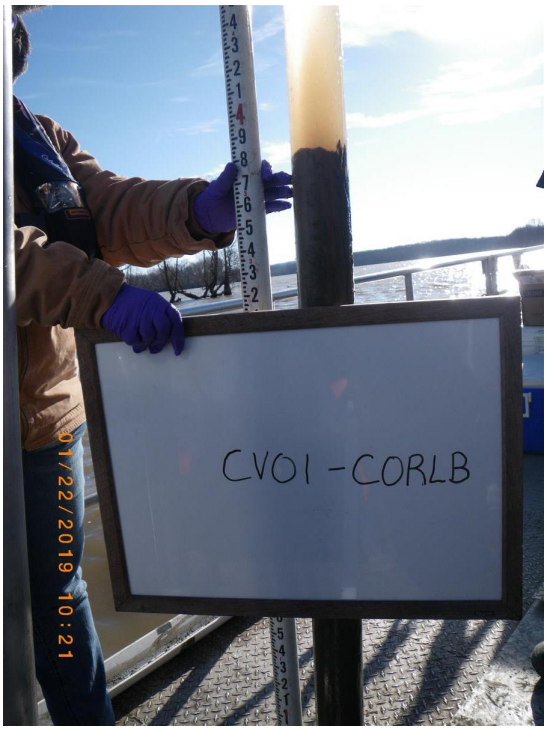
Comments:
Core depth 5.5 feet. Sample intervals (feet): 0.0-0.5, 0.5-3.0, and 3.0-5.5.

Photograph ID: 116

Photo Location:
SED-CV01-LB

Survey Date:
1/22/2019

Comments:
Core depth 3.8 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 117

Photo Location:
SED-CV01-LB

Survey Date:
1/22/2019

Comments:
Core depth 3.8 feet. Sample intervals (feet): 0.0-0.5, 0.5-2.0, and 2.0-3.8.

Photograph ID: 118

Photo Location:
SED-CV01-CC

Survey Date:
1/22/2019

Comments:
Core deployments yielded insufficient recovery. Surficial (0.0-0.5 feet) sediment sample generated from a composite of three Ponar grabs. Photo not available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 119

Photo Location:
SED-CV01-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.0 feet.

Photograph ID: 120

Photo Location:
SED-CV01-RB

Survey Date:
1/22/2019

Comments:
Core depth 1.0 feet. Surficial (0.0-0.5 feet) sediment sample. Parent material 0.5-1.0.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 121

Photo Location:
SED-CV02-LB

Survey Date:
1/23/2019

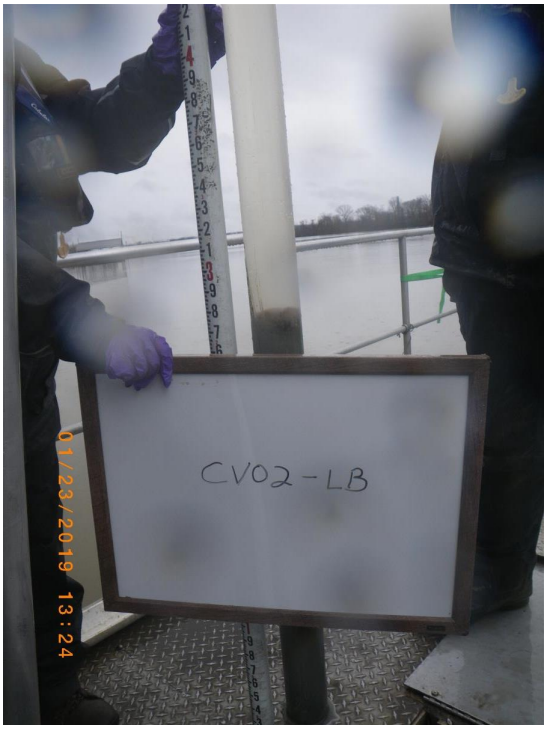
Comments:
Core depth 2.8 feet.

Photograph ID: 122

Photo Location:
SED-CV02-LB

Survey Date:
1/23/2019

Comments:
Core depth 2.8 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 123

Photo Location:
SED-CV02-LB

Survey Date:
1/23/2019

Comments:
Core depth 2.8 feet.

Photograph ID: 124

Photo Location:
SED-CV02-LB

Survey Date:
1/23/2019

Comments:
Core depth 2.8 feet.
Sample intervals (feet):
0.0-0.5 and 0.5-2.5. Parent material 2.5-2.8.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 125

Photo Location:
SED-CV02-CC

Survey Date:
1/23/2019

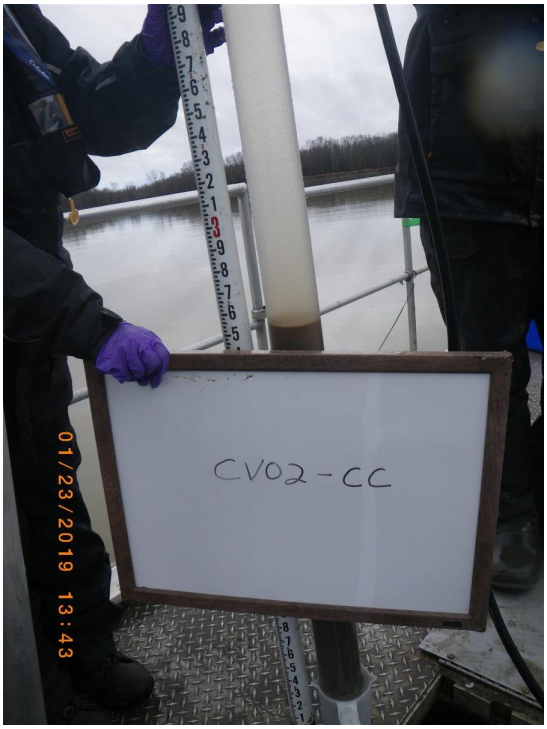
Comments:
Core depth 2.5 feet.

Photograph ID: 126

Photo Location:
SED-CV02-CC

Survey Date:
1/23/2019

Comments:
Core depth 2.5 feet.



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 127

Photo Location:
SED-CV02-CC

Survey Date:
1/23/2019

Comments:
Core depth 2.5 feet. Sample intervals (feet): 0.0-0.5 and 0.5-1.6. Parent material 1.6-2.5.

Photograph ID: 128

Photo Location:
SED-CV02-RB

Survey Date:
1/23/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample. No photo available.

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 129

Photo Location:
SED-CV03-LB

Survey Date:
1/23/2019

Comments:
Core depth 5.3 feet.

Photograph ID: 130

Photo Location:
SED-CV03-LB

Survey Date:
1/23/2019

Comments:
Core depth 5.3 feet.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 131

Photo Location:
SED-CV03-LB

Survey Date:
1/23/2019

Comments:
Core depth 5.3 feet.
Sample intervals (feet):
0.0-0.5, 0.5-2.5, and
2.5-5.3.

Photograph ID: 132

Photo Location:
SED-CV03-LB

Survey Date:
1/23/2019

Comments:
Core depth 5.3 feet.
Sample intervals (feet):
0.0-0.5, 0.5-2.5, and
2.5-5.3.

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 133

Photo Location:
SED-CV03-CC

Survey Date:
1/23/2019

Comments:
Ponar grab. Surficial (0.0-0.5 feet) sediment sample. No photo available.

PHOTOGRAPH NOT AVAILABLE

Photograph ID: 134

Photo Location:
SED-CV03-RB

Survey Date:
1/23/2019

Comments:
Core depth 3.4 feet.

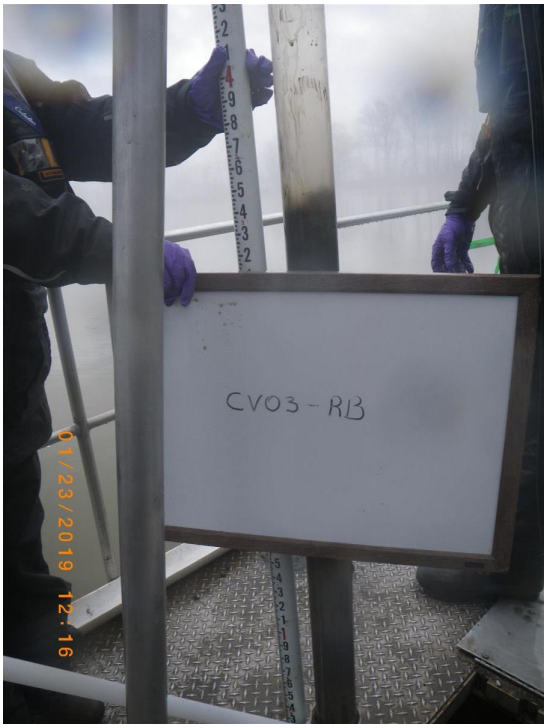
Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 135

Photo Location:
SED-CV03-RB

Survey Date:
1/23/2019

Comments:
Core depth 3.4 feet.



Photograph ID: 136

Photo Location:
SED-CV03-RB

Survey Date:
1/23/2019

Comments:
Core depth 3.4 feet. Sample intervals (feet): 0.0-0.5, 0.5-1.5, and 1.5-2.7. Parent material 2.7-3.4.

ATTACHMENT C.2

Photographic Logs of Benthic Invertebrate Community Substrate Samples

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 1

Photo Location:
MAC-TR01-BEN01

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN01-20191015

Comments:
Pre-washdown

Photograph ID: 2

Photo Location:
MAC-TR01-BEN01

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN01-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 3

Photo Location:
MAC-TR01-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN02-20191015

Comments:
Pre-washdown

Photograph ID: 4

Photo Location:
MAC-TR01-BEN03

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN03-20191015

Comments:
Pre-washdown

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 5

Photo Location:
MAC-TR01-BEN04

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN04-20191015

Comments:
Pre-washdown

Photograph ID: 6

Photo Location:
MAC-TR01-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN05-20191015

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 7

Photo Location:
MAC-TR01-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN05-20191015

Comments:
Mussel: *Amblema plicata*

Photograph ID: 8

Photo Location:
MAC-TR01-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN05-20191015

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 9

Photo Location:
MAC-TR01-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR01-BEN05-20191015

Comments:
Post-washdown

Photograph ID: 10

Photo Location:
MAC-TR02-BEN01

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR02-BEN01-20191015

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 11

Photo Location:
MAC-TR02-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR02-BEN02-20191015

Comments:
Pre-washdown

Photograph ID: 12

Photo Location:
MAC-TR02-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR02-BEN02-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 13

Photo Location:
MAC-TR02-BEN03

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR02-BEN03-20191015

Comments:
Pre-washdown

Photograph ID: 14

Photo Location:
MAC-TR02-BEN04

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR02-BEN04-20191015

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 15

Photo Location:
MAC-TR02-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR02-BEN05-20191015

Comments:
Pre-washdown

Photograph ID: 16

Photo Location:
MAC-TR02-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR02-BEN05-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 17

Photo Location:
MAC-TR03-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN01-20191017

Comments:
Pre-washdown

Photograph ID: 18

Photo Location:
MAC-TR03-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN01-20191017

Comments:
Mussel: *Quadrula apiculata*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 19

Photo Location:
MAC-TR03-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN01-20191017

Comments:
Mussel

Photograph ID: 20

Photo Location:
MAC-TR03-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN02-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 21

Photo Location: MAC-TR03-BEN02

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR03-BEN02-20191017

Comments: Mussel: *Megalonaias nervosa*

Photograph ID: 22

Photo Location: MAC-TR03-BEN03

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR03-BEN03-20191017

Comments: Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 23

Photo Location: MAC-TR03-BEN03

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR03-BEN03-20191017

Comments: Post-washdown

Photograph ID: 24

Photo Location: MAC-TR03-BEN04

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR03-BEN04-20191017

Comments: Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 25

Photo Location:
MAC-TR03-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN04-20191017

Comments:
Mussel: *Amblema plicata* (1) and *Plectomerus dombeyanus* (2)

Photograph ID: 26

Photo Location:
MAC-TR03-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN04-20191017

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 27

Photo Location:
MAC-TR03-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN04-20191017

Comments:
Mussel

Photograph ID: 28

Photo Location:
MAC-TR03-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN05-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 29

Photo Location:
MAC-TR03-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR03-BEN05-20191017

Comments:
Post-washdown

Photograph ID: 30

Photo Location:
MAC-TR04-BENSite

Survey Date:
10/17/2019

Sample ID:
#N/A

Comments:
Seasonally exposed substrate Transect TR04, left descending overbank

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 31

Photo Location:
MAC-TR04-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR04-BEN01-20191017

Comments:
Pre-washdown

Photograph ID: 32

Photo Location:
MAC-TR04-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR04-BEN01-20191017

Comments:
Post-washdown

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 33

Photo Location:
MAC-TR04-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR04-BEN02-20191017

Comments:
Pre-washdown

Photograph ID: 34

Photo Location:
MAC-TR04-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR04-BEN02-20191017

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 35

Photo Location:
MAC-TR04-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR04-BEN03-20191017

Comments:
Pre-washdown

Photograph ID: 36

Photo Location:
MAC-TR04-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR04-BEN04-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 37

Photo Location: MAC-TR04-BEN04

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR04-BEN04-20191017

Comments: Post-washdown

Photograph ID: 38

Photo Location: MAC-TR04-BEN05

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR04-BEN05-20191017

Comments: Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 39

Photo Location: MAC-TR04-BEN05

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR04-BEN05-20191017

Comments: Post-washdown

Photograph ID: 40

Photo Location: MAC-TR04-BEN05

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR04-BEN05-20191017

Comments: Mussel: *Plectomerus dombeyanus*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 41

Photo Location:
MAC-TR04-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR04-BEN05-20191017

Comments:
Mussel

Photograph ID: 42

Photo Location:
MAC-TR05-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN01-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 43

Photo Location:
MAC-TR05-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN02-20191017

Comments:
Pre-washdown

Photograph ID: 44

Photo Location:
MAC-TR05-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN03-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 45

Photo Location:
MAC-TR05-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN03-20191017

Comments:
Post-washdown

Photograph ID: 46

Photo Location:
MAC-TR05-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN04-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 47

Photo Location:
MAC-TR05-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN05-20191017

Comments:
Pre-washdown

Photograph ID: 48

Photo Location:
MAC-TR05-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN05-20191017

Comments:
Mussel: *Fusconaia ebena* (1), *Plectomerus dombeyanus* (1), *Amblema plicata* (2), and *Quadrula quadrula* (2)

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 49

Photo Location:
MAC-TR05-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN05-20191017

Comments:
Mussel

Photograph ID: 50

Photo Location:
MAC-TR05-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN05-20191017

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 51

Photo Location:
MAC-TR05-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN05-20191017

Comments:
Mussel

Photograph ID: 52

Photo Location:
MAC-TR05-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR05-BEN05-20191017

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 53

Photo Location:
MAC-TR06-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR06-BEN01-20191017

Comments:
Pre-washdown

Photograph ID: 54

Photo Location:
MAC-TR06-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR06-BEN02-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 55

Photo Location:
MAC-TR06-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR06-BEN03-20191017

Comments:
Pre-washdown

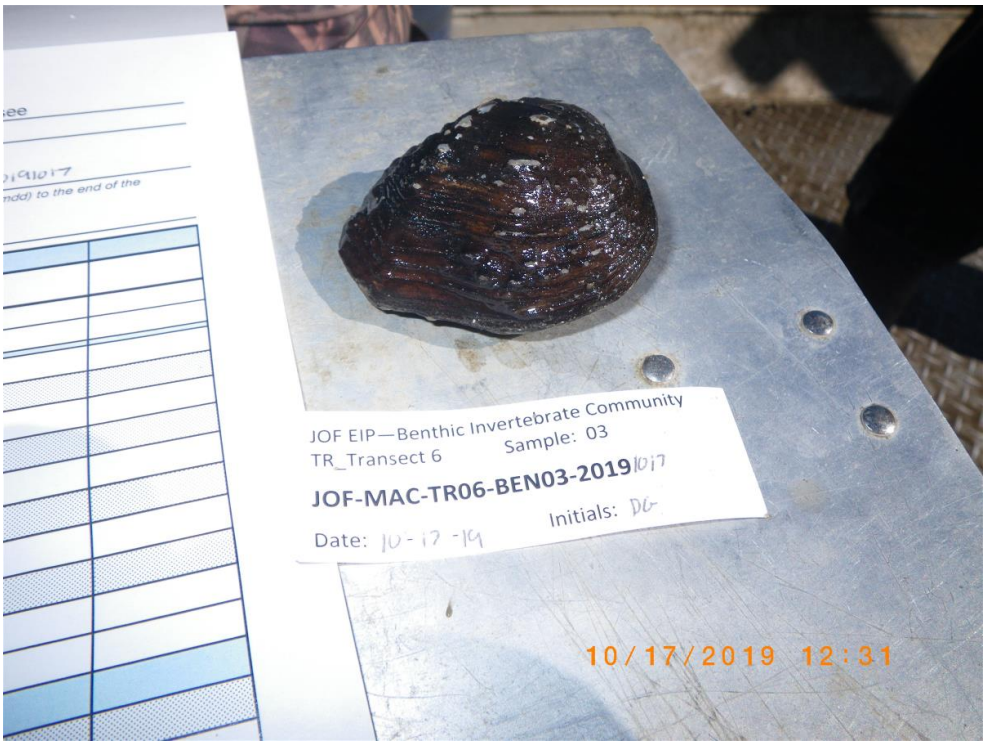
Photograph ID: 56

Photo Location:
MAC-TR06-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR06-BEN03-20191017

Comments:
Mussel: *Quadrula quadrula*



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 57

Photo Location:
MAC-TR06-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR06-BEN04-20191017

Comments:
Post-washdown

Photograph ID: 58

Photo Location:
MAC-TR06-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR06-BEN05-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 59

Photo Location:
MAC-TR06-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR06-BEN05-20191017

Comments:
Post-washdown

Photograph ID: 60

Photo Location:
MAC-TR07-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR07-BEN01-20191017

Comments:
Photo of MAC-TR07-BEN01 is unavailable

PHOTOGRAPH NOT AVAILABLE

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

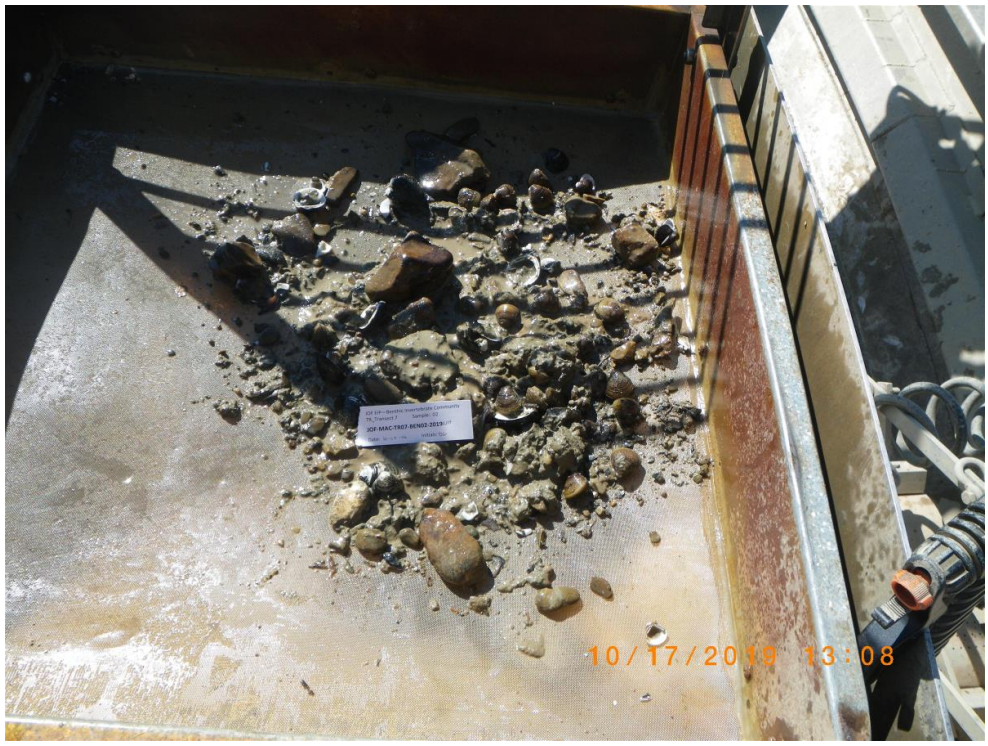
Photograph ID: 61

Photo Location:
MAC-TR07-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR07-BEN02-20191017

Comments:
Pre-washdown



Photograph ID: 62

Photo Location:
MAC-TR07-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR07-BEN03-20191017

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 63

Photo Location: MAC-TR07-BEN04

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR07-BEN04-20191017

Comments: Pre-washdown

Photograph ID: 64

Photo Location: MAC-TR07-BEN04

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR07-BEN04-20191017

Comments: Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 65

Photo Location:
MAC-TR07-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR07-BEN05-20191017

Comments:
Pre-washdown

Photograph ID: 66

Photo Location:
MAC-TR08-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN01-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 67

Photo Location:
MAC-TR08-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN02-20191017

Comments:
Pre-washdown

Photograph ID: 68

Photo Location:
MAC-TR08-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN03-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 69

Photo Location:
MAC-TR08-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN03-20191017

Comments:
Post-washdown

Photograph ID: 70

Photo Location:
MAC-TR08-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN04-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 71

Photo Location:
MAC-TR08-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN04-20191017

Comments:
Post-washdown

Photograph ID: 72

Photo Location:
MAC-TR08-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN04-20191017

Comments:
Mussel: *Quadrula quadrula* and *Megalonaias nervosa*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 73

Photo Location:
MAC-TR08-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN05-20191017

Comments:
Pre-washdown

Photograph ID: 74

Photo Location:
MAC-TR08-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR08-BEN05-20191017

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 75

Photo Location:
MAC-TR09-BEN01

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN01-20191015

Comments:
Pre-washdown

Photograph ID: 76

Photo Location:
MAC-TR09-BEN01

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN01-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 77

Photo Location:
MAC-TR09-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN02-20191015

Comments:
Pre-washdown

Photograph ID: 78

Photo Location:
MAC-TR09-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN02-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 79

Photo Location:
MAC-TR09-BEN03

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN03-20191015

Comments:
Pre-washdown

Photograph ID: 80

Photo Location:
MAC-TR09-BEN03

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN03-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 81

Photo Location:
MAC-TR09-BEN04

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN04-20191015

Comments:
Pre-washdown

Photograph ID: 82

Photo Location:
MAC-TR09-BEN04

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN04-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 83

Photo Location:
MAC-TR09-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN05-20191015

Comments:
Pre-washdown

Photograph ID: 84

Photo Location:
MAC-TR09-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN05-20191015

Comments:
Mussel: *Amblema plicata*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 85

Photo Location:
MAC-TR09-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN05-20191015

Comments:
Mussel

Photograph ID: 86

Photo Location:
MAC-TR09-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR09-BEN05-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 87

Photo Location:
MAC-TR10-BEN01

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN01-20191015

Comments:
Pre-washdown

Photograph ID: 88

Photo Location:
MAC-TR10-BEN01

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN01-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 89

Photo Location:
MAC-TR10-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN02-20191015

Comments:
Pre-washdown

Photograph ID: 90

Photo Location:
MAC-TR10-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN02-20191015

Comments:
Mussel: *Quadrula pustulosa* and *Plectomerus dombeyanus*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 91

Photo Location:
MAC-TR10-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN02-20191015

Comments:
Mussel

Photograph ID: 92

Photo Location:
MAC-TR10-BEN02

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN02-20191015

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 93

Photo Location:
MAC-TR10-BEN03

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN03-20191015

Comments:
Pre-washdown

Photograph ID: 94

Photo Location:
MAC-TR10-BEN03

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN03-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 95

Photo Location:
MAC-TR10-BEN04

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN04-20191015

Comments:
Pre-washdown

Photograph ID: 96

Photo Location:
MAC-TR10-BEN04

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN04-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 97

Photo Location:
MAC-TR10-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN05-20191015

Comments:
Pre-washdown

Photograph ID: 98

Photo Location:
MAC-TR10-BEN05

Survey Date:
10/15/2019

Sample ID:
JOF-MAC-TR10-BEN05-20191015

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 99

Photo Location:
MAC-TR11-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR11-BEN01-20191017

Comments:
Pre-washdown

Photograph ID: 100

Photo Location:
MAC-TR11-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR11-BEN01-20191017

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 101

Photo Location:
MAC-TR11-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR11-BEN02-20191017

Comments:
Pre-washdown

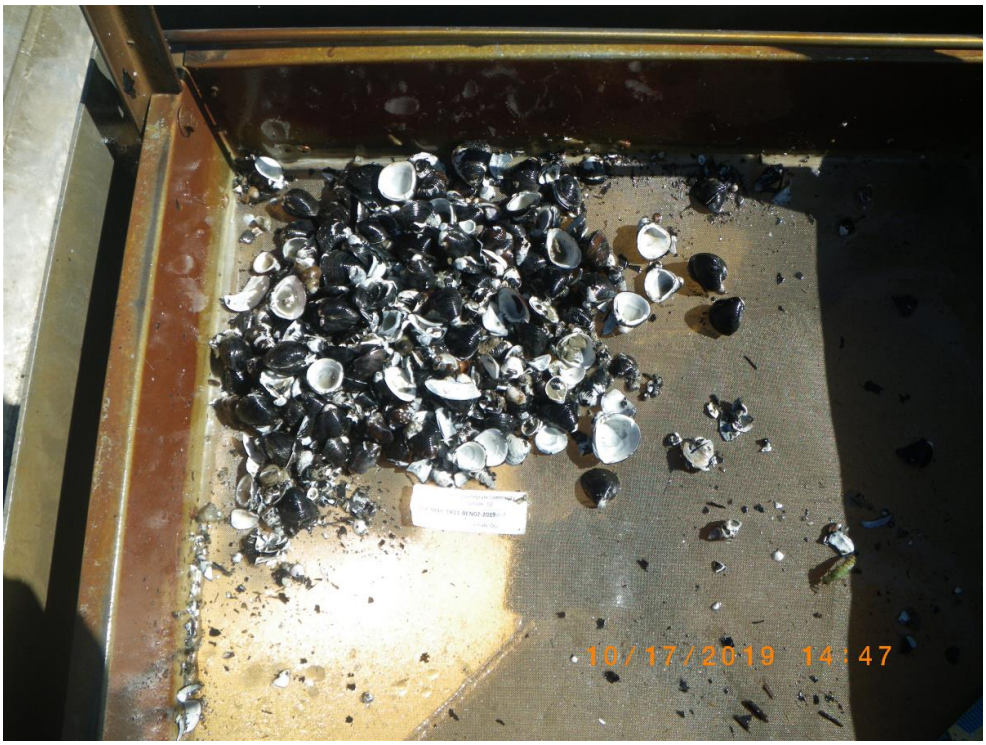
Photograph ID: 102

Photo Location:
MAC-TR11-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR11-BEN02-20191017

Comments:
Post-washdown



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 103

Photo Location: MAC-TR11-BEN03

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR11-BEN03-20191017

Comments: Pre-washdown

Photograph ID: 104

Photo Location: MAC-TR11-BEN04

Survey Date: 10/17/2019

Sample ID: JOF-MAC-TR11-BEN04-20191017

Comments: Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 105

Photo Location:
MAC-TR11-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR11-BEN04-20191017

Comments:
Post-washdown

Photograph ID: 106

Photo Location:
MAC-TR11-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR11-BEN05-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

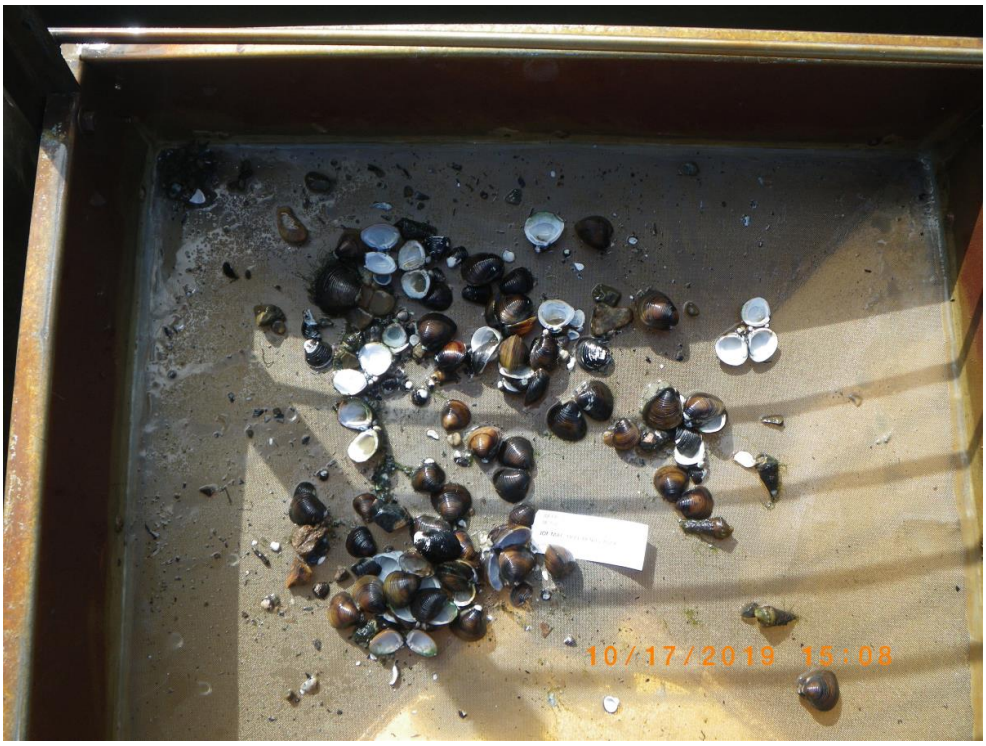
Photograph ID: 107

Photo Location:
MAC-TR11-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-TR11-BEN05-20191017

Comments:
Post-washdown



Photograph ID: 108

Photo Location:
MAC-IC01-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN01-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 109

Photo Location:
MAC-IC01-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN01-20191016

Comments:
Post-washdown

Photograph ID: 110

Photo Location:
MAC-IC01-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN02-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

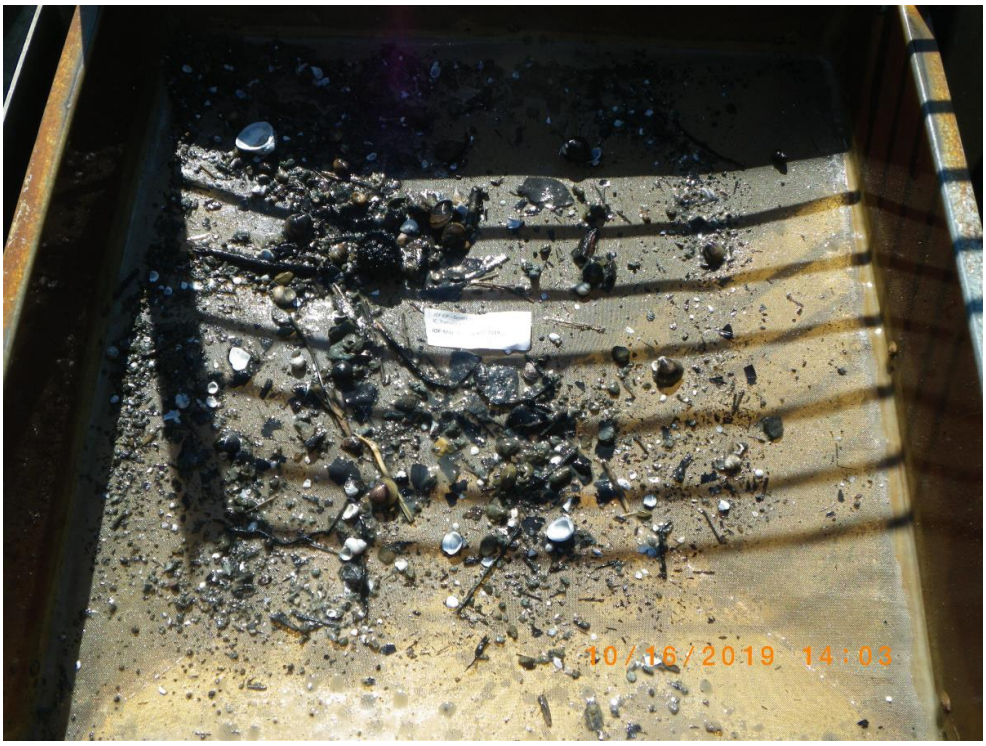
Photograph ID: 111

Photo Location:
MAC-IC01-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN02-20191016

Comments:
Post-washdown



Photograph ID: 112

Photo Location:
MAC-IC01-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN03-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 113

Photo Location:
MAC-IC01-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN03-20191016

Comments:
Post-washdown

Photograph ID: 114

Photo Location:
MAC-IC01-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN04-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 115

Photo Location:
MAC-IC01-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN04-20191016

Comments:
Post-washdown

Photograph ID: 116

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 117

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel: *Pleurobema sintoxia* (2), *Obliquaria reflexa* (4), *Plectomerus dombeyanus* (2), and *Amblema plicata* (2)

Photograph ID: 118

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 119

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Photograph ID: 120

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 121

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Photograph ID: 122

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 123

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Photograph ID: 124

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 125

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Mussel

Photograph ID: 126

Photo Location:
MAC-IC01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC01-BEN05-20191016

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 127

Photo Location:
MAC-IC02-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC02-BEN01-20191016

Comments:
Pre-washdown

Photograph ID: 128

Photo Location:
MAC-IC02-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC02-BEN02-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

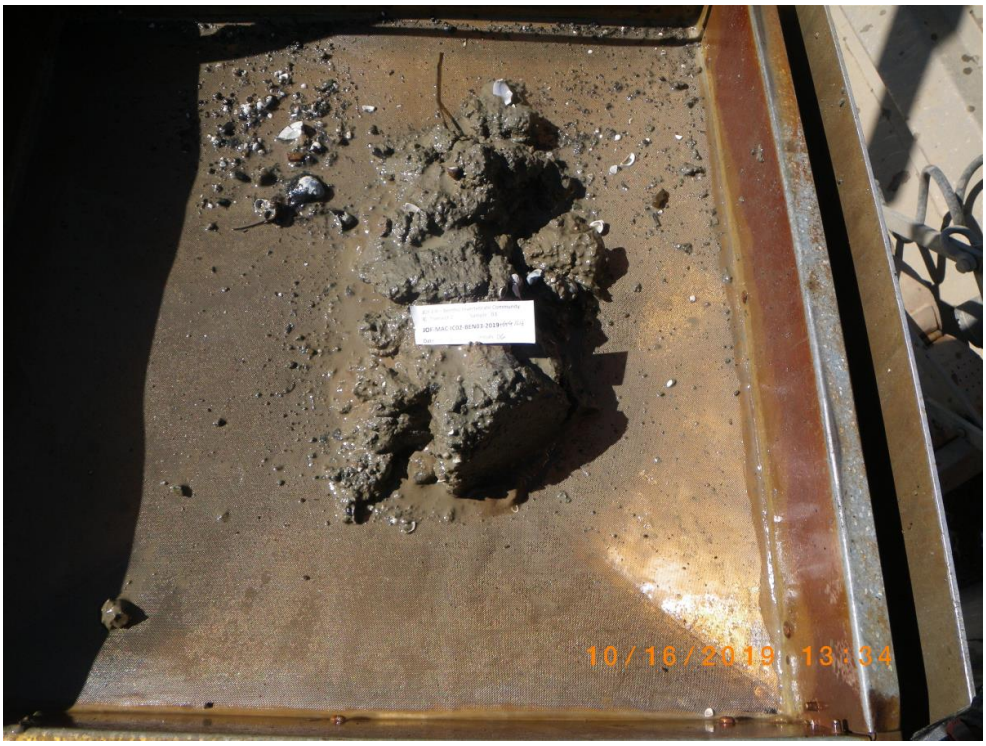
Photograph ID: 129

Photo Location:
MAC-IC02-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC02-BEN03-20191016

Comments:
Pre-washdown



Photograph ID: 130

Photo Location:
MAC-IC02-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC02-BEN03-20191016

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 131

Photo Location:
MAC-IC02-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC02-BEN04-20191016

Comments:
Pre-washdown

Photograph ID: 132

Photo Location:
MAC-IC02-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC02-BEN05-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 133

Photo Location:
MAC-IC02-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC02-BEN05-20191016

Comments:
Post-washdown

Photograph ID: 134

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 135

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Mussel: *Plectomerus dombeyanus* (1), *Pleurobema sintoxia* (2), *Amblema plicata* (2), *Quadrula apiculata* (1), *Quadrula pustulosa* (1), and *Obliquaria reflexa* (3)

Photograph ID: 136

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 137

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Mussel

Photograph ID: 138

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 139

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Mussel

Photograph ID: 140

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 141

Photo Location:
MAC-IC03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN01-20191016

Comments:
Post-washdown

Photograph ID: 142

Photo Location:
MAC-IC03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN02-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 143

Photo Location:
MAC-IC03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN02-20191016

Comments:
Mussel: *Pleurobema sintoxia*

Photograph ID: 144

Photo Location:
MAC-IC03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN02-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 145

Photo Location:
MAC-IC03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN02-20191016

Comments:
Post-washdown

Photograph ID: 146

Photo Location:
MAC-IC03-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN03-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 147

Photo Location:
MAC-IC03-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN03-20191016

Comments:
Post-washdown

Photograph ID: 148

Photo Location:
MAC-IC03-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN04-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 149

Photo Location:
MAC-IC03-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN04-20191016

Comments:
Post-washdown

Photograph ID: 150

Photo Location:
MAC-IC03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN05-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 151

Photo Location:
MAC-IC03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-IC03-BEN05-20191016

Comments:
Post-washdown

Photograph ID: 152

Photo Location:
MAC-BH01-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN01-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 153

Photo Location:
MAC-BH01-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN01-20191016

Comments:
Post-washdown

Photograph ID: 154

Photo Location:
MAC-BH01-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN02-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 155

Photo Location:
MAC-BH01-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN02-20191016

Comments:
Post-washdown

Photograph ID: 156

Photo Location:
MAC-BH01-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN03-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 157

Photo Location:
MAC-BH01-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN03-20191016

Comments:
Mussel: *Quadrula quadrula* and *Pleurobema sintoxia*

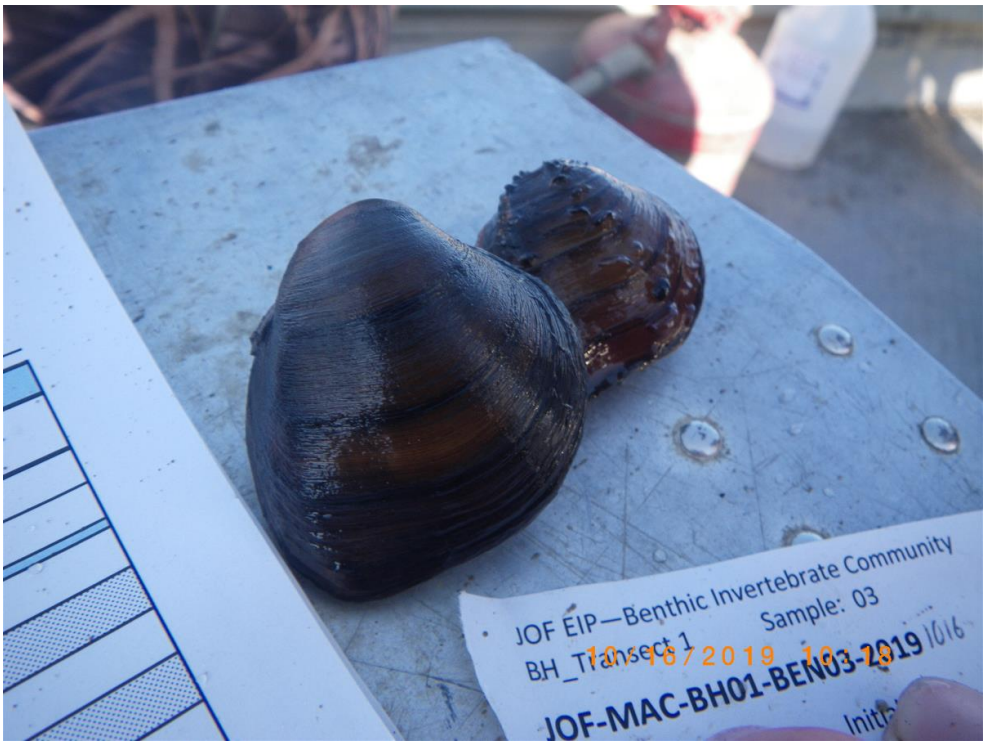
Photograph ID: 158

Photo Location:
MAC-BH01-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN03-20191016

Comments:
Mussel



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 159

Photo Location:
MAC-BH01-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN03-20191016

Comments:
Post-washdown

Photograph ID: 160

Photo Location:
MAC-BH01-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN04-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 161

Photo Location:
MAC-BH01-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN04-20191016

Comments:
Mussel: *Fusconaia ebena* (1) and *Amblema plicata* (2); one relic

Photograph ID: 162

Photo Location:
MAC-BH01-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN04-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 163

Photo Location:
MAC-BH01-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN04-20191016

Comments:
Mussel

Photograph ID: 164

Photo Location:
MAC-BH01-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN04-20191016

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 165

Photo Location:
MAC-BH01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN05-20191016

Comments:
Pre-washdown

Photograph ID: 166

Photo Location:
MAC-BH01-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH01-BEN05-20191016

Comments:
Mussel: *Plectomerus dombeyanus*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 167

Photo Location: MAC-BH02-BEN01

Survey Date: 10/16/2019

Sample ID: JOF-MAC-BH02-BEN01-20191016

Comments: Pre-washdown

Photograph ID: 168

Photo Location: MAC-BH02-BEN02

Survey Date: 10/16/2019

Sample ID: JOF-MAC-BH02-BEN02-20191016

Comments: Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 169

Photo Location:
MAC-BH02-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH02-BEN02-20191016

Comments:
Post-washdown

Photograph ID: 170

Photo Location:
MAC-BH02-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH02-BEN03-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 171

Photo Location:
MAC-BH02-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH02-BEN03-20191016

Comments:
Post-washdown

Photograph ID: 172

Photo Location:
MAC-BH02-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH02-BEN04-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 173

Photo Location:
MAC-BH02-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH02-BEN04-20191016

Comments:
Post-washdown

Photograph ID: 174

Photo Location:
MAC-BH02-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH02-BEN05-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 175

Photo Location:
MAC-BH02-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH02-BEN05-20191016

Comments:
Post-washdown

Photograph ID: 176

Photo Location:
MAC-BH03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN01-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 177

Photo Location:
MAC-BH03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN01-20191016

Comments:
Post-washdown

Photograph ID: 178

Photo Location:
MAC-BH03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN01-20191016

Comments:
Mussel: *Amblema plicata*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 179

Photo Location:
MAC-BH03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN01-20191016

Comments:
Mussel

Photograph ID: 180

Photo Location:
MAC-BH03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN02-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 181

Photo Location:
MAC-BH03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN02-20191016

Comments:
Post-washdown

Photograph ID: 182

Photo Location:
MAC-BH03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN02-20191016

Comments:
Mussel: *Quadrula apiculata*

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 183

Photo Location:
MAC-BH03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN02-20191016

Comments:
Mussel

Photograph ID: 184

Photo Location:
MAC-BH03-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN03-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 185

Photo Location:
MAC-BH03-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN03-20191016

Comments:
Post-washdown

Photograph ID: 186

Photo Location:
MAC-BH03-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN04-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 187

Photo Location:
MAC-BH03-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN04-20191016

Comments:
Mussel: *Truncilla donaciformis*

Photograph ID: 188

Photo Location:
MAC-BH03-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN04-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 189

Photo Location:
MAC-BH03-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN04-20191016

Comments:
Post-washdown

Photograph ID: 190

Photo Location:
MAC-BH03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN05-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 191

Photo Location:
MAC-BH03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN05-20191016

Comments:
Mussel: *Amblema Plicata* and *Quadrula apiculata*

Photograph ID: 192

Photo Location:
MAC-BH03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN05-20191016

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 193

Photo Location:
MAC-BH03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-BH03-BEN05-20191016

Comments:
Post-washdown

Photograph ID: 194

Photo Location:
MAC-CV01-BEN01

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN01-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 195

Photo Location: MAC-CV01-BEN01

Survey Date: 10/17/2019

Sample ID: JOF-MAC-CV01-BEN01-20191017

Comments: Post-washdown

Photograph ID: 196

Photo Location: MAC-CV01-BEN02

Survey Date: 10/17/2019

Sample ID: JOF-MAC-CV01-BEN02-20191017

Comments: Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 197

Photo Location:
MAC-CV01-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN02-20191017

Comments:
Mussel: *Potamilus alatus*

Photograph ID: 198

Photo Location:
MAC-CV01-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN02-20191017

Comments:
Mussel

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 199

Photo Location:
MAC-CV01-BEN02

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN02-20191017

Comments:
Post-washdown

Photograph ID: 200

Photo Location:
MAC-CV01-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN03-20191017

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 201

Photo Location:
MAC-CV01-BEN03

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN03-20191017

Comments:
Post-washdown

Photograph ID: 202

Photo Location:
MAC-CV01-BENSite

Survey Date:
10/17/2019

Sample ID:
Not applicable

Comments:
Seasonally exposed substrate on Transect CV01

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 203

Photo Location:
MAC-CV01-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN04-20191017

Comments:
Pre-washdown

Photograph ID: 204

Photo Location:
MAC-CV01-BEN04

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN04-20191017

Comments:
Post-washdown

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 205

Photo Location:
MAC-CV01-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN05-20191017

Comments:
Pre-washdown

Photograph ID: 206

Photo Location:
MAC-CV01-BEN05

Survey Date:
10/17/2019

Sample ID:
JOF-MAC-CV01-BEN05-20191017

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 207

Photo Location:
MAC-CV02-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN01-20191016

Comments:
Pre-washdown

Photograph ID: 208

Photo Location:
MAC-CV02-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN01-20191016

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 209

Photo Location:
MAC-CV02-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN02-20191016

Comments:
Pre-washdown

Photograph ID: 210

Photo Location:
MAC-CV02-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN02-20191016

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 211

Photo Location:
MAC-CV02-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN03-20191016

Comments:
Pre-washdown

Photograph ID: 212

Photo Location:
MAC-CV02-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN04-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 213

Photo Location:
MAC-CV02-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN04-20191016

Comments:
Post-washdown

Photograph ID: 214

Photo Location:
MAC-CV02-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN05-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 215

Photo Location:
MAC-CV02-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV02-BEN05-20191016

Comments:
Post-washdown

Photograph ID: 216

Photo Location:
MAC-CV03-BEN01

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN01-20191016

Comments:
Pre-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 217

Photo Location:
MAC-CV03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN02-20191016

Comments:
Pre-washdown

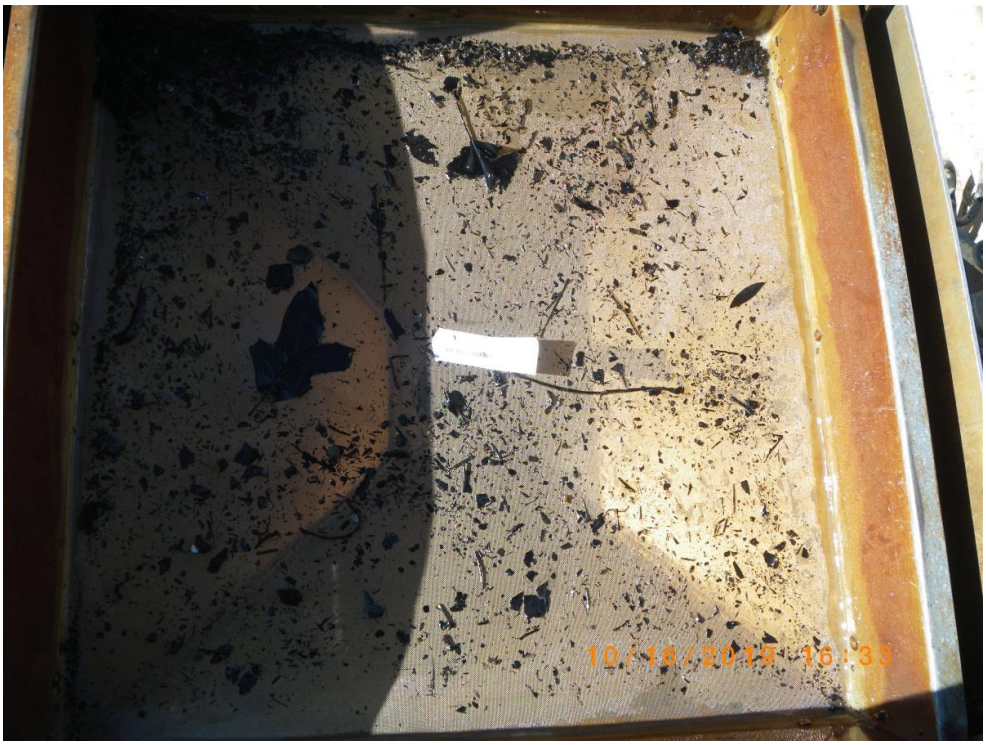
Photograph ID: 218

Photo Location:
MAC-CV03-BEN02

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN02-20191016

Comments:
Post-washdown



Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 219

Photo Location:
MAC-CV03-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN03-20191016

Comments:
Pre-washdown

Photograph ID: 220

Photo Location:
MAC-CV03-BEN03

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN03-20191016

Comments:
Post-washdown

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 221

Photo Location:
MAC-CV03-BEN04

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN04-20191016

Comments:
Pre-washdown

Photograph ID: 222

Photo Location:
MAC-CV03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN05-20191016

Comments:
Pre-washdown

Tennessee Valley Authority

Photographic Log

Client:	**Tennessee Valley Authority**	**Project:**	**TDEC Order**
Site Name:	**Johnsonville Fossil (JOF) Plant**	**Site Location:**	**New Johnsonville, Tennessee**

Photograph ID: 223

Photo Location:
MAC-CV03-BEN05

Survey Date:
10/16/2019

Sample ID:
JOF-MAC-CV03-BEN05-20191016

Comments:
Post-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

Johnsonville Fossil Plant
New Johnsonville, Tennessee
Tennessee Valley Authority

TVA

Title and Approval Page

Title of Document:	Appendix J.5 – Technical Evaluation of Fish Tissue Data Johnsonville Fossil Plant Tennessee Valley Authority New Johnsonville, Tennessee
Prepared By:	Tennessee Valley Authority
Effective Date:	February 12, 2024 Revision: 1

TVA Compliance Point of Contact	2/1/24 Date
TVA Technical Point of Contact	2/1/24 Date
TVA Limnologist, Fisheries & Aquatic Monitoring	1-31-24 Date
QA Oversight Manager	1/31/24 Date

Revision Log

Revision	Date	Description
0	September 6, 2023	Submittal to TDEC
1	February 12, 2024	Addresses November 14, 2023 TDEC Review Comments and Issued for TDEC

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LIST OF EXHIBITS

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Exhibit J.5-2 Fish Tissue Sampling Reaches
Exhibit J.5-3 Fish Tissue Sampling Results Above Critical Body Residue Values

Acronyms and Abbreviations

AAP2	Active Ash Pond 2
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
JOF Plant	Johnsonville Fossil Plant
LOAEL	Lowest Observed Adverse Effects Level
NOAEL	No Observed Adverse Effects Level
NPDES	National Pollutant Discharge Elimination System
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
REH	Reservoir Ecological Health Monitoring
RFAI	Reservoir Fish Assemblage Index
SAP	Sample and Analysis Plan
SAR	Sampling and Analysis Report
SFI	Sport Fishing Index
Stantec	Stantec Consulting Services Inc.
TDEC	Tennessee Department of Environment and Conservation
TDEC Order	Commissioner’s Order No. OGC15-0177
TRM	Tennessee River Mile
TVA	Tennessee Valley Authority
USEPA	US Environmental Protection Agency

Chapter 1 Introduction

The Tennessee Valley Authority (TVA) has prepared this technical evaluation appendix to summarize historical fish studies and recent fish tissue sampling data at TVA's Johnsonville Fossil Plant (JOF Plant) in New Johnsonville, Tennessee. Since the 1970s, various fishery studies have been conducted in the Tennessee River (also referred to as the Kentucky Reservoir or Kentucky Lake) in the vicinity of the JOF Plant, including fish population studies, sport fish surveys, impingement and entrainment monitoring, and fish tissue collection. This technical appendix provides a detailed evaluation of those studies and their supporting data for the Environmental Assessment Report (EAR) to fulfill the requirements for the Tennessee Department of Environment and Conservation-issued Commissioner's Order No. OGC15-0177 (TDEC Order) Program (TDEC 2015).

Chapter 2 Fish Tissue Investigation

The purpose of the fish tissue investigation was to characterize concentrations of Coal Combustion Residuals (CCR)-related constituents in fish tissue in the vicinity of the CCR management units[1] at the JOF Plant.

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

2.1 Historical Studies

Historically, TVA has conducted biological assessments by periodically monitoring aquatic communities (fish and benthic invertebrates) near the JOF Plant to evaluate their status upstream and downstream of the plant's thermal discharge. This monitoring was conducted to support continuance of the JOF Plant Alternative Thermal Limit (ATL) for the National Pollutant Discharge Elimination System (NPDES) permit for the facility (NPDES Permit No. TN0005444; [TDEC 2011]). Prior to becoming inactive in 2017, renewal of the JOF Plant's NPDES permit was based on the successful demonstration, in accordance with Section 316(a)[2] of the federal Clean Water Act (CWA), that a balanced indigenous population (BIP[3]) of fish and wildlife is present and being maintained in the Tennessee River (Kentucky Reservoir) downstream of the JOF Plant. The primary focus of the biological assessments conducted by TVA in accordance with the CWA consists of analyzing data to characterize the compositions of fish and benthic invertebrate communities upstream and downstream of the JOF Plant. Benthic invertebrate community information is provided in Appendix J.3.

Historical fish population assessments were completed for the Kentucky Reservoir in 1948 through 2011, as detailed in Chapter 2.1.1 below. Separate spring sportfish surveys conducted from 1995 to 2014 are discussed in Chapter 2.1.2. Fish impingement monitoring and entrainment studies were conducted as detailed in Chapters 2.1.3 and 2.1.4. Historical fish tissue sampling to support reservoir fish use suitability and state fish consumption advisories under the CWA is discussed in Chapter 2.1.5. The historical fish tissue data were limited, so a more comprehensive collection and analyses of fish and associated fish tissue were conducted as part of the TDEC Order EI, as described in Chapter 2.2. The results and discussion of the fish tissue sample data are presented in Chapter 3.0.

2.1.1 FISH POPULATION MONITORING

Pre-operational (prior to 1951) and post-operational studies were conducted upstream and downstream of the JOF Plant between 1948 and 1980 to assess potential impacts of the JOF Plant's thermal discharge on the Kentucky Reservoir fish

[1] The term "CCR management unit" is used in this document generally and is not intended to be a designation under federal or state regulations.
[2] 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.
[3] 40 C.F.R. § 125.71(c) (2021).

population. These studies comprised cove rotenone sampling annually from 1948 to 1961, and then in 1963, 1974, 1976, 1978, 1979 and 1980 to evaluate variations in biomass and species occurrence (TVA 1974, 1981). The studies also provided the basis for 1974 and 1980 biological studies to evaluate potential aquatic environmental effects of the JOF Plant thermal discharge on the indigenous fish population as required by the CWA Section 316(a) and to aid in JOF Plant NPDES permit renewal (TVA 1974 and 1980). These studies evaluated the impacts of JOF thermal discharge on fish population metrics including standing stock, species composition, reproductive success, and relative abundance at Tennessee River locations upstream and downstream of the JOF Plant. The initial Section 316(a) study concluded that fish species abundant in pre-operational samples remained present in downstream reaches, and that JOF Plant operations had little or no measurable impact on Kentucky Reservoir fish populations (TVA 1974). After the initial 1974 study, TVA conducted cove rotenone sampling at four locations in the vicinity of the JOF Plant. Results supported the earlier assessment that JOF Plant operations were not impacting fish populations and found that populations near the JOF Plant were similar to those in other areas of the Kentucky Reservoir (TVA 1981).

In 2001, TVA and TDEC reached an agreement whereby TVA's Reservoir Ecological Health Monitoring (REH) program and Reservoir Fish Assemblage Index (RFAI)[4] methodology would be the accepted study design for measuring the presence and maintenance of a BIP to support Section 316(a)-based ATLs (TVA 2011, 2012).

TVA uses two approaches in analyzing RFAI results to determine maintenance of a BIP (TVA 2011, 2012). One is "absolute" in that it compares the RFAI scores and individual metrics to predetermined values. The other is "relative" in that it compares RFAI scores attained downstream to the upstream control site for determining if operation of the JOF Plant has had impacts on the resident fish community. The "absolute" approach is based on Jennings et al. (1995) who suggested that favorable comparisons of the attained RFAI score from the potential impact zone to a predetermined criterion can be used to identify the presence of normal community structure and function, and hence existence of a BIP (TVA 2011, 2012). 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 an RFAI rating of "Fair" or better in the thermally affected area can be considered demonstration of a BIP, particularly where RFAI scores for unaffected upstream areas are similar to downstream scores (TVA 2011, 2012).

Biennial fish community surveys were completed between 2001 and 2007 in Kentucky Reservoir to demonstrate maintenance of a BIP of fish communities in support of a continued CWA Section 316(a) thermal variance and JOF Plant NPDES Permit No. TN0005444 renewal (TVA 2008). The studies concluded that average RFAI results rated "Good" and met BIP criteria at both the upstream and downstream locations [Tennessee River Miles (TRM) 105 and 97, respectively]. RFAI scores across these locations were similar (less than 6-point difference) during and among sample years. TVA concluded that the thermal discharge from the JOF Plant was not adversely impacting a BIP of aquatic life in the vicinity of the plant (TVA 2008).

Biological community monitoring of the Tennessee River near the JOF Plant was performed in autumn 2010 and in summer and autumn 2011 to determine if CWA Section 316(a) ATLs established for the JOF Plant thermal discharge were protective of a BIP of aquatic life (TVA 2011, 2012). Samples were collected from Tennessee River transects

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

upstream and downstream of the JOF Plant to evaluate fish, benthic invertebrate, and shoreline wildlife communities; shoreline aquatic and river bottom habitats; thermal plume intensity and extent (2011 only); and general water quality parameters. The aquatic community data were evaluated using community characteristics/metrics and statistical diversity comparisons. RFAI results rated “Good” at both upstream and downstream transects and the studies found that upstream and downstream aquatic communities near the JOF Plant were ecologically similar and supported a diverse fish community. As such, TVA concluded that thermal effluent from the JSF Plant was not adversely affecting downstream biological communities, and water quality was satisfactory for aquatic life use. (TVA 2011 and 2012). TDEC confirmed TVA’s position that a BIP exists in the Tennessee River adjacent to the JOF Plant in the facility’s NPDES permit (TN0005444) (TDEC 2011, pp 10 & 16 NOD).

Data collected from the historical fish population monitoring events were used solely to determine maintenance of a BIP and did not include collecting fish tissue. However, evaluation of these historical data served as the foundation to support the TDEC Order EI activities summarized in Chapter 2.2 and in the EAR Chapter 7.1.3.

2.1.2 Sport Fish Surveys

In 1995, TVA biologists and state fishery resource agencies in the Tennessee River Valley developed the Sport Fishing Index (SFI) to quantify sport fishing quality for individual sportfish species (Hickman 2000). The sport fish surveys used the calculated SFI to:

- Provide the fishing public with information that will assist them in selecting locations that have the best potential for a successful fishing experience for the species they prefer, and
- Provide TVA and state biologists with a reference point and subsequent measure of the quality of that fishery over time.

Between 1995 and 2014, annual sportfish surveys were conducted on the Kentucky Reservoir. The SFI incorporates measurements of quantity (fish species population) and quality aspects of potential for angler success. TVA reported SFI findings on its website for use by anglers and other members of the public (TVA 2019b). Surveys were conducted during the spring and comprised 12 runs at up to eight reservoir locations including Barge Island, Cypress Creek, Danville, Piney Camp, Birdsong Creek, Eagle Creek, Jonathan Creek, and Blood River. The surveys included electrofishing to collect data on fish abundance, species distribution, length, weight, relative stock density, and proportional stock density (TVA 2014). Data were collected on habitat type during these surveys to determine the multi-metric Shoreline Aquatic Habitat Index, which measures existing fish habitat quality.

The SFI and sport fish surveys were discontinued on mainstem Tennessee River reservoirs in 2014 except for Watts Bar Reservoir, which was last surveyed in 2017. While the spring sportfish surveys did not include fish tissue analyses, evaluation of these historical data served as one of the foundations supporting the TDEC Order fish tissue investigation activities summarized in Chapter 4.0.

2.1.3 Fish Impingement Monitoring

Between 1974 through 1976, TVA conducted fish impingement[5] investigations at the JOF Plant to assess the effects of the plant's cooling water intake on the aquatic community (TVA 1976a). The number of each fish species impinged on the JOF Plant intake screens was small in relation to standing stocks in Kentucky Reservoir (1976b), The study concluded that the impingement of fish at the JOF Plant did not adversely impact any of the fish populations of Kentucky Reservoir. In 1978, the ash pond discharge was relocated to a point immediately upstream from the cooling water intake, raising the water level at the point of intake and possibly increasing the potential for impingement. Studies were performed in 1980 through 1982 to determine the impact of this discharge relocation on fish impingement (TVA 1984).

Because the JOF Plant must comply with the Tennessee Water Quality Act and the federal CWA, TVA was required by Section 316(b) of the CWA to demonstrate that the condenser cooling water withdrawal at the JOF Plant had no significant impact on the aquatic community. TVA conducted impingement monitoring at the JOF Plant in 2005 through 2007 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 EPA impingement monitoring rule subsequently was suspended in 2007. (TVA 2007).

Data collected from the fish impingement monitoring did not include collecting fish tissue for analysis of CCR Parameters (defined for this investigation in Chapter 3.1 below). However, evaluation of these historical data served as a foundation to support the TDEC Order EI activities summarized below in Chapter 2.2 and in the EAR Chapter 7.1.3.

2.1.4 Fish Entrainment Monitoring

In 1975, TVA conducted fish entrainment[6] studies at the JOF Plant to evaluate the effects of the plant's cooling water intake on the aquatic community and concluded that the relatively low entrainment of eggs and larvae indicated that there was no adverse impact to Kentucky Reservoir fish from entrainment at the JOF Plant (TVA 1976b).

Data collected from the historical fish entrainment study did not include collecting fish tissue for analysis of CCR Parameters (see Chapter 3.1 below). However, the evaluation of these historical data served as a foundation to support the TDEC Order investigation activities summarized in Chapter 2.2 below and in the EAR Chapter 7.1.3.

2.1.5 Fish Tissue Monitoring

Between 1970 and 1979, TVA conducted an investigation of the Pickwick and Kentucky Reservoirs to evaluate mercury concentrations in fish tissue (TVA 1983). In 1970, the identified mercury source, the Muscle Shoals, Alabama Diamond Shamrock Chemicals, Inc. chlor-alkali plant, discharge (Pickwick Reservoir, TRM 258), had been retrofitted to substantially reduce the mercury load in the plant discharge. The purpose of TVA's studies was to evaluate long term trends in the downstream reservoirs and to inform fish consumption advisories. Collected fish species included largemouth bass, carp, and drum, fishes of sport and commercial value that represent different trophic levels (TVA 1983).

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[5] Impingement is a component of Section 316(b) of the CWA and refers to an adverse environmental impact (i.e., death or injury) in which aquatic organisms are pinned (or impinged) against a screen or other parts of a cooling water intake structure.
[6] Entrainment is defined in Section 316(b) of the CWA as an adverse environmental impact (i.e., death or injury) in which aquatic organisms are drawn (or entrained) into cooling water systems and subjected to thermal, physical or chemical stresses.

To meet the Clean Water Act "fishable" goals, screening-level fish tissue samples were collected from the Kentucky Reservoir on a rotational basis from 1988 through the present (TVA 1990). TVA, in cooperation with TDEC and Kentucky Department of Fish and Wildlife Resources, 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 up to six locations in Kentucky Reservoir downstream and upstream from the JOF Plant. Tissue samples were analyzed for EPA Priority Pollutants including metals, PCBs, and pesticides. Fish tissue study result summaries for years 1988 through 2011 can be found in TVA's annual fish tissue reports. Results for subsequent years are available electronically. Fish tissue contaminant concentrations were typically either below detectable levels or below levels used to issue fish consumption advisories. The State of Tennessee has issued two fish consumption advisories that are specific to embayments on Kentucky Reservoir; both advisories are due to mercury (TDEC 2022). In 2010, the State of Tennessee issued an advisory to not consumption fish caught from Beech Creek and its embayment on Kentucky Reservoir (TRM 155). In 2016, the State of Tennessee issued a precautionary advisory for the consumption of all bass species caught from the Big Sandy River and its embayment on Kentucky Reservoir (TRM 67). Since 2001 the Commonwealth of Kentucky has issued statewide health advisories for women of child-bearing age and children six years and younger for the consumption of larger, older fish caught from Kentucky streams and reservoirs because of the presence of mercury (Kentucky Department of Fish and Wildlife Resources 2014 and TVA 2002, 2004, and 2006).

2.1.6 Historical Fishery Study Conclusions

A summary of the conclusions from the historical fishery studies follows.

Fish Population Monitoring

- The initial CWA Section 316(a) study concluded that fish species abundant in pre-operational samples remained present in downstream reaches and that JOF Plant operations had little or no measurable impact on Kentucky Reservoir fish populations (TVA 1974). Subsequent cove rotenone studies supported these initial conclusions and found that fish populations near the JOF Plant were similar to those in other areas of the Kentucky Reservoir (TVA 1981).

- RFAI results for the 2001 to 2011 fish community monitoring concluded that the river met BIP criteria at upstream and downstream locations. RFAI scores at the downstream locations showed that fish communities were similar to the upstream control site. Based on these results, TVA concluded that JOF thermal effluent was not adversely affecting downstream fish communities (TVA 2011, 2012).

Fish Impingement Monitoring

- The initial 1970s impingement studies identified that fish species were typically impinged at a rate of 1.0 fish/day or less. Those species impinged at a rate above 1.0 fish/day were relatively common in the Kentucky Reservoir, and comparisons to standing stock data supported the conclusion that impingement rates would not be expected to adversely affect fish populations (TVA 1976a). While impingement increased after relocation of the JOF Plant ash pond discharge, TVA concluded that the relocation did not have a significant adverse impact on fish species (TVA 1984).

- During the 2005 to 2007 impingement monitoring, TVA measured lower impingement rates than the previous studies, further supporting the conclusion that JOF Plant operations had no adverse impact on local fish communities (TVA 2007).

Fish Entrainment Studies

- The 1975 entrainment study indicated no significant adverse environmental impact to the Kentucky Reservoir fisheries resources due to JOF Plant operations (TVA 1976b).

Fish Tissue Studies

- TVA (1983) found that mercury concentrations in fish tissue collected from the Pickwick and Kentucky Reservoirs peaked in 1972-1973 and steadily decreased thereafter. No fish tissue results exceeded the federal guideline concentration in 1979, the final year of the monitoring study.

- Beginning in 1988, fish tissue contaminant concentrations measured during screening-level sampling were typically either below detectable levels or below levels that would require issuance of fish consumption advisories. No fish consumption advisories specific to the mainstream of the Tennessee River within the Kentucky Reservoir (i.e., excluding statewide advisories) have been issued. A statewide fish consumption advisory was issued for all Kentucky waters due to mercury; the status of current Kentucky advisories may be found at (Kentucky Department of Fish and Wildlife Resources, 2014).

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 JOF Plant have higher tissue concentrations of CCR-related constituents than the same species of fish from upstream reference locations, and to provide data to be used in conjunction with sediment and mayfly sampling results to evaluate the bioaccumulation of these constituents. The information from the fish tissue investigation was used to help evaluate if CCR material and/or dissolved CCR constituents have migrated from the CCR management units and potentially impacted aquatic life.

TVA performed EI sample collection activities within the Kentucky Reservoir (Tennessee River) in general accordance with the *Fish Tissue Sample and Analysis Plan (SAP)* (Stantec 2018), *Environmental Investigation Plan (EIP)* (TVA 2018), and *Quality Assurance Project Plan (QAPP)* (Environmental Standards 2018), including TVA- and TDEC-approved programmatic and project-specific changes that were made after approval of the EIP. Descriptions of sample location selection, collection methodology, analyses, and Quality Assurance/Quality Control (QA/QC) completed for the investigation are provided in the *Fish Tissue Sampling and Analysis Report (SAR)* included in Appendix J.6.

The scope of the EI sampling activities included collecting targeted fish samples identified in the *SAP* from April through May 2019 from five reaches on the Tennessee River. The Tennessee River reaches were established upstream, adjacent, and downstream of the JOF Plant CCR management units. The three reaches adjacent to the JOF Plant CCR management units included Tennessee River Adjacent located west of Active Ash Pond 2 (AAP2) on the mainstream of the Tennessee River, and the Intake Channel and Boat Harbor located east of AAP2. Exhibit J.5-2 shows the locations of the sampling reaches. A total of 65 composite samples were collected (39 in the Tennessee River, 13 in the Intake

Channel and 13 in the Boat Harbor), 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 (gizzard shad with gut content), along with 13 duplicate samples.

Based on the 2019 results, further investigation of copper concentrations in biota and sediments from the JOF Boat Harbor and Intake Channel was conducted. The *Fish Tissue and Benthic Sampling and Analysis Plans Addendum I* (Stantec 2021) was prepared to describe the collection and testing of additional composited bluegill tissue samples, composited mayfly nymph samples, and sediment samples to support further evaluation of copper concentrations in biota and sediments in the Boat Harbor.

The supplemental sampling described in the Fish Tissue and Benthic SAPs Addendum I was conducted in June and July 2021. Three bluegill fish tissue liver samples were taken from the Tennessee River (upstream reach), the Intake Channel and the Boat Harbor. In accordance with the Addendum, the collected composite mayfly samples and sediment samples were retained pending the results of the fish tissue samples as the ultimate line of evidence that might demonstrate potential impacts. Because the total copper concentrations measured from the fish tissue samples collected in July 2021 were not determined to be elevated, the mayfly samples and sediment samples were not analyzed.

Chapter 3 Results and Discussion

Fish tissue data from the EI were collected from five sample reaches in the Tennessee River proximate to the JOF Plant, as described above. The results of the sample analyses and evaluation are discussed in the chapters below.

To aid in interpreting these data, TDEC-approved acute and chronic ecological screening values (ESVs) for the EAR (Tables 1-2 and 1-3, and Appendix A.2) to evaluate whether identified CCR constituent concentrations in surface stream and sediment samples may be indicative of potential impacts to aquatic life. For the fish tissue data, sampling results are compared to health-protective CBR values (Table 1-4), as described in Chapter 3.2.1 below.

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

3.1 Analytical Results

The fish tissue samples were analyzed for the following CCR-related constituents, hereafter referred to collectively as “CCR Parameters” for the fish tissue investigation:

- Boron and calcium from 40 CFR Part 257 Appendix III
- 40 CFR Part 257 Appendix IV Constituents, excluding radium and fluoride
- Five inorganic constituents from Appendix I of TN Rule 0400-11-.04: copper, nickel, silver, vanadium, and zinc
- Strontium
- Percent moisture.

The results of the exploratory data analysis of the EI fish tissue data for the JOF Plant are presented in Appendix E.8.

3.2 Exploratory Data Analysis

Exploratory data analyses for the surface stream and sediment sample results identified CCR Parameters with concentrations above established ESVs, where the comparison to ESVs does not include statistically significant outliers identified as suitable for removal from further statistical analysis (see further discussion in Appendices E.5 and E.6, respectively). These constituents were also evaluated for the fish tissue sample results. In addition, mercury and selenium were further evaluated for fish tissue samples due to their known bioaccumulation potential. Following these criteria, fish tissue sampling results were reviewed for beryllium, mercury, and selenium in the Tennessee River; arsenic, beryllium, mercury and selenium in the Intake Channel; and arsenic, beryllium, copper, mercury, and selenium in the Boat Harbor.

A summary of fish tissue sampling results above ESVs, including arsenic, beryllium, copper, mercury, and selenium, identified in the exploratory data analysis for the Tennessee River, Intake Channel, and Boat Harbor is provided in Table J.5-1. Exhibit J.5-3 illustrates the sampling results above CBR values for each sampling reach.

3.2.1 Comparative Analysis

The CCR Parameters identified from the exploratory data analysis for careful evaluation in the fish tissue data (i.e., focused on constituents with surface water or sediment concentrations above established ESVs and bioaccumulative constituents mercury and selenium) were further evaluated by comparison to the CBR values for the specific fish tissues. Beryllium, mercury, and selenium concentrations were evaluated for fish tissues from the Tennessee River. Arsenic, beryllium, mercury and selenium concentrations were evaluated for fish tissues from the Intake Channel. Arsenic, beryllium, copper, mercury, and selenium concentrations were evaluated for fish tissues from the Boat Harbor. The CBR values are included in the ESVs provided in Table 1-4 and Appendix A.2.

Tennessee River

The comparative analysis chart for CBR values provided in Table J.5-2 demonstrates the relationships between the fish tissue constituent concentrations for beryllium, mercury and selenium in the Tennessee River and the respective CBR values for whole fish and tissue types. The gray cells show areas where no applicable CBR value is available for a specific tissue type (e.g., there is no CBR value for mercury in ovaries). Green cells show where the constituent concentrations for a tissue type are below CBR NOAELs. Yellow cells show where constituent concentrations for a tissue type are above NOAELs but below CBR “Lowest Observed Adverse Effects Levels” (LOAELs). Orange cells indicate constituent concentrations that are above LOAELs.

In most cases, the gamefish (bluegill, channel catfish, largemouth, and redear sunfish) muscle and liver tissues had mercury concentrations higher than either the NOAEL or LOAEL and selenium concentrations in liver tissues higher than the NOAEL. Selenium concentrations were below the NOAEL in gamefish muscle and ovary tissues. Similar results across the upstream, adjacent and downstream locations, suggest no potential impacts from the JOF Plant CCR management units on gamefish muscle and liver tissue concentrations of mercury and selenium.

For whole-fish shad tissue samples, mercury concentrations were also consistently higher than the NOAEL for samples collected upstream, adjacent, and downstream of the JOF Plant. Beryllium and selenium concentrations were below the CBR NOAEL in whole-fish tissues. The sampling results suggest no potential impacts from the JOF Plant CCR management units on whole-fish tissue concentrations of mercury.

Exhibit J.5-3 shows the CCR Parameter results that were higher than CBR values for each fish type, tissue type, sampling date, and sampling reach.

Intake Channel

The comparative analysis chart for CBR values provided in Table J.5-3 demonstrates the relationships between the fish tissue constituent concentrations for arsenic, beryllium, mercury and selenium in the Intake Channel and the respective CBR values for whole fish and tissue types. Within the Intake Channel sampling reach there are no specific upstream or downstream segments – the entirety of the Intake Channel is considered adjacent to AAP2. Half of the gamefish muscle and liver tissue samples had arsenic concentrations higher than the NOAEL. Three of four gamefish muscle tissue

samples had mercury concentrations higher than the NOAEL. For liver tissues, the gamefish had selenium concentrations higher than the NOAEL, and mercury concentrations higher than the LOAEL. For whole-fish shad tissue samples, arsenic and mercury concentrations were higher than the NOAEL.

Arsenic and selenium concentrations were below the NOAEL in gamefish ovary tissues and selenium concentrations were below the NOAEL in gamefish muscle tissues. Beryllium and selenium concentrations were below the NOAEL in whole-fish tissues.

Boat Harbor

The comparative analysis chart for CBR values provided in Table J.5-4 demonstrates the relationships between the fish tissue constituent concentrations for arsenic, beryllium, copper, mercury and selenium in the Boat Harbor and the respective CBR values for whole fish and tissue types. Similar to the Intake Channel sampling reach, there are no specific upstream or downstream segments within the Boat Harbor reach. The entirety of the Boat Harbor is considered adjacent to AAP2 and Ash Disposal Area 1. Three of four gamefish muscle tissue samples had arsenic concentrations higher than the NOAEL. Of the four gamefish muscle tissue samples, only one had mercury concentrations higher than the NOAEL. For liver tissues, the gamefish had selenium concentrations higher than the NOAEL, and mercury concentrations higher than the LOAEL. Of the four gamefish liver tissue samples, a single sample had arsenic and copper concentrations higher than their respective NOAELs. For whole-fish tissue samples, arsenic, mercury, and copper concentrations were higher than their respective NOAELs.

Selenium and copper concentrations were found to be below their respective NOAELs in gamefish muscle tissues, as were arsenic and selenium concentrations in gamefish ovary tissues. Beryllium and selenium concentrations were found to be below their NOAELs in whole-fish tissues.

Supplemental Sampling within the Intake Channel and Boat Harbor Reaches

Results of the supplemental bluegill fish tissue liver sampling event demonstrated that the three samples collected within each sampling reach (Tennessee River, Intake Channel, Boat Harbor) had concentrations below the CBR NOAEL value for copper (Table J.5-5). Because the fish tissue samples from the additional fish tissue study had concentrations lower than the CBR NOAEL value for copper, comparative analyses were not conducted on the samples, nor were the sediment and benthic invertebrate samples analyzed per the conditions of the SAP Addendum.

Chapter 4 Summary

Fish tissue samples collected during the EI from upstream, adjacent, and downstream reaches of the Tennessee River and from adjacent reaches in the Intake Channel and Boat Harbor were evaluated for CCR Parameters that were identified based on surface stream and sediment sampling results.

The CCR Parameter concentrations in surface stream samples collected from the Tennessee River, Intake Channel, Boat Harbor, and coves were less than their respective ESVs. Whereas two CCR Parameters (beryllium and selenium) were above chronic ESVs in sediment samples from the Tennessee River; three CCR Parameters (arsenic, beryllium and selenium) were above chronic ESVs in sediment samples from the Intake Channel; and five CCR Parameters (arsenic, beryllium, copper, mercury and selenium) were above chronic ESVs in sediment samples from the Boat Harbor. Although mercury results from the Tennessee River and Intake Channel surface stream and sediment samples were not above the chronic ESV, mercury was evaluated in fish tissue concentrations at these locations due to its bioaccumulative properties in fish.

When comparing the Tennessee River data to the CBR values, upstream fish tissue concentrations for cadmium, copper, mercury and selenium were similar or sometimes higher than the adjacent and downstream fish tissue concentrations. A similar observation was made for whole fish samples, in which the adjacent and downstream concentrations for cadmium, copper, mercury and selenium were similar to upstream concentrations.

Although the Intake Channel and Boat Harbor reaches are considered similar to the coves (rather than riverine), thus precluding any direct fish tissue comparisons between upstream and downstream reaches, the beryllium, mercury and selenium concentrations in the Intake Channel and Boat Harbor, did show similarities to concentrations measured in the Tennessee River across the sampled fish species and tissue types. These similarities suggest no potential impacts on fish tissue from the JOF Plant CCR management units for those constituents. Due to an atypically higher copper concentration in a bluegill composite liver sample collected from the Boat Harbor, along with sediment samples showing elevated copper concentrations from the Boat Harbor, supplemental bluegill liver samples were collected from the Tennessee River, Intake Channel and Boat Harbor and analyzed for copper. All additional liver samples reported concentrations lower than the CBR NOAEL value for copper.

An additional line of evidence demonstrating the health of local fish communities is that RFAI scores over a 11-year period indicate the presence of consistent, balanced, and reproducing indigenous fish populations in the Tennessee River, according to historically documented 316(a) long term monitoring and reporting.

The fish tissue sampling results for the Tennessee River, together with the biological monitoring results, illustrate a consistent, balanced indigenous fish population, and do not indicate potential impacts to fish tissue concentrations or the fish community related to the JOF Plant CCR management units.

Chapter 5 References

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TABLES

Table J.5-1 - Fish Tissue Analytical Data
Johnsonville Fossil Plant

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Arsenic mg/kg	Beryllium mg/kg	Copper mg/kg	Mercury mg/kg	Selenium mg/kg
Bluegill	JOF-BH	14-May-19	JOF-FH-BG-BH-F-20190514		Normal Environmental Sample	Final-Verified	0.062 J	<0.031	<0.27	0.068 J	0.27
		14-May-19	JOF-FH-BG-BH-L-20190514		Normal Environmental Sample	Final-Verified	0.19	<0.032	28.1 J	0.023 J	2.1
		14-May-19	JOF-FH-BG-BH-O-20190514		Normal Environmental Sample	Final-Verified	0.18	<0.030	1.0	<0.0073	0.90
		13-Jul-21	JOF-FH-BG-BH-L-R1-20210713		Normal Environmental Sample	Validated	-	-	2.0	-	-
		13-Jul-21	JOF-FH-BG-BH-L-R2-20210713		Normal Environmental Sample	Validated	-	-	2.0	-	-
		13-Jul-21	JOF-FH-BG-BH-L-R3-20210713		Normal Environmental Sample	Validated	-	-	1.6	-	-
	JOF-IC	02-May-19	JOF-FH-BG-IC-F-20190502		Normal Environmental Sample	Final-Verified	0.044 J	<0.031	NA	0.14 J	0.37
		02-May-19	JOF-FH-BG-IC-L-20190502		Normal Environmental Sample	Final-Verified	0.63	<0.032	NA	0.042 J	1.9
		02-May-19	JOF-FH-BG-IC-O-20190502		Normal Environmental Sample	Final-Verified	0.12	<0.032	NA	<0.0073	0.80
		14-Jul-21	JOF-FH-BG-IC-L-R1-20210714		Normal Environmental Sample	Validated	-	-	NA	-	-
		14-Jul-21	JOF-FH-BG-IC-L-R2-20210714		Normal Environmental Sample	Validated	-	-	NA	-	-
		14-Jul-21	JOF-FH-BG-IC-L-R3-20210714		Normal Environmental Sample	Validated	-	-	NA	-	-
	JOF-TRA	14-May-19	JOF-FH-BG-TRA-F-20190514		Normal Environmental Sample	Final-Verified	NA	<0.032	NA	0.13 J	0.65
		14-May-19	JOF-FH-BG-TRA-L-20190514		Normal Environmental Sample	Final-Verified	NA	<0.032	NA	0.068 J	4.0
		14-May-19	JOF-FH-BG-TRA-O-20190514		Normal Environmental Sample	Final-Verified	NA	<0.032	NA	0.0081 J	1.2
	JOF-TRD	02-May-19	JOF-FH-BG-TRD-F-20190502		Normal Environmental Sample	Final-Verified	NA	<0.030	NA	0.093 J	0.33
		02-May-19	JOF-FH-BG-F-DUP01-20190502	JOF-FH-BG-TRD-F-20190502	Field Duplicate Sample	Final-Verified	NA	<0.031	NA	0.10 J	0.34
		02-May-19	JOF-FH-BG-TRD-L-20190502		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.047 J	1.9
		02-May-19	JOF-FH-BG-L-DUP01-20190502	JOF-FH-BG-TRD-L-20190502	Field Duplicate Sample	Final-Verified	NA	<0.032	NA	0.053 J	1.6
		02-May-19	JOF-FH-BG-TRD-O-20190502		Normal Environmental Sample	Final-Verified	NA	<0.030	NA	<0.0073	0.91
		02-May-19	JOF-FH-BG-O-DUP01-20190502	JOF-FH-BG-TRD-O-20190502	Field Duplicate Sample	Final-Verified	NA	<0.031	NA	<0.0071	0.87
	JOF-TRU	01-May-19	JOF-FH-BG-TRU-F-20190501		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.047 J	0.34
		01-May-19	JOF-FH-BG-TRU-L-20190501		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.060 J	1.3
		01-May-19	JOF-FH-BG-TRU-O-20190501		Normal Environmental Sample	Final-Verified	NA	<0.032	NA	0.0075 J	0.79
		14-Jul-21	JOF-FH-BG-TRU-L-R1-20210714		Normal Environmental Sample	Validated	-	-	NA	-	-
		14-Jul-21	JOF-FH-BG-TRU-L-R2-20210714		Normal Environmental Sample	Validated	-	-	NA	-	-
		14-Jul-21	JOF-FH-BG-TRU-L-R3-20210714		Normal Environmental Sample	Validated	-	-	NA	-	-
Channel Catfish	JOF-BH	10-Apr-19	JOF-FH-CC-BH-F-20190410		Normal Environmental Sample	Validated	0.078 J	<0.033	0.31 J	0.075 J	0.17
		10-Apr-19	JOF-FH-CC-BH-L-20190410		Normal Environmental Sample	Final-Verified	0.033 J	<0.031	5.1	0.18	0.86
		10-Apr-19	JOF-FH-CC-BH-O-20190410		Normal Environmental Sample	Final-Verified	<0.029	<0.032	0.96	<0.0071	0.98
	JOF-IC	07-May-19	JOF-FH-CC-IC-F-20190507		Normal Environmental Sample	Validated	0.059 J	<0.032	NA	0.056 J	0.16 J
		07-May-19	JOF-FH-CC-IC-L-20190507		Normal Environmental Sample	Final-Verified	<0.029	<0.032	NA	0.15	0.88
		07-May-19	JOF-FH-CC-IC-O-20190507		Normal Environmental Sample	Final-Verified	<0.028	<0.030	NA	<0.0075	1.0
	JOF-TRA	10-Apr-19	JOF-FH-CC-TRA-F-20190410		Normal Environmental Sample	Validated	NA	<0.029	NA	0.081 J	0.22
		25-Apr-19	JOF-FH-CC-F-DUP01-20190425	JOF-FH-CC-TRA-F-20190410	Field Duplicate Sample	Validated	NA	<0.029	NA	0.084 J	0.18
		10-Apr-19	JOF-FH-CC-TRA-L-20190410		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.19 J	0.96
		25-Apr-19	JOF-FH-CC-L-DUP01-20190425	JOF-FH-CC-TRA-L-20190410	Field Duplicate Sample	Final-Verified	NA	<0.030	NA	0.28 J	1.3
		10-Apr-19	JOF-FH-CC-TRA-O-20190410		Normal Environmental Sample	Final-Verified	NA	<0.033	NA	<0.0073	1.1
		25-Apr-19	JOF-FH-CC-O-DUP01-20190425	JOF-FH-CC-TRA-O-20190410	Field Duplicate Sample	Final-Verified	NA	<0.033	NA	<0.0071	1.3
	JOF-TRD	07-May-19	JOF-FH-CC-TRD-F-20190507		Normal Environmental Sample	Validated	NA	<0.030	NA	0.075 J	0.18
		07-May-19	JOF-FH-CC-TRD-L-20190507		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.17	1.1
		07-May-19	JOF-FH-CC-TRD-O-20190507		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	<0.0072	0.90
	JOF-TRU	01-May-19	JOF-FH-CC-TRU-F-20190501		Normal Environmental Sample	Validated	NA	<0.032	NA	0.073 J	0.17
		01-May-19	JOF-FH-CC-TRU-L-20190501		Normal Environmental Sample	Final-Verified	NA	<0.030	NA	0.17	0.98
		01-May-19	JOF-FH-CC-TRU-O-20190501		Normal Environmental Sample	Validated	NA	<0.033	NA	<0.0069	1.1

See last page for notes.

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Table J.5-1 - Fish Tissue Analytical Data
Johnsonville Fossil Plant

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Arsenic mg/kg	Beryllium mg/kg	Copper mg/kg	Mercury mg/kg	Selenium mg/kg
Largemouth Bass	JOF-BH	10-Apr-19	JOF-FH-LB-BH-F-20190410		Normal Environmental Sample	Validated	0.14	<0.030	<0.25	0.30 J	0.30
		10-Apr-19	JOF-FH-LB-BH-L-20190410		Normal Environmental Sample	Validated	0.36	<0.030	4.5	0.11 J	1.1
		10-Apr-19	JOF-FH-LB-BH-O-20190410		Normal Environmental Sample	Validated	0.19	<0.033	1.2	0.014 J	0.86
	JOF-IC	10-Apr-19	JOF-FH-LB-IC-F-20190410		Normal Environmental Sample	Validated	0.11	<0.029	NA	0.40 J	0.42
		10-Apr-19	JOF-FH-LB-IC-L-20190410		Normal Environmental Sample	Validated	0.24	<0.029	NA	0.19 J	1.2
		10-Apr-19	JOF-FH-LB-IC-O-20190410		Normal Environmental Sample	Validated	0.16	<0.031	NA	0.024 J	0.97
	JOF-TRA	11-Apr-19	JOF-FH-LB-TRA-F-20190411		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.52 J	0.34
		11-Apr-19	JOF-FH-LB-TRA-L-20190411		Normal Environmental Sample	Validated	NA	<0.033	NA	0.21 J	1.7
		11-Apr-19	JOF-FH-LB-TRA-O-20190411		Normal Environmental Sample	Validated	NA	<0.033	NA	0.033 J	1.0
	JOF-TRD	10-Apr-19	JOF-FH-LB-TRD-F-20190410		Normal Environmental Sample	Validated	NA	<0.033	NA	0.24 J	0.39
		10-Apr-19	JOF-FH-LB-TRD-L-20190410		Normal Environmental Sample	Validated	NA	<0.030	NA	0.13 J	1.2
		10-Apr-19	JOF-FH-LB-TRD-O-20190410		Normal Environmental Sample	Validated	NA	<0.031	NA	0.017 J	0.88
	JOF-TRU	10-Apr-19	JOF-FH-LB-TRU-F-20190410		Normal Environmental Sample	Final-Verified	NA	<0.033	NA	0.33 J	0.35
		10-Apr-19	JOF-FH-LB-TRU-L-20190410		Normal Environmental Sample	Validated	NA	<0.032	NA	0.13 J	1.4
		10-Apr-19	JOF-FH-LB-TRU-O-20190410		Normal Environmental Sample	Validated	NA	<0.032	NA	0.025 J	0.92
Redear Sunfish	JOF-BH	02-May-19	JOF-FH-RS-BH-F-20190502		Normal Environmental Sample	Final-Verified	0.19	<0.033	0.52 J	0.018 U*	0.43
		02-May-19	JOF-FH-RS-BH-L-20190502		Normal Environmental Sample	Final-Verified	0.92	<0.032	1.3	0.042 U*	1.4
		02-May-19	JOF-FH-RS-BH-O-20190502		Normal Environmental Sample	Final-Verified	0.46	<0.033	0.84 J	<0.0074	0.84
	JOF-IC	25-Apr-19	JOF-FH-RS-IC-F-20190425		Normal Environmental Sample	Final-Verified	0.15	<0.031	NA	0.088 J	0.47
		07-May-19	JOF-FH-RS-F-DUP01-20190507	JOF-FH-RS-IC-F-20190425	Field Duplicate Sample	Final-Verified	0.14	<0.032	NA	0.099 J	0.50
		25-Apr-19	JOF-FH-RS-IC-L-20190425		Normal Environmental Sample	Final-Verified	0.66	<0.033	NA	0.044 U*	1.5
		07-May-19	JOF-FH-RS-L-DUP01-20190507	JOF-FH-RS-IC-L-20190425	Field Duplicate Sample	Final-Verified	0.56	<0.031	NA	0.039 U*	1.2
		25-Apr-19	JOF-FH-RS-IC-O-20190425		Normal Environmental Sample	Final-Verified	0.47	<0.032	NA	<0.0074	0.92
		07-May-19	JOF-FH-RS-O-DUP01-20190507	JOF-FH-RS-IC-O-20190425	Field Duplicate Sample	Final-Verified	0.40	<0.030	NA	<0.0072	0.96
	JOF-TRA	01-May-19	JOF-FH-RS-TRA-F-20190501		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.088	0.37
		01-May-19	JOF-FH-RS-TRA-L-20190501		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.049 U*	1.1
		01-May-19	JOF-FH-RS-TRA-O-20190501		Normal Environmental Sample	Final-Verified	NA	<0.032	NA	<0.0072	0.75
	JOF-TRD	30-Apr-19	JOF-FH-RS-TRD-F-20190430		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.13	0.38
		30-Apr-19	JOF-FH-RS-TRD-L-20190430		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.068 U*	1.4
		30-Apr-19	JOF-FH-RS-TRD-O-20190430		Normal Environmental Sample	Final-Verified	NA	<0.032	NA	<0.0073	0.87
	JOF-TRU	01-May-19	JOF-FH-RS-TRU-F-20190501		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.097	0.39
		01-May-19	JOF-FH-RS-F-DUP02-20190501	JOF-FH-RS-TRU-F-20190501	Field Duplicate Sample	Final-Verified	NA	<0.032	NA	0.10 J	0.38
		01-May-19	JOF-FH-RS-TRU-L-20190501		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.054 U*	1.4
		01-May-19	JOF-FH-RS-L-DUP02-20190501	JOF-FH-RS-TRU-L-20190501	Field Duplicate Sample	Final-Verified	NA	<0.030	NA	0.064 U*	1.2
		01-May-19	JOF-FH-RS-TRU-O-20190501		Normal Environmental Sample	Final-Verified	NA	<0.032	NA	<0.0071	0.81
		01-May-19	JOF-FH-RS-O-DUP02-20190501	JOF-FH-RS-TRU-O-20190501	Field Duplicate Sample	Final-Verified	NA	<0.032	NA	<0.0069	0.77

See last page for notes.

Table J.5-1 - Fish Tissue Analytical Data
Johnsonville Fossil Plant

Species	Sample Location	Sample Date	Sample ID	Parent Sample ID	Sample Type	Level of Review	Arsenic mg/kg	Beryllium mg/kg	Copper mg/kg	Mercury mg/kg	Selenium mg/kg
Gizzard Shad	JOF-BH	23-Apr-19	JOF-FH-SH-BH-WF-20190423		Normal Environmental Sample	Final-Verified	0.26	<0.031	0.90	0.016 J	0.40
		23-Apr-19	JOF-FH-SH-WF-DUP01-20190423	JOF-FH-SH-BH-WF-20190423	Field Duplicate Sample	Final-Verified	0.24	<0.033	0.93 J	0.016 J	0.38
	JOF-IC	25-Apr-19	JOF-FH-SH-IC-WF-20190425		Normal Environmental Sample	Final-Verified	0.32	<0.031	NA	0.023 J	0.47
	JOF-TRA	25-Apr-19	JOF-FH-SH-TRA-WF-20190425		Normal Environmental Sample	Final-Verified	NA	<0.030	NA	0.019 J	0.39
	JOF-TRD	23-Apr-19	JOF-FH-SH-TRD-WF-20190423		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	0.018 J	0.39
	JOF-TRU	24-Apr-19	JOF-FH-SH-TRU-WF-20190424		Normal Environmental Sample	Final-Verified	NA	<0.031	NA	<0.0072	0.39

Whole Body Fish Tissue (WF)	NOAEL	0.04	5.13	0.196	0.006	8.5
	LOAEL	0.4	51.3	1.96	0.06	8.5
Liver Tissue (L)	NOAEL	0.569	NV	6.52	0.0009	0.524
	LOAEL	5.69	NV	65.2	0.009	5.24
Muscle Tissue (F)	NOAEL	0.076	NV	3.4	0.08	11.3
	LOAEL	0.76	NV	34	0.8	11.3
Ovary Tissue (O)	NOAEL	8.4	NV	NV	NV	15.1
	LOAEL	84	NV	NV	NV	15.1

Legend:

Concentration > CBR NOAEL

Concentration > CBR LOAEL

Notes:

15.2	Measured concentration did not exceed the indicated standard
<0.03	Analyte was not detected at a concentration greater than the Method Detection Limit
CBR	Critical body residue
ID	Identification
LOAEL	Lowest observed adverse effect level
NA	Not applicable. Comparison of fish tissue concentrations to Critical Body Residue (CBR) values was limited to CCR Parameters with concentrations greater than applicable ecological screening values (ESVs) in sediment or surface stream (evaluated separately for each sampled water body) and CCR parameters identified as potentially bioaccumulative (see further discussion in Appendix E.8).
NOAEL	No-observable adverse effect level
NV	No value
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
-	Not analyzed

1. Level of review is defined in the Quality Assurance Project Plan.
2. NOAEL and LOAEL values are specific to the Fish Tissue Type (Whole Body, Liver, Muscle, Ovary)

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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	Beryllium	TRU	Upstream	<0.031	<0.032	<0.033	<0.031	<0.031	<0.030	<0.032	<0.031	<0.032	<0.033	<0.032	<0.032	<0.031
		TRA	Adjacent	<0.032	<0.029	<0.031	<0.031	<0.032	<0.031	<0.033	<0.031	<0.032	<0.033	<0.033	<0.032	<0.030
		TRD	Downstream	<0.030	<0.030	<0.033	<0.031	<0.031	<0.031	<0.030	<0.031	<0.030	<0.031	<0.031	<0.032	<0.031
	Mercury	TRU	Upstream	0.047	0.073	0.33	0.097	0.060	0.17	0.13	<0.054	0.0075	<0.0069	0.025	<0.0071	<0.0072
		TRA	Adjacent	0.13	0.081	0.52	0.088	0.068	0.19	0.21	<0.049	0.0081	<0.0073	0.033	<0.0072	0.019
		TRD	Downstream	0.093	0.075	0.24	0.13	0.047	0.17	0.13	<0.068	<0.0073	<0.0072	0.017	<0.0073	0.018
	Selenium	TRU	Upstream	0.34	0.17	0.35	0.39	1.3	0.98	1.4	1.4	0.79	1.1	0.92	0.81	0.39
		TRA	Adjacent	0.65	0.22	0.34	0.37	4.0	0.96	1.7	1.1	1.2	1.1	1.0	0.75	0.39
		TRD	Downstream	0.33	0.18	0.39	0.38	1.9	1.1	1.2	1.4	0.91	0.90	0.88	0.87	0.39

	Critical Body Residue Values							
	Muscle Tissue		Liver Tissue		Ovary Tissue		Whole Body	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Beryllium	NA	NA	NA	NA	NA	NA	5.13	51.3
Mercury	0.08	0.8	0.0009	0.009	NA	NA	0.006	0.06
Selenium	11.3	11.3	0.524	5.24	15.1	15.1	8.5	8.5

Legend
No applicable CBR
Concentration < CBR NOAEL
Concentration > CBR NOAEL
Concentration > CBR LOAEL

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257

CBR – critical body residue

LOAEL – Lowest Observed Adverse Effect Level

NOAEL - No Observed Adverse Effect Level

mg/kg – milligram per kilogram

ww – wet weight

TDEC – Tennessee Department of Environment and Conservation

TRU – Tennessee River Upstream

TRA – Tennessee 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 (dw) for whole body, muscle, and ovary to permit direct comparison to the selenium critical body residues for these tissues.

Table J.5-3 Critical Body Residue Value Analysis – Intake Channel

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	Arsenic	IC	Adjacent	0.044	0.059	0.11	0.15	0.63	<0.029	0.24	0.66	0.12	<0.028	0.16	0.47	0.32
	Beryllium	IC	Adjacent	<0.031	<0.032	<0.029	<0.031	<0.032	<0.032	<0.029	<0.033	<0.032	<0.030	<0.031	<0.032	<0.031
	Mercury	IC	Adjacent	0.14	0.056	0.40	0.088	0.042	0.15	0.19	<0.044	<0.0073	<0.0075	0.024	<0.0074	0.023
	Selenium	IC	Adjacent	0.37	0.16	0.42	0.47	1.9	0.88	1.2	1.5	0.80	1.0	0.97	0.92	0.47

	Critical Body Residue Values							
	Muscle Tissue		Liver Tissue		Ovary Tissue		Whole Body	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Arsenic	0.076	0.76	0.569	5.69	8.4	84	0.04	0.4
Beryllium	NA	NA	NA	NA	NA	NA	5.13	51.3
Mercury	0.08	0.8	0.0009	0.009	NA	NA	0.006	0.06
Selenium	11.3	11.3	0.524	5.24	15.1	15.1	8.5	8.5

Legend
No applicable CBR
Concentration < CBR NOAEL
Concentration > CBR NOAEL
Concentration > CBR LOAEL

Notes:

CCR Rule - Title 40, Code of Federal Regulations, Part 257
CBR – critical body residue
LOAEL – Lowest Observed Adverse Effect Level
NOAEL - No Observed Adverse Effect Level
mg/kg – milligram per kilogram
ww – wet weight

TDEC – Tennessee Department of Environment and Conservation
IC – Intake Channel
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 (dw) for whole body, muscle, and ovary to permit direct comparison to the selenium critical body residues for these tissues.

Table J.5-4 Critical Body Residue Value Analysis – Boat Harbor

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	Arsenic	BH	Adjacent	0.062	0.078	0.14	0.19	0.19	0.033	0.36	0.92	0.18	<0.029	0.19	0.46	0.26
	Beryllium	BH	Adjacent	<0.031	<0.033	<0.030	<0.033	<0.032	<0.031	<0.030	<0.032	<0.030	<0.032	<0.033	<0.033	<0.031
	Mercury	BH	Adjacent	0.068	0.075	0.30	<0.018	0.023	0.18	0.11	<0.042	<0.0073	<0.0071	0.014	<0.0074	0.016
	Selenium	BH	Adjacent	0.27	0.17	0.30	0.43	2.1	0.86	1.1	1.4	0.90	0.98	0.86	0.84	0.40
TDEC Appendix I	Copper	BH	Adjacent	<0.27	0.31	<0.25	0.52	28.1	5.1	4.5	1.3	1.0	0.96	1.2	0.84	0.90
	Copper (2021)[1]	BH	Adjacent	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA

	Critical Body Residue Values							
	Muscle Tissue		Liver Tissue		Ovary Tissue		Whole Body	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Arsenic	0.076	0.76	0.569	5.69	8.4	84	0.04	0.4
Beryllium	NA	NA	NA	NA	NA	NA	5.13	51.3
Copper	3.4	34	6.52	65.2	NA	NA	0.196	1.96
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

BH – Boat Harbor

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

RS – Redear Sunfish, SH – Shad

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

1. Results from a supplemental sampling completed in 2021 was to further investigate copper concentrations in biota and sediments in the Boat Harbor

Table J.5-5 – Summary of Boat Harbor Fish Tissue Analytical Results
Johnsonville Fossil Plant

Sample Location	Sample Date	Sample ID	Level of Review	Copper (mg/kg)
JOF-BH	13-Jul-21	JOF-FH-BG-BH-L-R1-20210713	Validated	2.0
	13-Jul-21	JOF-FH-BG-BH-L-R2-20210713	Validated	2.0
	13-Jul-21	JOF-FH-BG-BH-L-R3-20210713	Validated	1.6
JOF-IC	14-Jul-21	JOF-FH-BG-IC-L-R1-20210714	Validated	1.8
	14-Jul-21	JOF-FH-BG-IC-L-R2-20210714	Validated	1.4
	14-Jul-21	JOF-FH-BG-IC-L-R3-20210714	Validated	1.8
JOF-TRU	14-Jul-21	JOF-FH-BG-TRU-L-R1-20210714	Validated	2.7
	14-Jul-21	JOF-FH-BG-TRU-L-R2-20210714	Validated	1.7
	14-Jul-21	JOF-FH-BG-TRU-L-R3-20210714	Validated	1.2

Critical Body Residue Values for Liver Tissue		
	NOAEL	LOAEL
Copper	6.52	65.2

Notes:

15.2	measured concentration did not exceed the indicated standard
BG	Blue Gill
BH	Boat Harbor
IC	Intake channel
ID	Identification
L	Liver
mg/kg	milligrams per kilogram
TRU	Tennessee River Upstream

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

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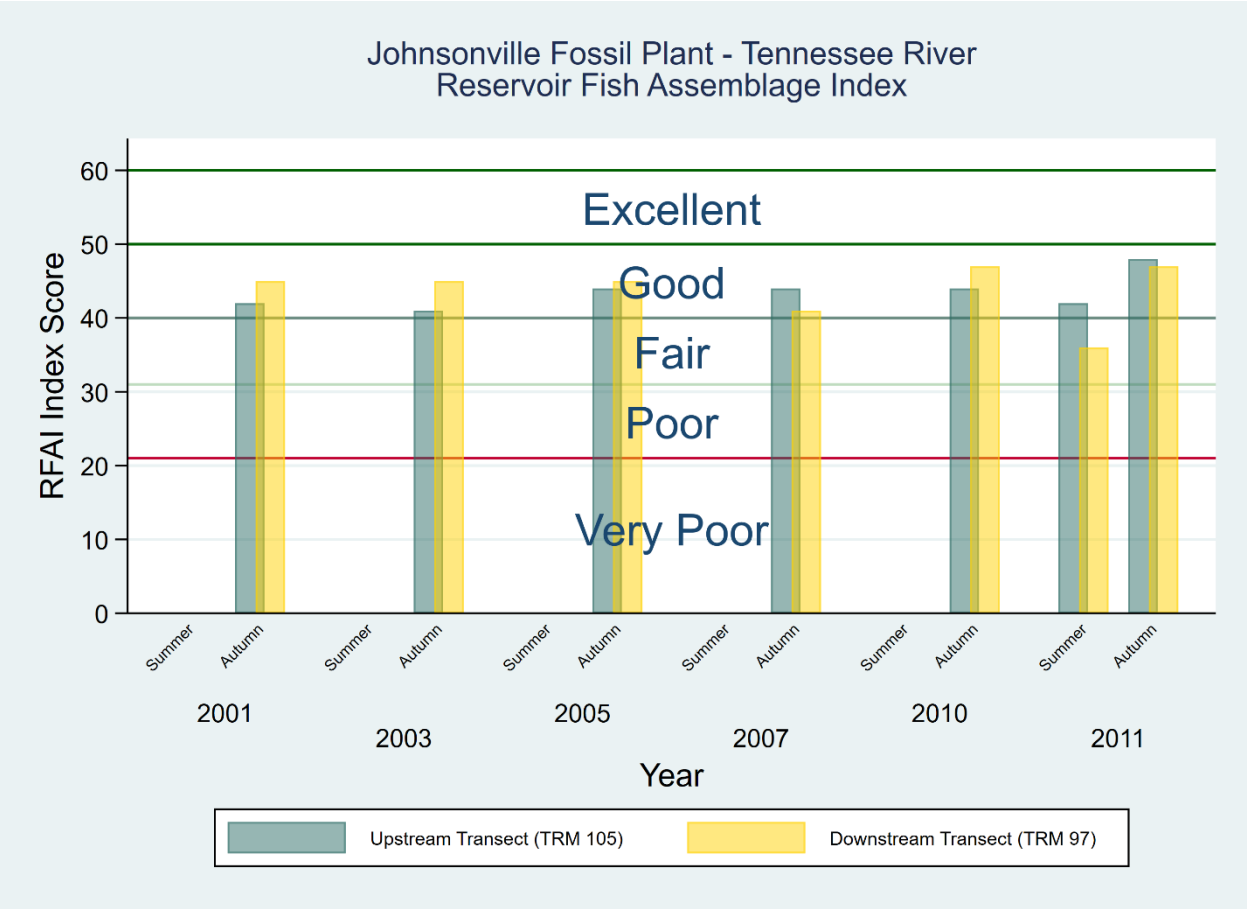
EXHIBITS

Exhibit J.5-1 Reservoir Fish Assemblage Annual Index



Reference: TVA. (2012), "Biological Monitoring of the Tennessee River Near Johnsonville Fossil Plant Discharge Summer and Autumn 2011." October.

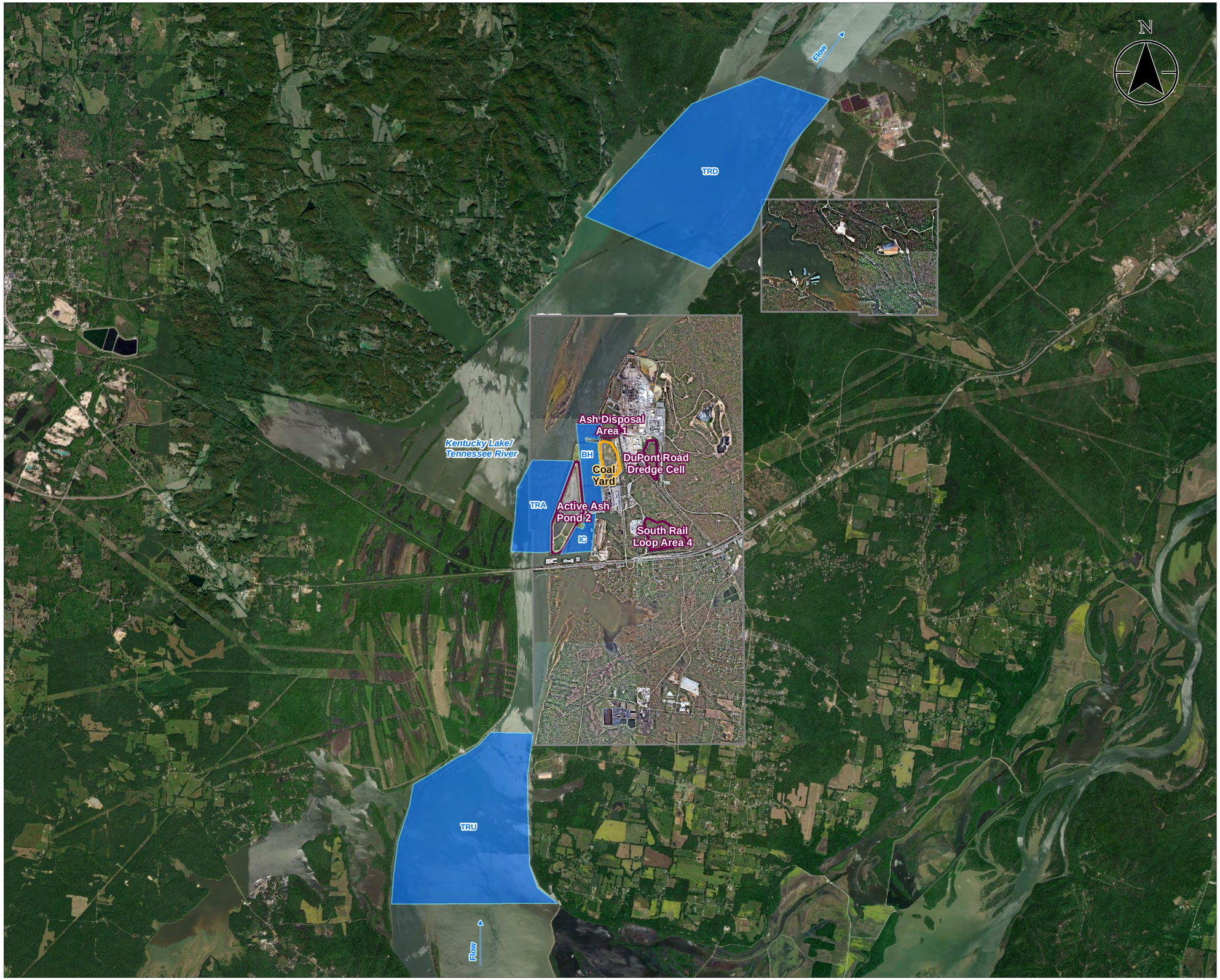


Exhibit No.

J.5-2

Title

Fish Tissue Sampling Reaches

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2022-07-19
Technical Review by JS on 2022-07-19

0 2,500 5,000 7,500 10,000 Feet

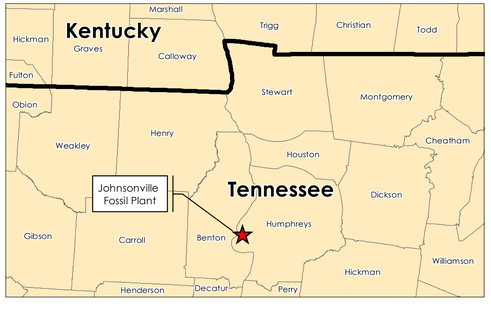
1:30,000 (At original document size of 22x34)

Legend

- Fish Sample Location — TRU – Tennessee River Upstream; TRA – Tennessee River Adjacent; TRD – Tennessee River Downstream; IC – Intake Channel; BH – Boat Harbor
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



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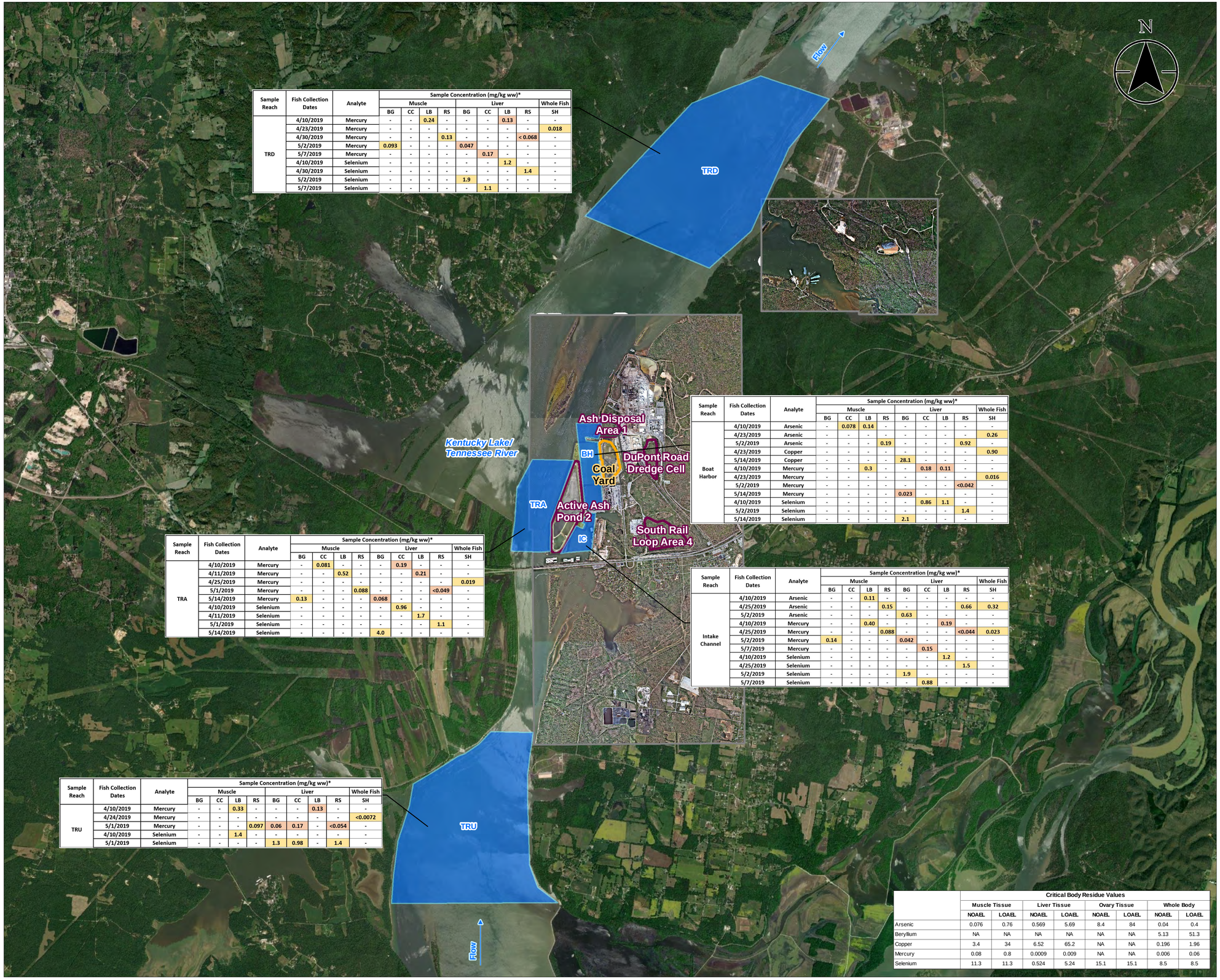


Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
TRD	4/10/2019	Mercury	-	-	0.24	-	-	-	0.13	-	-
	4/23/2019	Mercury	-	-	-	-	-	-	-	-	0.018
	4/30/2019	Mercury	-	-	-	0.13	-	-	-	< 0.068	-
	5/2/2019	Mercury	0.093	-	-	-	0.047	-	-	-	-
	5/7/2019	Mercury	-	-	-	-	-	0.17	-	-	-
	4/10/2019	Selenium	-	-	-	-	-	-	1.2	-	-
	4/30/2019	Selenium	-	-	-	-	-	-	-	1.4	-
	5/2/2019	Selenium	-	-	-	-	1.9	-	-	-	-
	5/7/2019	Selenium	-	-	-	-	-	1.1	-	-	-

Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
Boat Harbor	4/10/2019	Arsenic	-	0.078	0.14	-	-	-	-	-	-
	4/23/2019	Arsenic	-	-	-	-	-	-	-	-	0.26
	5/2/2019	Arsenic	-	-	-	0.19	-	-	-	0.92	-
	4/23/2019	Copper	-	-	-	-	-	-	-	-	0.90
	5/14/2019	Copper	-	-	-	-	28.1	-	-	-	-
	4/10/2019	Mercury	-	-	0.3	-	-	0.18	0.11	-	-
	4/23/2019	Mercury	-	-	-	-	-	-	-	-	0.016
	5/2/2019	Mercury	-	-	-	-	-	-	-	<0.042	-
	5/14/2019	Mercury	-	-	-	-	0.023	-	-	-	-
	4/10/2019	Selenium	-	-	-	-	-	0.86	1.1	-	-
	5/2/2019	Selenium	-	-	-	-	-	-	-	1.4	-
	5/14/2019	Selenium	-	-	-	-	2.1	-	-	-	-

Sample Reach	Fish Collection Dates	Analyte	Sample Concentration (mg/kg ww)*								
			Muscle				Liver				Whole Fish
			BG	CC	LB	RS	BG	CC	LB	RS	SH
Intake Channel	4/10/2019	Arsenic	-	-	0.11	-	-	-	-	-	-
	4/25/2019	Arsenic	-	-	-	0.15	-	-	-	0.66	0.32
	5/2/2019	Arsenic	-	-	-	-	0.63	-	-	-	-
	4/10/2019	Mercury	-	-	0.40	-	-	-	0.19	-	-
	4/25/2019	Mercury	-	-	-	0.088	-	-	-	<0.044	0.023
	5/2/2019	Mercury	0.14	-	-	-	0.042	-	-	-	-
	5/7/2019	Mercury	-	-	-	-	-	0.15	-	-	-
	4/10/2019	Selenium	-	-	-	-	-	-	1.2	-	-
	4/25/2019	Selenium	-	-	-	-	-	-	-	1.5	-
	5/2/2019	Selenium	-	-	-	-	1.9	-	-	-	-
	5/7/2019	Selenium	-	-	-	-	-	0.88	-	-	-

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	4/10/2019	Mercury	-	0.081	-	-	-	0.19	-	-	-
	4/11/2019	Mercury	-	-	0.52	-	-	-	0.21	-	-
	4/25/2019	Mercury	-	-	-	-	-	-	-	-	0.019
	5/1/2019	Mercury	-	-	-	0.088	-	-	-	<0.049	-
	5/14/2019	Mercury	0.13	-	-	-	0.068	-	-	-	-
	4/10/2019	Selenium	-	-	-	-	-	0.96	-	-	-
	4/11/2019	Selenium	-	-	-	-	-	-	1.7	-	-
	5/1/2019	Selenium	-	-	-	-	-	-	-	1.1	-
	5/14/2019	Selenium	-	-	-	-	4.0	-	-	-	-

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	4/10/2019	Mercury	-	-	0.33	-	-	-	0.13	-	-
	4/24/2019	Mercury	-	-	-	-	-	-	-	-	<0.0072
	5/1/2019	Mercury	-	-	-	0.097	0.06	0.17	-	<0.054	-
	4/10/2019	Selenium	-	-	1.4	-	-	-	-	-	-
	5/1/2019	Selenium	-	-	-	-	1.3	0.98	-	1.4	-

	Critical Body Residue Values							
	Muscle Tissue		Liver Tissue		Ovary Tissue		Whole Body	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Arsenic	0.076	0.76	0.569	5.69	8.4	84	0.04	0.4
Beryllium	NA	NA	NA	NA	NA	NA	5.13	51.3
Copper	3.4	34	6.52	65.2	NA	NA	0.196	1.96
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

Exhibit No.

J.5-3

Title

Fish Tissue Sampling Results Above Critical Body Residue Values

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-04-24
Technical Review by JS on 2023-04-24

0 2,500 5,000 7,500 10,000 Feet

1:30,000 (At original document size of 22x34)

Legend

Fish Sample Location
TRU – Tennessee River Upstream
TRA – Tennessee River Adjacent
TRD – Tennessee River Downstream
IC – Intake Channel
BH – Boat Harbor

2017 Imagery Boundary

2018 Imagery Boundary

CCR Unit Area (Approximate)

Coal Yard (Approximate)

Concentration > CBR NOAEL
Concentration > CBR LOAEL

Abbreviations:

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

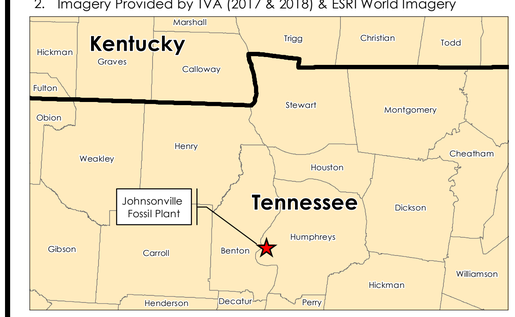
TR = Tennessee River
U = Upstream
A = Adjacent
D = Downstream
IC = Intake Channel
BH = Boat Harbor

CCR - Coal combustion residuals
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 TVA (2017 & 2018) & ESRI World Imagery



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APPENDIX J.6

FISH TISSUE SAMPLING AND ANALYSIS REPORT

Johnsonville Fossil Plant - Fish Tissue Sampling and Analysis Report

TDEC Commissioner's Order:
Environmental Investigation Plan
Johnsonville Fossil Plant
New Johnsonville, Tennessee

August 20, 2021

Prepared by:

Tennessee Valley Authority

Revision Record

Revision	Description	Date
0	Submittal to TDEC	April 16, 2021
1	Addresses May 17, 2021 TDEC Review Comments and Issued for TDEC	August 20, 2021

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Table B.4 – Fish Tissue Analytical Results

Abbreviations

^{o}C	degrees Celsius
CCR	Coal Combustion Residuals
CCR Parameters	Boron and calcium (40 CFR 257 Appendix III); 40 CFR Part 257 Appendix IV Constituents, excluding radium and fluoride; five inorganic constituents included in Appendix I of Tennessee Rule 0400-11-01-.04; strontium and percent moisture
CFR	Code of Federal Regulations
COC	Chain-of-Custody
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
JOF Plant	Johnsonville Fossil Plant
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

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 Johnsonville Fossil Plant (JOF Plant) in New Johnsonville, Tennessee.

The purpose of the fish tissue investigation is to characterize concentrations of constituents related to coal combustion residuals (CCR) in fish in the vicinity of the JOF Plant in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

The purpose of this SAR is to document the work performed and to present the information and data collected during the execution of the Fish Tissue Sampling and Analysis Plan (SAP) (Stantec 2018a). This SAR is not intended to provide conclusions or evaluate results. The scope of the fish tissue investigation represented herein was conducted pursuant to the SAP and is part of a larger environmental investigation at the JOF Plant. The evaluation of the results will consider other aspects of the environmental investigation, as well as data collected under other State and/or CCR programs, and will be presented in the Environmental Assessment Report (EAR).

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

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

The fish tissue investigation was implemented in accordance with TVA- and TDEC-approved Programmatic and Project-specific changes. Variations in scope and procedures from those outlined in the Fish Tissue SAP and occurring during field activities due to field conditions and programmatic updates are referenced in Section 3.6.

Fish tissue investigation field activities were performed during April and May 2019. TVA personnel performed the field work activities, including fish tissue resections. TVA shipped the fish tissue samples to the analytical laboratory in August 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 Environmental Standards, Inc. (EnvStds) under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The primary objective of the investigation conducted pursuant to the Fish Tissue SAP is to assess whether fish in the immediate vicinity and downstream of the JOF 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 JOF Plant. The approach for the fish tissue investigation was to:

- Collect fish from five sampling reaches located on the Tennessee River upstream, adjacent, 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 and May 2019, when fish were reproductively mature. TVA performed fish collections and fish tissue processing activities based on guidance and specifications listed in TVA's Technical Instructions (TIs), 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 five sampling reaches located on the Tennessee River, including one reach upstream of the CCR units, three reaches adjacent to the CCR units, and one reach 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 13 field duplicates and 14 equipment blanks
- Shipped fish tissue samples via commercial courier service to Pace Analytical for analysis.

Details on each activity are presented in the sections below.

3.1 SAMPLING LOCATIONS

Five sampling reaches were selected for the collection of fish and associated fish tissues. The sampling reaches and the TDEC Order CCR units at the JOF Plant (Active Ash Pond 2, Ash Pond Disposal Area 1, DuPont Road Dredge Cell, and South Rail Loop Area 4) are shown on Exhibit A.1 in Appendix A. Tables B.1 and B.2, in Appendix B, provide a summary of the sampling reaches and the fish tissue samples collected, respectively.

Three sampling reaches were located adjacent to Active Ash Pond 2. The first reach, TRA, was located to the west of Active Ash Pond 2 on the mainstream of the Tennessee River and extended approximately one river mile (Tennessee River Mile (TRM) 99.3 to 100.3). The second reach, BH, was located east of Active Ash Pond 2 in what is known as the Boat Harbor and was approximately 0.9 miles in length. The third reach, IC, also was located east of Active Ash Pond 2 in what is known as the Intake Channel, and it extended approximately 0.4 miles in length.

The downstream-most sampling reach on the Tennessee River, TRD, extended approximately 2.2 river miles (TRMs 94.6 to 96.8) and originated approximately 2.5 river miles downstream from Active Ash Pond 2. The upstream reference reach, TRU (TRM 102.2 to 104.5), originated approximately 2 river miles upstream from the JOF Plant CCR units and extended upstream approximately 2.3 river miles.

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, QAPP, or SOPs 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, Chattanooga, Tennessee.

3.2.1.3 Analytical Laboratory Chain-of-Custody

TVA personnel completed Analytical Laboratory *COCs*, listing each fish tissue sample. The sample identification (ID), sample location, type of sample, sample date and time, analysis requested, and the sample custody record were recorded on the *COCs*. The Fish Tissue Investigation Lead reviewed the *COCs* for completeness, and a QC check of samples in each cooler compared to sample IDs on the corresponding *COC* was conducted. *COCs* were completed in general accordance with *ENV-TI-05.80.02: Sample Labeling and Custody*.

3.2.1.4 Weekly Balance Check

Balances used to weigh fish and resected fish tissues were checked weekly for accuracy using check weights.

3.3 SAMPLING METHODS

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

3.3.1 Fish Collection

Fish collection occurred during April and May 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 JOF Plant.

As specified in the SAP, five species of fish representing different trophic levels were selected for analysis, including four species of gamefish — largemouth bass, *Micropterus salmoides* (top carnivore), bluegill, *Lepomis macrochirus* (invertivore), redear sunfish, *Lepomis microlophus* (bottom feeding invertivore), and channel catfish, *Ictalurus punctatus* (bottom feeding omnivore) — and one species of forage fish — gizzard shad, *Dorosoma cepedianum* (planktivore).

Fish were collected using boat electrofishing (TVA-KIF-SOP-33, *Standard Operating Procedure for: Fish Sampling Using Boat-Mounted Electroshocker*). Electroshocking produced sufficient numbers of fish to meet investigation objectives without using gill nets. Fish species targeted for analysis were retained in aerated live wells until completion of a sampling effort within a sampling reach. At the completion of a sampling effort, fish were sorted based on species, size (total length), and a visual assessment of female egg development stage. Fish retained for further evaluation were double-bagged separately by species and sample reach. Bags containing fish were labeled with facility name, site ID, date of collection, and collector's initials and placed in coolers with wet ice; ensuring ice completely covered the fish. Fish were stored in separate coolers for each sampling reach and two custody seals were applied to each cooler. Field sampling personnel wore new, clean nitrile gloves when handling fish.

TVA personnel transported whole fish from the field to the TVA Chickamauga Power Service, 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 with the exception of a few fish which exceeded the targeted hold time by 45 minutes or less. Individual fish received for processing were inspected carefully to ensure that they were not compromised in any way (i.e., mutilated by the collection gear or not properly preserved during shipment). Fish also were observed for abnormalities, such as scoliosis, blind eye, parasites, fungus, or lesions and the abnormalities recorded. Table B.3, in Appendix B, provides the measurements and observations made on each fish during processing.

Gamefish were processed into muscle (skinless, boneless fillet), ovary, and liver tissues, and the tissues were combined to form six-fish composite samples for each tissue type by species and sampling reach. Total length, weight, and sex were recorded for each fish, and the weight of each resected tissue was recorded. Personnel wore new, clean nitrile gloves when handling and processing fish. Fish were rinsed with deionized (DI) water prior to tissue resection and each resected tissue was rinsed with DI water prior to being placed in a labeled plastic bag and frozen. Tissue samples were maintained at or below -20°C in secure freezers at the TVA Chickamauga Power Service Center.

Each gamefish produced two fillet samples, a right and left fillet. Female fish with mature ovaries produced two ovary samples. Livers from largemouth bass and channel catfish were proportioned into two samples. Due to limited mass, livers from bluegill and redear sunfish were retained whole, producing one sample from each fish. One fillet, ovary, and liver sample from each fish was allocated to a composite sample for analytical analysis. Remaining fillet, ovary, and liver tissues were retained as individual samples and archived frozen for potential future analysis, if needed.

Whole fish composite samples of nine to 18 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, one co-located sample was collected from each sampling reach that comprised an additional six-fish composite 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.*

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% of the total length of the largest individual
- Were consistent with EPA guidance (EPA 2000) that the same number of gamefish were used in each composite sample
- Individuals of the same species were collected as close to the same time as possible.

Fish tissue samples were analyzed for the following CCR-related constituents, hereafter referred to collectively as “CCR Parameters” for the fish tissue investigation:

- Boron and calcium from Title 40 of the Code of Federal Regulations (CFR) Part 257 (40 CFR 257) Appendix III
- 40 CFR 257 Appendix IV Constituents, excluding radium and fluoride
- Five inorganic constituents from Appendix I of TN Rule 0400-11-.04: copper, nickel, silver, vanadium, and zinc
- Strontium
- Percent moisture.

The five inorganic constituents listed in Appendix I of Tennessee Rule 0400-11-01-.04 and not included in the 40 CFR 257 Appendices III and IV were analyzed to maintain continuity with other TDEC environmental programs. As specified in the SAP, the fish tissue analysis did not include dissolved oxygen, chloride, fluoride, pH, sulfate, or total dissolved solids (which are on the federal CCR Appendices III and IV constituents lists) because those constituents are not relevant to analyses of animal tissues.

3.3.3 Equipment Decontamination Procedures

Decontamination was performed for fish tissue sampling and processing equipment in accordance with TVA TI ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination* and EPA *Guidance for Assessing Chemical Contaminants Data for Use in Fish Advisories* (EPA 2000).

Prior to field mobilizations, dip nets used to retrieve fish during boat electrofishing were washed in a Liquinox™ 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
- 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 JOF Plant-specific waste management plan, and local, state, and federal regulations. Fish remains were frozen and disposed of in a general trash dumpster at the TVA Chickamauga Power Service Center. Used disposable PPE (e.g., nitrile gloves) and general trash generated throughout the day were stored in garbage bags and disposed of in a general trash dumpster onsite or at another TVA facility.

3.5 SAMPLE SHIPMENT

Samples were packed, transported, and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. Samples were shipped overnight on dry ice via a commercial courier to Pace Analytical, Green Bay, Wisconsin. Pace Analytical submitted sample receipt confirmation forms to EnvStds for review and confirmation.

3.6 VARIATIONS

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

3.6.1 Variations in Scope

No variations in scope were documented during field activities.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- Tissues from eight fish were not resected and frozen within 48 hours of fish collection as specified in the SAP. These fish exceeded the recommended hold time by 45 minutes or less. However, fish were collected using electrofishing and stored on ice from the time of field collection to

sample preparation, and arrived for processing in good condition, with no indication of spoilage or decomposition that might affect the tissue analyses. Consequently, these minimal exceedances of the SAP-specified holding time would not be expected to adversely affect the analytical results.

- The duplicate sample of gizzard shad collected from the Boat Harbor (JOF-FH-SH-WF-DUP01-20190423) consisted of nine fish instead of the 10 to 20 individuals proposed in the SAP.
- Four of six bluegill liver composites consisted of 6.1 to 6.8 grams of tissue instead of the eight grams specified in the SAP. However, six grams of tissue is sufficient to allow analysis of the CCR Parameters and percent moisture. As detailed in the sections above, due to limited mass, livers from bluegill were retained whole and allocated to a composite sample submitted for analysis. Additionally, using the selection criteria presented in Section 3.3.2 in conjunction with the preference for collecting females with developed eggs, the composited tissue samples were limited to six fish.
- The Field Biota *COC* for fish collected on 5/29/2019 was misplaced. However, these fish were not submitted for analytical analysis.
- 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 30 equipment blanks were collected during 11 of the 14 days that fish from the JOF 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 at the JOF Plant. The scope of work during this investigation included collecting five targeted species of fish from each of five 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 and May 2019, and the fish tissue samples were shipped to the analytical laboratory in August 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 JOF Plant in New Johnsonville, 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 Johnsonville Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 3. December 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Fish Tissue Sampling and Analysis Plan (SAP), Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec. 2018b. *Environmental Investigation Plan, Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Tennessee Department of Environment and Conservation. 2015. *Commissioner's Order No. OGC15-0177.*

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

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

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

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

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

TVA, TVA-KIF-SOP-33, *Standard Operating Procedure for: Fish Sampling Using Boat-Mounted Electroshocker*.

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 - EXHIBITS

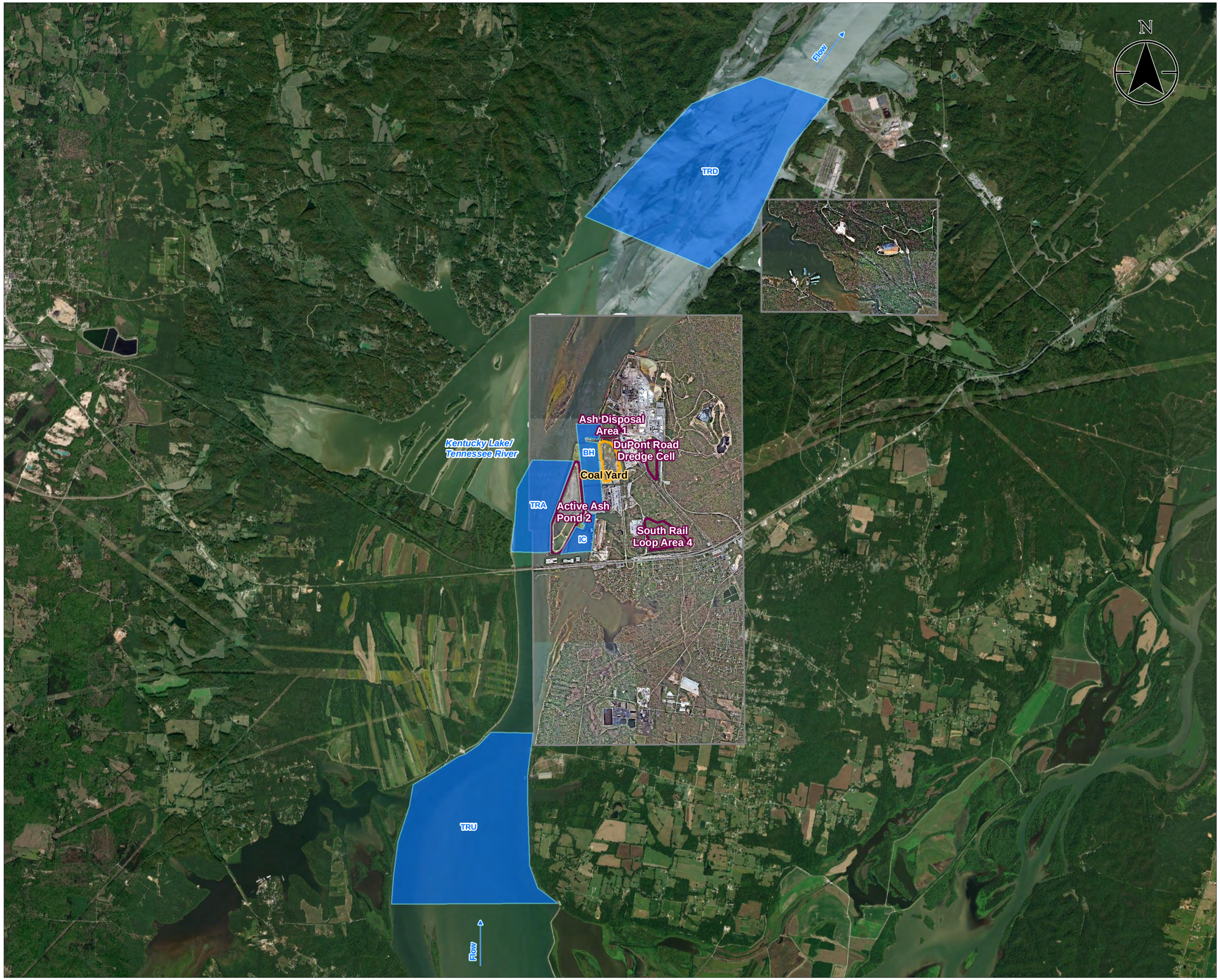


Exhibit No.

A.1

Title

Fish Tissue Sampling Reaches

Client/Project

Tennessee Valley Authority
Johnsonville Fossil Plant (JOF) TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2021-04-15
Technical Review by JS on 2021-04-15

0 2,500 5,000 7,500 10,000 Feet

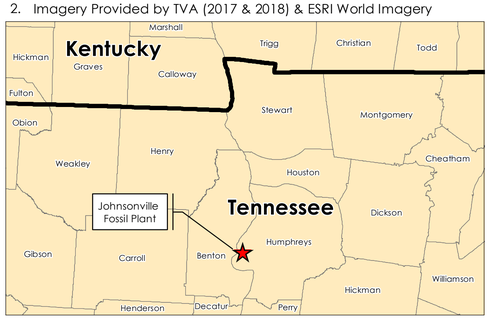
1:30,000 (At original document size of 22x34)

Legend

- Fish Sample Location
  - TRU – Tennessee River Upstream
  - TRA – Tennessee River Adjacent
  - TRD – Tennessee River Downstream
  - IC – Intake Channel
  - BH – Boat Harbor
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery



Stantec TVA

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APPENDIX B - TABLES

TABLE B.1 – Fish Tissue Sampling Reaches
Johnsonville Fossil Plant

Sampling Reach ID	Sampling Reach Name[1]	Sampling Reach Location[2]			
		Approximate River Miles (extent)		Latitude	Longitude
TRU	Tennessee River Upstream	TRM 104.5 – 102.2 (2.3)	Upstream	35.968068	-88.005683
			Downstream	35.993332	-88.002785
TRA	Tennessee River Adjacent	TRM 100.3 – 99.3 (1.0)	Upstream	36.019968	-88.000325
			Downstream	36.033569	-87.997085
TRD	Tennessee River Downstream	TRM 96.8 – 94.6 (2.2)	Upstream	36.065467	-87.979023
			Downstream	36.089419	-87.955018
IC	Intake Channel (adjacent)	n/a (0.4)	Upstream	36.020139	-87.991695
			Downstream	36.025828	-87.989523
BH	Boat Harbor (adjacent)	n/a (0.9)	Upstream	36.026483	-87.989298
			Downstream	36.039090	-87.990590

Notes:

ID	Identification
n/a	not applicable
TRM	Tennessee River Mile

1. Upstream, Adjacent, and Downstream of the Johnsonville Fossil Plant
2. The coordinates provide the approximate upstream to downstream extent of each sampling reach presented on Exhibit A.1 in Appendix A.

TABLE B.2 – Summary of Fish Tissue Samples
Johnsonville Fossil Plant
April and May 2019

Sampling Reach	Fish Species	Sample ID (Fillet)[1]	Sample Type[2]	Number of Fish: Sex: Male	Number of Fish: Sex: Female	Number of Fish: Tissue Composite: Fillet	Number of Fish: Tissue Composite: Liver	Number of Fish: Tissue Composite: Ovary	Number of Fish: Tissue Composite: Whole Fish	Length (mm): Min	Length (mm): Max	Collection Date Range: Initial	Collection Date Range: Final	Analysis Type: Total Metals	Analysis Type: Total Mercury	Analysis Type: % Moisture
Tennessee River Upstream (TRU)	Bluegill	JOF-FH-BG-TRU-F-20190501	N	–	6	6	6	6	--	142	171	5/1/2019	5/15/2019	x	x	x
	Channel Catfish	JOF-FH-CC-TRU-F-20190501	N	–	6	6	6	6	--	444	533	5/1/2019	5/15/2019	x	x	x
	Largemouth Bass	JOF-FH-LB-TRU-F-20190410	N	–	6	6	6	6	--	395	479	4/10/2019	4/24/2019	x	x	x
	Redear Sunfish	JOF-FH-RS-TRU-F-20190501	N	–	6	6	6	6	--	190	232	5/1/2019	5/1/2019	x	x	x
	Redear Sunfish	JOF-FH-RS-F-DUP02-20190501	FD	–	6	6	6	6	--	203	239	5/1/2019	5/1/2019	x	x	x
	Gizzard Shad	JOF-FH-SH-TRU-WF-20190424	N	–	–	--	--	--	17	180	215	4/24/2019	4/24/2019	x	x	x
Tennessee River Adjacent (TRA)	Bluegill	JOF-FH-BG-TRA-F-20190514	N	–	6	6	6	6	--	133	160	5/14/2019	5/23/2019	x	x	x
	Channel Catfish	JOF-FH-CC-TRA-F-20190410	N	–	6	6	6	6	--	416	501	4/10/2019	4/25/2019	x	x	x
	Channel Catfish	JOF-FH-CC-F-DUP01-20190425	FD	–	6	6	6	6	--	429	515	4/25/2019	5/14/2019	x	x	x
	Largemouth Bass	JOF-FH-LB-TRA-F-20190411	N	–	6	6	6	6	--	420	498	4/11/2019	5/8/2019	x	x	x
	Redear Sunfish	JOF-FH-RS-TRA-F-20190501	N	–	6	6	6	6	--	223	271	5/1/2019	5/1/2019	x	x	x
	Gizzard Shad	JOF-FH-SH-TRA-WF-20190425	N	–	–	--	--	--	12	180	210	4/25/2019	4/25/2019	x	x	x
Tennessee River Downstream (TRD)	Bluegill	JOF-FH-BG-TRD-F-20190502	N	–	6	6	6	6	--	138	174	5/2/2019	5/16/2019	x	x	x
	Bluegill	JOF-FH-BG-F-DUP01-20190502	FD	–	6	6	6	6	--	133	167	5/2/2019	5/16/2019	x	x	x
	Channel Catfish	JOF-FH-CC-TRD-F-20190507	N	–	6	6	6	6	--	472	534	5/7/2019	5/23/2019	x	x	x
	Largemouth Bass	JOF-FH-LB-TRD-F-20190410	N	–	6	6	6	6	--	391	470	4/10/2019	4/23/2019	x	x	x
	Redear Sunfish	JOF-FH-RS-TRD-F-20190430	N	–	6	6	6	6	--	211	270	4/30/2019	5/7/2019	x	x	x
	Gizzard Shad	JOF-FH-SH-TRD-WF-20190423	N	–	–	--	--	--	18	190	215	4/23/2019	4/23/2019	x	x	x
Intake Channel (IC)	Bluegill	JOF-FH-BG-IC-F-20190502	N	–	6	6	6	6	--	136	158	5/2/2019	5/23/2019	x	x	x
	Channel Catfish	JOF-FH-CC-IC-F-20190507	N	–	6	6	6	6	--	494	545	5/7/2019	5/23/2019	x	x	x
	Largemouth Bass	JOF-FH-LB-IC-F-20190410	N	–	6	6	6	6	--	402	495	4/10/2019	4/17/2019	x	x	x
	Redear Sunfish	JOF-FH-RS-IC-F-20190425	N	–	6	6	6	6	--	217	254	4/25/2019	5/15/2019	x	x	x
	Redear Sunfish	JOF-FH-RS-F-DUP01-20190507	FD	–	6	6	6	6	--	195	243	5/7/2019	5/15/2019	x	x	x
	Gizzard Shad	JOF-FH-SH-IC-WF-20190425	N	–	–	--	--	--	15	190	225	4/25/2019	5/15/2019	x	x	x
Boat Harbor (BH)	Bluegill	JOF-FH-BG-BH-F-20190514	N	–	6	6	6	6	--	130	164	5/14/2019	5/23/2019	x	x	x
	Channel Catfish	JOF-FH-CC-BH-F-20190410	N	–	6	6	6	6	--	428	510	4/10/2019	4/25/2019	x	x	x
	Largemouth Bass	JOF-FH-LB-BH-F-20190410	N	–	6	6	6	6	--	395	472	4/10/2019	4/25/2019	x	x	x
	Redear Sunfish	JOF-FH-RS-BH-F-20190502	N	–	6	6	6	6	--	215	255	5/2/2019	5/14/2019	x	x	x
	Gizzard Shad	JOF-FH-SH-BH-WF-20190423	N	–	–	--	--	--	10	180	230	4/23/2019	5/7/2019	x	x	x
	Gizzard Shad	JOF-FH-SH-WF-DUP01-20190423	FD	–	–	--	--	--	9	180	230	4/23/2019	5/7/2019	x	x	x

Notes:

Total Metals	SW-846 Method 6020A
Total Mercury	SW-846 Method 7473
% Moisture	ASTM D2974-87
–	measurement or observation not applicable
mm	millimeter

1. The Sample IDs presented in the table are for fillet (-F-) and whole fish (-WF-) samples. Fillet, ovary, and liver tissue samples were generated for bluegill, channel catfish, largemouth bass, and redear sunfish. Whole fish samples were generated for shad.

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

   Sample Naming Convention for Duplicate Samples: Plant Acronym - Matrix Acronym - Species Acronym - Tissue Identifier - Duplicate Number - yyyymmdd

   Species Acronym: BG=Bluegill, CC=Channel Catfish, LB=Largemouth Bass, RS=Redear Sunfish, SH=Shad

   Tissue Identifier: F=Fillet, O=Ovary, L=Liver, WF=Whole Fish

   Sample date (yyyymmdd) is the earliest collection date among the fish contributing to a composite.

2. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate

TABLE B.3 – Fish Measurements and Observations
Johnsonville Fossil Plant
April and May 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)	Anomaly
Tennessee River Upstream (TRU)	Bluegill	JOF-FH-BG-TRU-F-20190501 JOF-FH-BG-TRU-O-20190501 JOF-FH-BG-TRU-L-20190501	5/1/2019	170	103.8	F	16.0	17.1	6.2	7.3	13.5	1.2	–	1.2	none
			5/8/2019	168	120.6	F	19.4	18.3	8.5	5.8	14.3	1.2	–	1.2	none
			5/8/2019	171	87.6	F	11.1	11.1	3.8	2.9	6.7	0.8	–	0.8	none
			5/8/2019	148	66.3	F	8.9	9.8	3.8	3.8	7.6	0.6	–	0.6	none
			5/15/2019	170	126.4	F	14.9	15.9	7.9	7.1	15.0	1.3	–	1.3	none
			5/15/2019	142	68.3	F	11.5	11.9	2.7	1.7	4.4	1.7	–	1.7	none
Tennessee River Adjacent (TRA)	Bluegill	JOF-FH-BG-TRA-F-20190514 JOF-FH-BG-TRA-O-20190514 JOF-FH-BG-TRA-L-20190514	5/14/2019	133	53.7	F	6.6	6.9	2.4	1.8	4.2	1.1	–	1.1	none
			5/14/2019	147	77.5	F	12.5	9.5	3.6	3.5	7.1	0.9	–	0.9	none
			5/14/2019	160	88.4	F	12.9	13.5	2.7	1.9	4.6	1.3	–	1.3	none
			5/14/2019	160	88.9	F	13.7	13.5	1.7	1.4	3.1	1.5	–	1.5	none
			5/14/2019	134	48.7	F	7.6	7.4	1.3	0.8	2.1	0.6	–	0.6	none
			5/23/2019	134	54.4	F	8.5	8.2	1.6	1.4	3.0	0.7	–	0.7	none
Tennessee River Downstream (TRD)	Bluegill	JOF-FH-BG-TRD-F-20190502 JOF-FH-BG-TRD-O-20190502 JOF-FH-BG-TRD-L-20190502	5/2/2019	174	118.2	F	18.0	19.6	4.3	3.7	8.0	1.0	–	1.0	none
			5/2/2019	158	94.7	F	14.4	13.4	3.2	3.7	6.9	2.1	–	2.1	none
			5/2/2019	158	79.9	F	11.9	12.0	3.6	3.3	6.9	1.2	–	1.2	none
			5/7/2019	160	94.1	F	16.3	15.0	2.7	2.0	4.7	2.5	–	2.5	none
			5/7/2019	144	71.8	F	11.5	12.0	3.4	2.8	6.2	0.9	–	0.9	none
			5/16/2019	138	53.8	F	7.4	7.8	2.4	2.0	4.4	1.2	–	1.2	none
		JOF-FH-BG-F-DUP01-20190502 JOF-FH-BG-O-DUP01-20190502 JOF-FH-BG-L-DUP01-20190502	5/2/2019	167	95.8	F	11.8	12.6	4.2	2.3	6.5	1.3	–	1.3	none
			5/2/2019	159	82.8	F	11.3	11.1	3.0	3.6	6.6	1.4	–	1.4	none
			5/2/2019	153	82.8	F	12.8	13.5	5.2	4.2	9.4	1.2	–	1.2	none
			5/7/2019	163	90.3	F	13.9	16.6	2.8	1.9	4.7	2.2	–	2.2	none
			5/16/2019	155	76.5	F	11.5	11.4	4.1	2.8	6.9	1.1	–	1.1	none
			5/16/2019	133	46.0	F	6.9	7.1	1.6	1.4	3.0	0.8	–	0.8	none
Intake Channel (IC)	Bluegill	JOF-FH-BG-IC-F-20190502 JOF-FH-BG-IC-O-20190502 JOF-FH-BG-IC-L-20190502	5/2/2019	136	51.3	F	7.2	7.1	2.6	1.5	4.1	1.0	–	1.0	none
			5/8/2019	158	81.6	F	12.1	11.3	5.2	5.1	10.3	0.9	–	0.9	none
			5/8/2019	156	75.2	F	11.9	12.5	3.1	3.5	6.6	1.1	–	1.1	none
			5/14/2019	141	52.4	F	7.4	6.9	2.7	1.3	4.0	1.1	–	1.1	none
			5/16/2019	158	81.5	F	11.4	11.1	5.7	3.6	9.3	0.9	–	0.9	none
			5/23/2019	146	63.2	F	9.8	9.8	1.9	2.0	3.9	1.4	–	1.4	none
Boat Harbor (BH)	Bluegill	JOF-FH-BG-BH-F-20190514 JOF-FH-BG-BH-O-20190514 JOF-FH-BG-BH-L-20190514	5/14/2019	164	107.4	F	18.4	16.9	6.4	6.1	12.5	1.3	–	1.3	none
			5/14/2019	145	57.9	F	8.7	7.7	1.9	1.5	3.4	0.6	–	0.6	none
			5/14/2019	131	43.8	F	7.3	7.2	1.5	1.0	2.5	0.9	–	0.9	none
			5/23/2019	158	91.2	F	13.0	13.8	3.0	2.5	5.5	2.2	–	2.2	none
			5/23/2019	143	62.3	F	9.4	9.4	1.7	1.5	3.2	0.9	–	0.9	none
			5/23/2019	130	44.4	F	6.8	7.2	1.7	2.2	3.9	0.4	–	0.4	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Johnsonville Fossil Plant
April and May 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)	Anomaly
Tennessee River Upstream (TRU)	Channel Catfish	JOF-FH-CC-TRU-F-20190501 JOF-FH-CC-TRU-O-20190501 JOF-FH-CC-TRU-L-20190501	5/1/2019	500	1362	F	276.4	291.2	42.0	55.8	97.8	8.9	11.6	20.5	none
			5/1/2019	533	1776	F	266.3	257.3	75.9	77.4	153.3	24.0	16.7	40.7	none
			5/1/2019	451	944	F	151.8	151.4	65.6	60.8	126.4	7.1	8.5	15.6	none
			5/8/2019	444	976	F	159.8	146.1	57.5	48.8	106.3	7.9	5.6	13.5	none
			5/15/2019	471	996	F	156.5	141.1	64.9	62.0	126.9	9.5	6.3	15.8	none
			5/15/2019	458	980	F	162.7	157.7	79.2	77.2	156.4	8.6	7.3	15.9	none
Tennessee River Adjacent (TRA)	Channel Catfish	JOF-FH-CC-TRA-F-20190410 JOF-FH-CC-TRA-O-20190410 JOF-FH-CC-TRA-L-20190410	4/10/2019	482	1090	F	197.4	197.6	40.2	36.1	76.3	12.3	13.3	25.6	none
			4/17/2019	501	1328	F	222.6	233.0	70.6	78.7	149.3	9.7	9.8	19.5	none
			4/25/2019	444	1008	F	177.1	162.8	80.9	81.6	162.5	8.6	7.6	16.2	none
			4/25/2019	466	1128	F	194.4	208.6	49.4	53.1	102.5	10.5	10.1	20.6	none
			4/25/2019	458	1078	F	206.2	206.9	37.8	32.7	70.5	6.8	9.0	15.8	none
			4/25/2019	416	824	F	154.8	148.4	34.4	31.1	65.5	5.8	6.3	12.1	none
		JOF-FH-CC-F-DUP01-20190425 JOF-FH-CC-O-DUP01-20190425 JOF-FH-CC-L-DUP01-20190425	4/25/2019	515	1398	F	234.4	232.6	48.6	49.5	98.1	10.1	14.1	24.2	none
			4/25/2019	473	1102	F	229.0	223.1	41.6	39.0	80.6	10.1	7.5	17.6	none
			4/25/2019	429	824	F	166.3	164.4	38.6	42.0	80.6	5.6	5.8	11.4	none
			5/1/2019	466	1054	F	172.4	174.8	54.9	56.8	111.7	9.4	9.5	18.9	none
			5/14/2019	514	1416	F	222.5	206.9	121.3	113.2	234.5	8.5	8.4	16.9	none
			5/14/2019	503	1516	F	272.0	275.9	47.8	47.6	95.4	12.1	11.5	23.6	none
Tennessee River Downstream (TRD)	Channel Catfish	JOF-FH-CC-TRD-F-20190507 JOF-FH-CC-TRD-O-20190507 JOF-FH-CC-TRD-L-20190507	5/7/2019	506	1464	F	208.3	226.0	108.4	96.4	204.8	13.8	13.5	27.3	none
			5/7/2019	472	1136	F	192.3	188.3	62.6	58.3	120.9	8.8	7.9	16.7	none
			5/14/2019	489	1282	F	189.4	197.0	88.2	75.7	163.9	10.8	9.8	20.6	none
			5/14/2019	497	1324	F	235.7	227.8	59.3	66.8	126.1	13.2	10.4	23.6	none
			5/23/2019	505	1330	F	273.5	251.0	38.1	36.8	74.9	9.5	9.3	18.8	none
			5/23/2019	534	1762	F	350.2	338.9	43.7	45.1	88.8	12.7	11.5	24.2	none
Intake Channel (IC)	Channel Catfish	JOF-FH-CC-IC-F-20190507 JOF-FH-CC-IC-O-20190507 JOF-FH-CC-IC-L-20190507	5/7/2019	515	1448	F	218.2	213.3	86.9	84.3	171.2	14.2	9.1	23.3	none
			5/14/2019	535	1830	F	345.2	319.1	97.9	92.6	190.5	13.4	12.7	26.1	none
			5/14/2019	545	2058	F	304.1	299.7	137.1	137.8	274.9	15.7	11.8	27.5	none
			5/23/2019	507	1500	F	232.7	241.0	116.4	132.2	248.6	7.2	10.0	17.2	none
			5/23/2019	509	1398	F	223.0	241.2	100.1	98.6	198.7	11.6	9.1	20.7	none
			5/23/2019	494	1254	F	217.8	214.6	76.3	61.6	137.9	8.2	7.3	15.5	none
Boat Harbor (BH)	Channel Catfish	JOF-FH-CC-BH-F-20190410 JOF-FH-CC-BH-O-20190410 JOF-FH-CC-BH-L-20190410	4/10/2019	471	1042	F	190	187.2	47.3	50.3	97.6	7.8	11.2	19.0	none
			4/16/2019	470	1030	F	155.7	166.9	56.2	50.4	106.6	8.7	9.8	18.5	none
			4/16/2019	510	1584	F	285.5	274.6	74.9	87.3	162.2	12.9	15.8	28.7	none
			4/25/2019	440	852	F	141.9	151.0	43.8	38.2	82.0	7.1	6.7	13.8	none
			4/25/2019	441	820	F	115.9	118.5	39.9	43.2	83.1	7.8	6.4	14.2	none
			4/25/2019	428	794	F	135.7	133.3	52.6	48.1	100.7	6.4	6.8	13.2	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Johnsonville Fossil Plant
April and May 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)	Anomaly
Tennessee River Upstream (TRU)	Largemouth Bass	JOF-FH-LB-TRU-F-20190410 JOF-FH-LB-TRU-O-20190410 JOF-FH-LB-TRU-L-20190410	4/10/2019	395	926	F	163.5	153.6	21.6	17.3	38.9	6.8	5.7	12.5	none
			4/17/2019	464	1626	F	267.3	246.9	41.4	38.8	80.2	16.8	18.4	35.2	none
			4/17/2019	420	1218	F	225.2	227.4	34.3	26.5	60.8	10.1	8.6	18.7	none
			4/24/2019	408	996	F	129.3	136.3	27.0	28.4	55.4	8.0	9.7	17.7	none
			4/24/2019	449	1252	F	190.1	178.9	21.7	22.9	44.6	11.2	11.3	22.5	none
			4/24/2019	479	1774	F	278.3	281.8	48.5	40.0	88.5	10.5	6.7	17.2	none
Tennessee River Adjacent (TRA)	Largemouth Bass	JOF-FH-LB-TRA-F-20190411 JOF-FH-LB-TRA-O-20190411 JOF-FH-LB-TRA-L-20190411	4/11/2019	420	1166	F	198.8	197.6	35.7	32.3	68.0	12.7	11.5	24.2	none
			4/11/2019	444	1156	F	191.4	188.8	21.7	19.5	41.2	7.6	8.2	15.8	none
			4/17/2019	428	1278	F	230.8	217.3	35.0	29.2	64.2	9.8	8.4	18.2	none
			5/1/2019	460	1380	F	235.7	237.5	16.4	17.9	34.3	6.4	4.0	10.4	none
			5/8/2019	498	1750	F	314.7	307.5	27.2	25.6	52.8	9.6	10.3	19.9	none
			5/8/2019	436	1188	F	183.1	177.6	18.2	15.8	34.0	9.9	9.7	19.6	none
Tennessee River Downstream (TRD)	Largemouth Bass	JOF-FH-LB-TRD-F-20190410 JOF-FH-LB-TRD-O-20190410 JOF-FH-LB-TRD-L-20190410	4/10/2019	420	1124	F	200.2	195.4	30.5	33.2	63.7	12.8	10.5	23.3	none
			4/10/2019	455	1534	F	285.2	283.7	37.3	34.5	71.8	12.8	8.1	20.9	none
			4/10/2019	430	1196	F	210.2	201.4	20.3	20.0	40.3	7.3	11.4	18.7	none
			4/16/2019	391	1114	F	176.7	184.3	29.4	27.3	56.7	8.7	7.1	15.8	none
			4/23/2019	445	1648	F	280.6	281.4	36.0	30.5	66.5	7.1	9.6	16.7	none
			4/23/2019	470	1428	F	251.1	249.5	27.1	24.4	51.5	8.8	5.9	14.7	none
Intake Channel (IC)	Largemouth Bass	JOF-FH-LB-IC-F-20190410 JOF-FH-LB-IC-O-20190410 JOF-FH-LB-IC-L-20190410	4/10/2019	457	1720	F	303.1	283.6	43.1	42.0	85.1	15.1	14.9	30.0	none
			4/10/2019	402	1182	F	216.2	207.3	28.9	31.4	60.3	7.0	10.2	17.2	none
			4/11/2019	422	1014	F	155.7	153.4	22.2	25.1	47.3	8.9	6.2	15.1	none
			4/16/2019	495	2076	F	342.9	317.0	48.5	51.5	100.0	12.5	15.6	28.1	none
			4/17/2019	470	1886	F	316.0	313.4	58.0	54.7	112.7	12.0	13.1	25.1	none
			4/17/2019	435	1354	F	211.9	206.2	34.5	32.2	66.7	9.5	6.7	16.2	none
Boat Harbor (BH)	Largemouth Bass	JOF-FH-LB-BH-F-20190410 JOF-FH-LB-BH-O-20190410 JOF-FH-LB-BH-L-20190410	4/10/2019	440	962	F	157.0	151.6	53.1	60.4	113.5	8.7	8.7	17.4	Skinny
			4/11/2019	455	1706	F	311.5	307.3	35.1	32.8	67.9	13.9	10.0	23.9	none
			4/16/2019	472	1886	F	342.0	335.1	52.3	45.7	98.0	12.9	14.8	27.7	none
			4/16/2019	461	1546	F	256.3	252.8	33.4	29.4	62.8	13.6	12.3	25.9	none
			4/23/2019	442	1352	F	253.5	256.6	24.7	23.2	47.9	8.5	9.0	17.5	none
			4/25/2019	395	920	F	156.5	151.4	24.9	24.6	49.5	8.7	7.5	16.2	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Johnsonville Fossil Plant
April and May 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)	Anomaly
Tennessee River Upstream (TRU)	Redear Sunfish	JOF-FH-RS-TRU-F-20190501 JOF-FH-RS-TRU-O-20190501 JOF-FH-RS-TRU-L-20190501	5/1/2019	232	250.4	F	36.2	37.5	10.1	10.1	20.2	3.3	–	3.3	none
			5/1/2019	222	238.2	F	36.3	35.3	10.4	8.9	19.3	3.7	–	3.7	none
			5/1/2019	190	140.8	F	22.3	20.8	7.3	5.4	12.7	1.9	–	1.9	none
			5/1/2019	232	278.7	F	37.8	33.1	18.0	18.4	36.4	3.2	–	3.2	none
			5/1/2019	227	254.7	F	40.8	42.6	14.2	9.6	23.8	3.9	–	3.9	none
			5/1/2019	220	241.1	F	32.0	34.9	9.8	14.0	23.8	3.6	–	3.6	none
		JOF-FH-RS-F-DUP02-20190501 JOF-FH-RS-O-DUP02-20190501 JOF-FH-RS-L-DUP02-20190501	5/1/2019	230	275.0	F	38.5	41.0	11.9	10.5	22.4	4.3	–	4.3	none
			5/1/2019	239	275.5	F	38.6	40.3	12.3	9.6	21.9	4.1	–	4.1	none
			5/1/2019	212	187.5	F	31.3	30.0	7.1	8.9	16.0	3.0	–	3.0	none
			5/1/2019	238	289.8	F	43.4	43.0	14.0	19.2	33.2	3.8	–	3.8	none
			5/1/2019	210	194.9	F	28.0	28.9	12.5	10.9	23.4	2.7	–	2.7	none
			5/1/2019	203	177.6	F	32.3	29.6	10.4	8.2	18.6	2.3	–	2.3	none
Tennessee River Adjacent (TRA)	Redear Sunfish	JOF-FH-RS-TRA-F-20190501 JOF-FH-RS-TRA-O-20190501 JOF-FH-RS-TRA-L-20190501	5/1/2019	236	273.5	F	40.1	40.0	16.5	10.7	27.2	3.2	–	3.2	none
			5/1/2019	232	243.4	F	34.4	32.0	15.6	16.8	32.4	3.3	–	3.3	none
			5/1/2019	223	266.3	F	38.9	36.6	24.6	13.1	37.7	3.9	–	3.9	none
			5/1/2019	246	329.0	F	48.3	49.2	29.2	18.0	47.2	4.1	–	4.1	none
			5/1/2019	271	413.5	F	61.8	57.0	20.3	16.9	37.2	4.2	–	4.2	none
			5/1/2019	266	429.7	F	67.3	70.4	21.0	17.4	38.4	5.9	–	5.9	none
Tennessee River Downstream (TRD)	Redear Sunfish	JOF-FH-RS-TRD-F-20190430 JOF-FH-RS-TRD-O-20190430 JOF-FH-RS-TRD-L-20190430	4/30/2019	255	370.5	F	50.0	52.3	17.1	14.0	31.1	4.8	–	4.8	none
			4/30/2019	270	462.5	F	70.2	69.2	33.3	22.5	55.8	5.9	–	5.9	none
			5/2/2019	255	320.5	F	40.9	40.6	13.9	12.7	26.6	3.2	–	3.2	none
			5/7/2019	258	362.1	F	53.9	57.2	18.4	12.7	31.1	5.2	–	5.2	none
			5/7/2019	267	389.7	F	45.9	49.5	18.0	16.6	34.6	5.5	–	5.5	none
			5/7/2019	211	210.9	F	23.2	24.0	12.7	10.9	23.6	3.0	–	3.0	none
Intake Channel (IC)	Redear Sunfish	JOF-FH-RS-IC-F-20190425 JOF-FH-RS-IC-O-20190425 JOF-FH-RS-IC-L-20190425	4/25/2019	251	372.0	F	63.9	61.8	17.6	14.6	32.2	5.0	–	5.0	none
			5/7/2019	245	296.7	F	36.8	36.5	19.1	14.5	33.6	3.7	–	3.7	none
			5/7/2019	230	239.0	F	30.4	32.0	9.2	6.9	16.1	2.3	–	2.3	none
			5/7/2019	227	250.1	F	37.8	37.4	13.1	10.7	23.8	3.3	–	3.3	none
			5/14/2019	217	228.2	F	33.0	32.4	10.7	8.9	19.6	2.7	–	2.7	none
			5/15/2019	254	353.0	F	51.9	47.2	26.1	14.4	40.5	4.3	–	4.3	none
		JOF-FH-RS-F-DUP01-20190507 JOF-FH-RS-O-DUP01-20190507 JOF-FH-RS-L-DUP01-20190507	5/7/2019	235	273.7	F	34.3	37.0	7.0	6.0	13.0	4.6	–	4.6	none
			5/7/2019	223	259.1	F	41.2	39.3	8.8	8.5	17.3	4.7	–	4.7	none
			5/7/2019	208	206.9	F	30.3	27.1	8.8	5.9	14.7	3.2	–	3.2	none
			5/7/2019	243	336.4	F	44.2	44.0	10.6	9.1	19.7	5.8	–	5.8	none
			5/7/2019	234	264.5	F	31.2	32.2	11.5	6.4	17.9	2.6	–	2.6	none
			5/15/2019	195	151.9	F	22.9	24.3	8.1	6.9	15.0	2.0	–	2.0	none
Boat Harbor (BH)	Redear Sunfish	JOF-FH-RS-BH-F-20190502 JOF-FH-RS-BH-O-20190502 JOF-FH-RS-BH-L-20190502	5/2/2019	255	344.4	F	52.5	51.7	14.4	16.2	30.6	4.6	–	4.6	none
			5/8/2019	232	243.5	F	31.6	31.3	10.4	7.8	18.2	2.7	–	2.7	none
			5/8/2019	242	332.2	F	46.8	47.5	15.2	10.1	25.3	3.2	–	3.2	none
			5/8/2019	215	229.7	F	28.7	29.6	12.8	10.3	23.1	3.1	–	3.1	none
			5/8/2019	220	204.6	F	26.6	25.0	9.8	7.2	17.0	2.2	–	2.2	none
			5/14/2019	254	324.0	F	44.8	45.5	16.6	8.3	24.9	5.5	–	5.5	none

See notes on last page.

TABLE B.3 – Fish Measurements and Observations
Johnsonville Fossil Plant
April and May 2019

Sampling Reach	Species	Sample IDs[1]	Sample Date	Fish Length[2] (mm)	Fish Weight[3] (g)	Sex	Tissue Weights[4,5,6]								Anomaly
							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)	
Tennessee River Upstream (TRU)	Gizzard Shad	JOF-FH-SH-TRU-WF-20190424	4/24/2019	180-215 (17)	1330	–	–	–	–	–	–	–	–	–	none
Tennessee River Adjacent (TRA)	Gizzard Shad	JOF-FH-SH-TRA-WF-20190425	4/25/2019	180-210 (12)	954	–	–	–	–	–	–	–	–	–	none
Tennessee River Downstream (TRD)	Gizzard Shad	JOF-FH-SH-TRD-WF-20190423	4/23/2019	190-215 (18)	1542	–	–	–	–	–	–	–	–	–	none
Intake Channel (IC)	Gizzard Shad	JOF-FH-SH-IC-WF-20190425	4/25/2019 & 5/15/2019	190-225 (15)	1468	–	–	–	–	–	–	–	–	–	none
Boat Harbor (BH)	Gizzard Shad	JOF-FH-SH-BH-WF-20190423	4/23/2019, 4/25/2019, & 5/7/2019	180-230 (10)	876	–	–	–	–	–	–	–	–	–	none
		JOF-FH-SH-WF-DUP01-20190423		180-230 (9)	824	–	–	–	–	–	–	–	–	–	none

Notes:

–	measurement or observation not applicable
g	gram
mm	millimeter

1. Sample Naming Convention
   - Sample Naming Convention for Normal Samples (N): Plant Acronym - Matrix Acronym - Species Acronym - Sampling Reach Identifier - Tissue Identifier - yyyymmdd
   - Sample Naming Convention for Field Duplicate Samples (FD): Plant Acronym - Matrix Acronym - Species Acronym - Tissue Identifier - Duplicate Number - yyyymmdd
   - Species Acronym: BG=Bluegill, CC=Channel Catfish, LB=Largemouth Bass, RS=Redear Sunfish, SH=Shad
   - Tissue Identifier: F=Fillet, O=Ovary, L=Liver, WF=Whole Fish
   - Sample date (yyyymmdd) is the earliest collection date among the fish contributing to a composite.
2. Fish length for gizzard shad is the range (minimum and maximum) in total length for fish included in a composite sample. The parenthetical number denotes the number of fish included in a composite sample.
3. Fish weight for gizzard shad is the total weight of the fish composite sample.
4. Tissues denoted as Lab were allocated to a composite sample for analytical analysis.
5. Tissues denoted as Archive were retained as individual samples and archived for potential future analysis, if needed.
6. Livers from bluegill and redear sunfish were retained whole and allocated to a composite sample for analytical analysis.

TABLE B.4 – Fish Tissue Analytical Results
Johnsonville Fossil Plant
April and May 2019

Species	Sampling Reach ID	Sample Date[1]	Sample ID	Sample Type[2]	Level of Review[3]	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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Bluegill	JOF-TRU	5/1/2019	JOF-FH-BG-TRU-F-20190501	N	Final-Verified	81.8	<0.020	0.041 J	<0.028	<0.031	<0.65	<0.010	192 J	<0.082	<0.018	<0.26	<0.028	<0.020	0.047 J	<0.033	0.048 J	0.34	<0.010	<0.15	<0.012	<0.031	6.3
			JOF-FH-BG-TRU-L-20190501		Final-Verified	76.9	<0.020	0.17	<0.029	<0.031	<0.66	0.23	167 J	<0.084	0.11	2.0	<0.028	<0.020	0.060 J	0.15	0.049 J	1.3	<0.011	<0.15	<0.012	0.38	22.9
			JOF-FH-BG-TRU-O-20190501		Final-Verified	70.3	<0.020	0.12	0.11	<0.032	<0.67	<0.010	171 J	<0.085	<0.018	0.88 J	<0.029	<0.020	0.0075 J	<0.034	<0.039	0.79	<0.011	0.19 J	<0.012	0.037 J	26.7
	JOF-TRA	5/14/2019	JOF-FH-BG-TRA-F-20190514	N	Final-Verified	83.1	<0.020	0.043 J	<0.029	<0.032	<0.67	<0.011	199 J	<0.085	<0.018	0.33 J	<0.029	<0.020	0.13 J	<0.034	<0.039	0.65	<0.011	<0.15	<0.012	<0.032	6.0
			JOF-FH-BG-TRA-L-20190514		Final-Verified	77.0	<0.021	0.30	0.059 J	<0.032	<0.68	0.31	105 J	<0.087	0.16	1.8	<0.029	<0.021	0.068 J	0.21	0.052 J	4.0	<0.011	<0.16	0.032 J	0.63	25.3
			JOF-FH-BG-TRA-O-20190514		Final-Verified	70.8	<0.021	0.10	0.14	<0.032	<0.68	<0.011	159 J	<0.087	0.033 J	0.99	<0.029	<0.021	0.0081 J	0.081 J	<0.040	1.2	<0.011	0.33 J	<0.013	0.051 J	33.9
	JOF-TRD	5/2/2019	JOF-FH-BG-TRD-F-20190502	N	Final-Verified	82.7	<0.019	0.082 J	<0.028	<0.030	<0.64	<0.010	391 J	<0.081	<0.017	0.27 J	<0.028	<0.020	0.093 J	<0.033	0.15	0.33	<0.010	0.28 J	<0.012	<0.031	5.8
			JOF-FH-BG-TRD-L-20190502		Final-Verified	77.0	<0.020	0.610 J	<0.029	<0.031	<0.65	0.15	114 J	<0.083	0.20	3.3	0.030 J	<0.020	0.047 J	0.15	<0.038	1.9	0.017 J	<0.15	0.02 J	0.84 J	26.0
			JOF-FH-BG-TRD-O-20190502		Final-Verified	71.1	<0.019	0.17	0.067 J	<0.030	<0.64	<0.010	146 J	<0.081	0.024 J	0.84 J	<0.027	<0.019	<0.0073	0.036 J	<0.038	0.91	<0.010	0.19 J	<0.012	0.044 J	28.3
		5/2/2019	JOF-FH-BG-F-DUP01-20190502	FD	Final-Verified	83.0	<0.020	0.073 J	<0.028	<0.031	<0.65	<0.010	217 J	<0.082	<0.018	<0.26	<0.028	<0.020	0.10 J	<0.033	<0.038	0.34	<0.010	<0.15	<0.012	<0.031	5.7
			JOF-FH-BG-L-DUP01-20190502		Final-Verified	78.1	<0.020	0.240 J	0.038 J	<0.032	<0.67	0.23	105 J	<0.085	0.15	1.7	<0.029	<0.020	0.053 J	0.13	<0.039	1.6	<0.011	<0.15	0.017 J	0.49 J	24.7
			JOF-FH-BG-O-DUP01-20190502		Final-Verified	72.1	<0.020	0.13	0.13	<0.031	<0.66	<0.010	246 J	<0.084	0.025 J	0.84 J	<0.028	<0.020	<0.0071	<0.034	<0.039	0.87	<0.011	0.29 J	<0.012	0.036 J	31.2
	JOF-IC	5/2/2019	JOF-FH-BG-IC-F-20190502	N	Final-Verified	83.4	<0.020	0.044 J	<0.029	<0.031	<0.66	<0.010	278 J	<0.083	<0.018	<0.27	<0.028	<0.020	0.14 J	<0.034	<0.039	0.37	<0.011	0.19 J	<0.012	<0.031	6.5
			JOF-FH-BG-IC-L-20190502		Final-Verified	79.0	<0.020	0.63	<0.030	<0.032	<0.68	0.21	107 J	<0.086	0.17	6.4	<0.029	<0.021	0.042 J	0.18	0.041 J	1.9	0.016 J	<0.16	<0.013	0.76	23.7
			JOF-FH-BG-IC-O-20190502		Final-Verified	70.6	<0.020	0.12	0.051 J	<0.032	<0.67	<0.011	155 J	<0.085	0.026 J	0.82 J	<0.029	<0.021	<0.0073	0.042 J	<0.040	0.80	<0.011	0.19 J	<0.013	<0.032	26.9
	JOF-BH	5/14/2019	JOF-FH-BG-BH-F-20190514	N	Final-Verified	82.8	<0.020	0.062 J	<0.029	<0.031	<0.65	<0.010	391 J	<0.083	<0.018	<0.27	<0.028	<0.020	0.068 J	<0.034	<0.038	0.27	<0.010	0.34 J	<0.012	<0.031	6.3
			JOF-FH-BG-BH-L-20190514		Final-Verified	79.2	<0.020	0.19	<0.029	<0.032	<0.66	0.18	81.3 J	<0.084	0.13	28.1 J	<0.029	<0.020	0.023 J	0.19	0.044 J	2.1	0.022 J	<0.15	<0.012	0.44	22.0
			JOF-FH-BG-BH-O-20190514		Final-Verified	68.6	<0.019	0.18	0.097	<0.030	<0.63	<0.010	119 J	<0.080	0.026 J	1.0	<0.027	<0.019	<0.0073	0.061 J	<0.037	0.90	<0.010	0.23 J	<0.012	<0.030	30.6
Channel Catfish	JOF-TRU	5/1/2019	JOF-FH-CC-TRU-F-20190501	N	Validated	77.7	<0.021	0.072 J	<0.030	<0.032	<0.68	<0.011	79.7 J	<0.087	<0.019	0.40 J	<0.029	<0.021	0.073 J	<0.035	0.087 J	0.17	<0.011	<0.16	<0.013	<0.033	6.3
			JOF-FH-CC-TRU-L-20190501		Final-Verified	82.7	<0.019	<0.028	<0.028	<0.030	<0.64	0.12	96.3	<0.081	0.040 J	2.1	0.042 J	<0.020	0.17	0.12	<0.038	0.98	<0.010	<0.15	<0.012	0.96	21.8
			JOF-FH-CC-TRU-O-20190501		Validated	61.5	<0.021	<0.030	0.28	<0.033	<0.69	<0.011	878 J	<0.088	0.031 J	1.1	<0.030	<0.021	<0.0069	<0.036	0.15	1.1	<0.011	1.1	<0.013	0.067 U*	43.8
	JOF-TRA	4/10/2019	JOF-FH-CC-TRA-F-20190410	N	Validated	77.5	<0.019	0.076 J	<0.027	<0.029	<0.62	<0.0097	88.8 J	<0.078	<0.017	0.27 J	<0.027	<0.019	0.081 J	<0.032	<0.036	0.22	<0.0099	<0.14	<0.012	<0.029	6.8
			JOF-FH-CC-TRA-L-20190410		Final-Verified	82.4	<0.019	<0.028	<0.028	<0.031	<0.65	0.089 J	91.5	<0.082	0.025 J	3.4 J	0.038 J	<0.020	0.190 J	0.094 J	<0.038	0.96	<0.010	<0.15	<0.012	0.98	20.4
			JOF-FH-CC-TRA-O-20190410		Final-Verified	61.4	<0.021	0.092 J	0.27	<0.033	<0.69	0.025 J	766	<0.088	<0.019	1.4	<0.030	<0.021	<0.0073	<0.036	<0.041	1.1	<0.011	1.1	<0.013	0.075 J	47.5
		4/25/2019	JOF-FH-CC-F-DUP01-20190425	FD	Validated	77.3	<0.019	0.081 J	<0.027	<0.029	<0.62	<0.0097	179 J	<0.078	<0.017	0.31 J	<0.026	<0.019	0.084 J	<0.032	<0.036	0.18	<0.0099	<0.14	<0.011	<0.029	7.0
			JOF-FH-CC-L-DUP01-20190425		Final-Verified	80.7	<0.019	0.040 J	0.059 J	<0.030	<0.64	0.11	227	<0.081	0.048 J	6.4 J	0.041 J	<0.020	0.28 J	0.12	<0.038	1.3	<0.010	0.27 J	<0.012	0.99	27.0
			JOF-FH-CC-O-DUP01-20190425		Final-Verified	62.9	<0.021	<0.030	0.29	<0.033	<0.69	<0.011	846	<0.088	0.032 J	1.1	<0.030	<0.021	<0.0071	<0.035	<0.041	1.3	<0.011	1.1	<0.013	0.064 J	47.5
	JOF-TRD	5/7/2019	JOF-FH-CC-TRD-F-20190507	N	Validated	78.0	<0.019	0.087 J	0.036 J	<0.030	<0.63	<0.0098	70.3 J	<0.079	<0.017	0.37 J	<0.027	<0.019	0.075 J	<0.032	0.039 J	0.18	<0.010	<0.14	<0.012	<0.030	6.3
			JOF-FH-CC-TRD-L-20190507		Final-Verified	84.5	<0.020	0.036 J	<0.029	<0.031	<0.66	0.093 J	49.2 J	<0.083	0.028 J	1.9	0.037 J	<0.020	0.17	0.12	<0.039	1.1	<0.011	<0.15	<0.012	1.0	21.3
			JOF-FH-CC-TRD-O-20190507		Final-Verified	63.2	<0.020	<0.028	0.21	<0.031	<0.65	<0.010	734	<0.082	0.022 J	0.9	<0.028	<0.020	<0.0072	<0.033	<0.038	0.90	<0.010	0.96	<0.012	0.067 J	36.4
	JOF-IC	5/7/2019	JOF-FH-CC-IC-F-20190507	N	Validated	78.6	<0.020	0.059 J	<0.029	<0.032	<0.67	<0.010	112 J	<0.085	<0.018	<0.27	<0.029	<0.020	0.056 J	<0.034	<0.039	0.16 J	<0.011	<0.15	<0.012	<0.032	6.4
			JOF-FH-CC-IC-L-20190507		Final-Verified	81.9	<0.020	<0.029	<0.030	<0.032	<0.67	0.089 J	42.9 J	<0.085	0.038 J	1.6	0.046 J	<0.021	0.15	0.13	<0.040	0.88	<0.011	<0.16	<0.013	1.3	19.7
			JOF-FH-CC-IC-O-20190507		Final-Verified	63.3	<0.019	<0.028	0.28	<0.030	<0.64	<0.010	756	<0.081	0.020 J	1.0	<0.027	<0.019	<0.0075	<0.033	<0.038	1.0	<0.010	1.0	<0.012	0.051 J	41.0
	JOF-BH	4/10/2019	JOF-FH-CC-BH-F-20190410	N	Validated	78.5	<0.021	0.078 J	<0.030	<0.033	<0.69	<0.011	71.4 J	<0.088	<0.019	0.31 J	<0.030	<0.021	0.075 J	<0.036	0.062 J	0.17	<0.011	<0.16	<0.013	0.044 U*	6.0
			JOF-FH-CC-BH-L-20190410		Final-Verified	82.8	<0.020	0.033 J	<0.029	<0.031	<0.66	0.10	34 J	<0.083	0.036 J	5.1	0.067 J	<0.020	0.18	0.077 J	<0.039	0.86	<0.011	<0.15	<0.012	1.3	20.0
			JOF-FH-CC-BH-O-20190410		Final-Verified	64.3	<0.020	<0.029	0.21	<0.032	<0.67	<0.011	747	<0.085	0.023 J	1.0	<0.029	<0.020	<0.0071	<0.034	<0.040	0.98	<0.011	0.95	<0.013	0.12	48.4
Largemouth Bass	JOF-TRU	4/10/2019	JOF-FH-LB-TRU-F-20190410	N	Final-Verified	81.6	<0.021	0.10	<0.031	<0.033	<0.70	<0.011	255 J	<0.088	<0.019	0.40 J	<0.030	<0.021	0.33 J	<0.036	<0.041	0.35	<0.011	<0.16	<0.013	<0.033	4.7
			JOF-FH-LB-TRU-L-20190410		Validated	79.9	<0.021	0.27	<0.030	<0.032	<0.68	0.18	130 J	<0.086	0.064 J	3.3	<0.029	<0.021	0.13 J	0.16	0.059 J	1.4	<0.011	<0.16	0.028 U*	0.170 U*	22.1
			JOF-FH-LB-TRU-O-20190410		Validated	71.4	<0.021	0.18	<0.030	<0.032	<0.68	<0.011	103 J	<0.086	0.035 J	1.7	<0.029	<0.021	0.025 J	<0.035	<0.040	0.92	<0.011	<0.16	<0.013	<0.033	32.7
	JOF-TRA	4/11/2019	JOF-FH-LB-TRA-F-20190411	N	Final-Verified	81.5	<0.019	0.065 J	<0.028	<0.031	<0.65	<0.010	272 J	<0.082	<0.018	0.46 J	<0.028	<0.020	0.52 J	<0.033	<0.038	0.34	<0.010	0.15 J	<0.012	<0.031	4.3 J
			JOF-FH-LB-TRA-L-20190411		Validated	81.0	<0.021	0.31	<0.030	<0.033	<0.69	0.22	128 J	<0.087	0.081 J	6.3	<0.030	<0.021	0.21 J	0.19	<0.041	1.7	<0.011	<0.16	0.029 U*	0.22	25.2
			JOF-FH-LB-TRA-O-20190411		Validated	69.6	<0.021	0.19	<0.030	<0.033	<0.69	<0.011	116 J	<0.088	0.039 J	1.4	<0.030	<0.021	0.033 J	<0.036	0.042 J	1.0	<0.011	<0.16	<0.013	<0.033	35.0
	JOF-TRD	4/10/2019	JOF-FH-LB-TRD-F-20190410	N	Validated	79.9	<0.021	0.11	<0.031	<0.033	<0.70	<0.011	219 J	0.18 J	<0.019	0.29 J	<0.030	<0.021	0.24 J	<0.036	0.048 J	0.39	<0.011	<0.16	<0.013	<0.033	4.1 J
			JOF-FH-LB-TRD-L-20190410		Validated	79.7	<0.019	0.26	<0.028	<0.030	<0.63	0.13	106 J	<0.080	0.060 J	2.8	<0.027	<0.019	0.13 J	0.16	<0.037	1.2	<0.010	<0.15	0.025 U*	0.12 U*	22.3
			JOF-FH-LB-TRD-O-20190410		Validated	70.3	<0.020	0.17	<0.029	<0.031	<0.66	<0.010	118 J	<0.084	0.028 J	1.5	<0.028	<0.020	0.017 J	<0.034	<0.039	0.88	<0.011	<0.15	<0.012	<0.032	31.4
	JOF-IC	4/10/2019	JOF-FH-LB-IC-F-20190410	N	Validated	80.9	<0.019	0.11	<0.027	<0.029	<0.62	<0.0097	265 J	<0.078	<0.017	8.2	0.22	<0.019	0.40 J	<0.032	0.11 J	0.42	<0.0099	<0.14	<0.012	<0.030	7.3
			JOF-FH-LB-IC-L-20190410		Validated	80.3	<0.018	0.24	<0.027	<0.029	<0.61	0.30	126 J	<0.078	0.068 J	3.4	<0.026	<0.019	0.19 J	0.18	<0.036	1.2	<0.0099	<0.14	0.035 U*	0.22	21.2
			JOF-FH-LB-IC-O-20190410		Validated	70.6	<0.020	0.16	<0.029	<0.031	<0.65	<0.010	149 J	<0.083	0.032 J	1.4	<0.028	<0.020	0.024 J	<0.033	<0.038	0.97	<0.010	<0.15	<0.012	<0.031	32.4
	JOF-BH	4/10/2019	JOF-FH-LB-BH-F-20190410	N	Validated	80.0	<0.019	0.14	<0.027	<0.030	<0.62	<0.0098	188 J	<0.079	<0.017	<0.25	<0.027	<0.019	0.30 J	<0.032	<0.037	0.30	<0.010	<0.14	<0.012	<0.030	3.8 J
			JOF-FH-LB-BH-L-20190410		Validated	79.9	<0.019	0.36	<0.028	<0.030	<0.64	0.093	95.2 J	<0.081	0.063 J	4.5	0.060 J	<0.019	0.11 J	0.17	<0.038	1.1	<0.010	<0.15	0.03 U*	0.076 U*	22.8
			JOF-FH-LB-BH-O-20190410		Validated	71.6	<0.021	0.19	<0.030	<0.033	<0.69	<0.011	119 J	<0.087	0.029 J	1.2	<0.030	<0.021	0.014 J	<0.035	0.079 J	0.86	<0.011	<0.16	<0.013	<0.033	27.4

See notes on last page.

TABLE B.4 – Fish Tissue Analytical Results
Johnsonville Fossil Plant
April and May 2019

Species	Sampling Reach ID	Sample Date[1]	Sample ID	Sample Type[2]	Level of Review[3]	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	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Redear Sunfish	JOF-TRU	5/1/2019	JOF-FH-RS-TRU-F-20190501	N	Final-Verified	82.4	<0.020	0.12	<0.029	<0.031	<0.66	<0.010	269	<0.084	<0.018	<0.27	<0.028	<0.020	0.097	<0.034	<0.039	0.39	<0.011	<0.15	<0.012	<0.032	7.4
			JOF-FH-RS-TRU-L-20190501		Final-Verified	77.6	<0.020	0.62	<0.029	<0.031	<0.66	0.17	77.0 J	<0.084	0.13	1.4	<0.028	<0.020	0.054 U*	0.17	0.048 J	1.4	<0.011	<0.15	0.016 J	0.64	20.9
			JOF-FH-RS-TRU-O-20190501		Final-Verified	70.9	<0.020	0.28	0.22	<0.032	<0.67	<0.010	217 J	<0.085	0.022 J	0.73 J	<0.029	<0.020	<0.0071	0.069 J	<0.039	0.81	<0.011	0.22 J	<0.012	0.042 J	25.9
		5/1/2019	JOF-FH-RS-F-DUP02-20190501	FD	Final-Verified	81.9	<0.020	0.11	<0.030	<0.032	<0.68	<0.011	249 J	<0.086	<0.019	<0.28	<0.029	<0.021	0.10 J	0.036 J	<0.040	0.38	<0.011	<0.16	<0.013	<0.032	6.7
			JOF-FH-RS-L-DUP02-20190501		Final-Verified	77.6	<0.019	0.56	<0.028	<0.030	<0.64	0.15	105 J	<0.081	0.11	1.3	<0.027	<0.019	0.064 U*	0.18	0.047 J	1.2	<0.010	<0.15	0.014 J	0.70	20.8
			JOF-FH-RS-O-DUP02-20190501		Final-Verified	71.1	<0.020	0.26	0.17	<0.032	<0.68	<0.011	213 J	<0.086	0.020 J	0.75 J	<0.029	<0.021	<0.0069	0.061 J	<0.040	0.77	<0.011	0.20 J	<0.013	0.045 J	24.4
	JOF-TRA	5/1/2019	JOF-FH-RS-TRA-F-20190501	N	Final-Verified	81.6	<0.020	0.15	0.029 J	<0.031	<0.65	<0.010	283	<0.083	<0.018	<0.27	<0.028	<0.020	0.088	<0.033	<0.038	0.37	<0.010	0.17 J	<0.012	<0.031	8.1
			JOF-FH-RS-TRA-L-20190501		Final-Verified	78.7	<0.020	0.55	<0.029	<0.031	<0.65	0.18	72.8 J	<0.083	0.15	1.3	<0.028	<0.020	0.049 U*	0.17	0.052 J	1.1	<0.010	<0.15	<0.012	0.80	21.1
			JOF-FH-RS-TRA-O-20190501		Final-Verified	70.1	<0.020	0.32	0.22	<0.032	<0.68	<0.011	190 J	<0.086	0.021 J	0.60 J	<0.029	<0.021	<0.0072	0.053 J	<0.040	0.75	<0.011	0.23 J	<0.013	0.048 J	23.4
	JOF-TRD	4/30/2019	JOF-FH-RS-TRD-F-20190430	N	Final-Verified	82.9	<0.020	0.15	<0.029	<0.031	<0.66	<0.010	251	<0.084	<0.018	<0.27	<0.028	<0.020	0.13	<0.034	<0.039	0.38	<0.011	<0.15	<0.012	<0.032	9.2
			JOF-FH-RS-TRD-L-20190430		Final-Verified	80.2	<0.020	0.89	<0.029	<0.031	<0.66	0.21	112 J	<0.083	0.18	1.1	<0.028	<0.020	0.068 U*	0.16	0.043 J	1.4	<0.011	<0.15	<0.012	1.4	20.3
			JOF-FH-RS-TRD-O-20190430		Final-Verified	68.9	<0.020	0.39	0.20	<0.032	<0.67	<0.011	158 J	<0.085	0.022 J	0.73 J	<0.029	<0.020	<0.0073	0.059 J	<0.039	0.87	<0.011	0.22 J	<0.012	0.078 J	29.9
	JOF-IC	4/25/2019	JOF-FH-RS-IC-F-20190425	N	Final-Verified	81.1	<0.020	0.15	0.047 J	<0.031	<0.66	<0.010	331 J	<0.084	<0.018	<0.27	<0.029	<0.020	0.088 J	<0.034	<0.039	0.47	<0.011	0.19 J	<0.012	<0.032	7.7
			JOF-FH-RS-IC-L-20190425		Final-Verified	77.9	<0.021	0.66	0.033 J	<0.033	<0.69	0.18	91.2 J	<0.088	0.17	1.3	<0.030	<0.021	0.044 U*	0.21	0.052 J	1.5	<0.011	<0.16	<0.013	1.2 J	20.2
			JOF-FH-RS-IC-O-20190425		Final-Verified	67.4	<0.020	0.47	0.34	<0.032	<0.68	<0.011	170 J	<0.086	0.023 J	0.96	<0.029	<0.021	<0.0074	0.087 J	<0.040	0.92	<0.011	0.26 J	<0.013	0.081 J	30.3
		5/7/2019	JOF-FH-RS-F-DUP01-20190507	FD	Final-Verified	82.0	<0.020	0.14	<0.029	<0.032	<0.67	<0.010	316 J	<0.085	<0.018	<0.27	<0.029	<0.020	0.099 J	<0.034	<0.039	0.50	<0.011	0.16 J	<0.012	<0.032	8.6
			JOF-FH-RS-L-DUP01-20190507		Final-Verified	81.1	<0.020	0.56	0.036 J	<0.031	<0.66	0.16	73.6 J	<0.084	0.16	1.1	<0.028	<0.020	0.039 U*	0.17	0.049 J	1.2	<0.011	<0.15	<0.012	0.80 J	17.4
			JOF-FH-RS-O-DUP01-20190507		Final-Verified	68.3	<0.019	0.40	0.28	<0.030	<0.64	<0.010	176 J	<0.081	0.034 J	0.85 J	<0.028	<0.020	<0.0072	0.084 J	0.041 J	0.96	<0.010	0.26 J	<0.012	0.072 J	33.4
	JOF-BH	5/2/2019	JOF-FH-RS-BH-F-20190502	N	Final-Verified	81.0	<0.021	0.19	0.086 J	<0.033	<0.69	0.036 J	553 J	<0.088	<0.019	0.52 J	<0.030	<0.021	0.018 U*	<0.036	<0.041	0.43	<0.011	0.38 J	<0.013	<0.033	7.6
			JOF-FH-RS-BH-L-20190502		Final-Verified	77.7	<0.021	0.92	<0.030	<0.032	<0.68	0.18	81.5 J	<0.087	0.13	1.3	<0.029	<0.021	0.042 U*	0.24	0.053 J	1.4	<0.011	<0.16	0.024 J	0.70	20.1
			JOF-FH-RS-BH-O-20190502		Final-Verified	70.0	<0.021	0.46	0.25	<0.033	<0.69	<0.011	251 J	<0.087	0.028 J	0.84 J	<0.030	<0.021	<0.0074	0.10 J	<0.041	0.84	<0.011	0.28 J	<0.013	0.061 J	28.3
Gizzard Shad	JOF-TRU	4/24/2019	JOF-FH-SH-TRU-WF-20190424	N	Final-Verified	77.0	<0.019	0.18	5.0	<0.031	<0.64	0.011 J	10800	0.45	0.13	0.91	0.13	0.098	<0.0072	0.042 J	0.20	0.39	<0.010	7.8	<0.012	0.27	15.9
	JOF-TRA	4/25/2019	JOF-FH-SH-TRA-WF-20190425	N	Final-Verified	79.0	<0.019	0.20	5.4	<0.030	<0.64	0.014 J	10700	0.46	0.19	0.86 J	0.20	0.16	0.019 J	0.038 J	0.24	0.39	<0.010	7.4	<0.012	0.37	15.8
	JOF-TRD	4/23/2019	JOF-FH-SH-TRD-WF-20190423	N	Final-Verified	78.3	<0.020	0.27	5.8	<0.031	<0.66	0.012 J	12000	0.85	0.21	1.0	0.23	0.19	0.018 J	0.040 J	0.33	0.39	<0.011	8.7	<0.012	0.51	16.7
	JOF-IC	4/25/2019	JOF-FH-SH-IC-WF-20190425	N	Final-Verified	78.2	<0.019	0.32	7.8	<0.031	<0.65	0.019 J	12900	1.4	0.40	1.2	0.39	0.34	0.023 J	0.054 J	0.55	0.47	<0.010	8.7	<0.012	0.75	16.6
	JOF-BH	4/23/2019	JOF-FH-SH-BH-WF-20190423	N	Final-Verified	77.0	<0.020	0.26	4.9	<0.031	<0.66	0.011 J	15100 J	0.28	0.092 J	0.90	0.23	0.076 J	0.016 J	0.060 J	0.14	0.40	<0.011	10.2 J	<0.012	0.35	17.7
		4/23/2019	JOF-FH-SH-WF-DUP01-20190423	FD	Final-Verified	76.1	<0.021	0.24	3.8	<0.033	<0.69	0.012 J	9650 J	0.31	0.099 J	0.93 J	0.29	0.077 J	0.016 J	0.040 J	0.16	0.38	<0.011	6.7 J	<0.013	0.30	15.5

Notes:

<	analyte was not detected at a concentration greater than the Method Detection Limit
%	percent
ID	Identification
J	quantitation is approximate due to limitations identified during data validation
mg/kg	milligrams per kilogram
U*	this result should be considered "not detected" because it was detected in an associated field or laboratory blank at a similar level

1. Sample Date is the earliest collection date among the fish contributing to a composite.
2. Sample Type: N=Normal Environmental Sample, FD=Field Duplicate
3. Level of review is defined in the Quality Assurance Project Plan.

APPENDIX J.7

FISH TISSUE AND BENTHIC SAMPLING AND ANALYSIS REPORT ADDENDUM

Johnsonville Fossil Plant - Fish Tissue and Benthic Sampling and Analysis Report Addendum

TDEC Commissioner's Order:
Environmental Investigation Plan
Johnsonville Fossil Plant
New Johnsonville, Tennessee

September 6, 2023

Prepared by:

Tennessee Valley Authority

TENNESSEE VALLEY AUTHORITY

Revision Record

Revision	Description	Date
0	Submittal to TDEC	September 6, 2023

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Abbreviations

CCR	Coal Combustion Residuals
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
JOF Plant	Johnsonville Fossil Plant
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
TI	Technical Instruction
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency

1.0 INTRODUCTION

The Tennessee Valley Authority (TVA) has prepared this sampling and analysis report (SAR) to document completion of activities related to the supplemental fish and benthic investigation at TVA's Johnsonville Fossil Plant (JOF Plant) in New Johnsonville, Tennessee, as outlined in the Fish Tissue and Benthic Sampling and Analysis Plans (SAPs) - Addendum I (Stantec Consulting Services Inc. [Stantec] 2022).

The purpose of this supplemental investigation was to further investigate copper concentrations in biota and sediments in the Boat Harbor, located adjacent to the JOF Plant, in support of fulfilling the requirements for the Tennessee Department of Environment and Conservation (TDEC) issued Commissioner's Order No. OGC15-0177 (TDEC Order) to TVA (TDEC 2015). The TDEC Order sets forth a "process for the investigation, assessment, and remediation of unacceptable risks" at TVA's coal ash disposal sites in Tennessee.

During previous sampling and analysis of biota and sediments collected from the Boat Harbor as part of implementation of the JOF Plant Environmental Investigation Plan (EIP) (Stantec 2018a), a bluegill (*Lepomis macrochirus*) composite liver sample was reported to have an atypically higher copper concentration than observed at the other sampling locations. In addition, several sediment samples collected from the Boat Harbor also had elevated copper concentrations compared to other sampling locations, as did the sample of non-depurated mayfly (*Hexagenia* spp.) nymphs collected from the Boat Harbor (although copper concentrations reported for both mayfly nymphs and adults were below the applicable screening levels (i.e., the "no observed adverse effect" level (NOAEL)) for critical body residues).

The purpose of this SAR is to document the work performed and to present the information and data collected during the execution of the combined Fish Tissue and Benthic SAPs Addendum. This SAR is not intended to provide conclusions or evaluate results. The scope of the supplemental investigation represented herein is part of a larger environmental investigation at the JOF 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).

The fish tissue and 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 JOF Plant:

- *Fish Tissue SAP* (Stantec 2018b)
- *Benthic SAP* (Stantec 2018c)
- *Fish Tissue and Benthic SAPs - Addendum I* (Stantec 2022)
- *Quality Assurance Project Plan (QAPP)* (Environmental Standards, Inc. [EnvStds] 2018).

The supplemental fish tissue and 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 SAPs Addendum and occurring during field activities due to field conditions and programmatic updates are referenced in Section 3.6.

Fish tissue sampling and processing was performed between July 13 and July 23, 2021. Sediment and mayfly nymph sampling and processing was performed the week of June 14, 2021. TVA personnel performed the sample collection and processing activities, including fish tissue resections. TVA shipped the fish tissue samples to the analytical laboratory in August 2021. Laboratory analysis of copper concentrations in bluegill liver tissue was performed by Pace Analytical in Green Bay, Wisconsin. In accordance with the SAPs Addendum, samples of fish egg/ovary tissue, fish carcasses, mayfly nymphs, and sediments were held pending the results of the bluegill liver analysis. These samples are archived at the TVA Chickamauga Power Service Center in Chattanooga, Tennessee, for potential future analysis, if needed. Additional Quality Assurance oversight on data acquisition protocols, sampling practices, and data validation or verification was performed by EnvStds under direct contract to TVA.

2.0 OBJECTIVE AND SCOPE

The objective of the supplemental investigation, conducted pursuant to the Fish Tissue and Benthic SAPs – Addendum I, was to further investigate copper concentrations in biota and sediments in the Boat Harbor, located adjacent to the JOF Plant. The phased approach for the supplement investigation was to:

Phase 1

- Collect samples of bluegill tissues, mayfly nymphs, and sediments from the Boat Harbor and Intake Channel, as specified in the SAPs Addendum, plus an additional TDEC-approved location on the mainstream of the Tennessee River upstream of the JOF Plant.
    - Analyze composite samples of bluegill liver tissue from each sampling reach for concentrations of copper to evaluate potential bioaccumulation
    - Retain bluegill egg/ovary tissues and the remaining gutted fish carcasses as individual samples, pending the results of the bluegill liver tissue analysis
    - Retain composite samples of mayfly nymphs (both depurated and non-depurated) for analysis of copper, pending the results of the bluegill liver tissue analysis
    - Retain composite samples of sediments for additional processing and analyses, pending the results of the bluegill liver tissue analysis.

Phase 2

- In the event that copper concentrations measured in bluegill liver tissue samples were determined to be elevated, suggesting that additional characterization of the mayfly tissue samples and/or sediment samples may provide corroborative information, the following actions would be implemented:
    - Analyze the retained mayfly samples for concentrations of copper
    - Analyze an aliquot from each retained sediment sample for concentrations of copper
    - Process an aliquot of each retained sediment sample to separate out any observed potential coal/ash particles and/or paint flakes into separate samples for copper analysis
    - Characterize aliquots of the coal and paint flake samples using scanning electron microscopy and X-ray diffraction.

The scope of work for Phase 1 consisted of collecting up to four samples of bluegill liver composites, depurated mayfly nymph composites, and non-depurated mayfly nymph composites from each of the three sampling reaches, and collecting samples of sediments from five transect locations; three in the Boat Harbor, one in the Intake Channel, and one in the Tennessee River upstream of the JOF Plant. The scope of work also included retaining the fish egg/ovary tissues and carcasses as individual samples.

Phase 2 was not implemented since copper concentrations measured in the bluegill liver samples were not elevated.

3.0 FIELD ACTIVITIES

Fish sampling and processing was performed between July 13 and July 23, 2021. Sediment and mayfly nymph sampling and processing was performed the week of June 14, 2021. Each component of the supplemental investigation included samples collected from the Boat Harbor, the Intake Channel, and the Tennessee River upstream of the JOF Plant.

TVA performed fish tissue and benthic investigation sample collection and processing activities based on guidance and specifications listed in TVA's Technical Instructions (TIs), the SAPs, 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 (Section 3.6).

During the fish tissue and benthic investigation, TVA:

- Coordinated activities with Tennessee Wildlife Resources Agency (TWRA) as required by the Scientific Collection Permit
- Verified and documented sampling locations using the global positioning system (GPS)
- Collected bluegill from the three proposed sampling reaches
- Conveyed whole fish collected during field sampling efforts to TVA's Chickamauga Power Service Center in Chattanooga, Tennessee, for processing
- Resected bluegill liver tissue and generated three composite samples for each sampling reach
- Resected egg/ovary tissue and retained the egg/ovary tissues and remaining gutted fish carcasses as individual samples
- Collected mayfly nymphs from the three proposed sampling reaches and generated four composite samples of depurated nymphs and of non-depurated nymphs for each sampling reach
- Collected sediment samples from the five proposed transects, including three in the Boat Harbor, one in the Intake Channel, and one in the Tennessee River upstream of the JOF Plant
- Collected quality control (QC) samples, including five fish tissue equipment blanks, four mayfly duplicates and five equipment blanks; and one sediment duplicate, two field blanks, and two equipment blanks
- Shipped the bluegill liver composite samples via commercial courier service to Pace Analytical for analysis of copper
- Retained the collected samples of fish egg/ovary tissue, fish carcasses, and mayfly nymphs in frozen storage
- Retained the collected sediment samples in cold storage.

Details on each activity are presented in the sections below.

3.1 SAMPLING LOCATIONS

The fish tissue, mayfly nymph, and sediment sampling locations for the supplemental investigation are shown on Exhibits A.1 and A.2 in Appendix A. Tables B.1 and B.2, in Appendix B, provide summaries of the sampling locations. These locations were originally sampled under the JOF Plant Fish Tissue SAP and the JOF Plant Benthic SAP.

Fish Tissue

Bluegill specimens were collected at multiple random locations within the three reaches/areas depicted on Exhibit A.1. Two sampling reaches were located adjacent to Active Ash Pond 2. The first sampling reach, BH, was in what is known as the Boat Harbor, which is approximately 0.9 miles in length. The second area, IC, was located in what is known as the Intake Channel, which is approximately 0.4 miles in length.

The third sampling reach, TRU, was located on the mainstream of the Tennessee River upstream of the JOF Plant. TRU originated approximately 2 river miles upstream from the JOF Plant CCR units and extended further upstream approximately 2.3 river miles (Tennessee River Mile 102.2 to 104.5).

Mayfly Nymphs

Mayfly nymphs were collected from submerged sediments at multiple randomly selected locations within the same three fish tissue sampling reaches depicted on Exhibit A.1 and described in Table B.1.

Sediment

Sediment samples were collected at the five transect locations indicated on Exhibit A.2 and described in Table B.2. These locations coincide with the fish and mayfly sampling reaches. Sediment sampling locations consisted of three transects in the Boat Harbor, one transect in the Intake Channel, and one transect on the mainstream of the Tennessee River upstream of JOF Plant. Sample transects were established across the width of the stream perpendicular to the direction of flow. Along each transect, samples were collected at center channel, left bank, and right bank stations; a total of 15 stations. “Left bank” and “right bank” were determined with a downstream-facing orientation.

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 supplement investigation included:

- *Benthic Invertebrate Bioaccumulation Field Form and Sample Custody Record*
- *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., GPS coordinates, numbers of fish and mayflies retained) in field logbooks to chronologically document the field program. Deviations from the SAPs Addendum, TIs, or QAPP were documented in the field logbooks.

3.2.1.2 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 mayfly sampling reach. The form documented the field collection team, the sampling reach/area, collection date and times, waypoint identifications (IDs), the number of mayfly nymphs collected in each Ponar or Peterson substrate grab during field collections, and the custody record for the collected organisms.

3.2.1.3 TVA Biota Field Chain-of-Custody

TVA field sampling personnel completed Biota Field *COCs* to document the fish and mayflies collected during the supplemental investigation field activities. The Biota Field *COC* documents the field collection team, sampling locations, collection dates and times, and the number of fish and mayfly nymphs retained for processing.

3.2.1.4 Analytical Laboratory Chain-of-Custody

TVA personnel completed Analytical Laboratory *COCs*, listing each bluegill liver composite sample for the supplemental investigation. The sample ID, sample location, type of sample, sample date and time, analysis requested, and the sample custody record were recorded on the *COCs*. The Field Team Lead or designee 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*.

3.2.1.5 Weekly Balance Check

Balances used to weigh fish, resected fish tissues, and mayfly nymphs were checked weekly for accuracy using check weights.

3.3 SAMPLING METHODS

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

3.3.1 Fish Sampling

Bluegill were collected from the three sampling reaches detailed in Section 3.1 and depicted on Exhibit A.1. The analytical samples collected are listed in Table B.3 (Appendix B).

Bluegill collections occurred during July 2021, using boat electrofishing (ENV-TI-05.40.22, *Fish Sampling Using Boat-Mounted Electroshocker*). Bluegill were retained in aerated live wells until completion of a sampling effort within a sampling reach. At the completion of a sampling effort, bluegill were sorted based on size (total length). Fish retained for further evaluation were double-bagged separately by sampling reach. Bags containing fish were labeled 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. Bags containing fish were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody.*

TVA personnel transported whole fish from the field to the TVA Chickamauga Power Service in Chattanooga, Tennessee, for processing. TVA used the *Biota Field COC* for sample custody. Fish were processed and tissue samples frozen within 48 hours of collection. Fish received for processing were inspected to ensure that they were properly preserved. Fish also were observed for abnormalities, such as scoliosis, blind eye, parasites, fungus, or lesions, and the abnormalities recorded. Total length, weight, and sex were recorded for each fish, and the weight of each resected tissue (liver and ovary) was recorded. Table B.4, in Appendix B, provides the measurements and observations made on each fish during processing.

A sufficient number of bluegill specimens were collected and processed to generate three composite liver samples for each sampling reach. Fish were sorted into three size classes. Dependent on the size class, liver tissue from eight or 11 fish comprised a composite sample. Fish used to generate a composite sample were of similar size so that the smallest individual in a composite was no less than 75% of the total length of the largest individual. Ovaries, if encountered, and the remaining gutted carcasses were retained as individual samples and archived frozen for potential future analysis, if needed. The bluegill liver composite samples were submitted to Pace Analytical in Green Bay, Wisconsin, to be analyzed for copper. The analytical data are presented in Table B.5.

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 and each carcass was rinsed with DI water prior to being placed in a labeled plastic bag and frozen.

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 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 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.*

3.3.2 Mayfly Sampling

Samples of mayfly nymphs were collected from the three sampling reaches detailed in Section 3.1 and depicted on Exhibit A.1. Samples of mayfly nymphs were collected in accordance with ENV-TI-05.40.43, *Mayfly Sampling* and ENV-TI-05.80.04, *Field Sampling Quality Control*.

The analytical samples collected, including field duplicates, are listed in Table B.6. In accordance with the SAPs Addendum, the mayfly samples were held pending the results of the bluegill liver analysis. The mayfly samples were not analyzed since copper concentrations measured in the bluegill liver composite samples were not elevated. The mayfly tissue samples are archived frozen at the TVA Chickamauga Power Service Center for potential future analysis, if needed.

Mayfly nymphs were collected by taking multiple randomly placed Peterson grabs of sediment within a sampling reach and selectively removing the organisms. Each sediment grab was emptied onto a stainless steel, Nitex, or Teflon screen then rinsed with river water to remove fine sediments and expose the nymphs. The nymphs were then removed from the screen using decontaminated stainless steel forceps and placed into a clean plastic container filled with surface water from the sampling location to allow preliminary removal of substrate adhering to the organisms. Nymphs that appeared damaged (i.e., severed head/abdomen) were discarded. Undamaged nymphs collected from a sampling reach were randomly sorted into composite samples, with a minimum of 50 to 75 nymphs for each depurated (i.e., held 48-hours to allow evacuation of digestive system contents) and non-depurated sample. Additional nymphs were collected to form duplicate samples.

Nymphs collected for analysis without depuration of their gut contents were transferred into certified clean, glass sample containers and held in wet ice at temperatures less than six degrees Celsius

pending processing. These nymphs were subsequently triple rinsed with DI water and transferred to new, certified clean glass containers, weighed, and frozen within 24 hours of collection to compose the non-depurated samples for each sampling reach. Nymphs collected for depuration prior to laboratory analysis were maintained alive by proportioning the nymphs between two or more certified clean, glass quart sample containers filled with surface water from the sampling reach and maintaining the containers in a cooler containing wet ice pending transport to the off-site processing location. At the off-site processing location, these nymphs were held in a DI water bath for a 48-hour depuration period. DI water baths consisted of decontaminated six-quart plastic containers partially filled with DI water which was periodically exchanged throughout the depuration period. After 48 hours, the nymphs were triple rinsed with DI water and transferred to new, certified clean glass containers, weighed, and frozen to compose the depurated samples for each sampling reach.

Personnel wore new, clean nitrile gloves when handling and processing mayflies. Decontamination was performed for mayfly sampling and processing equipment in accordance with TVA TI ENV-TI-05.80.05, *Field Sampling Equipment Cleaning and Decontamination.* Quality control 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*.

3.3.3 Sediment Sampling

Sediment samples were collected from the five transect locations detailed in Section 3.1 and depicted on Exhibit A.2. 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.7. In accordance with the SAPs Addendum, the sediment samples were held pending the results of the bluegill liver analysis. The sediment samples were not analyzed since copper concentrations measured in the bluegill liver composite samples were not elevated. The sediment samples are archived in cold storage at the TVA Chickamauga Power Service Center for potential future analysis, if needed.

At each station (center channel, left bank, and right bank) along a transect, a composite sample of surficial sediments (approximately 0 to 0.5 feet deep) was collected using decontaminated Wildco™ Petite Ponar Dredge. Each sediment sample comprised the contents of two Petite Ponar grabs. For each grab, surface water was slowly decanted from the dredge and the collected sediments were deposited directly into a decontaminated plastic bowl and homogenized using new, certified clean scoops. To the extent practicable, twigs, roots, leaves, mollusk shells, rocks, and miscellaneous debris were removed. The sediments were then transferred into two new, certified clean 16 ounce glass sample containers. Samples were labeled, custody-sealed, and maintained in a cooler with ice pending transport to the TVA Chickamauga Power Service Center.

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*. Scoops were treated as single-use and were discarded after each sample collection. Samples were labeled and handled in accordance with ENV-TI-05.80.02, *Sample Labeling and Custody*. 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.

3.4 INVESTIGATION DERIVED WASTE

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

- Fish remains
- 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 JOF 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

The bluegill liver composite samples were packed, transported, and shipped under *COC* procedures specified in ENV-TI-05.80.06, *Handling and Shipping of Samples*. The liver 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 supplemental investigation were outlined in the SAPs, 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 SAPs Addendum 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 supplemental investigation at the JOF Plant.

3.6.1 Variations in Scope

Variations in scope are provided below.

- The SAPs Addendum specified collecting samples of fish tissues, mayfly nymphs, and sediments from the Boat Harbor and Intake Channel. However, each sample type also was collected from a TDEC-approved sampling reach located on the mainstream of the Tennessee River upstream of the JOF Plant.

3.6.2 Variations in Procedures

Variations in procedures occurring in the field are provided below.

- Fish tissue investigation field activities were initially conducted during June 2021. However, the cooler containing the bluegill liver composite samples was misplaced by the courier during shipment to the analytical laboratory. Therefore, TVA collected and processed additional samples of bluegill from each sampling reach during July 2021. The bluegill liver composite samples from the July sampling effort were analyzed for copper.
- One of nine bluegill liver composites consisted of 5.8 grams of tissue instead of the six to eight grams specified in the SAPs Addendum. However, 5.8 grams of tissue is sufficient to allow analysis of cooper.

4.0 SUMMARY

The data presented in this report are from the supplemental fish tissue and benthic investigation sampling at the JOF Plant. The scope of work during this investigation included collecting additional samples of bluegill liver tissue, depurated and non-depurated mayfly nymphs, and sediments from three sampling reaches (Boat Harbor, Intake Channel, and Tennessee River Upstream) originally sampled under the JOF Plant Fish Tissue SAP and the JOF Plant Benthic SAP. Fish tissue, mayfly, and sediment sampling locations are summarized in Tables B.1 and B.2, and depicted on Exhibits A.1 and A.2.

A summary of the bluegill liver composite samples collected in July is presented in Table B.3. The fish measurements and observations are presented in Table B.4. Analytical data for copper are presented in Table B.5. Analytical data were reported by Pace Analytical, and data verification or validation was performed by EnvStds.

A summary of the mayfly and sediment samples collected, including field duplicates, are presented in Tables B.6 and B.7, respectively. In accordance with the SAPs Addendum, the mayfly and sediment samples were not analyzed since copper concentrations measured in the bluegill liver samples were not elevated. The mayfly and sediment samples are archived at the TVA Chickamauga Power Service Center for potential future analysis, if needed.

TVA has completed the supplemental investigation to support further evaluation of copper concentrations in the Boat Harbor in accordance with the Fish Tissue and Benthic SAPs Addendum as documented herein. The data generated 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 Johnsonville Fossil Plant Environmental Investigation*. Prepared for Tennessee Valley Authority. Revision 3. December 2018.

Stantec Consulting Services Inc. (Stantec). 2018a. *Environmental Investigation Plan, Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec. 2018b. *Fish Tissue Sampling and Analysis Plan, Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec. 2018c. *Benthic Sampling and Analysis Plan, Johnsonville Fossil Plant.* Revision 4. Prepared for Tennessee Valley Authority. December 10, 2018.

Stantec. 2022. *Fish Tissue and Benthic Sampling and Analysis Plans, Johnsonville Fossil Plant – Addendum I.* Revision 1. Prepared for Tennessee Valley Authority. February 3, 2022.

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

Tennessee Valley Authority (TVA). ENV-TI-05.40.22, *Fish Sampling Using Boat-Mounted Electroshocker.*

TVA, ENV-TI-05.40.43, *Mayfly Sampling*.

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*.

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 - EXHIBITS

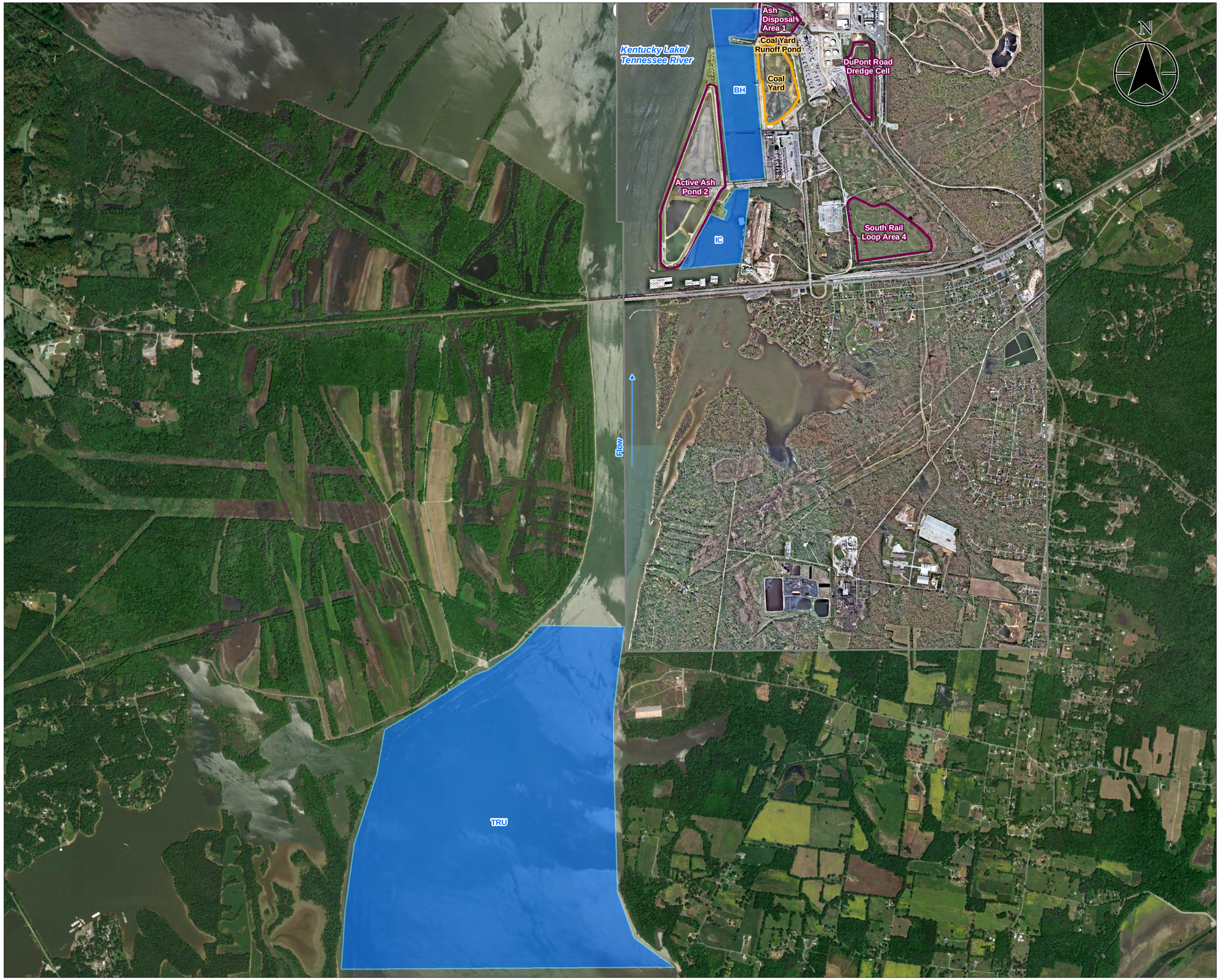

Exhibit No.

A.1

Title

Supplemental Fish Tissue and Mayfly Nymph Sampling Reaches

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-05-18
Technical Review by TB on 2023-05-18

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

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

Legend

- Fish/Mayfly Sampling Locations — TRU – Tennessee River Upstream; IC – Intake Channel; BH – Boat Harbor Channel
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Area (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) & ESRI World Imagery

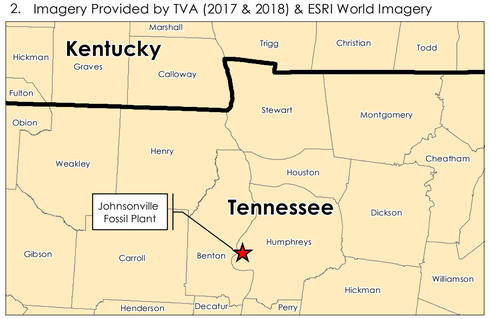

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Exhibit No.

A.2

Title

Supplemental Sediment Sampling Locations

Client/Project

Tennessee Valley Authority
Johnsonville Fossil (JOF) Plant TDEC Order

Project Location

New Johnsonville, Tennessee

175568286
Prepared by MB on 2023-08-08
Technical Review by TB on 2023-08-08

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

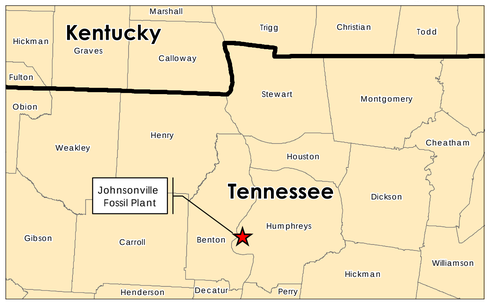
1:12,000 (At original document size of 22x34)

Legend

- Sediment Sampling Location
- Sediment Sampling Location Transect
- 2017 Imagery Boundary
- 2018 Imagery Boundary
- CCR Unit Boundary (Approximate)
- Coal Yard (Approximate)

Notes

1. Coordinate System: NAD 1983 StatePlane Tennessee FIPS 4100 Feet
2. Imagery Provided by TVA (2017 & 2018) and ESRI World Imagery



Stantec TVA

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APPENDIX B - TABLES

TABLE B.1 – Supplemental Fish Tissue and Mayfly Nymph Sampling Reaches
Johnsonville Fossil Plant

Area ID	Sampling Reach Name	Extent	Latitude	Longitude
BH	Boat Harbor	Northern extent	36.039090	-87.990590
		Southern extent	36.026483	-87.989298
IC	Intake Channel	Northern extent	36.025828	-87.989523
		Southern extent	36.020139	-87.991695
TRU	Tennessee River Upstream	Northern extent	35.993332	-88.002785
		Southern extent	35.968068	-88.005683

Notes:

ID Identification

1. Samples of fish tissue and mayfly nymphs also were collected in these areas (BH, IC, and TRU) under the JOF Plant Fish Tissue SAP and the JOF Plant Benthic SAP.

TABLE B.2 – Supplemental Sediment Sampling Locations
Johnsonville Fossil Plant

Transect Location ID	Description
SED-BH01	Boat Harbor Adjacent to Active Ash Pond 2
SED-BH02	Boat Harbor Adjacent to Active Ash Pond 2
SED-BH03	Boat Harbor North of Active Ash Pond 2
SED-IC01	Intake Channel Adjacent to Active Ash Pond 2
SED-TRU	Tennessee River Upstream of JOF Plant

Notes:

ID Identification

1. Sediment samples also were collected at the Boat Harbor and Intake Channel transect locations under the JOF Plant Benthic SAP.

TABLE B.3 – Summary of Bluegill Liver Composite Samples
Johnsonville Fossil Plant
July 2021

Sampling Reach	Sample ID	Sample Type	Numbers of fish: Sex: Male	Female	Not Discernable	Total	Length (mm): Min	Max	Average	Collection Date Range: Initial	Final	Analysis: Total Copper
Boat Harbor (BH)	JOF-FH-BG-BH-L-R1-20210713	N	3	8	–	11	113	126	118.2	7/13/2021	7/22/2021	X
	JOF-FH-BG-BH-L-R2-20210713	N	4	3	1	8	129	140	133.3	7/13/2021	7/22/2021	X
	JOF-FH-BG-BH-L-R3-20210713	N	7	1	–	8	142	170	161.3	7/13/2021	7/22/2021	X
Intake Channel (IC)	JOF-FH-BG-IC-L-R1-20210714	N	2	7	2	11	114	125	118.4	7/14/2021	7/14/2021	X
	JOF-FH-BG-IC-L-R2-20210714	N	3	5	–	8	128	144	134.8	7/14/2021	7/21/2021	X
	JOF-FH-BG-IC-L-R3-20210714	N	7	1	–	8	150	167	156.8	7/14/2021	7/14/2021	X
Tennessee River Upstream (TRU)	JOF-FH-BG-TRU-L-R1-20210714	N	3	7	1	11	115	125	119.2	7/14/2021	7/14/2021	X
	JOF-FH-BG-TRU-L-R2-20210714	N	4	4	–	8	128	141	133.0	7/14/2021	7/14/2021	X
	JOF-FH-BG-TRU-L-R3-20210714	N	7	1	–	8	143	168	155.3	7/14/2021	7/14/2021	X

Notes:

ID Identification
mm millimeter

Analysis
Total Copper SW-846 Method 6020A

Sample ID
JOF Johnsonville Fossil Plant
FH Fish Health
BG Bluegill
BH, IC, or TRU Boat Harbor, Intake Channel, or Tennessee River Upstream
L Liver
R1 Replicate sample number
Date (yyyymmdd) in the Sample ID is the earliest collection date among the fish contributing to a composite.

Sample Type
N Normal Environmental Sample

1. Field and laboratory quality control sample results are not included in report tables but were used for data validation.

TABLE B.4 – Bluegill Measurements and Observations
Johnsonville Fossil Plant
July 2021

Sampling Reach	Sample ID	Sample Date	Fish Length (mm)	Fish Weight (g)	Sex	Liver Weight (g)	Ovary Weight (g)	Fish Abnormality
Boat Harbor (BH)	JOF-FH-BG-BH-L-R1-20210713	7/13/2021	126	46.0	M	0.7	–	none
		7/13/2021	121	41.1	F	0.6	1.7	none
		7/13/2021	119	36.4	F	0.5	2.7	none
		7/13/2021	116	33.4	F	0.3	2.5	none
		7/13/2021	115	36.0	M	0.5	–	none
		7/13/2021	115	32.4	F	0.4	–	none
		7/13/2021	115	31.9	M	0.4	–	none
		7/13/2021	115	36.5	F	0.5	2.3	none
		7/13/2021	113	30.0	F	0.5	0.8	none
		7/21/2021	125	41.0	F	0.6	–	none
		7/22/2021	120	38.6	F	0.8	1.7	none
	JOF-FH-BG-BH-L-R2-20210713	7/13/2021	136	64.5	M	0.8	–	none
		7/13/2021	131	53.1	M	0.5	–	none
		7/13/2021	140	75.3	F	1.7	2.3	none
		7/13/2021	129	43.9	F	0.8	2.9	none
		7/21/2021	134	62.6	M	0.7	–	none
		7/21/2021	136	63.0	M	1.3	–	none
		7/21/2021	130	44.5	F	0.6	3.7	none
		7/22/2021	130	44.2	ND	0.5	–	none
	JOF-FH-BG-BH-L-R3-20210713	7/13/2021	142	70.8	M	0.8	–	none
		7/13/2021	165	110.8	M	1.4	–	none
		7/13/2021	160	90.6	F	2.0	3.5	none
		7/13/2021	155	91.4	M	1.0	–	none
		7/13/2021	170	112.0	M	1.4	–	none
		7/21/2021	165	104.1	M	1.0	–	none
		7/21/2021	165	101.7	M	1.1	–	none
		7/22/2021	168	103.2	M	1.6	–	none
Intake Channel (IC)	JOF-FH-BG-IC-L-R1-20210714	7/14/2021	116	34.4	F	0.5	2.4	none
		7/14/2021	114	32.8	F	0.4	–	none
		7/14/2021	118	30.3	F	0.6	–	none
		7/14/2021	125	46.7	M	0.8	–	none
		7/14/2021	121	39.4	F	0.6	3.4	none
		7/14/2021	116	38.4	F	0.7	1.8	none
		7/14/2021	120	40.7	F	0.7	–	none
		7/14/2021	120	36.5	M	0.4	–	none
		7/14/2021	120	39.9	ND	0.5	–	none
		7/14/2021	115	32.8	ND	0.4	–	none
		7/14/2021	117	36.8	F	0.5	2.6	none
	JOF-FH-BG-IC-L-R2-20210714	7/14/2021	140	64.4	F	1.1	2.3	none
		7/14/2021	144	62.7	M	1.0	–	none
		7/14/2021	128	44.6	F	0.6	1.5	none
		7/14/2021	139	60.1	M	0.8	–	none
		7/14/2021	135	63.4	M	0.8	–	none
		7/21/2021	132	49.9	F	0.7	2.4	none
		7/21/2021	130	49.9	F	0.8	2.0	none
		7/21/2021	130	48.1	F	0.9	2.2	none
	JOF-FH-BG-IC-L-R3-20210714	7/14/2021	158	96.2	F	1.3	6.4	none
		7/14/2021	160	105.7	M	1.4	–	none
		7/14/2021	151	81.5	M	0.9	–	none
		7/14/2021	151	84.0	M	1.0	–	none
		7/14/2021	150	82.2	M	1.2	–	none
		7/14/2021	155	86.9	M	1.2	–	none
		7/14/2021	167	83.9	M	1.2	–	none
		7/14/2021	162	104.5	M	1.0	–	none

TABLE B.4 – Bluegill Measurements and Observations
Johnsonville Fossil Plant
July 2021

Sampling Reach	Sample ID	Sample Date	Fish Length (mm)	Fish Weight (g)	Sex	Liver Weight (g)	Ovary Weight (g)	Fish Abnormality
Tennessee River Upstream (TRU)	JOF-FH-BG-TRU-L-R1-20210714	7/14/2021	122	40.9	F	1.0	2.2	none
		7/14/2021	116	38.6	M	0.6	–	none
		7/14/2021	115	36.3	F	0.5	2.1	none
		7/14/2021	115	32.3	ND	0.4	–	none
		7/14/2021	125	54.5	F	0.7	3.0	none
		7/14/2021	122	46.8	F	0.9	1.9	none
		7/14/2021	120	40.4	M	0.5	–	none
		7/14/2021	122	43.9	F	0.5	3.0	none
		7/14/2021	119	43.5	M	0.6	–	none
		7/14/2021	115	31.4	F	0.4	1.0	none
		7/14/2021	120	44.6	F	0.5	2.4	none
	JOF-FH-BG-TRU-L-R2-20210714	7/14/2021	130	58.0	M	0.8	–	none
		7/14/2021	131	67.4	F	1.2	4.4	none
		7/14/2021	137	76.7	F	1.4	4.0	none
		7/14/2021	141	75.4	M	1.5	–	none
		7/14/2021	136	64.0	M	1.0	–	none
		7/14/2021	131	56.1	F	0.9	–	none
		7/14/2021	128	55.9	F	1.1	2.8	none
		7/14/2021	130	56.4	M	0.6	–	none
	JOF-FH-BG-TRU-L-R3-20210714	7/14/2021	151	84.1	F	2.0	6.2	none
		7/14/2021	145	95.8	M	1.4	–	none
		7/14/2021	154	103.8	M	1.2	–	none
		7/14/2021	156	115.0	M	2.3	–	none
		7/14/2021	168	140.4	M	2.0	–	none
		7/14/2021	162	124.2	M	2.2	–	none
		7/14/2021	143	75.6	M	1.0	–	none
		7/14/2021	163	114.5	M	1.9	–	none

Notes:

–	Ovary measurement not applicable; male, or a female with immature ovary.
g	gram
ID	Identification
mm	millimeter
ND	Not discernable

Sample ID:

JOF	Johnsonville Fossil Plant
FH	Fish Health
BG	Bluegill
BH, IC, or TRU	Boat Harbor, Intake Channel, or Tennessee River Upstream
L	Liver
R1	Replicate sample number

Date (yyyymmdd) in the Sample ID is the earliest collection date among the fish contributing to a composite.

1. Ovaries were archived for potential future analysis, if needed.
2. Fish were observed for abnormalities, such as scoliosis, blind eye, parasites, fungus, or lesions.

TABLE B.5 – Analytical Results for Bluegill Liver Composite Samples
Johnsonville Fossil Plant
July 2021

Sampling Reach	Sample Date	Sample ID	Sample Type	Analysis	
				Copper mg/kg ww	Level of Review
Boat Harbor (BH)	7/13/2021	JOF-FH-BG-BH-L-R1-20210713	Normal Environmental Sample	2.0	Validated
	7/13/2021	JOF-FH-BG-BH-L-R2-20210713	Normal Environmental Sample	2.0	Validated
	7/13/2021	JOF-FH-BG-BH-L-R3-20210713	Normal Environmental Sample	1.6	Validated
Intake Channel (IC)	7/14/2021	JOF-FH-BG-IC-L-R1-20210714	Normal Environmental Sample	1.8	Validated
	7/14/2021	JOF-FH-BG-IC-L-R2-20210714	Normal Environmental Sample	1.4	Validated
	7/14/2021	JOF-FH-BG-IC-L-R3-20210714	Normal Environmental Sample	1.8	Validated
Tennessee River Upstream (TRU)	7/14/2021	JOF-FH-BG-TRU-L-R1-20210714	Normal Environmental Sample	2.7	Validated
	7/14/2021	JOF-FH-BG-TRU-L-R2-20210714	Normal Environmental Sample	1.7	Validated
	7/14/2021	JOF-FH-BG-TRU-L-R3-20210714	Normal Environmental Sample	1.2	Validated

Notes:

ID Identification
mg/kg ww milligrams per kilogram, wet weight

1. Sample Date is the earliest collection date among the fish contributing to a composite.
2. Level of review is defined in the Quality Assurance Project Plan.

TABLE B.6 – Summary of Mayfly Samples
Johnsonville Fossil Plant
June 2021

Sampling Reach	Composite Type	Sample Date	Sample Type	Sample ID	Parent Sample ID
Boat Harbor (BH)	Nymph Non-Depurated	6/15/2021	Normal Environmental Sample	JOF-MFN-BH-R1-20210615	
			Normal Environmental Sample	JOF-MFN-BH-R2-20210615	
			Normal Environmental Sample	JOF-MFN-BH-R3-20210615	
			Field Duplicate	JOF-MFN-DUP01-20210615	JOF-MFN-BH-R3-20210615
			Normal Environmental Sample	JOF-MFN-BH-R4-20210615	
	Nymph Depurated	6/16/2021	Normal Environmental Sample	JOF-MFP-BH-R1-20210616	
			Normal Environmental Sample	JOF-MFP-BH-R2-20210616	
			Field Duplicate	JOF-MFP-DUP01-20210616	JOF-MFP-BH-R2-20210616
			Normal Environmental Sample	JOF-MFP-BH-R3-20210616	
			Normal Environmental Sample	JOF-MFP-BH-R4-20210616	
Intake Channel (IC)	Nymph Non-Depurated	6/15/2021	Normal Environmental Sample	JOF-MFN-IC-R1-20210615	
			Normal Environmental Sample	JOF-MFN-IC-R2-20210615	
			Normal Environmental Sample	JOF-MFN-IC-R3-20210615	
			Normal Environmental Sample	JOF-MFN-IC-R4-20210615	
	Nymph Depurated	6/16/2021	Normal Environmental Sample	JOF-MFP-IC-R1-20210616	
			Normal Environmental Sample	JOF-MFP-IC-R2-20210616	
			Normal Environmental Sample	JOF-MFP-IC-R3-20210616	
			Normal Environmental Sample	JOF-MFP-IC-R4-20210616	
Tennessee River Upstream (TRU)	Nymph Non-Depurated	6/16/2021	Normal Environmental Sample	JOF-MFN-TRU-R1-20210616	
			Normal Environmental Sample	JOF-MFN-TRU-R2-20210616	
			Normal Environmental Sample	JOF-MFN-TRU-R3-20210616	
			Normal Environmental Sample	JOF-MFN-TRU-R4-20210616	
			Field Duplicate	JOF-MFN-DUP02-20210616	JOF-MFN-TRU-R4-20210616
	Nymph Depurated	6/17/2021	Normal Environmental Sample	JOF-MFP-TRU-R1-20210617	
			Normal Environmental Sample	JOF-MFP-TRU-R2-20210617	
			Normal Environmental Sample	JOF-MFP-TRU-R3-20210617	
			Normal Environmental Sample	JOF-MFP-TRU-R4-20210617	
			Field Duplicate	JOF-MFP-DUP02-20210617	JOF-MFP-TRU-R4-20210617

Notes:

ID	Identification

Sample ID

JOF	Johnsonville Fossil Plant
MFN or MFP	Mayfly Nymph Non-depurated or Mayfly Nymph Purged (Depurated)
BH, IC, or TRU	Boat Harbor, Intake Channel, or Tennessee River Upstream
R1, R2, R3, or R4	Replicate sample number
DUP01	Field Duplicate sample number
Sample Date	(yyyymmdd)

1. Mayfly nymph samples were archived for potential future analysis, if needed.

TABLE B.7 – Summary of Sediment Samples
Johnsonville Fossil Plant
June 2021

Sample Area	Location ID	Station ID	Sample Date	Sample Type	Sample ID	Parent Sample ID
Boat Harbor (BH)	SED-BH01	LB	6/14/2021	Normal Environmental Sample	JOF-SED-BH01-CORLB-0.0/0.5-20210614	
		CC	6/14/2021	Normal Environmental Sample	JOF-SED-BH01-CORCC-0.0/0.5-20210614	
		RB	6/14/2021	Normal Environmental Sample	JOF-SED-BH01-CORRB-0.0/0.5-20210614	
	SED-BH02	LB	6/14/2021	Normal Environmental Sample	JOF-SED-BH02-CORLB-0.0/0.5-20210614	JOF-SED-BH02-CORLB-0.0/0.5-20210614
		LB	6/14/2021	Field Duplicate	JOF-SED-BH02-DUP01-20210614	
		CC	6/14/2021	Normal Environmental Sample	JOF-SED-BH02-CORCC-0.0/0.5-20210614	
		RB	6/14/2021	Normal Environmental Sample	JOF-SED-BH02-CORRB-0.0/0.5-20210614	
	SED-BH03	LB	6/17/2021	Normal Environmental Sample	JOF-SED-BH03-CORLB-0.0/0.5-20210617	
		CC	6/17/2021	Normal Environmental Sample	JOF-SED-BH03-CORCC-0.0/0.5-20210617	
		RB	6/17/2021	Normal Environmental Sample	JOF-SED-BH03-CORRB-0.0/0.5-20210617	
Intake Channel (IC)	SED-IC01	LB	6/14/2021	Normal Environmental Sample	JOF-SED-IC01-CORLB-0.0/0.5-20210614	
		CC	6/14/2021	Normal Environmental Sample	JOF-SED-IC01-CORCC-0.0/0.5-20210614	
		RB	6/14/2021	Normal Environmental Sample	JOF-SED-IC01-CORRB-0.0/0.5-20210614	
Tennessee River Upstream (TRU)	SED-TRU	LB	6/17/2021	Normal Environmental Sample	JOF-SED-TRU-CORLB-0.0/0.5-20210617	
		CC	6/17/2021	Normal Environmental Sample	JOF-SED-TRU-CORCC-0.0/0.5-20210617	
		RB	6/17/2021	Normal Environmental Sample	JOF-SED-TRU-CORRB-0.0/0.5-20210617	

Notes:

ID Identification
Station ID LB=Left Bank, CC=Center Channel, RB=Right Bank (left bank and right bank determined with a downstream-facing orientation)

1. A composite sample of surficial sediments (approximately 0 to 0.5 feet deep [0.0/0.5]) was collected at each station.
2. Sediment samples were archived for potential future analysis, if needed.