

**Data Validation Report
Tennessee Valley Authority
John Sevier Fossil Plant
Environmental Investigation Plan
Surface Stream Samples
Chain-of-Custody Number: JSF_STR_20190718_3A**

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the four aqueous samples collected on July 18, 2019, at the Tennessee Valley Authority (TVA) John Sevier Fossil Plant facility. These samples were collectively analyzed by Eurofins TestAmerica, of Pittsburgh, Pennsylvania, for total and dissolved metals by SW-846 Method 6020A; for total and dissolved mercury by SW-846 Method 7470A; for anions (specifically, chloride, fluoride, and sulfate) by SW-846 Method 9056A; for total dissolved solids by Standard Method (SM) 2540C; for total suspended solids by SM 2540D; and for hardness by SM 2340B.

This review was performed in accordance with the Environmental Investigation Plan for the Tennessee Valley Authority John Sevier Fossil Plant Environmental Investigation (JSF EIP, Revision 3, October 2018). This review was performed with guidance from the National Functional Guidelines for Inorganic Data Review (US EPA, October 2004); the US EPA Region IV Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (November 2001); and the US EPA Region IV Data Validation Standard Operating Procedures. These validation guidance documents specifically address analyses performed in accordance with the Contract Laboratory Program (CLP) analytical methods and are not completely applicable to the type of analyses and analytical protocols performed for the SW-846 Standard Methods utilized by the laboratory for these samples. Environmental Standards, Inc. (Environmental Standards) used professional judgment to determine the usability of the analytical results and compliance relative to the SW-846 and Standard Methods utilized by the laboratory.

Summary

The analytical results and associated laboratory quality control (QC) samples were reviewed to determine the integrity of the reported analytical results and to ensure that the data met the established data quality objectives. This QA review includes all samples in Eurofins TestAmerica Job Number 180-93097-1.

The samples that have undergone Stage 4 data validation are listed below:

Sample Identification	Laboratory Sample Identification	Job Number	Matrix	Date Sample Collected	Parameters Examined
JSF-STR-PB09-CC-SUR-20190718	180-93097-1	180-93097-1	Aq	7/18/19	M, M ¹ , Hg, Hg ¹ , H, A, TDS, TSS
JSF-STR-PB08-CC-SUR-20190718	180-93097-2	180-93097-1	Aq	7/18/19	M, M ¹ , Hg, Hg ¹ , H, A, TDS, TSS
JSF-STR-PB07-CC-SUR-20190718	180-93097-3	180-93097-1	Aq	7/18/19	M, M ¹ , Hg, Hg ¹ , H, A, TDS, TSS
JSF-STR-PB06-CC-SUR-20190718	180-93097-4	180-93097-1	Aq	7/18/19	M, M ¹ , Hg, Hg ¹ , H, A, TDS, TSS

Parameters Examined

- M - Total Metals by SW-846 Method 6020A.
- M¹ - Dissolved Metals by SW-846 Method 6020A.
- Hg - Total Mercury by SW-846 Method 7470A.
- Hg¹ - Dissolved Mercury by SW-846 Method 7470A.
- H - Hardness by SM 2340B.
- A - Anions (specifically, chloride, fluoride, and sulfate) by SW-846 Method 9056A.
- TDS - Total dissolved solids by SM 2540C.
- TSS - Total suspended solids by SM 2540D.
- Aq - Aqueous.



Items Reviewed	
Holding Times	Instrument Tuning and Calibrations
Sample Preservation	Reporting Limit (RL) Standard Recoveries
Chain-of-Custody (COC) Record and Case Narrative	Internal Standard Recoveries
Blank Results	Serial Dilution Analysis
Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results	Post-Digestion Spike Results
Laboratory Control Sample (LCS) Results	Sample Preparation
Laboratory Duplicate Results	Analytical Sequence
Quantitation of Positive Results	Total vs. Dissolved Results Comparison

Comments and Exceptions

- All analyses performed for the sampling event were in compliance with the requirements set forth in the EIP.

Qualifier Summary

Analyte(s)	Job Number	Sample(s)	Validation Qualifier(s)	Reason(s) for Qualification
total zinc	180-93097-1	JSF-STR-PB09-CC-SUR-20190718, JSF-STR-PB07-CC-SUR-20190718, and JSF-STR-PB06-CC-SUR-20190718	U*	BE, BF
total and dissolved molybdenum	180-93097-1	JSF-STR-PB09-CC-SUR-20190718 and JSF-STR-PB08-CC-SUR-20190718	U*	BL
total and dissolved cobalt	180-93097-1	JSF-STR-PB07-CC-SUR-20190718 and JSF-STR-PB06-CC-SUR-20190718	U*	BL

Unless otherwise qualified, all positive results reported between the method detection limit (MDL) and quantitation limit (QL) should be considered estimated and have been flagged "J" on the data tables. (Reason Code: RL)

Review performed by: Thomas H. Weinmann, Senior Quality Assurance Chemist
 Review reviewed by: Andrew L. Piasecki, Senior Quality Assurance Chemist
 Review approved by: Rock J. Vitale, CEAC, Technical Director of Chemistry/Principal
 Date review completed: 10/3/19

SECTION 2

ANALYTICAL RESULTS

INORGANIC DATA QUALIFIERS

- U* This result should be considered “not-detected” because it was detected in a rinsate blank or laboratory blank at a similar level.
- UR Unreliable reporting limit; analyte may or may not be present in sample.
- R Unreliable positive result; analyte may or may not be present in sample.
- J Quantitation is approximate due to limitations identified during data validation.
- UJ This analyte was not detected, but the reporting limit may or may not be higher due to a bias identified during data validation.



REASON CODES AND EXPLANATIONS

Reason Code	Explanation
BE	Equipment blank contamination. The result should be considered "not-detected."
BF	Field blank contamination. The result should be considered "not-detected."
BL	Laboratory blank contamination. The result should be considered "not-detected."
BN	Negative laboratory blank contamination.
C	Initial and/or Continuing Calibration issue, indeterminate bias.
C+	Initial and/or Continuing Calibration issue. The result may be biased high.
C-	Initial and/or Continuing Calibration issue. The result may be biased low.
FD	Field duplicate imprecision.
FG	Total versus Dissolved Imprecision.
H	Holding time exceeded.
I	Internal standard recovery outside of acceptance limits.
L	LCS and LCSD recoveries outside of acceptance limits, indeterminate bias.
L+	LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased high.
L-	LCS and/or LCSD recoveries outside of acceptance limits. The result may be biased low.
LD	Laboratory duplicate imprecision.
LP	LCS/LCSD imprecision.
M	MS and MSD recoveries outside of acceptance limits, indeterminate bias.
M+	MS and/or MSD recoveries outside of acceptance limits. The result may be biased high.
M-	MS and/or MSD recoveries outside of acceptance limits. The result may be biased low.
MP	MS/MSD imprecision.
P	Post-digestion spike recoveries outside of acceptance limits, indeterminate bias.
P+	Post-digestion spike recovery outside of acceptance limits. The result may be biased high.
P-	Post-digestion spike recovery outside of acceptance limits. The result may be biased low.
Q	Chemical Preservation issue.
R	RL standards outside of acceptance limits, indeterminate bias.
R+	RL standard(s) outside of acceptance limits. The result may be biased high.
R-	RL standard(s) outside of acceptance limits. The result may be biased low.
RL	Reported result between the MDL and the QL.
T	Temperature preservation issue.
SD	Serial Dilution imprecision.
X	Percent solids < 50%.
Y+	Chemical Yield outside of acceptance limits. The result may be biased high.
Y-	Chemical yield outside of acceptance limits. The result may be biased low.
Z	ICP or ICP/MS Interference.
ZZ	Other.

Lab Sample ID	180-93097-1
Sys Sample Code	JSF-STR-PB09-CC-SUR-20190718
Sample Name	JSF-STR-PB09-CC-SUR-20190718
Sample Date	7/18/2019 1:45:00 PM
Location	JSF-PB09
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis	
SM 2340B	Hardness asCaCO3	HARD	T	MG/L	175			0.0218	0.0218	0.670	Y	Yes	1	NA	
SM2540C	Total Dissolved	TDS	T	MG/L	216			10.0	10.0	10.0	Y	Yes	1	NA	
SM2540D	Total Suspended	TSS	T	MG/L	36.4			0.500	0.500	0.500	Y	Yes	1	NA	
SW-846 6020A	Antimony	7440-36-0	D	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
			T	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
	Arsenic	7440-38-2	D	UG/L	2.74			0.323	0.323	1.00	Y	Yes	1	NA	
			T	UG/L	3.44			0.323	0.323	1.00	Y	Yes	1	NA	
	Barium	7440-39-3	D	UG/L	36.2			1.60	1.60	10.0	Y	Yes	1	NA	
			T	UG/L	42.0			1.60	1.60	10.0	Y	Yes	1	NA	
	Beryllium	7440-41-7	D	UG/L			U	0.182	0.182	1.00	N	Yes	1	NA	
			T	UG/L			U	0.182	0.182	1.00	N	Yes	1	NA	
	Boron	7440-42-8	D	UG/L	126			38.6	38.6	80.0	Y	Yes	1	NA	
			T	UG/L	132			38.6	38.6	80.0	Y	Yes	1	NA	
	Cadmium	7440-43-9	D	UG/L			U	0.125	0.125	1.00	N	Yes	1	NA	
			T	UG/L			U	0.125	0.125	1.00	N	Yes	1	NA	
	Calcium	7440-70-2	D	UG/L	57700			127	127	500	Y	Yes	1	NA	
			T	UG/L	58400			127	127	500	Y	Yes	1	NA	
	Chromium	7440-47-3	D	UG/L			U	1.53	1.53	2.00	N	Yes	1	NA	
			T	UG/L			U	1.53	1.53	2.00	N	Yes	1	NA	
	Cobalt	7440-48-4	D	UG/L	0.0780		J	RL	0.0750	0.0750	0.500	Y	Yes	1	NA
			T	UG/L	0.326		J	RL	0.0750	0.0750	0.500	Y	Yes	1	NA
	Copper	7440-50-8	D	UG/L	0.810		J	RL	0.627	0.627	2.00	Y	Yes	1	NA
			T	UG/L	1.21		J	RL	0.627	0.627	2.00	Y	Yes	1	NA
	Iron	7439-89-6	D	UG/L	43.7		J	RL	19.5	19.5	50.0	Y	Yes	1	NA
			T	UG/L	549				19.5	19.5	50.0	Y	Yes	1	NA
	Lead	7439-92-1	D	UG/L			U		0.128	0.128	1.00	N	Yes	1	NA
			T	UG/L	0.441		J	RL	0.128	0.128	1.00	Y	Yes	1	NA
Lithium	7439-93-2	D	UG/L			U		3.39	3.39	5.00	N	Yes	1	NA	
		T	UG/L	3.59		J	RL	3.39	3.39	5.00	Y	Yes	1	NA	
Magnesium	7439-95-4	D	UG/L	6930				82.7	82.7	500	Y	Yes	1	NA	
		T	UG/L	7050				82.7	82.7	500	Y	Yes	1	NA	
Manganese	7439-96-5	D	UG/L	22.2				1.35	1.35	5.00	Y	Yes	1	NA	

Lab Sample ID	180-93097-1
Sys Sample Code	JSF-STR-PB09-CC-SUR-20190718
Sample Name	JSF-STR-PB09-CC-SUR-20190718
Sample Date	7/18/2019 1:45:00 PM
Location	JSF-PB09
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
SW-846 6020A	Manganese	7439-96-5	T	UG/L	78.5			1.35	1.35	5.00	Y	Yes	1	NA
	Molybdenum	7439-98-7	D	UG/L		U*	BL	5.40	5.40	5.40	N	Yes	1	NA
			T	UG/L		U*	BL	5.28	5.28	5.28	N	Yes	1	NA
	Nickel	7440-02-0	D	UG/L	0.520	J	RL	0.336	0.336	1.00	Y	Yes	1	NA
			T	UG/L	0.697	J	RL	0.336	0.336	1.00	Y	Yes	1	NA
	Selenium	7782-49-2	D	UG/L		U		1.51	1.51	5.00	N	Yes	1	NA
			T	UG/L		U		1.51	1.51	5.00	N	Yes	1	NA
	Silver	7440-22-4	D	UG/L		U		0.177	0.177	1.00	N	Yes	1	NA
			T	UG/L		U		0.177	0.177	1.00	N	Yes	1	NA
	Thallium	7440-28-0	D	UG/L		U		0.148	0.148	1.00	N	Yes	1	NA
			T	UG/L		U		0.148	0.148	1.00	N	Yes	1	NA
	Vanadium	7440-62-2	D	UG/L		U		0.991	0.991	1.00	N	Yes	1	NA
			T	UG/L		U		0.991	0.991	1.00	N	Yes	1	NA
	Zinc	7440-66-6	D	UG/L		U		3.22	3.22	5.00	N	Yes	1	NA
T			UG/L		U*	BE,BF	4.81	4.81	5.00	N	Yes	1	NA	
SW-846 7470A	Mercury	7439-97-6	D	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA
			T	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA
SW-846 9056A	Chloride	16887-00-6	N	MG/L	4.05			0.715	0.715	1.00	Y	Yes	1	NA
	Fluoride	16984-48-8	N	MG/L	0.0900	J	RL	0.0263	0.0263	0.100	Y	Yes	1	NA
	Sulfate	14808-79-8	N	MG/L	24.7			0.380	0.380	1.00	Y	Yes	1	NA

Lab Sample ID	180-93097-2
Sys Sample Code	JSF-STR-PB08-CC-SUR-20190718
Sample Name	JSF-STR-PB08-CC-SUR-20190718
Sample Date	7/18/2019 2:35:00 PM
Location	JSF-PB08
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis	
SM 2340B	Hardness asCaCO3	HARD	T	MG/L	154			0.0218	0.0218	0.670	Y	Yes	1	NA	
SM2540C	Total Dissolved	TDS	T	MG/L	183			10.0	10.0	10.0	Y	Yes	1	NA	
SM2540D	Total Suspended	TSS	T	MG/L	0.900			0.500	0.500	0.500	Y	Yes	1	NA	
SW-846 6020A	Antimony	7440-36-0	D	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
			T	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
	Arsenic	7440-38-2	D	UG/L	3.21				0.323	0.323	1.00	Y	Yes	1	NA
			T	UG/L	3.10				0.323	0.323	1.00	Y	Yes	1	NA
	Barium	7440-39-3	D	UG/L	18.7				1.60	1.60	10.0	Y	Yes	1	NA
			T	UG/L	18.7				1.60	1.60	10.0	Y	Yes	1	NA
	Beryllium	7440-41-7	D	UG/L			U		0.182	0.182	1.00	N	Yes	1	NA
			T	UG/L			U		0.182	0.182	1.00	N	Yes	1	NA
	Boron	7440-42-8	D	UG/L	55.2		J	RL	38.6	38.6	80.0	Y	Yes	1	NA
			T	UG/L	49.5		J	RL	38.6	38.6	80.0	Y	Yes	1	NA
	Cadmium	7440-43-9	D	UG/L			U		0.125	0.125	1.00	N	Yes	1	NA
			T	UG/L			U		0.125	0.125	1.00	N	Yes	1	NA
	Calcium	7440-70-2	D	UG/L	51400				127	127	500	Y	Yes	1	NA
			T	UG/L	49700				127	127	500	Y	Yes	1	NA
	Chromium	7440-47-3	D	UG/L			U		1.53	1.53	2.00	N	Yes	1	NA
			T	UG/L			U		1.53	1.53	2.00	N	Yes	1	NA
	Cobalt	7440-48-4	D	UG/L	0.110		J	RL	0.0750	0.0750	0.500	Y	Yes	1	NA
			T	UG/L	0.109		J	RL	0.0750	0.0750	0.500	Y	Yes	1	NA
	Copper	7440-50-8	D	UG/L			U		0.627	0.627	2.00	N	Yes	1	NA
			T	UG/L			U		0.627	0.627	2.00	N	Yes	1	NA
	Iron	7439-89-6	D	UG/L			U		19.5	19.5	50.0	N	Yes	1	NA
			T	UG/L	52.3				19.5	19.5	50.0	Y	Yes	1	NA
	Lead	7439-92-1	D	UG/L			U		0.128	0.128	1.00	N	Yes	1	NA
			T	UG/L			U		0.128	0.128	1.00	N	Yes	1	NA
	Lithium	7439-93-2	D	UG/L			U		3.39	3.39	5.00	N	Yes	1	NA
			T	UG/L			U		3.39	3.39	5.00	N	Yes	1	NA
	Magnesium	7439-95-4	D	UG/L	7460				82.7	82.7	500	Y	Yes	1	NA
			T	UG/L	7180				82.7	82.7	500	Y	Yes	1	NA
Manganese	7439-96-5	D	UG/L	106				1.35	1.35	5.00	Y	Yes	1	NA	

Lab Sample ID	180-93097-2
Sys Sample Code	JSF-STR-PB08-CC-SUR-20190718
Sample Name	JSF-STR-PB08-CC-SUR-20190718
Sample Date	7/18/2019 2:35:00 PM
Location	JSF-PB08
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
SW-846 6020A	Manganese	7439-96-5	T	UG/L	145			1.35	1.35	5.00	Y	Yes	1	NA
	Molybdenum	7439-98-7	D	UG/L		U*	BL	3.05	3.05	5.00	N	Yes	1	NA
			T	UG/L		U*	BL	2.95	2.95	5.00	N	Yes	1	NA
	Nickel	7440-02-0	D	UG/L	0.547	J	RL	0.336	0.336	1.00	Y	Yes	1	NA
			T	UG/L	0.515	J	RL	0.336	0.336	1.00	Y	Yes	1	NA
	Selenium	7782-49-2	D	UG/L		U		1.51	1.51	5.00	N	Yes	1	NA
			T	UG/L		U		1.51	1.51	5.00	N	Yes	1	NA
	Silver	7440-22-4	D	UG/L		U		0.177	0.177	1.00	N	Yes	1	NA
			T	UG/L		U		0.177	0.177	1.00	N	Yes	1	NA
	Thallium	7440-28-0	D	UG/L		U		0.148	0.148	1.00	N	Yes	1	NA
			T	UG/L		U		0.148	0.148	1.00	N	Yes	1	NA
	Vanadium	7440-62-2	D	UG/L		U		0.991	0.991	1.00	N	Yes	1	NA
			T	UG/L		U		0.991	0.991	1.00	N	Yes	1	NA
	Zinc	7440-66-6	D	UG/L		U		3.22	3.22	5.00	N	Yes	1	NA
T			UG/L		U		3.22	3.22	5.00	N	Yes	1	NA	
SW-846 7470A	Mercury	7439-97-6	D	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA
			T	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA
SW-846 9056A	Chloride	16887-00-6	N	MG/L	1.30			0.715	0.715	1.00	Y	Yes	1	NA
	Fluoride	16984-48-8	N	MG/L	0.0859	J	RL	0.0263	0.0263	0.100	Y	Yes	1	NA
	Sulfate	14808-79-8	N	MG/L	30.4			0.380	0.380	1.00	Y	Yes	1	NA

Lab Sample ID	180-93097-3
Sys Sample Code	JSF-STR-PB07-CC-SUR-20190718
Sample Name	JSF-STR-PB07-CC-SUR-20190718
Sample Date	7/18/2019 3:05:00 PM
Location	JSF-PB07
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis	
SM 2340B	Hardness asCaCO3	HARD	T	MG/L	140			0.0218	0.0218	0.670	Y	Yes	1	NA	
SM2540C	Total Dissolved	TDS	T	MG/L	169			10.0	10.0	10.0	Y	Yes	1	NA	
SM2540D	Total Suspended	TSS	T	MG/L	8.60			0.500	0.500	0.500	Y	Yes	1	NA	
SW-846 6020A	Antimony	7440-36-0	D	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
			T	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
	Arsenic	7440-38-2	D	UG/L	3.28			0.323	0.323	1.00	Y	Yes	1	NA	
			T	UG/L	3.75			0.323	0.323	1.00	Y	Yes	1	NA	
	Barium	7440-39-3	D	UG/L	30.0			1.60	1.60	10.0	Y	Yes	1	NA	
			T	UG/L	30.8			1.60	1.60	10.0	Y	Yes	1	NA	
	Beryllium	7440-41-7	D	UG/L			U		0.182	0.182	1.00	N	Yes	1	NA
			T	UG/L			U		0.182	0.182	1.00	N	Yes	1	NA
	Boron	7440-42-8	D	UG/L	51.7		J	RL	38.6	38.6	80.0	Y	Yes	1	NA
			T	UG/L	50.5		J	RL	38.6	38.6	80.0	Y	Yes	1	NA
	Cadmium	7440-43-9	D	UG/L			U		0.125	0.125	1.00	N	Yes	1	NA
			T	UG/L			U		0.125	0.125	1.00	N	Yes	1	NA
	Calcium	7440-70-2	D	UG/L	46400				127	127	500	Y	Yes	1	NA
			T	UG/L	46300				127	127	500	Y	Yes	1	NA
	Chromium	7440-47-3	D	UG/L			U		1.53	1.53	2.00	N	Yes	1	NA
			T	UG/L			U		1.53	1.53	2.00	N	Yes	1	NA
	Cobalt	7440-48-4	D	UG/L			U*	BL	0.185	0.185	0.500	N	Yes	1	NA
			T	UG/L			U*	BL	0.350	0.350	0.500	N	Yes	1	NA
	Copper	7440-50-8	D	UG/L			U		0.627	0.627	2.00	N	Yes	1	NA
			T	UG/L			U		0.627	0.627	2.00	N	Yes	1	NA
	Iron	7439-89-6	D	UG/L	71.9				19.5	19.5	50.0	Y	Yes	1	NA
			T	UG/L	261				19.5	19.5	50.0	Y	Yes	1	NA
	Lead	7439-92-1	D	UG/L			U		0.128	0.128	1.00	N	Yes	1	NA
			T	UG/L	0.195		J	RL	0.128	0.128	1.00	Y	Yes	1	NA
Lithium	7439-93-2	D	UG/L			U		3.39	3.39	5.00	N	Yes	1	NA	
		T	UG/L			U		3.39	3.39	5.00	N	Yes	1	NA	
Magnesium	7439-95-4	D	UG/L	6090				82.7	82.7	500	Y	Yes	1	NA	
		T	UG/L	6020				82.7	82.7	500	Y	Yes	1	NA	
Manganese	7439-96-5	D	UG/L	1070				1.35	1.35	5.00	Y	Yes	1	NA	

Lab Sample ID	180-93097-3
Sys Sample Code	JSF-STR-PB07-CC-SUR-20190718
Sample Name	JSF-STR-PB07-CC-SUR-20190718
Sample Date	7/18/2019 3:05:00 PM
Location	JSF-PB07
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis	
SW-846 6020A	Manganese	7439-96-5	T	UG/L	1230			1.35	1.35	5.00	Y	Yes	1	NA	
	Molybdenum	7439-98-7	D	UG/L	1.65	J	RL	0.610	0.610	5.00	Y	Yes	1	NA	
			T	UG/L	1.74	J	RL	0.610	0.610	5.00	Y	Yes	1	NA	
	Nickel	7440-02-0	D	UG/L	0.509	J	RL	0.336	0.336	1.00	Y	Yes	1	NA	
			T	UG/L	0.749	J	RL	0.336	0.336	1.00	Y	Yes	1	NA	
	Selenium	7782-49-2	D	UG/L			U		1.51	1.51	5.00	N	Yes	1	NA
			T	UG/L			U		1.51	1.51	5.00	N	Yes	1	NA
	Silver	7440-22-4	D	UG/L			U		0.177	0.177	1.00	N	Yes	1	NA
			T	UG/L			U		0.177	0.177	1.00	N	Yes	1	NA
	Thallium	7440-28-0	D	UG/L			U		0.148	0.148	1.00	N	Yes	1	NA
			T	UG/L			U		0.148	0.148	1.00	N	Yes	1	NA
	Vanadium	7440-62-2	D	UG/L			U		0.991	0.991	1.00	N	Yes	1	NA
			T	UG/L			U		0.991	0.991	1.00	N	Yes	1	NA
	Zinc	7440-66-6	D	UG/L			U		3.22	3.22	5.00	N	Yes	1	NA
T			UG/L			U*	BE,BF	4.66	4.66	5.00	N	Yes	1	NA	
SW-846 7470A	Mercury	7439-97-6	D	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA	
			T	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA	
SW-846 9056A	Chloride	16887-00-6	N	MG/L	1.43			0.715	0.715	1.00	Y	Yes	1	NA	
	Fluoride	16984-48-8	N	MG/L	0.0784	J	RL	0.0263	0.0263	0.100	Y	Yes	1	NA	
	Sulfate	14808-79-8	N	MG/L	11.8			0.380	0.380	1.00	Y	Yes	1	NA	

Lab Sample ID	180-93097-4
Sys Sample Code	JSF-STR-PB06-CC-SUR-20190718
Sample Name	JSF-STR-PB06-CC-SUR-20190718
Sample Date	7/18/2019 3:45:00 PM
Location	JSF-PB06
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis	
SM 2340B	Hardness asCaCO3	HARD	T	MG/L	144			0.0218	0.0218	0.670	Y	Yes	1	NA	
SM2540C	Total Dissolved	TDS	T	MG/L	177			10.0	10.0	10.0	Y	Yes	1	NA	
SM2540D	Total Suspended	TSS	T	MG/L	4.70			0.500	0.500	0.500	Y	Yes	1	NA	
SW-846 6020A	Antimony	7440-36-0	D	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
			T	UG/L		U		0.378	0.378	2.00	N	Yes	1	NA	
	Arsenic	7440-38-2	D	UG/L	2.16				0.323	0.323	1.00	Y	Yes	1	NA
			T	UG/L	2.48				0.323	0.323	1.00	Y	Yes	1	NA
	Barium	7440-39-3	D	UG/L	22.3				1.60	1.60	10.0	Y	Yes	1	NA
			T	UG/L	24.7				1.60	1.60	10.0	Y	Yes	1	NA
	Beryllium	7440-41-7	D	UG/L			U		0.182	0.182	1.00	N	Yes	1	NA
			T	UG/L			U		0.182	0.182	1.00	N	Yes	1	NA
	Boron	7440-42-8	D	UG/L	44.8		J	RL	38.6	38.6	80.0	Y	Yes	1	NA
			T	UG/L	43.8		J	RL	38.6	38.6	80.0	Y	Yes	1	NA
	Cadmium	7440-43-9	D	UG/L			U		0.125	0.125	1.00	N	Yes	1	NA
			T	UG/L			U		0.125	0.125	1.00	N	Yes	1	NA
	Calcium	7440-70-2	D	UG/L	46900				127	127	500	Y	Yes	1	NA
			T	UG/L	48700				127	127	500	Y	Yes	1	NA
	Chromium	7440-47-3	D	UG/L			U		1.53	1.53	2.00	N	Yes	1	NA
			T	UG/L			U		1.53	1.53	2.00	N	Yes	1	NA
	Cobalt	7440-48-4	D	UG/L			U*	BL	0.140	0.140	0.500	N	Yes	1	NA
			T	UG/L			U*	BL	0.271	0.271	0.500	N	Yes	1	NA
	Copper	7440-50-8	D	UG/L			U		0.627	0.627	2.00	N	Yes	1	NA
			T	UG/L			U		0.627	0.627	2.00	N	Yes	1	NA
	Iron	7439-89-6	D	UG/L	21.4		J	RL	19.5	19.5	50.0	Y	Yes	1	NA
			T	UG/L	301				19.5	19.5	50.0	Y	Yes	1	NA
	Lead	7439-92-1	D	UG/L			U		0.128	0.128	1.00	N	Yes	1	NA
			T	UG/L	0.210		J	RL	0.128	0.128	1.00	Y	Yes	1	NA
	Lithium	7439-93-2	D	UG/L			U		3.39	3.39	5.00	N	Yes	1	NA
			T	UG/L			U		3.39	3.39	5.00	N	Yes	1	NA
	Magnesium	7439-95-4	D	UG/L	5260				82.7	82.7	500	Y	Yes	1	NA
			T	UG/L	5470				82.7	82.7	500	Y	Yes	1	NA
Manganese	7439-96-5	D	UG/L	391				1.35	1.35	5.00	Y	Yes	1	NA	

Lab Sample ID	180-93097-4
Sys Sample Code	JSF-STR-PB06-CC-SUR-20190718
Sample Name	JSF-STR-PB06-CC-SUR-20190718
Sample Date	7/18/2019 3:45:00 PM
Location	JSF-PB06
Sample Type	N
Parent Sample	

Analytic Method	Chemical Name	CAS Rn	Fraction	Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
SW-846 6020A	Manganese	7439-96-5	T	UG/L	529			1.35	1.35	5.00	Y	Yes	1	NA
	Molybdenum	7439-98-7	D	UG/L		U		0.610	0.610	5.00	N	Yes	1	NA
			T	UG/L		U		0.610	0.610	5.00	N	Yes	1	NA
	Nickel	7440-02-0	D	UG/L	0.475	J	RL	0.336	0.336	1.00	Y	Yes	1	NA
			T	UG/L	0.761	J	RL	0.336	0.336	1.00	Y	Yes	1	NA
	Selenium	7782-49-2	D	UG/L		U		1.51	1.51	5.00	N	Yes	1	NA
			T	UG/L		U		1.51	1.51	5.00	N	Yes	1	NA
	Silver	7440-22-4	D	UG/L		U		0.177	0.177	1.00	N	Yes	1	NA
			T	UG/L		U		0.177	0.177	1.00	N	Yes	1	NA
	Thallium	7440-28-0	D	UG/L		U		0.148	0.148	1.00	N	Yes	1	NA
			T	UG/L		U		0.148	0.148	1.00	N	Yes	1	NA
	Vanadium	7440-62-2	D	UG/L		U		0.991	0.991	1.00	N	Yes	1	NA
			T	UG/L		U		0.991	0.991	1.00	N	Yes	1	NA
	Zinc	7440-66-6	D	UG/L		U		3.22	3.22	5.00	N	Yes	1	NA
T			UG/L		U*	BE,BF	3.80	3.80	5.00	N	Yes	1	NA	
SW-846 7470A	Mercury	7439-97-6	D	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA
			T	UG/L		U		0.101	0.101	0.200	N	Yes	1	NA
SW-846 9056A	Chloride	16887-00-6	N	MG/L	1.58			0.715	0.715	1.00	Y	Yes	1	NA
	Fluoride	16984-48-8	N	MG/L	0.0779	J	RL	0.0263	0.0263	0.100	Y	Yes	1	NA
	Sulfate	14808-79-8	N	MG/L	9.44			0.380	0.380	1.00	Y	Yes	1	NA

SECTION 3

SUPPORTING DOCUMENTATION FOR QUALIFIERS

INORGANIC ANALYSIS SUPPORT DOCUMENTATION

 ESI project name: TVA JSF
 Sample Collection Dates: 7/18/19
 Job Number: 20188396.A000
 Project Manager: Amanda Cover
 Laboratory: Eurofins TA- Pitt

 Reviewed by: THW
 Approved by: AP
 Completion Date: 9/20/19

Applicable Sample No's () _____ Refer to Table 1 in the Quality Assurance Review

Deliverable:	CLP-like(Full) ()	<u>SDG No.</u>	<u>Lab Control No.</u>
	Level IV (Full) (x)	180-93097-1	_____
	Limited ()	_____	_____
	Other: _____	_____	_____

The following table indicates criteria that were examined, the identified problems, and support documentation attachments

	Criteria Examined in Detail				Problems Identified				Support Documentation Attachments			
	Check (√) if Yes or Footnote Letter for Comments Below				Check (√) if Yes or Footnote Letter for Comments Below				Check (√) if Yes or Footnote Letter for Comments Below			
	Metals	Mercury	Gen Chem		Metals	Mercury	Gen Chem		Metals	Mercury	Gen Chem	
Holding Times	x	x	x									
Blank Analysis Results	x	x	x		x				x			
Matrix Spike (Predigestion) Results	x	x	x									
Duplicate Analysis: () Field (x) Lab			x									
Quantitation of Results	x	x	x									
Detection Limit/Sensitivity	x	x	x									
Initial Calibrations	x	x	x									
Continuing Calibrations	x	x	x									
Laboratory Control Standard (LCS)	x	x	x									
ICP Linear Range Analysis	x											
ICP Interference Checks												
ICP Serial Dilutions	x											
ICP/ICPMS Post-Digestion Spike	x											
ICPMS Internal Standards	x											
GFAA Post Digestion Spikes												
GFAA Duplicate Injections												
ICP Multiple Exposures												
GFAA Standard Additions												
CRDL Standards	x	x										
Condition on Receipt	x	x	x									
Percent Solids												
Others:												

 Comments: _____

Client Sample Results

Client: Environmental Standards Inc.
Project/Site: JSF_STR_20190717_1A

Job ID: 180-93023-1

Client Sample ID: JSF-STR-EB01-20190717 ~ NA

Lab Sample ID: 180-93023-2

Date Collected: 07/17/19 08:20

Matrix: Water

Date Received: 07/22/19 10:55

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.00	0.715	mg/L			07/25/19 05:50	1
Fluoride	ND		0.100	0.0263	mg/L			07/25/19 05:50	1
Sulfate	ND		1.00	0.380	mg/L			07/25/19 05:50	1

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		2.00	0.378	ug/L		07/31/19 09:38	08/02/19 11:12	1
Arsenic	ND		1.00	0.323	ug/L		07/31/19 09:38	08/02/19 11:12	1
Barium	ND		10.0	1.60	ug/L		07/31/19 09:38	08/02/19 11:12	1
Beryllium	ND		1.00	0.182	ug/L		07/31/19 09:38	08/02/19 11:12	1
Boron	ND		80.0	38.6	ug/L		07/31/19 09:38	08/02/19 11:12	1
Cadmium	ND		1.00	0.125	ug/L		07/31/19 09:38	08/02/19 11:12	1
Calcium	ND		500	127	ug/L		07/31/19 09:38	08/02/19 11:12	1
Chromium	ND		2.00	1.53	ug/L		07/31/19 09:38	08/02/19 11:12	1
Cobalt	ND		0.500	0.0750	ug/L		07/31/19 09:38	08/02/19 11:12	1
Copper	ND		2.00	0.627	ug/L		07/31/19 09:38	08/02/19 11:12	1
Iron	ND		50.0	19.5	ug/L		07/31/19 09:38	08/02/19 11:12	1
Lead	ND		1.00	0.128	ug/L		07/31/19 09:38	08/02/19 11:12	1
Lithium	ND		5.00	3.39	ug/L		07/31/19 09:38	08/02/19 11:12	1
Magnesium	ND		500	82.7	ug/L		07/31/19 09:38	08/02/19 11:12	1
Manganese	ND		5.00	1.35	ug/L		07/31/19 09:38	08/02/19 11:12	1
Molybdenum	ND		5.00	0.610	ug/L		07/31/19 09:38	08/02/19 11:12	1
Nickel	ND		1.00	0.336	ug/L		07/31/19 09:38	08/02/19 11:12	1
Selenium	ND		5.00	1.51	ug/L		07/31/19 09:38	08/02/19 11:12	1
Silver	ND		1.00	0.177	ug/L		07/31/19 09:38	08/02/19 11:12	1
Thallium	ND		1.00	0.148	ug/L		07/31/19 09:38	08/02/19 11:12	1
Vanadium	ND		1.00	0.991	ug/L		07/31/19 09:38	08/02/19 11:12	1
Zinc	U* -1, -3, -4 6.50		5.00	3.22	ug/L		07/31/19 09:38	08/02/19 11:12	1

Method: EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.200	0.101	ug/L		07/29/19 16:49	07/30/19 13:54	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	ND		0.670	0.0218	mg/L			07/31/19 15:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10.0	10.0	mg/L			07/23/19 11:49	1
Total Suspended Solids	ND		0.500	0.500	mg/L			07/23/19 09:05	1



Client Sample Results

Client: Environmental Standards Inc.
Project/Site: JSF_STR_20190717_1A

Job ID: 180-93023-1

Client Sample ID: JSF-STR-FB01-20190718 ~ NA

Lab Sample ID: 180-93023-62

Date Collected: 07/18/19 10:50

Matrix: Water

Date Received: 07/20/19 09:15

Method: EPA 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		1.00	0.715	mg/L			07/26/19 10:21	1
Fluoride	ND		0.100	0.0263	mg/L			07/26/19 10:21	1
Sulfate	ND		1.00	0.380	mg/L			07/26/19 10:21	1

Method: EPA 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		2.00	0.378	ug/L		07/31/19 09:35	08/06/19 19:17	1
Arsenic	ND		1.00	0.323	ug/L		07/31/19 09:35	08/06/19 19:17	1
Barium	ND		10.0	1.60	ug/L		07/31/19 09:35	08/06/19 19:17	1
Beryllium	ND		1.00	0.182	ug/L		07/31/19 09:35	08/06/19 19:17	1
Boron	ND		80.0	38.6	ug/L		07/31/19 09:35	08/06/19 19:17	1
Cadmium	ND		1.00	0.125	ug/L		07/31/19 09:35	08/06/19 19:17	1
Calcium	ND		500	127	ug/L		07/31/19 09:35	08/06/19 19:17	1
Chromium	ND		2.00	1.53	ug/L		07/31/19 09:35	08/06/19 19:17	1
Cobalt	ND		0.500	0.0750	ug/L		07/31/19 09:35	08/06/19 19:17	1
Copper	ND		2.00	0.627	ug/L		07/31/19 09:35	08/06/19 19:17	1
Iron	ND		50.0	19.5	ug/L		07/31/19 09:35	08/06/19 19:17	1
Lead	ND		1.00	0.128	ug/L		07/31/19 09:35	08/06/19 19:17	1
Lithium	ND		5.00	3.39	ug/L		07/31/19 09:35	08/06/19 19:17	1
Magnesium	ND		500	82.7	ug/L		07/31/19 09:35	08/06/19 19:17	1
Manganese	ND		5.00	1.35	ug/L		07/31/19 09:35	08/06/19 19:17	1
Molybdenum	ND		5.00	0.610	ug/L		07/31/19 09:35	08/06/19 19:17	1
Nickel	ND		1.00	0.336	ug/L		07/31/19 09:35	08/06/19 19:17	1
Selenium	ND		5.00	1.51	ug/L		07/31/19 09:35	08/06/19 19:17	1
Silver	ND		1.00	0.177	ug/L		07/31/19 09:35	08/06/19 19:17	1
Thallium	ND		1.00	0.148	ug/L		07/31/19 09:35	08/06/19 19:17	1
Vanadium	ND		1.00	0.991	ug/L		07/31/19 09:35	08/06/19 19:17	1
Zinc	4.09	J B	5.00	3.22	ug/L		07/31/19 09:35	08/06/19 19:17	1

U-1,-3,-4*

4.09 J B

Method: EPA 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.200	0.101	ug/L		07/31/19 05:59	08/01/19 14:42	1

Method: SM 2340B - Total Hardness (as CaCO3) by calculation - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	ND		0.670	0.0218	mg/L			08/07/19 13:00	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10.0	10.0	mg/L			07/23/19 14:24	1
Total Suspended Solids	ND		0.500	0.500	mg/L			07/23/19 14:06	1

Eurofins TestAmerica, Pittsburgh



2A-IN
CALIBRATION VERIFICATIONS
METALS

Lab Name: Eurofins TestAmerica, Pittsburgh Job No.: 180-93097-1

SDG No.:

ICV Source: MCRIX A_00086

Concentration Units: ug/L

CCV Source: MCRIX A_00086

Analyte	ICVL 180-287504/8 08/07/2019 21:29				CCVL 180-287504/138 08/08/2019 08:15				Found	C	True	%R
	Found	C	True	%R	Found	C	True	%R				
Antimony	1.823	J	2.00	91	1.726	J	2.00	86				
Arsenic	0.9103	J	1.00	91	0.8867	J	1.00	89				
Barium	9.417	J	10.0	94	10.15		10.0	101				
Beryllium	0.9710	J	1.00	97	1.010		1.00	101				
Boron	78.54	J	80.0	98	86.71		80.0	108				
Cadmium	1.041		1.00	104	0.9973	J	1.00	100				
Calcium	477.5	J	500	95	470.7	J	500	94				
Chromium	1.890	J	2.00	94	1.604	J	2.00	80				
Cobalt	0.4290	J	0.500	86	0.4613	J	0.500	92				
Copper	2.104		2.00	105	2.056		2.00	103				
Iron	46.66	J	50.0	93	46.61	J	50.0	93				
Lead	0.9800	J	1.00	98	1.005		1.00	100				
Lithium	5.031		5.00	101	5.225		5.00	105				
Magnesium	496.5	J	500	99	483.3	J	500	97				
Manganese	4.717	J	5.00	94	4.874	J	5.00	97				
Molybdenum	4.725	J	5.00	95	4.726	J	5.00	95				
Nickel	0.8377	J	1.00	84	0.8363	J	1.00	84				
Selenium	4.047	J	5.00	81	4.007	J	5.00	80				
Silver	0.9870	J	1.00	99	0.9607	J	1.00	96				
Thallium	0.8587	J	1.00	86	0.8317	J	1.00	83				
Vanadium	0.917		1.00	92	0.861		1.00	86				
Zinc	5.046		5.00	101	4.680	J	5.00	94				

THW
8/20/19

70-130

Note! Calculations are performed before rounding to avoid round-off errors in calculated results.
Italicized analytes were not requested for this sequence.

ICVL 3176137 8/7/2019 9:29:08 PM QC Status: PASS (Initial: PASS)

User Pre-dilution: 1.000

Run	Time	6Li	7Li	9Be	10B	11B	13C	23Na	25Mg
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	21:29:16	96.657%	4.841	0.915	77.930	78.250	0.000	550.100	502.100
2	21:29:23	94.263%	5.595	1.106	75.820	78.430	0.000	537.500	493.900
3	21:29:31	95.506%	4.656	0.892	82.540	78.950	0.000	542.900	500.700
x		95.475%	100.614%	97.092%	1575.273%	1570.836%	0.000	679.381%	498.894%
σ		1.197%	n/a	n/a	n/a	n/a	0.000	n/a	n/a
%RSD		1.254	9.884	12.080	4.363	0.462	0.000	1.166	0.881
Run	Time	26Mg	27Al	28Si	37Cl	39K	43Ca	44Ca	45Sc
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	21:29:16	496.600	30.150	502.600	0.000	544.700	488.500	480.100	98.898%
2	21:29:23	495.700	30.000	506.000	0.000	518.600	504.100	472.100	97.895%
3	21:29:31	497.300	30.010	504.600	0.000	546.600	463.500	480.200	97.508%
x		496.526%	100.167%	100.879%	0.000	536.618%	485.352%	477.447%	98.100%
σ		n/a	n/a	n/a	0.000	n/a	n/a	n/a	0.718%
%RSD		0.170	0.275	0.339	0.000	2.917	4.223	0.976	0.731
Run	Time	47Ti	51V	52Cr	55Mn	56Fe	57Fe	59Co	60Ni
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	21:29:16	4.673	0.895	1.726	4.707	44.640	47.150	0.387	0.695
2	21:29:23	5.017	0.909	2.031	4.729	46.150	51.020	0.476	0.770
3	21:29:31	4.603	0.946	1.912	4.716	49.200	51.000	0.424	1.048
x		95.285%	91.660%	94.485%	94.345%	93.328%	99.445%	85.768%	83.807%
σ		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%RSD		4.651	2.857	8.141	0.225	4.986	4.481	10.440	22.200
Run	Time	63Cu	65Cu	66Zn	68Zn	75As	78Se	82Se	83Kr
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	21:29:16	1.936	2.204	5.056	4.763	0.878	3.630	5.761	0.000
2	21:29:23	2.174	2.032	5.044	4.966	0.955	4.211	4.992	0.000
3	21:29:31	2.020	2.075	5.039	4.895	0.898	4.301	5.407	0.000
x		102.158%	105.184%	100.923%	97.495%	91.040%	80.950%	107.736%	0.000
σ		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.000
%RSD		5.902	4.265	0.172	2.114	4.346	8.994	7.146	0.000
Run	Time	88Sr	89Y	95Mo	98Mo	103Rh	107Ag	109Ag	111Cd
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	21:29:16	4.955	95.614%	4.743	4.785	89.512%	1.072	1.134	1.037
2	21:29:23	5.288	101.569%	5.022	4.914	95.362%	0.971	1.052	0.994
3	21:29:31	4.556	108.224%	5.118	4.476	103.708%	0.918	0.912	1.092
x		98.660%	101.803%	99.220%	94.492%	96.194%	98.687%	103.266%	104.097%
σ		n/a	6.308%	n/a	n/a	7.134%	n/a	n/a	n/a
%RSD		7.428	6.196	3.926	4.766	7.417	7.922	10.850	4.738
Run	Time	114Cd	115In	118Sn	121Sb	123Sb	135Ba	137Ba	159Tb
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	21:29:16	1.211	92.136%	5.375	1.891	1.682	9.792	9.141	93.106%
2	21:29:23	0.962	99.007%	5.533	1.787	1.671	8.584	9.788	98.202%
3	21:29:31	1.227	104.959%	5.197	1.791	1.902	9.903	9.321	102.478%
x		113.340%	98.701%	107.368%	91.156%	87.585%	94.264%	94.167%	97.929%
σ		n/a	6.417%	n/a	n/a	n/a	n/a	n/a	4.692%
%RSD		13.120	6.502	3.127	3.245	7.435	7.761	3.543	4.791
Run	Time	203Tl	205Tl	206Pb	207Pb	208Pb	209Bi		
		ppb	ppb	ppb	ppb	ppb	ppb		
1	21:29:16	0.809	0.846	0.990	0.944	0.977	82.919%		
2	21:29:23	0.816	0.864	1.040	0.981	0.984	90.021%		
3	21:29:31	0.793	0.866	0.944	0.981	0.979	94.039%		
x		80.603%	85.873%	99.131%	96.861%	97.995%	88.993%		
σ		n/a	n/a	n/a	n/a	n/a	5.631%		
%RSD		1.470	1.267	4.882	2.237	0.343	6.328		

CCVL 3176137 8/8/2019 8:15:07 AM QC Status: PASS (Initial: PASS)

User Pre-dilution: 1.000

Run	Time	6Li	7Li	9Be	10B	11B	13C	23Na	25Mg
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	08:15:15	77.056%	7.506	1.108	86.170	85.370	0.000	436.200	473.400
2	08:15:23	78.344%	3.798	0.937	89.290	89.460	0.000	451.800	487.200
3	08:15:31	76.421%	4.372	0.986	87.900	85.290	0.000	445.500	487.300
x		77.274%	104.502%	101.037%	1755.743%	1734.197%	0.000	555.618%	482.627%
σ		0.980%	n/a	n/a	n/a	n/a	0.000	n/a	n/a
%RSD		1.268	38.190	8.733	1.778	2.752	0.000	1.769	1.648
Run	Time	26Mg	27Al	28Si	37Cl	39K	43Ca	44Ca	45Sc
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	08:15:15	478.400	29.320	534.200	0.000	501.500	509.400	461.000	94.639%
2	08:15:23	488.000	30.100	533.800	0.000	506.100	488.200	479.400	93.799%
3	08:15:31	483.600	29.940	544.800	0.000	492.900	462.600	471.700	92.892%
x		483.316%	99.289%	107.515%	0.000	500.168%	486.756%	470.704%	93.777%
σ		n/a	n/a	n/a	0.000	n/a	n/a	n/a	0.874%
%RSD		0.989	1.391	1.161	0.000	1.332	4.819	1.970	0.932
Run	Time	47Ti	51V	52Cr	55Mn	56Fe	57Fe	59Co	60Ni
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	08:15:15	4.766	0.810	1.475	4.881	46.020	44.300	0.413	0.877
2	08:15:23	4.441	0.796	1.532	4.822	45.580	43.960	0.506	1.035
3	08:15:31	4.692	0.977	1.806	4.918	48.240	54.110	0.465	0.597
x		92.662%	86.105%	80.225%	97.470%	93.226%	94.919%	92.240%	83.605%
σ		n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
%RSD		3.686	11.670	11.010	0.999	3.061	12.140	10.110	26.550
Run	Time	63Cu	65Cu	66Zn	68Zn	75As	78Se	82Se	83Kr
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	08:15:15	1.848	2.241	4.601	3.771	0.925	4.293	2.311	0.000
2	08:15:23	1.898	1.825	4.367	4.917	0.797	4.738	5.559	0.000
3	08:15:31	1.871	2.101	5.071	5.788	0.938	2.990	4.784	0.000
x		93.620%	102.780%	93.592%	96.507%	88.683%	80.142%	84.358%	0.000
σ		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.000
%RSD		1.356	10.310	7.671	20.960	8.799	22.680	40.220	0.000
Run	Time	88Sr	89Y	95Mo	98Mo	103Rh	107Ag	109Ag	111Cd
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	08:15:15	4.989	95.535%	4.639	4.724	82.080%	0.886	0.923	1.005
2	08:15:23	4.516	100.591%	4.503	4.629	86.629%	0.993	0.940	0.981
3	08:15:31	4.910	105.663%	4.628	4.825	90.910%	1.003	1.112	1.006
x		96.104%	100.596%	91.795%	94.521%	86.540%	96.077%	99.192%	99.716%
σ		n/a	5.064%	n/a	n/a	4.416%	n/a	n/a	n/a
%RSD		5.279	5.034	1.650	2.066	5.102	6.775	10.540	1.434
Run	Time	114Cd	115In	118Sn	121Sb	123Sb	135Ba	137Ba	159Tb
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	08:15:15	1.113	86.724%	5.405	1.677	1.568	10.130	10.470	85.776%
2	08:15:23	1.130	91.460%	5.234	1.808	1.780	10.890	9.909	91.402%
3	08:15:31	1.185	97.613%	5.567	1.692	1.960	10.400	10.060	96.326%
x		114.276%	91.933%	108.048%	86.288%	88.467%	104.708%	101.456%	91.168%
σ		n/a	5.460%	n/a	n/a	n/a	n/a	n/a	5.279%
%RSD		3.308	5.939	3.083	4.133	11.080	3.700	2.838	5.790
Run	Time	203Tl	205Tl	206Pb	207Pb	208Pb	209Bi		
		ppb	ppb	ppb	ppb	ppb	ppb		
1	08:15:15	0.792	0.859	1.059	1.097	1.013	61.600%		
2	08:15:23	0.780	0.836	1.028	1.073	1.026	68.454%		
3	08:15:31	0.779	0.800	0.977	1.048	0.975	73.834%		
x		78.360%	83.176%	102.141%	107.258%	100.483%	67.963%		
σ		n/a	n/a	n/a	n/a	n/a	6.132%		
%RSD		0.966	3.571	4.046	2.294	2.681	9.022		

3-IN
INSTRUMENT BLANKS
METALS

Lab Name: Eurofins TestAmerica, Pittsburgh

Job No.: 180-93097-1

SDG No.:

Concentration Units: ug/L

Analyte	RL	ICB 180-287504/6 08/07/2019 21:19		CCB1 180-287504/12 08/07/2019 21:48		CCB2 180-287504/24 08/07/2019 22:45		CCB3 180-287504/36 08/07/2019 23:41	
		Found	C	Found	C	Found	C	Found	C
Antimony	2.00	ND		ND		ND		ND	
Arsenic	1.00	ND		ND		ND		ND	
Barium	10.0	ND		ND		ND		ND	
Beryllium	1.00	ND		ND		ND		ND	
Boron	80.0	ND		ND		ND		ND	
Cadmium	1.00	ND		ND		ND		ND	
Calcium	500	ND		ND		ND		ND	
Chromium	2.00	ND		ND		ND		ND	
Cobalt	0.500	ND		ND		ND		0.08700	J
Copper	2.00	ND		ND		ND		ND	
Iron	50.0	ND		ND		ND		ND	
Lead	1.00	ND		ND		ND		ND	
Lithium	5.00	ND		ND		ND		ND	
Magnesium	500	ND		ND		ND		ND	
Manganese	5.00	ND		ND		ND		ND	
Molybdenum	5.00	ND		1.123	J	ND		ND	
Nickel	1.00	ND		ND		ND		ND	
Selenium	5.00	ND		ND		ND		ND	
Silver	1.00	ND		ND		ND		ND	
Thallium	1.00	ND		ND		ND		0.1710	J
Vanadium	1.00	ND		ND		ND		ND	
Zinc	5.00	ND		ND		ND		ND	

U* T+D Mo in 1,2

T+D Co in 3,4

No ⊕ for Tl

Italicized analytes were not requested for this sequence.

13-IN
ANALYSIS RUN LOG
METALS

Lab Name: Eurofins TestAmerica, Pittsburgh

Job No.: 180-93097-1

SDG No.:

Instrument ID: M

Analysis Method: EPA 6020A

Start Date: 08/07/2019 13:25

End Date: 08/08/2019 08:15

Lab Sample Id	D/F	T y p e	Time	Analytes																		
				A	A	B	B	B	C	C	C	C	F	L	M	M	N	P	S	S	T	V
ITUNE 180-287504/1			13:25																			
STD1 180-287504/2 IC	1		21:00	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STD2 180-287504/3 IC	1		21:05	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
STD3 180-287504/4 IC	1		21:10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ICV 180-287504/5	1		21:14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ICB 180-287504/6	1		21:19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ICVL 180-287504/7			21:24																			
ICVL 180-287504/8	1		21:29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ICSA 180-287504/9	1		21:33	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ICSAB 180-287504/10	1		21:38	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CCV 180-287504/11	1		21:43	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CCB1 180-287504/12	1		21:48	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MB 180-286758/1-A	1 R		21:52	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
LCS 180-286758/2-A	1 R		21:57	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZZZZZ			22:02																			
ZZZZZ			22:07																			
ZZZZZ			22:11																			
ZZZZZ			22:16																			
180-93097-1	1 R		22:21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93097-1	1 D		22:25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93097-2	1 R		22:30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93097-2	1 D		22:35	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CCV 180-287504/23	1		22:40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CCB2 180-287504/24	1		22:45	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93097-3	1 R		22:49	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93097-3	1 D		22:54	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93097-4	1 R		22:59	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93097-4	1 D		23:03	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZZZZZ			23:08																			
180-93099-I-1-B SD ^5	5 R		23:13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93099-D-1-C MS	1 R		23:18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93099-D-1-D MSD	1 R		23:22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
180-93099-I-1-B PDS	1 R		23:27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZZZZZ			23:32																			
CCV 180-287504/35	1		23:37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
CCB3 180-287504/36	1		23:41	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ZZZZZ			23:46																			
ZZZZZ			23:51																			
ZZZZZ			23:56																			
ZZZZZ			00:00																			
ZZZZZ			00:05																			
ZZZZZ			00:10																			

15-IN
ICP-MS INTERNAL STANDARDS RELATIVE INTENSITY SUMMARY
METALS

Lab Name: Eurofins TestAmerica, Pittsburgh Job No.: 180-93097-1

SDG No.:

ICP-MS Instrument ID: M Start Date: 08/07/2019 End Date: 08/08/2019

Lab Sample ID	Time	Internal Standards %RI For:							
		Element Tb	Q	Element Bi	Q	Element	Element	Element	Q
STD1 180-287504/2 IC	21:00	100		100					
STD2 180-287504/3 IC	21:05	88							
STD3 180-287504/4 IC	21:10	99		94					
ICV 180-287504/5	21:14	97		93					
ICB 180-287504/6	21:19	100		100					
ICVL 180-287504/8	21:29	98		89					
ICSA 180-287504/9	21:33	98		91					
ICSAB 180-287504/10	21:38	97		89					
CCV 180-287504/11	21:43	88		63					
CCB1 180-287504/12	21:48	97		88					
MB 180-286758/1-A	21:52	97		93					
LCS 180-286758/2-A	21:57	95		89					
180-93097-1	22:21	91		67					
180-93097-1	22:25	95		91					
180-93097-2	22:30	95		96					
180-93097-2	22:35	95		90					
CCV 180-287504/23	22:40	90		68					
CCB2 180-287504/24	22:45	99		97					
180-93097-3	22:49	97		96					
180-93097-3	22:54	92		78					
180-93097-4	22:59	94		81					
180-93097-4	23:03	94		93					
180-93099-I-1-B SD ^5	23:13	93		78					
180-93099-D-1-C MS	23:18	89		76					
180-93099-D-1-D MSD	23:22	92		87					
180-93099-I-1-B PDS	23:27	92		89					
CCV 180-287504/35	23:37	94		86					
CCB3 180-287504/36	23:41	99		100					
CCVL 180-287504/138	08:15	91							

THW
8/20/19



180-93097-E-1-D 8/7/2019 10:21:12 PM

User Pre-dilution: 1.000

Run	Time	6Li	7Li	9Be	10B	11B	13C	23Na	25Mg
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	22:21:20	114.600%	3.717	0.040	133.500	131.800	0.000	4533.000	7193.000
2	22:21:28	112.901%	3.075	-0.049	132.200	131.700	0.000	4548.000	7156.000
3	22:21:36	113.741%	3.967	0.042	130.200	131.300	0.000	4571.000	7254.000
x		113.747%	3.586	0.011	132.000	131.600	0.000	4551.000	7201.000
σ		0.850%	0.460	0.052	1.675	0.269	0.000	19.100	49.430
%RSD		0.747	12.840	472.300	1.269	0.204	0.000	0.420	0.687
Run	Time	26Mg	27Al	28Si	37Cl	39K	43Ca	44Ca	45Sc
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	22:21:20	7054.000	321.900	4906.000	0.000	2681.000	58640.000	58090.000	99.629%
2	22:21:28	7028.000	329.400	4937.000	0.000	2657.000	58680.000	58180.000	99.275%
3	22:21:36	7071.000	325.200	4947.000	0.000	2698.000	59490.000	58920.000	97.486%
x		7051.000	325.500	4930.000	0.000	2679.000	58940.000	58400.000	98.797%
σ		21.580	3.792	21.200	0.000	20.650	481.700	455.900	1.149%
%RSD		0.306	1.165	0.430	0.000	0.771	0.817	0.781	1.163
Run	Time	47Ti	51V	52Cr	55Mn	56Fe	57Fe	59Co	60Ni
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	22:21:20	4.309	0.922	0.323	78.380	526.300	566.400	0.304	0.676
2	22:21:28	5.566	0.940	0.398	77.930	551.400	545.100	0.358	0.709
3	22:21:36	5.058	0.872	0.416	79.240	569.900	626.600	0.315	0.707
x		4.978	0.911	0.379	78.520	549.200	579.400	0.326	0.697
σ		0.632	0.035	0.049	0.664	21.850	42.300	0.028	0.019
%RSD		12.700	3.855	12.940	0.846	3.979	7.301	8.672	2.704
Run	Time	63Cu	65Cu	66Zn	68Zn	75As	78Se	82Se	83Kr
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	22:21:20	1.135	1.156	4.922	5.162	3.404	0.303	3.242	0.000
2	22:21:28	1.189	1.342	4.556	5.740	3.212	0.464	0.410	0.000
3	22:21:36	1.182	1.133	4.963	5.931	3.703	0.619	4.200	0.000
x		1.168	1.210	4.814	5.611	3.440	0.462	2.617	0.000
σ		0.030	0.115	0.224	0.400	0.247	0.158	1.971	0.000
%RSD		2.526	9.470	4.659	7.133	7.191	34.190	75.310	0.000
Run	Time	88Sr	89Y	95Mo	98Mo	103Rh	107Ag	109Ag	111Cd
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	22:21:20	234.800	79.851%	5.463	5.069	76.089%	-0.008	0.005	-0.001
2	22:21:28	235.300	82.961%	5.054	5.164	81.171%	-0.004	-0.007	0.015
3	22:21:36	239.300	85.909%	5.437	5.592	84.066%	0.010	0.005	-0.002
x		236.500	82.907%	5.318	5.275	80.442%	-0.000	0.001	0.004
σ		2.485	3.029%	0.229	0.279	4.038%	0.010	0.007	0.009
%RSD		1.051	3.654	4.311	5.289	5.020	2980.000	652.600	238.200
Run	Time	114Cd	115In	118Sn	121Sb	123Sb	135Ba	137Ba	159Tb
		ppb	ppb	ppb	ppb	ppb	ppb	ppb	ppb
1	22:21:20	0.037	75.038%	0.404	0.091	-0.012	41.950	41.780	86.196%
2	22:21:28	0.021	79.780%	0.347	0.144	0.010	39.190	42.090	90.725%
3	22:21:36	0.001	83.704%	0.292	0.059	-0.000	42.450	42.070	94.657%
x		0.020	79.507%	0.347	0.098	-0.001	41.200	41.980	90.526%
σ		0.018	4.339%	0.056	0.043	0.011	1.755	0.174	4.234%
%RSD		91.810	5.457	16.060	43.940	1448.000	4.260	0.414	4.677
Run	Time	203Tl	205Tl	206Pb	207Pb	208Pb	209Bi		
		ppb	ppb	ppb	ppb	ppb	ppb		
1	22:21:20	0.001	-0.045	0.436	0.497	0.429	61.946%		
2	22:21:28	-0.016	-0.034	0.454	0.412	0.433	67.256%		
3	22:21:36	-0.018	-0.020	0.490	0.442	0.461	72.631%		
x		-0.011	-0.033	0.460	0.450	0.441	67.078%		
σ		0.011	0.013	0.027	0.043	0.017	5.045%		
%RSD		95.750	37.850	5.971	9.638	3.919	7.521		

SECTION 4

CASE NARRATIVE AND CHAIN-OF-CUSTODY RECORD

Sample Summary

Client: Environmental Standards Inc.
Project/Site: JSF_STR_20190718_3A

Job ID: 180-93097-1

Lab Sample ID	Client Sample ID ✓	Matrix	Collected ✓	Received ✓	Asset ID
180-93097-1	JSF-STR-PB09-CC-SUR-20190718 ~ STR-PB09	Water	07/18/19 13:45	07/23/19 09:20	
180-93097-2	JSF-STR-PB08-CC-SUR-20190718 ~ STR-PB08	Water	07/18/19 14:35	07/23/19 09:20	
180-93097-3	JSF-STR-PB07-CC-SUR-20190718 ~ STR-PB07	Water	07/18/19 15:05	07/23/19 09:20	
180-93097-4	JSF-STR-PB06-CC-SUR-20190718 ~ STR-PB06	Water	07/18/19 15:45	07/23/19 09:20	

Job Narrative
180-93097-1

Receipt

The samples were received on 7/23/2019 9:20 AM; the samples arrived in good condition, properly preserved and on ice. The temperature of the cooler at receipt was 0.8° C.

GC Semi VOA

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry

No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Login Sample Receipt Checklist

Client: Environmental Standards Inc.

Job Number: 180-93097-1

Login Number: 93097

List Number: 1

Creator: Say, Thomas C

List Source: Eurofins TestAmerica, Pittsburgh

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	