

**Data Validation Report
Tennessee Valley Authority
Cumberland Fossil Plant
Environmental Investigation Plan
Biota Samples
Chain-of-Custody: CUF_FH_20190415_1A**

This quality assurance (QA) review is based upon an examination of the data generated from the analyses of the 20 biota samples collected on April 29, 2019 and on May 1, 7, and 8, 2019, at the Tennessee Valley Authority (TVA) Cumberland Fossil Plant facility. These samples were collectively analyzed by Pace Analytical Services, Inc. (Pace), of Green Bay, Wisconsin, for total metals by SW-846 Method 6020; for total mercury by SW-846 Method 7473; and for percent moisture by American Society for Testing and Materials (ASTM) Method D2974-87.

This review was performed in accordance with the Environmental Investigation Plan, Cumberland Fossil Plant (CUF EIP; Revision 3, June 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 and ASTM 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, ASTM, and Pace Methods.

Summary

The analytical results and associated laboratory QA/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 Pace Work Order 40194793.

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

Sample Identification	Laboratory Sample Identification	Job Number	Matrix	Date Sample Collected	Parameter(s) Examined
CUF-FH-BG-CURA-F-20190507	40194793001	40194793	Biota	5/7/19	M, Hg, PM
CUF-FH-BG-CURD-F-20190508	40194793002	40194793	Biota	5/8/19	M, Hg, PM
CUF-FH-BG-CURU-F-20190429	40194793003	40194793	Biota	4/29/19	M, Hg, PM
CUF-FH-BG-WCD-F-20190501	40194793004	40194793	Biota	5/1/19	M, Hg, PM
CUF-FH-BG-WCU-F-20190508	40194793005	40194793	Biota	5/8/19	M, Hg, PM
CUF-FH-BG-F-DUP01-20190429 (Field Duplicate of CUF-FH-BG-CURU-F-20190429)	40194793006	40194793	Biota	4/29/19	M, Hg, PM
CUF-FH-BG-F-DUP02-20190501 (Field Duplicate of CUF-FH-BG-WCD-F-20190501)	40194793007	40194793	Biota	5/1/19	M, Hg, PM
CUF-FH-BG-CURA-O-20190507	40194793008	40194793	Biota	5/7/19	M, Hg, PM
CUF-FH-BG-CURD-O-20190508	40194793009	40194793	Biota	5/8/19	M, Hg, PM
CUF-FH-BG-CURU-O-20190429	40194793010	40194793	Biota	4/29/19	M, Hg, PM
CUF-FH-BG-WCD-O-20190501	40194793011	40194793	Biota	5/1/19	M, Hg, PM
CUF-FH-BG-WCU-O-20190508	40194793012	40194793	Biota	5/8/19	M, Hg, PM
CUF-FH-BG-O-DUP01-20190429 (Field Duplicate of CUF-FH-BG-CURU-O-20190429)	40194793013	40194793	Biota	4/29/19	M, Hg, PM
CUF-FH-BG-O-DUP02-20190501 (Field Duplicate of CUF-FH-BG-WCD-O-20190501)	40194793014	40194793	Biota	5/1/19	M, Hg, PM
CUF-FH-BG-CURA-L-20190507	40194793015	40194793	Biota	5/7/19	M, Hg, PM
CUF-FH-BG-CURD-L-20190508	40194793016	40194793	Biota	5/8/19	M, Hg, PM
CUF-FH-BG-CURU-L-20190429	40194793017	40194793	Biota	4/29/19	M, Hg, PM
CUF-FH-BG-WCD-L-20190501	40194793018	40194793	Biota	5/1/19	M, Hg, PM
CUF-FH-BG-WCU-L-20190508	40194793019	40194793	Biota	5/8/19	M, Hg, PM
CUF-FH-BG-L-DUP01-20190429 (Field Duplicate of CUF-FH-BG-CURU-L-20190429)	40194793020	40194793	Biota	4/29/19	M, Hg, PM

Parameters Examined

- M - Total Metals by SW-846 Method 6020.
- Hg - Mercury by SW-846 Method 7473.
- PM - Percent Moisture by ASTM Method D2974-87.

Items Reviewed	
Holding Times	Instrument Tuning and Calibrations
Sample Preservation	Reporting Limit (RL) Standard Recoveries
Chain-of-Custody (COC) Record and Case Narratives	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
Field and Laboratory Duplicate Results	Analytical Sequence
Quantitation of Positive Results	

Comments and Exceptions

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

Qualifier Summary

Analyte	Job Number	Sample(s)	Validation Qualifier	Reason for Qualification
total calcium and total mercury	40194793	all samples	J	M+
total cadmium, total calcium, total mercury, total selenium, total vanadium, and total zinc	40194793	CUF-FH-BG-F-DUP02-20190501 and CUF-FH-BG-WCD-F-20190501	J/UJ	FD
total cadmium, total selenium, total vanadium, and total zinc	40194793	CUF-FH-BG-WCD-L-20190501	J/UJ	FD

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: Amanda E. Harvey, Quality Assurance Chemist

Review reviewed and approved by: Amanda J. Cover, Senior Quality Assurance Chemist

Review approved by: Rock J. Vitale, CEAC, Technical Director of Chemistry/Principal

Date review completed: 12/20/19

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	40194793001									
				Sys Sample Code	CUF-FH-BG-CURA-F-20190507									
				Sample Name	CUF-FH-BG-CURA-F-20190507									
				Sample Date	5/7/2019 2:45:00 PM									
				Location	FH-CURA									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	82.0			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.021	0.021	0.099	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.046	J	RL	0.030	0.030	0.099	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG		U		0.030	0.030	0.099	N	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.69	0.69	2.3	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.011	0.011	0.099	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	390	J	M+	25.3	25.3	84.2	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.088	0.088	0.29	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG		U		0.019	0.019	0.099	N	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	0.33	J	RL	0.28	0.28	0.94	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.030	0.030	0.099	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.021	0.021	0.099	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG		U		0.036	0.036	0.12	N	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.041	0.041	0.14	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.27			0.050	0.050	0.17	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.050	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.29	J	RL	0.16	0.16	0.54	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.013	0.013	0.099	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	6.9			1.4	1.4	4.6	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.019	J	M+	0.0072	0.0072	0.024	Y	Yes	1	WET

				Lab Sample ID	40194793002									
				Sys Sample Code	CUF-FH-BG-CURD-F-20190508									
				Sample Name	CUF-FH-BG-CURD-F-20190508									
				Sample Date	5/8/2019 4:30:00 PM									
				Location	FH-CURD									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	82.1			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG		U		0.029	0.029	0.095	N	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.059	J	RL	0.029	0.029	0.095	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.66	0.66	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.095	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	472	J	M+	24.1	24.1	80.4	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.084	0.084	0.28	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG		U		0.018	0.018	0.095	N	Yes	1	WET
	Copper	7440-50-8	T	MG/KG		U		0.27	0.27	0.90	N	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.095	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG		U		0.034	0.034	0.11	N	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.32			0.048	0.048	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.31	J	RL	0.15	0.15	0.51	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.095	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG		U		0.032	0.032	0.10	N	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	6.2			1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.13	J	M+	0.0075	0.0075	0.025	Y	Yes	1	WET

Lab Sample ID	40194793003									
Sys Sample Code	CUF-FH-BG-CURU-F-20190429									
Sample Name	CUF-FH-BG-CURU-F-20190429									
Sample Date	4/29/2019 3:30:00 PM									
Location	FH-CURU									
Sample Type	N									
Parent Sample										
Result Unit	Final Result	Final Qual	Reason code	Final MDL	Final RL	Final QL	Final Detect	Final Report	DF	Basis
%	81.3			0.10	0.10	0.10	Y	Yes	1	WET
MG/KG		U		0.021	0.021	0.099	N	Yes	1	WET
MG/KG		U		0.030	0.030	0.099	N	Yes	1	WET
MG/KG	0.048	J	RL	0.030	0.030	0.099	Y	Yes	1	WET
MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
MG/KG		U		0.69	0.69	2.3	N	Yes	1	WET
MG/KG		U		0.011	0.011	0.099	N	Yes	1	WET
MG/KG	518	J	M+	25.2	25.2	83.9	Y	Yes	1	WET
MG/KG		U		0.088	0.088	0.29	N	Yes	1	WET
MG/KG		U		0.019	0.019	0.099	N	Yes	1	WET
MG/KG		U		0.28	0.28	0.94	N	Yes	1	WET
MG/KG		U		0.030	0.030	0.099	N	Yes	1	WET
MG/KG		U		0.021	0.021	0.099	N	Yes	1	WET
MG/KG		U		0.035	0.035	0.12	N	Yes	1	WET
MG/KG		U		0.041	0.041	0.14	N	Yes	1	WET
MG/KG	0.31			0.050	0.050	0.17	Y	Yes	1	WET
MG/KG		U		0.011	0.011	0.050	N	Yes	1	WET
MG/KG	0.29	J	RL	0.16	0.16	0.53	Y	Yes	1	WET
MG/KG		U		0.013	0.013	0.099	N	Yes	1	WET
MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
MG/KG	6.1			6.1	6.1	6.1	Y	Yes	1	WET
MG/KG	0.091	J	M+	0.0075	0.0075	0.025	Y	Yes	1	WET

				Lab Sample ID	40194793004									
				Sys Sample Code	CUF-FH-BG-WCD-F-20190501									
				Sample Name	CUF-FH-BG-WCD-F-20190501									
				Sample Date	5/1/2019 10:50:00 AM									
				Location	FH-WCD									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	81.6			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.096	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG		U		0.029	0.029	0.096	N	Yes	1	WET
	Barium	7440-39-3	T	MG/KG		U		0.029	0.029	0.096	N	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.032	0.032	0.11	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.67	0.67	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		UJ	FD	0.011	0.011	0.096	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	385	J	FD,M+	24.4	24.4	81.2	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.085	0.085	0.28	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG		U		0.018	0.018	0.096	N	Yes	1	WET
	Copper	7440-50-8	T	MG/KG		U		0.27	0.27	0.91	N	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.029	0.029	0.096	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.096	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG		U		0.034	0.034	0.12	N	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.35	J	FD	0.049	0.049	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.048	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.28	J	RL	0.15	0.15	0.52	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.096	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG		UJ	FD	0.032	0.032	0.11	N	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	7.5	J	FD	1.3	1.3	4.5	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.13	J	FD,M+	0.0072	0.0072	0.024	Y	Yes	1	WET

				Lab Sample ID	40194793005									
				Sys Sample Code	CUF-FH-BG-WCU-F-20190508									
				Sample Name	CUF-FH-BG-WCU-F-20190508									
				Sample Date	5/8/2019 10:50:00 AM									
				Location	FH-WCU									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	81.4			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.094	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG		U		0.028	0.028	0.094	N	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.039	J	RL	0.029	0.029	0.094	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.65	0.65	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.094	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	559	J	M+	23.8	23.8	79.2	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.083	0.083	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG		U		0.018	0.018	0.094	N	Yes	1	WET
	Copper	7440-50-8	T	MG/KG		U		0.27	0.27	0.89	N	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.094	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.094	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.038	0.038	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.33			0.047	0.047	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.34	J	RL	0.15	0.15	0.51	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.094	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	5.9			1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.15	J	M+	0.0076	0.0076	0.025	Y	Yes	1	WET

Lab Sample ID	40194793006
Sys Sample Code	CUF-FH-BG-F-DUP01-20190429
Sample Name	CUF-FH-BG-F-DUP01-20190429
Sample Date	4/29/2019 12:00:00 AM
Location	FH-CURU
Sample Type	FD
Parent Sample	CUF-FH-BG-CURU-F-20190429

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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	81.1			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG		U		0.029	0.029	0.095	N	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.050	J	RL	0.029	0.029	0.095	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.66	0.66	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.095	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	573	J	M+	24.1	24.1	80.4	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.084	0.084	0.28	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG		U		0.018	0.018	0.095	N	Yes	1	WET
	Copper	7440-50-8	T	MG/KG		U		0.27	0.27	0.90	N	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.095	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG		U		0.034	0.034	0.11	N	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.32			0.048	0.048	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.32	J	RL	0.15	0.15	0.51	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.095	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG		U		0.032	0.032	0.10	N	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	5.5			1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.095	J	M+	0.0076	0.0076	0.025	Y	Yes	1	WET

Lab Sample ID	40194793007
Sys Sample Code	CUF-FH-BG-F-DUP02-20190501
Sample Name	CUF-FH-BG-F-DUP02-20190501
Sample Date	5/1/2019 12:00:00 AM
Location	FH-WCD
Sample Type	FD
Parent Sample	CUF-FH-BG-WCD-F-20190501

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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	77.1			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.14			0.029	0.029	0.095	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.042	J	RL	0.029	0.029	0.095	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.66	0.66	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG	0.37	J	FD	0.010	0.010	0.095	Y	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	129	J	FD,M+	24.1	24.1	80.4	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.084	0.084	0.28	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.17			0.018	0.018	0.095	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.5			0.27	0.27	0.90	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.095	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.16			0.034	0.034	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	1.5	J	FD	0.048	0.048	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG		U		0.15	0.15	0.51	N	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG	0.024	J	RL	0.012	0.012	0.095	Y	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.38	J	FD	0.032	0.032	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	24.5	J	FD	1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.050	J	FD,M+	0.0074	0.0074	0.025	Y	Yes	1	WET

				Lab Sample ID	40194793008									
				Sys Sample Code	CUF-FH-BG-CURA-O-20190507									
				Sample Name	CUF-FH-BG-CURA-O-20190507									
				Sample Date	5/7/2019 2:45:00 PM									
				Location	FH-CURA									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	67.4			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.019	0.019	0.092	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.053	J	RL	0.028	0.028	0.092	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.16			0.028	0.028	0.092	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.030	0.030	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.64	0.64	2.1	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.092	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	161	J	M+	23.3	23.3	77.6	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.081	0.081	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.030	J	RL	0.017	0.017	0.092	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	0.93			0.26	0.26	0.87	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.027	0.027	0.092	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.019	0.019	0.092	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.060	J	RL	0.033	0.033	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.038	0.038	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.80			0.046	0.046	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.046	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.25	J	RL	0.15	0.15	0.49	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.092	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.045	J	RL	0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	31.3			1.3	1.3	4.3	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG		U		0.0069	0.0069	0.023	N	Yes	1	WET

	Lab Sample ID	40194793009												
	Sys Sample Code	CUF-FH-BG-CURD-O-20190508												
	Sample Name	CUF-FH-BG-CURD-O-20190508												
	Sample Date	5/8/2019 4:30:00 PM												
	Location	FH-CURD												
	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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	69.1			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.021	0.021	0.099	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.048	J	RL	0.030	0.030	0.099	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.15			0.030	0.030	0.099	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.69	0.69	2.3	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.011	0.011	0.099	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	154	J	M+	25.2	25.2	83.9	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.088	0.088	0.29	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.024	J	RL	0.019	0.019	0.099	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	0.93	J	RL	0.28	0.28	0.94	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.030	0.030	0.099	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.021	0.021	0.099	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.045	J	RL	0.035	0.035	0.12	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.041	0.041	0.14	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.75			0.050	0.050	0.17	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.050	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.24	J	RL	0.16	0.16	0.53	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.013	0.013	0.099	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	32.0			1.4	1.4	4.6	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.0074	J	M+	0.0071	0.0071	0.024	Y	Yes	1	WET

	Lab Sample ID	40194793010												
	Sys Sample Code	CUF-FH-BG-CURU-O-20190429												
	Sample Name	CUF-FH-BG-CURU-O-20190429												
	Sample Date	4/29/2019 3:30:00 PM												
	Location	FH-CURU												
	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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	67.1			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.019	0.019	0.093	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.041	J	RL	0.028	0.028	0.093	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.11			0.028	0.028	0.093	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.65	0.65	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.093	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	151	J	M+	23.6	23.6	78.5	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.082	0.082	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.025	J	RL	0.018	0.018	0.093	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.1			0.26	0.26	0.88	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.093	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.093	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.045	J	RL	0.033	0.033	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.038	0.038	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.91			0.047	0.047	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.046	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.18	J	RL	0.15	0.15	0.50	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.093	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.046	J	RL	0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	29.9			1.3	1.3	4.3	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG		U		0.0070	0.0070	0.023	N	Yes	1	WET

				Lab Sample ID	40194793011									
				Sys Sample Code	CUF-FH-BG-WCD-O-20190501									
				Sample Name	CUF-FH-BG-WCD-O-20190501									
				Sample Date	5/1/2019 10:50:00 AM									
				Location	FH-WCD									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	69.7			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.019	0.019	0.093	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.046	J	RL	0.028	0.028	0.093	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.15			0.028	0.028	0.093	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.65	0.65	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.093	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	147	J	M+	23.5	23.5	78.3	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.082	0.082	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.021	J	RL	0.018	0.018	0.093	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	0.98			0.26	0.26	0.88	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.093	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.093	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.054	J	RL	0.033	0.033	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.038	0.038	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.82			0.047	0.047	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.046	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.26	J	RL	0.15	0.15	0.50	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.093	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.036	J	RL	0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	28.2			1.3	1.3	4.3	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG		U		0.0073	0.0073	0.024	N	Yes	1	WET

				Lab Sample ID	40194793012									
				Sys Sample Code	CUF-FH-BG-WCU-O-20190508									
				Sample Name	CUF-FH-BG-WCU-O-20190508									
				Sample Date	5/8/2019 10:50:00 AM									
				Location	FH-WCU									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	70.2			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.019	0.019	0.092	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.068	J	RL	0.028	0.028	0.092	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.13			0.028	0.028	0.092	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.64	0.64	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.092	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	169	J	M+	23.4	23.4	78.1	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.082	0.082	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.026	J	RL	0.018	0.018	0.092	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	0.84	J	RL	0.26	0.26	0.88	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.092	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.092	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.045	J	RL	0.033	0.033	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.038	0.038	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.78			0.047	0.047	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.046	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.21	J	RL	0.15	0.15	0.50	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.092	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	28.2			1.3	1.3	4.3	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.0085	J	M+	0.0073	0.0073	0.025	Y	Yes	1	WET

Lab Sample ID	40194793013
Sys Sample Code	CUF-FH-BG-O-DUP01-20190429
Sample Name	CUF-FH-BG-O-DUP01-20190429
Sample Date	4/29/2019 12:00:00 AM
Location	FH-CURU
Sample Type	FD
Parent Sample	CUF-FH-BG-CURU-O-20190429

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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	67.4			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.044	J	RL	0.029	0.029	0.095	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.16			0.029	0.029	0.095	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.66	0.66	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.095	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	142	J	M+	24.0	24.0	80.0	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.084	0.084	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.024	J	RL	0.018	0.018	0.095	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.1			0.27	0.27	0.90	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.095	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.043	J	RL	0.034	0.034	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.96			0.048	0.048	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.18	J	RL	0.15	0.15	0.51	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.095	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.034	J	RL	0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	28.7			1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG		U		0.0074	0.0074	0.025	N	Yes	1	WET

Lab Sample ID	40194793014
Sys Sample Code	CUF-FH-BG-O-DUP02-20190501
Sample Name	CUF-FH-BG-O-DUP02-20190501
Sample Date	5/1/2019 12:00:00 AM
Location	FH-WCD
Sample Type	FD
Parent Sample	CUF-FH-BG-WCD-O-20190501

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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	68.9			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.019	0.019	0.092	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.060	J	RL	0.028	0.028	0.092	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.17			0.028	0.028	0.092	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.030	0.030	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.64	0.64	2.1	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG		U		0.010	0.010	0.092	N	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	157	J	M+	23.4	23.4	78.0	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.081	0.081	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.034	J	RL	0.017	0.017	0.092	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	0.94			0.26	0.26	0.87	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.092	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.092	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.048	J	RL	0.033	0.033	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.038	0.038	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	0.90			0.047	0.047	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.046	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG	0.24	J	RL	0.15	0.15	0.50	Y	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.012	0.012	0.092	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.035	J	RL	0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	27.5			1.3	1.3	4.3	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG		U		0.0075	0.0075	0.025	N	Yes	1	WET

				Lab Sample ID	40194793015									
				Sys Sample Code	CUF-FH-BG-CURA-L-20190507									
				Sample Name	CUF-FH-BG-CURA-L-20190507									
				Sample Date	5/7/2019 2:45:00 PM									
				Location	FH-CURA									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	79.9			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.021	0.021	0.10	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.15			0.030	0.030	0.10	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.033	0.033	0.11	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.70	0.70	2.3	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG	0.47			0.011	0.011	0.10	Y	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	96.9	J	M+	25.4	25.4	84.5	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.088	0.088	0.29	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.12			0.019	0.019	0.10	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.2			0.28	0.28	0.95	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.030	0.030	0.10	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.021	0.021	0.10	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.14			0.036	0.036	0.12	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG	0.047	J	RL	0.041	0.041	0.14	Y	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	1.1			0.051	0.051	0.17	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.050	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG		U		0.16	0.16	0.54	N	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG		U		0.013	0.013	0.10	N	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.26			0.033	0.033	0.11	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	20.7			1.4	1.4	4.7	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.030	J	M+	0.0076	0.0076	0.025	Y	Yes	1	WET

		Lab Sample ID	40194793016											
		Sys Sample Code	CUF-FH-BG-CURD-L-20190508											
		Sample Name	CUF-FH-BG-CURD-L-20190508											
		Sample Date	5/8/2019 4:30:00 PM											
		Location	FH-CURD											
		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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	77.8			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.14			0.029	0.029	0.095	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG		U		0.029	0.029	0.095	N	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.66	0.66	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG	0.52			0.010	0.010	0.095	Y	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	157	J	M+	24.1	24.1	80.2	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.084	0.084	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.11			0.018	0.018	0.095	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.3			0.27	0.27	0.90	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.095	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.095	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.12			0.034	0.034	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	1.2			0.048	0.048	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG		U		0.15	0.15	0.51	N	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG	0.016	J	RL	0.012	0.012	0.095	Y	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.22			0.032	0.032	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	20.3			1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.047	J	M+	0.0070	0.0070	0.023	Y	Yes	1	WET

	Lab Sample ID	40194793017												
	Sys Sample Code	CUF-FH-BG-CURU-L-20190429												
	Sample Name	CUF-FH-BG-CURU-L-20190429												
	Sample Date	4/29/2019 3:30:00 PM												
	Location	FH-CURU												
	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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	77.5			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.094	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.13			0.028	0.028	0.094	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG		U		0.029	0.029	0.094	N	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.66	0.66	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG	0.47			0.010	0.010	0.094	Y	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	178	J	M+	24.0	24.0	79.9	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.084	0.084	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.13			0.018	0.018	0.094	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.3			0.27	0.27	0.90	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.094	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.094	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.12			0.034	0.034	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	1.2			0.048	0.048	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG		U		0.15	0.15	0.51	N	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG	0.026	J	RL	0.012	0.012	0.094	Y	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.30			0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	20.6			1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.042	J	M+	0.0073	0.0073	0.025	Y	Yes	1	WET

				Lab Sample ID	40194793018									
				Sys Sample Code	CUF-FH-BG-WCD-L-20190501									
				Sample Name	CUF-FH-BG-WCD-L-20190501									
				Sample Date	5/1/2019 10:50:00 AM									
				Location	FH-WCD									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	78.5			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.093	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.099			0.028	0.028	0.093	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG	0.094			0.029	0.029	0.093	Y	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.65	0.65	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG	0.36	J	FD	0.010	0.010	0.093	Y	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	183	J	M+	23.7	23.7	79.0	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.083	0.083	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.11			0.018	0.018	0.093	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.4			0.27	0.27	0.89	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.093	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.093	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.12			0.033	0.033	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG	0.040	J	RL	0.038	0.038	0.13	Y	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	1.2	J	FD	0.047	0.047	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG		U		0.15	0.15	0.50	N	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG	0.017	J	RL	0.012	0.012	0.093	Y	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.30	J	FD	0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	20.1	J	FD	1.3	1.3	4.3	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.048	J	M+	0.0073	0.0073	0.025	Y	Yes	1	WET

				Lab Sample ID	40194793019									
				Sys Sample Code	CUF-FH-BG-WCU-L-20190508									
				Sample Name	CUF-FH-BG-WCU-L-20190508									
				Sample Date	5/8/2019 10:50:00 AM									
				Location	FH-WCU									
				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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	78.6			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.020	0.020	0.094	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.19			0.028	0.028	0.094	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG		U		0.029	0.029	0.094	N	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.031	0.031	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.66	0.66	2.2	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG	0.41			0.010	0.010	0.094	Y	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	106	J	M+	24.0	24.0	79.9	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.083	0.083	0.27	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.14			0.018	0.018	0.094	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.3			0.27	0.27	0.90	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.028	0.028	0.094	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.020	0.020	0.094	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.15			0.034	0.034	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG		U		0.039	0.039	0.13	N	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	1.2			0.048	0.048	0.16	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.011	0.011	0.047	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG		U		0.15	0.15	0.51	N	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG	0.018	J	RL	0.012	0.012	0.094	Y	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.15			0.031	0.031	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	21.6			1.3	1.3	4.4	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.066	J	M+	0.0070	0.0070	0.023	Y	Yes	1	WET

Lab Sample ID	40194793020
Sys Sample Code	CUF-FH-BG-L-DUP01-20190429
Sample Name	CUF-FH-BG-L-DUP01-20190429
Sample Date	4/29/2019 12:00:00 AM
Location	FH-CURU
Sample Type	FD
Parent Sample	CUF-FH-BG-CURU-L-20190429

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
ASTM D2974-87	Percent Moisture	MOISTURE	N	%	77.6			0.10	0.10	0.10	Y	Yes	1	WET
SW-846 6020A	Antimony	7440-36-0	T	MG/KG		U		0.019	0.019	0.091	N	Yes	1	WET
	Arsenic	7440-38-2	T	MG/KG	0.18			0.027	0.027	0.091	Y	Yes	1	WET
	Barium	7440-39-3	T	MG/KG		U		0.028	0.028	0.091	N	Yes	1	WET
	Beryllium	7440-41-7	T	MG/KG		U		0.030	0.030	0.10	N	Yes	1	WET
	Boron	7440-42-8	T	MG/KG		U		0.64	0.64	2.1	N	Yes	1	WET
	Cadmium	7440-43-9	T	MG/KG	0.67			0.010	0.010	0.091	Y	Yes	1	WET
	Calcium	7440-70-2	T	MG/KG	169	J	M+	23.1	23.1	77.1	Y	Yes	1	WET
	Chromium	7440-47-3	T	MG/KG		U		0.081	0.081	0.26	N	Yes	1	WET
	Cobalt	7440-48-4	T	MG/KG	0.19			0.017	0.017	0.091	Y	Yes	1	WET
	Copper	7440-50-8	T	MG/KG	1.3			0.26	0.26	0.87	Y	Yes	1	WET
	Lead	7439-92-1	T	MG/KG		U		0.027	0.027	0.091	N	Yes	1	WET
	Lithium	7439-93-2	T	MG/KG		U		0.019	0.019	0.091	N	Yes	1	WET
	Molybdenum	7439-98-7	T	MG/KG	0.13			0.033	0.033	0.11	Y	Yes	1	WET
	Nickel	7440-02-0	T	MG/KG	0.042	J	RL	0.037	0.037	0.13	Y	Yes	1	WET
	Selenium	7782-49-2	T	MG/KG	1.4			0.046	0.046	0.15	Y	Yes	1	WET
	Silver	7440-22-4	T	MG/KG		U		0.010	0.010	0.046	N	Yes	1	WET
	Strontium	7440-24-6	T	MG/KG		U		0.15	0.15	0.49	N	Yes	1	WET
	Thallium	7440-28-0	T	MG/KG	0.024	J	RL	0.012	0.012	0.091	Y	Yes	1	WET
	Vanadium	7440-62-2	T	MG/KG	0.44			0.030	0.030	0.10	Y	Yes	1	WET
	Zinc	7440-66-6	T	MG/KG	20.2			1.3	1.3	4.2	Y	Yes	1	WET
SW-846 7473	Mercury	7439-97-6	T	MG/KG	0.047	J	M+	0.0070	0.0070	0.023	Y	Yes	1	WET

SECTION 3

SUPPORTING DOCUMENTATION FOR QUALIFIERS



INORGANIC ANALYSIS SUPPORT DOCUMENTATION

ESI project name: CUF EI Biota
Sample Collection Dates: 4/29/19, 5/1/19,
5/7/19-5/8/19
Job Number: 20188111.A000
Project Manager:
Laboratory: Pace-Green Bay

Reviewed by: Amanda Harvey
Approved by: AJC
Completion Date: 10/19

Applicable Sample No's (X)

Refer to Table 1 in the Quality Assurance Review

Deliverable:	CLP (Full) ()	40194793	
	Level IV (Full) (X)		
	Limited ()		
	Other:		

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

Comments: All results are acceptable unless otherwise qualified.

NOTES:

Qual: Qualifier(s) based on evaluation(s) other than Total/ vs. Dissolved comparison, if applicable (J, U, U* or B)

RPD: Relative Percent Difference

QL: Quantitation Limit

MDL: Method Detection Limit

RL: Reporting Limit. RL = QL for QL reporting and MDL for MDL reporting.

J: The analyte concentration should be considered estimated
H: The limit of detection is the lowest concentration at which the analyte can be detected.

U: The analyte was not detected in the sample at or above the RL indicated. The RL will be used for comparison purposes.

UJ: The analyte was not detected in the sample at or above the Reporting Limit Indicated. The RL is approximate.

R: The analyte was analyzed for and detected, but sample results are unreliable. The presence or absence of the analyte cannot be verified.
UR: The analyte was analyzed for and not detected, but the determination that the analyte was not present in the sample is unreliable. The presence or absence of the analyte cannot be verified.

U* The result was blank qualified. The RL will be used for comparison purposes.

NA: The MDL (for QL reporting), RPD or Difference is not applicable

Comments:

**ENVIRONMENTAL STANDARDS, INC.
EVALUATION OF DUPLICATE RESULTS**

NOTES:

Qual: Qualifier(s) based on evaluation(s) other than Total/ vs. Dissolved comparison, if applicable (J, U, U* or B)

RPD: Relative Percent Difference

QL: Quantitation Limit

MDL: Method Detection Limit

RL: Reporting Limit. RL = QL for QL reporting and MDL for MDL reporting

J: The analyte concentration should be considered estimated

U: The analyte was not detected in the sample at or above the RL indicated. The RL will be used for comparison purposes.

UJ: The analyte was not detected in the sample at or above the Reporting Limit Indicated. The RL is approximate.

R: The analyte was analyzed for and detected, but sample results are unreliable. The presence or absence of the analyte cannot be verified.

UR: The analyte was analyzed for and not detected, but the determination that the analyte was not present in the sample is unreliable. The pre-

U* absence of the analyte cannot be verified.
The result was blank qualified. The RL will be used for comparison purposes.

NA: The MDL (for QL reporting), RPD or Difference is not applicable

Comments.

SAMPLE NO.

FORM V INORGANIC-1
MATRIX SPIKE SAMPLE RECOVERY

1946250MS

Lab Name: Pace Analytical - Green Bay SDG No.: 40194793 Contract: 0777010 CUMBERLAND

Matrix: Tissue Basis: Wet Parent Sample ID: CUF-FH-BG-CURA-F-

Percent Moisture: _____

75-125

Analyte	Units	Control Limit %R	Spiked Sample Result (SSR)	Sample Result (SR)	Spike Added (SA)	%R
Antimony	mg/kg	75-125	5.4	<0.021	5.0	109
Arsenic	mg/kg	75-125	5.2	0.046J	5.0	104
Barium	mg/kg	75-125	5.1	<0.030	5.0	102
Beryllium	mg/kg	75-125	4.7	<0.033	5.0	94
Boron	mg/kg	75-125	9.3	<0.69	9.9	92
Cadmium	mg/kg	75-125	5.2	<0.011	5.0	105
Calcium	mg/kg	75-125	753 ✓	390	249	146* ✓
Chromium	mg/kg	75-125	5.0	<0.088	5.0	100
Cobalt	mg/kg	75-125	4.9	<0.019	5.0	qq
Copper	mg/kg	75-125	5.1	0.33J	5.0	96
Lead	mg/kg	75-125	5.1	<0.030	5.0	102
Lithium	mg/kg	75-125	4.6 ✓	<0.021	5.0	92 ✓
Molybdenum	mg/kg	75-125	4.8	<0.036	5.0	96
Nickel	mg/kg	75-125	5.0 ✓	<0.041	5.0	100 ✓
Selenium	mg/kg	75-125	5.8	0.27	5.0	111
Silver	mg/kg	75-125	2.0	<0.011	2.5	80
Strontium	mg/kg	75-125	5.4	0.29J	5.0	102
Thallium	mg/kg	75-125	5.1	<0.013	5.0	103
Vanadium	mg/kg	75-125	5.1	<0.033	5.0	102
Zinc	mg/kg	75-125	28.8	6.9	19.9	110

JIM* ✓
#1-20

* Spike Recovery outside QC Limits

10/24/2019 07:21

40194793

SAMPLE NO.

1950125MS

FORM V INORGANIC-1
MATRIX SPIKE SAMPLE RECOVERY

Lab Name: Pace Analytical - Green Bay SDG No. : 40194793 Contract: 0777010 CUMBERLAND

Matrix: Tissue Basis: Wet Parent Sample ID: CUF-FH-BG-CURA-F-

Percent Moisture: _____

75-125

Analyte	Units	Control Limit %R	Spiked Sample Result (SSR)	Sample Result (SR)	Spike Added (SA)	%R
Mercury	mg/kg	80-120	0.20	0.019J	0.14	130*

← J/M*
 #1-20

* Spike Recovery outside QC Limits

10/15/2019 15:21

40194793

SAMPLE NO.

1950126MSD

FORM V INORGANIC-2
MATRIX SPIKE SAMPLE RECOVERY

Lab Name: Pace Analytical - Green Bay SDG No. : 40194793 Contract: 0777010 CUMBERLAND

Matrix: Tissue Basis: Wet Parent Sample ID: CUF-FH-BG-CURA-F-

Percent Moisture: _____

Analyte	Units	Control Limit %R	Spiked Sample Result (SSR)	Sample Result (SR)	Spike Added (SA)	%R
Mercury	mg/kg	80-120	0.21	0.019J	0.14	134* J/M* #1-20

* Spike Recovery outside QC Limits

10/15/2019 15:21

40194793

SECTION 4

CASE NARRATIVES AND CHAIN-OF-CUSTODY RECORD



CASE NARRATIVE - METALS ANALYSIS

Lab Report Number (SDG): 40194793

Client: TENNESSEE VALLEY AUTHORITY

Project Name: CUMBERLAND FOSSIL PLANT

Project Number: 0777010

1. RECEIPT

Samples were received frozen on dry ice. Sample PREP BLANK 40194793-021-A was generated in the laboratory by rinsing the equipment used to stir the tissue samples with deionized water.

2. HOLDING TIMES

- A. **Sample Preparation:** The samples, with the exception of PREP BLANK 40194793-021-A, were kept frozen prior to analysis, therefore the sample hold-time criteria is not applicable.
- B. **Sample Analysis:** All method required holding times were met.

3. METHOD

Preparation: SW846 3050B, 7473

Analysis: SW846 6020, 7473

4. PREPARATION

Sample preparation proceeded normally. Although sample PREP BLANK 40194793-021-A consists of deionized water, the sample was prepared in a manner consistent with the other tissue samples in this SDG (i.e., as if it were a tissue sample).

5. ANALYSIS

- A. **Calibration:**
 - 1. **Initial verification:** All method acceptance criteria were met.
 - 2. **Continuing verification:** All method acceptance criteria were met.
 - 3. **Reporting limit verification (CRDL):** All method acceptance criteria were met. Due to software limitations, the percent recovery for Calcium and Copper are based on the water reporting limits rather than the tissue reporting limits and appear to recover two (Ca) and five (Cu) times higher than the true value.
- B. **Blanks:**
 - 1. **Initial calibration:** All method acceptance criteria were met.
 - 2. **Continuing calibration:** All method acceptance criteria were met.
 - 3. **Method:** All project specific acceptance criteria were met.
 - 4. **Chicken:** A chicken blank is prepared and analyzed with each sample batch to determine the background contamination levels of the chicken used for the laboratory control spike (LCS). The chicken blank is analyzed down to the laboratory MDL. Calcium, Selenium, and Zinc were detected at a level above the MDL in the chicken blank. The chicken blank results for these analytes were subtracted from the associated LCS results prior to calculating the percent recovery of the spike.
- C. **Spikes:**
 - 1. **Lab Control Spike (LCS):** The associated LCS met all in-house accuracy and precision criteria.
 - 2. **SRM:** A Standard Reference Material was analyzed with this analytical batch.
 - 3. **Matrix Spike / Duplicate (MS/MSD):** Sample CUF-FH-BG-CURA-F-20190507 was designated as the 6020 and 7473 matrix spike sample for this SDG. All in-house accuracy and precision criteria were met with the following exceptions. The recoveries of Mercury were above control criteria in the MS and MSD. The recovery of Calcium was above control criteria in the MS. The "M0" data qualifier was applied to the final report.
- D. **Sample Duplicates:** Not applicable.



- E. **Internal Standards:** All in-house acceptance criteria were met for the internal standards used for quantification.
- F. **ICPMS Interference Check Samples:** All acceptance criteria were met.
- G. **Samples:** Sample analyses proceeded normally.
- H. **Dilutions:** None required for this SDG.
- I. **Reanalysis:** None required for this SDG.
- J. **Comments:** Samples were reported on a wet weight basis.

I certify that this data package is in compliance, with the terms and conditions agreed to by **Pace Analytical Services, LLC** and by the client, both technically and for completeness, except for the conditions detailed above. The Laboratory Manager or his designee, as verified by the following signature, has authorized release of the data contained in this completed data package:

Signed: Jill A. Duranceau Date: 10/25/19
Name: Jill A Duranceau Position: Quality Assurance Auditor

PROJECT NARRATIVE

Project: 0777010 CUMBERLAND FOSSIL PLAN

Pace Project No.: 40194793

Method: EPA 6020

Description: 6020 MET ICPMS

Client: TENNESSEE VALLEY AUTHORITY

Date: October 22, 2019

General Information:

21 samples were analyzed for EPA 6020. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:

The samples were prepared in accordance with EPA 3050B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 335259

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 40194793001

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MS (Lab ID: 1946250)
 - Calcium

QC Batch: 336121

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 40194816001

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MS (Lab ID: 1951524)
 - Strontium
- MSD (Lab ID: 1951525)
 - Strontium

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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Page 6 of 44

PROJECT NARRATIVE

Project: 0777010 CUMBERLAND FOSSIL PLAN

Pace Project No.: 40194793

Method: EPA 7473

Description: 7473 Mercury, Tissue

Client: TENNESSEE VALLEY AUTHORITY

Date: October 22, 2019

General Information:

21 samples were analyzed for EPA 7473. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: 335819

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 40194793001

M0: Matrix spike recovery and/or matrix spike duplicate recovery was outside laboratory control limits.

- MS (Lab ID: 1950125)
 - Mercury
- MSD (Lab ID: 1950126)
 - Mercury

Additional Comments:

REPORT OF LABORATORY ANALYSIS

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Page 7 of 44

PROJECT NARRATIVE

Project: 0777010 CUMBERLAND FOSSIL PLAN

Pace Project No.: 40194793

Method: ASTM D2974-87

Description: Percent Moisture Reportable

Client: TENNESSEE VALLEY AUTHORITY

Date: October 22, 2019

General Information:

20 samples were analyzed for ASTM D2974-87. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):

All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:

All criteria were within method requirements with any exceptions noted below.

Internal Standards:

All internal standards were within QC limits with any exceptions noted below.

Surrogates:

All surrogates were within QC limits with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:

All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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Page 8 of 44



Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

COOLER No.:	1	of	5
COC No.:	CUF FH 20190415 1A		
1 of 8 Pages			
Task Desc.:	CUF_FH		



Tennessee Valley Authority

TVA Environmental Investigations

Chain-of-Custody / Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed and accurate.

COOLER No.:	1	of	8
COC No.:	CUF_FH_20190415_1A		
2 of 8 Pages			
Task Desc:	CUF_FH		

Page 42 of 44

Pace Analytical Services, LLC
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Client Name: TVA

Sample Preservation Receipt Form

Project # U0194793All containers needing preservation have been checked and noted below: Yes No N/A

Lab Lot# of pH paper:

Lab Std #ID of preservation (if pH adjusted):

Initial when completed:

Date/
Time:

Pace Lab #	AG1U	Glass	BP1U	Plastic	DG9A	Vials	BP3N	BP3S	DG9T	VG9U	VG9H	VG9M	VG9D	JGFU	WGFU	WPFU	SPST	ZPLC	General	VOA Vials (>6mm) *	H2SO4 pH ≤2	NaOH+Zn Act pH ≥9	NaOH pH ≥12	HNO3 pH ≤2	pH after adjusted	Volume (mL)
001																										2.5 / 5 / 10
002																										2.5 / 5 / 10
003																										2.5 / 5 / 10
004																										2.5 / 5 / 10
005																										2.5 / 5 / 10
006																										2.5 / 5 / 10
007																										2.5 / 5 / 10
008																										2.5 / 5 / 10
009																										2.5 / 5 / 10
010																										2.5 / 5 / 10
011																										2.5 / 5 / 10
012																										2.5 / 5 / 10
013																										2.5 / 5 / 10
014																										2.5 / 5 / 10
015																										2.5 / 5 / 10
016																										2.5 / 5 / 10
017																										2.5 / 5 / 10
018																										2.5 / 5 / 10
019																										2.5 / 5 / 10
020																										2.5 / 5 / 10

Exceptions to preservation check: VOA, Coliform, TOC, TOX, TOH, O&G, WI DRO, Phenolics, Other:

Headspace in VOA Vials (>6mm) : Yes No N/A *If yes look in headspace column

AG1U	1 liter amber glass	BP1U	1 liter plastic unpres	DG9A	40 mL amber ascorbic	JGFU	4 oz amber jar unpres
AGIH	1 liter amber glass HCL	BP2N	500 mL plastic HNO3	DG9T	40 mL amber Na Thio	WGFU	4 oz clear jar unpres
AG4S	125 mL amber glass H2SO4	BP2Z	500 mL plastic NaOH, Znact	VG9U	40 mL clear vial unpres	WPFU	4 oz plastic jar unpres
AG4U	120 mL amber glass unpres	BP3U	250 mL plastic unpres	VG9H	40 mL clear vial HCL		
AG5U	100 mL amber glass unpres	BP3B	250 mL plastic NaOH	VG9M	40 mL clear vial MeOH	SPST	120 mL plastic Na Thiosulfate
AG2S	500 mL amber glass H2SO4	BP3N	250 mL plastic HNO3	VG9D	40 mL clear vial DI	ZPLC	ziploc bag
BG3U	250 mL clear glass unpres	BP3S	250 mL plastic H2SO4			GN:	



Document Name: Sample Condition Upon Receipt (SCUR)	Document Revised: 25Apr2018
Document No.: F-GB-C-031-Rev.07	Issuing Authority: Pace Green Bay Quality Office

Sample Condition Upon Receipt Form (SCUR)

Project #:

Client Name: TVACourier: CS Logistics FedEx Speedee UPS Waltco
 Client Pace Other: _____

Tracking #:

WO# : 40194793



40194793

Custody Seal on Cooler/Box Present: yes no Seals intact: yes noCustody Seal on Samples Present: yes no Seals intact: yes noPacking Material: Bubble Wrap Bubble Bags None OtherThermometer Used SR - 82 Type of Ice: Wet Blue Dry None Samples on ice, cooling process has begunCooler Temperature Uncorr: 11 /Corr: 11Temp Blank Present: yes noBiological Tissue is Frozen: yes no

Person examining contents:

Date: 9/11/19Initials: DP

Temp should be above freezing to 6°C.

Biota Samples may be received at ≤ 0°C.

Chain of Custody Present:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	1.
Chain of Custody Filled Out:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	2.
Chain of Custody Relinquished:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	3.
Sampler Name & Signature on COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	4.
Samples Arrived within Hold Time:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5.
- VOA Samples frozen upon receipt	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Date/Time:
Short Hold Time Analysis (<72hr):	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	6.
Rush Turn Around Time Requested:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	7.
Sufficient Volume:		8.
For Analysis: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No MS/MSD: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A		
Correct Containers Used:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	9.
-Pace Containers Used:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
-Pace IR Containers Used:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Containers Intact:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	10.
Filtered volume received for Dissolved tests	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	11.
Sample Labels match COC:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A	<u>007 RD BG-L-DUP 02-</u>
-Includes date/time/ID/Analysis	Matrix: <u>B</u>	<u>9/11/19</u>
Trip Blank Present:	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	13.
Trip Blank Custody Seals Present	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution:

If checked, see attached form for additional comments

Person Contacted:

Date/Time:

Comments/ Resolution: 0 789696228174 ± -5, 789696196289 ± 0, 78969626410 ± -5,
789601114169 ± -5, 789696128701 ± -5

Project Manager Review:

An Rv TN

Date:

9/11/19Page 2 of 2