

September 10, 2019

Roy Quinn
TVA Cumberland Fossil Plant
815 Cumberland City Road
Cumberland City, TN 37050

RE: TVA Cumberland Fossil Plant Project/0777010 – Analytical Report
RJ Lee Group Project Number AOH1055321-0

Dear Mr. Quinn,

RJ Lee Group, Inc. (RJLG) Monroeville laboratory received 11 samples on September 4, 2019 associated with Tennessee Valley Authority (TVA) Cumberland Fossil Plant. The samples were logged into RJ Lee Group project number AOH1055321-0 and assigned RJLG sample numbers as indicated in Appendix A.

The samples were received in good condition with all custody seals in place and intact. Attached in Appendix A is the signed sample receipt confirmation form, revised COC and sample receipt check list.

These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which the results are used or interpreted. Unless notified to return the samples covered in this report, RJ Lee Group will store them for a period of ninety (90) days before discarding.

Should you have any questions regarding this information, please do not hesitate to contact us.

Sincerely,



Monica McGrath-Koerner
Geologist

Attachments: Chain of Custody Forms
Mineral Identification Report

Appendix A
Chain of Custody Forms

Original Issue: 09/16/2005
 Effective Date: May 2014
 Approved By: Quality Assurance

Form A FOR.002.4
 Supersedes: Form FOR-002A Rev. 03
 Page 1 of 2

Chain of Custody
RJ Lee Group Work Order #: AOH1055321-0
Project Name/Case #: Cumberland Fossil Plant / 0777010

Received From:	Relinquished To:
Tyler Baker Tennessee Valley Authority TVA Chickamauga Power Service Center Chattanooga, TN 37415 United States Main: 423-876-6733	RJLee Group, Inc. 350 Hochberg Road Monroeville, PA 15146 United States Main: 724-325-1776 Fax: 724-325-1775

Sample ID	Client Sample ID	Date Received
10487079	CUF-SED-UT03-CORCC-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487080	CUF-SED-UT03-CORCC-0.5/1.0-20190821	09/04/2019 8:56 AM EDT
10487081	CUF-SED-UT03-CORLB-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487082	CUF-SED-UT02-CORCC-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487083	CUF-SED-UT02-CORRB-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487084	CUF-SED-UT02-CORRB-0.5/2.0-20190821	09/04/2019 8:56 AM EDT
10487085	CUF-SED-UT01-CORRB-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487086	CUF-SED-UT01-CORLB-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487087	CUF-SED-UT01-CORCC-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487088	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	09/04/2019 8:56 AM EDT
10487089	CUF-SED-UT01-DUP01-20190821	09/04/2019 8:56 AM EDT
10487090	QC_CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	09/04/2019 8:56 AM EDT

	Received From: Tyler Baker	<i>Method of Shipment:</i> Federal Express
	Company: Tennessee Valley Authority	Date: 09/04/2019
	Received By: Monica Carse	<i>Package Condition Upon Receipt:</i> Sealed
	Company: RJ Lee Group, Inc.	Date: 09/04/2019

	Relinquished	<i>Method of Shipment:</i>
	Company:	Date:
	Received By:	<i>Package Condition Upon Receipt:</i>
	Company:	Date:

	Relinquished	<i>Method of Shipment:</i>
	Company:	Date:
	Received By:	<i>Package Condition Upon Receipt:</i>
	Company:	Date:

**RJ Lee Group
Sample Receipt and Log in Check List**

Client:	TVA	Date Received:	9/4/2019	Log in Date:	9/4/2019
Time Received:	8:56 AM	By:	Monica Carse	COC# :	CUF_SED_20190821_1C
Project:	AOH1055321-0	# Coolers Received	1	Means of Shipment:	FedEx
Air Bill:	7895 5673 0399				

As Received Screen	Yes	No	Comments
Were the Coolers received in good condition?	✓		
Was there evidence of tampering?		✓	
Are Custody Seals intact and in good condition?	✓		
Were Coolers received between 2 and 4 degrees C?	N/A		
Were all samples intact?	✓		
Were all samples accurately labeled?	✓		
Was the COC received in good condition?	✓		
Did the sample ID on COC match the ID on the sample jars?	✓		
Were there any discrepancies among samples and COC?		✓	
Is the COC completely filled out?	✓		
Was the COC relinquished properly?	✓		

List any anomalies associated with Sample Receipt

N/A

Analyst Signature: M. Carse 09-04-19

Manager Signature: [Signature] 09-04-19



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	1
COC No:	CUF_SED_20190821_1C		
1 of 1 Pages			
Task Desc:	CUF_SED		

Required Ship to Lab:		Required Project Information:		Required Sampler Information		
Lab Name:	RJ Lee Group, Inc.	Site ID #:	CUMBERLAND FOSSIL PLANT		Sampler: Tyler Baker	
Lab Address:	350 Hochberg Road Monroeville, PA 15146	Project #:	0777010		Sampling Company: TVA	
Lab Manager Contact Information		Site Address	815 Cumberland City Road		Address: TVA Chickamauga Power Service Center, 4601 N. Access Road, 37415	
		City	Cumberland City	State, Zip:	TN, 37763	City/State: Chattanooga, TN 37415
		Site PM Name:	Roy Quinn		Phone: 423-876-6733	
Lab PM:	Monica Carse	Phone/Fax:	423-751-3753		Sampling Team Number: 1	
Phone/Fax:	724.325.1776	Site PM Email:	jrquinn@tva.gov		Send EDD/Hard Copy to: tva_deliverables@envstd.com	
Lab Email:	MCarse@rjleegroup.com			Analysis Turnaround Time		

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth		MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD
			Depth Unit	Meters								
			Start Depth	End Depth								
1	CUF-SED-UT03-CORCC-0.0/0.5-20190821	SED-UT03	0.0	0.5	SED	G	N	8/21/2019	1510	1		<input type="checkbox"/>
2	CUF-SED-UT03-CORCC-0.5/1.0-20190821	SED-UT03	0.5	1.0	SED	G	N	8/21/2019	1510	1		<input type="checkbox"/>
3	CUF-SED-UT03-CORLB-0.0/0.5-20190821	SED-UT03	0.0	0.5	SED	G	N	8/21/2019	1525	1		<input type="checkbox"/>
4	CUF-SED-UT02-CORCC-0.0/0.5-20190821	SED-UT02	0.0	0.5	SED	G	N	8/21/2019	1545	1		<input type="checkbox"/>
5	CUF-SED-UT02-CORRB-0.0/0.5-20190821	SED-UT02	0.0	0.5	SED	G	N	8/21/2019	1615	1		<input type="checkbox"/>
6	CUF-SED-UT02-CORRB-0.5/2.0-20190821	SED-UT02	0.5	2.0	SED	G	N	8/21/2019	1615	1		<input type="checkbox"/>
7	CUF-SED-UT01-CORRB-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1650	1		<input type="checkbox"/>
8	CUF-SED-UT01-CORLB-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1710	1		<input type="checkbox"/>
9	CUF-SED-UT01-CORCC-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1700	1		<input type="checkbox"/>
10	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1720	1		<input type="checkbox"/>
11	CUF-SED-UT01-DUP01-20190821	--	NA	NA	SED	G	FD	8/21/2019	--	1		<input type="checkbox"/>
12												<input type="checkbox"/>
13												<input type="checkbox"/>

Additional Comments/Special Instructions:

RELINQUISHED BY / AFFILIATION		DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions			
Tyler Baker / TVA		9-3-19	1500	M. Canale ^{RT} / KCS GROUP	09-04-19	08:56 ^{am}	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No
							<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
							<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
							<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
							<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
SHIPPING METHOD:		SAMPLER NAME AND SIGNATURE								
Fedex		Tyler Baker <i>Tyler Baker</i>								

Custody Seal 641266

A0H1055321-0

TVA Environmental Investigations



Tennessee Valley Authority

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	1
COC No.:	CUF_SED 20190821_1C		
1 of 1 Pages			
Task Desc:	CUF_SED		

#b090619

Required Ship to Lab:		Required Project Information:		Required Sampler Information:	
Lab Name:	RJ Lee Group, Inc.	Site ID #:	CUMBERLAND FOSSIL PLANT	Sampler:	Tyler Baker
Lab Address:	350 Hochberg Road Monroeville, PA 15146	Project #:	0777010	Sampling Company:	TVA
		Site Address:	815 Cumberland City Road	Address:	TVA Chickamauga Power Service Center, 4601 N. Access Road, 37415
		City:	Cumberland City	City/State:	Chattanooga, TN 37415
		State, Zip:	TN, 37783	Phone:	423-876-6733
Lab Manager Contact Information		Site PM Name:	Roy Quinn	Sampling Team Number:	1
Lab PM:	Monica Carse	Phone/Fax:	423-751-3753	Send EDD/Hard Copy to:	tva_deliverables@envsvid.com
Phone/Fax:	724.325.1776	Site PM Email:	rquinn@tva.gov		
Lab Email:	MCarse@rjleeorgroup.com				

ITEMS #	SAMPLE ID Samples IDs MUST BE UNIQUE	SAMPLE LOCATION	Sample Depth		MATRIX CODE	G= GRAB C=COMP	SAMPLE TYPE	SAMPLE DATE	SAMPLE TIME	# OF CONTAINERS	Comments/ Lab Sample I.D.	MS/MSD	Analysis CUF_SEDIMENT PLAN
			Depth Unit	Meters									
1	CUF-SED-UT03-CORCC-0.0/0.5-20190821	SED-UT03	0.0	0.5	SED	G	N	8/21/2019	1510	1			X
2	CUF-SED-UT03-CORCC-0.5/1.0-20190821	SED-UT03	0.5	1.0	SED	G	N	8/21/2019	1510	1			X
3	CUF-SED-UT03-CORLB-0.0/0.5-20190821	SED-UT03	0.0	0.5	SED	G	N	8/21/2019	1525	1			X
4	CUF-SED-UT02-CORCC-0.0/0.5-20190821	SED-UT02	0.0	0.5	SED	G	N	8/21/2019	1545	1			X
5	CUF-SED-UT02-CORRB-0.0/0.5-20190821	SED-UT02	0.0	0.5	SED	G	N	8/21/2019	1615	1			X
6	CUF-SED-UT02-CORRB-0.5/2.0-20190821	SED-UT02	0.5	2.0	SED	G	N	8/21/2019	1615	1			X
7	CUF-SED-UT01-CORRB-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1650	1			X
8	CUF-SED-UT01-CORLB-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1710	1			X
9	CUF-SED-UT01-CORCC-0.0/0.5-20190821	SED-UT01	0.0	0.5	SED	G	N	8/21/2019	1700	1			X
10	CUF-SED-UT01.5-CORCC-0.0/0.5-20190821	SED-UT01.5	0.0	0.5	SED	G	N	8/21/2019	1720	1			X
11	CUF-SED-UT01-DUP01-20190821	SED-UT01	NA	NA	SED	G	FD	8/21/2019	--	1			X
12													
13													

Additional Comments/Special Instructions:

Custody Seal 641266

RELINQUISHED BY / AFFILIATION		DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	Sample Receipt Conditions			
Tyler Baker / TVA		9-3-19	1500	M. Carney / RJ Lee Group	09-04-19	08:56	<input checked="" type="checkbox"/> Temp in °C <input checked="" type="checkbox"/> Sample on Ice? <input checked="" type="checkbox"/> Sample Intact? <input checked="" type="checkbox"/> Trip Blank?			
SHIPPING METHOD:		Fedex		SAMPLER NAME AND SIGNATURE		Tyler Baker				

Appendix B
Mineral Identification Report

Mineral Identification

Polarized Light Microscopy (PLM) Laboratory Report

Roy Quinn
 TVA Cumberland Fossil Plant
 815 Cumberland City Road
 Cumberland City, TN 37050 United States
 Email: jrquinn@tva.gov
 Main: 423-751-3753

Report Date: 09/10/2019
Sample Received Date: 09/04/2019
RJLG Project: AOH1055321-0
Customer COC: CUF_SED_20190821_1C
Purchase Order: 4663341
Analytical Method: Fly Ash Determination by PLM

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
CUF-SED-UT01-CORCC- 0.0/0.5-20190821	10487087	09/06/2019	08/21/2019	29%	Carbonate Clay Opagues Quartz	Grey Sediment
CUF-SED-UT01-CORLB- 0.0/0.5-20190821	10487086	09/05/2019	08/21/2019	27%	Carbonate Clay Opagues Organic Particulate Quartz	Grey-Brown Sediment
CUF-SED-UT01-CORRB- 0.0/0.5-20190821	10487085	09/05/2019	08/21/2019	21%	Amphibole Carbonate Opagues Quartz	Brown Sediment
CUF-SED-UT01-DUP01-2 0190821	10487089	09/06/2019	08/21/2019	29%	Carbonate Clay Opagues Quartz	Dark Brown Sediment
CUF-SED-UT01.5-CORC C-0.0/0.5-20190821	10487088	09/06/2019	08/21/2019	30%	Carbonate Clay Opagues Quartz	Dark Brown Sediment

Customer Sample # :	RJLG ID	Date Analyzed	Date Collected	Area % Fly Ash	Non-Fly Ash Components	Comments
CUF-SED-UT02-CORCC- 0.0/0.5-20190821	10487082	09/06/2019	08/21/2019	41%	Carbonate Clay Opaques Quartz	Grey Sediment
CUF-SED-UT02-CORRB- 0.0/0.5-20190821	10487083	09/06/2019	08/21/2019	29%	Carbonate Clay Opaques Quartz	Dark Brown Sediment
CUF-SED-UT02-CORRB- 0.5/2.0-20190821	10487084	09/05/2019	08/21/2019	10%	Carbonate Opaques Organic Particulate Quartz	Brown Sediment
CUF-SED-UT03-CORCC- 0.0/0.5-20190821	10487079	09/06/2019	08/21/2019	22%	Carbonate Clay Opaques Quartz	Light Grey-Brown Sediment
CUF-SED-UT03-CORCC- 0.5/1.0-20190821	10487080	09/06/2019	08/21/2019	32%	Carbonate Clay Opaques Quartz	Light Brown Sediment
CUF-SED-UT03-CORLB- 0.0/0.5-20190821	10487081	09/06/2019	08/21/2019	22%	Carbonate Clay Opaques Quartz	Brown Sediment
QC_CUF-SED-UT01.5-C ORCC-0.0/0.5-20190821	10487090	09/06/2019	08/21/2019	28%	NA	Dark Brown Sediment

Disclaimer Notes

- * Samples will be returned to client immediately upon the release of final report.
- * These results are submitted pursuant to RJ Lee Group's current terms and conditions of sale, including the company's standard warranty and limitation of liability provisions. No responsibility or liability is assumed for the manner in which these results are used or interpreted.
- * This test report relates to the items tested.
- * Any reproduction of this document must include the entire document in order for the report to be valid.
- * This report may not be used to claim product endorsement by NVLAP Lab Code 101208-0 or any agency of the U.S. Government.
- * Sample(s) for this project were analyzed at our: Monroeville, PA (AIHA # 100364, NVLAP # 101208-0, NY ELAP # 10884) facility.
- * If RJ Lee Group, Inc. did not collect the samples analyzed, the verifiability of the laboratory's results is limited to the reported values.
- * For the purposes of this method, Fly Ash is defined as any particle consistent with Coal Ash.
- * The method reporting level is 1% and anything <1% is considered a not-detected.

Quartz – Angular anisotropic particulate with low relief.

Feldspar – Angular to blocky anisotropic particulate, low to moderate relief, biaxial, can have polysynthetic twinning.

Clay – Sheet silicates with polycrystalline or display non-uniform extinction with low to moderate relief, and zero to low birefringence. Clay also refers to particles that are less than 2.0 microns.

Opakes – Opaque is a generic term for a particle that does not transmit light. Opaque minerals are distinguished from opaque bottom ash based on morphology of fracture.

Fly Ash – Isotropic to opaque spheres, agglomeration of spheres, and angular ash particles.

Organic Particulate – Pollen, plant and insect matter, and carbonaceous matter.

Carbonates – High birefringent, can be rhombohedral, with high relief.

Diatoms – Silica rich isotropic particles with various morphologies.

Mica – Sheet silicate with moderate to high relief and low birefringence, mono-crystalline, and normal extinction.

Miscellaneous Silicate – Isotropic and anisotropic silicates, with low to high relief, identification unsure and beyond the scope of the method to identify.

Amphibole – Elongated anisotropic particulate with moderate to high relief.

Coal – Irregular to angular particles with moderate opacity, edges and thin particles are reddish brown in color.

<1% Fly Ash – Fly Ash observed, none counted.

ND – No Fly Ash detected.