TRC LOWELL

COVANTA MONTGOMERY

CLIENT # T004
REPORT # 14-371

SUBMITTED BY:
CHESTER LabNet
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CHESTER LabNet

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Case Narrative

Date: September 3, 2014

General Information

Client:	TRC Lowell
Client Number:	T004
Report Number:	14-371
Sample Description:	Quartz Filters
Sample Numbers:	14-U713 – 14-U722

Analysis

Analytes:	XRF Metals (Al - Pb)
Analytical Protocols:	X-Ray Fluorescence: EPA IO-3.3
Analytical Notes:	The laboratory suspects that the sample 3-S-CTM0272 does not come from the same filter lot as the others submitted in this report. It is also suspected that the values reported for the XRF analysis of this sample are more representative of the filter than the deposit. The sample was analyzed with the deposit facing the detector, and then facing away from the detector. Please refer to the XRF-772 Replicate Report for 14-U720. The Al and P signal would have been completely absorbed by the quartz matrix if the signal was coming from the deposit, and not the filter itself. Any Ni on the deposit would have been reduced by 50% due to matrix absorption. This would indicate that the values reported for this sample have more to do with the filter material itself, than with the deposit. Results are not blank corrected.
QA/QC Review:	All of the data have been reviewed by the analysts performing the analyses and the project manager. All of the quality control and sample-specific information in this package is complete and meets or exceeds the minimum requirements for acceptability.
Comments:	If you have any questions or concerns regarding this analysis, please feel free to contact the project manager.
Disclaimer:	This report shall not be reproduced, except in full, without the written approval of the laboratory. The results only represent that of the samples as received into the laboratory.

9/3/14

Project Manager Date
Paul Duda

CHESTER LabNet

XRF-772 **XRF Analytical Quality Assurance Report**

Client: TRC-Lowell
Report: 14-371
Analysis Period: August 19, 2014
Number of Samples: 10

1. Precision Data

Micromatter Multi-elemental Quality Control Standard: QS285

QC Standard Results

Analyte	n	Counts per Second			c.v.	%E
		Calib.	Meas.	S.D.		
Ti(0)	1	296.65	279.46	na	na	-5.80
Fe(1)	1	343.19	324.53	na	na	-5.44
Se(2)	1	420.82	414.89	na	na	-1.41
Pb(2)	1	508.47	503.89	na	na	-0.90
Cd(3)	1	161.66	163.41	na	na	1.09

2. Accuracy Data

NIST Standard Reference Materials: SRM 1832, SRM 1833

Analyte/ SRM	n	Certified Value(µg/cm²)	Measured Value (µg/cm²)					% Rec.
			High	Low	Average			
Al 1832	4	14.6 +/- .97	15.30	14.55	14.91	+/-	0.33	102.1
Si 1832	4	34.0 +/- 1.1	36.93	36.42	36.61	+/-	0.19	107.7
Si 1833	4	31.5 +/- 2.1	32.47	31.77	32.16	+/-	0.26	102.1
S 2708	4	2.46 +/- .25	2.37	2.31	2.34	+/-	0.02	95.0
K 1833	4	16.4 +/- 1.64	17.70	17.16	17.32	+/-	0.22	105.6
Ca 1832	4	1.32 +/- 0.17	1.22	1.17	1.19	+/-	0.02	89.8
Ti 1833	4	12.1 +/- 1.79	12.09	11.99	12.05	+/-	0.04	99.6
V 1832	4	4.70 +/- .49	4.73	4.56	4.64	+/-	0.07	98.6
Mn 1832	4	4.54 +/- .49	4.90	4.79	4.83	+/-	0.04	106.3
Fe 1833	4	13.6 +/- .45	13.50	12.90	13.29	+/-	0.23	97.8
Cu 1832	4	2.43 +/- .16	2.63	2.54	2.60	+/-	0.04	107.2
Zn 2783	4	.180 +/- .013	0.18	0.17	0.18	+/-	0.00	99.2
Pb 1833	4	16.1 +/- .75	16.63	16.24	16.46	+/-	0.15	102.2

NIST: National Institute of Standards and Technology
% Rec: Percent Recovery = (Experimental/Given) x 100
n: Number of Observations
S.D.: Standard Deviation
c.v.: Coefficient of Variation = (S.D./Measured) x 100
% E: Percent Error = [(Measured-Calibrated)/Calibrated] x 100

XRF-772 REPLICATE REPORT

2.76

Original ID: 14-U715

Replicate ID: RU715 90 degree rotation

Filter Lot:

Deposit Mass: 251 µg

Deposit Area: 1.0 cm^2

Particle Size: T

Element	Original ug/cm2	Replicate ug/cm2	Difference ug/cm2		RPD	
Al	0.2425 +- 0.2349	0.3338 +- 0.2354	-0.0913 +- 0.3326			
P	0.0000 +- 0.1082	0.0000 +- 0.1147	0.0000 +- 0.1577			
S	3.4704 +- 0.2579	3.5539 +- 0.2636	-0.0834 +- 0.3688	+	-2.4	+- 10.5
Cl	0.4882 +- 0.0527	0.5369 +- 0.0539	-0.0487 +- 0.0754	+	-9.5	+- 14.7
K	0.6417 +- 0.0425	0.6763 +- 0.0442	-0.0346 +- 0.0613	+	-5.3	+- 9.3
Ca	6.5645 +- 0.3708	6.3397 +- 0.3584	0.2249 +- 0.5157	+	3.5	+- 8.0
Ti	0.0889 +- 0.0071	0.0895 +- 0.0072	-0.0005 +- 0.0101	+	-0.6	+- 11.3
V	0.0000 +- 0.0036	0.0000 +- 0.0035	0.0000 +- 0.0050			
Cr	0.1029 +- 0.0066	0.0892 +- 0.0060	0.0137 +- 0.0089	0	14.3	+- 9.3
Mn	0.0419 +- 0.0045	0.0453 +- 0.0046	-0.0034 +- 0.0064	+	-7.7	+- 14.7
Fe	5.1885 +- 0.2676	4.9141 +- 0.2535	0.2743 +- 0.3686	+	5.4	+- 7.3
Co	0.0000 +- 0.0043	0.0000 +- 0.0043	0.0000 +- 0.0061			
Ni	0.0661 +- 0.0042	0.0648 +- 0.0042	0.0012 +- 0.0060	+	1.9	+- 9.1
Cu	0.0927 +- 0.0055	0.0771 +- 0.0083	0.0156 +- 0.0100	0	18.4	+- 11.7
Zn	0.5365 +- 0.0278	0.5441 +- 0.0403	-0.0076 +- 0.0489	+	-1.4	+- 9.1
Ga	0.0000 +- 0.0034	0.0000 +- 0.0033	0.0000 +- 0.0047			
Ge	0.0158 +- 0.0032	0.0138 +- 0.0031	0.0020 +- 0.0044	+	13.5	+- 29.7
As	0.0462 +- 0.0067	0.0558 +- 0.0068	-0.0096 +- 0.0095	0	-18.8	+- 18.6
Se	0.0000 +- 0.0025	0.0015 +- 0.0025	-0.0015 +- 0.0036			
Br	0.0764 +- 0.0048	0.0817 +- 0.0050	-0.0053 +- 0.0069	+	-6.7	+- 8.7
Rb	0.0000 +- 0.0027	0.0000 +- 0.0027	0.0000 +- 0.0039			
Sr	0.0078 +- 0.0031	0.0093 +- 0.0031	-0.0015 +- 0.0044			
Y	0.0000 +- 0.0040	0.0000 +- 0.0040	0.0000 +- 0.0056			
Zr	0.0386 +- 0.0054	0.0462 +- 0.0055	-0.0076 +- 0.0077	+	-17.8	+- 18.1
Mo	0.3811 +- 0.0205	0.3836 +- 0.0206	-0.0025 +- 0.0291	+	-0.7	+- 7.6
Pd	0.0032 +- 0.0039	0.0000 +- 0.0038	0.0032 +- 0.0054			
Ag	0.0000 +- 0.0041	0.0025 +- 0.0041	-0.0025 +- 0.0058			
Cd	0.0089 +- 0.0043	0.0028 +- 0.0042	0.0061 +- 0.0060			
In	0.0000 +- 0.0047	0.0024 +- 0.0047	-0.0024 +- 0.0066			
Sn	0.1286 +- 0.0089	0.1217 +- 0.0086	0.0069 +- 0.0123	+	5.5	+- 9.9
Sb	0.1828 +- 0.0119	0.1628 +- 0.0111	0.0200 +- 0.0163	0	11.6	+- 9.4
Ba	0.0480 +- 0.0296	0.0793 +- 0.0294	-0.0313 +- 0.0417			
La	0.0000 +- 0.0372	0.0000 +- 0.0369	0.0000 +- 0.0524			
Hg	0.0000 +- 0.0074	0.0000 +- 0.0072	0.0000 +- 0.0103			
Pb	0.3184 +- 0.0183	0.3046 +- 0.0176	0.0138 +- 0.0254	+	4.4	+- 8.1

RPD: Relative Percent Difference (X1-X2)/[(X1+X2)/2]*100. RPD is calculated when original value is greater than three times its uncertainty.

XRF-772 REPLICATE REPORT

0.44

Original ID: 14-U720

Replicate ID: UU720 non-deposit side

Filter Lot:

Deposit Mass: 387 µg

Deposit Area: 1.0 cm^2

Particle Size: T

Element	Deposit Side ug/cm2	Non-Deposit Side ug/cm2	Difference ug/cm2		RPD
Al	27.2519 +- 2.2911	27.6771 +- 2.2903	-0.4251 +- 3.2395	+	-1.5 +- 11.8
P	4.5918 +- 0.5993	4.6007 +- 0.5785	-0.0089 +- 0.8330	+	-0.2 +- 18.1
S	2.1661 +- 0.2238	0.7770 +- 0.1499	1.3891 +- 0.2693	--	94.4 +- 18.3
Cl	3.9714 +- 0.2927	0.0517 +- 0.0859	3.9196 +- 0.3050	--	194.9 +- 15.2
K	8.6836 +- 0.7651	7.8210 +- 0.6884	0.8625 +- 1.0292	+	10.5 +- 12.5
Ca	287.1031 +- 23.7545	281.3251 +- 23.1872	5.7780 +- 33.1952	+	2.0 +- 11.7
Ti	3.4763 +- 0.2256	3.5222 +- 0.2274	-0.0459 +- 0.3203	+	-1.3 +- 9.2
V	0.0000 +- 0.0339	0.0000 +- 0.0335	0.0000 +- 0.0476		
Cr	0.1250 +- 0.0205	0.1575 +- 0.0208	-0.0324 +- 0.0292	0	-23.0 +- 20.6
Mn	0.4929 +- 0.0370	0.4859 +- 0.0361	0.0070 +- 0.0517	+	1.4 +- 10.6
Fe	18.7186 +- 1.0229	17.5507 +- 0.9577	1.1679 +- 1.4013	+	6.4 +- 7.7
Co	0.0000 +- 0.0177	0.0000 +- 0.0172	0.0000 +- 0.0247		
Ni	0.1515 +- 0.0110	0.1324 +- 0.0101	0.0190 +- 0.0149	0	13.4 +- 10.5
Cu	0.1002 +- 0.0084	0.0755 +- 0.0072	0.0247 +- 0.0111	-	28.1 +- 12.6

RPD: Relative Percent Difference (X1-X2)/[(X1+X2)/2]*100. RPD is calculated when original value is greater than three times its uncertainty.

14-371

Company Name: Coventa Montgomery		
Contact: Eli Golfer	Phone: 301-691-9008	
E-Mail Address: egolfer@coventa.com	Fax:	
Report Address: 21204 Martinsburg Rd		
City: Dickerson	State: md	Zip: 20842
Billing Address: TRC (Gary Hunt)		
City:	State:	Zip:
PO #:	Project:	

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CHAIN-OF-CUSTODY RECORD

Page ___ of ___

LabNet ID	Field Sample ID	Site	Sample Date	Volume (m^3)	Particle Size	Gravimetry	XRF Metals	OC/EC	IC	ICP	Cr VI					Remarks
14-4713	1-S-CTM0271	MONT	8/13/14				X									Please call with
4714	1-S-CTM0272						X									any questions.
4715	1-S-CTM-0273						X									
4716	2-S-CTM0271						X									
4717	2-S-CTM-0272						X									
4718	2-S-CTM-0273						X									
4719	3-S-CTM-0271						X									
4720	3-SCTM-0272						X									
4721	3-SCTM-0273						X									
4722	Reagent Blank		—				X									

Analysis Requested

Turn Around Time
☐ Standard
☐ Rush _____ Specify

Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time	Notes:
Eli Golfer 8.14.14 2pm	Jan Bell 8/14/14 10:20	
Relinquished By: (Signature) Date/Time	Received By: (Signature) Date/Time	

Original (white) accompanies shipment, Second copy (yellow) for customer use

RAW DATA

Available upon request

Lab ID	Client ID	Site	Sample Date	Comments	Deposit Area	Units	Al	Al Unc.	P	P Unc.	S	S Unc.	Cl	Cl Unc.	K	K Unc.	Ca
14-U713	1-S-CTM0271	Covanta Montgomery	8/13/2014		52.8	ug/filter	19.2400	12.3200	0.0000	5.6020	10.0700	2.9040	20.9700	2.3870	24.9700	1.7530	44.3500
14-U714	1-S-CTM0272	Covanta Montgomery	8/13/2014		52.8	ug/filter	8.5480	13.0400	0.0000	5.6390	2.6820	2.7980	13.2400	2.1010	34.3800	2.2550	27.4000
14-U715	1-S-CTM0273	Covanta Montgomery	8/13/2014		52.8	ug/filter	12.8000	12.4000	0.0000	5.7130	183.2000	13.6200	25.7800	2.7830	33.8800	2.2440	346.6000
14-U716	2-S-CTM0271	Covanta Montgomery	8/13/2014		52.8	ug/filter	8.8020	12.5900	0.0000	5.4860	4.6890	2.8300	10.1600	1.9750	27.4500	2.7930	24.9300
14-U717	2-S-CTM0272	Covanta Montgomery	8/13/2014		52.8	ug/filter	15.2200	12.2700	0.0000	5.2750	1.4680	2.8930	14.4800	2.1750	26.3800	1.8160	29.6300
14-U718	2-S-CTM0273	Covanta Montgomery	8/13/2014		52.8	ug/filter	17.0700	12.0900	0.0000	5.6230	2.9620	2.7560	5.4280	1.8640	25.3100	1.7530	16.4000
14-U719	3-S-CTM0271	Covanta Montgomery	8/13/2014		52.8	ug/filter	2.2810	13.1300	0.0000	5.4750	72.9200	6.2940	206.7000	13.6400	81.8400	4.9470	223.4000
14-U720	3-S-CTM0272	Covanta Montgomery	8/13/2014	Highly contaminated filter lot	52.8	ug/filter	1439.000	121.0000	242.5000	31.6400	114.4000	11.8200	209.7000	15.4500	458.5000	40.4000	15160.00
14-U721	3-S-CTM0273	Covanta Montgomery	8/13/2014		52.8	ug/filter	14.2000	12.7100	0.0000	5.3960	47.2300	4.7630	139.8000	9.4350	55.9700	3.4690	188.2000
14-U722	Reagent Blank	Covanta Montgomery	8/13/2014		52.8	ug/filter	18.9300	12.0200	0.0000	5.5020	1.1090	2.6350	0.0000	1.6680	22.6500	1.5950	1.8640

Highlighted concentrations are less than three times the uncertainty

Ca Unc.	Ti	Ti Unc.	V	V Unc.	Cr	Cr Unc.	Mn	Mn Unc.	Fe	Fe Unc.	Co	Co Unc.	Ni	Ni Unc.	Cu	Cu Unc.	Zn	Zn Unc.	Ga	Ga Unc.
3.8230	3.5430	0.2904	0.0000	0.1320	1.4100	0.1531	0.8026	0.1637	36.7000	1.9220	0.0000	0.1162	2.3280	0.1637	1.6260	0.1320	9.1340	0.7234	0.2006	0.1637
2.5450	2.9520	0.2534	0.0000	0.1320	1.0080	0.1426	1.2200	0.1690	32.0300	1.6840	0.0000	0.1109	2.5130	0.1690	1.9270	0.1426	13.5700	1.0300	0.2798	0.1637
19.5800	4.6940	0.3749	0.0000	0.1901	5.4330	0.3485	2.2120	0.2376	273.9000	14.1300	0.0000	0.2270	3.4900	0.2218	4.7940	0.2746	27.8100	1.4150	0.0000	0.1742
2.3390	2.6610	0.2429	0.0000	0.1267	0.9398	0.1373	1.1510	0.1690	61.9900	3.2210	0.0000	0.1320	2.2440	0.1637	1.7690	0.1373	8.5170	0.6811	0.3485	0.1690
2.6880	2.6770	0.2429	0.0000	0.1320	0.6230	0.1373	0.8501	0.1637	77.8300	4.0340	0.0000	0.1426	2.2760	0.1637	1.5000	0.2851	8.5750	0.6811	0.2006	0.1637
1.7050	2.6400	0.2376	0.0000	0.1267	0.9662	0.1373	1.1140	0.1637	49.8600	2.5980	0.0000	0.1214	2.1910	0.1531	1.6210	0.2851	5.1270	0.4594	0.1848	0.1637
18.0200	2.2120	0.2693	0.0000	0.1690	1.6320	0.1795	1.9800	0.2059	63.3600	3.2950	0.0000	0.1373	2.7400	0.1795	2.3920	0.3326	46.6200	2.3500	0.0000	0.1690
1254.00	183.5000	11.9100	0.0000	1.7900	6.6000	1.0820	26.0300	1.9540	988.4000	54.0100	0.0000	0.9346	7.9990	0.5808	4.9580	0.3907	58.8200	4.2820	4.7260	0.4541
15.2200	2.9460	0.2904	0.0000	0.1637	1.6790	0.1742	1.2040	0.1848	106.5000	7.8200	0.0000	0.1584	2.2390	0.1637	2.3390	0.3221	45.0300	2.2700	0.0000	0.1637
0.8342	2.3230	0.2218	0.0000	0.1214	0.5914	0.1267	0.7814	0.1531	9.6410	0.5386	0.0000	0.0950	1.9480	0.1426	1.4570	0.1214	1.0820	0.2482	0.3485	0.1584

Ge	Ge Unc.	As	As Unc.	Se	Se Unc.	Br	Br Unc.	Rb	Rb Unc	Sr	Sr Unc.	Y	Y Unc.	Zr	Zr Unc.	Mo	Mo Unc.	Pd	Pd Unc.	Ag
0.7762	0.1584	0.5544	0.1426	0.1531	0.1267	2.6930	0.1901	0.0000	0.1373	0.0317	0.1637	0.0317	0.2059	2.7190	0.2904	19.3100	1.0450	0.0581	0.2006	0.0000
0.9821	0.1584	0.3115	0.2376	0.2006	0.1320	11.6600	0.6125	0.0000	0.1478	0.2323	0.1637	0.5280	0.2112	2.8300	0.3010	21.0600	1.1300	0.0000	0.2006	0.0634
0.8290	0.1637	2.4390	0.3538	0.0000	0.1320	4.0340	0.2534	0.0000	0.1426	0.4118	0.1637	0.0000	0.2112	2.0380	0.2851	20.1200	1.0820	0.1690	0.2059	0.0000
0.6442	0.1584	0.1426	0.2376	0.3749	0.1320	5.7550	0.3274	0.0000	0.1426	0.3696	0.1637	0.3538	0.2059	2.5450	0.2904	20.3100	1.0930	0.0000	0.2006	0.0898
0.7286	0.1531	0.2006	0.2376	0.1954	0.1267	1.8270	0.1584	0.0000	0.1373	0.0000	0.1584	0.0000	0.2059	2.3020	0.2851	20.4700	1.0980	0.1426	0.2006	0.9610
0.5386	0.1478	0.3485	0.2270	0.0475	0.1267	1.1770	0.1373	0.2534	0.1373	0.0000	0.1584	0.1742	0.2006	2.4920	0.2851	18.8700	1.0240	0.0000	0.1954	0.1426
0.8026	0.1637	0.5491	0.2693	0.1056	0.1320	17.5200	0.9029	0.0000	0.1531	0.2904	0.1637	0.3379	0.2112	2.6290	0.2904	20.3900	1.0980	0.0000	0.2006	0.0000
0.0000	0.3326	975.7000	48.8500	0.0000	0.2957	11.9400	0.8026	3.0990	0.3432	331.0000	16.5800	2.6290	0.3696	69.5900	3.5590	0.0000	0.5544	0.3643	0.2534	0.0000
0.8501	0.1531	0.9240	0.2798	0.0845	0.1267	10.2500	0.5438	0.0000	0.1426	0.3643	0.1584	0.0000	0.2059	2.5450	0.2851	18.7700	1.0190	0.0000	0.2006	0.0000
0.7920	0.1531	0.2165	0.1267	0.0634	0.1214	0.0528	0.1109	0.0000	0.1320	0.0000	0.1584	0.1214	0.2059	2.3440	0.2798	20.0100	1.0770	0.0000	0.1954	0.2112

Ag Unc.	Cd	Cd Unc.	In	In Unc.	Sn	Sn Unc.	Sb	Sb Unc.	Ba	Ba Unc.	La	La Unc.	Hg	Hg Unc.	Pb	Pb Unc.
0.2112	0.0000	0.2165	0.0000	0.2429	1.4940	0.3062	0.3062	0.3643	2.0120	1.5310	1.2510	1.9380	0.0000	0.3749	0.7656	0.3590
0.2112	0.2798	0.2218	0.0264	0.2482	1.9750	0.3168	0.6125	0.3696	2.4500	1.5630	4.4350	1.9750	0.5122	0.3749	1.3310	0.3696
0.2165	0.4699	0.2270	0.0000	0.2482	6.7900	0.4699	9.6520	0.6283	2.5340	1.5630	0.0000	1.9640	0.0000	0.3907	16.8100	0.9662
0.2112	0.2640	0.2218	0.1742	0.2482	1.6530	0.3115	0.3907	0.3696	0.0000	1.5630	0.0000	1.9850	0.3326	0.3802	1.4680	0.3749
0.2165	0.0000	0.2112	0.0000	0.2429	1.6950	0.3062	0.7075	0.3643	3.2740	1.5470	1.9220	1.9430	0.0000	0.3749	2.1010	0.3749
0.2059	0.0000	0.2112	0.0000	0.2429	1.7850	0.3062	0.0000	0.3643	0.8712	1.5100	0.9187	1.9170	0.2798	0.3643	1.0770	0.3538
0.2112	0.8078	0.2270	0.2112	0.2482	2.7090	0.3326	1.4730	0.3802	0.6547	1.5580	0.1003	1.9640	0.0000	0.3907	6.9800	0.5280
0.2587	0.5755	0.2746	0.1795	0.2957	5.9450	0.4752	41.3700	2.1440	328.4000	16.5700	10.4500	2.1960	0.0000	0.8501	21.1500	1.3620
0.2059	0.3696	0.2218	0.2851	0.2429	2.9460	0.3326	0.7286	0.3749	2.0700	1.5310	0.0000	1.9220	0.0000	0.3643	9.3560	0.6230
0.2059	0.0422	0.2112	0.0000	0.2376	1.6320	0.3010	0.4858	0.3590	2.5340	1.5310	0.2904	1.9270	0.4118	0.3643	0.0000	0.3379