metrovancouver

Bottom Ash Data

2023 Week 48

The following analytical report represents bottom ash composite results for week 48 of 2023 (November 26, 2023 to December 2 2023).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.

CERTIFICATE OF ANALYSIS

Work Order	: **VA23C9363**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 06-Dec-2023 13:00
PO	: VANCO0000051998	Date Analysis Commenced	: 07-Dec-2023
C-O-C number	: ----	Issue Date	: 18-Dec-2023 07:45
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances

LOR: Limit of Reporting (detection limit).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA 2348-A-1	BA 2348-A-2	BA 2348-A-3	BA 2348-A-4	BA 2348-A-5
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00
						VA23C9363-001	VA23C9363-002	VA23C9363-003	VA23C9363-004	VA23C9363-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		26.0	24.9	24.9	24.4	25.5
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.1	11.3	11.5	11.5	11.5
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		37800	34900	34800	35800	45000
Antimony	7440-36-0	E440/VA	0.10	mg/kg		99.8	111	106	100	128
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		17.1	16.6	18.2	16.8	20.0
Barium	7440-39-3	E440/VA	0.50	mg/kg		533	487	478	543	544
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.34	0.34	0.35	0.35	13.3
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		7.90	8.20	7.94	7.73	9.96
Boron	7440-42-8	E440/VA	5.0	mg/kg		151	248	235	199	198
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		9.69	8.03	8.63	8.84	7.50
Calcium	7440-70-2	E440/VA	50	mg/kg		142000	147000	146000	142000	147000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		122	142	141	194	199
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		56.2	72.3	58.6	41.2	245
Copper	7440-50-8	E440/VA	0.50	mg/kg		3910	2300	1790	8500	6050
Iron	7439-89-6	E440/VA	50	mg/kg		40700	53300	47600	48400	59000
Lead	7439-92-1	E440/VA	0.50	mg/kg		663	483	503	338	419
Lithium	7439-93-2	E440/VA	2.0	mg/kg		23.8	29.3	26.0	22.5	44.3
Magnesium	7439-95-4	E440/VA	20	mg/kg		12100	12100	12300	12000	11500
Manganese	7439-96-5	E440/VA	1.0	mg/kg		694	1000	760	860	1190
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		17.4	34.6	15.9	16.1	30.6
Nickel	7440-02-0	E440/VA	0.50	mg/kg		127	218	122	1680	520
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8420	9090	9780	8800	7960
Potassium	7440-09-7	E440/VA	100	mg/kg		4930	5310	5480	4940	4710
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.31	0.34	0.26	0.22	0.41
Silver	7440-22-4	E440.Ag/VA	0.10	mg/kg		3.58	----	4.93	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		----	4.53	----	5.18	4.66
Sodium	7440-23-5	E440/VA	50	mg/kg		13800	15100	15300	14200	13900

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA 2348-A-1	BA 2348-A-2	BA 2348-A-3	BA 2348-A-4	BA 2348-A-5
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00
						VA23C9363-001	VA23C9363-002	VA23C9363-003	VA23C9363-004	VA23C9363-005
						Result	Result	Result	Result	Result
Metals										
Strontium	7440-24-6	E440/VA	0.50	mg/kg		256	286	279	256	288
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11600	12400	12600	10400	10900
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		90.4	119	89.1	99.8	113
Titanium	7440-32-6	E440/VA	1.0	mg/kg		343	379	258	335	594
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		9.78	21.2	9.60	9.00	9.06
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.82	2.94	3.03	3.05	2.62
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		38.3	37.7	41.1	41.6	38.0
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3770	3170	3480	5490	2800
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.2	1.8	2.8	2.4	2.5
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.7	11.6	11.7	11.7	11.7
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.55	6.04	6.27	6.47	6.20
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.73	6.40	6.44	6.52	6.62
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.26	1.99	2.13	2.17	1.99
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.104	0.146	0.145	0.143	0.141
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2180	2100	2200	2280	2040
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		0.991	1.46	1.28	1.51	0.980
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		0.941	1.24	1.09	1.50	1.09
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	0.40	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		129	138	134	139	127
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.32	0.43	0.45	0.38	0.38

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA 2348-A-1	BA 2348-A-2	BA 2348-A-3	BA 2348-A-4	BA 2348-A-5
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C9363-001	VA23C9363-002	VA23C9363-003	VA23C9363-004	VA23C9363-005
						Result	Result	Result	Result	Result
TCLP Metals										
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		16.5	24.0	38.4	23.5	15.5
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA 2348-A-6	BA 2348-A-7	BA 2348-A-8	BA 2348-A-9	BA 2348-A-10
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00
						VA23C9363-006	VA23C9363-007	VA23C9363-008	VA23C9363-009	VA23C9363-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144/VA	0.25	%		24.7	24.4	25.2	24.3	24.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.3	11.6	11.4	11.5	11.2
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		33200	38000	32300	34400	30500
Antimony	7440-36-0	E440/VA	0.10	mg/kg		118	216	111	105	128
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		19.1	16.6	16.1	18.6	16.8
Barium	7440-39-3	E440/VA	0.50	mg/kg		490	510	443	502	603
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.37	0.32	0.31	0.34	0.36
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		11.7	9.63	7.08	8.11	7.95
Boron	7440-42-8	E440/VA	5.0	mg/kg		195	139	150	176	213
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		8.15	8.57	9.26	10.4	50.0
Calcium	7440-70-2	E440/VA	50	mg/kg		146000	135000	143000	146000	150000
Chromium	7440-47-3	E440/VA	0.50	mg/kg		121	142	234	135	225
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		290	59.3	140	59.1	42.3
Copper	7440-50-8	E440/VA	0.50	mg/kg		2110	2070	16700	2380	2710
Iron	7439-89-6	E440/VA	50	mg/kg		44300	56900	50900	38200	54600
Lead	7439-92-1	E440/VA	0.50	mg/kg		361	1260	565	402	2500
Lithium	7439-93-2	E440/VA	2.0	mg/kg		33.3	27.0	30.8	29.1	28.3
Magnesium	7439-95-4	E440/VA	20	mg/kg		11500	10900	11200	11800	12000
Manganese	7439-96-5	E440/VA	1.0	mg/kg		820	918	751	608	776
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		20.5	17.8	19.6	18.1	21.2
Nickel	7440-02-0	E440/VA	0.50	mg/kg		233	114	916	132	230
Phosphorus	7723-14-0	E440/VA	50	mg/kg		7540	7790	8080	8790	7840
Potassium	7440-09-7	E440/VA	100	mg/kg		5050	4820	5110	5000	5160
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.25	0.28	0.26	0.30	0.32
Silver	7440-22-4	E440/VA	0.10	mg/kg		4.82	5.13	4.16	3.53	7.86
Sodium	7440-23-5	E440/VA	50	mg/kg		14600	13300	14100	14800	15100
Strontium	7440-24-6	E440/VA	0.50	mg/kg		268	355	254	260	413
Sulfur	7704-34-9	E440/VA	1000	mg/kg		10800	10600	10500	10900	10700

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA 2348-A-6	BA 2348-A-7	BA 2348-A-8	BA 2348-A-9	BA 2348-A-10
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00
						VA23C9363-006	VA23C9363-007	VA23C9363-008	VA23C9363-009	VA23C9363-010
						Result	Result	Result	Result	Result
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg		101	3480	111	137	101
Titanium	7440-32-6	E440/VA	1.0	mg/kg		235	358	206	296	306
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		8.67	7.33	7.95	10.6	33.0
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.80	2.62	2.83	2.96	2.93
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		35.8	36.1	40.6	38.8	57.2
Zinc	7440-66-6	E440/VA	2.0	mg/kg		2660	3030	2680	3560	5340
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		3.1	2.3	2.8	2.1	1.8
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.7	11.7	11.7	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.70	6.70	6.14	6.37	6.36
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.54	6.69	6.80	6.58	6.61
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.01	1.99	2.16	2.14	2.00
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.120	0.123	0.093	0.133	0.244
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2120	2120	2200	2120	2150
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		1.27	1.01	1.10	0.716	1.04
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.18	1.14	1.16	0.906	1.24
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		124	130	126	128	126
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.48	0.34	0.26	0.40	0.30
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA 2348-A-6	BA 2348-A-7	BA 2348-A-8	BA 2348-A-9	BA 2348-A-10
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00	06-Dec-2023 09:00
						VA23C9363-006	VA23C9363-007	VA23C9363-008	VA23C9363-009	VA23C9363-010
						Result	Result	Result	Result	Result
TCLP Metals										
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		39.4	21.2	16.8	23.0	16.5
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method/Lab	LOR	Unit	Client sample ID	BA 2348-A-11	BA 2348-A-12	----	----	----
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	----	----	----
						VA23C9363-011	VA23C9363-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144/VA	0.25	%		25.4	25.3	----	----	----
pH (1:2 soil:water)	----	E108/VA	0.10	pH units		11.5	11.2	----	----	----
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg		34100	29300	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg		114	99.9	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg		16.7	16.2	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg		560	468	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg		0.34	0.35	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg		7.30	10.8	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg		212	169	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg		8.63	7.64	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg		153000	144000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg		148	135	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg		93.5	98.9	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg		2800	3740	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg		58400	56100	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg		570	1020	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg		25.8	31.0	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg		13300	12900	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg		794	1030	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg		<0.0500	<0.0500	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg		16.6	18.4	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg		134	110	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg		8610	8150	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg		4790	5080	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg		0.28	0.29	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg		5.12	3.13	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg		15300	14400	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg		311	286	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg		11800	11200	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA 2348-A-11	BA 2348-A-12	----	----	----
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C9363-011	VA23C9363-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
Thallium	7440-28-0	E440/VA	0.050	mg/kg		<0.050	<0.050	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg		211	92.0	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg		310	270	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg		9.80	7.33	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg		2.91	2.78	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg		39.1	39.8	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg		3620	4670	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg		2.0	2.4	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units		11.7	11.7	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units		6.68	6.59	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units		2.88	2.88	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units		6.64	6.56	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L		<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L		<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L		<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L		2.08	1.94	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L		0.253	0.108	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L		2140	1980	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L		1.46	1.10	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L		1.01	0.913	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L		<5.0	<5.0	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L		<0.25	<0.25	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L		125	126	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L		<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L		0.34	0.38	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L		<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L		<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA 2348-A-11	BA 2348-A-12	----	----	----
					Client sampling date / time	06-Dec-2023 09:00	06-Dec-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23C9363-011	VA23C9363-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L		<1.0	<1.0	----	----	----
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L		<0.20	<0.20	----	----	----
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L		<0.15	<0.15	----	----	----
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L		17.3	42.8	----	----	----
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L		<10	<10	----	----	----

Please refer to the General Comments section for an explanation of any result qualifiers detected.

Please refer to the Accreditation section for an explanation of analyte accreditations.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23C9363**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 06-Dec-2023 13:00
PO	: VANCO0000051998	Issue Date	: 18-Dec-2023 07:43
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA23C9363-001	BA 2348-A-1	Antimony	7440-36-0	E440	38.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Bismuth	7440-69-9	E440	128 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Boron	7440-42-8	E440	45.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Copper	7440-50-8	E440	146 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Iron	7439-89-6	E440	45.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Molybdenum	7439-98-7	E440	114 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Nickel	7440-02-0	E440	94.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Tin	7440-31-5	E440	193 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Titanium	7440-32-6	E440	51.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C9363-001	BA 2348-A-1	Zinc	7440-66-6	E440	32.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / **Container / Client Sample ID(s)**	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-1	E440.Ag	06-Dec-2023	11-Dec-2023	180 days	5 days	✓	12-Dec-2023	180 days	7 days	✓
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-3	E440.Ag	06-Dec-2023	15-Dec-2023	180 days	9 days	✓	15-Dec-2023	180 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-1	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-10	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-11	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-12	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-2	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-3	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-4	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-5	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-6	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-7	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-8	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA 2348-A-9	E510	06-Dec-2023	08-Dec-2023	28 days	2 days	✓	08-Dec-2023	28 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-1	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-10	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-11	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-12	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-2	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-3	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-4	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-5	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-6	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-7	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-8	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA 2348-A-9	E440	06-Dec-2023	08-Dec-2023	180 days	2 days	✓	08-Dec-2023	180 days	3 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-1	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-10	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-11	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-12	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-2	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-3	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-4	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-5	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-6	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-7	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-8	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA 2348-A-9	E144	06-Dec-2023	----	----	----		07-Dec-2023	----	1 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-1	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-10	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-11	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-12	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-2	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-3	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-4	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-5	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-6	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-7	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-8	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA 2348-A-9	E108	06-Dec-2023	08-Dec-2023	30 days	2 days	✓	08-Dec-2023	30 days	2 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-1	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-10	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-11	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-12	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-2	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-3	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-4	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-5	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-6	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-7	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA 2348-A-8	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved)										
BA 2348-A-9	E512	07-Dec-2023	11-Dec-2023	29 days	5 days	✓	11-Dec-2023	29 days	5 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-1	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-10	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-11	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-12	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-2	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-3	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-4	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved)										
BA 2348-A-5	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2348-A-6	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2348-A-7	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2348-A-8	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA 2348-A-9	E444	07-Dec-2023	11-Dec-2023	181 days	5 days	✓	11-Dec-2023	181 days	6 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-1	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-10	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-11	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-12	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-2	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓

Matrix: **Soil/Solid**

Evaluation: × = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group : Analytical Method / Container / Client Sample ID(s)	*Method*	*Sampling Date*	*Extraction / Preparation*				*Analysis*			
			Preparation Date	*Holding Times*		*Eval*	*Analysis Date*	*Holding Times*		*Eval*
				Rec	*Actual*			*Rec*	*Actual*	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-3	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-4	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-5	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-6	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-7	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-8	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA 2348-A-9	EPP444	06-Dec-2023	07-Dec-2023	----	----		----	28 days	1 days	✓

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).

Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	1268680	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1268681	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	1268683	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1268682	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	1278882	2	2	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1268680	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1268681	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	1268683	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	1268682	1	12	8.3	5.0	✓
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	1278882	2	2	100.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	1272094	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	1268680	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1272095	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	1268681	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	1268683	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1272094	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	1272095	1	12	8.3	5.0	✓

Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 ALS Environmental - Vancouver	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 ALS Environmental - Vancouver	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 ALS Environmental - Vancouver	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 ALS Environmental - Vancouver	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 ALS Environmental - Vancouver	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: **VA23C9363**	Page	: 1 of 12
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 06-Dec-2023 13:00
PO	: VANCO0000051998	Date Analysis Commenced	: 07-Dec-2023
C-O-C number	: ----	Issue Date	: 18-Dec-2023 07:43
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1268682)											
VA23C9363-001	BA 2348-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.3	1.2%	5%	----
Physical Tests (QC Lot: 1268683)											
VA23C9363-001	BA 2348-A-1	Moisture	----	E144	0.25	%	26.0	25.9	0.490%	20%	----
Metals (QC Lot: 1268680)											
VA23C9363-001	BA 2348-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 1268681)											
VA23C9363-001	BA 2348-A-1	Aluminum	7429-90-5	E440	50	mg/kg	37800	25400	39.4%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	99.8	148	38.9%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	17.1	17.3	1.33%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	533	528	0.907%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.32	0.02	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	7.90	35.9	128%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	151	239	45.0%	30%	DUP-H
		Cadmium	7440-43-9	E440	0.020	mg/kg	9.69	7.76	22.2%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	142000	143000	0.795%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	122	155	23.8%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	56.2	44.5	23.1%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	3910	24900	146%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	40700	64300	45.0%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	663	725	8.94%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	23.8	20.5	14.8%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	12100	10900	10.0%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	694	728	4.86%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	17.4	63.5	114%	40%	DUP-H
		Nickel	7440-02-0	E440	0.50	mg/kg	127	354	94.3%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	8420	8000	5.09%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	4930	4620	6.54%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.31	0.44	0.12	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	13800	13400	2.82%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	256	237	7.90%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 1268681) - continued											
VA23C9363-001	BA 2348-A-1	Sulfur	7704-34-9	E440	1000	mg/kg	11600	9900	15.6%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	90.4	5150	193%	40%	DUP-H
		Titanium	7440-32-6	E440	1.0	mg/kg	343	204	51.0%	40%	DUP-H
		Tungsten	7440-33-7	E440	0.50	mg/kg	9.78	8.39	15.4%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	2.82	2.64	6.56%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	38.3	35.1	8.78%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	3770	5230	32.5%	30%	DUP-H
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.2	2.0	0.2	Diff <2x LOR	----

Qualifiers

Qualifier	*Description*
DUP-H	*Duplicate results outside ALS DQO, due to sample heterogeneity.*

Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1268683)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 1268680)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 1268681)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	----
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
Boron	7440-42-8	E440	5	mg/kg	<5.0	----
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
Calcium	7440-70-2	E440	50	mg/kg	<50	----
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
Iron	7439-89-6	E440	50	mg/kg	<50	----
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
Lithium	7439-93-2	E440	2	mg/kg	<2.0	----
Magnesium	7439-95-4	E440	20	mg/kg	<20	----
Manganese	7439-96-5	E440	1	mg/kg	<1.0	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
Phosphorus	7723-14-0	E440	50	mg/kg	<50	----
Potassium	7440-09-7	E440	100	mg/kg	<100	----
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
Sodium	7440-23-5	E440	50	mg/kg	<50	----
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
Tin	7440-31-5	E440	2	mg/kg	<2.0	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1268681) - continued						
Titanium	7440-32-6	E440	1	mg/kg	<1.0	----
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
Uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
Vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
Zinc	7440-66-6	E440	2	mg/kg	<2.0	----
Zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 1271945)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
Metals (QCLot: 1278882)						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 1272094)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1272095)						
Antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
Arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
Barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
Beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
Boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
Cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
Calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
Chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
Cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
Copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
Iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
Lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
Magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
Nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
Selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
Silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
Thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
Uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
Vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
Zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 1268682)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	101	95.0	105	----
Physical Tests (QCLot: 1268683)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1268680)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	92.8	80.0	120	----
Metals (QCLot: 1268681)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	101	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.9	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	96.5	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.0	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.8	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.2	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.3	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.2	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.2	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	100	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	94.7	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	102	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	101	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.3	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.9	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.6	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	97.2	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1268681) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	98.2	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.4	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.1	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	91.8	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.1	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.0	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	96.8	80.0	120	----
Metals (QCLot: 1271945)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	98.4	80.0	120	----
Metals (QCLot: 1278882)									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	103	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1272094)										
VA23C9363-001	BA 2348-A-1	Mercury, TCLP	7439-97-6	E512	0.0011 mg/L	0.001 mg/L	107	50.0	140	----
TCLP Metals (QCLot: 1272095)										
VA23C9363-001	BA 2348-A-1	Antimony, TCLP	7440-36-0	E444	5.58 mg/L	5 mg/L	112	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.8 mg/L	5 mg/L	117	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.1 mg/L	12.5 mg/L	105	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.277 mg/L	0.25 mg/L	111	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.260 mg/L	0.25 mg/L	104	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.38 mg/L	1.25 mg/L	111	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.53 mg/L	2.5 mg/L	101	50.0	140	----
		Iron, TCLP	7439-89-6	E444	270 mg/L	250 mg/L	108	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	274 mg/L	250 mg/L	109	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.67 mg/L	2.5 mg/L	107	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.30 mg/L	5 mg/L	106	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.090 mg/L	0.1 mg/L	90.0	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.3 mg/L	5 mg/L	106	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.42 mg/L	5 mg/L	108	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.84 mg/L	0.75 mg/L	113	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	1.0 mg/L	1 mg/L	95.3	50.0	150	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1268680)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	94.0	70.0	130	----
Metals (QCLot: 1268681)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	113	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	103	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	108	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	127	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	102	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	114	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	98.6	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	110	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	99.5	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	99.1	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	105	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	113	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	109	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	101	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	92.0	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	112	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	93.1	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	86.4	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	96.8	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	122	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 1268681) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	92.3	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	105	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	97.7	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	93.6	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Nicole Victor / Dan Skrypnyk	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive	Email 1:	nvictor@covanta.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2:	ofetherstonhaugh@covanta.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025 Fax:	Email 3:	dskrypnyk@covanta.com	**Analysis Request**
	☐ Yes ☐ No		brent.kirkpatrick@metrovancouver.org	
			Sarah.Wellman@metrovancouver.org	
Invoice To	Same as Report ?	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #:		
Company:		PO / AFE:	PO# _VANCO 0000051998__ Weekly Bottom As	
Contact:		LSD:	(includes 2:1 pH)	
Address:				
Phone:	Fax:	Quote #:		
Lab Work Order # (lab use only)	C9363	ALS Contact:	Sampler:	

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
	BA 2348-A-1		9:00	Soil	X	X		X	1
	BA 2348-A-2		9:00	Soil	X	X		X	1
	BA 2348-A-3		9:00	Soil	X	X		X	1
	BA 2348-A-4		9:00	Soil	X	X		X	1
	BA 2348-A-5		9:00	Soil	X	X		X	1
	BA 2348-A-6		9:00	Soil	X	X		X	1
	BA 2348-A-7		9:00	Soil	X	X		X	1
	BA 2348-A-8		9:00	Soil	X	X		X	1
	BA 2348-A-9		9:00	Soil	X	X		X	1
	BA 2348-A-10		9:00	Soil	X	X		X	1
	BA 2348-A-11		9:00	Soil	X	X		X	1
	BA 2348-A-12		9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA23C9363

Telephone : +1 604 253 4188

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
KINGLIS	Dec 6/23	8:30	JC	6 Dec 23	1pm	17 °C				