TEST REPORT

SCOPE: EMISSIONS, EFFICIENCY AND OUTPUT

FUEL: PELLET

TEST STANDARD: EPA

MODEL: EDISON PELLET STOVE

Notice to reader: Our Edison pellet stove was tested as part of our Volta engine. Therefore, the Volta is referenced throughout the attached test report.

Intertek
1829, 32nd Avenue
Lachine, Quebec
H8T 3J1
hone (514)631-3100
Fax : (514)631-1133

TEST REPORT

TEST OF A WOOD BURNING STOVE
FOR
EMISSIONS AND EFFICIENCY
PER
EPA METHODS 28 AND 5G-3, FEBRUARY 1988

MODEL: VOLTA

Client: Stove Builder International inc.
Add1: 250 de Copenhague, St-Augustin-de-Desmaures, Quebec, G3A 2H3
Add2: 798, 8e rue, La Guadeloupe, Quebec, G0M 1G0

Attention: Mr. Claude Paré

TESTED BY:
Intertek Testing Services NA Ltd.
1829, 32nd Avenue
Lachine, Québec
H8T 3J1

TEST DATES: From April 15, 2015 to April 17, 2015
REPORT DATE: April 29, 2015
Project number: G102038216

1.0 INTRODUCTION

1.1 GENERAL

From April 15, 2015 to April 17, 2015, Intertek, Lachine, Québec, conducted tests on the Model Volta, wood pellet stove from Stove Builder International inc., to determine compliance with U.S. EPA emissions regulations.

Tests were conducted by Claude Pelland, Eng. the undersigned. Tests were conducted at the client facility in St-Augustin-de-Desmaures, Quebec located at 250 de Copenhague, St-Augustin-de-Desmaures, Quebec, G3A 2H3. The laboratory elevation is 213 feet above sea level. Tests were conducted to EPA Method 28 and 5G-3 criteria, February 1988.

1.2. TEST UNIT DESCRIPTION

The DC Series Pellet Stove is a freestanding and automatically fed Pellet Stove constructed of carbon HR and CR steel. The outer dimensions are 27 1/2-inches deep, 41-inches high, and 21 3/4-inches wide. The unit has a front door with a viewing glass and a hopper to store the pellet.
(See product drawings.). See also components description in Appendix H.

The DC Series comprises Model “VOLTA” from Osburn Brand and Model “EDISON” from Drolet Brand which differ by minor aesthetic differences.

Proprietary drawings and manufacturing methods are on file at Intertek in Lachine, Quebec.

Tests were conducted using the Volta unit as a reference representative of the DC series.

1.3. RESULTS

The unit as tested produced a weighted average emissions rate of 2.48 grams/hour and did not exceed any of the emission rate caps specified in the EPA regulations. The unit thus meets EPA certification requirements for 1990.

1.4. PRETEST INFORMATION

The test unit was prepared at client's facility in St-Augustin-de-Desmaures, Quebec, for April 15, 2015 from the client. The unit was inspected upon program start and found to be in good condition. It had been set up, following the manufacturer's instructions.

Following assembly, the unit was placed on the test stand and the instrumented thermocouples were hooked up to the logging system. Prior to emission testing, a ten (10) hours break-in period was performed during which the unit was set to operate at high to medium burn rate. During the break-in period, the unit was found to operate satisfactorily. The 10 plus hours of pre-burning were conducted during several consecutive R & D runs performed by the manufacturer immediately preceding the dates of the testing reflected in this report. The fuel used for the break-in process was wood pellet of premium grade made by LG inc. Proofs of burning are reproduced in appendix G of this report.

Following inspection of the unit, the chimney system and laboratory dilution tunnel were cleaned using standard wire brush chimney cleaning equipment.

On April 10, 2015, the unit was set-up for testing.

1.5. REPORT ORGANIZATION

This report includes summaries of all data necessary to determine compliance with the regulations.

2.0 SUMMARY OF TEST RESULTS

2.1 EMISSIONS

Run Number	Test Date	Burn Rate (kg/hr)	Adjusted Emission Rate (g/hr)	Heating Efficiency (% HHV)	Heating Efficiency (% LHV)
1	2015-04-15	0.549	1.935	67.9	73.2
2	2015-04-16	0.898	2.422	64.1	69.1
3	2015-04-16	1.384	2.333	61.3	66.1
4	2015-04-17	2.113	3.399	58.4	63.0

2.2. WEIGHTED AVERAGE CALCULATION

Run Number	Burn Rate (kg/hr)	Adjusted Emission Rate (g/hr)	OHE (% Overall)	Output (BTU/hr)	Prob	(K) Weighting Factor
1	0.549	1.935	67.89	6619.95	0.0856	0.2982
2	0.898	2.422	64.10	10828.26	0.2982	0.5963
3	1.384	2.333	61.30	16688.55	0.6819	0.6287
4	2.113	3.399	58.40	25478.98	0.9268	0.3181
					Sum:	1.8412

Weighted Average Emissions Rate: 2.48 g/hr

2.3 TEST FACILITY CONDITIONS

Run Number	Room Temperature		Barometric pressure		Relative humidity		Air Velocity	
	Before (F)	After (F)	Before (in.Hg)	After (in.Hg)	Before (%)	After (%)	Before (ft/min)	After (ft/min)
1	76	75	30.32	30.32	17	15	0	0
2	73	74	30.56	30.50	16	15	0	0
3	75	75	30.41	30.32	16	15	0	0
4	74	75	29.94	29.85	21	23	0	0

2.4. FUEL QUALITIES

Run Number	Pre-Test Load		Test Load	
	Loading Weight Wet Basis (lb)	Moisture Content Dry Basis (%)	Weight Wet Basis (lb)	Moisture Content Dry Basis (%)
1	1.3	7.07	2.6	7.07
2	2.12	7.07	4.25	7.07
3	3.27	7.07	6.55	7.07
4	5	7.07	10.00	7.07

2.5 DILUTION TUNNEL FLOW RATE MEASUREMENTS AND SAMPLING DATA (5G-3)

Average dilution tunnel measurements				Sample Data			
Run Number	Burn Rate (Min)	Volumetric Flow Rate (dscf/min)	Total Temperatures (^{o}R)	Volume sampled (DSCF)		Particulate catch (mg)	
				1	2	1	2
1	120	134.25	556	19.49	18.68	2.6	2.5
2	120	133.01	564	19.29	18.47	3.8	2.9
3	120	145.77	585	17.82	15.86	2.8	2.4
4	120	147.67	616	20.48	21.30	5.2	4.8

2.6 DILUTION TUNNEL DUAL TRAIN PRECISION

Run Number	Sample Ratio (no units)		Total Emission (g)		
	Train 1	Train 2	Train 1	Train 2	% Deviation
1	826.60	862.65	2.149	2.157	0.07%
2	827.24	863.93	3.144	2.505	4.69%
3	981.51	1103.07	2.748	2.647	0.78%
4	865.28	831.96	4.499	3.993	2.47%

2.7 GENERAL SUMMARY OF RESULTS

Run Number	Burn Rate (kg/hr)	Average Surface Temperature (F)	Change in surface Temperature (F)	Initial Draft (in. H^2O)	Primary Air Setting	Run Time (min)
1	0.549	212	9.4	0.025	N/A	120
2	0.898	263	-4.3	0.040	N/A	120
3	1.384	334	-7.1	0.055	N/A	120
4	2.113	457	-22.9	0.080	N/A	120

3.0 PROCESS DESCRIPTION

3.1 DISCUSSION

During the entire test program, the unit performed well and no hazardous behavior has been noticed.

3.2 UNIT DIMENSIONS

Unit dimensions are reproduced in appendix E to this report.

Details of unit construction can be found in this appendix.

3.3 AIR SUPPLY SYSTEM

Combustion air enters at the back of the stove through an opening at the middle bottom of the firebox. This air is automatically controlled by an electronic board and a blower which covers the inlet hole. All gases exit through the 4" dia. Flue.

Air supply system of this unit is reproduced in appendix E to this report.

3. 4 TEST SET-UP DESCRIPTON

A standard 4" diameter pellet type L vent was installed to 15' above floor level. The unit controls were set in accordance with the manufacturer's instruction to achieve the targeted burn-rate during the test.

3.5 OPERATION DURING TEST

Run #1 (April 15, 2015) Primary air ventilation system was powered at 75% PWM[1], Exhaust fan at 40% PWM[1] and Convection Blower at 100% PWM[1] and control board was set at speed 1 of 12. Burn time was 120 minutes. Burn Rate was 0.549 Kg/h. This test led to a 1.935 g/h Adjusted Emission Rate. System so set reached a category I.

Run #2 (April 16, 2015) Primary air ventilation system was powered at 75% PWM[1], Exhaust fan at 53% PWM[1] and Convection Blower at 100% PWM[1] and control board was set at speed 5 of 12. Burn time was 120 minutes. Burn Rate was 0.898 Kg/h. This test led to a 2.422 g/h Adjusted Emission Rate. System so set reached a category II.

Run #3 (April 16, 2015) Primary air ventilation system was powered at 75% PWM[1], Exhaust fan at 66% PWM[1] and Convection Blower at 100% PWM[1] and control board was set at speed 8 of 12. Burn time was 120 minutes. Burn Rate was 1.384 Kg/h. This test led to a 2.333 g/h Adjusted Emission Rate. System so set reached a category III.

Run #4 (April 17, 2015) Primary air ventilation system was powered at 100% PWM[1], Exhaust fan at 100% PWM[1] and Convection Blower at 100% PWM[1] and control board was set at speed 12 of 12. Burn time was 120 minutes. Burn Rate was 2.113 Kg/h. This test led to a 3.399 g/h Adjusted Emission Rate. System so set reached a category IV.

Note 1: PWM is “Pulse Width Modulation”

4.0 SAMPLING SYSTEMS

4.1 SAMPLING LOCATIONS

(Particulate) Samples are collected from the dilution tunnel at a point 20 feet from the tunnel entrance. The tunnel has two elbows and two mixing baffles in the system ahead of the sampling section. The sampling section is a continuous 13-foot section of 6-inch diameter pipe straight over the entire length. A standard pitot tube located 60 inches from the start of the sampling section determines tunnel velocity pressure. Thermocouple is installed on the pilot tube to measure the dry bulb temp. MC is assumed, as allowed, to be 4%. Tunnel samplers are located 60 inches downstream of the pitot tube and 36 inches upstream from the end of this section.

4.2 DRAWINGS

Various drawings of the stack gas sampling train and of dilution tunnel system are found in Appendix I

4.3 EMISSIONS/EFFICIENCY TESTING EQUIPMENT LIST

List of instruments and equipment used during testing:
Calibration records are kept in file for future reference. The calibration matrix of all equipment meets the requirement of ISO 17025.

ITEM DESCRIPTION	Equipment #	MANUFACTURER	MODEL	SERIAL #
-Calibration weight	SBI-238	Mettler-Toledo	200 gr	B316238717
-Platform scale	SBI-013	Rice Lake	Roughdeck	B00927396KL
-Manometer	SBI-024	Dwyer	2000-00	W80111CF89
-Manometer	SBI-127	Dwyer	2000-0DC	W11SBH
-DGM Reference	SBI-103	American Meter	DTM 200A	07J264834
-Sampling Train #1	SBI-046	American Meter	DTM 200A	90R054300
-Sampling Train #2	SBI-047	American Meter	DTM 200A	98Z332226
-Analytical scale	SBI-206	Sartorius	TE214S	25851066
-Timer	SBI-235	Sportline	410	---
-Gas analyser	SBI-113	Siemens	Ultramat23	7MB2338-8BA10-5AF2
-R H Temperature Meter	SBI-212	Amprobe	TH-3	100906351

5.0 SAMPLING METHODS

5.1 PARTICULATE SAMPLING

Particulates were sampled in strict accordance with EPA Method 5G-3. This method uses two identical sampling systems with Gelman A/E 61631 binder free, 47 mm diameter filters. The dryers used in the sample systems are filled with "Drierite" before each test run.

6.0 QUALITY ASSURANCE

6.1 INSTRUMENT CALIBRATION

6.1.1 Dry Gas Meters

At the conclusion of each test program the dry gas meters are verified using a reference dry gas meter. This process involves sampling the train operation for 1 cubic foot of volume. With readings made to .001 ft^3, the resolution is .1%, giving accuracy higher than the $\pm$2% required by the standard.

6.1.2 Stack Sample Rotameter

The stack sample rotameter is checked by running three tests at each flow rate used during the test program. The flow rate is checked by running the rotameter in series with one of the dry gas meters for 10 minutes with the rotameter at a constant setting. The dry gas meter volume measured is then corrected to standard temperature and pressure conditions.

6.1.3 Gas Analyzers

The continuous analyzers are zeroed and spanned before each test with NBS traceable gases. A mid-scale multi-component calibration gas is then analyzed (values are recorded). At the conclusion of a test, the instruments are checked again span gas (values are recorded only). The drift in each meter is then calculated and must not exceed 5% of the scale used for the test.

6.2 TEST METHOD PROCEDURES

6.2.1 Leak Check Procedures

Before and after each test, each sample train is tested for leaks. Leakage rates are measured and must not exceed 0.02 CFM or 4% of the sampling rate. Leak checks are performed checking the entire sampling train. Pre-test and post-test leak checks are conducted with a vacuum of 5 inches of mercury. Vacuum is monitored during each test and the highest vacuum reached is then used for the post test vacuum value. If leakage limits are not met, the test run is rejected. During, these tests the vacuum is typically less than 2 inches of mercury. Leakage rates reported are expected to be much higher than actual leakage during the tests.

6.2.2 Tunnel Velocity/Flow Measurement

The tunnel velocity is calculated from a center point pitot tube signal multiplied by an adjustment factor. This factor is determined by a traverse of the tunnel as prescribed in EPA Method 1. Final tunnel velocities and flow rates are calculated from EPA Method 2, Equation 6.9 and 6.10. (Tunnel cross sectional area is the average from both lines of traverse.)

Pitot tubes are cleaned before each test.

6.2.3 Pm Sampling Proportionality (5g-3)

Proportionality was calculated in accordance with EPA Method 5G-3. The data and results are kept in file for future reference.

Tested by:
Claude Pelland, Eng.
Project Engineer, BP Lachine, Qc

Reviewed by:
Rick Curkeet, PE
Chief Engineer-Hearth Products

APPENDIX A

Data and Calculation Forms

							Type of	
							Stove:	3
					Weighted Average		1=cat	
							2=noncat	
							3=pellet	
		(E)						
		Ave.		Heat		(K)		
	Burn	Emission		Output		Weighting		
Test No.	Rate	Rate g/hr	(OHE)	(BTU/HR)	Prob.	Factor	(KxE)	KxOHE
1	0.549	1.935		6619.95	0.0856	0.2982	0.5769	0.00
2	0.898	2.422		10828.26	0.2982	0.5963	1.4442	0.00
3	1.384	2.333		16688.55	0.6819	0.6287	1.4667	0.00
4	2.113	3.399		25478.98	0.9268	0.3181	1.0813	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
4				0.00				
						1.84124	4.5691	0.00
ighted average emissions rate:							2.4816	
	Weighted Average OHE						0.00	

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-15
Run:	1
Project #:	G102038216
Test Duration: (minutes)	120

RESULTS

AVERAGE ADJUSTED EMISSION RATE: 1.935

Burn Rate (Dry kg/hr): 0.549

Category I

PRESSURE FACTOR: 1.01337

TEMPERATURE FACTORS

DGM #1: 0.97939

DGM #2: 0.98007

VOLUMES SAMPLED

DGM #1: 19.48967

DGM #2: 18.67513

TOTAL TUNNEL VOLUME (scf): 16110.082

SAMPLE RATIOS

Sample Train 1: 826.596

Sample Train 2: 862.649

TOTAL EMISSIONS

Sample Train 1 (g): 2.1491

Sample Train 2 (g): 2.1566

EMISSION RATES

Sample Train 1 (g/hr): 1.0746

Sample Train 2 (g/hr): 1.0783

ADJUSTED EMISSION RATES

Sample Train 1 (g/hr): 1.9320

Sample Train 2 (g/hr): 1.9375

DEVIATION: 0.07%

BAROMETRIC PRESSURE

Average: 30.32

Start: 30.32

End: 30.32

DRY GAS METER VALUES

DGM #1 Final: 325.472

Initial: 305.874

DGM #2 Final: 931.634

Initial: 912.717

TEMPERATURES (DEG. RANKIN)

DGM #1: 539.109

DGM #2: 538.737

CALIBRATION FACTORS

DGM #1: 1.0020

DGM #2: 0.9940

TUNNEL FLOW RATE: 134.251

PARTICULATE CATCH (mg)

Sample Train 1: 2.6000

Sample Train 2: 2.5000

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-15-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	1 - precharge	282	=	539.6	
Control #:	G102038216				
Test Duration:	90				

	Start	End	P.Static:	0.0675
Barometer (in.Hg):	30.32	30.32		
Wet Bulb (F):				
Dry Bulb (F):	79.6	79.7		
Humidity (%):	16.9	15		

Average Stove Temperature: 214.103

	Average	#DIV/0!	#DIV/0!	#DIV/0!	172.56	75.061	92.66	#DIV/0!	232.43
	*	*	*	*	*	*	*		*
Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0	8.190				175.8	75.010	92.570		236.500
10	8.190				175.8	75.010	92.570		236.500
20	8.000				170.4	75.060	92.470		234.500
30	7.760				175.2	74.860	92.420		235.000
40	7.590				162.7	74.880	91.900		223.600
50	7.380				168.1	74.990	92.030		225.400
60	7.150				174	75.050	92.480		231.200
70	6.930				177.3	75.130	93.170		238.400
80	7.010				174.3	75.270	92.940		234.200
90	6.550				172	75.350	94.050		229.000

NGE"}

NGE"}

		Pre-Test Load weight (wet lb)	Moisture (Dry %)

288.56 * Unit Back	231.5 * Unit R.Side	222.08 * Unit L.Side	95.945 * Unit Bottom
306.800	234.600	226.100	95.490
306.800	234.600	226.100	95.490
275.800	227.700	221.800	95.850
302.100	234.100	225.000	96.010
245.500	213.400	211.100	95.950
268.000	222.200	217.200	95.820
290.900	235.900	224.000	95.740
311.300	241.000	228.800	96.190
291.300	240.000	222.200	96.460
287.100	231.500	218.500	96.450

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-15-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	1	282	=	539.6	
Control #:	G102038216				
Test Duration:	120				

	Start	End	P.Static:	0.0675
Barometer (in.Hg):	30.32	30.32		
Wet Bulb (F):				
Dry Bulb (F):	79.6	79.7		
Humidity (%):	16.9	15		

Average Stove Temperature: 212.1929

	Average	0.145385	1.5215385	19.072308	172.376923	75.52384615	96.4861538	#DIV/0!	232.4
	*	*	*	*	*	*	*		*
Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0	2.600	0.150	1.580	18.990	172.400	75.850	96.400		233.100
10	2.383	0.140	1.300	19.330	168.300	75.480	96.060		227.800
20	2.167	0.150	1.550	19.010	171.700	75.500	96.360		230.300
30	1.950	0.140	1.590	18.960	172.200	75.660	96.410		230.000
40	1.733	0.130	1.390	19.280	169.000	75.570	96.220		228.100
50	1.517	0.160	1.710	18.930	169.600	75.700	95.660		223.400
60	1.300	0.150	1.460	19.140	170.000	75.720	96.100		227.600
70	1.083	0.140	1.390	19.230	181.200	75.740	97.530		246.800
80	0.867	0.160	1.870	18.740	177.000	75.370	97.060		239.400
90	0.650	0.130	1.370	19.260	172.700	75.240	96.640		234.400
100	0.433	0.130	1.310	19.240	168.300	75.330	96.200		228.300
110	0.217	0.150	1.510	19.030	171.800	75.260	96.490		232.700
120	0.000	0.160	1.750	18.800	176.700	75.390	97.190		239.300

.NGE"}

.NGE"}

	Pre-Test Load weight (wet lb)	Moisture (Dry %)	Coal Bed Weight	Test Load Weight (wet lb)	Loading Density	Moisture (Dry %)	Piece Length	Number of 2x4	4x4
281.76923	228.03077	221.830769	96.9338462	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	315.7693846
*	*	*	*	*	*	*				*
Unit Back	Unit R.Side	Unit L.Side	Unit Bottom	Catalyst Down	Catalyst Center	Catalyst Upper	Stack Wet bulb	Train Temp	Gas Smple Roto.	DGM 1 Reading
278.900	229.200	220.300	96.970							305.874
263.300	222.300	215.300	96.940							307.614
280.900	229.000	220.100	96.950							309.306
277.800	229.700	219.400	96.860							310.971
275.600	222.000	216.600	97.010							312.613
286.900	220.700	213.100	96.640							314.225
271.600	223.500	216.300	96.530							315.822
310.700	244.100	239.500	97.110							317.423
291.200	238.100	228.500	97.340							319.017
283.700	225.700	222.600	97.230							320.583
260.200	220.900	216.200	96.890							322.223
277.800	226.200	224.100	96.780							323.859
304.400	233.000	231.800	96.890							325.472

#DIV/0!	79.118462	79.0992308	82.4584615	922.29877	#DIV/0!	78.767692	78.705385	81.6053846	0.01	0.0251923	0
	*	*	*	*		*	*	*	*	*	
Roto 1 Reading	DGM 1 Inlet T	DGM 1 Outlet T	Filter 1 Temp	DGM 2 Reading	Roto 2 Reading	DGM 2 Inlet T	DGM 2 Outlet T	Filter 2 Temp	Tunnel Velocity	Draft	Smoke Observed
	78.490	78.390	78.260	**912.717**		78.270	77.980	76.930	0.010	0.025	ok
	78.770	78.690	81.830	**914.414**		78.310	78.200	80.580	0.010	0.025	ok
	79.020	78.850	82.840	**916.052**		78.610	78.410	81.770	0.010	0.025	ok
	79.120	78.970	83.040	**917.660**		78.670	78.530	82.130	0.010	0.025	ok
	79.190	79.160	82.950	**919.230**		78.800	78.620	82.240	0.010	0.025	ok
	79.310	79.240	82.620	**920.784**		78.990	78.860	82.140	0.010	0.025	ok
	79.240	79.240	82.770	**922.309**		78.870	78.890	82.120	0.010	0.025	ok
	79.340	79.270	82.960	**923.924**		78.900	78.900	82.450	0.010	0.025	ok
	79.270	79.300	82.930	**925.496**		78.900	78.920	82.380	0.010	0.028	ok
	79.070	79.250	82.890	**927.040**		78.850	78.920	82.180	0.010	0.025	ok
	79.170	79.260	82.890	**928.565**		78.970	78.980	81.960	0.010	0.025	ok
	79.290	79.330	82.970	**930.059**		78.890	78.950	81.900	0.010	0.025	ok
	79.260	79.340	83.010	**931.634**		78.950	79.010	82.090	0.010	0.025	ok

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-15 Engineer: Claude Pelland Run #: 1 Sample Train #: 1

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	207	Tare:	0.1192	Preliminary Wt:		
Rear Filter #	217	Tare:	0.1214	Preliminary Wt:		
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:				Preliminary Wt:		

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h20		207	0.1216		
			217	0.1214		
2015-04-20	7h50		207	0.1216	2.4mg	
			217	0.1214	0.0mg	

Probe #:	17	Tare:	139.7462	Preliminary Wt:		
Date/Time in dessicator:						

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h20			139.7464		
2015-04-20	7h50			139.7464	0.2mg	

Date: _____

Engineer Signature: _____

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-15 Engineer: Claude Pelland Run #: 1 Sample Train #: 2

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	211	Tare:	0.1214	Preliminary Wt:	
Rear Filter #	216	Tare:	0.1194	Preliminary Wt:	
Seal Set #		Tare:		Preliminary Wt:	
Date/Time in dessicator:				Preliminary Wt:	

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h20		211	0.1236		
			216	0.1195		
2015-04-20	7h50		211	0.1236	2.2mg	
			216	0.1195	0.1mg	

Probe #:	18	Tare:	147.8827	Preliminary Wt:	
Date/Time in dessicator:					

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h20			147.8829		
2015-04-20	7h50			147.8829	0.2mg	

Date: _____

Engineer Signature: _____

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-16-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	2	282	=	539.6	
Control #:	G102038216				
Test Duration:	60				

	Start	End	P.Static:	0.0575
Barometer (in.Hg):	30.56	30.50		
Wet Bulb (F):				
Dry Bulb (F):	74.8	75.9		
Humidity (%):	16.1	15.3		

Average Stove Temperature: 263.0691

	Average	#DIV/0!	#DIV/0!	#DIV/0!	216.6	72.63	104.285714	#DIV/0!	286.15714
	*	*	*	*	*	*	*		*
Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0	21.840				216.000	72.360	104.100		284.100
10	21.500				215.400	72.460	103.600		283.300
20	21.200				214.500	72.630	103.800		285.800
30	20.840				218.600	72.540	104.700		289.600
40	20.480				220.500	72.810	104.700		290.400
50	20.150				216.700	72.900	104.900		286.600
60	19.770				214.500	72.710	104.200		283.300

	Pre-Test Load weight (wet lb)	Moisture (Dry %)
NGE"}		
NGE"}		

357.14286 293.94286 276.528571 101.574286

*	*	*	*
Unit Back	Unit R.Side	Unit L.Side	Unit Bottom
360.900	296.800	274.100	98.180
387.000	290.400	275.000	99.840
344.000	286.400	279.300	101.800
361.600	298.300	283.600	101.800
357.400	300.100	281.700	101.900
345.500	293.700	273.800	103.400
343.600	291.900	268.200	104.100

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-16
Run:	2
Project #:	G102038216
Test Duration: (minutes)	120

RESULTS

AVERAGE ADJUSTED EMISSION RATE: 2.422

Burn Rate (Dry kg/hr): 0.898

Category II

PRESSURE FACTOR: 1.02039

TEMPERATURE FACTORS

DGM #1: 0.98888

DGM #2: 0.98925

VOLUMES SAMPLED

DGM #1: 19.29407

DGM #2: 18.47482

TOTAL TUNNEL VOLUME (scf): 15960.873

SAMPLE RATIOS

Sample Train 1: 827.242

Sample Train 2: 863.926

TOTAL EMISSIONS

Sample Train 1 (g): 3.1435

Sample Train 2 (g): 2.5054

EMISSION RATES

Sample Train 1 (g/hr): 1.5718

Sample Train 2 (g/hr): 1.2527

ADJUSTED EMISSION RATES

Sample Train 1 (g/hr): 2.6489

Sample Train 2 (g/hr): 2.1942

DEVIATION: 4.69%

BAROMETRIC PRESSURE

Average: 30.53

Start: 30.56

End: 30.5

DRY GAS METER VALUES

DGM #1

Final: 344.594

Initial: 325.511

DGM #2

Final: 950.081

Initial: 931.668

TEMPERATURES (DEG. RANKIN)

DGM #1: 533.937

DGM #2: 533.740

CALIBRATION FACTORS

DGM #1: 1.0020

DGM #2: 0.9940

TUNNEL FLOW RATE: 133.007

PARTICULATE CATCH (mg)

Sample Train 1: 3.8000

Sample Train 2: 2.9000

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-16-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	2	282	=	539.6	
Control #:	G102038216				
Test Duration:	120				

	Start	End	P.Static:	0.0575
Barometer (in.Hg):	30.56	30.50		
Wet Bulb (F):				
Dry Bulb (F):	74.8	75.9		
Humidity (%):	16.1	15.3		

Average Stove Temperature: 262.9338

	Average	0.191538	1.9992308	18.528462	218.792308	73.14923077	104.276923	#DIV/0!	288.79231
Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0	4.250	0.200	2.220	18.340	216.900	72.720	104.500		284.100
10	3.896	0.200	2.120	18.440	213.300	72.820	102.800		282.200
20	3.542	0.180	1.640	18.880	216.300	72.690	103.000		285.600
30	3.188	0.190	2.030	18.560	216.200	72.730	103.700		282.800
40	2.833	0.180	1.790	18.750	223.000	72.940	104.200		293.800
50	2.479	0.200	2.300	18.200	218.800	73.050	104.000		290.600
60	2.125	0.180	1.720	18.790	221.200	73.270	104.600		287.900
70	1.771	0.200	2.370	18.000	222.400	73.260	104.500		295.600
80	1.417	0.190	2.100	18.430	216.600	73.410	104.500		290.600
90	1.063	0.210	2.420	18.080	217.900	73.510	104.900		289.400
100	0.708	0.180	1.630	18.930	219.000	73.320	104.400		290.200
110	0.354	0.190	1.710	18.820	222.400	73.520	105.100		290.000
120	0.000	0.190	1.940	18.650	220.300	73.700	105.400		291.500

NGE"}

NGE"}

				Pre-Test Load			Test Load				
				weight	Moisture	Coal Bed	Weight	Loading	Moisture	Piece	Number of
				(wet lb)	(Dry %)	Weight	(wet lb)	Density	(Dry %)	Length	2x4
351.49231	298.95385		271.2	104.230769	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!
*	*	*	*		*	*	*				
Unit	Unit	Unit	Unit		Catalyst	Catalyst	Catalyst	Stack	Train	Gas Smple	
Back	R.Side	L.Side	Bottom		Down	Center	Upper	Wet bulb	Temp	Roto.	
370.300	297.900	270.100	104.300								
351.300	292.200	267.600	104.500								
358.600	303.300	271.400	103.800								
331.100	296.400	261.400	103.100								
368.000	306.800	274.200	103.200								
337.900	300.200	268.400	103.300								
366.000	306.500	266.500	103.400								
344.500	305.200	277.300	104.700								
349.800	294.300	273.100	105.000								
351.500	295.000	271.300	106.400								
353.400	295.000	276.200	105.700								
348.600	294.900	275.000	104.000								
338.400	298.700	273.100	103.600								

335.1577692
*
DGM 1
Reading
325.511
327.180
328.820
330.430
332.031
333.613
335.173
336.778
338.379
339.958
341.521
343.063
344.594

#DIV/0!	74.047692	73.8253846	81.8430769	940.99092	#DIV/0!	73.82	73.66	80.4784615	0.01	0.04	0
	*	*	*	*		*	*	*	*	*	
Roto 1 Reading	DGM 1 Inlet T	DGM 1 Outlet T	Filter 1 Temp	DGM 2 Reading	Roto 2 Reading	DGM 2 Inlet T	DGM 2 Outlet T	Filter 2 Temp	Tunnel Velocity	Draft	Smoke Observed
	73.090	73.140	75.950	**931.668**		73.020	72.960	73.330	0.010	0.040	ok
	73.190	73.220	79.610	**933.311**		73.030	72.980	77.670	0.010	0.040	ok
	73.370	73.270	81.450	**934.910**		73.270	73.130	80.020	0.010	0.040	ok
	73.590	73.390	81.990	**936.474**		73.340	73.220	80.780	0.010	0.040	ok
	73.880	73.470	82.290	**938.017**		73.580	73.320	81.140	0.010	0.040	ok
	74.060	73.690	82.400	**939.538**		73.810	73.550	81.380	0.010	0.040	ok
	74.200	73.880	82.530	**941.038**		73.900	73.690	81.450	0.010	0.040	ok
	74.400	74.010	82.990	**942.507**		74.000	73.860	81.560	0.010	0.040	ok
	74.520	74.130	82.960	**944.042**		74.230	73.980	81.710	0.010	0.040	ok
	74.480	74.270	82.840	**945.589**		74.270	74.140	81.880	0.010	0.040	ok
	74.540	74.350	83.000	**947.107**		74.310	74.170	81.780	0.010	0.040	ok
	74.480	74.390	82.920	**948.600**		74.330	74.230	81.700	0.010	0.040	ok
	74.820	74.520	83.030	**950.081**		74.570	74.350	81.820	0.010	0.040	ok

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-16 Engineer: Claude Pelland Run #: 2 Sample Train #: 1

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	208	Tare:	0.1216	Preliminary Wt:		
Rear Filter #	215	Tare:	0.1219	Preliminary Wt:		
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:				Preliminary Wt:		

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	11h45		208	0.1239		
			215	0.1220		
2015-04-20	7h50		208	0.1240	2.4mg	
			215	0.1220	0.1mg	

Probe #:	25	Tare:	136.8003	Preliminary Wt:		
Date/Time in dessicator:						

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	11h45			136.8019		
2015-04-20	7h50			136.8016	1.3mg	

Date: _____

Engineer Signature: _____

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-16 Engineer: Claude Pelland Run #: 2 Sample Train #: 2

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	214	Tare:	0.1212	Preliminary Wt:		
Rear Filter #	213	Tare:	0.1199	Preliminary Wt:		
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:				Preliminary Wt:		

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	11h45		214	0.1232		
			213	0.1198		
2015-04-20	7h50		214	0.1234	2.2mg	
			213	0.1198	0.0mg	

Probe #:	26	Tare:	139.7895	Preliminary Wt:		
Date/Time in dessicator:						

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	11h45			139.7902		
2015-04-20	7h50			139.7902	0.7mg	

Date: _____

Engineer Signature: _____

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-16-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	3	282	=	539.6	
Control #:	G102038216				
Test Duration:	70				

	Start	End	P.Static:	0.12
Barometer (in.Hg):	30.41	30.32		
Wet Bulb (F):				
Dry Bulb (F):	77.5	78.8		
Humidity (%):	16	15.3		

Average Stove Temperature: 339.725

	Average	#DIV/0!	#DIV/0!	#DIV/0!	278.3375	74.39125	117.5875	#DIV/0!	374.05
*	*	*	*	*	*	*	*		*
Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0	12.030				281.100	73.960	124.900		372.300
10	11.510				273.200	74.010	124.600		371.500
20	10.920				278.000	74.060	118.800		373.800
30	10.390				277.000	74.110	114.100		372.000
40	9.840				280.000	74.460	114.600		376.600
50	9.320				277.500	74.690	114.700		374.800
60	8.800				277.300	74.830	115.000		373.000
70	8.260				282.600	75.010	114.000		378.400

NGE"}

	Pre-Test Load weight (wet lb)	Moisture (Dry %)

NGE"}

462.65 * Unit Back	381.3125 * Unit R.Side	358.175 * Unit L.Side	122.4375 * Unit Bottom
471.700	386.800	351.300	123.100
452.300	374.100	358.200	124.200
462.500	390.600	362.600	124.700
455.500	377.400	351.300	123.300
464.600	376.700	361.200	121.700
464.500	380.000	359.900	121.000
466.300	375.500	360.500	120.500
463.800	389.400	360.400	121.000

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-16
Run:	3
Project #:	G102038216
Test Duration: (minutes)	120

RESULTS

AVERAGE ADJUSTED EMISSION RATE: 2.333

Burn Rate (Dry kg/hr): 1.384

Category III

PRESSURE FACTOR: 1.01487

TEMPERATURE FACTORS

DGM #1:	0.98384
DGM #2:	0.98442

VOLUMES SAMPLED

DGM #1:	17.82241
DGM #2:	15.85833

TOTAL TUNNEL VOLUME (scf): 17492.920

SAMPLE RATIOS

Sample Train 1:	981.512
Sample Train 2:	1103.075

TOTAL EMISSIONS

Sample Train 1 (g):	2.7482
Sample Train 2 (g):	2.6474

EMISSION RATES

Sample Train 1 (g/hr):	1.3741
Sample Train 2 (g/hr):	1.3237

ADJUSTED EMISSION RATES

Sample Train 1 (g/hr):	2.3694
Sample Train 2 (g/hr):	2.2970

DEVIATION: 0.78%

BAROMETRIC PRESSURE

Average:	30.365
Start:	30.41
End:	30.32

DRY GAS METER VALUES

DGM #1	Final:	362.435
	Initial:	344.621
DGM #2	Final:	966.079
	Initial:	950.110

TEMPERATURES (DEG. RANKIN)

DGM #1:	536.671
DGM #2:	536.355

CALIBRATION FACTORS

DGM #1:	1.0020
DGM #2:	0.9940

TUNNEL FLOW RATE: 145.774

PARTICULATE CATCH (mg)

Sample Train 1:	2.8000
Sample Train 2:	2.4000

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-16-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	3	282	=	539.6	
Control #:	G102038216				
Test Duration:	120				

	Start	End	P.Static:	0.12
Barometer (in.Hg):	30.41	30.32		
Wet Bulb (F):				
Dry Bulb (F):	77.5	78.8		
Humidity (%):	16	15.3		

Average Stove Temperature: 334.3585

	Average	0.226923	2.5715385	17.84	280.715385	74.78769231	124.5	#DIV/0!	374.67692

Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0	6.550	0.230	2.660	17.750	282.900	75.010	115.700		378.600
10	6.004	0.250	3.280	17.010	280.600	74.590	115.700		376.200
20	5.458	0.220	2.400	18.010	283.400	74.410	118.200		380.800
30	4.913	0.210	1.890	18.580	282.900	74.380	117.200		373.900
40	4.367	0.220	2.470	18.010	278.500	74.510	121.400		370.100
50	3.821	0.230	2.820	17.620	277.600	74.750	126.300		367.400
60	3.275	0.210	2.270	18.190	286.900	74.630	125.900		380.300
70	2.729	0.210	2.050	18.440	281.100	74.940	129.600		373.300
80	2.183	0.240	2.960	17.360	282.900	74.980	129.700		377.300
90	1.638	0.230	2.740	17.670	281.100	74.810	129.800		373.700
100	1.092	0.220	2.330	18.070	279.200	74.980	129.000		372.800
110	0.546	0.230	2.330	18.150	274.000	75.160	129.800		370.000
120	0.000	0.250	3.230	17.060	278.200	75.090	130.200		376.400

NGE"}

NGE"}

	Pre-Test Load					Test Load				
	weight (wet lb)	Moisture (Dry %)	Coal Bed Weight	Weight (wet lb)	Loading Density	Moisture (Dry %)	Piece Length	Number of 2x4	4x4	
434.81538	376.96923	356.146154	129.184615	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	354.1050769
*	*	*	*	*	*	*				*
Unit Back	Unit R.Side	Unit L.Side	Unit Bottom	Catalyst Down	Catalyst Center	Catalyst Upper	Stack Wet bulb	Train Temp	Gas Smple Roto.	DGM 1 Reading
454.400	386.100	359.000	121.600							**344.621**
443.100	380.500	359.900	121.500							**346.411**
443.500	381.600	366.100	123.100							**348.158**
451.200	379.300	352.600	123.000							**349.870**
428.400	368.500	349.700	126.000							**351.535**
423.300	369.200	344.900	128.200							**353.080**
465.600	383.600	360.000	135.100							**354.525**
435.000	377.500	357.300	136.300							**355.893**
429.900	380.500	357.100	133.900							**357.237**
440.000	378.700	356.800	133.100							**358.566**
421.600	377.200	352.600	131.900							**359.870**
398.500	363.100	351.500	133.300							**361.165**
418.100	374.800	362.400	132.400							**362.435**

#DIV/0!	76.820769	76.5215385	87.1730769	958.66985	#DIV/0!	76.444615	76.265385	83.5861538	0.01346154	0.055	0
	*	*	*	*		*	*	*	*	*	
Roto 1 Reading	DGM 1 Inlet T	DGM 1 Outlet T	Filter 1 Temp	DGM 2 Reading	Roto 2 Reading	DGM 2 Inlet T	DGM 2 Outlet T	Filter 2 Temp	Tunnel Velocity	Draft	Smoke Observed
	75.920	75.720	75.210	**950.110**		75.540	75.380	74.020	0.020	0.055	ok
	76.110	75.740	80.550	**951.750**		75.760	75.430	77.990	0.020	0.055	ok
	76.090	75.990	86.190	**953.368**		75.810	75.670	83.090	0.018	0.055	ok
	76.720	76.160	88.350	**954.944**		76.210	75.900	85.020	0.018	0.055	ok
	76.740	76.280	89.040	**956.460**		76.430	76.120	85.580	0.015	0.055	ok
	76.990	76.480	89.160	**957.831**		76.420	76.230	85.540	0.013	0.055	ok
	77.000	76.610	89.480	**959.126**		76.720	76.450	85.790	0.013	0.055	ok
	76.930	76.690	89.130	**960.332**		76.480	76.370	85.360	0.010	0.055	ok
	77.160	76.830	89.320	**961.462**		76.700	76.590	85.010	0.010	0.055	ok
	77.190	76.980	89.260	**962.580**		76.860	76.720	84.600	0.010	0.055	ok
	77.320	77.030	89.310	**963.747**		76.910	76.790	84.510	0.010	0.055	ok
	77.150	77.080	89.180	**964.919**		76.880	76.830	84.960	0.010	0.055	ok
	77.350	77.190	89.070	**966.079**		77.060	76.970	85.150	0.010	0.055	ok

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-16 Engineer: Claude Pelland Run #: 3 Sample Train #: 1

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	223	Tare:	0.1202	Preliminary Wt:	
Rear Filter #	221	Tare:	0.1222	Preliminary Wt:	
Seal Set #		Tare:		Preliminary Wt:	
Date/Time in dessicator:				Preliminary Wt:	

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h30		223	0.1227		
			221	0.1224		
2015-04-20	7h50		223	0.1228	2 tours	
			221	0.1223	0,1mg	

Probe #:	19	Tare:	140.1099	Preliminary Wt:	
Date/Time in dessicator:					

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h30			140.1100		
2015-04-20	7h50			140.1100	0.1mg	

Date: _____

Engineer Signature: _____

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-16 Engineer: Claude Pelland Run #: 3 Sample Train #: 2

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	220	Tare:	0.1210	Preliminary Wt:		
Rear Filter #	212	Tare:	0.1217	Preliminary Wt:		
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:				Preliminary Wt:		

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h30		220	0.1233		
			212	0.1217		
2015-04-20	7h50		220	0.1233	2.3mg	
			212	0.1217	0.0mg	

Probe #:	20	Tare:	139.0579	Preliminary Wt:		
Date/Time in dessicator:						

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-17	16h30			139.0580		
2015-04-20	7h50			139.0580	0.1mg	

Date: _____

Engineer Signature: _____

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-17-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	4	282	=	539.6	
Control #:	G102038216				
Test Duration:	60				

	Start	End	P.Static:	0.1025
Barometer (in.Hg):	29.94	29.85		
Wet Bulb (F):				
Dry Bulb (F):	76.1	77.5		
Humidity (%):	21	22.7		

Average Stove Temperature: 463.84

	Average	#DIV/0!	#DIV/0!	#DIV/0!	362.842857	73.35	153.314286	#DIV/0!	479.44286
*	*	*	*	*	*	*	*		*
Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0	19.040				359.100	72.660	159.400		462.700
10	18.170				359.700	72.650	161.500		470.500
20	17.290				356.000	73.080	154.300		473.300
30	16.410				363.700	73.570	149.000		484.400
40	15.510				365.100	73.780	149.700		487.000
50	14.710				364.300	73.870	148.700		482.700
60	13.860				372.000	73.840	150.600		495.500

NGE"}	Pre-Test Load weight (wet lb)	Moisture (Dry %)
NGE"}		

681.47143	505.4	506.1	146.785714
*	*	*	*
Unit Back	Unit R.Side	Unit L.Side	Unit Bottom
686.000	501.300	495.500	132.700
684.200	501.300	495.500	141.800
667.000	502.700	504.700	147.000
684.300	498.800	507.800	150.300
680.600	500.800	507.300	152.100
683.800	506.000	507.400	151.500
684.400	526.900	524.500	152.100

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-17
Run:	4
Project #:	G102038216
Test Duration: (minutes)	120

RESULTS

AVERAGE ADJUSTED EMISSION RATE: **3.399**

Burn Rate (Dry kg/hr): **2.113**

Category IV

PRESSURE FACTOR: 0.99916

TEMPERATURE FACTORS

DGM #1: 0.98636

DGM #2: 0.98672

VOLUMES SAMPLED

DGM #1: 20.47886

DGM #2: 21.29892

TOTAL TUNNEL VOLUME (scf): 17719.952

SAMPLE RATIOS

Sample Train 1: 865.280

Sample Train 2: 831.965

TOTAL EMISSIONS

Sample Train 1 (g): 4.4995

Sample Train 2 (g): 3.9934

EMISSION RATES

Sample Train 1 (g/hr): 2.2497

Sample Train 2 (g/hr): 1.9967

ADJUSTED EMISSION RATES

Sample Train 1 (g/hr): 3.5673

Sample Train 2 (g/hr): 3.2310

DEVIATION: 2.47%

BAROMETRIC PRESSURE

Average:	29.895
Start:	29.94
End:	29.85

DRY GAS METER VALUES

DGM #1

Final:	383.201
Initial:	362.463

DGM #2

Final:	987.846
Initial:	966.112

TEMPERATURES (DEG. RANKIN)

DGM #1:	535.303
DGM #2:	535.105

CALIBRATION FACTORS

DGM #1:	1.0020
DGM #2:	0.9940

TUNNEL FLOW RATE: 147.666

PARTICULATE CATCH (mg)

Sample Train 1:	**5.2000**
Sample Train 2:	**4.8000**

Manufacturer:	SBI	F	=	C	{EDIT-GOTO "cc2";;"RA
Model:	Volta	398	=	203.333333	
Date:	04-17-15	C	=	F	{EDIT-GOTO "a15";;"RA
Run:	4	282	=	539.6	
Control #:	G102038216				
Test Duration:	120				

	Start	End	P.Static:	0.1025
Barometer (in.Hg):	29.94	29.85		
Wet Bulb (F):				
Dry Bulb (F):	76.1	77.5		
Humidity (%):	21	22.7		

Average Stove Temperature: 456.7662

	Average	0.236154	3.1861538	17.196923	362.546154	74.27076923	155.715385	#DIV/0!	487.45385
	*	*	*	*	*	*	*		*
	Elapsed	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Tunnel Wet bulb	Unit Top
0		10.000	0.250	3.250	17.160	367.300	73.990	149.200		488.800
10		9.167	0.24	3.44	16.96	368.900	74.050	158.500		495.000
20		8.333	0.24	3.5	16.8	363.200	73.970	158.200		485.000
30		7.500	0.24	3.22	17.26	360.600	74.050	155.800		486.600
40		6.667	0.25	3.34	16.99	361.100	74.200	157.500		481.800
50		5.834	0.23	3.39	16.99	360.500	74.230	157.400		486.300
60		5.000	0.22	2.66	17.76	364.600	74.290	155.400		485.200
70		4.167	0.23	3.41	16.96	363.000	74.290	154.700		491.900
80		3.334	0.23	3.16	17.21	361.600	74.490	156.200		493.800
90		2.500	0.23	2.81	17.62	360.900	74.430	155.300		487.600
100		1.667	0.23	2.64	17.79	359.900	74.450	153.500		483.500
110		0.834	0.24	3.4	16.97	360.200	74.440	156.200		482.900
120		0.000	0.24	3.2	17.09	361.300	74.640	156.400		488.500

NGE"}	Pre-Test Load weight (wet lb)	Moisture (Dry %)	Coal Bed Weight	Test Load Weight (wet lb)	Loading Density	Moisture (Dry %)	Piece Length	Number of 2x4	4x4
NGE"}									

646.41538	502.64615	499.084615	148.230769	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	372.8935385
*	*	*	*	*	*	*				*
Unit Back	Unit R.Side	Unit L.Side	Unit Bottom	Catalyst Down	Catalyst Center	Catalyst Upper	Stack Wet bulb	Train Temp	Gas Smple Roto.	DGM 1 Reading
695.000	517.000	510.900	152.200							**362.463**
693.300	515.000	520.000	152.300							**364.271**
649.000	508.600	500.200	152.100							**366.038**
633.900	505.700	499.200	151.400							**367.780**
637.000	496.300	490.300	150.100							**369.507**
640.500	506.900	499.000	150.100							**371.207**
656.700	511.300	499.000	148.600							**372.892**
644.800	505.600	506.200	146.600							**374.568**
640.900	492.500	503.100	145.500							**376.320**
653.600	495.100	493.400	145.400							**378.067**
618.000	490.200	489.100	144.500							**379.794**
617.300	489.500	485.900	143.400							**381.508**
623.400	500.700	491.800	144.800							**383.201**

#DIV/0!	75.507692	75.0984615	84.5746154	977.01985	#DIV/0!	75.206154	75.004615	85.0176923	0.0125	0.08	0
	*	*	*	*		*	*	*	*	*	
Roto 1 Reading	DGM 1 Inlet T	DGM 1 Outlet T	Filter 1 Temp	DGM 2 Reading	Roto 2 Reading	DGM 2 Inlet T	DGM 2 Outlet T	Filter 2 Temp	Tunnel Velocity	Draft	Smoke Observed
	74.360	74.300	76.210	**966.112**		74.130	74.200	74.470	0.013	0.080	ok
	74.670	74.310	80.490	**968.039**		74.410	74.170	79.150	0.013	0.080	ok
	74.950	74.510	83.370	**969.778**		74.770	74.460	81.370	0.013	0.080	ok
	75.210	74.630	85.480	**971.621**		74.850	74.580	85.530	0.013	0.080	ok
	75.450	74.830	85.790	**973.456**		75.160	74.760	86.670	0.013	0.080	ok
	75.530	74.950	86.030	**975.255**		75.170	74.930	87.270	0.013	0.080	ok
	75.700	75.160	85.830	**977.021**		75.320	75.150	87.100	0.013	0.080	ok
	75.750	75.290	85.710	**978.766**		75.490	75.260	86.830	0.013	0.080	ok
	75.960	75.520	86.060	**980.595**		75.630	75.420	87.250	0.013	0.080	ok
	75.970	75.580	86.330	**982.441**		75.710	75.500	87.580	0.013	0.080	ok
	75.940	75.620	86.180	**984.262**		75.700	75.510	87.500	0.013	0.080	ok
	76.080	75.780	85.970	**986.066**		75.650	75.570	87.240	0.013	0.080	ok
	76.030	75.800	86.020	**987.846**		75.690	75.550	87.270	0.013	0.080	ok

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-17 Engineer: Claude Pelland Run #: 4 Sample Train #: 1

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	222	Tare:	0.1204	Preliminary Wt:	
Rear Filter #	218	Tare:	0.1222	Preliminary Wt:	
Seal Set #		Tare:		Preliminary Wt:	
Date/Time in dessicator:				Preliminary Wt:	

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-20	7h50		222	0.1243		
			218	0.1222		
2015-04-21	11h45		222	0.1243	3.9mg	
			218	0.1223	0.1mg	

Probe #:	21	Tare:	136.0330	Preliminary Wt:	
Date/Time in dessicator:					

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-20	7h50			136.0342		
2015-04-21	11h45			136.0342	1.2mg	

Date: _____

Engineer Signature: _____

Intertek

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: Volta

Project #: G102038216 Sample ID #: _____

Date: 2015-04-17 Engineer: Claude Pelland Run #: 4 Sample Train #: 2

Balance Equipment #: SBI-206 Thermo/Hygrometer Equipment #:

Front Filter #	225	Tare:	0.1180	Preliminary Wt:		
Rear Filter #	224	Tare:	0.1219	Preliminary Wt:		
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:				Preliminary Wt:		

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-20	7h50		225	0.1220		
			224	0.1219		
2015-04-21	11h45		225	0.1221	4.1mg	
			224	0.1218	0.0mg	

Probe #:	22	Tare:	139.5680	Preliminary Wt:		
Date/Time in dessicator:						

Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
2015-04-20	7h50			139.5689		
2015-04-21	11h45			139.5687	0.7mg	

Date: _____

Engineer Signature: _____

15 april 2015

Run #1 Before

Train #1: No leaks
Train #2: No Leaks

Run #1 After

Train #1: No leaks
Train #2: No Leaks

==========

16 April 2015 Run #2

Run #2 Before

Train #1: No leaks
Train #2: 0.001 cu ft

Run #2 After

Train #1: No leaks
Train #2: No Leaks

==========

16- April 2015

Run #3

Run #3 Before

Train #1: No leaks
Train #2: No leaks

Run #3 After

Train #1: No leaks
Train #2: No Leaks

==========

17- April 2015

Run #4

Run #4 Before

Train #1: No leaks
Train #2: No leaks

Run #4 After

Train #1: No leaks
Train #2: No Leaks

==========

APPENDIX B
Laboratory Operating Procedures

A. GAS ANALYSIS

1. Instruments should be turned on and allowed to warm up for one (1) hour minimum.

2. Calibrate analyzers as follows:

   NOTE : Prior to proceeding with calibration, make sure to use NIST tracable calibration gas bottles. Adjust flow meter if necessary at each instrument to required flow value.

   a) Using span gas, adjust span control to values specified on calibration gas label.
   b) Using nitrogene, adjust zero controls to provide a 0.00 analyzer readout.

   c) Repeat a) and b) until no further adjustment is required.
   d) Check readout vs. calibration gases (2) labels.

   The CO_2 and CO analyzers are "ZEROED" on nitrogen. The O_2 analyzer is spanned on air and set for 20.9%. It is zeroed on nitrogen as well.

3. Check for response time synchronization.

   a) With no fire in unit, allow reading to stabilize (O_2 should be 20.93, CO and CO_2 should equal O).
   b) Flow the calibration gas in the unit and start stop watch. Note the time required for each unit to reach .90 of the calibration gas bottle value. If all three analyzers reach this value within 15 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.

4. Set-up sample clean-up and water collection train as follows.

   a) Load impingers as follows:
   Impinger #1: 100 ml distilled water and 5 ml H_2SO_4
   Impinger #2: 100 ml distilled water and 5 ml H_2SO_4
   Impinger #3: Empty
   Impinger #4: 200 – 300 grams silica gel (dry)

b) Place impingers in container and connect with “U TUBES”. Grease carefully on bottom half of ball joint so that grease will not get into tubes.
c) Connect filter to first impinger and sample line to last impinger.

e. Leak check system as follows.

1) Plug probe.
2) Turn on sample system.
3) Observe sample flow rotometer and vacuum gauge. If necessary, use vacuum; adjust valve to set vacuum to the maximum inches Hg.
4) If the float in rotometer does not stabilize below 10 on scale, system must be resealed.
5) Repeat leak check procedure until satisfactory results are obtained.

f) Just prior to starting test, fill impinger container with water and ice and record ambiant conditions on data form no. 192-t-9904.

B. Dilution tunnel sample train set-up

1. Filters and holders.

a) Clean probes and filter holder front housings carefully and desiccate for at least 24 hours prior to use.
b) Filters should be numbered and filter and probe combinations labeled prior to use.
c) Weigh desiccated filters and probe-filter units on analytical balance. Record weights data form no. 192-p-9904. Note that probe and front half of front filter are to be weighed as a unit.
d) Carefully assemble filter holder units and connect to sampling systems. Check “DRIERITE” columns for adequate dry absorbent (blue).

2. Leak checking.

a) Each sample system is to be checked for leakage prior to inserting probes in tunnel.

b) Plug probes and start samplers, adjust pump bypass valve to produce a vacuum reading of 5 inches Hg. (NOTE: During test, vacuum must not exceed 5 inches unless posttest leak check shows acceptable results.)

c) Allow vacuum indication to stabilize for two (2) minutes, then record time and dry gas (DGM_1) and (DGM_2) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM_3, DGM_4). NOTE: If mark, system is leaking too much and all seals should be checked.

d) Calculate leakage rate as follows.

1) System 1: $\frac{(DGM_3 - DGM_1)}{10} = CFM_1$

2) System 2: $\frac{(DGM_4 - DGM_2)}{10} = CFM_2$

If CFM_1 or CFM_2 is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM_1 or CFM_2 is greater than 0.04 X sample rate, leakage is unacceptable. For most tests, the sample rate will be about 0.15 CFM, thus leakage rates in excess of 0.04 X 0.15 = 0.006 CFM are not acceptable.

e) Once leakage check is satisfactory, unplug probe and set flow to appropriate rate for test. This should be done in the minimum amount of time necessary and with the probes in ambient air. Do not insert probes in tunnel until the start of the test run. When flow is established, replug probes to prevent contamination.

Report Number: G102038216 Issued date: April 29, 2015
Client: Stove Builder International inc.

TEST CONDUCT

A. FUEL LOAD

1. Determine optimum load weight by multiplying firebox volume in cubic feet by 7. This is the load weight on an as-fired basis.
2. Determine piece size to obtain the requested load configuration and meet the test load weight criteria. The load should consist of the following: **TO BE DETERMINED**
3. Weigh out test load and adjust weight by shortening all pieces equally if necessary.

4. Measure and record moisture content of each fuel piece using Delmhorst moisture meter. Determine if fuel load moisture content is in required range. If not, construct new load using wood with required moisture content. All wood in the humidity chamber should be within range. Contact project manager if you cannot find suitable pieces.

B. Unit start-up

1. Before lighting a fire, turn on dilution tunnel and set flow rate to 140 SCFM if burn rate is to be less than 3 kg/hr or to an appropriate rate from table provided in laboratory for higher burn rates. Record readings on data form no. 192-r-9904.
2. Check draft imposed on cold stove with all inlets closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005.
3. Check for ambient airflow around unit with hot wire anomometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with uncolored newspaper and kindling representing 10 % of test load with the same type of fuel.
6. Once kindling is burning well after 5 minutes, add splitted pieces having a bottom surface around 4 sq. inches and representing 25% of test load weight. Operate at high fire for 15 minutes. Then adjust settings to intended test run levels as per the manufacturer's.
7. Following addition of pretest fuel load (splitted pieces), start computer for data logging.

C. Test run

1. When the 15 minutes high fire pre-burn period is completed, the test is to be started as follows:

   a) Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
   b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)
   c) Turn on probe sample systems and stack sampler.
   d) Open stove door, rake coals and load stove as follows: **TO BE DETERMINED**
   e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test.)
   f) An alarm will sound an audible signal at the (10) minutes intervals. This signal a reading interval. You must record at each interval the following readings on data form no. 192-v-9904:

      1) Rotometer readings.
      2) Tunnel pitot tube reading.
      (Zero regularly between readings)
      3) Dry gas meter readings.
      4) Temperature readings.
      5) Draft reading
      6) Test laod weight
      7) CO, CO_2 and O_2 readings
      8) Observations of any unusual or non-routine events.

   g) During the test, any condition approaching unacceptable limits will be noted. The filter probes and housings are installed in small holders just outside the tunnel. If the filter temperature gets too high, you will have to increase the water flow through the cooling unit until acceptable temperatures are obtained. In between readings, check on other equipment. Be sure dryers and filters are working and monitor impinger train for proper water and ice levels etc.

h) When the fuel charge is consumed, it will signal end of test and shut down the sampling systems. When this occurs, remove filter holder and probes from tunnel and impingers from sample line.

III. POST TEST PROCEDURES

SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters.
3. Place probe and front half of first filter holders (still assembled) and filters in desiccator. Allow 24-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at two (2) hour intervals until weight change between weighings is less than 0.5 mg. Record all weights taken on data form no. 192-p-9904.

Calculation of results

The computer program carries out all final calculations. When run, it will ask for data from forms used during the test. Enter data as called for.

Other tests

Fuel samples for each run should be tested for heating value and moisture content by ASTM D3286 and D4442 methods respectively.

GENERAL

This guide cannot cover every possible contingency, which may develop during a particular test program. Many questions, which may arise, can be answered by a complete understanding of the test standards and their intent. When in doubt on any detail, check with the laboratory manager and be sure you understand the procedures involved.

It is critical that all spaces on the data forms be properly filled in. Each test must be represented by a complete record of what was done and when.

APPENDIX C
Sampling Proportionality Results

(EPA Formulas from PR5G)

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-15
Run:	1

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
106.59	107.71	1.731	1.676	10
103.63	103.95	1.683	1.617	20
101.96	102.03	1.656	1.587	30
100.51	99.58	1.632	1.550	40
98.61	98.48	1.602	1.533	50
97.74	96.69	1.587	1.505	60
98.10	102.52	1.591	1.593	70
97.63	99.75	1.584	1.551	80
95.90	97.94	1.557	1.523	90
100.38	96.68	1.630	1.504	100
100.15	94.75	1.626	1.474	110
98.80	99.94	1.603	1.554	120

(EPA Formulas from PR5G)

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-16
Run:	2

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
104.97	107.09	1.689	1.650	10
103.14	104.21	1.660	1.606	20
101.29	101.97	1.629	1.570	30
100.73	100.62	1.619	1.549	40
99.48	99.12	1.599	1.526	50
98.12	97.78	1.577	1.504	60
100.91	95.73	1.622	1.473	70
100.63	100.00	1.617	1.539	80
99.28	100.80	1.595	1.550	90
98.21	98.86	1.578	1.521	100
96.96	97.28	1.557	1.496	110
96.25	96.49	1.545	1.484	120

(EPA Formulas from PR5G)

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-16
Run:	3

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
97.28	99.43	1.793	1.631	10
101.70	105.07	1.750	1.608	20
99.50	102.19	1.713	1.566	30
104.89	106.52	1.666	1.506	40
107.02	105.96	1.545	1.361	50
100.05	100.00	1.445	1.285	60
106.23	104.48	1.368	1.197	70
104.34	97.87	1.344	1.121	80
103.17	96.81	1.328	1.109	90
101.14	100.97	1.303	1.158	100
100.52	101.47	1.294	1.163	110
98.59	100.44	1.269	1.150	120

(EPA Formulas from PR5G)

Manufacturer:	SBI
Model:	Volta
Date:	2015-04-17
Run:	4

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
105.03	106.81	1.788	1.891	10
102.58	96.31	1.747	1.705	20
100.89	101.85	1.721	1.807	30
100.12	101.50	1.706	1.798	40
98.53	99.49	1.679	1.763	50
97.47	97.47	1.663	1.730	60
96.88	96.23	1.654	1.709	70
101.35	100.96	1.728	1.791	80
100.98	101.81	1.723	1.807	90
99.68	100.28	1.704	1.783	100
99.12	99.56	1.690	1.766	110
97.92	98.25	1.670	1.742	120

APPENDIX D
Calibration Data

Certificate No: MT0031137

METTLER-TOLEDO, LLC
900 Polaris Pkwy
Columbus, OH 43240
1-800-METTLER

METTLER TOLEDO

ACCREDITED
Cert # 1788.01

Mass Calibration Certificate

Customer Information

Customer Name:	Sbi	*City:*	Saint-Augustin-De-Dema
Address:	250 Rue Copenhague	*State / Province:*	QC
Purchase Order:	34985	*Zip / Postal Code:*	G3A 2H3

Measurement and Test Equipment Identification

Serial Number:	B316238717	*Date Received:*	4/16/2013
Manufacturer:	Mettler-Toledo	*Condition:*	*Excellent*
Asset number:		*Tolerance Class:*	OIML F1, F2

Environmental Conditions

Temperature:	20.365 °C	*Relative Humidity:*	47.865 *%RH*
Barometric Pressure:	981.2060 *hPa*	*Air Density:*	1.1599 *kg/m³*

The standards used to perform this calibration are traceable to NIST through METTLER TOLEDO traceability number: MT5061

This certificate is issued in accordance with the conditions granted by A2LA under Certificate number 1788.01, which is based on ISO/IEC17025. A2LA has assessed the measurement capability of the laboratory and its traceability to recognized national standards. All uncertainties in this certificate are reported at a 95% (k=2) confidence factor.

Calibration Date: 04/09/2013

Next Calibration Due: 04/15/~~2014~~ 2018 GF 2014-06-23

Calibration Technician: Kathy Weatherbie

Signature: Ann J Anderson 04/16/2013

Metrology Specialist Date

16280500A

Certificate No: MT0031137

As Found Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
200 g	(B316238717)	200.001163	200.000974	0.035	3.0	7.95
10 g	(B316238717)	10.0000725	10.0000630	0.0078	0.20	7.95

As Left Data

Nominal Value&Suffix	Serial Number	True Mass (g)	Conv. Mass (g)	Uncertainty (mg, k = 2)	Tolerance (mg)	Density (g/cm³)
200 g	(B316238717)	200.001163	200.000974	0.035	3.0	7.95
10 g	(B316238717)	10.0000725	10.0000630	0.0078	0.20	7.95

Comparators Used

#	Equipment Used	Serial Number	Equipment Type	Calibration Due
#11 :	a200XL	B010016733	Automated Mass Comparator	08/31/2013

Comments

No Remarks

Definitions

Nominal Value - The value as labeled on the weight or defined by shape in accordance with OIML R111 for milligram weights. The number within the parentheses after the nominal value is the serial number of the set to which the weight belongs.

True Mass - The mass value of the weight if measured in a vacuum.

Conventional Mass - For a mass at 20 °C, "Conventional Mass" is the mass of a reference standard of density 8000 kg/m³ which it balances in air with a density of 1.2 kg/m³. This value should be referenced when testing the accuracy of a weighing device using any of the nominal values contained in this certificate. The As Found results will equal the As Left in cases where no adjustment or replacement was required.

Uncertainty - All Uncertainty values are reported at 95% confidence level (k=2) . The uncertainty value does not include a component for the affects due to magnetism.

Tolerance - The acceptable range of deviation (positive and negative) from the nominal value, including the uncertainty, as defined by ASTM and OIML for the respective classes.

Density - The assumed density of the material used by the manufacturer.

Calibration Process - The METTLER TOLEDO procedure used to obtain the measurement results. All procedures are based on SOPs as defined in NIST Handbook 145. The same process is used to obtain the As Found and As Left results.

OOT - The As Found measurement result combined with the uncertainty exceeded the tolerance for the specified weight class.

A - Weight was adjusted after As Found testing to within the appropriate tolerance class.

R - The received weight was replaced due to an out of tolerance condition and the weight was not adjustable or the weight for this nominal value was missing.

Rapport d'étalonnage No. ca0003-944-030515

Mettler Toledo
Service Business Unit Industrial
1900 Polaris Parkway
Columbus, Ohio 43240
1-800-METTLER

METTLER TOLEDO

ISO 9001 Registered

ANSI/NCSL Z540-1 Accrédité

Accrédité par l'American Association for Laboratory Accreditation (A2LA)

CERT.CALIBRATION #1902.02

Certificat d'étalonnage

Client

Société :	SBI Fabricant De Poeles		
Adresse :	250 Rue de Copenhague		
Ville :	Saint-Augustin-De-Desmaures	*État/Province :*	Quebec
Code postal :	G3A 2H3	Astea Customer ID:	300276257

Instrument

Constructeur :	RICE LAKE	*Modèle de terminal :*	IND560
Modèle :	Roughdeck	*# série du terminal:*	00927396KL
No de série :	B00927396KL	*# série de l'imprimant*	N/A
Capacité :	625 kg		Lab
Résolution :	0,02 kg	*Nbre de Divisions:*	31250
Classe :	III	*Procédure utilisée :*	NIST Handbook 44
No./ID d'inventaire:	SBI-013		
Procédure:	Le présent certificat est émis conformément aux conditions de certification accordées par l'A2LA, en vertu de la norme ISO/IEC 17025. A2LA a évalué la capacité de mesure du laboratoire et la traçabilité des normes nationales reconnues.		

Date de calibrage :	5-mars-2015	*Date, prochaine Cal.*	31-mars-2016
Signataire autorisé (A2LA) :	Dany Careau	*Signature:*	ELECTRONIC SIGNATURE

Étalons de travail

Retracabilité: Les poids de test utilisés se réfèrent au National Institute of Standards and Technology.

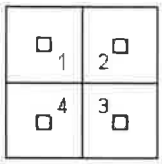
Jeu de poids no :	*Traçabilité NIST No.:*	*Classe ASTM/OIML*	*Date d'étalonnage :*	*Date proch. étalonnage*
BE16	M14-0106	M1	29-mai-2014	29-mai-2015
Q200	1401292	M1	12-mars-2014	12-mars-2015

Résultats de mesure

La température : 23 °C

Les conditions ambiantes ont été vérifiées afin d'assurer l'exactitude de l'étalonnage.

Test de variation



		Avant Réglage	*Après Réglage*
Poids Appliqués	*Position*	*Valeur lue*	*Valeur lue*
1: 100 kg	*Position 1*	99,98 kg	99,96 kg
2: 100 kg	*Position 2*	100,04 kg	100,02 kg
3: 100 kg	*Position 3*	100,02 kg	100,00 kg
4: 100 kg	*Position 4*	100,02 kg	100,00 kg
Erreur maximum :		0,06 kg	0,06 kg
Max Erreur Admissible :		0,10 kg	0,1 kg

Linéarité

	Avant réglage					
	Poids Appliqués	*Valeur lue*	*Erreur*		*Erreur admissible*	*Dans la Tolérance*
Zero 1,00	0,00 kg	0,00 kg	0,00 kg	0 d	1 d	OUI
2,00	40,00 kg	40,00 kg	0,00 kg	0 d	2 d	OUI
3,00	80,00 kg	80,00 kg	0,00 kg	0 d	3 d	OUI
4,00	120,00 kg	120,00 kg	0,00 kg	0 d	5 d	OUI
5,00	160,00 kg	160,00 kg	0,00 kg	0 d	5 d	OUI
Max 6,00	200,00 kg	200,02 kg	0,02 kg	1 d	5 d	OUI

☐ Méthode de substitution utilisée

	Après réglage					
	Poids Appliqués	*Valeur lue*	*Erreur*		*Erreur admissible*	*Dans la Tolérance*
Zero 1,00	0,00 kg	0,00 kg	0,00 kg	0 d	1 d	OUI
2,00	40,00 kg	40,00 kg	0,00 kg	0 d	2 d	OUI
3,00	80,00 kg	80,00 kg	0,00 kg	0 d	3 d	OUI
4,00	120,00 kg	120,00 kg	0,00 kg	0 d	5 d	OUI
5,00	160,00 kg	160,00 kg	0,00 kg	0 d	5 d	OUI
Max 6,00	200,00 kg	200,00 kg	0,00 kg	0 d	5 d	OUI

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis
Si non, les résultats "avant réglage" correspondent aux résultats tel que laissé.

☑ **OUI** ☐ **NON**

Répétabilité

Poids appliqués : 100,00 kg

	Chargé	*Vide*	*Différence*
1	100,00 kg	0,00 kg	100 kg
2	100,00 kg	0,00 kg	100 kg
3	100,00 kg	0,00 kg	100 kg
	Erreur maximale :	0,00 kg	0,0 d
	Tolérance :	0,10 kg	5 d

Incertitude

Mesure de l'incertitude = 0,012 kg

L'incertitude de mesure représente les incertitudes étendues selon un facteur de sécurité K=2 générant un niveau de confiance approximatif de 95 %. Des dispositions doivent être prises en matière d'environnement au lieu d'étalonnage, d'incertitude induite par l'article en étalonnage et d'effets indésirables causés par le transport du matériel d'étalonnage. Ces facteurs pourraient entraîner une incertitude plus grande que le CMC.

Remarques

Aucune.

Mesures Canada | Measurement Canada

Un organisme d'Industrie Canada | An Agency of Industry Canada

District de Québec
1550, avenue d'Estimauville
Québec, Québec, G1J 0C4

Numéro du jeu de poids	Émis le (AAAA-MM-JJ)	Date d'expiration (AAAA-MM-JJ)
SÉRIE Q2XX	2014-03-12	2015-03-12
Propriétaire		
METTLER TOLEDO		
Adresse		
2915, ARGENTIA ROAD, UNIT 6, MISSISSAUGA, ONTARIO, L5N 8G6		
Personne ressource	Numéro de téléphone	

CERTIFICAT DE DÉSIGNATION

Étalons gravimétriques

Je soussigné(e), étant autorisé(e) par le ministre d'Industrie à exercer les pouvoirs du ministre d'Industrie conformément à l'article 13 (1) de la *Loi sur les poids et mesures*,

1) certifie par la présente que l'étalon ou jeu d'étalons a été étalonné conformément à la Partie III du Règlement sur les poids et mesures et par rapport à un étalon de référence traçable aux étalons nationaux de mesure du Canada par une chaîne ininterrompue de comparaisons où les étalons nationaux de mesure sont maintenus par le Conseil national de recherches du Canada, et

2) désigne ledit étalon ou jeu d'étalons décris ci-dessous à titre d'étalon(s) local(aux):

Numéro d'identification	Valeur Nominale	Numéro d'identification	Valeur Nominale	Numéro d'identification	Valeur Nominale	Numéro d'identification	Valeur Nominale
Q201	20 kg	Q214	20 kg	Q227	20 kg	Q240	20 kg
Q202	20 kg	Q215	20 kg	Q228	20 kg	Q241	20 kg
Q203	20 kg	Q216	20 kg	Q229	20 kg	Q242	20 kg
Q204	20 kg	Q217	20 kg	Q230	20 kg	Q243	20 kg
Q205	20 kg	Q218	20 kg	Q231	20 kg	Q244	20 kg
Q206	20 kg	Q219	20 kg	Q232	20 kg	Q245	20 kg
Q207	20 kg	Q220	20 kg	Q233	20 kg	Q246	20 kg
Q208	20 kg	Q221	20 kg	Q234	20 kg	Q247	20 kg
Q209	20 kg	Q222	20 kg	Q235	20 kg	Q248	20 kg
Q210	20 kg	Q223	20 kg	Q236	20 kg	Q249	20 kg
Q211	20 kg	Q224	20 kg	Q237	20 kg	Q250	20 kg
Q212	20 kg	Q225	20 kg	Q238	20 kg		
Q213	20 kg	Q226	20 kg	Q239	20 kg		

District	Certifié par	Désigné par : (Lettres moulées)	Titre du poste
District de Québec (28)	Sandra Gravel	Guy Tessier	Gestionnaire de district / District manager
	Numéro du certificat d'étalonnage: 1401292	(Signature)	

Canada

Report of Calibration

As Found / As Left

ACCREDITED
CALIBRATION
CERT #2260.01

Procedure: Low Pressure: CAL VER /Ruska 7250LP: Revision: 1.2.A

UUT

Made by:	Dwyer
Model:	2000-00
Serial No.:	W80111CF89
ID No.:	SBI-024
Description:	Pressure Gauge

Customer

STOVE BUILDER INTERNATIONAL INC.
250 RUE DE COPENHAGUE
ST-AUSTIN-DE-DESMAURES, QC
G3A 2H3

Calibration

Report No.:	AC14051066-W80111CF89
Adjusted:	No
Condition:	In Tolerance
Calibration Date:	9-May-2014
Calibration Due:	9-May-2015

Environment

Temperature:	25.1°C
Humidity:	42%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor K = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2005 and ANSI/NCSL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Low Pressure Calibrator	Ruska 7250LP	PRE-CAL-06	1500153193/1500153194	29-Aug-2014

REMARKS:

Calibrated in vertical position.

Performed by: Alex Radomishelsky

Reviewed by: Slava Peciurov

Report of Calibration
As Found / As Left

ACCREDITED
CALIBRATION
CERT #2260.01

UUT

Made by: Dwyer
Model: 2000-00
Serial No.: W80111CF89
ID No.: SBI-024
Description: Pressure Gauge

Calibration

Report No.: AC14051066-W80111CF89
Adjusted: No
Condition: In Tolerance
Calibration Date: 9-May-2014
Calibration Due: 9-May-2015

Test Description	STD	UUT	Error	Tolerance	Units	P/F	Uncertainty
LOW PRESSURE TEST							
0.000 inH2O	0.000	0.00	0.00000	±0.010	inH2O	Pass	5.78e-003
0.051 inH2O	0.051	0.05	-0.00100	±0.010	inH2O	Pass	5.78e-003
0.101 inH2O	0.101	0.10	-0.00100	±0.010	inH2O	Pass	5.78e-003
0.150 inH2O	0.150	0.15	0.00000	±0.010	inH2O	Pass	5.78e-003
0.201 inH2O	0.201	0.20	-0.00100	±0.010	inH2O	Pass	5.78e-003
0.254 inH2O	0.254	0.25	-0.00400	±0.010	inH2O	Pass	5.78e-003
0.200 inH2O	0.200	0.20	0.00000	±0.010	inH2O	Pass	5.78e-003
0.148 inH2O	0.148	0.15	0.00200	±0.010	inH2O	Pass	5.78e-003
0.098 inH2O	0.098	0.10	0.00200	±0.010	inH2O	Pass	5.78e-003
0.048 inH2O	0.048	0.05	0.00200	±0.010	inH2O	Pass	5.78e-003
-0.001 inH2O	-0.001	0.00	0.00100	±0.010	inH2O	Pass	5.78e-003

END OF REPORT

Report of Calibration

As Found / As Left

ACCREDITED
CALIBRATION
CERT #2260.01

Procedure: Low Pressure: CAL VER /Ruska 7250LP: Revision: 1.2.A

UUT

Made by:	Dwyer
Model:	2000-0DC
Serial No.:	W11SBH
ID No.:	SBI-127
Description:	Pressure Gauge

Customer

STOVE BUILDER INTERNATIONAL INC.
250 RUE DE COPENHAGUE
ST-AUSTIN-DE-DESMAURES, QC
G3A 2H3

Calibration

Report No.:	AC14051066-W11SBH
Adjusted:	No
Condition:	As Tested
Calibration Date:	9-May-2014
Calibration Due:	9-May-2015

Environment

Temperature:	24.4°C
Humidity:	39%RH

STATEMENT OF UNCERTAINTY: The reported expanded uncertainty of measurement is stated as the standard measurement uncertainty multiplied by the coverage factor K = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 percent. Alpha Controls & Instrumentation Inc. certifies this instrument was calibrated on the date shown using standards traceable to NIST/NRC or accepted intrinsic standards and in compliance with ISO/IEC-17025:2005 and ANSI/NCSL Z540-1.

Any statement of compliance is made without taking measurement uncertainty into account and is based on UUT performance against required tolerance only. The customer must ensure equipment calibrated meets the intended use.

Tolerance is based on manufacturer specification if not stated otherwise. Calibration results relate to items calibrated only.

STANDARDS

Instrument	Model	ID No./Serial No.	Traceability No.	Recall Date
Low Pressure Calibrator	Ruska 7250LP	PRE-CAL-06	1500153193/1500153194	29-Aug-2014

REMARKS:

Calibrated in vertical position.

Only zero adjustment available.

Performed by: Alex Radomishelsky

Reviewed by: Slava Peciurov

Report of Calibration
As Found / As Left

ACCREDITED
CALIBRATION
CERT #2260.01

UUT

Made by:	Dwyer
Model:	2000-0DC
Serial No.:	W11SBH
ID No.:	SBI-127
Description:	Pressure Gauge

Calibration

Report No.:	AC14051066-W11SBH
Adjusted:	No
Condition:	As Tested
Calibration Date:	9-May-2014
Calibration Due:	9-May-2015

Test Description	STD	UUT	Error	Units	Uncertainty
LOW PRESSURE TEST					
0.00 inH2O	0.00	0.0	0.00000	inH2O	5.77e-002
0.11 inH2O	0.11	0.1	-0.01000	inH2O	5.77e-002
0.215 inH2O	0.215	0.2	-0.01500	inH2O	5.77e-002
0.32 inH2O	0.32	0.3	-0.02000	inH2O	5.77e-002
0.415 inH2O	0.415	0.4	-0.01500	inH2O	5.77e-002
0.521 inH2O	0.521	0.5	-0.02100	inH2O	5.77e-002
0.41 inH2O	0.41	0.4	-0.01000	inH2O	5.77e-002
0.306 inH2O	0.306	0.3	-0.00600	inH2O	5.77e-002
0.201 inH2O	0.201	0.2	-0.00100	inH2O	5.77e-002
0.0902 inH2O	0.0902	0.1	0.00980	inH2O	5.77e-002
-0.013 inH2O	-0.013	0.0	0.01300	inH2O	5.77e-002

END OF REPORT

CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 44493

LABORATORY ACCREDITATION BUREAU ACCREDITED
Certificate # L2115-1 Calibration
ISO 17025-2005 ACCREDITED

Customer Information

Customer: SBI St-Augustin

Address : 250, De Copenhague
Doors 11-12
St-Augustin-de-Desmaures

Customer PO #: 41183

Calibration Procedure Information

Procedure ID: GTP FLOW_INDI Revision #: 7 Revision Date: 1/6/2013

Calibration Standards Information

Graftel ID	Manufacturer	Model #	Description	CAL Due
10074	Meriam	50MJ10-14	Laminar Flowmeter	3/3/2015
10075	Meriam	50MJ10-9	Laminar Flowmeter	6/20/2015
51202	Paroscientific	760-100A	Pressure, 100 Psia	8/22/2015
10062	Graftel	9202	5-Channel Temperature Sensor	8/24/2015
10128	Furness	FCO352	Diff Pressure	1/14/2016
60030	Paroscientific	760-100A	Pressure, 100 psia	11/21/2014
10159	HOBO	U12-011	Environment Monitor System	11/28/2014

Sensor_Information

Manufacturer: American Meter
Model #: DTM-200A
Instrument ID#: SBI-103
Serial #: 07J264834

Description: Gas Meter
Rated Accuracy: ± 1 % of Reading
Range: 0 to 250 cfh

Method Used: Laminar
Accuracy Specified By: AmericanMeter
Condition: Functional

Comments: Calibration Date: 09-09-2014

The instruments(s) listed on this certificate have been calibrated against standards traceable to the National Institue of Standards and Technology (NIST) or compared to nationally or internationally recognized consensus standards. The reported calibration uncertainty has a confidence level of 95% (k=2). A calibration uncertainty ratio of 4:1 was maintained unless required uncertainty is supported by analysis. Graftel, LLC. Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2005 and ISO 9001: 2008. All results contained within this certificate relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graftel, LLC. Acceptance Criteria per Simple Acceptance Rule: Measurement Uncertainty is not applied to the measured value when in/out of tolerance statement is made.

Performed By: L. Chan Date: 09/09/2014

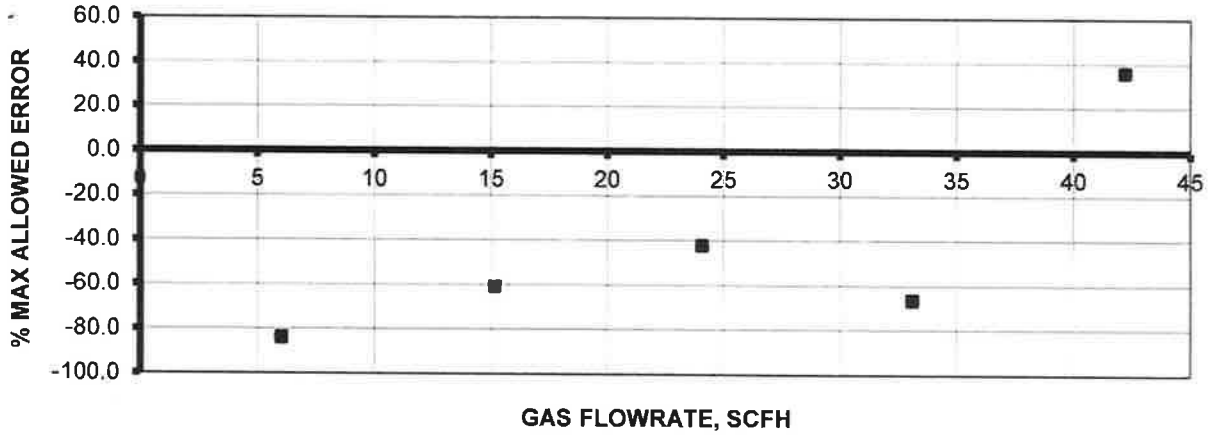
L. Chan
Calibration Technician

GRAFTEL, LLC. 870 Cambridge Drive, Elk Grove Village, IL 60007 847.364.2600
www.graftel.com

ATTACHMENT TO CALIBRATION CERTIFICATE 44493
AS FOUND DATA

Air Flow Rate From Standard, scfh	Air Vol From Standard, scf	Air Vol From Meter, cf	Air vol From Meter, scf	Diff Air Vol STD - METER scf	% Proof	Measurement Uncertainty, scf	STATUS
6.034	0.2837	0.30	0.286	-0.002	99.17	0.002	Pass
15.153	0.9510	1.00	0.957	-0.006	99.39	0.005	Pass
24.073	0.9567	1.00	0.961	-0.004	99.58	0.005	Pass
33.091	1.9155	2.00	1.928	-0.013	99.34	0.010	Pass
42.180	1.9453	2.00	1.938	0.007	100.36	0.010	Pass

ERROR CHART



INSTRUMENT SPECIFICATIONS		
Test Gas	Air	
Standard Pressure,Meter	14.73	psia
Standard Temperature,Meter	60	F
Rated Accuracy	1	% Rding
Full Scale Flow Rate	250	scfh Natural Gas @ 1/2 inch WC
LABORATORY AMBIENT CONDITIONS		
Pressure	14.33	psia
Humidity	48.44	% RH
Temperature	71.38	F

Flow - Humidity - Temperature - Pressure - Design - Consulting - Engineering
NIST Traceable Calibration Data Sheet
Graftel, LLC. 870 Cambridge Drive, Elk Grove Village, IL 60007
P. 847-364-2600 F. 847-364-2699
www.graftel.com

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer: American Meter Company
Model: DTM-200A
Serial Number: 90R054300

Average Gas Meter y Factor
0.998

Calibration Date: 04-21-15
Calibrated by: Claude Paré
Calibration Frequency: Post Test
Next Calibration Due:
Instrument Range: 1.000 cfm
Standard Temp.: 73 oF
Standard Press.: 29.92 "Hg
Barometric Press.: 29.7 "Hg
Signature/Date: 2015-04-21

Previous Calibration Comparision

Date		Acceptable Deviation (5%)	Deviation
y Factor		0	0.998
Acceptance			

Current Calibration

Acceptable y Deviation	
Maximum y Deviation	0.002
Acceptance	

Reference Standard *		
Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 09, 2014
	Calib. Value	0.9920 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	230.9	236.6	242.3
Final Reference Meter	236.268	241.938	249.127
Initial DGM	405.724	411.426	417.118
Final DGM	411.093	416.752	423.911
Temp. Ref. Meter (°F), Tr	73.5	74.5	74.8
Temperature DGM (°F), Td	76.0	76.2	76.0
Time (Minutes)	29.0	29.0	37.0
Net Volume Ref. Meter, Vr	5.368	5.338	6.827
Net Volume DGM, Vd	5.369	5.326	6.793
Gas Meter y Factor =	**0.996**	**0.997**	**0.999**
Gas Meter y Factor Deviation (from avg.)	0.001	0.000	0.002
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.185137931

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272

Thermal Metering System Calibration
Y factor for Method 5G sampling

Manufacturer: American Meter Company
Model: DTM-200A
Serial Number: 98Z332226

Average Gas Meter y Factor
0.997

Calibration Date: 04-21-15
Calibrated by: Claude Paré
Calibration Frequency: Post Test
Next Calibration Due:
Instrument Range: 1.000 cfm
Standard Temp.: 73 oF
Standard Press.: 29.92 "Hg
Barometric Press.: 29.64 "Hg

Signature/Date: 2015-04-21

Previous Calibration Comparision

Date		Acceptable Deviation (5%)	Deviation
y Factor		0	0.997
Acceptance			

Current Calibration

Acceptable y Deviation	
Maximum y Deviation	0.003
Acceptance	

Reference Standard *		
Standard Calibrator	Model	Standard Test Meter
	S/N	07J264834
	Calib. Date	Sept. 09, 2014
	Calib. Value	0.9920 y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	250.2	255.7	261.1
Final Reference Meter	255.261	260.761	266.276
Initial DGM	8.688	14.17	19.561
Final DGM	13.716	19.224	24.708
Temp. Ref. Meter (°F), Tr	74.9	74.6	74.3
Temperature DGM (°F), Td	75.3	75.0	74.8
Time (Minutes)	33.0	29.0	30.0
Net Volume Ref. Meter, Vr	5.061	5.061	5.176
Net Volume DGM, Vd	5.028	5.054	5.147
Gas Meter y Factor =	**0.999**	**0.994**	**0.999**
Gas Meter y Factor Deviation (from avg.)	0.002	0.003	0.001
Orifice dH@	**0.00**	**0.00**	**0.00**
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where: 0.152363636

1. Deviation = |Average value for all runs - current run value|
2. y = [Vr x (y factor (ref)) x (Pb) x (Td + 460) / [Vd x (Pb + (dH / 13.6)) x (Tr + 460]
3. dH@ = 0.0317 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272

Rapport d'étalonnage No. ca0003-939-030515

Mettler Toledo
Service Business Unit Industrial
1900 Polaris Parkway
Columbus, Ohio 43240
1-800-METTLER

METTLER TOLEDO

ISO 9001 Registered

ANSI/NCSL Z540-1 Accrédité

Accrédité par l'American Association for Laboratory Accreditation (A2LA)

CERT.CALIBRATION #1902.02

Certificat d'étalonnage

Client

Société :	SBI Fabricant De Poeles		
Adresse :	250 Rue de Copenhague		
Ville :	Saint-Augustin-De-Desmaures	*État/Province :*	Quebec
Code postal :	G3A 2H3	Astea Customer ID:	300276257

Instrument

Constructeur :	SARTORIUS	*Modèle de terminal :*	N/A
Modèle :	TE214S	*# série du terminal:*	N/A
No de série :	25851066	*# série de l'imprimant*	N/A
Capacité :	210 g		Lab
Résolution :	0,0001 g	*Nbre de Divisions:*	2100000
Classe :	I	*Procédure utilisée :*	NIST Handbook 44
No./ID d'inventaire:	SBI-206		
Procédure:	Le présent certificat est émis conformément aux conditions de certification accordées par l'A2LA, en vertu de la norme ISO/IEC 17025. A2LA a évalué la capacité de mesure du laboratoire et la traçabilité des normes nationales reconnues.		

Date de calibrage :	5-mars-2015	*Date, prochaine Cal.*	31-mars-2016
Signataire autorisé (A2LA) :	Dany Careau	*Signature:*	ELECTRONIC SIGNATURE

Étalons de travail

Retracabilité: Les poids de test utilisés se réfèrent au National Institute of Standards and Technology.

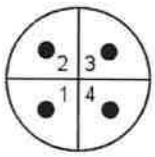
Jeu de poids no :	*Traçabilité NIST No.:*	*Classe ASTM/OIML*	*Date d'étalonnage :*	*Date proch. étalonnage*
142	MT00997	F1	7-mai-2014	30-avr-2016

Résultats de mesure

La température : 23 °C

Les conditions ambiantes ont été vérifiées afin d'assurer l'exactitude de l'étalonnage.

Test de variation



		Avant Réglage	*Après Réglage*
Poids Appliqués	*Position*	*Valeur lue*	*Valeur lue*
1: 50 g	*Position 1*	50,0003 g	50,0000 g
2: 50 g	*Position 2*	50,0002 g	50,0000 g
3: 50 g	*Position 3*	50,0003 g	50,0001 g
4: 50 g	*Position 4*	50,0002 g	50,0000 g
Erreur maximum :		0,0003 g	0,0001 g
Max Erreur Admissible :		0,0003 g	0,0003 g

Linéarité

	Avant réglage					
	Poids Appliqués	*Valeur lue*	*Erreur*		*Erreur admissible*	*Dans la Tolérance*
Zero 1,00	0,0000 g	0,0000 g	0,0000 g	0 d	1 d	OUI
2,00	1,0000 g	1,0000 g	0,0000 g	0 d	1 d	OUI
3,00	10,0000 g	10,0001 g	0,0001 g	1 d	2 d	OUI
4,00	50,0000 g	50,0003 g	0,0003 g	3 d	3 d	OUI
5,00	100,0000 g	100,0005 g	0,0005 g	5 d	3 d	NON
Max 6,00	200,0000 g	200,0008 g	0,0008 g	8 d	3 d	NON

☐ Méthode de substitution utilisée

	Après réglage					
	Poids Appliqués	*Valeur lue*	*Erreur*		*Erreur admissible*	*Dans la Tolérance*
Zero 1,00	0,0000 g	0,0000 g	0,0000 g	0 d	1 d	OUI
2,00	1,0000 g	1,0000 g	0,0000 g	0 d	1 d	OUI
3,00	10,0000 g	10,0001 g	0,0001 g	1 d	2 d	OUI
4,00	50,0000 g	50,0000 g	0,0000 g	0 d	3 d	OUI
5,00	100,0000 g	100,0000 g	0,0000 g	0 d	3 d	OUI
Max 6,00	200,0000 g	199,9999 g	-0,0001 g	1 d	3 d	OUI

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis
Si non, les résultats "avant réglage" correspondent aux résultats tel que laissé.

☑ **OUI** ☐ **NON**

Répétabilité

Poids appliqués : 50,0000 g

	Chargé	*Vide*	*Différence*
1	50,0000 g	0,0000 g	50 g
2	49,9999 g	0,0000 g	49,9999 g
3	50,0000 g	0,0000 g	50 g
	Erreur maximale :	0,0001 g	1,0 d
	Tolérance :	0,0003 g	3 d

Incertitude

Mesure de l'incertitude = 0,00023 g

L'incertitude de mesure représente les incertitudes étendues selon un facteur de sécurité K=2 générant un niveau de confiance approximatif de 95 %. Des dispositions doivent être prises en matière d'environnement au lieu d'étalonnage, d'incertitude induite par l'article en étalonnage et d'effets indésirables causés par le transport du matériel d'étalonnage. Ces facteurs pourraient entraîner une incertitude plus grande que le CMC.

Remarques

Aucune.

Date: 2015-01-18

Equipment: SBI-235
Accuracy: 0.01
Reference: Horloge parlante

Temperature: 74 F
R.H.: 38%

S.D.	0.00	%	
R.M.U.	0.00	%	
O.M.U	**0.00**	**%**	
	Ave A.D.	0.00	%
Standard	Reading	A.D.	
81900.0	81901.0	0.00	

Vincent Pelletier

Engineer: Vincent Pelletier

Date: 2015-04-16
ID: SBI-113

	Calibration gas	Reading
CO	1.82%	2.04%
CO2	17.30%	15.56%
O2	21.40%	21.40%

	Nitrogen	Reading
CO	0.00%	0.00%
CO2	0.00%	0.00%
O2	0.00%	0.00%

Date: 2015-04-16
ID: SBI-113

	Calibration gas	Reading
CO	0.996%	0.93%
CO2	7.05%	6.69%

	Nitrogen	Reading
CO	0.00%	0.00%
CO2	0.00%	0.00%
O2	0.00%	0.00%

AIR LIQUIDE

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 20/09/2011
Code de produit: SPG-4MX0016589
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 590

No de série: S970148E
No d`ordre de fabrication: 11-SGM-2925
Pression: 9625 kPa (15°C)
1425 psi (21°C)
Volume: 0,7 m3
Date d'expiration: 20/09/2014

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
MONOXYDE DE CARBONE	1,7 % molaire	1,82 % molaire
DIOXYDE DE CARBONE	17 % molaire	17,3 % molaire
OXYGÈNE	21,25 % molaire	21,4 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par: S. Amrani

SAMIA AMRANI B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins,on choisi préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

AIR LIQUIDE

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 25/11/2010
Code de produit: SPG-2MX0000729
Qualité: CERTIFIE
Taille: 7
Raccord de sortie du robinet: CGA 350

No de série: C0010195A
No d'ordre de fabrication: 10-SGM-3862
Pression: 10125 kPa (15°C)
1500 psi (21°C)
Volume: 0,739 m3
Date d'expiration: 25/11/2013

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
MONOXYDE DE CARBONE	1 % molaire	0,996 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par:

SAMIA AMRANI B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins,on choisi préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

www.airliquide.ca

AIR LIQUIDE

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 26/11/2010
Code de produit: SPG-2MX0013437
Qualité: CERTIFIE
Taille: 7
Raccord de sortie du robinet: CGA 580

No de série: C-880162-A
No d`ordre de fabrication: 10-SGM-3912
Pression: 13500 kPa (15°C)
2000 psi (21°C)
Volume: 0,97 m3
Date d'expiration: 26/11/2013

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
DIOXYDE DE CARBONE	7 % molaire	7,05 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par
pour Frédéric Gagnon
FREDERIC GAGNON B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins,on choisi préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0,5% et +/- 5% pour les constituants en concentration inférieure 0,5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

www.airliquide.ca

AIR LIQUIDE

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 27/09/2011
Code de produit: SPG-2MX0017105
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 350

No de série: SG-090193-A
No d'ordre de fabrication: 11-SGM-3257
Pression: 9788 kPa (15°C)
1450 psi (21°C)
Volume: 0,596 m3
Date d'expiration: 27/09/2014

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
MONOXYDE DE CARBONE	20 % molaire	20,2 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par

FREDERIC GAGNON B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins,on choisi préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0,5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

AIR LIQUIDE

CERTIFICAT D'ANALYSE

MONTREAL SPECIALTY GAS PLANT
11201 RAY LAWSON
MONTREAL QC
H1J 1M6

Client: QUEBEC
2230 BOUL. CHAREST O. STE-FOY
QUEBEC QUEBEC
G1N 2G3 CANADA

Date d'analyse: 19/09/2013
Code de produit: SPG-2MX0008101
Qualité: CERTIFIE
Taille: 7AL
Raccord de sortie du robinet: CGA 580

No de série: FF-33551
No d'ordre de fabrication: 13-SGM-3199
Pression: 13500 kPa (15°C)
2000 psi (21°C)
Volume: 1,0 m3
Date d'expiration: 19/09/2016

COMPOSANTS	CONCENTRATION NOMINALE	RÉSULTAT D'ANALYSE
DIOXYDE DE CARBONE	20 % molaire	19,9 % molaire
AZOTE	BALANCE	BALANCE

Analyse réalisée par:

FRÉDERIC GAGNON B.Sc.

MÉTHODE D'ANALYSE:

La méthode d'analyse est basée sur le principe de la chromatographie en phase gazeuse comme décrit dans les Instructions d'Opérations de Air Liquide Canada. Selon les besoins,on choisi préférentiellement un détecteur FID ou TCD avec une colonne capillaire ou une colonne remplie.

PRÉCISION ANALYTIQUE:

Les spécifications pour les concentrations rapportées sont: +/- 2% pour les constituants en concentration supérieure à 0.5% et +/- 5% pour les constituants en concentration inférieure 0.5%. Sauf indication contraire, la précision d'analyse est indiquée en pourcentage du constituant. Dans certains cas, les valeurs peuvent changer en fonction de la nature, du nombre et de la concentration des constituants du mélange.

C13-SGM-3199-1
24/09/2013

Ulrich Métrologie inc.
Ulrich Metrology Inc.
9912, Côte-de-Liesse
Montréal (Québec) H8T 1A1

Tél. (514) 631-6653
Fax (514) 631-6122
info@ulrich.ca
www.ulrich.ca

ACCREDITATION ISO 17025

CALIBRATION CERTIFICATE

Certificate no.:	414979	**Calibration date:**	May 12, 2014
Identification:	SBI-212	**Certificate issued:**	May 12, 2014
Description:	THERMO-HYGROMETER, AMPROBE TH-3	**Interval:**	12 months
Manufacturer:	AMPROBE	**Due date:**	May 12, 2015
Model no.:	TH-3	**Procedure no.:**	MET/CAL
Serial no.:	100906351	**Environment:**	CLAS Type 2 Laboratory
		Temperature:	23 ± 2°C
		Humidity:	35 - 55% RH
		Metrologist:	MIC

Property of: SBI
250 RUE DE COPENHAGUE
ST-AUGUSTIN-DE-DESMAURES, QC G3A 2H3

Approved by: David Llorens, Quality Manager

This calibration certificate is issued in accordance with the applicable requirements of ISO/IEC 17025 and Ulrich Metrology's quality manual QM-09 Revision 9. Measurement results provided are traceable to either the National Research Council Canada (NRC), the National Institute of Standards and Technology (NIST), a national laboratory of another country signatory to the CIPM Mutual Recognition Arrangement (MRA), or a calibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

CALIBRATION STANDARDS

See notes below.

MEASUREMENT UNCERTAINTY

The above listed instrument meets or exceeds all specifications as stated in the reference procedure, unless noted otherwise. For measurement results associated with the conformance to a tolerance, the uncertainty in the measurement system did not exceed 25% (4:1 test uncertainty ratio) of the acceptable tolerance for each characteristic calibrated, unless otherwise noted in the report.

CALIBRATION DATA

See next page for measurement results.

Notes:

9 volts square battery replaced.

234528 P

ULRICH

Ulrich Métrologie inc.
Ulrich Metrology inc.
9912, Côte-de-Liesse
Montréal (Québec) H8T 1A1

Tél. (514) 631-6653
Fax (514) 631-6122
info@ulrich.ca
www.ulrich.ca

CALIBRATION DATA

Certificate no.: 414979
Identification: SBI-212
Description: THERMO-HYGROMETER
Serial no.: 100906351
Procedure: Amprobe TH-3: 2500ST-LT-M

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

Identification	Description	Manufacturer	Model no.	Cal. Date	Due Date
1304953	HUMIDITY GENERATOR	THUNDER SCIENTIFIC	2500ST-LT	2014/04/30	2015/04/30

MEASUREMENT RESULTS (Per MET/CAL)

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
TEMPERATURE CALIBRATION						
23°C						
22.98degC		22.80	22.18	23.78	PASS	
RELATIVE HUMIDITY CALIBRATION AT 23°C						
20% RH						
20.03%		19.30	17.03	23.03	PASS	
50% RH						
50.01%		48.00	47.01	53.01	PASS	
80% RH						
80.01%		77.20	77.01	83.01	PASS	

End of Test Data

APPENDIX G
Unit Aging Documentation

Elapsed Time (min)	Fuel Weight Remaining (lb)	Temp. (ºF) Flue Gas	Room Temp
0	3.04	284.2	71.5
10	2.51	288.5	71.7
20	2.02	281.5	71.5
30	1.53	276.5	71.8
40	1.04	277.4	71.8
50	0.52	277.4	71.7
60	0.00	285.1	71.6
70	5.24	383.5	71.7
80	4.38	383.4	71.7
90	3.52	378.7	72.0
100	2.64	386.8	71.8
110	1.73	398.2	72.1
120	0.88	387.7	72.2
130	0.00	390.3	72.5
140	5.00	372.4	71.1
150	4.17	372.6	71.3
160	3.37	366.3	71.5
170	2.52	369.7	71.4
180	1.64	379.9	71.5
190	0.80	379.2	71.7
200	0.00	370.5	71.9
210	5.00	372.4	71.1
220	4.17	372.6	71.3
230	3.37	366.3	71.5
240	2.52	369.7	71.4
250	1.64	379.9	71.5
260	0.80	379.2	71.7
270	0.00	370.5	71.9
280	2.85	276.6	73.0
290	2.40	273.4	73.0
300	1.91	276.2	72.9
310	1.45	275.7	73.5
320	0.95	280.3	73.3
330	0.46	277.3	73.5
340	0.00	286.5	73.9
350	14.80	395.9	72.5

Elapsed Time (min)	Fuel Weight Remaining (lb)	Temp. (ºF) Flue Gas	Room Temp
360	13.94	399.4	72.0
370	13.08	404.4	72.2
380	12.20	400.1	72.0
390	11.29	404.0	72.4
400	10.44	400.4	72.5
410	9.56	407.6	72.4
420	8.71	331.0	72.5
430	7.96	278.2	72.6
440	7.31	259.3	72.5
450	6.78	256.1	72.6
460	6.29	246.1	72.4
470	5.80	243.7	71.9
480	5.31	244.7	72.2
490	4.79	244.6	71.87
500	4.27	247.8	71.79
510	3.77	246.6	71.8
520	3.24	243.1	72.21
530	2.73	245	72.12
540	5.24	383.5	71.73
550	4.38	383.4	71.74
560	3.52	378.7	71.95
570	2.64	386.8	71.83
580	1.73	398.2	72.07
590	0.88	387.7	72.15
600	0.00	390.3	72.46

Front of unit “Volta”

Rear side “Volta”

APPENDIX I
Drawings of stack gas sampling train and dilution tunnel system

IV.A.(1) DILUTION TUNNEL

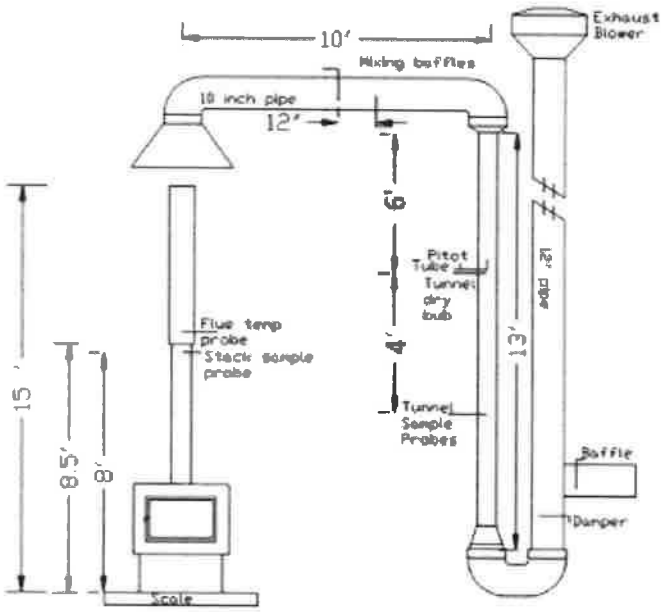


FIGURE 1

IV.B.(2). DILUTION TUNNEL SAMPLE SYSTEMS

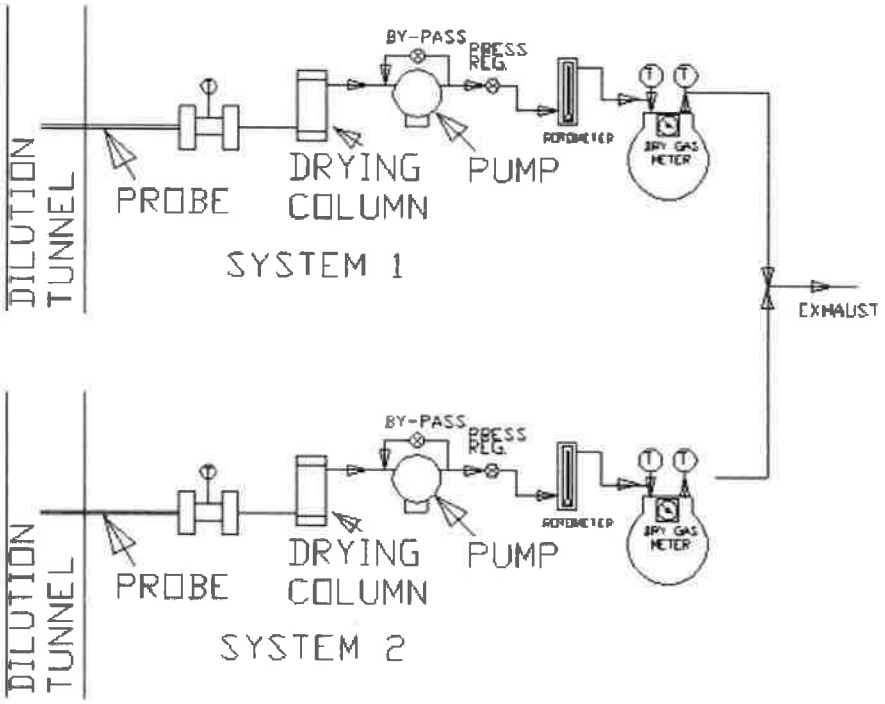


Figure 2