



## **TEST REPORT**

**SCOPE:** EMISSIONS, EFFICIENCY AND OUTPUT

**FUEL:** EPA TEST FUEL (CRIBS)

**TEST STANDARD:** EPA

**MODEL:** DESTINATION 2.3-I WOOD INSERT

**Notice to reader:** Our Destination 2.3-I wood insert was tested as part of our 2.3 Series (XTD 1.9) firebox. Therefore, the 2.3 Series (XTD 1.9) is referenced throughout the attached test report.

# TEST REPORT

The Intertek logo consists of the word "Intertek" in a white, sans-serif font, centered within a dark blue rounded rectangle.

**REPORT NUMBER: 100456088MTL-002**

**REPORT DATE: March 21, 2012**

**EVALUATION CENTER**

Intertek Testing Services NA Inc.

Intertek (Lachine)

1829 32<sup>nd</sup> Ave

Lachine, Qc

**RENDERED TO**

S.B.I.-Stove Builders International

250 Copenhagen Street

St-Augustin-de-Desmaures, QC G3A 2H3

**PRODUCT EVALUATED:**

MODEL XTD 1.9 Wood Stove

**Report of Testing Model XTD 1.9 Wood Fuel Room Heater for compliance as an "Affected Facility" with the applicable requirements of the following criteria: EPA Method 28 "Certification and Auditing of Wood Heaters" and EPA Method 5G "Determination of Particulate Matter Emissions from Wood Heaters".**

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## **I. INTRODUCTION**

Intertek Testing Services NA (Intertek) has witnessed testing for S.B.I.-Stove Builders International, on Wood Room Heater model XTD 1.9, to evaluate all applicable performance requirements included in EPA Method 28 "Certification and auditing of wood heaters" and Method 5G-3 "Determination of particulate matter emissions from wood heaters."

### **I.A PURPOSE OF TEST**

The test was conducted to determine if the unit is in accordance with U.S EPA requirements for Residential Wood Room Heaters. This evaluation was conducted August 22, 2011 – August 26, 2011.

### **I.B LABORATORY**

The test on Wood Room Heater model XTD 1.9 was conducted at the S.B.I.'s testing facility located at 250 Copenhagen Street, St-Augustin-de-Desmaures, PQ G3A 2H3. The test was conducted by Florin Anghel.

### **I.C DESCRIPTION OF UNIT**

The model XTD 1.9 Wood Room Heater is constructed of carbon steel. The outer dimensions are 25.45 - inches deep, 30.001 - inches high, and 25.625 - inches wide.  
(See product drawings.)

Proprietary drawings are on file at Intertek in Montreal.

### **I.D REPORT ORGANIZATION**

This report includes summaries of all data necessary to determine compliance with the regulations. Raw data, calibration records, intermediate calculations, drawings, specifications and other supporting information are contained in appendices to this report.

## **II. SUMMARIZATION**

### **II.A PRETEST INFORMATION**

Prior to beginning the emissions tests the unit was operated for a minimum of one hour at the burn rate corresponding to the burn rate category the unit was about to be tested. The fuel used for the break-in process was Douglas Fir.

On August 22, 2011 the unit was set-up for testing.

### **II.B INFORMATION LOG**

#### **TEST STANDARD**

From August 22, 2011 – August 26, 2011 the unit was tested for EPA emissions.

#### **Deviation from Standard Method**

No deviations from the standards were performed, however, only the applicable sections from each standard were used during all testing.

## II.C SUMMARY OF TEST RESULTS

RUN #1 (August 22, 2011) Burn time was 330 minutes with a category 2 burn rate of 0.96 Kg/hr and an emission rate of 4.82 g/hr. The fuel was loaded by 50 seconds and the door was closed at 90 seconds. The air control was fully opened for 5 minutes and then set to it's fully closed position at 5.0 minutes. The blower was off for the first 30 minutes and on-low for the remainder of the test.

RUN #2 (August 23, 2011) Burn time was 290 minutes with a category 2 burn rate of 1.09 and an emission rate of 4.07 g/hr. The fuel was loaded in 45 seconds and the door was left ajar (1/4") for 90 seconds. The air control was opened for the first 5 minutes and then abruptly set to 3/16" inch open at 5 minutes. The blower was off for the first 30 minutes and on-low for the remainder of the test.

RUN #3 (August 24, 2011) Burn time was 170 minutes with a category 3 burn rate of 1.84 kg/hr and an emission rate of 3.10 g/hr. The fuel was loaded in 45 seconds and the door was ajar (1/4") for 90 seconds. The air control was opened for 5 minutes and then abruptly set to 3/4 inch open for the remainder of the test. The blower was off for the first 30 minutes and on-low for the remainder of the test.

RUN #4 (August 25, 2011-Fan Confirmation) Burn time was 290 minutes with a category 2 burn rate of 1.09 kg/hr and an emission rate of 4.55 g/hr. The fuel was loaded in 50 seconds and the door was ajar at 1/4" for 90 seconds. The air control was opened for 5 minutes and then set to 3/16 inch open from fully closed. Blower was off for the whole duration of the preburn and of the run.

RUN #5 (August 26, 2011) Burn time was 120 minutes with a category 4 burn rate of 2.67 Kg/hr. and an emission rate 2.86 g/hr. The fuel was loaded by 35 seconds and the door was left ajar at 1/4" for 60 seconds. The air control was opened for 5 minutes and then set to it's fully open position. The blower was off for the first 30 minutes and on-low for the remainder of the test.

## II.D SUMMARY OF OTHER DATA

### EMISSIONS

Run Number	Test Date	Burn Rate (kg/hr)	Emission Rate (g/hr)	Adjusted Emission Rate (g/hr)	Heating Efficiency (% LHV)
1	09/22/2011	0.96	3.23	4.82	74.7
2	09/23/2011	1.09	2.64	4.07	77.2
3	09/24/2011	1.84	1.93	3.15	75.2
4	09/25/2011 Fan Conf.	1.09	3.03	4.56	75.9
5	09/26/2011	2.67	1.73	2.87	67.4

### WEIGHTED AVERAGE CALCULATION

Test No.	Burn Rate	(E) Average Emission Rate g/hr	Heat Output (Btu/hr)	Probability	(K) Weighting Factor	(KxE)
1	0.96	4.82	11575.87	0.3384	0.4494	2.1161
2	1.09	4.07	13143.44	0.4494	0.5422	2.2068
3	1.84	3.15	22187.09	0.8806	0.5264	1.6582
5	2.67	2.87	32195.39	0.9758	0.1194	0.3427
Totals:					1.6374	6.3737
Weighted average emission rate:						3.8926

### TEST FACILITY CONDITIONS

Run	Room Temp. °F before	Room Temp °F after	Baro. Pres. In. Hg before	Baro. Pres. In. Hg after	R.H. % before	R.H. % After	Air Vel. Ft/min before	Air Vel. Ft/min after
1	81.7	81.6	29.54	29.5	24	22	0	0
2	82.5	86.1	29.91	29.92	22	22	0	0
3	79.9	80.1	29.95	29.95	24	23	0	0
4	79.8	88.2	29.7	29.7	25	24	0	0
5	78.8	83.9	29.97	29.7	23	23	0	0

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

Run No.	Burn Time (min)	Velocity (ft/sec)	Volumetric Flow Rate (dscf/min)	Total Temp. (°R)	Volume Sample		Particulate Catch (mg)	
					1	2	1	2
1	330	7.62	142.76	559.078	29.609	33.084	11.7	11.9
2	290	7.802	146.54	564.923	29.622	29.750	8.6	9.2
3	170	7.707	138.22	592.318	17.133	17.172	4.1	3.9
4	290	7.81	147.18	559.113	29.239	29.138	9.8	10.2
5	120	8.514	149.12	604.156	12.140	12.107	2.4	2.3

### DILUTION TUNNEL DUAL TRAIN PRECISION

Run No.	Sample Ratios		Total Emissions (g)		% Deviation	% Deviation of 7.5% of 7.5 grams*
	Train 1	Train 2	Train 1	Train 2		
1	1591.1	1423.9	18.62	16.94	3.90	5.01
2	1434.6	1428.4	12.34	13.14	2.62	2.84
3	1371.5	1368.4	5.62	5.34	2.17	1.82
4	1459.8	1464.9	14.31	14.94	1.80	2.19
5	1474.0	1478.1	3.54	3.40	1.65	1.27

\*= As described in Method 5G-3 section 16.2.5

### GENERAL SUMMARY OF RESULTS

Run No.	Burn Rate (kg/hr)	Change In Surface Temp (°F)	Initial Draft (in/H <sub>2</sub> O) *	Run Time (min)	Average Draft (in/H <sub>2</sub> O) *
1	0.96	-120.3	N/A	330	N/A
2	1.09	-122.6	N/A	290	N/A
3	1.84	-19.16	N/A	170	N/A
4	1.09	-126 **	N/A	290	N/A
5	2.67	-41.68	N/A	120	N/A

\* The Initial draft was not recorded on all the test runs

\*\*We noticed that the Delta-T obtained in the Fan Confirmation Test one degree over the allowed limit. Nevertheless, we ask for it to be taken into consideration as a limit exception, given that this test does not get into the calculation of the overall weighed average and that it's purpose is solely to demonstrate that the the wood heater may be considered to have the same average emission rate with or without the blower operating

### **III. PROCESS DESCRIPTION**

#### **III.A TEST SET-UP DESCRIPTON**

A standard 8" diameter single wall pipe and insulated chimney system was installed to 15' above the scale level. The unit controls were set to the lowest setting during the test.

### **IV. SAMPLING SYSTEMS**

#### **IV.A. 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. (See Figure 3) The sampling section is a continuous 13 foot section of 6 inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard Pitot tube located 60 inches from the beginning of the sampling section. The dry bulb thermocouple is located six inches downstream from the Pitot tube. Tunnel samplers are located 60 inches downstream of the Pitot tube and 36 inches upstream from the end of this section. (See Figure 1)

Stack gas samples are collected from the steel chimney section 8 feet  $\pm$  6 inches above the scale platform. (See Figure 2)

#### IV.A.(1) DILUTION TUNNEL

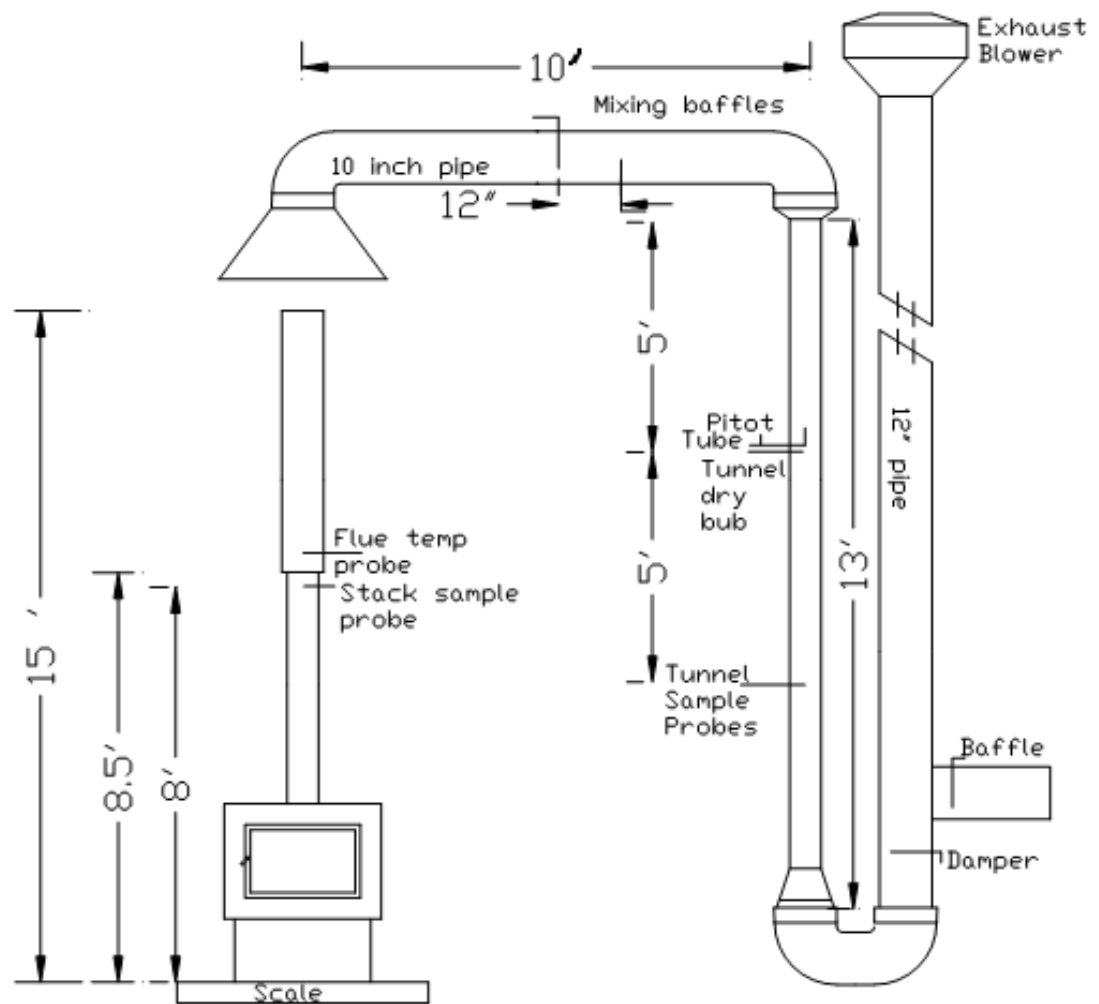
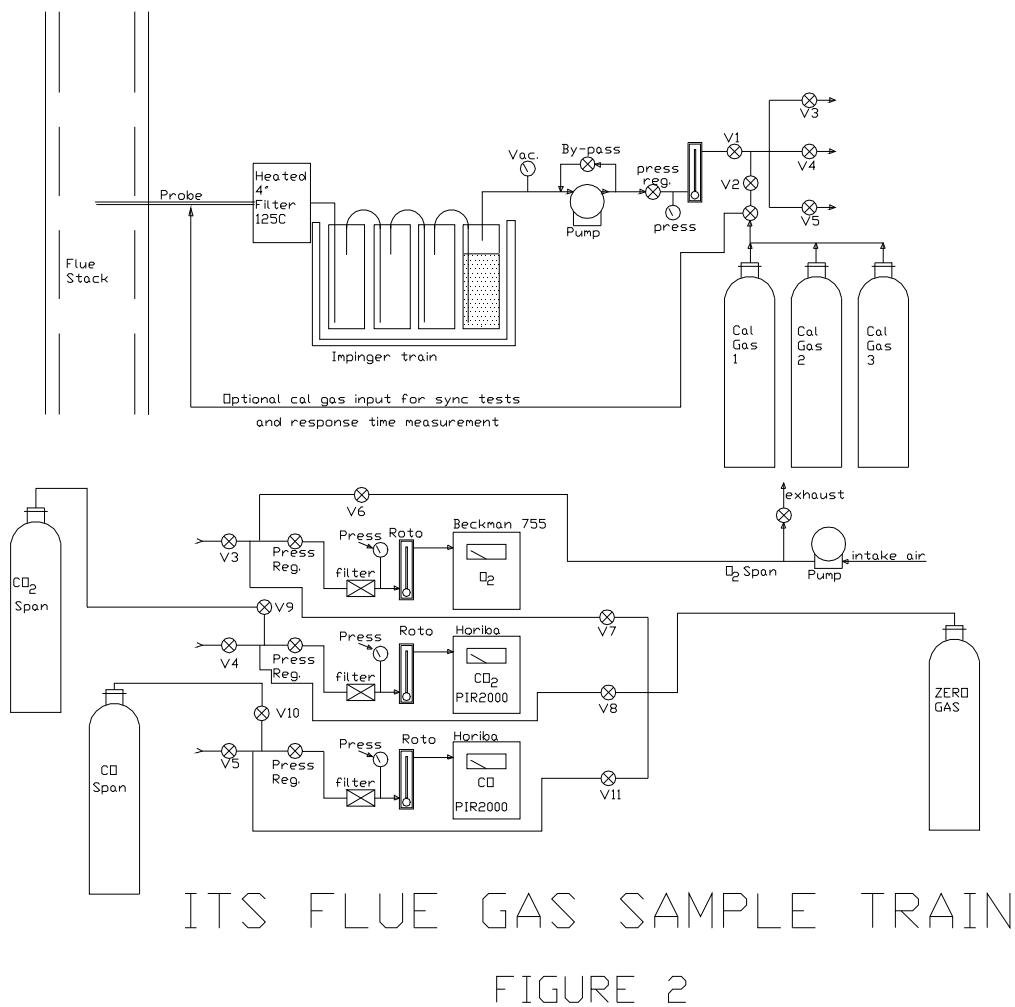


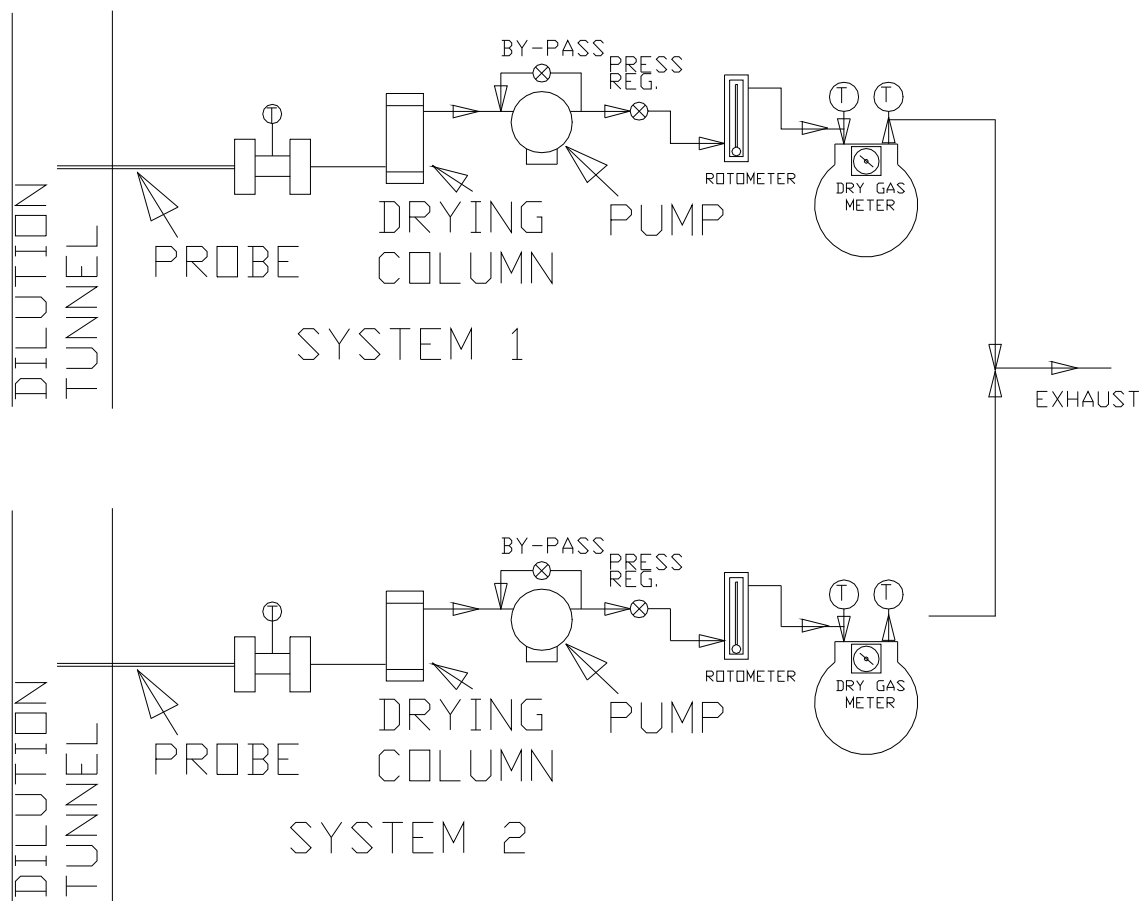
FIGURE 1

## IV.B. OPERATIONAL DRAWINGS

### IV.B.(1) STACK GAS SAMPLE TRAIN



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



**Figure 3**

## **V. SAMPLING METHODS**

### **V.A. PARTICULATE SAMPLING**

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

## **VI. QUALITY ASSURANCE**

### **VI.A. INSTRUMENT CALIBRATION**

#### **VI.A. (1). DRY GAS METERS**

At the conclusion of each test program the dry gas meters are checked against our standard dry gas meter. Three runs are made on each dry gas meter used during the test program. The average calibration factors obtained are then compared with the six-month calibration factor and, if within 5%, the six-month factor is used to calculate standard volumes. Results of this calibration are contained in Appendix D.

An integral part of the post test calibration procedure is a leak check of the pressure side by plugging the system exhaust and pressurizing the system to 10" W.C. The system is judged to be leak free if it retains the pressure for at least 10 minutes.

The standard dry gas meter is calibrated annually by an accredited laboratory certified ISO 17025. The process involves sampling the train operation for 1 cubic foot of volume. With readings made to .001 ft<sup>3</sup>, the resolution is .1%, giving an accuracy higher than the  $\pm 2\%$  required by the standard.

#### **VI.A.(2). STACK SAMPLE ROTAMETER**

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

### **VI.A.(3). GAS ANALYZERS**

The continuous analyzers are zeroed and spanned before each test with appropriate 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 with zero, span and calibration gases (values are recorded only). The drift in each meter is then calculated and must not exceed 5% of the scale used for the test.

At the conclusion of each unit test program, a five-point calibration check is made. This calibration check must meet accuracy requirements of the applicable standards. Consistent deviations between analyzer readings and calibration gas concentrations are used to correct data before computer processing. Data is also corrected for interferences as prescribed by the instrument manufacturer's instructions.

### **VI.B. TEST METHOD PROCEDURES**

#### **VI.B.(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, not just the dry gas meters. Pre-test and post-test leak checks are conducted with a vacuum of 10 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 was typically less than 2 inches of mercury. Thus, leakage rates reported are expected to be much higher than actual leakage during the tests.

#### **VI.B.(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 and leak checks are conducted after each test.

#### **VI.B.(3). PM SAMPLING PROPORTIONALITY (5G-3)**

Proportionality was calculated in accordance with EPA Method 5G-3. The data and results are included in Appendix C.

## VII. CONCLUSION

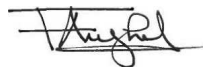
These tests demonstrate that this unit is an affected facility under the definition given in the regulation. The weighted average emission rate of 3.89 g/hr meets the EPA requirements.

### VII.A RESULTS AND OBSERVATIONS

The Model XTD 1.9 Wood Room Heater has been found to be in compliance with the applicable performance and construction requirements of the following criteria: EPA Method 28 "Certification and auditing of wood heaters" and Method 5G-3 Determination of particulate matter emissions for pellet stoves."

## INTERTEK TESTING SERVICES NA

Reported by:



Florin Anghel  
Testing Engineer

Reviewed by:



Bruce S. Davis,  
Project Engineer

## **Appendix C**

### **Sample Analysis**

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBIMODEL: XTD 1.9PROJECT #: G100456088DATE: 8/22/2011RUN #: 1SAMPLE TRAIN: ASAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	1	133.6	122.6	
REAR FILTER CATCH	FILTER	2	122.8	122.3	
TOTAL TARE			256.4000	244.9000	11.50
PROBE & FILTER HOLDER	PROBE	17	139749.6	139749.4	0.20
				TOTAL:	11.70

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBI MODEL: XTD 1.9 PROJECT #: G100456088DATE: 8/22/2011 RUN #: 1SAMPLE TRAIN: B SAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	3	133	122.8	
REAR FILTER CATCH	FILTER	4	123.1	122.3	
TOTAL TARE			256.10	245.10	11.00
PROBE & FILTER HOLDER	PROBE	19	140123.3	140122.4	0.90
				TOTAL:	11.90

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBI MODEL: XTD 1.9 PROJECT #: G100456088DATE: 8/23/2011 RUN #: 2SAMPLE TRAIN: A SAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	5	128.9	121.7	
REAR FILTER CATCH	FILTER	6	122.9	122.4	
TOTAL TARE			251.80	244.10	7.70
PROBE & FILTER HOLDER	PROBE	20	139069	139068.1	0.90
				TOTAL:	8.60

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBI MODEL: XTD 1.9 PROJECT #: G100456088DATE: 8/23/2011 RUN #: 2SAMPLE TRAIN: B SAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	7	133	122.7	
REAR FILTER CATCH	FILTER	8	123.1	122	
TOTAL TARE			253.20	244.70	8.50
PROBE & FILTER HOLDER	PROBE	21	139249.4	139248.7	0.70
				TOTAL:	9.20

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBI MODEL: XTD 1.9 PROJECT #: G100456088DATE: 8/24/2011 RUN #: 3SAMPLE TRAIN: A SAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	9	124.7	121.6	
REAR FILTER CATCH	FILTER	10	122.4	121.8	
TOTAL TARE			247.10	243.40	3.70
PROBE & FILTER HOLDER	PROBE	23	136189	136188.6	0.40
				TOTAL:	4.10

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBI MODEL: XTD 1.9 PROJECT #: G100456088DATE: 8/24/2011 RUN #: 3SAMPLE TRAIN: B SAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	11	123.7	120.6	
REAR FILTER CATCH	FILTER	12	123.3	123	
TOTAL TARE			247.00	243.60	3.40
PROBE & FILTER HOLDER	PROBE	24	136041.3	136040.8	0.50
				TOTAL:	3.90

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBI MODEL: XTD 1.9 PROJECT #: G100456088DATE: 8/25/2011 RUN #: 4SAMPLE TRAIN: A SAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	13	130.6	122	
REAR FILTER CATCH	FILTER	14	123.1	122.4	
TOTAL TARE			253.70	244.40	9.30
PROBE & FILTER HOLDER	PROBE	25	136833.6	136833.1	0.50
				TOTAL:	9.80

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBIMODEL: XTD 1.9PROJECT #: G100456088DATE: 8/25/2011RUN #: 4SAMPLE TRAIN: BSAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	15	132.2	123.3	
REAR FILTER CATCH	FILTER	16	123.8	122.9	
TOTAL TARE			256.00	246.20	9.80
PROBE & FILTER HOLDER	PROBE	26	139829.3	139828.9	0.40
				TOTAL:	10.20

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBI MODEL: XTD 1.9 PROJECT #: G100456088DATE: 8/26/2011 RUN #: 5SAMPLE TRAIN: A SAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	17	124.6	123	
REAR FILTER CATCH	FILTER	18	122.5	122.3	
TOTAL TARE			247.10	245.30	1.80
PROBE & FILTER HOLDER	PROBE	27	136902.6	136902	0.60
				TOTAL:	2.40

ENGINEER: DATE: 11/8/2011

## DILUTION TUNNEL PARTICULATE CALCULATIONS

Intertek

CLIENT: SBIMODEL: XTD 1.9PROJECT #: G100456088DATE: 8/26/2011RUN #: 5SAMPLE TRAIN: BSAMPLE ID #: MTL1108221414-001INTERTEK EQUIPMENT #'s: SBI 206

SAMPLE COMPONENT	REAGENT	FILTER # OR PROBE #	WEIGHTS (mg)		
			FINAL	TARE	PARTICULATE
FRONT FILTER CATCH	FILTER	19	124	122.2	
REAR FILTER CATCH	FILTER	20	117.6	117.5	
TOTAL TARE			241.60	239.70	1.90
PROBE & FILTER HOLDER	PROBE	28	136224.2	136223.8	0.40
				TOTAL:	2.30

ENGINEER: DATE: 11/8/2011

**Standard:**

[illegible]

11-08-11  
T. J. [Signature]

**Standard:**

XTD 1.9

Date:

V. Pelletier


**Standard:**

18630

12h:15 13:00 17:00

	18k 30	12k 15	15:00	17:00
2011-08-25	2011-08-25	2011-08-26	2011-08-26	2011-09-12
2011-08-25	2011-08-25	2011-08-26	2011-08-26	2011-09-13

Id.	Filtres	Date	Date	Date	Date	Date	Date	Date	Date
1	0.1336	0.1336							
2	0.1228								
3	0.1330	0.1330							
4	0.1231								
5	0.1287	0.1289							
6	0.1229	0.1229							
7	0.1302	0.1304							
8	0.1228	0.1228							
9		0.1248	0.1247						
10		0.1222	0.1224						
11		0.1238	0.1237						
12		0.1233	0.1233						
13		0.1211		0.1308	0.1306				
14		0.1232		0.1231	0.1231				
15		0.1325		0.1322	0.1322				
16		0.1236		0.1237	0.1238				
17	0.1229		0.1230	0.1245	0.1247				
18	0.1224		0.1223	0.1227	0.1226				
19	0.1223		0.1222	0.1239	0.1240				
20	0.1197		0.1175	0.1179	0.1175	0.1175			
21	0.1224								
22	0.1228								
23	0.1185								
24	0.1230								



11-08-11

Project: XTD 1.9

Date:

Tech: V. Pelletier

Standard:

1.9

		2011-08-11		2011-08-12		2011-08-17		2011-08-19		2011-08-22		2011-08-23		2011-08-24		2011-08-24	
		Date		Date		Date		Date		Date		Date		Date		Date	
Run #1	17	139,7483	139,7489	139,7478	139,7489	139,7494	139,7484	139,7494	139,7484	139,7494	139,7484	139,7494	139,7484	139,7494	139,7484	139,7494	139,7484
	18	147,8909	147,8910	147,8904	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910	147,8910
	19	140,1219	140,1220	140,1214	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219	140,1219
	20	139,0680	139,0682	139,0679	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682	139,0682
Run #3	21	139,2484	139,2484	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482	139,2482
	22	139,5793	139,5793	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789	139,5789
	23	136,1879	136,1882	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880	136,1880
	24	136,0406	136,0405	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402	136,0402
Run #4	25	136,8525	136,8525	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523	136,8523
	26	139,8286	139,8285	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283	139,8283
	27	136,9013	136,9013	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009	136,9009
	28	136,2232	136,2232	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230	136,2230
Run #5	29	135,1830	135,1830	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826	135,1826
	30	135,9029	135,9029	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025	135,9025
	31	137,0499	137,0499	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493	137,0493
	32	136,0144	136,0144	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137	136,0137
Run #6	33	135,4949	135,4949	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942	135,4942
	34	108,4113	108,4113	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110	108,4110
	35	107,8381	107,8381	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374	107,8374
	36	108,5030	108,5030	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026	108,5026
Run #7	37	108,3837	108,3837	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833	108,3833
	38																

11-08-11

Projet: XTD 1.9  
 Date:  
 Tech: V. Pelletier  
 Standard:

		18 R 30		12 R 15		12 R 00		17:00	
		2011-08-25		2011-08-26		2011-08-26		2011-08-26	
		Date		Date		Date		Date	
Id. Probes		Date		Date		Date		Date	
		17 139,7496							
		18 <del>144</del> 8917							
		19 140,1233		140,1231					
		20 139,0688		139,0690					
		21 139,2493		139,2494					
		22 139,5795							
		23		136,1891					
		24		136,0420					
		25 136,8331		136,8335		136,8340		136,8336	
		26 139,8289				136,8298		139,8293	
		27 136,9017				136,9020		136,9023	
		28 136,2235				136,2238		136,2240	
		29							
		30							
		31							
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 11-08-11

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.9

Project #: G100456088 Sample ID #: HTL1108221414-001

Date: 08-22-11 Engineer: FLORIAN ANGHEL Run #: 1 Sample Train #: A

Balance Equipment #: SBI-206 Thermo/Hygro meter Equipment #: SBI-212

Audit weight Equipment #: 180-135 (Balance audit mfr. std: 500 ± 0.72 mg)

Front Filter #	<u>1</u>	Tare:	<u>0.1226</u>	Preliminary Wt:	<u>0.1340</u>	
Rear Filter #	<u>2</u>	Tare:	<u>0.1223</u>	Preliminary Wt:	<u>0.1230</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>08-22-11 / 17:40</u>			Preliminary Wt:	<u>0.257</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>08-23-11</u>	<u>17:00</u>	<u>15%</u>	<u>69.9</u>	<u>0.2569</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>08-25-11</u>	<u>8:30</u>	<u>17%</u>	<u>68.5</u>	<u>0.2564</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>08-25-11</u>	<u>18:30</u>	<u>17%</u>	<u>69.0</u>	<u>0.2564</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
Probe #:	<u>17</u>	Tare:	<u>139,7494</u>	Preliminary Wt:	<u>139,7484</u>	
Date/Time in dessicator:	<u>08-22-11 / 17:40</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>08-23-11</u>	<u>17:00</u>	<u>15%</u>	<u>69.9</u>	<u>139,7496</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>08-25-11</u>	<u>8:30</u>	<u>17%</u>	<u>68.5</u>	<u>139,7496</u>	<u>200.0 = 200.002</u>	<u>FA</u>

FINAL STABILIZED WEIGHT

FINAL STABILIZED WEIGHT

Date: 11-08-11

Engineer signature: \_\_\_\_\_

Florian Anghel

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.9

Project #: G100456088 Sample ID #: MTL1108221414-001

Date: 08-22-11 Engineer: FLORIN ANGHEL Run #: 1 Sample Train #: B

Balance Equipment #: SBI-206 Thermo/Hygro meter Equipment #: SBI-212

Audit weight Equipment #: 180-135 (Balance audit mfr. std:  $500 \pm 0.72$  mg)

Front Filter #	<u>3</u>	Tare:	<u>0.1228</u>	Preliminary Wt:	<u>0.1334</u>	
Rear Filter #	<u>4</u>	Tare:	<u>0.1223</u>	Preliminary Wt:	<u>0.1233</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>08-22-11 / 17:40</u>			Preliminary Wt:	<u>0.2577</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>08-23-11</u>	<u>17:00</u>	<u>15%</u>	<u>69.9</u>	<u>0.2566</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>08-25-11</u>	<u>8:30</u>	<u>17%</u>	<u>68.5</u>	<u>0.2561</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>08-25-11</u>	<u>18:30</u>	<u>17%</u>	<u>69.0</u>	<u>0.2561</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
Probe #:	<u>19</u>	Tare:	<u>140,1224</u>	Preliminary Wt:	<u>140,1224</u>	
Date/Time in dessicator:	<u>08-22-11 / 17:40</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>08-23-11</u>	<u>17:00</u>	<u>15%</u>	<u>69.9</u>	<u>140,1230</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>08-25-11</u>	<u>8:30</u>	<u>17%</u>	<u>68.5</u>	<u>140,1233</u>	<u>200.0 = 200.002</u>	<u>FA</u>

FINAL STABILIZE WEIGHT

FINAL STABILIZE WEIGHT

Date: 11-08-11

Engineer signature: \_\_\_\_\_

Florin Anghel

## DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.9Project #: G100456088 Sample ID #: MTL 1108221414-001Date: 08-23-11 Engineer: FLORIN ANGHEL Run #: 2 Sample Train #: ABalance Equipment #: SBI-206 Thermo/Hygro meter Equipment #: SBI-212Audit weight Equipment #: 180-135  
180-110 (Balance audit mfr. std:  $500 \pm 0.72$  mg)

Front Filter #	<u>5</u>	Tare:	<u>0.1217</u>	Preliminary Wt:	<u>0.1288</u>	
Rear Filter #	<u>6</u>	Tare:	<u>0.1224</u>	Preliminary Wt:	<u>0.1230</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>8-23-11 / 17:00</u>			Preliminary Wt:	<u>0.251</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-25-11</u>	<u>8:30</u>	<u>17%</u>	<u>68.5</u>	<u>0.2516</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>8-25-11</u>	<u>18:30</u>	<u>17%</u>	<u>69.0</u>	<u>0.2518</u>	<u>0.2 = 0.2000</u>	<u>FA</u> ✓
Probe #:	<u>20</u>	Tare:	<u>139,0681</u>	Preliminary Wt:	<u>139,0681</u>	
Date/Time in dessicator:	<u>8-23-11 / 17:00</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-25-11</u>	<u>8:30</u>	<u>17</u>	<u>68.5</u>	<u>139,0688</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>8-25-11</u>	<u>18:30</u>	<u>17</u>	<u>69.0</u>	<u>139,0691</u>	<u>200.0 = 200.002</u>	<u>FA</u> ✓
<u>8-26-11</u>	<u>12:15</u>	<u>17</u>	<u>69.0</u>	<u>139,0690</u>	<u>200.0 = 200.002</u>	<u>FA</u>

Date: 11-08-11Engineer signature: Florin Anghel

## DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.9Project #: G100456088 Sample ID #: HTL 1108221414-001Date: 8-23-11 Engineer: FLORIN ANGHEL Run #: 2 Sample Train #: BBalance Equipment #: SBI 206 Thermo/Hygro meter Equipment #: SBI-212Audit weight Equipment #: 180-135 (Balance audit mfr. std: 500 ± 0.72 mg)

Front Filter #	<u>7</u>	Tare:	<u>0.1227</u>	Preliminary Wt:	<u>0.1301</u>	
Rear Filter #	<u>8</u>	Tare:	<u>0.1220</u>	Preliminary Wt:	<u>0.1227</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>8-23-11 / 17:00</u>			Preliminary Wt:	<u>0.2528</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-25-11</u>	<u>8:30</u>	<u>17%</u>	<u>68.5</u>	<u>0.2530</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>8-25-11</u>	<u>18:30</u>	<u>17</u>	<u>69.0</u>	<u>0.2532</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
Probe #:	<u>21</u>	Tare:	<u>139,2487</u>	Preliminary Wt:	<u>139,2484</u>	
Date/Time in dessicator:	<u>8-23-11 / 17:00</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-25-11</u>	<u>8:30</u>	<u>17</u>	<u>68.5</u>	<u>139,2493</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>8-25-11</u>	<u>18:30</u>	<u>17</u>	<u>69.0</u>	<u>139,2495</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>8-26-11</u>	<u>12:15</u>	<u>17</u>	<u>69.0</u>	<u>139,2494</u>	<u>200.0 = 200.002</u>	<u>FA</u>

Date: 11-08-11Engineer signature: Florin Anghel

## DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.9Project #: G100486088 Sample ID #: HTL 1108221414-001Date: 08-24-11 Engineer: FLORIN ANGHEL Run #: 3 Sample Train #: ABalance Equipment #: SBI 206 Thermo/Hygro meter Equipment #: SBI-212Audit weight Equipment #: 180-135  
180-110 (Balance audit mfr. std: 500 ± 0.72 mg)

Front Filter #	<u>9</u>	Tare:	<u>0.1216</u>	Preliminary Wt:	<u>0.1248</u>
Rear Filter #	<u>10</u>	Tare:	<u>0.1218</u>	Preliminary Wt:	<u>0.1225</u>
Seal Set #		Tare:		Preliminary Wt:	
Date/Time in dessicator:	<u>8-24-11 / 18:00</u>			Preliminary Wt:	<u>0.2473</u>
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)
<u>8-25-11</u>	<u>18:30</u>	<u>17</u>	<u>69.0</u>	<u>0.2470</u>	<u>0.2 = 0.2000</u>
<u>8-26-11</u>	<u>12:15</u>	<u>17</u>	<u>69.0</u>	<u>0.2471</u>	<u>0.2 = 0.2000</u>
Probe #:	<u>23</u>	Tare:	<u>136,1886</u>	Preliminary Wt:	<u>136,1881</u>
Date/Time in dessicator:	<u>8-24-11 / 18:00</u>				
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)
<u>8-25-11</u>	<u>18:30</u>	<u>17</u>	<u>69.0</u>	<u>136,1891</u>	<u>200.0 = 200.002</u>
<u>8-26-11</u>	<u>12:15</u>	<u>17</u>	<u>69.00</u>	<u>136,1890</u>	<u>200.0 = 200.002</u>

Date: 11-08-11Engineer signature: 

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.3

Project #: G100456088 Sample ID #: MTL1108221414-001

Date: 8-24-11 Engineer: FLORIN ANGHEL Run #: 3 Sample Train #: B

Balance Equipment #: SBI 206 Thermo/Hygro meter Equipment #: SBI-212

Audit weight Equipment #: 180-135 (Balance audit mfr. std:  $500 \pm 0.72$  mg)

Front Filter #	<u>11</u>	Tare:	<u>0.1206</u>	Preliminary Wt:	<u>0.1237</u>	
Rear Filter #	<u>12</u>	Tare:	<u>0.1230</u>	Preliminary Wt:	<u>0.1235</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>8-24-11 / 18:00</u>			Preliminary Wt:	<u>0.2472</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-25-11</u>	<u>18:30</u>	<u>17</u>	<u>69.0</u>	<u>0.2471</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>8-26-11</u>	<u>12:15</u>	<u>17</u>	<u>69.0</u>	<u>0.2470</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
Probe #:	<u>24</u>	Tare:	<u>136,0408</u>	Preliminary Wt:	<u>136,0413</u>	
Date/Time in dessicator:	<u>8-24-11 / 18:00</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-25-11</u>	<u>18:30</u>	<u>17</u>	<u>69.0</u>	<u>136,0420</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>8-26-11</u>	<u>12:15</u>	<u>17</u>	<u>69.0</u>	<u>136,0412</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>9-12-11</u>	<u>18:00</u>	<u>16</u>	<u>69.9</u>	<u>136,0413</u>	<u>200.0 = 200.002</u>	<u>FA</u>

Date: 11-08-11

Engineer signature: Florin Anghel

DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.3

Project #: G100456088 Sample ID #: MTL1108221414-001

Date: 8-25-11 Engineer: FLORIAN ANGHE Run #: 4 Sample Train #: A

Balance Equipment #: SBI206 Thermo/Hygro meter Equipment #: SBI-212

Audit weight Equipment #: 180-135 (Balance audit mfr. std: 500 ± 0.72 mg)

Front Filter #	<u>13</u>	Tare:	<u>0.1220</u>	Preliminary Wt:	<u>0.1311</u>	
Rear Filter #	<u>14</u>	Tare:	<u>0.1224</u>	Preliminary Wt:	<u>0.1232</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>8-25-11 / 18:30</u>			Preliminary Wt:	<u>0.2543</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-26-11</u>	<u>19:00</u>	<u>17</u>	<u>69.6</u>	<u>0.2539</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>9-12-11</u>	<u>17:00</u>	<u>16</u>	<u>70.0</u>	<u>0.2537</u>	<u>0.2 = 0.2000</u>	<u>FA</u> ✓
Probe #:	<u>25</u>	Tare:	<u>136,8331</u>	Preliminary Wt:	<u>136,8335</u>	
Date/Time in dessicator:	<u>8-25-11 / 18:30</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>8-26-11</u>	<u>19:00</u>	<u>17</u>	<u>69.6</u>	<u>136,8340</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>9-12-11</u>	<u>17:00</u>	<u>16</u>	<u>70.0</u>	<u>136,8336</u>	<u>200.0 = 200.002</u>	<u>FA</u> ✓

Date: 11-08-11

Engineer signature: \_\_\_\_\_

[Signature]

# DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.9

Project #: G100456088 Sample ID #: MTL M08221414-001

Date: 8-25-11 Engineer: FLORIN ANGHEL Run #: 4 Sample Train #: B

Balance Equipment #: SBI 206 Thermo/Hygro meter Equipment #: SBI 212

Audit weight Equipment #: 180-195 (Balance audit mfr. std: 500 ± 0.72 mg)

Front Filter #	15		Tare:	0.1233		Preliminary Wt:	0.1325	
Rear Filter #	16		Tare:	0.1229		Preliminary Wt:	0.1236	
Seal Set #			Tare:			Preliminary Wt:		
Date/Time in dessicator:			8-25-11 / 18:30			Preliminary Wt: 0.2561		
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials		
8-26-11	19:00	17	69.6	0.2559	0.2 = 0.2000	FA		
9-12-11	17:00	16	70.0	0.2560	0.2 = 0.2000	FA		
Probe #:			26		Tare:	139,828.9		Preliminary Wt: 139,829.8
Date/Time in dessicator:			8-25-11 / 18:30					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials		
8-26-11	19:00	17	69.6	139,829.8	200.0 = 200.002	FA		
9-12-11	17:00	16	70.0	139,829.3	200.0 = 200.002	FA		

Date: 11-08-11

Engineer signature: Florin Anghel

## DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.9Project #: G100456088 Sample ID #: MTL 1108221414-001Date: 8-26-11 Engineer: FLORIN ANGHEL Run #: 5 Sample Train #: ABalance Equipment #: SBI-206 Thermo/Hygro meter Equipment #: SBI-212Audit weight Equipment #: 180-135 (Balance audit mfr. std:  $500 \pm 0.72$  mg)

Front Filter #	<u>17</u>	Tare:	<u>0.1230</u>	Preliminary Wt:	<u>0.1245</u>	
Rear Filter #	<u>18</u>	Tare:	<u>0.1223</u>	Preliminary Wt:	<u>0.1227</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>8-26-11 / 12:15</u>			Preliminary Wt:	<u>0.2472</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>9-12-11</u>	<u>17:00</u>	<u>16</u>	<u>70.0</u>	<u>0.2473</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>10-20-11</u>	<u>9:30</u>	<u>16</u>	<u>69.5</u>	<u>0.2471</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
Probe #:	<u>27</u>	Tare:	<u>136,9020</u>	Preliminary Wt:	<u>136,9023</u>	
Date/Time in dessicator:	<u>8-26-11 / 12:15</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>9-12-11</u>	<u>17:00</u>	<u>16</u>	<u>70.0</u>	<u>136,9027</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>10-20-11</u>	<u>9:30</u>	<u>16</u>	<u>69.5</u>	<u>136,9026</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>10-21-11</u>	<u>9:00</u>	<u>16</u>	<u>70.0</u>	<u>136,9024</u>	<u>200.0 = 200.002</u>	<u>FA</u>

Date: 11-08-11Engineer signature: Florin Anghel

## DILUTION TUNNEL WORKSHEET - METHOD 5G3

Client: SBI Model: XTD 1.3Project #: G100450088 Sample ID #: HTL1108221414-001Date: 8-26-11 Engineer: FLORIN ANGHEL Run #: 5 Sample Train #: BBalance Equipment #: SBI-206 Thermo/Hygro meter Equipment #: SBI-212Audit weight Equipment #: 180-135 (Balance audit mfr. std:  $500 \pm 0.72$  mg)

Front Filter #	<u>19</u>	Tare:	<u>0.1222</u>	Preliminary Wt:	<u>0.1239</u>	
Rear Filter #	<u>20</u>	Tare:	<u>0.1175</u>	Preliminary Wt:	<u>0.1179</u>	
Seal Set #		Tare:		Preliminary Wt:		
Date/Time in dessicator:	<u>8-26-11 / 12:15</u>			Preliminary Wt:	<u>0.2418</u>	
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>9-12-11</u>	<u>17:00</u>	<u>16</u>	<u>70.0</u>	<u>0.2415</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
<u>10-20-11</u>	<u>9:30</u>	<u>16</u>	<u>69.5</u>	<u>0.2416</u>	<u>0.2 = 0.2000</u>	<u>FA</u>
Probe #:	<u>28</u>	Tare:	<u>136,2238</u>	Preliminary Wt:	<u>136,2238</u>	
Date/Time in dessicator:	<u>8-26-11 / 12:15</u>					
Date	Time	R/H %	Temp. (F)	Weight (grams)	Audit (grams)	Initials
<u>9-12-11</u>	<u>17:00</u>	<u>16</u>	<u>70.0</u>	<u>136,2240</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>10-20-11</u>	<u>9:30</u>	<u>16</u>	<u>69.5</u>	<u>136,2242</u>	<u>200.0 = 200.002</u>	<u>FA</u>
<u>10-21-11</u>	<u>9:00</u>	<u>16</u>	<u>70.0</u>	<u>136,2240</u>	<u>200.0 = 200.002</u>	<u>FA</u>

Date: 11-08-11Engineer signature: Florin Anghel

## **Appendix D**

### **Calibrations**



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

CERT.CALIBRATION #1902.02

## Certificat d'étalonnage

### Client

Société : SBI Fabricant de poêles International inc.  
Adresse : 250, rue Copenhague  
Ville : St-Augustin État/Province : Québec  
Code postal : G3A 2V1 Astea Customer ID: C037589001001

### Instrument

Constructeur : Rice Lake Modèle de terminal : IND560  
Modèle : Roughdeck No de série du termin 00927396KL  
No de série : B00927396KL No. Série Impr. N/A  
Capacité : 625 kg Service/Pièce : Lab  
Résolution : 0.02 kg Nbre de Divisions 31250  
Classe : III Procédure utilisée : Canadien  
Numéro/ID d'actif du clié 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 : 21-mars-2011 Le prochain Cal Date 31-mars-2012  
Signataire autorisé (A2LA) : Dany Careau Signature: ELECTRONIC SIGNATURE  
Signature du client :

### Étalons de travail

Traçabilité 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
42268	M10-0278	M1	5-août-2010	5-août-2011
MTP1	MT0015626	F1	17-sept.-2010	17-sept.-2011
Kit S	1356103	M1	5-oct.-2010	5-oct.-2011

**Résultats de mesure**

La température : 70 °F

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

**Test de variation**

<input type="checkbox"/> 1	<input type="checkbox"/> 2
<input type="checkbox"/> 4	<input type="checkbox"/> 3

Les poids Appliqués	Position	Avant Réglage	Après Réglage
		Valeur lue	Valeur lue
1: 125 kg	Position 1	125.02 kg	124.98 kg
2: 125 kg	Position 2	125.16 kg	125.02 kg
3: 125 kg	Position 3	125.16 kg	125.02 kg
4: 125 kg	Position 4	125.26 kg	125.00 kg
Erreur maximum :		0.26 kg	0.04 kg
Max Erreur Admissible :		0.10 kg	0.1 kg

**Linéarité**

	Avant réglage					Dans la Tolérance
	Les poids Appliqués	Valeur lue	Erreur		Erreur admissible	
Zero 1	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI
2	20.00 kg	20.02 kg	0.02 kg	1 d	2 d	OUI
3	40.00 kg	40.04 kg	0.04 kg	2 d	2 d	OUI
4	100.00 kg	100.12 kg	0.12 kg	6 d	5 d	NON
Max 5	200.00 kg	200.24 kg	0.24 kg	12 d	5 d	NON
6	100.00 kg	100.12 kg	0.12 kg	6 d	5 d	NON
7	40.00 kg	40.04 kg	0.04 kg	2 d	2 d	OUI
8	20.00 kg	20.02 kg	0.02 kg	1 d	2 d	OUI
Zero 9	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI

☐ Méthode de substitution utilisée

	Après réglage					Dans la Tolérance
	Les poids Appliqués	Valeur lue	Erreur		Erreur admissible	
Zero 1	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI
2	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
3	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
4	100.00 kg	100.02 kg	0.02 kg	1 d	5 d	OUI
Max 5	200.00 kg	200.02 kg	0.02 kg	1 d	5 d	OUI
6	100.00 kg	100.02 kg	0.02 kg	1 d	5 d	OUI
7	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
8	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
Zero 9	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis

Si NON, les résultats relatifs à l'état du système avant la prestation de service correspondent à l'état de

☒ OUI

☐ NON

## Répétabilité

Poids appliqués : 100.00 kg

	Chargé	Vide	Différence
1	100.00 kg	0.00 kg	100 kg
2	100.02 kg	0.00 kg	100.02 kg
3	100.02 kg	0.00 kg	100.02 kg
Erreur maximale :		0.02 kg	1.0 d
Tolérance :		0.10 kg	5 d

## Incertitude

Mesure de l'incertitude = 0.022 kg

Les meilleures incertitudes représentent 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 BMC.

## Remarques

Aucune.

No du rapport d'étalonnage CA0003-086-032111

**Mettler Toledo**

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

**METTLER TOLEDO**

ISO 9001 Registered

ANSI/NCSL Z540 Accrédité



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

CERT.CALIBRATION #1902.02

## Certificat d'étalonnage

### Client

Société : SBI Fabricant de poêles International inc.  
Adresse : 250, rue Copenhagen  
Ville : St-Augustin État/Province : Québec  
Code postal : G3A 2V1 Astea Customer ID: C037589001001

### Instrument

Constructeur : Weightronix Modèle de terminal : IND560  
Modèle : DSL-6060 No de série du termin 00927386KL  
No de série : B00927386KL No. Série Impr. N/A  
Capacité : 500 kg Service/Pièce : LAB  
Résolution : 0.02 kg Nbre de Divisions 25000  
Classe : III Procédure utilisée : Canadien  
Numéro/ID d'actif du clie SBI-014  
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 : 21-mars-2011 Le prochain Cal Date 31-mars-2012  
Signataire autorisé (A2LA) : Dany Careau Signature: ELECTRONIC SIGNATURE  
Signature du client :

### Étalons de travail

Traçabilité 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
42268	M10-0278	M1	5-août-2010	5-août-2011
MTP1	MT0015626	F1	17-sept.-2010	17-sept.-2011
Kit S	1356103	M1	5-oct.-2010	5-oct.-2011

**Résultats de mesure**

La température : 70 °F

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

**Test de variation**

<input type="checkbox"/> 1	<input type="checkbox"/> 2
<input type="checkbox"/> 4	<input type="checkbox"/> 3

Les poids Appliqués	Position	Avant Réglage	Après Réglage
		Valeur lue	Valeur lue
1: 125.00 kg	Position 1	125.00 kg	125.00 kg
2: 125.00 kg	Position 2	125.04 kg	125.00 kg
3: 125.00 kg	Position 3	125.00 kg	125.00 kg
4: 125.00 kg	Position 4	124.96 kg	125.00 kg
Erreur maximum :		0.08 kg	0.00 kg
Max Erreur Admissible :		0.10 kg	0.1 kg

**Linéarité**

	Avant réglage					Dans la Tolérance
	Les poids Appliqués	Valeur lue	Erreur		Erreur admissible	
Zero 1	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI
2	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
3	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
4	100.00 kg	100.02 kg	0.02 kg	1 d	5 d	OUI
Max 5	200.00 kg	200.04 kg	0.04 kg	2 d	5 d	OUI
6	100.00 kg	100.02 kg	0.02 kg	1 d	5 d	OUI
7	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
8	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
Zero 9	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI

☐ Méthode de substitution utilisée

	Après réglage					Dans la Tolérance
	Les poids Appliqués	Valeur lue	Erreur		Erreur admissible	
Zero 1	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI
2	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
3	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
4	100.00 kg	100.00 kg	0.00 kg	0 d	5 d	OUI
Max 5	200.00 kg	200.00 kg	0.00 kg	0 d	5 d	OUI
6	100.00 kg	100.00 kg	0.00 kg	0 d	5 d	OUI
7	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
8	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
Zero 9	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis

Si NON, les résultats relatifs à l'état du système avant la prestation de service correspondent à l'état de

☒ OUI

☐ NON

## Répétabilité

Poids appliqués : 100.00 kg

	Chargé	Vide	Différence
1	100.00 kg	0.00 kg	100 kg
2	100.02 kg	0.00 kg	100.02 kg
3	100.00 kg	0.00 kg	100 kg
Erreur maximale :		0.02 kg	1.0 d
Tolérance :		0.10 kg	5 d

## Incertitude

Mesure de l'incertitude = 0.022 kg

Les meilleures incertitudes représentent 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 BMC.

## Remarques

Aucune.

**Mettler Toledo**

Service Business Unit Industrial

1900 Polaris Parkway

Columbus, Ohio 43240

1-800-METTLER

**METTLER TOLEDO**

ISO 9001 Registered

ANSI/NCSL Z540 Accrédité

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

CERT.CALIBRATION #1902.02

**Certificat d'étalonnage****Client**

Société : SBI Fabricant de poêles International inc.

Adresse : 250, rue Copenhagen

Ville : St-Augustin État/Province : Québec

Code postal : G3A 2V1 Astea Customer ID: C037589001001

**Instrument**

Constructeur : Mettler Toledo Modèle de terminal : IND560

Modèle : 2256 kg No de série du termin : 00927336KL

No de série : B00927336KL No. Série Impr. : N/A

Capacité : 625 kg Service/Pièce : Lab

Résolution : 0.02 kg Nbre de Divisions : 31250

Classe : III Procédure utilisée : Canadien

Numéro/ID d'actif du clie : SBI-186

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 : 21-mars-2011 Le prochain Cal Date : 31-mars-2012

Signataire autorisé (A2LA) : Dany Careau Signature: ELECTRONIC SIGNATURE

Signature du client :

**Étalons de travail**

Traçabilité 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
42268	M10-0278	M1	5-août-2010	5-août-2011
MTP1	MT0015626	F1	17-sept.-2010	17-sept.-2011
Kit S	1356103	M1	5-oct.-2010	5-oct.-2011

**Résultats de mesure**

La température : 70 °F

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

**Test de variation**

<input type="checkbox"/> 1	<input type="checkbox"/> 2
<input type="checkbox"/> 4	<input type="checkbox"/> 3

Les poids Appliqués	Position	Avant Réglage
		Valeur lue
1: 125 kg	Position 1	124.98 kg
2: 125 kg	Position 2	124.98 kg
3: 125 kg	Position 3	125.02 kg
4: 125 kg	Position 4	125.00 kg
Erreur maximum :		0.04 kg
Max Erreur Admissible :		0.10 kg

**Linéarité**

	Avant réglage					Dans la Tolérance
	Les poids Appliqués	Valeur lue	Erreur		Erreur admissible	
Zero 1	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI
2	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
3	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
4	100.00 kg	100.00 kg	0.00 kg	0 d	5 d	OUI
Max 5	200.00 kg	200.00 kg	0.00 kg	0 d	5 d	OUI
6	100.00 kg	100.00 kg	0.00 kg	0 d	5 d	OUI
7	40.00 kg	40.00 kg	0.00 kg	0 d	2 d	OUI
8	20.00 kg	20.00 kg	0.00 kg	0 d	2 d	OUI
Zero 9	0.00 kg	0.00 kg	0.00 kg	0 d	1 d	OUI

☐ Méthode de substitution utilisée

Un réglage de la balance a été requis

Si NON, les résultats relatifs à l'état du système avant la prestation de service correspondent à l'état de

☐ 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

Les meilleures incertitudes représentent 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 BMC.

**Remarques**

Aucune.

# Certificat d'Étalonnage

# 724396 - 01

**Client:** SBI Stove Builder International

**Local:** Metrologie

St-Augustin de Desmaures

**Modèle :** TE214S

**Balance**
**# Série :** 25851066

## Liste des Vérifications

codes

Câble d'alimentation OK

Sélecteurs, clavier, commandes OK

Circuits imprimés OK

Mécanisme de pesée OK

Poids d'étalonnage interne N/A

Horizontalité OK

Plateau et support de plateau OK

Boîtier et housse OK

Vitres OK

Fonction de tarage OK

Fonction Auto-Calibration OK

Hysteresis OK

Charges excentrées Tolérance :  $\pm 0.5$  mg

Commentaires :

## Spécifications :

Fabricant: ☒

Client: ☐

Capacité : 210 g

Tolérance : 0.2 mg

Résolution : 0.1 mg

☐ Linéarité

☒ Charge Maximale

## Relevées des vérifications

Référence

Tel que trouvé

Tel que laissé

☒ g ☐ mg

0.0500

0.0500

0.0500

☒ g ☐ mg

5.0000

5.0056

5.0000

☒ g ☐ mg

50.0000

50.0564

50.0001

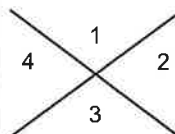
☒ g ☐ mg

200.0000

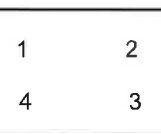
200.2254

200.0000

Répond aux spécifications : Tel que trouvé : ☐ Oui ☒ Non

Répond aux spécifications : Tel que laissé : ☒ Oui ☐ Non


Tel que trouvé :



Tel que laissé :

Centre: 0.0000

Centre: 0.0000

1: 0.0000

1: 0.0000

2: 0.0000

2: 0.0000

3: 0.0000

3: 0.0000

4: 0.0000

4: 0.0000

## Charges excentrées

Poids d'essai: 100

☒ g ☐ kg

Répond aux spécifications :

Tel que trouvé : ☒ Oui ☐ Non

Tel que laissé : ☒ Oui ☐ Non

Codes : OK = , vérifié , étalonné , nettoyé

N/A = non applicable

Cor = corrigé

Déf = défectueux

Remp = Remplacer

## Étalons certifiés

Jeu de poids QUE014

Représentant de service :

Daniel Toulouse

Date d'étalonnage :

15 Novembre 2010

Prochaine date d'étalonnage :

30 Novembre 2011

Approbation du client :

Date:

# Thermal Metering System Calibration

## Y factor for Method 5G sampling

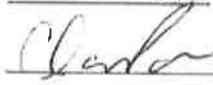
Manufacturer: American Meter Company  
 Model: DTM-200A  
 Serial Number: 90R054300

### Previous Calibration Comparison

Date	N/A	Acceptable	Deviation
		Deviation (5%)	
y Factor	1,003	5	0,003
Acceptance	Acceptable		

**Average Gas  
Meter y Factor**  
**1,000**

Calibration Date: 04-28-11  
 Calibrated by: Claude Paré  
 Calibration Frequency: 6-month  
 Next Calibration Due: 10-27-11  
 Instrument Range: 1,000 cfm  
 Standard Temp.: 67 °F  
 Standard Press.: 29,92 "Hg  
 Barometric Press.: 29,66 "Hg

Signature/Date:  2011-04-28

### Current Calibration

Acceptable y Deviation	0,020
Maximum y Deviation	0,003
Acceptance	Acceptable

### Reference Standard \*

Standard	Model	Standard Test Meter
Calibrator	S/N	07J264834
	Calib. Date	21-mars-11
	Calib. Value	0,9930 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	543,9	549,1	554,5
Final Reference Meter	548,9	554,3	559,8
Initial DGM	462,625	467,778	473,129
Final DGM	467,581	472,933	478,407
Temp. Ref. Meter (°F), Tr	67,0	67,0	68,0
Temperature DGM (°F), Td	67,0	67,0	68,0
Time (Minutes)	45,5	48,0	50,0
Net Volume Ref. Meter, Vr	5,000	5,200	5,300
Net Volume DGM, Vd	4,956	5,155	5,278
Gas Meter y Factor =	1,002	1,002	0,997
Gas Meter y Factor Deviation (from avg.)	0,002	0,001	0,003
Orifice dH@	0,00	0,00	0,00
Orifice dH@ Deviation (from avg.)	0,000	0,000	0,000

where: 0,108923077

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

\* 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

### Previous Calibration Comparison

Date	N/A	Acceptable	Deviation
		Deviation (5%)	
y Factor	0,996	5	0,000
Acceptance	Acceptable		

**Average Gas  
Meter y Factor**  
**0,996**

Calibration Date: 04-28-11  
 Calibrated by: Claude Paré  
 Calibration Frequency: 6-month  
 Next Calibration Due: 10-27-11  
 Instrument Range: 1,000 cfm  
 Standard Temp.: 71 °F  
 Standard Press.: 29,92 "Hg  
 Barometric Press.: 29,49 "Hg

Signature/Date:  2011-04-28

### Current Calibration

Acceptable y Deviation	0,020
Maximum y Deviation	0,001
Acceptance	Acceptable

### Reference Standard \*

Standard	Model	Standard Test Meter
Calibrator	S/N	07J264834
	Calib. Date	21-mars-11
	Calib. Value	0,9930 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	560,3	565,5	573
Final Reference Meter	565,3	572,8	578
Initial DGM	552,783	557,957	565,424
Final DGM	557,76	565,228	570,396
Temp. Ref. Meter (°F), Tr	70,5	71,0	71,0
Temperature DGM (°F), Td	70,0	70,0	70,0
Time (Minutes)	50,5	72,0	48,5
Net Volume Ref. Meter, Vr	5,000	7,300	5,000
Net Volume DGM, Vd	4,977	7,271	4,972
Gas Meter y Factor =	0,997	0,995	0,997
Gas Meter y Factor Deviation (from avg.)	0,001	0,001	0,001
Orifice dH@	0,00	0,00	0,00
Orifice dH@ Deviation (from avg.)	0,000	0,000	0,000

where: 0,098554455

1. Deviation = |Average value for all runs - current run value|
2.  $y = [V_r \times (y \text{ factor (ref)}) \times (P_b) \times (T_d + 460)] / [V_d \times (P_b + (dH / 13.6)) \times (T_r + 460)]$
3.  $dH@ = 0.0317 \times dH / (P_b (T_d + 460)) \times [(T_r + 460) \times \text{time}] / V_r]^2$

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

# CERTIFICATE OF NIST TRACEABLE CALIBRATION

Calibration Certificate No: 24648

## Customer Information

Customer: SBI St-Augustin

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

Customer PO #: 23966



**LABORATORY  
ACCREDITATION  
BUREAU**  
**ACCREDITED**  
Certificate # L2115-1 Calibration

**ISO 17025-2005 ACCREDITED**

## Calibration Procedure Information

Procedure ID: GTP FLOW\_INDI

Revision #: 3

Revision Date: 7/21/2008

## Calibration Standards Information

<u>Graffel ID</u>	<u>Manufacturer</u>	<u>Model #</u>	<u>Description</u>	<u>CAL Due</u>
10159	HOBO	U12-011	Environment Monitor System	6/22/2011
60030	Paroscientific	760-100A	Pressure, 100 psia	8/24/2011
10128	Furness	FCO352	Diff Pressure	8/24/2011
10062	Graffel	9202	5-Channel Temperature Sensor	8/28/2012
10075	Meriam	50MJ10-9	Laminar Flowmeter	6/23/2011
51202	Paroscientific	760-100A	Pressure, 100 Psia	2/24/2012

## Sensor Information

Manufacturer: American Meter

Description: Gas Meter

Method Used: Laminar

Model #: DTM-200A

Rated Accuracy:  $\pm 1$  % of Reading

Accuracy Specified By: American Met.

Instrument ID#: SBI-103

Range: 0 to 250 scfh

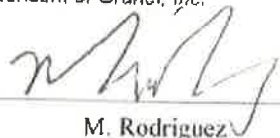
Condition: Functional

Serial #: 07J264834

Comments: Calibration Date: 03-21-2011

*The instrument(s) listed on this certificate have been calibrated against standards traceable to the National Institute 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 support by analysis. Graffel, Inc. Quality Assurance System complies with applicable requirements of ISO/IEC-17025-2005, ANSI/NCSL Z540-1-1994 and ISO 9002:1994(E). All results contained within this certification relate only to item(s) calibrated. This certificate shall not be reproduced except in full and with the written consent of Graffel, Inc.*

Performed By:

  
M. Rodriguez  
Calibration Technician

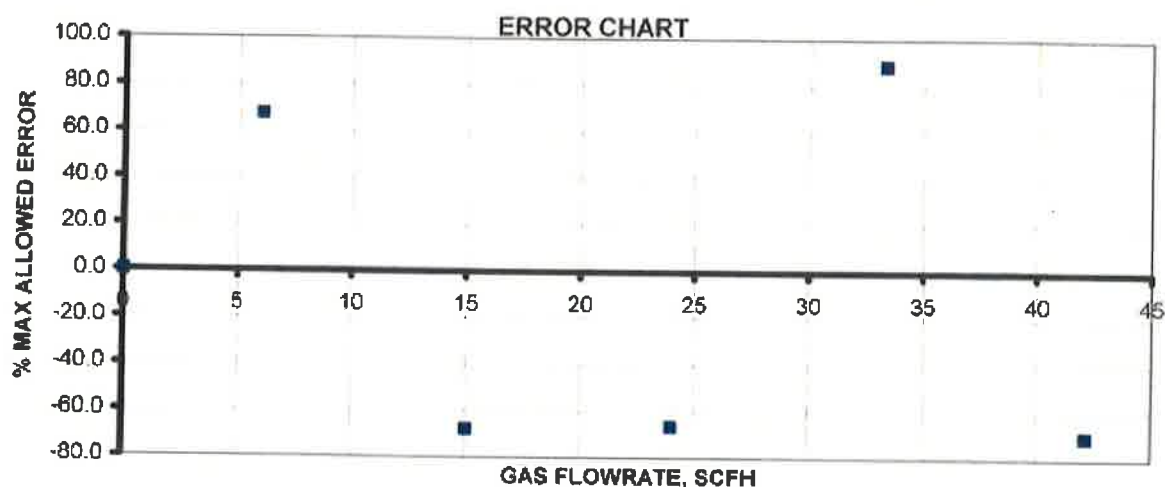
Date:

3/21/11

# ATTACHMENT TO CALIBRATION CERTIFICATE 24648 AS FOUND DATA

Page 2 of 2

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
6.069	0.2962	0.300	0.294	0.00	100.679	0.002	Pass
15.044	0.9576	1.000	0.964	-0.01	99.327	0.005	Pass
24.043	0.9605	1.000	0.967	-0.01	99.338	0.005	Pass
33.346	1.9576	2.000	1.940	0.02	100.896	0.010	Pass
42.149	1.935	2.000	1.949	-0.01	99.301	0.010	Pass



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	14.40	psia
Humidity	30.8	% RH
Temperature	69.6	F



www.grafel.com

Flow - Humidity - Temperature - Pressure - Design - Consulting - Engineering  
**NIST Traceable Calibration Data Sheet**  
 Graftel, LLC, 870 Cambridge Drive, Elk Grove Village, IL 60007  
 P. 847-384-2800 F. 847-384-2889

Date: 12/7/2010

Equipment: SBI-134 (T1) Temperature: 71 F  
 Accuracy: 0.2 R.H.: 41%  
 Reference: SBI-096

S.D.	0.00	%	
R.M.U.	0.29	%	
O.M.U	0.60	%	
Ave A.D.	0.10	%	
Standard Reading	A.D.		
70.0	70.0	0.00	
70.0	69.8	0.29	
70.0	70.0	0.00	

S.D.	0.00	%	
R.M.U.	0.10	%	
O.M.U	0.45	%	
Ave A.D.	0.20	%	
Standard Reading	A.D.		
200.0	199.6	0.20	
200.0	199.6	0.20	
200.0	199.6	0.20	

S.D.	0.00	%	
R.M.U.	0.03	%	
O.M.U	0.21	%	
Ave A.D.	0.10	%	
Standard Reading	A.D.		
600.0	599.4	0.10	
600.0	599.4	0.10	
600.0	599.4	0.10	

S.D.	0.00	%	
R.M.U.	0.02	%	
O.M.U	0.10	%	
Ave A.D.	0.05	%	
Standard Reading	A.D.		
1000.0	999.6	0.04	
1000.0	999.6	0.04	
1000.0	999.4	0.06	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U	0.09	%	
Ave A.D.	0.04	%	
Standard Reading	A.D.		
1400.0	1399.4	0.04	
1400.0	1399.4	0.04	
1400.0	1399.4	0.04	

Technician: Claude Paré

Date: 12/7/2010

Equipment: SBI-134 (T2)      Température: 71 F  
 Accuracy: 0.2      R.H.: 41%  
 Reference: SBI-096

S.D.	0.02	%	
R.M.U.	0.29	%	
O.M.U.	2.36	%	
Ave A.D.	1.14	%	
Standard	Reading	A.D.	
70.0	70.8	1.14	
70.0	70.8	1.14	
70.0	70.8	1.14	

S.D.	0.00	%	
R.M.U.	0.10	%	
O.M.U.	0.45	%	
Ave A.D.	0.20	%	
Standard	Reading	A.D.	
200.0	200.4	0.20	
200.0	200.4	0.20	
200.0	200.4	0.20	

S.D.	0.00	%	
R.M.U.	0.03	%	
O.M.U.	0.09	%	
Ave A.D.	0.03	%	
Standard	Reading	A.D.	
600.0	600.2	0.03	
600.0	600.2	0.03	
600.0	600.2	0.03	

S.D.	0.00	%	
R.M.U.	0.02	%	
O.M.U.	0.09	%	
Ave A.D.	0.04	%	
Standard	Reading	A.D.	
1000.0	1000.4	0.04	
1000.0	1000.4	0.04	
1000.0	1000.4	0.04	

S.D.	0.00	%	
R.M.U.	0.01	%	
O.M.U.	0.03	%	
Ave A.D.	0.01	%	
Standard	Reading	A.D.	
1400.0	1400.2	0.01	
1400.0	1400.2	0.01	
1400.0	1400.0	0.00	

Technician: Claude Paré



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 CERTIFICATE

Certificate no.: 228051  
Identification: SBI-096  
Description: CALIBRATOR, OMEGA CL23A  
Size: TC K/J/T  
Manufacturer: OMEGA  
Model no.: CL23A  
Serial no.: T-256137

Calibration date: August 09, 2010  
Certificate issued: August 09, 2010  
Interval: 12 months  
Due date: August 9, 2011  
Procedure no.: MET/CAL  
Environment: CLAS Type 2 Laboratory  
Temperature:  $23 \pm 2^{\circ}\text{C}$   
Humidity: 35 - 55% RH  
Metrologist: NFS

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

Approved by:   
Nuccio Mercuri, Lab Manager

*This calibration certificate is issued in accordance with the applicable requirements of ISO/IEC 17025 and QM-98. 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:

9V battery replaced.



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Lachine, QC H8T 1A1 Fax (514) 631-6122  
www.ulrich.ca info@ulrich.ca

## CALIBRATION DATA

Certificate No.228051

Instrument ID: SBI-096  
Type: CALIBRATOR THERMOMETER  
Serial no.: T-256137  
Procedure: Omega CL23A: 5520A-M

Result: PASS  
Condition: FOUND-LEFT

### CALIBRATION STANDARDS

Standard ID	Type	Manufacturer	Model no.	Cal. Date	Due Date
7870009	CALIBRATOR	FLUKE	5520A	2010/04/23	2011/04/23

### MEASUREMENT RESULTS (Per METICAL)

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
DISPLAY CALIBRATION						
Did all segments of the display illuminate?						
Result of Operator Evaluation						
					PASS	
THERMOMETER CALIBRATION						
K Type Thermocouple						
-200.0degF		-200.8	-201.0	-199.0	PASS	1.7
-60.0degF		-60.6	-61.0	-59.0	PASS	3.1
-40.0degF		-40.5	-40.5	-39.5	PASS	1.5
32.0degF		31.6	31.5	32.5	PASS	1.7
1240.0degF		1239.6	1239.5	1240.5	PASS	1.1
1260.0degF		1259.6	1259.5	1260.5	PASS	1.1
2500.0degF		2499.5	2499.0	2501.0	PASS	1.4
J Type Thermocouple						
-200.0degF		-200.6	-201.0	-199.0	PASS	2.1
-60.0degF		-60.4	-61.0	-59.0	PASS	3.5
-40.0degF		-40.4	-40.5	-39.5	PASS	1.7
32.0degF		31.6	31.5	32.5	PASS	2.0
1240.0degF		1239.5	1239.5	1240.5	PASS	1.6
1260.0degF		1259.5	1259.5	1260.5	PASS	1.6
1400.0degF		1399.5	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-200.3	-201.0	-199.0	PASS	2.3
-60.0degF		-60.0	-61.0	-59.0	PASS	2.3
-40.0degF		-40.1	-40.5	-39.5	PASS	1.2
32.0degF		31.6	31.5	32.5	PASS	1.7
750.0degF		749.8	749.5	750.5	PASS	2.0
CALIBRATOR CALIBRATION						
K Type Thermocouple						
-200.0degF		-199.3	-201.0	-199.0	PASS	1.7
-60.0degF		-59.7	-61.0	-59.0	PASS	3.1
-40.0degF		-39.7	-40.5	-39.5	PASS	1.5
32.0degF		32.2	31.5	32.5	PASS	1.7



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PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS		PASS/ FAIL	TUR
			LOW	HIGH		
1240.0degF		1239.6	1239.5	1240.5	PASS	1.1
1260.0degF		1259.6	1259.5	1260.5	PASS	1.1
2500.0degF		2499.3	2499.0	2501.0	PASS	1.4
J Type Thermocouple						
-200.0degF		-199.9	-201.0	-199.0	PASS	2.1
-60.0degF		-60.1	-61.0	-59.0	PASS	3.5
-40.0degF		-39.9	-40.5	-39.5	PASS	1.7
32.0degF		31.9	31.5	32.5	PASS	2.0
1240.0degF		1239.5	1239.5	1240.5	PASS	1.6
1260.0degF		1259.6	1259.5	1260.5	PASS	1.6
1400.0degF		1399.3	1399.4	1400.6	FAIL	1.8
1400.0degF		1399.5	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-199.8	-201.0	-199.0	PASS	2.3
-60.0degF		-60.0	-61.0	-59.0	PASS	2.3
-40.0degF		-39.8	-40.5	-39.5	PASS	1.2
32.0degF		31.9	31.5	32.5	PASS	1.7
750.0degF		749.6	749.5	750.5	PASS	2.0

End of Test Data

## Certificat d'étalonnage

Numéro du certificat: CE1640

### Étalonnage effectué par :

LA CIE J. CHEVRIER INSTRUMENTS INC.  
4850 GOUIN EST  
MONTREAL, QC, CANADA H1G 1A2

### Pour :

3424  
SBI INC  
250, RUE DE COPENHAGUE  
ST-AUGUSTIN-DE-DESMARES, QC G3A 2H3

### Informations sur l'instrument

Description: MANOMETRE DIFFERENTIEL ANALOGIQUE

Manufacturier: DWYER

Modèle: 2000-00

Plage: 0/0.25 POH2O

Précision:  $\pm 4\%$  P.E.

Numéro de série :

I.D.: SBI-101

Etat de l'instrument: BON

Commentaire :

Date d'étalonnage : 2011-02-10

Échéance : 2012-02-10

Résultat de l'étalonnage: Conforme

Conditions ambiantes 20.9 °C / 29.9%HR

Technicien : Pierre Junior Berlus

PJB

C.O.  
PJB

### POINTS D'ÉTALONNAGE

	Valeur Appliquée	Tolérance -	Lectures	Tolérance +	Verdict
Ascendant	0.0000 poH2O	-0.0100	0	0.0100	OK
Ascendant	0.0500 poH2O	0.0400	0.045	0.0600	OK
Ascendant	0.1000 poH2O	0.0900	0.10	0.1100	OK
Ascendant	0.1500 poH2O	0.1400	0.15	0.1600	OK
Ascendant	0.2000 poH2O	0.1900	0.20	0.2100	OK
Ascendant	0.2500 poH2O	0.2400	0.25	0.2600	OK
	Valeur Appliquée	Tolérance -	Lectures	Tolérance +	Verdict
Descendant	0.2500 poH2O	0.2400	0.25	0.2600	OK
Descendant	0.2000 poH2O	0.1900	0.20	0.2100	OK
Descendant	0.1500 poH2O	0.1400	0.15	0.1600	OK
Descendant	0.1000 poH2O	0.0900	0.10	0.1100	OK
Descendant	0.0500 poH2O	0.0400	0.045	0.0600	OK
Descendant	0.0000 poH2O	-0.0100	0	0.0100	OK

## Certificat d'étalonnage

Numéro du certificat: CE1640

### Étalons utilisés traçable au C.N.R.C / N.I.S.T

I.D.	Certificat No	Description	Étalonné le	Échéance
CHEV175	12688334994	CALIBRATEUR DE PRESSION DH PPC4	2010-03-17	2011-03-17

### Procédures utilisées pour effectuer cet étalonnage

Procédure	Description
3PR500-01-CHE	ÉTALONNAGE DE MANOMÈTRE



4850, bd Gouin est  
Montréal-Nord, Qc  
Canada H1G 1A2  
www.chevrierinstruments.com

Tél. (514) 328-2550  
1 800 522-1226  
Fax (514) 327-0604

info@chevrierinstruments.com

Instruments de mesure et de régulation pour les procédés industriels et laboratoire d'étalonnage

## Certificat d'Étalonnage

Numéro du certificat: CE509

### Étalonnage effectué par :

LA CIE J. CHEVRIER INSTRUMENTS INC.  
4850 GOUIN EST  
MONTREAL, QC, CANADA H1G 1A2

### Pour :

3424  
SBI INC  
250, RUE DE COPENHAGUE  
ST-AUGUSTIN-DE-DESMAURES, QC G3A 2H3

### Informations sur l'instrument

Description: TUBE DE PITOT EN S  
Manufacturier: DWYER  
Modèle: 160S-24  
Numéro de série:  
I.D.: SBI-203  
État de l'instrument: BON

Date d'étalonnage: 2010-12-15

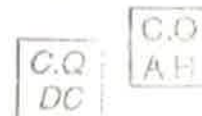
Échéance: 2011-12-15

Résultat de l'étalonnage: Conforme

Conditions ambiantes: 21.1 °C / 39 %hr

Technicien: Abdenour Hocini A.H.

### Commentaire :

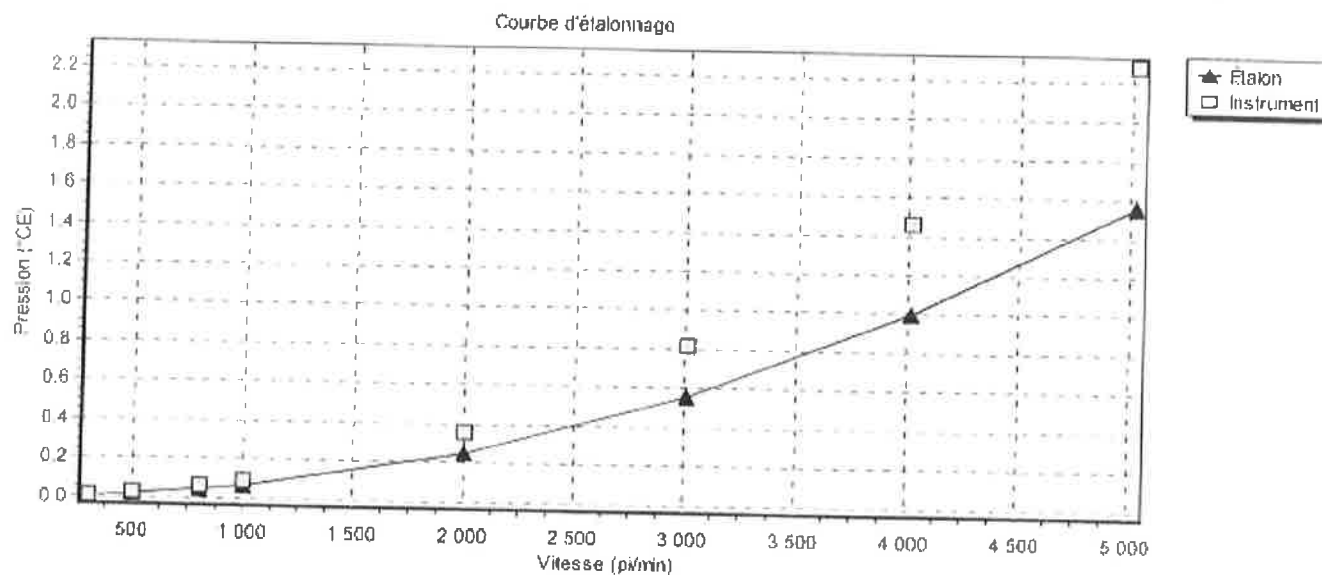


### Points d'étalonnage

Valeur Appliquée pi/min	Pitot standard "Ce	Pitot Util "Ce	ratio
298 pi-min	0.0055 poH2O	0.0074 poH2O	0.86
499 pi-min	0.0154 poH2O	0.0231 poH2O	0.82
802 pi-min	0.0398 poH2O	0.0577 poH2O	0.83
1002 pi-min	0.0622 poH2O	0.0920 poH2O	0.82
2004 pi-min	0.2485 poH2O	0.3614 poH2O	0.83
3008 pi-min	0.5592 poH2O	0.8208 poH2O	0.83
4014 pi-min	0.9940 poH2O	1.4596 poH2O	0.83
5022 pi-min	1.5535 poH2O	2.2827 poH2O	0.82

## Certificat d'Étalonnage

Numéro du certificat: CE509



Fait conformément à l'Échelle International de Température EIT90.

Étalons utilisés traçable au C.N.R.C / N.I.S.T

I.D.	Certificat No	Description	Étalonné le	Échéance
CHEV029	081210-960294	MANOMETRE NUMERIQUE FURNESS PPC500	2009-12-16	2010-12-16
CHEV031	CHEV121-100830	TUYÈRE AIRFLOW DEVELOPMENTS	2010-08-30	2011-02-28

Procédures utilisées dans cet étalonnage

Procédure	Description
3PR500-22-CHE	ÉTALONNAGE TUBE DE PITOT

Date de révision

Date: 11/24/2010  
ID: SBI-113

Post test calibration

	Calibration gas	Reading
CO	20.10%	20.14%
CO2	19.80%	19.85%
O2	20.90%	20.95%

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

## **Appendix E**

### **Sample Calculations**

## Equations and Sample Calculations - Method 5G

Equations used to calculate the parameters listed below are described in this appendix. Sample calculations are provided for each equation. The raw data and printout results from a sample run are also provided for comparison to the sample calculations.

BR	Dry burn rate, kg/hr
$m_p$	Total particulate matter collected, mg
$V_{m(std)}$	Volume of gas sampled corrected to standard conditions, dscf
$v_s$	Average dilution tunnel gas velocity, ft/sec
$C_s$	Particulate concentration, g/dscf
$Q_{sd}$	Average dilution tunnel gas flow rate, dscf/min
E	Particulate emission rate, lbs/hr
PR	Proportional rate variation, %

## Dry Burn Rate

Using equation 28-3:

$$BR = \frac{60 \times W_{wd}}{\theta} \times \frac{100 - \%M_w}{100}$$

Where,

- BR = Dry burn rate, lb/hr  
W<sub>wd</sub> = Mass of wood burned (wet basis) during test run, lb  
θ = Total time of test run, minutes  
%M<sub>w</sub> = Average moisture content of test fuel charge, wet basis percent

Sample Calculation:

Dry basis moisture of fuel = 20.03%

Using the equation 28-2 for converting dry basis moisture to wet basis moisture,

$$\%M_w = \frac{20.03 \times 100}{20.03 + 100}$$

$$\%M_w = 16.69\%$$

The wet weight of the fuel charge was 7.8 pounds. Converting pounds to kilograms yields a weight of 3.538 kg. The run time for this run was 180 minutes. Therefore, the burn rate equation appears thus:

$$BR = \frac{60 \times 3.538 \times (100 - 16.69)}{180 \times 100}$$

$$BR = 0.98 \text{ kg/hr} = 2.17 \text{ lb/hr}$$

## Volume of Gas Sampled Corrected to Dry Standard Conditions

Using equation 5-1:

$$V_{m(std)} = V_m \times Y \times \left( \frac{T_{std}}{P_{std}} \right) \times \frac{(P_b + \frac{\Delta H}{13.6})}{T_m}$$

Where:

K	=	17.64 °R/in. Hg
T <sub>std</sub>	=	528 °R
P <sub>std</sub>	=	29.92 in. Hg
V <sub>m</sub>	=	Volume of gas sample measured at the dry gas meter, dcf
Y	=	Dry gas meter calibration factor, dimensionless
P <sub>b</sub>	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H <sub>2</sub> O
T <sub>m</sub>	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

$$V_{m(std)} = 98.434 \times 1.01 \times \left( \frac{528}{29.92} \right) \times \frac{30.03 + \frac{0.7}{13.6}}{532.5}$$

$$V_{m(std)} = 99.116 \text{ ft}^3$$

## Dilution Tunnel Gas Velocity

Using equations 2-7 and 2-6, calculated at each recorded interval:

$$v_s = k_p \times C_p \times \sqrt{\Delta P} \times \sqrt{\frac{T_{s(avg)}}{P_s \times M_s}}$$

$$M_s = M_d \times (1 - B_{ws}) + 18.0 \times B_{ws}$$

Where:

- $v_s$  = Average dilution tunnel gas velocity, ft/sec
- $k_p$  = Pitot tube constant:  $85.49 \frac{ft}{sec} \left[ \frac{(lb/lb-mole) \times (inches\ Hg)}{(^{\circ}R) \times (inches\ H_2O)} \right]^{\frac{1}{2}}$
- $C_p$  = Pitot tube coefficient (0.99 for standard pitot tube; 0.84 may be used for S-type pitot tubes constructed according to Method 2 procedures), unitless
- $\Delta P$  =  $\Delta P$  measured during the pre-test flow traverse of the dilution tunnel; the square root of the  $\Delta P$  values are averaged for this calculation, in.  $H_2O$
- $P_b$  = Barometric pressure at test site, in. Hg
- $P_s$  = Static Pressure of tunnel, in. Hg
- $P_t$  = Absolute tunnel pressure,  $= P_b + P_s$
- $M_s$  = Molecular weight of tunnel gas; assume  $M_d = 29$  lb/lb-mole (per method 5G)
- $B_{ws}$  = Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)
- $T_s$  = Dilution tunnel temperature,  $^{\circ}R$ ; ( $^{\circ}R = ^{\circ}F + 460$ )

Sample calculation:

$$M_s = 29 \times (1 - 0.04) + 18.0 \times 0.04 = 28.56$$

$$v_s = 85.49 \times 0.99 \times \sqrt{0.0351} \times \sqrt{\frac{(548)}{(30.03 + \frac{-0.45}{13.6}) \times (28.56)}}$$

$$v_s = 12.69 \frac{ft}{sec}$$

## Particulate Concentration

Using equation 5G-2:

$$C_s = 0.001 \frac{g}{mg} \times \frac{m_n}{V_{m(std)}}$$

Where:

$C_s$  = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscf

$m_n$  = Total mass of particulate matter collected in the sampling train, mg

$V_{m(std)}$  = Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

$$C_s = \frac{0.001 \times 16.2}{99.116}$$

$$C_s = 0.000163 \text{ g/dscf}$$

## Average Dilution Tunnel Gas Flow Rate

Using equation 2-8, calculated at each recorded interval:

$$Q_{sd} = 3600 \times (1 - B_{ws}) \times v_s \times A \times \frac{T_{std}}{T_{s(avg)}} \times \frac{P_s}{P_{std}}$$

Where:

- $Q_{sd}$  = Gas flow rate corrected to dry, standard conditions, dscf/hr
- 3600 = Conversion from seconds to hours
- $B_{ws}$  = Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)
- $v_s$  = Average dilution tunnel gas velocity, ft/sec
- $A$  = Cross sectional area of dilution tunnel, ft<sup>2</sup>
- $T_{std}$  = Standard absolute temperature, 538°R
- $T_{s(avg)}$  = Average absolute dilution tunnel temperature, °R, (°R = °F + 460)
- $P_b$  = Barometric pressure at test site, in. Hg
- $P_g$  = Dilution tunnel static pressure, in. Hg
- $P_s$  = Absolute dilution tunnel gas pressure, in Hg, (Hg =  $P_b + P_g$ )
- $P_{std}$  = Standard absolute pressure, 29.92 in Hg

Sample calculation:

$$Q_{sd} = 3600 \times (1 - 0.04) \times 12.69 \times \frac{(\pi \times 3^2)}{144} \times \frac{528}{548} \times \frac{30.03 + \frac{-0.45}{13.6}}{29.92}$$

$$Q_{sd} = 8313.36 \text{ dscf/hr} = 138.56 \text{ dscf/min}$$

## Particulate Emission Rate

Using equation 5G-3 and 5G-4:

$$E = C_s \times Q_{sd}$$

$$E_{adj} = K_3 \times E^{0.83}$$

Where:

$E$  = Particulate emission rate, g/hr

$E_{adj}$  = Particulate emission rate, adjusted, g/hr

$C_s$  = Concentration of particulate matter in the stack, corrected to dry, standard conditions, g/dscf

$Q_{sd}$  = Average dilution tunnel gas flow rate, dscf/hr

$K_3$  = Constant, 1.82 for metric units, 0.643 for English units

Sample calculation:

$$E = 0.000163 \times 8313.36$$

$$E = 1.36 \text{ g/hr}$$

$$E_{adj} = 1.82 \times 1.36^{0.83}$$

$$E = 2.35 \text{ g/hr}$$

## Proportional Rate Variation

Using equation 5H-9, calculated at each recorded interval:

$$PR = \frac{\theta \times (V_{mi} \times V_s \times T_m \times T_{st})}{10 \times (V_m \times V_{si} \times T_s \times T_{mi})} \times 100$$

Where:

- PR = Percent proportional rate
- $\theta$  = Time of test, min
- $S_i$  = Measured tracer gas concentration for the "i<sup>th</sup>" interval, in this case, the inverse of the calculated flow in the stack based on CO<sub>2</sub> concentrations in the stack and in the dilution tunnel
- $V_{mi(st)}$  = Volume of gas sample measured by the dry gas meter during the "i<sup>th</sup>" 10 minute interval, dscf
- $V_m$  = Volume of gas sample as measured by dry gas meter, dscf
- $V_{st}$  = Average gas velocity in the dilution tunnel during each 10 minute interval, i, of the test run, m/sec
- $V_s$  = Average gas velocity in the dilution tunnel, m/sec
- $T_{mi}$  = Absolute average dry gas meter temperature during each 10 minute interval, i, of the test run, °R
- $T_m$  = Absolute average dry gas meter temperature, °R
- $T_{st}$  = Absolute average gas temperature in the dilution tunnel during each 10 minute interval, i, of the test run, °R
- $T_s$  = Absolute average gas temperature in the dilution tunnel, °R

Sample calculation (for the reading at 50 minutes into test run 1):

$$PR = \frac{180 \times 5.6 \times 12.69 \times 533 \times 552}{10 \times 98.434 \times 12.63 \times 548 \times 532} \times 100$$

$$PR = 103.8\%$$

## **Appendix F**

### **Test Data**

Manufacturer: SBI  
 Model: XTD 1.9  
 Project No. G100456088

## EPA NSPS WEIGHTED AVERAGE CALCULATION

V 1.1

Sort data from lowest to highest  
 burn rate and enter below.

Weighted Average

Type of  
 Stove:  
 1=cat  
 2=noncat  
 3=pellet

2

		(E) Ave.	Heat		(K)			
Test	Burn	Emission		Output		Weighting		
No.	Rate	Rate g/hr	(OHE)	(BTU/HR)	Prob.	Factor	(KxE)	KxOHE
1	0.96	4.82		11575.87	0.3384	0.4494	2.1661	0.00
2	1.09	4.07		13143.44	0.4494	0.5422	2.2068	0.00
3	1.84	3.15		22187.09	0.8806	0.5264	1.6582	0.00
5	2.67	2.87		32195.39	0.9758	0.1194	0.3427	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

Totals: 1.6374 6.3737 0.00

Weighted average emissions rate:	3.8926
Weighted Average OHE:	0.00

  
 03/26/2012

**Run 1**



**Run Notes**  
**EPA Methods 28 and 5G-3**

PROJECT / TEST INFORMATION		Appliance Information		
Project Number:	G100456088	Appliance Type:	2	1 - Catalytic
Manufacturer:	SBI			2 - Non - Catalytic
Model:	XTD 1.9			3 - Pellet
Sample ID Number:	MTL1108221414-001			4 - Hydronic
Test Date:	22-Aug-11	Firebox Volume, ft <sup>3</sup> :	2.14	N/A for pellet type
Test Run Number:	1	Convection Blower	2	1 - No Fan
Date tunnel cleaned:	8/18/2011			2 - Fan Optional
Purpose of Test	Cat 1			3 - Fan Standard

[illegible]

03/26/12

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 22-08-2011  
 Run: 1  
 Control #: G100456088  
 Test Duration: 330

VERSION 1.2


2/5/2010

	Start	End
Barometer (in. Hg):	29.54	29.5
Dry Bulb (F):	82	82
Humidity (%):	24	22

\*Blower turned on at 30 min - low position.


Moisture content of wood (wet basis): 16.5786

	Average	1.32	4.51	15.77	222.75	84.38	99.08	388.10	410.33	386.36	420.06	329.36
Elapsed Time	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Unit Top	Unit Back	Unit R.Side	Unit L.Side	Unit Bottom
0	13.95	0.85	1.97	19.07	264.06	81.68	110.11	376.03	488.82	433.31	474.67	408.04
10	13.17	0.89	3.42	17.25	236.03	92.63	97.66	382.31	464.11	398.73	452.71	406.02
20	12.54	0.95	4.07	16.92	224.55	84.40	98.69	360.97	429.37	363.69	423.05	397.11
30	11.80	0.72	9.12	12.38	226.30	83.92	98.04	368.27	402.09	351.77	407.93	382.87
40	10.77	0.70	10.32	10.59	267.51	80.80	101.06	434.50	399.52	347.01	398.85	360.48
50	9.65	0.57	9.83	10.79	305.72	89.53	105.04	533.45	418.80	362.82	412.32	343.61
60	8.47	0.88	10.89	9.71	323.50	83.53	111.34	583.70	277.12	379.99	434.74	331.49
70	7.25	0.96	8.75	11.72	331.86	92.24	108.67	612.47	297.39	399.68	453.81	324.04
80	6.21	0.98	8.27	12.27	313.43	89.68	109.75	592.06	314.81	419.83	474.81	321.40
90	5.27	0.81	8.12	11.94	302.83	84.39	112.11	558.89	328.00	438.22	486.06	318.29
100	4.45	0.60	7.18	13.47	293.92	83.12	110.60	542.25	339.29	447.21	492.58	316.78
110	3.80	1.03	5.57	14.85	276.99	82.31	109.10	522.92	359.76	451.31	499.55	316.59
120	3.35	0.97	5.46	14.32	251.45	82.90	105.75	485.10	408.81	455.39	496.10	316.93
130	2.91	1.11	4.62	15.28	244.29	81.50	105.15	455.33	506.74	458.82	487.86	317.01
140	2.62	1.00	4.58	15.58	230.41	79.22	102.78	434.16	528.58	461.66	482.36	317.82
150	2.42	1.27	4.15	15.83	220.39	79.40	101.75	410.23	514.94	449.20	475.50	318.59
160	2.22	1.51	3.31	16.72	214.12	78.46	100.32	390.84	505.08	431.31	466.23	318.82
170	2.07	1.67	3.40	16.51	209.55	77.71	99.01	372.79	494.16	412.28	456.24	320.02
180	1.92	1.52	3.12	16.72	201.83	85.81	96.15	357.47	480.73	393.25	443.24	321.60
190	1.73	1.81	3.03	16.66	196.09	86.15	96.63	344.24	467.38	380.69	430.71	322.86
200	1.55	1.87	2.96	16.79	191.56	84.50	95.60	332.62	453.95	375.73	418.53	323.48
210	1.41	2.27	2.51	17.16	187.99	83.42	95.18	324.72	442.70	364.12	408.40	322.81
220	1.29	1.76	2.81	17.37	185.14	84.16	93.30	316.35	432.57	358.93	400.20	321.64
230	1.18	1.85	2.72	17.41	182.43	86.36	93.37	309.29	421.99	356.56	391.25	320.55
240	1.04	2.02	2.48	17.63	179.70	85.18	92.97	304.02	410.81	347.66	384.62	318.74
250	0.90	1.88	2.59	17.6	178.06	84.52	92.55	299.06	401.65	341.23	378.63	316.90
260	0.75	1.98	2.04	17.96	175.76	84.96	92.49	292.58	395.71	336.78	370.42	314.82
270	0.62	1.81	2.16	17.92	172.57	82.91	92.08	286.65	390.07	335.34	361.37	312.89
280	0.48	1.67	2.33	17.71	169.44	82.71	92.15	279.59	381.27	341.17	352.29	312.14
290	0.38	1.34	2.89	17.39	166.11	87.51	90.06	273.75	372.08	346.71	344.31	312.23
300	0.25	1.41	2.56	17.93	163.92	88.72	88.31	268.25	363.55	352.94	337.95	312.95
310	0.16	1.46	2.06	18.15	163.46	86.84	89.79	266.89	357.81	355.02	332.93	310.99
320	0.06	1.41	2.18	18.23	162.04	86.03	90.49	263.78	353.50	347.14	328.65	310.50
330	0.00	1.60	1.94	18.19	160.34	81.61	90.61	259.95	347.98	340.87	323.06	307.39


  
 03/26/12

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 22-08-2011  
 Run: 1  
 Control #: G100456088

348.76	79.54	79.51	81.82	388.01	79.58	79.50	82.74	0.02	0.000	0.00	386.84			
DGM 1	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	DGM 2	Filter 2	Tunnel	Chimney	Visual	Average	Change in		
Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp	Velocity	Draft	Smoke	Stove	Surface	Elapsed	
										Observed	Temp	Temp.	Time	
333.439	78.26	78.19	79.42	370.835	78.26	78.12	79.09	0.021			436.2	0	0	
334.379	78.40	78.32	81.00	371.795	78.34	78.24	81.09	0.021			420.8	-15.402	10	
335.300	78.44	78.38	81.23	372.745	78.40	78.31	81.57	0.021			394.8	-41.34	20	
336.232	78.59	78.48	81.22	373.812	78.49	78.44	81.92	0.021			382.6	-53.591	30	
337.163	78.79	78.65	81.44	374.925	78.65	78.65	82.22	0.021			388.1	-48.102	40	
338.090	78.75	78.71	81.59	375.958	78.71	78.68	82.40	0.021			414.2	-21.978	50	
339.012	78.83	78.78	81.85	376.982	78.78	78.76	82.99	0.021			401.4	-34.768	60	
339.938	79.05	78.90	82.41	378.038	78.95	78.91	83.78	0.021			417.5	-18.699	70	
340.866	79.11	79.00	82.42	379.064	79.05	78.99	83.96	0.021			424.6	-11.593	80	
341.792	79.29	79.15	82.83	380.131	79.20	79.16	84.40	0.021			425.9	-10.285	90	
342.726	79.39	79.24	82.95	381.218	79.31	79.27	84.52	0.021			427.6	-8.5597	100	
343.657	79.51	79.35	82.95	382.285	79.42	79.38	84.57	0.021			430.0	-6.1501	110	
344.580	79.51	79.37	82.85	383.313	79.51	79.40	84.38	0.021			432.5	-3.7093	120	
345.513	79.55	79.44	82.73	384.363	79.56	79.43	84.19	0.021			445.1	8.9736	130	
346.441	79.58	79.46	82.56	385.406	79.59	79.47	84.04	0.021			444.9	8.7391	140	
347.382	79.66	79.55	82.43	386.468	79.68	79.55	83.80	0.021			433.7	-2.4874	150	
348.305	79.65	79.57	82.30	387.495	79.69	79.57	83.51	0.021			422.5	-13.719	160	
349.232	79.69	79.61	82.21	388.549	79.72	79.61	83.24	0.021			411.1	-25.078	170	
350.261	79.72	79.70	82.12	389.695	79.81	79.70	83.10	0.021			399.3	-36.919	180	
351.088	79.64	79.70	82.09	390.842	79.82	79.68	82.96	0.021			389.2	-47	190	
352.011	79.76	79.80	81.92	391.894	79.86	79.79	82.78	0.021			380.9	-55.314	200	
352.928	79.80	79.84	81.79	392.736	79.91	79.82	82.63	0.021			372.5	-63.626	210	
353.843	79.89	79.91	81.83	393.788	80.01	79.97	82.44	0.021			365.9	-70.237	220	
354.768	79.93	79.98	81.46	394.824	80.05	80.01	82.33	0.021			359.9	-76.247	230	
355.698	79.97	80.04	81.60	395.862	80.07	80.03	82.38	0.021			353.2	-83.007	240	
356.615	79.97	80.06	81.55	396.909	80.07	80.00	82.46	0.021			347.5	-88.682	250	
357.549	80.04	80.12	81.70	397.945	80.14	80.08	82.51	0.021			342.1	-94.113	260	
358.495	80.04	80.14	81.61	398.990	80.16	80.09	82.37	0.021			337.3	-98.913	270	
359.422	80.19	80.25	81.49	400.035	80.31	80.26	82.19	0.021			333.3	-102.89	280	
360.359	80.24	80.30	81.57	401.070	80.39	80.33	82.21	0.021			329.8	-106.36	290	
361.381	80.21	80.29	81.23	402.118	80.41	80.28	81.84	0.021			327.1	-109.05	300	
362.224	80.27	80.35	81.21	403.153	80.46	80.32	81.79	0.021			324.7	-111.45	310	
363.160	80.28	80.33	81.22	404.191	80.49	80.35	81.80	0.021			320.7	-115.46	320	
364.104	80.33	80.35	81.28	405.238	80.46	80.34	81.82	0.021			315.8	-120.33	330	

  
 03/26/12

Manufacturer:	SBI								
Model:	XTD 1.9								
Date:	22-08-2011								
Run:	1								
Project #:	G100456088								
Test Duration:	330								
Total Gas Volume (DGM 1):	29.595	Pitot Factor	0.82						
Total Gas Volume (DGM 2):	33.068		(0.99 standard,						
Average Barometric Pressure:	29.52		0.84 or Cal. Factor for S-Type)						
Molecular Weight:	28.56								
Pitot Correction:	0.9151								
Calibration Factor (DGM #1):	1.0000								
Calibration Factor (DGM #2):	0.9960								
	(1) VS:	0.0276							
	(2) VS:	0.0247							
							Filter Face	Filter Face	
							Velocity	Velocity	
							DGM 1	DGM 2	
DGM 1	DGM 1	DGM 1	DGM 2	DGM 2	DGM 2	Tunnel			
Reading	Inlet T	Outlet T	Reading	Inlet T	Outlet T	Dry Bulb			
333.439	78.3	78.2	370.835	78.3	78.1	110.1			
334.379	78.4	78.3	371.795	78.3	78.2	97.7	7.84	7.97	
335.300	78.4	78.4	372.745	78.4	78.3	98.7	7.68	7.89	
336.232	78.6	78.5	373.812	78.5	78.4	98.0	7.77	8.86	
337.163	78.8	78.6	374.925	78.7	78.7	101.1	7.76	9.24	
338.090	78.8	78.7	375.958	78.7	78.7	105.0	7.72	8.57	
339.012	78.8	78.8	376.962	78.8	78.8	111.3	7.68	8.33	
339.938	79.0	78.9	378.038	79.0	78.9	108.7	7.71	8.93	
340.866	79.1	79.0	379.064	79.1	79.0	109.8	7.73	8.51	
341.792	79.3	79.2	380.131	79.2	79.2	112.1	7.71	8.85	
342.726	79.4	79.2	381.218	79.3	79.3	110.6	7.77	9.01	
343.657	79.5	79.3	382.265	79.4	79.4	109.1	7.75	8.68	
344.580	79.5	79.4	383.313	79.5	79.4	105.8	7.68	8.69	
345.513	79.5	79.4	384.363	79.6	79.4	105.2	7.76	8.70	
346.441	79.6	79.5	385.406	79.6	79.5	102.8	7.72	8.64	
347.382	79.7	79.6	386.468	79.7	79.6	101.7	7.83	8.80	
348.305	79.6	79.6	387.495	79.7	79.6	100.3	7.68	8.51	
349.232	79.7	79.6	388.549	79.7	79.6	99.0	7.71	8.73	
350.261	79.7	79.7	389.695	79.8	79.7	96.1	8.56	9.49	
351.088	79.6	79.7	390.642	79.8	79.7	96.6	6.88	7.84	
352.011	79.8	79.8	391.694	79.9	79.8	95.6	7.68	8.71	
352.926	79.8	79.8	392.736	79.9	79.8	95.2	7.61	8.63	
353.843	79.9	79.9	393.788	80.0	80.0	93.3	7.62	8.71	
354.768	79.9	80.0	394.824	80.0	80.0	93.4	7.69	8.58	
355.698	80.0	80.0	395.862	80.1	80.0	93.0	7.73	8.59	
356.615	80.0	80.1	396.909	80.1	80.0	92.6	7.62	8.67	
357.549	80.0	80.1	397.945	80.1	80.1	92.5	7.76	8.58	
358.495	80.0	80.1	398.990	80.2	80.1	92.1	7.86	8.65	
359.422	80.2	80.3	400.035	80.3	80.3	92.2	7.70	8.65	
360.359	80.2	80.3	401.070	80.4	80.3	90.1	7.79	8.56	
361.381	80.2	80.3	402.118	80.4	80.3	88.3	8.49	8.67	
362.224	80.3	80.3	403.153	80.5	80.3	89.8	7.00	8.56	
363.160	80.3	80.3	404.191	80.5	80.3	90.5	7.78	8.59	
364.104	80.3	80.3	405.238	80.5	80.3	90.6	7.84	8.66	

  
 03/26/12

Stack area (ft2):		0.3491		Manufacturer: SBI				
Wood moisture (% wet):		16.579		Model: XTD 1.9				
Load Weight (lbs wet):		13.95		Date: 22-08-2011				
Burn Rate (Dry kg/hr):		0.960		Run: 1				
Final Temperature (DGM #1) Degrees Rankin:				539.524				
Final Temperature (DGM #2) Degrees Rankin:				539.540				
Final Tunnel Temperature Degrees Rankin:				559.078				
Final Tunnel Velocity (feet per second):				7.623023				
Standardized Tunnel Flow (dscfm):				142.76				
		Average	Average					
		Inlet +	Inlet +					
		Outlet	Outlet	99.96	99.97	#1	#2	
Tunnel	Tunnel	Temp.	Temp.			dDGM	dDGM	
Velocity	Velocity	Meter 1	Meter 2			Vol.Std.	Vol.Std.	
Delta-P	FI/Sec	Deg. R	Deg. R	PR1	PR2	(ft3)	(ft3)	Time
0.021	7.698	538.2	538.2					0
0.021	7.614	538.4	538.3	101.25	92.19	0.909	0.925	10
0.021	7.621	538.4	538.4	99.29	91.30	0.891	0.915	20
0.021	7.616	538.5	538.5	100.39	102.46	0.901	1.028	30
0.021	7.637	538.7	538.7	100.52	107.13	0.900	1.072	40
0.021	7.664	538.7	538.7	100.44	99.78	0.896	0.995	50
0.021	7.706	538.8	538.8	100.44	97.50	0.891	0.967	60
0.021	7.688	539.0	538.9	100.61	104.22	0.895	1.036	70
0.021	7.696	539.1	539.0	100.91	99.45	0.896	0.987	80
0.021	7.712	539.2	539.2	100.87	103.61	0.894	1.026	90
0.021	7.701	539.3	539.3	101.59	105.39	0.902	1.045	100
0.021	7.691	539.4	539.4	101.11	101.36	0.899	1.007	110
0.021	7.669	539.4	539.5	99.94	101.15	0.891	1.008	120
0.021	7.664	539.5	539.5	100.96	101.28	0.901	1.009	130
0.021	7.648	539.5	539.5	100.20	100.38	0.896	1.003	140
0.021	7.641	539.6	539.6	101.50	102.10	0.908	1.021	150
0.021	7.632	539.6	539.6	99.43	98.61	0.891	0.987	160
0.021	7.623	539.7	539.7	99.73	101.08	0.895	1.013	170
0.021	7.603	539.7	539.8	110.41	109.60	0.993	1.101	180
0.021	7.606	539.7	539.8	88.78	90.61	0.798	0.910	190
0.021	7.599	539.8	539.8	98.98	100.55	0.890	1.011	200
0.021	7.597	539.8	539.9	98.07	99.55	0.883	1.001	210
0.021	7.584	539.9	540.0	98.11	100.31	0.884	1.010	220
0.021	7.584	540.0	540.0	98.96	98.78	0.892	0.995	230
0.021	7.581	540.0	540.0	99.45	98.93	0.897	0.997	240
0.021	7.579	540.0	540.0	98.02	99.76	0.884	1.006	250
0.021	7.578	540.1	540.1	99.82	98.69	0.901	0.995	260
0.021	7.575	540.1	540.1	101.06	99.51	0.912	1.003	270
0.021	7.576	540.2	540.3	99.02	99.48	0.894	1.003	280
0.021	7.561	540.3	540.4	99.89	98.33	0.903	0.993	290
0.021	7.549	540.3	540.3	108.78	99.41	0.985	1.006	300
0.021	7.560	540.3	540.4	89.84	98.30	0.812	0.993	310
0.021	7.564	540.3	540.4	99.81	98.64	0.902	0.996	320
0.021	7.565	540.3	540.4	100.67	99.51	0.910	1.005	330

*Hydral*  
03/26/12

## Intertek Testing Services

## SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer: SBI  
Model: XTD 1.9  
Date: 22-08-2011  
Run: 1  
Project #: G100456088  
Test Duration (Minutes): 330  
Test Duration (Hours): 5.50

## RESULTS

Average Adjusted Emissions Rate:	4.82
Average Unadjusted Emission Rate	3.23
Burn Rate (Dry kg/hr):	0.96

## BAROMETRIC PRESSURE

Average:	29.52
Start:	29.54
End:	29.5

## TEMPERATURE FACTORS

DGM #1:	0.9786
DGM #2:	0.9786

## DRY GAS METER VALUES

## VOLUMES SAMPLED

DGM #1:	29.609
DGM #2:	33.084

DGM #1	Final:	364.104
	Initial:	333.439

DGM #2	Final:	405.238
	Initial:	370.835

TOTAL TUNNEL VOLUME (scf):	47110
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## SAMPLE RATIOS

Sample Train 1:	1591.1
Sample Train 2:	1423.9

## TEMPERATURES (DEG. RANKIN)

DGM #1:	539.52
DGM #2:	539.54

## TOTAL EMISSIONS

Sample Train 1 (g):	18.62
Sample Train 2 (g):	16.94
Ave:	17.78

## CALIBRATION FACTORS

DGM #1:	1.000
DGM #2:	0.996

## EMISSION RATES

Sample Train 1 (g/hr):	3.38
Sample Train 2 (g/hr):	3.08
Ave:	3.23

TUNNEL FLOW RATE:	142.8
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## PARTICULATE CATCH (mg)

Sample Train 1:	
Filters	11.5
Probe	0.2
Total	11.7

## ADJUSTED EMISSION RATES

Sample Train 1 (g/hr):	5.01
Sample Train 2 (g/hr):	4.63
Ave:	4.82

Sample Train 2:	
Filters	11
Probe	0.9
Total	11.9

DEVIATION:	3.90%
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If deviation is greater than 7.5% due to low particulate catch  
The two emission rates shall not differ by 7.5%  
of the weighted average emission rate limit (4.1 or 7.5) (5g-3)


Use the following:

Catalytic units	9.17%
7.5% of 4.1 g/hr	

Non catalytic units	5.01%
7.5% of 7.5 g/hr	

*[Signature]*  
03/26/12

REPORT DATA							
Client:		SBI					
Run:		1					
Date:		22-08-2011					
Project:		G100456088					
Model:		XTD 1.9					
Fuel Moisture (Dry):		19.87333333					
Stack Static (neg):		-0.0925					
Barometer:		29.52					
Average Room Temp:		84.38					
Change in stove temp:		-120.3276534					
Burn Rate:		0.960					
Adjusted Emission Rate:		4.819					
System 1:		5.007					
System 2:		4.631					
Deviation:		3.90%					
Filter 1:		81.82					
Filter 2:		82.74					
Tunnel:		99.08					
DGM 1:		79.52					
DGM 2:		79.54					
Water Collected:							
Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
Before	After	Before	After	Before	After	Before	After
82	82	29.54	29.50	24	22	0	0

  
03/26/12

Manufacturer: SBI  
 Model XTD 1.9  
 Project G100456088

Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Scale
Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom	weight
609.46	85.92	174.76	688.52	456.68	589.43	565.00	469.30	10.28
408.59	86.69	134.54	725.69	427.78	590.33	583.80	477.08	8.21
358.29	85.57	122.60	634.08	438.83	556.52	574.42	474.02	7.03
349.50	85.88	118.39	640.54	435.22	544.92	572.45	462.07	5.80
353.02	86.41	4170.61	665.84	562.98	533.03	581.82	450.51	4.45
300.31	85.93	115.50	613.82	462.44	533.08	581.70	435.28	3.84
278.02	84.96	112.68	541.96	538.80	517.69	564.85	428.07	3.50
249.51	83.73	107.79	479.79	456.58	483.90	538.29	423.05	3.33
236.55	83.28	105.03	436.09	519.03	463.18	514.35	417.99	3.16
224.35	80.10	100.76	408.85	514.06	445.53	495.61	415.07	3.00
216.43	79.39	99.26	389.31	495.91	428.23	480.52	410.20	2.81



03/26/12

VERSION 1.2

2/5/2010

## E&E Tunnel Traverse Worksheet

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.023	119	0.1500
B CENTER	0.020	118	0.1414
A1	0.018	117	0.1323
A2	0.020	118	0.1414
A3	0.018	118	0.1323
A4	0.018	108	0.1323
B1	0.018	118	0.1323
B2	0.020	119	0.1414
B3	0.018	119	0.1323
B4	0.015	113	0.1225
AVERAGE	0.0185	116.86	0.1333

Static Pressure:

**PITOT  
CONSTANT** 0.9151

Tunnel Diameter (in):   
Tunnel Area (ft2) 0.349066  
Tunnel Static Pressure

*F. Taylor*  
03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

## E&E FUEL LOAD DATA SHEET

Test Load Weight:  
Lower Ideal Upper  
Firebox Volume:  cu. ft     
Load Volume:  cu. ft Loading Density: 5.327 lbs./ft<sup>3</sup>  
Number of Spacers:  Load Density: #DIV/0! lbs./ft<sup>3</sup>  
VERSION 1.2 2/5/2010

Thick	Piece Size:			Weight lbs	Meter Moisture Content		
	x Wide	x	Length		Dry Uncorrected %		
	2	4	12	1.2	20.4	19	19
	2	4	12	1.3	20	19.7	21
	2	4	12	1.1	20.5	20.1	21
	2	4	12	1.2	21.2	21	21.4
	2	4	16	1.55	21	20.5	21
	2	4	16	1.75	19.00	19.50	20.90
	2	4	16	1.70	20.50	21.20	20.90
	2	4	16	1.60	20.10	19.90	19.90

Test Load Weight  lbs.

Dry Weight  kg.

Average Pretest Moisture Content: %

Dry:

two pin: (dry)

Wet:

  
03/25/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

VERSION 1.2

2/5/2010

## E&E FUEL LOAD DATA SHEET

Test Load Weight:  
Lower Ideal Upper  
Firebox Volume:  cu. ft     
Load Volume:  cu. ft Loading Density: 6.519 lbs./ft<sup>3</sup>  
Number of Spacers:  Load Density: 214.272 lbs./ft<sup>3</sup>

Piece Size:				Weight lbs	Meter Moisture Content Dry Uncorrected %		
Thick	x	Wide	x Length				
2		4	15.75	2.10	21.40	21.40	21.10
2		4	15.75	1.85	19.50	19.80	19.70
2		4	15.75	1.75	19.90	19.70	19.00
4		4	15.75	4.10	19.50	18.90	19.50
4		4	15.75	4.15	20.00	19.20	19.50

Test Load Weight  lbs.

Dry Weight  kg.

Average Moisture Content: %

Dry:

Wet:

Pre-test moisture content: %

Wet:

Coal Bed Range:  lbs. to  lbs. 20% to 25% of test load


*Thayer*  
03/26/12

**Run 2**



## Run Notes

### EPA Methods 28 and 5G-3

PROJECT / TEST INFORMATION			Appliance Information		
Project Number:	G100456088		Appliance Type:	2	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Manufacturer:	SBI				
Model:	XTD 1.9				
Sample ID Number:	MTL1108221414-001				
Test Date:	23-Aug-11	Firebox Volume, ft <sup>3</sup> :	2.14	N/A for pellet type	
Test Run Number:	2	Convection Blower	2	1 - No Fan 2 - Fan Optional 3 - Fan Standard	
Date tunnel cleaned:	8/18/2011				
Purpose of Test	Cat 2				

[illegible]

Thyrid  
03/26/12

VERSION 1.2

2/5/2010

Manufacturer: SBI

Model: XTD 1.9

Date: 23-08-2011

Run: 2

Control #: G100456088

Test Duration: 290

	Start	End
Barometer (in.Hg):	29.91	29.92
Dry Bulb (F):	87	87
Humidity (%):	22	22

\*Blower turned on at 30 min-low position.


Moisture content of wood (wet basis): 16.523

Average		0.95	4.95	15.77	261.95	81.53	104.92	424.55	433.95	424.81	456.18	345.81
Elapsed Time	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Unit Top	Unit Back	Unit R.Side	Unit L.Side	Unit Bottom
0	13.85	0.55	2.25	19.09	300.22	82.45	122.16	403.35	441.36	453.78	491.76	413.71
10	12.99	0.57	4.78	17.27	261.16	74.14	105.50	397.81	464.45	418.12	467.94	412.39
20	12.33	0.46	9.99	10.81	253.80	78.90	102.08	378.25	459.23	378.31	432.10	403.36
30	11.13	0.35	10.36	10.74	329.92	77.49	107.19	450.63	445.48	381.18	411.62	387.72
40	9.80	0.45	10.25	10.86	357.00	82.81	112.16	559.73	314.22	395.11	428.75	366.66
50	8.59	0.48	10.65	10.32	363.85	85.31	112.23	594.79	324.57	419.75	455.22	351.58
60	7.34	0.49	9.79	11.1	370.73	82.66	117.37	623.39	362.96	427.78	475.99	342.85
70	6.18	0.41	9.09	11.8	360.68	87.93	116.47	628.62	377.04	442.62	494.79	336.84
80	5.19	0.56	8.36	12.89	350.32	82.14	115.10	604.56	382.43	464.41	514.53	332.81
90	4.34	0.66	7.48	13.41	330.84	83.08	115.09	577.39	396.26	476.11	525.14	330.30
100	3.66	0.50	7.33	13.82	318.18	87.34	111.82	550.67	398.48	481.11	528.35	329.57
110	3.10	0.63	5.86	14.8	296.46	82.24	110.52	518.18	445.09	489.21	522.44	329.10
120	2.65	0.78	4.92	15.6	281.69	79.89	109.15	495.72	517.45	501.31	523.60	328.78
130	2.39	0.88	4.77	15.83	264.69	79.39	106.67	461.40	513.24	489.54	522.99	327.97
140	2.09	0.90	4.82	15.81	254.16	80.80	105.14	433.18	503.55	478.12	513.39	328.08
150	1.90	0.99	4.59	15.87	246.44	78.24	104.71	414.56	518.98	471.09	502.41	328.67
160	1.69	1.05	4.37	16.02	240.42	76.77	102.97	400.48	515.03	488.19	492.54	330.69
170	1.46	0.94	3.88	16.5	236.41	74.94	103.28	389.73	508.52	484.72	484.67	333.26
180	1.24	1.31	3.53	16.8	233.64	75.19	102.42	383.24	497.99	484.84	477.98	335.83
190	1.09	1.20	3.16	17.11	228.66	81.90	98.87	373.11	491.28	448.57	470.02	340.14
200	0.91	1.27	3.36	17.39	222.50	80.94	99.62	361.49	481.35	432.06	458.36	343.60
210	0.77	1.31	2.95	17.38	218.66	85.86	99.19	349.64	467.55	417.48	445.07	345.80
220	0.60	1.61	1.59	18.82	213.27	81.82	98.86	341.53	455.31	411.05	431.88	347.59
230	0.51	1.52	1.62	18.66	207.59	82.03	97.23	330.68	443.26	393.69	419.08	348.82
240	0.41	1.46	1.51	19.09	201.26	78.92	96.57	316.29	426.02	377.96	403.25	344.99
250	0.32	1.46	1.25	19.29	195.20	83.13	97.34	302.12	407.21	355.56	387.29	339.62
260	0.24	1.66	1.03	19.53	188.60	82.12	96.49	290.73	389.92	345.65	372.74	334.97
270	0.13	1.38	1.56	19.18	181.69	85.83	95.07	277.46	372.86	334.72	357.76	330.83
280	0.05	1.32	1.7	18.97	177.16	85.66	92.92	267.05	356.76	329.86	343.59	326.54
290	0.00	1.30	1.98	18.94	175.40	86.06	93.47	260.68	344.70	332.30	332.04	321.33

Thyng  
03/26/12

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 23-08-2011  
 Run: 2  
 Control #: G100456088

379.14	80.81	80.68	0.00	420.54	80.57	80.57	0.00	0.02	0.000	0.00	417.06		
*	*	*	*	*	*	*	*	*	*	Visual	Average	Change in	
DGM 1	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	DGM 2	Filter 2	Tunnel	Chimney	Smoke	Stove	Surface	Elapsed
Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp	Velocity	Draft	Observed	Temp	Temp.	Time
384.105	78.76	78.72		405.250	78.83	78.65		0.023			440.8	0	0
384.918	79.00	78.88		406.368	78.73	78.84		0.023			432.1	-8.6502	10
385.970	79.17	79.03		407.496	78.93	78.99		0.023			410.3	-30.544	20
387.022	79.19	79.17		408.435	79.06	79.09		0.023			415.3	-25.469	30
388.074	79.42	79.31		409.470	79.19	79.27		0.023			412.9	-27.9	40
389.117	79.60	79.61		410.598	79.43	79.54		0.023			429.2	-11.609	50
370.167	79.68	79.63		411.522	79.58	79.62		0.023			446.6	5.8003	60
371.210	79.97	79.85		412.571	79.79	79.89		0.023			456.0	15.188	70
372.260	80.18	80.05		413.646	79.97	80.08		0.023			459.7	18.915	80
373.315	80.45	80.31		414.698	80.21	80.29		0.023			461.0	20.245	90
374.368	80.47	80.46		415.761	80.33	80.43		0.023			456.8	16.044	100
375.424	80.63	80.62		416.813	80.41	80.49		0.023			460.8	20.009	110
376.477	80.84	80.75		417.894	80.59	80.69		0.023			473.4	32.58	120
377.531	80.91	80.90		418.940	80.72	80.81		0.023			463.0	22.234	130
378.585	81.01	81.03		419.956	80.90	80.94		0.023			451.3	10.471	140
379.645	81.07	81.16		421.024	80.99	80.99		0.023			447.1	6.348	150
380.705	81.14	81.24		422.191	81.06	81.10		0.023			441.4	0.5917	160
381.765	81.22	81.33		423.156	81.15	81.15		0.023			435.8	-5.0141	170
382.823	81.25	81.40		424.220	81.24	81.22		0.023			432.0	-8.8184	180
383.879	81.18	81.39		425.273	81.29	81.20		0.023			424.6	-16.168	190
384.944	81.18	81.43		426.347	81.31	81.24		0.023			415.4	-25.421	200
385.998	81.17	81.41		427.398	81.28	81.19		0.023			405.1	-35.645	210
387.061	81.22	81.45		428.458	81.33	81.24		0.023			397.5	-43.32	220
388.114	81.22	81.47		429.504	81.37	81.24		0.023			387.1	-53.689	230
389.174	81.33	81.56		430.568	81.45	81.37		0.023			373.7	-67.093	240
390.224	81.35	81.63		431.616	81.54	81.43		0.023			358.4	-82.432	250
391.285	81.36	81.63		432.678	81.55	81.47		0.023			346.8	-93.993	260
392.331	81.32	81.65		433.732	81.56	81.45		0.023			334.7	-106.07	270
393.392	81.42	81.67		434.790	81.62	81.52		0.023			324.8	-116.03	280
394.441	81.49	81.76		435.836	81.75	81.61		0.023			318.2	-122.58	290

  
 03/26/12

Manufacturer:		SBI									
Model:		XTD 1.9									
Date:		23-08-2011									
Run:		2									
Project #:		G100456088									
Test Duration:		290									
Total Gas Volume (DGM 1):		29.605		Pitot Factor		0.82					
Total Gas Volume (DGM 2):		29.735						(0.99 standard,			
Average Barometric Pressure:		29.915						0.84 or Cal. Factor for S-Type)			
Molecular Weight:		28.56									
Pitot Correction:		0.9124									
Calibration Factor (DGM #1):		1.0000									
Calibration Factor (DGM #2):		0.9960									
(1) VS:		0.0280									
(2) VS:		0.0279									
								Filter Face		Filter Face	
								Velocity		Velocity	
								DGM 1		DGM 2	
DGM 1	DGM 1	DGM 1	DGM 2	DGM 2	DGM 2	Tunnel					
Reading	Inlet T	Outlet T	Reading	Inlet T	Outlet T	Dry Bulb					
364.105	78.8	78.7	405.250	78.629247	78.652	122.16					
364.918	79.0	78.9	406.366	78.725053	78.837	105.5	6.86		9.39		
365.970	79.2	79.0	407.496	78.934498	78.987	102.08	8.88		9.50		
367.022	79.2	79.2	408.435	79.061544	79.09	107.19	8.88		7.89		
368.074	79.4	79.3	409.470	79.186059	79.274	112.16	8.87		8.70		
369.117	79.6	79.5	410.598	79.432406	79.538	112.23	8.79		9.47		
370.167	79.7	79.6	411.522	79.581358	79.624	117.37	8.85		7.76		
371.210	80.0	79.8	412.571	79.791744	79.885	116.47	8.79		8.80		
372.260	80.2	80.0	413.646	79.96844	80.081	115.1	8.84		9.02		
373.315	80.4	80.3	414.698	80.208142	80.289	115.09	8.88		8.82		
374.368	80.5	80.5	415.761	80.329168	80.434	111.82	8.86		8.91		
375.424	80.6	80.6	416.813	80.412347	80.494	110.52	8.89		8.82		
376.477	80.8	80.8	417.894	80.591955	80.686	109.15	8.86		9.06		
377.531	80.9	80.9	418.940	80.719212	80.815	106.67	8.86		8.76		
378.585	81.0	81.0	419.956	80.90185	80.938	105.14	8.86		8.51		
379.645	81.1	81.2	421.024	80.991852	80.995	104.71	8.91		8.94		
380.705	81.1	81.2	422.191	81.08308	81.1	102.97	8.91		9.77		
381.765	81.2	81.3	423.156	81.154143	81.148	103.28	8.91		8.08		
382.823	81.2	81.4	424.220	81.240354	81.219	102.42	8.89		8.91		
383.879	81.2	81.4	425.273	81.287122	81.198	98.871	8.87		8.82		
384.944	81.2	81.4	426.347	81.309336	81.245	99.623	8.95		8.99		
385.998	81.2	81.4	427.398	81.276636	81.191	99.191	8.86		8.80		
387.061	81.2	81.5	428.458	81.330697	81.243	98.865	8.93		8.87		
388.114	81.2	81.5	429.504	81.365372	81.244	97.227	8.85		8.76		
389.174	81.3	81.6	430.568	81.447432	81.37	96.566	8.91		8.90		
390.224	81.3	81.6	431.616	81.543416	81.428	97.342	8.82		8.77		
391.285	81.4	81.6	432.678	81.552549	81.472	96.491	8.91		8.89		
392.331	81.3	81.6	433.732	81.556603	81.455	95.071	8.79		8.82		
393.392	81.4	81.7	434.790	81.616452	81.522	92.919	8.91		8.85		
394.441	81.5	81.8	435.836	81.749149	81.608	93.474	8.81		8.75		

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03/25/12

Proportional Rate Calculations				(EPA Formulas from PR5G)				
Stack area (ft2):		0.3491		Manufacturer:		SBI		
Wood moisture (% wet):		16.523		Model:		XTD 1.9		
Load Weight (lbs wet):		13.9		Date:		23-08-2011		
Burn Rate (Dry kg/hr):		1.089		Run:		2		
Final Temperature (DGM #1) Degrees Rankin:				540.644				
Final Temperature (DGM #2) Degrees Rankin:				540.567				
Final Tunnel Temperature Degrees Rankin:				564.923				
Final Tunnel Velocity (feet per second):				7.802204				
Standardized Tunnel Flow (dscfm):				140.54				
		Average Inlet + Outlet Temp.	Average Inlet + Outlet Temp.	99.94	99.94	#1 dDGM Vol.Std.	#2 dDGM Vol.Std.	
Tunnel Velocity	Tunnel Velocity	Meter 1	Meter 2					
Delta-P	Ft/Sec	Deg. R	Deg. R	PR1	PR2	(ft3)	(ft3)	Time
0.023	7.921	538.7	538.6					0
0.023	7.806	538.9	538.8	78.02	106.23	0.796	1.089	10
0.023	7.783	539.1	539.0	100.61	107.20	1.030	1.102	20
0.023	7.818	539.2	539.1	101.06	89.47	1.030	0.916	30
0.023	7.852	539.4	539.2	101.46	99.01	1.029	1.009	40
0.023	7.853	539.6	539.5	100.56	107.87	1.020	1.099	50
0.023	7.888	539.7	539.6	101.67	88.74	1.027	0.900	60
0.023	7.882	539.9	539.8	100.87	100.62	1.019	1.021	70
0.023	7.872	540.1	540.0	101.39	102.95	1.026	1.046	80
0.023	7.872	540.4	540.2	101.82	100.71	1.030	1.023	90
0.023	7.850	540.5	540.4	101.32	101.45	1.028	1.034	100
0.023	7.841	540.6	540.5	101.46	100.27	1.031	1.023	110
0.023	7.832	540.8	540.6	101.02	102.87	1.028	1.051	120
0.023	7.814	540.9	540.8	100.88	99.30	1.028	1.017	130
0.023	7.804	541.0	540.9	100.72	96.30	1.028	0.987	140
0.023	7.801	541.1	541.0	101.24	101.17	1.034	1.038	150
0.023	7.789	541.2	541.1	101.07	110.36	1.034	1.134	160
0.023	7.791	541.3	541.2	101.08	91.27	1.033	0.937	170
0.023	7.785	541.3	541.2	100.80	100.55	1.031	1.033	180
0.023	7.760	541.3	541.2	100.30	99.19	1.029	1.023	190
0.023	7.766	541.3	541.3	101.22	101.23	1.038	1.043	200
0.023	7.763	541.3	541.2	100.14	99.03	1.028	1.021	210
0.023	7.760	541.3	541.3	100.96	99.84	1.036	1.029	220
0.023	7.749	541.3	541.3	99.86	98.37	1.026	1.016	230
0.023	7.744	541.4	541.4	100.44	99.99	1.033	1.033	240
0.023	7.750	541.5	541.5	99.58	98.54	1.023	1.017	250
0.023	7.744	541.5	541.5	100.52	99.77	1.034	1.031	260
0.023	7.734	541.5	541.5	98.98	98.90	1.019	1.023	270
0.023	7.719	541.5	541.6	100.19	99.07	1.034	1.027	280
0.023	7.723	541.6	541.7	99.09	97.97	1.022	1.015	290

*[Signature]*  
03/25/12

Intertek Testing Services

## SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer:

SBI

## RESULTS

Model: XTD 1.9

Date: 23-08-2011

Run: 2

Project #: G100456088

Test Duration (Minutes): 290

Test Duration (Hours): 4.83

Average Adjusted Emissions Rate: 4.07

Average Unadjusted Emission Rate: 2.84

Burn Rate (Dry kg/hr): 1.09

## BAROMETRIC PRESSURE

Average: 29.915

Start: 29.91

End: 29.92

## TEMPERATURE FACTORS

DGM #1: 0.9766

DGM #2: 0.9768

## DRY GAS METER VALUES

DGM #1 Final: 394.441

Initial: 364.106

## VOLUMES SAMPLED

DGM #1: 29.622

DGM #2: 29.750

DGM #2 Final: 435.836

Initial: 405.26

TOTAL TUNNEL VOLUME (scf): 42496

## SAMPLE RATIOS

Sample Train 1: 1434.6

Sample Train 2: 1428.4

## TEMPERATURES (DEG. RANKIN)

DGM #1: 540.64

DGM #2: 540.57

## TOTAL EMISSIONS

Sample Train 1 (g): 12.34

Sample Train 2 (g): 13.14

Ave: 12.74

## CALIBRATION FACTORS

DGM #1: 1.000

DGM #2: 0.996

## EMISSION RATES

Sample Train 1 (g/hr): 2.55

Sample Train 2 (g/hr): 2.72

Ave: 2.64

TUNNEL FLOW RATE: 146.5

## PARTICULATE CATCH (mg)

Sample Train 1:

Filters: 7.7

Probe: 0.9

Total: 8.6

## ADJUSTED EMISSION RATES

Sample Train 1 (g/hr): 3.96

Sample Train 2 (g/hr): 4.17

Ave: 4.07

Sample Train 2:

Filters: 8.5

Probe: 0.7

Total: 9.2

DEVIATION: 2.62%

If deviation is greater than 7.5% due to low particulate catch  
 The two emission rates shall not differ by 7.5%  
 of the weighted average emission rate limit (4.1 or 7.5) (5g-3)

Use the following:

Catalytic units 5.20%  
 7.5% of 4.1 g/hr

Non catalytic units 2.84%  
 7.5% of 7.5 g/hr

*Thyphal*  
 03/26/12

REPORT DATA									
Client:		SBI							
Run:		2							
Date:		23-08-2011							
Project:		G100456088							
Model:		XTD 1.9							
Fuel Moisture (Dry):		19.79333333							
Stack Static (neg):		0.095							
Barometer:		29.915							
Average Room Temp:		81.53							
Change in stove temp:		-122.582564							
Burn Rate:		1.089							
Adjusted Emission Rate:		4.068							
System 1:		3.962							
System 2:		4.175							
Deviation:		2.62%							
Filter 1:		0.00							
Filter 2:		0.00							
Tunnel:		104.92							
DGM 1:		80.64							
DGM 2:		80.57							
Water Collected:									
Room Temp		Bar Pressure		Relative Humidity		Air Velocity			
Before	After	Before	After	Before	After	Before	After		
87	87	29.91	29.92	22	22	0	0		

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03/26/12

Manufacturer SBI  
 Model XTD 1.9  
 Project G100456088

Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Scale
Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom	weight
436.96	84.08	156.35	477.01	405.05	577.00	562.04	422.45	12.69
624.55	81.62	180.81	764.07	377.45	587.52	541.59	432.65	10.03
403.01	77.67	130.83	670.34	380.39	560.45	546.41	450.00	8.37
379.40	76.14	125.41	639.99	408.64	546.39	546.11	456.44	6.96
358.50	77.87	120.73	601.00	414.39	542.31	544.89	454.52	5.89
352.85	78.32	4170.00	600.28	516.58	528.07	550.43	449.09	4.82
380.09	88.48	126.33	606.60	505.74	526.66	554.50	439.75	3.77
310.65	85.91	113.21	568.36	534.91	508.50	553.92	428.14	3.38
275.85	86.85	108.41	485.65	497.23	479.31	530.34	420.71	3.17
257.11	84.35	103.86	437.27	493.99	457.76	507.45	414.97	2.99

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 03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088


## E&E Tunnel Traverse Worksheet

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.023	120	0.1500
B CENTER	0.023	118	0.1500
A1	0.018	118	0.1323
A2	0.020	117	0.1414
A3	0.020	118	0.1414
A4	0.018	113	0.1323
B1	0.018	117	0.1323
B2	0.020	118	0.1414
B3	0.020	118	0.1414
B4	0.018	116	0.1323
AVERAGE	0.0195	117.24	0.1369

Static Pressure:

**PITOT  
CONSTANT** 0.9124

Tunnel Diameter (in):   
Tunnel Area (ft<sup>2</sup>) 0.349066  
Tunnel Static Pressure

  
03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

## E&E FUEL LOAD DATA SHEET

Test Load Weight:  
Lower Ideal Upper  
Firebox Volume:  cu. ft     
Load Volume:  cu. ft Loading Density: 5.724 lbs./ft3  
Number of Spacers:  Load Density: 188.160 lbs./ft3  
VERSION 1.2 2/5/2010

Thick	Piece Size:			Weight lbs	Meter Moisture Content		
	x Wide	x	Length		Dry Uncorrected %		
2	4	12	1	20.1	20.6	20.2	
2	4	12	1	20.2	20.3	20.4	
2	4	12	1	21	20.3	20.5	
2	4	12	1.1	20.5	19.8	18.9	
2	4	16	1.65	21.1	20.3	22	
2	4	16	1.85	20.30	19.90	20.40	
2	4	16	1.70	19.80	21.00	21.00	
2	4	16	1.65	20.90	19.90	21.10	
2	4	16	1.30	21.40	20.30	21.00	

Test Load Weight  lbs.

Dry Weight  kg.

### Average Pretest Moisture Content: %

Dry:

two pin: (dry)

Wet:

*Thyler*  
03/26/12

Manufacturer SBI  
 Model XTD 1.9  
 Project G100456088

Firebox Volume:  cu. ft      Test Load Weight:  
    Lower      Ideal      Upper  
         

Load Volume:  cu. ft      Loading Density:      6.495      lbs./ft3

Number of Spacers:       Load Density:      213.504      lbs./ft3

Piece Size:				Weight lbs	Meter Moisture Content		
Thick	x Wide	x Length			Dry Uncorrected %		
2	4	15.75		1.35	19.30	19.30	18.60
2	4	15.75		1.30	19.80	19.20	19.80
2	4	15.75		1.95	22.20	21.90	21.50
4	4	15.75		3.55	19.70	19.10	18.90
4	4	15.75		3.60	19.80	19.20	18.60
		Spacers		2.15			

Test Load Weight  lbs.

Dry Weight  kg.

Average Moisture Content: %


Dry:

Wet:

Pre-test moisture content: %

Wet:

Coal Bed Range:  lbs. to  lbs.      20% to 25% of test load


  
 03/26/12

**Run 3**



## Run Notes

### EPA Methods 28 and 5G-3

PROJECT / TEST INFORMATION			Appliance Information		
Project Number:	G100456088		Appliance Type:	2	1 - Catalytic
Manufacturer:	SBI				2 - Non - Catalytic
Model:	XTD 1.9		3 - Pellet		
Sample ID Number:	MTL1108221414-001		4 - Hydronic		
Test Date:	24-Aug-11		Firebox Volume, ft <sup>3</sup> :	2.14	N/A for pellet type
Test Run Number:	3		Convection Blower	2	1 - No Fan
Date tunnel cleaned:	8/18/2011				2 - Fan Optional
Purpose of Test	Cat 3				3 - Fan Standard

[illegible]

Thyroid  
03/26/12

Manufacturer: SBI		VERSION 1.2										2/5/2010	
Model: XTD 1.9													
Date: 24-08-2011													
Run: 3													
Control #: G100456088													
Test Duration: 170													
		Start	End										
Barometer (in.Hg):		29.95	29.95										
Dry Bulb (F):		87	87										
Humidity (%):		24	23										
*Blower turned on at 30 min-low position.													
Moisture content of wood (wet basis):		16.2666											
Average		0.67	6.54	14.49	400.69	84.74	132.32	544.97	512.12	498.60	550.21	353.50	
Elapsed Time	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Unit Top	Unit Back	Unit R.Side	Unit L.Side	Unit Bottom	
0	13.70	0.37	9.22	13.27	411.36	79.92	140.87	459.32	545.92	457.42	501.75	355.45	
10	12.29	0.35	12.02	9.09	428.60	86.01	134.97	502.97	520.06	429.67	482.87	367.95	
20	10.40	0.25	11.24	9.51	519.39	88.59	145.22	648.93	344.21	448.44	486.08	363.78	
30	8.58	0.23	9.82	11.58	523.57	83.76	150.61	721.59	382.50	481.50	515.53	356.74	
40	7.16	0.25	9.31	11.84	486.62	84.40	143.78	695.04	451.44	484.42	548.25	346.90	
50	5.91	0.28	9.26	12.39	471.68	83.90	144.26	674.20	579.88	481.15	566.31	342.62	
60	4.84	0.31	9.07	12.3	455.04	84.87	141.52	642.64	508.43	487.35	578.32	339.14	
70	3.79	0.33	8.65	12.27	443.62	85.90	140.46	625.04	520.19	506.93	594.70	337.52	
80	2.76	0.44	6.71	14.48	446.82	87.57	141.54	626.91	574.44	539.29	609.75	338.30	
90	2.06	0.62	5.17	15.57	409.73	87.68	136.35	598.55	498.75	555.60	618.37	341.97	
100	1.60	0.71	4.88	16.07	378.42	84.80	132.65	552.16	609.09	553.59	609.16	346.88	
110	1.28	0.88	4.24	16.66	356.21	89.61	126.80	505.55	470.40	549.92	589.89	351.59	
120	1.05	0.84	4.39	16.54	339.80	86.98	120.67	471.17	519.61	526.07	570.29	354.92	
130	0.76	1.02	3.82	17.06	330.15	85.73	118.15	450.10	570.17	513.49	554.18	358.00	
140	0.49	1.29	2.77	17.65	320.03	82.93	118.71	434.81	555.03	504.46	541.87	361.90	
150	0.23	1.38	2.69	17.84	310.06	81.65	117.44	418.62	540.63	496.79	529.77	365.42	
160	0.05	1.32	2.29	18.28	295.84	80.85	115.22	399.25	523.31	482.64	513.84	367.37	
170	0.00	1.18	2.42	18.49	285.49	80.11	112.53	382.59	504.09	476.04	494.79	366.54	

*[Signature]*  
03/26/12

Manufacturer: SBI

Model: XTD 1.9

Date: 24-08-2011

Run: 3

Control #: G100456088

403.26	83.75	83.75	85.51	444.75	83.54	83.54	86.99	0.02	0.000	0.00	491.88		
*	*	*	*	*	*	*	*	*	*	*			
DGM 1 Reading	DGM 1 Inlet T	DGM 1 Outlet T	Filter 1 Temp	DGM 2 Reading	DGM 2 Inlet T	DGM 2 Outlet T	Filter 2 Temp	Tunnel Velocity	Chimney Draft	Visual Smoke Observed	Average Stove Temp.	Change in Surface Temp.	Elapsed Time
394.453	81.79	81.79	82.20	435.849	81.67	81.62	81.84	0.020			464.0	0	0
395.485	82.15	82.01	86.65	436.941	81.94	81.93	87.71	0.020			460.7	-3.2684	10
396.540	82.33	82.24	88.95	437.999	82.10	82.12	89.96	0.020			458.3	-5.6832	20
397.558	82.72	82.53	86.31	439.017	82.39	82.47	88.02	0.020			491.6	27.599	30
398.589	83.10	82.89	84.53	440.055	82.67	82.79	86.56	0.020			505.2	41.236	40
399.631	83.27	83.11	84.15	441.122	82.88	82.99	85.60	0.020			528.8	64.861	50
400.669	83.57	83.42	84.51	442.165	83.17	83.30	85.84	0.020			510.8	46.802	60
401.710	83.80	83.67	84.17	443.210	83.44	83.54	86.16	0.020			516.9	52.904	70
402.744	84.00	83.90	84.14	444.243	83.71	83.76	86.17	0.020			537.7	73.765	80
403.774	84.12	84.10	83.98	445.271	83.87	83.91	86.54	0.020			522.6	58.673	90
404.805	84.20	84.23	83.67	446.305	84.01	83.98	86.12	0.020			534.2	70.203	100
405.847	84.35	84.41	87.52	447.345	84.14	84.10	89.05	0.020			493.5	29.5	110
406.882	84.35	84.49	83.47	448.387	84.18	84.11	85.29	0.020			488.4	24.439	120
407.925	84.51	84.65	86.31	449.423	84.36	84.28	87.66	0.020			489.2	25.215	130
408.961	84.70	84.82	88.05	450.463	84.58	84.50	89.33	0.020			479.6	15.64	140
410.002	84.80	84.97	84.87	451.500	84.77	84.69	86.23	0.020			470.2	8.2748	150
411.041	84.85	85.06	87.36	452.549	84.85	84.73	88.34	0.020			457.3	-6.6922	160
412.079	84.95	85.14	88.34	453.580	84.95	84.85	89.35	0.020			444.8	-19.163	170

*Thayer*  
03/26/12

Manufacturer:		SBI							
Model:		XTD 1.9							
Date:		24-08-2011							
Run:		3							
Project #:		G100456088							
Test Duration:		170							
Total Gas Volume (DGM 1):		17.122		Pitot Factor	0.82				
Total Gas Volume (DGM 2):		17.182		(0.99 standard,					
Average Barometric Pressure:		29.95		0.84 or Cal. Factor for S-Type)					
Molecular Weight:		28.56							
Pitot Correction:		0.9342							
Calibration Factor (DGM #1):		1.0000							
Calibration Factor (DGM #2):		0.9960							
(1) VS:		0.0456							
(2) VS:		0.0455							
							Filter Face	Filter Face	
DGM 1	DGM 1	DGM 1	DGM 2	DGM 2	DGM 2	Tunnel	Velocity	Velocity	
Reading	Inlet T.	Outlet T.	Reading	Inlet T.	Outlet T.	Dry Bulb	DGM 1	DGM 2	
394.453	81.8	81.8	435.849	81.668899	81.618	140.87			
395.485	82.2	82.0	436.941	81.941464	81.932	134.97	8.67	9.14	
396.540	82.3	82.2	437.999	82.095693	82.122	145.22	8.86	8.85	
397.558	82.7	82.5	439.017	82.388255	82.469	150.61	8.54	8.51	
398.589	83.1	82.9	440.055	82.670854	82.791	143.78	8.65	8.68	
399.631	83.3	83.1	441.122	82.884323	82.987	144.26	8.74	8.91	
400.669	83.6	83.4	442.165	83.167972	83.301	141.52	8.70	8.71	
401.710	83.8	83.7	443.210	83.438783	83.54	140.46	8.72	8.72	
402.744	84.0	83.9	444.243	83.705638	83.757	141.54	8.66	8.62	
403.774	84.1	84.1	445.271	83.867129	83.913	136.35	8.62	8.57	
404.805	84.2	84.2	446.305	84.006334	83.975	132.65	8.63	8.62	
405.847	84.3	84.4	447.345	84.137122	84.099	126.8	8.72	8.67	
406.882	84.4	84.5	448.387	84.184462	84.11	120.67	8.66	8.69	
407.925	84.5	84.6	449.423	84.363675	84.283	118.15	8.72	8.63	
408.961	84.7	84.8	450.463	84.576035	84.501	118.71	8.66	8.66	
410.002	84.8	85.0	451.500	84.772274	84.687	117.44	8.70	8.64	
411.041	84.8	85.1	452.549	84.85142	84.735	115.22	8.68	8.73	
412.079	84.9	85.1	453.580	84.946482	84.853	112.53	8.67	8.58	

*T. Taylor*  
03/26/12

Proportional Rate Calculations				(EPA Formulas from PR5G)				
Stack area (ft2):		0.3491		Manufacturer: SBI				
Wood moisture (% wet):		16.267		Model: XTD 1.9				
Load Weight (lbs wet):		13.7		Date: 24-08-2011				
Burn Rate (Dry kg/hr):		1.837		Run: 3				
Final Temperature (DGM #1) Degrees Rankin:				543.750				
Final Temperature (DGM #2) Degrees Rankin:				543.537				
Final Tunnel Temperature Degrees Rankin:				592.318				
Final Tunnel Velocity (feet per second):				7.707459				
Standardized Tunnel Flow (dscfm):				138.22				
		Average	Average					
		Inlet +	Inlet +					
		Outlet	Outlet	99.95	99.95	#1	#2	
Tunnel	Tunnel	Temp.	Temp.			dDGM	dDGM	
Velocity	Velocity	Meter 1	Meter 2			Vol.Std.	Vol.Std.	
Delta-P	Ft/Sec	Deg. R	Deg. R	PR1	PR2	(ft3)	(ft3)	Time
0.020	7.763	541.8	541.6					0
0.020	7.725	542.1	541.9	100.08	105.26	1.006	1.060	10
0.020	7.791	542.3	542.1	103.15	102.82	1.028	1.027	20
0.020	7.826	542.6	542.4	99.91	99.31	0.991	0.988	30
0.020	7.782	543.0	542.7	100.55	100.64	1.003	1.006	40
0.020	7.785	543.2	542.9	101.63	103.46	1.013	1.034	50
0.020	7.768	543.5	543.2	100.95	100.84	1.009	1.010	60
0.020	7.761	543.7	543.5	101.11	100.90	1.011	1.012	70
0.020	7.768	544.0	543.7	100.48	99.79	1.004	1.000	80
0.020	7.734	544.1	543.9	99.63	98.85	1.000	0.995	90
0.020	7.710	544.2	544.0	99.40	99.10	1.001	1.000	100
0.020	7.672	544.4	544.1	99.93	99.15	1.011	1.006	110
0.020	7.632	544.4	544.1	98.73	98.82	1.004	1.008	120
0.020	7.615	544.6	544.3	99.25	98.01	1.012	1.002	130
0.020	7.619	544.8	544.5	98.60	98.39	1.005	1.005	140
0.020	7.610	544.9	544.7	98.94	97.97	1.009	1.002	150
0.020	7.596	545.0	544.8	98.55	98.90	1.007	1.013	160
0.020	7.578	545.0	544.9	98.21	96.95	1.006	0.996	170

*Thyghel*

03/26/12

Intertek Testing Services

SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 24-08-2011  
 Run: 3  
 Project #: G100456088  
 Test Duration (Minutes): 170  
 Test Duration (Hours): 2.83

RESULTS

Average Adjusted Emissions Rate:	3.15
Average Unadjusted Emission Rate:	1.93
Burn Rate (Dry kg/hr):	1.84

BAROMETRIC PRESSURE

Average: 29.95  
 Start: 29.95  
 End: 29.95

TEMPERATURE FACTORS

DGM #1: 0.9710  
 DGM #2: 0.9714

DRY GAS METER VALUES

VOLUMES SAMPLED

DGM #1: 17.133  
 DGM #2: 17.172

DGM #1 Final: 412.079  
 Initial: 394.453  
 DGM #2 Final: 453.58  
 Initial: 435.849

TOTAL TUNNEL VOLUME (scf): 23498

SAMPLE RATIOS

Sample Train 1: 1371.5  
 Sample Train 2: 1368.4

TEMPERATURES (DEG. RANKIN)

DGM #1: 543.75  
 DGM #2: 543.54

TOTAL EMISSIONS

Sample Train 1 (g): 5.62  
 Sample Train 2 (g): 5.34  
 Ave: 5.48

CALIBRATION FACTORS

DGM #1: 1.000  
 DGM #2: 0.996

EMISSION RATES

Sample Train 1 (g/hr): 1.98  
 Sample Train 2 (g/hr): 1.88  
 Ave: 1.93

TUNNEL FLOW RATE: 138.2

PARTICULATE CATCH (mg)

Sample Train 1:

Filters: 3.7  
 Probe: 0.4  
 Total: 4.1

ADJUSTED EMISSION RATES

Sample Train 1 (g/hr): 3.21  
 Sample Train 2 (g/hr): 3.08  
 Ave: 3.15

Sample Train 2:

Filters: 3.4  
 Probe: 0.5  
 Total: 3.9

DEVIATION: 2.17%

If deviation is greater than 7.5% due to low particulate catch  
 The two emission rates shall not differ by 7.5%  
 of the weighted average emission rate limit (4.1 or 7.5) (5g-3)


Use the following:

Catalytic units 3.33%  
 7.5% of 4.1 g/hr

Non catalytic units 1.82%  
 7.5% of 7.5 g/hr

*Thyghel*  
 03/26/12

REPORT DATA							
Client:		SBI					
Run:		3					
Date:		24-08-2011					
Project:		G100456088					
Model:		XTD 1.9					
Fuel Moisture (Dry):		19.42666667					
Stack Static (neg):		0.0925					
Barometer:		29.95					
Average Room Temp:		84.74					
Change in stove temp:		-19.1629032					
Burn Rate:		1.837					
Adjusted Emission Rate:		3.146					
System 1:		3.215					
System 2:		3.078					
Deviation:		2.17%					
Filter 1:		85.51					
Filter 2:		86.99					
Tunnel:		132.32					
DGM 1:		83.75					
DGM 2:		83.54					
Water Collected:							
Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
Before	After	Before	After	Before	After	Before	After
87	87	29.95	29.95	24	23	0	0

  
 03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Scale
Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom	weight
567.07	76.35	273.15	307.58	143.34	166.31	131.18	99.32	13.26
475.66	74.22	139.84	444.71	228.98	239.26	215.69	118.71	11.41
414.66	74.90	126.85	508.05	307.54	279.23	285.27	154.91	9.77
460.30	76.73	132.23	571.50	383.73	345.65	347.66	193.50	8.12
456.26	79.04	134.34	608.37	447.02	382.60	412.68	229.95	6.65
449.39	80.44	135.37	609.73	495.01	425.45	462.86	266.06	5.32
425.93	82.33	132.80	595.63	536.00	463.81	509.88	309.39	4.16
365.27	81.41	123.79	524.79	556.51	453.37	520.86	338.29	3.65
339.69	81.00	120.99	474.50	550.58	452.38	508.48	351.85	3.18

*Thyghel*  
03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

## E&E Tunnel Traverse Worksheet

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.020	132	0.1414
B CENTER	0.020	133	0.1414
A1	0.018	131	0.1323
A2	0.020	131	0.1414
A3	0.018	130	0.1323
A4	0.015	128	0.1225
B1	0.018	133	0.1323
B2	0.020	134	0.1414
B3	0.018	134	0.1323
B4	0.015	128	0.1225
AVERAGE	0.018	131.46	0.1321

Static Pressure:

**PITOT  
CONSTANT** 0.9342

Tunnel Diameter (in):   
Tunnel Area (ft<sup>2</sup>) 0.349066  
Tunnel Static Pressure

*Thayer*  
03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

## E&E FUEL LOAD DATA SHEET

Test Load Weight:  
Lower Ideal Upper  
Firebox Volume:  cu. ft     
Load Volume:  cu. ft Loading Density: 5.958 lbs./ft3  
Number of Spacers:  Load Density: #DIV/0! lbs./ft3  
VERSION 1.2 2/5/2010

Thick	Piece Size:			Weight lbs	Meter Moisture Content		
	x Wide	x	Length		Dry Uncorrected %		
2	4	12	1.2	19.5	20.9	20.8	
2	4	12	1.15	21.2	21.1	21	
2	4	12	1.25	20.3	20.4	20.9	
2	4	12	1.15	20.5	21.6	21.7	
2	4	16	1.55	20.5	20.8	21.4	
2	4	16	1.65	20.80	19.70	20.30	
2	4	16	1.60	21.50	20.10	20.10	
2	4	16	1.60	21.00	20.80	20.90	
2	4	16	1.60	21.00	19.20	20.20	

Test Load Weight  lbs.

Dry Weight  kg.

Average Pretest Moisture Content: %

Dry:

two pin: (dry)

Wet:

*Hayes*  
03/26/12

Manufacturer SBI  
 Model XTD 1.9  
 Project G100456088

				Test Load Weight:		
				Lower	Ideal	Upper
Firebox Volume:	<input type="text" value="2.14"/>	cu. ft		<input type="text" value="13.48"/>	<input type="text" value="14.98"/>	<input type="text" value="16.48"/>
Load Volume:	<input type="text" value="0.0651"/>	cu. ft		Loading Density:	6.402	lbs./ft3
Number of Spacers:	<input type="text" value="20"/>			Load Density:	210.432	lbs./ft3

Piece Size:				Weight lbs	Meter Moisture Content Dry Uncorrected %		
Thick	x	Wide	x Length				
2		4	15.75	1.50	19.50	19.50	19.50
2		4	15.75	1.55	19.30	19.50	19.90
2		4	15.75	1.45	19.20	19.10	19.10
4		4	15.75	3.70	19.80	18.80	19.20
4		4	15.75	3.35	19.50	19.50	20.00
			Spacers	2.15			

Test Load Weight  lbs.

Dry Weight  kg.

Average Moisture Content: %

Dry:

Wet:

Pre-test moisture content: %

Wet:

Coal Bed Range:  lbs. to  lbs. 20% to 25% of test load

*Thyges*  
 03/26/12

**Run 4**



## Run Notes

### EPA Methods 28 and 5G-3

PROJECT / TEST INFORMATION	
Project Number:	G100456088
Manufacturer:	SBI
Model:	XTD 1.9
Sample ID Number:	MTL1108221414-001
Test Date:	25-Aug-11
Test Run Number:	4
Date tunnel cleaned:	8/18/2011
Purpose of Test	Fan Confirmation



Appliance Information		
Appliance Type:	2	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft <sup>3</sup> :	2.14	N/A for pellet type
Convection Blower	2	1 - No Fan 2 - Fan Optional 3 - Fan Standard

[illegible]

03/26/12

Manufacturer: SBI		VERSION 1.2		2/5/2010													
Model: XTD 1.9																	
Date: 25-08-2011																	
Run: 4-Fan Confirmation																	
Control #: G100456088																	
Test Duration: 290																	
		Start		End													
Barometer (in.Hg):		29.7		29.7													
Dry Bulb (F):		87		87													
Humidity (%):		25		24													
*Blower turned on at 30 min-low position.																	
Moisture content of wood (wet basis):		16.6528															
Average		0.95		4.89		16.12		257.38		86.11		99.11		422.13		396.21	
Elapsed Time		Weight Remaining		CO		CO2		O2		Flue Gas		Room Temp		Tunnel Dry Bulb		Unit Top	
																Unit Back	
																Unit R.Side	
																Unit L.Side	
																Unit Bottom	
0		13.85		0.46		2.28		19.46		289.68		79.77		116.74		408.57	
10		13.10		0.61		4		17.2		255.60		83.78		101.53		405.06	
20		12.43		0.45		9.54		11.74		245.91		82.25		99.08		382.21	
30		11.23		0.69		10.85		10.02		318.87		82.34		104.43		445.74	
40		9.69		0.44		9.93		11.13		368.49		85.06		108.76		572.88	
50		8.31		0.43		7.58		13.35		374.70		87.95		111.01		620.78	
60		7.28		0.6		6.37		14.58		343.53		87.33		108.79		604.16	
70		6.56		0.6		6.79		14.35		315.82		85.88		105.88		553.58	
80		5.84		0.59		7.5		13.73		303.31		87.59		104.17		520.16	
90		5.15		0.66		6.19		14.57		303.76		88.84		103.37		508.04	
100		4.52		0.84		5.31		15.58		288.50		87.74		101.97		495.71	
110		4.11		0.7		5.84		15.29		270.85		88.17		100.22		466.13	
120		3.62		0.37		7.4		14.24		263.47		88.92		99.56		446.90	
130		3.16		0.53		6.44		14.83		268.72		85.29		98.96		448.48	
140		2.61		0.42		6.04		14.91		269.92		87.30		98.74		459.77	
150		2.15		0.82		4.55		16.19		267.17		84.69		98.59		459.08	
160		1.91		1.08		4.2		16.32		253.94		84.62		97.15		440.60	
170		1.66		1.26		3.89		16.53		243.37		85.62		96.14		418.68	
180		1.44		1.42		3.62		16.67		235.93		84.19		95.38		400.47	
190		1.25		1.42		3.48		16.83		231.51		84.55		95.07		385.71	
200		1.07		1.22		3.25		17.2		224.36		84.54		94.34		371.30	
210		0.90		1.33		3.03		17.39		221.20		86.11		94.49		362.48	
220		0.76		1.5		2.17		18.2		217.40		86.81		93.91		353.78	
230		0.63		1.56		2.02		18.3		209.30		86.88		93.32		341.32	
240		0.50		1.85		1.81		18.54		203.72		87.01		92.78		327.19	
250		0.38		1.36		1.45		19.12		197.46		87.82		92.15		315.10	
260		0.26		1.34		1.28		19.31		192.06		88.40		92.13		304.02	
270		0.17		1.5		1.01		19.42		185.68		87.95		91.77		292.16	
280		0.10		1.38		1.48		19.3		180.98		87.77		91.65		281.80	
290		0.00		1.23		1.53		19.38		176.24		88.23		91.29		272.00	

*Thyghel*  
03/25/12

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 25-08-2011  
 Run: 4-Fan Confirmation  
 Control #: G100456088

427.21	82.50	82.51	85.35	468.71	82.36	82.32	85.63	0.02	0.000	0.00	403.55	
DGM 1	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	DGM 2	Filter 2	Tunnel	Chimney	Visual	Average	Change in
Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp	Velocity	Draft	Smoke	Stove	Surface
										Observed	Temp	Temp.
412.092	81.92	81.89	81.88	453.582	81.78	81.76	81.98	0.023			450.9	0
413.145	82.10	82.01	84.89	454.840	81.93	81.91	84.84	0.023			425.4	-25.547
414.185	82.18	82.09	85.38	455.882	81.97	81.97	85.60	0.023			394.1	-56.766
415.202	82.25	82.17	85.60	458.708	82.04	82.05	85.92	0.023			396.4	-54.467
416.219	82.28	82.21	86.04	457.726	82.10	82.08	86.29	0.023			402.0	-48.885
417.264	82.41	82.33	86.58	458.763	82.20	82.22	86.74	0.023			425.0	-25.889
418.302	82.40	82.35	86.76	459.804	82.18	82.18	87.04	0.023			430.5	-20.38
419.372	82.52	82.45	86.87	460.898	82.32	82.27	87.02	0.023			421.9	-29.016
420.418	82.56	82.49	86.54	461.905	82.35	82.29	86.85	0.023			418.8	-32.059
421.460	82.52	82.54	86.42	462.955	82.39	82.32	86.70	0.023			419.3	-31.56
422.508	82.43	82.51	86.25	464.016	82.35	82.24	86.56	0.023			425.0	-25.859
423.545	82.40	82.46	86.04	465.052	82.29	82.22	86.22	0.023			445.7	-5.2
424.596	82.42	82.48	85.73	466.113	82.32	82.25	86.08	0.023			404.0	-46.876
425.642	82.47	82.51	85.65	467.133	82.37	82.37	85.93	0.023			410.5	-40.378
426.685	82.42	82.52	85.65	468.187	82.33	82.28	85.79	0.023			422.0	-28.914
427.735	82.45	82.49	85.53	469.222	82.34	82.31	85.72	0.023			427.4	-23.518
428.775	82.49	82.57	85.55	470.280	82.36	82.34	85.68	0.023			418.3	-32.563
429.824	82.57	82.62	85.55	471.327	82.43	82.41	85.61	0.023			411.6	-39.349
430.870	82.54	82.62	85.28	472.383	82.44	82.38	85.39	0.023			415.6	-35.351
431.912	82.56	82.58	85.02	473.427	82.47	82.35	85.26	0.023			424.6	-26.296
432.959	82.65	82.63	84.94	474.478	82.48	82.41	85.22	0.023			415.8	-35.137
434.007	82.66	82.63	84.96	475.510	82.49	82.39	85.26	0.023			408.1	-42.79
435.055	82.67	82.65	84.92	476.551	82.54	82.46	85.19	0.023			399.4	-51.52
436.098	82.65	82.63	84.85	477.604	82.51	82.42	85.17	0.023			389.2	-61.704
437.137	82.66	82.72	84.79	478.652	82.60	82.56	85.14	0.023			377.3	-73.602
438.180	82.67	82.72	84.76	479.683	82.58	82.51	85.15	0.023			366.8	-84.139
439.217	82.76	82.77	84.75	480.707	82.63	82.60	85.22	0.023			356.3	-94.585
440.265	82.77	82.77	84.59	481.783	82.61	82.58	85.19	0.023			345.3	-105.63
441.314	82.75	82.83	84.48	482.818	82.70	82.69	85.03	0.023			334.3	-116.59
442.357	82.88	82.90	84.39	483.854	82.79	82.78	85.01	0.023			324.9	-126

  
 03/26/12

Manufacturer:		SBI									
Model:		XTD 1.9									
Date:		25-08-2011									
Run:		4-Fan Confirmation									
Project #:		G100456088									
Test Duration:		290									
Total Gas Volume (DGM 1):		29.227		Pitot Factor		0.82					
Total Gas Volume (DGM 2):		29.125						(0.99 standard,			
Average Barometric Pressure:		29.7						0.84 or Cal. Factor for S-Type)			
Molecular Weight:		28.56									
Pitot Correction:		0.915									
Calibration Factor (DGM #1):		1.0000									
Calibration Factor (DGM #2):		0.9960									
(1) VS:		0.0287									
(2) VS:		0.0288									
							Filter	Filter			
							Face	Face			
							Velocity	Velocity			
DGM 1	DGM 1	DGM 1	DGM 2	DGM 2	DGM 2	Tunnel	DGM 1	DGM 2			
Reading	Inlet T	Outlet T	Reading	Inlet T	Outlet T	Dry Bulb					
412.092	81.9	81.9	453.582	81.781248	81.758	116.74					
413.145	82.1	82.0	454.640	81.929632	81.909	101.53	8.77	8.78			
414.185	82.2	82.1	455.682	81.971338	81.971	99.079	8.66	8.65			
415.202	82.2	82.2	456.708	82.03575	82.045	104.43	8.47	8.51			
416.219	82.3	82.2	457.726	82.099349	82.058	108.76	8.47	8.45			
417.264	82.4	82.3	458.763	82.195643	82.221	111.01	8.70	8.60			
418.302	82.4	82.3	459.804	82.180898	82.178	108.79	8.64	8.64			
419.372	82.5	82.4	460.898	82.321816	82.27	105.88	8.91	9.07			
420.418	82.6	82.5	461.905	82.348315	82.286	104.17	8.71	8.35			
421.460	82.5	82.5	462.955	82.390194	82.316	103.37	8.67	8.71			
422.508	82.4	82.5	464.016	82.351067	82.236	101.97	8.73	8.80			
423.545	82.4	82.5	465.052	82.289862	82.223	100.22	8.63	8.59			
424.596	82.4	82.5	466.113	82.321002	82.246	99.561	8.75	8.80			
425.642	82.5	82.5	467.133	82.374472	82.37	98.964	8.71	8.46			
426.685	82.4	82.5	468.187	82.327256	82.284	98.739	8.68	8.74			
427.735	82.5	82.5	469.222	82.344883	82.306	98.59	8.74	8.58			
428.775	82.5	82.6	470.280	82.362811	82.345	97.153	8.66	8.78			
429.824	82.6	82.6	471.327	82.433036	82.414	96.144	8.73	8.68			
430.870	82.5	82.6	472.363	82.43575	82.377	95.381	8.71	8.59			
431.912	82.6	82.6	473.427	82.471214	82.353	95.075	8.67	8.82			
432.959	82.6	82.6	474.478	82.461684	82.405	94.343	8.71	8.72			
434.007	82.7	82.6	475.510	82.486717	82.391	94.489	8.72	8.56			
435.055	82.7	82.6	476.551	82.536783	82.463	93.907	8.72	8.63			
436.098	82.6	82.6	477.604	82.512443	82.42	93.321	8.68	8.73			
437.137	82.7	82.7	478.652	82.604884	82.565	92.778	8.65	8.69			
438.180	82.7	82.7	479.683	82.584228	82.508	92.153	8.68	8.55			
439.217	82.8	82.8	480.707	82.628727	82.598	92.134	8.63	8.49			
440.265	82.8	82.8	481.783	82.613875	82.576	91.769	8.72	8.92			
441.314	82.8	82.8	482.818	82.701504	82.687	91.648	8.73	8.58			
442.357	82.9	82.9	483.854	82.790418	82.782	91.293	8.68	8.59			

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03/26/12

Proportional Rate Calculations					(EPA Formulas from PR5G)				
Stack area (ft2):		0.3491			Manufacturer: SBI				
Wood moisture (% wet):		16.653			Model: XTD 1.9				
Load Weight (lbs wet):		13.9			Date: 25-08-2011				
Burn Rate (Dry kg/hr):		1.087			Run: 4-Fan Confirmation				
Final Temperature (DGM #1) Degrees Rankin:					542.503				
Final Temperature (DGM #2) Degrees Rankin:					542.341				
Final Tunnel Temperature Degrees Rankin:					559.113				
Final Tunnel Velocity (feet per second):					7.812183				
Standardized Tunnel Flow (dscfm):					147.18				
		Average	Average						
		Inlet +	Inlet +						
		Outlet	Outlet	99.94	99.94	#1	#2		
Tunnel	Tunnel	Temp.	Temp.			dDGM	dDGM		
Velocity	Velocity	Meter 1	Meter 2			Vol.Std.	Vol.Std.		
Delta-P	Ft/Sec	Deg. R	Deg. R	PR1	PR2	(ft3)	(ft3)	Time	
0.023	7.934	541.9	541.8					0	
0.023	7.829	542.1	541.9	101.20	101.65	1.018	1.019	10	
0.023	7.812	542.1	542.0	99.72	99.89	1.005	1.003	20	
0.023	7.849	542.2	542.0	97.97	98.81	0.983	0.988	30	
0.023	7.879	542.2	542.1	98.33	98.41	0.983	0.980	40	
0.023	7.895	542.4	542.2	101.22	100.42	1.009	0.998	50	
0.023	7.880	542.4	542.2	100.34	100.62	1.003	1.002	60	
0.023	7.859	542.5	542.3	103.15	105.45	1.033	1.053	70	
0.023	7.848	542.5	542.3	100.68	96.91	1.010	0.969	80	
0.023	7.842	542.5	542.4	100.22	100.97	1.006	1.010	90	
0.023	7.832	542.5	542.3	100.68	101.91	1.012	1.021	100	
0.023	7.820	542.4	542.3	99.48	99.36	1.002	0.997	110	
0.023	7.815	542.5	542.3	100.76	101.70	1.015	1.021	120	
0.023	7.811	542.5	542.4	100.22	97.70	1.010	0.981	130	
0.023	7.810	542.5	542.3	99.92	100.95	1.007	1.014	140	
0.023	7.809	542.5	542.3	100.57	99.11	1.014	0.996	150	
0.023	7.799	542.5	542.4	99.48	101.18	1.004	1.018	160	
0.023	7.792	542.6	542.4	100.23	100.02	1.013	1.007	170	
0.023	7.786	542.6	542.4	99.88	98.91	1.010	0.997	180	
0.023	7.784	542.6	542.4	99.47	101.55	1.006	1.024	190	
0.023	7.779	542.6	542.4	99.87	100.24	1.011	1.011	200	
0.023	7.780	542.6	542.4	99.98	98.44	1.012	0.993	210	
0.023	7.776	542.7	542.5	99.92	99.23	1.012	1.001	220	
0.023	7.772	542.6	542.5	99.40	100.33	1.007	1.013	230	
0.023	7.768	542.7	542.6	98.96	99.78	1.003	1.008	240	
0.023	7.764	542.7	542.5	99.28	98.12	1.007	0.992	250	
0.023	7.763	542.8	542.6	98.70	97.44	1.001	0.985	260	
0.023	7.761	542.8	542.6	99.71	102.35	1.012	1.035	270	
0.023	7.760	542.8	542.7	99.79	98.42	1.013	0.995	280	
0.023	7.757	542.9	542.8	99.17	98.47	1.007	0.996	290	

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03/26/12

Intertek Testing Services

## SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 25-08-2011  
 Run: 4-Fan Confirmation  
 Project #: G100456088  
 Test Duration (Minutes): 290  
 Test Duration (Hours): 4.83

## RESULTS

Average Adjusted Emissions Rate:	4.56
Average Unadjusted Emission Rate	3.03
Burn Rate (Dry kg/hr)	1.09

## BAROMETRIC PRESSURE

Average: 29.7  
 Start: 29.7  
 End: 29.7

## TEMPERATURE FACTORS

DGM #1: 0.9733  
 DGM #2: 0.9736

## DRY GAS METER VALUES

## VOLUMES SAMPLED

DGM #1: 29.239  
 DGM #2: 29.138

DGM #1 Final: 442.357  
 Initial: 412.092

DGM #2 Final: 483.854  
 Initial: 453.682

TOTAL TUNNEL VOLUME (scf):

42683

## SAMPLE RATIOS

Sample Train 1: 1459.8  
 Sample Train 2: 1464.9

## TEMPERATURES (DEG. RANKIN)

DGM #1: 542.50  
 DGM #2: 542.34

## TOTAL EMISSIONS

Sample Train 1 (g): 14.31  
 Sample Train 2 (g): 14.94  
 Ave: 14.62

## CALIBRATION FACTORS

DGM #1: 1.000  
 DGM #2: 0.996

## EMISSION RATES

Sample Train 1 (g/hr): 2.96  
 Sample Train 2 (g/hr): 3.09  
 Ave: 3.03

TUNNEL FLOW RATE: 147.2

## PARTICULATE CATCH (mg)

## Sample Train 1:

Filters: 9.3  
 Probe: 0.5  
 Total: 9.8

## Sample Train 2:

Filters: 9.8  
 Probe: 0.4  
 Total: 10.2

## ADJUSTED EMISSION RATES

Sample Train 1 (g/hr): 4.48  
 Sample Train 2 (g/hr): 4.64  
 Ave: 4.56

DEVIATION: 1.80%

If deviation is greater than 7.5% due to low particulate catch  
 The two emission rates shall not differ by 7.5%  
 of the weighted average emission rate limit (4.1 or 7.5) (5g-3)

Use the following:

Catalytic units 4.02%  
 7.5% of 4.1 g/hr

Non catalytic units 2.19%  
 7.5% of 7.5 g/hr


*[Signature]*  
 03/26/12

REPORT DATA							
Client:		SBI					
Run:		1-Fan Confirmation					
Date:		25-08-2011					
Project:		G100456088					
Model:		XTD 1.9					
Fuel Moisture (Dry):		19.98					
Stack Static (neg):		0.085					
Barometer:		29.7					
Average Room Temp:		86.11					
Change in stove temp:		0					
Burn Rate:		1.087					
Adjusted Emission Rate:		4.562					
System 1:		4.479					
System 2:		4.644					
Deviation:		1.80%					
Filter 1:		85.35					
Filter 2:		85.63					
Tunnel:		99.11					
DGM 1:		82.50					
DGM 2:		82.34					
Water Collected:							
Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
Before	After	Before	After	Before	After	Before	After
87	87	29.70	29.70	25	24	0	0

*[Signature]*  
03/28/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Scale
Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom	weight
529.73	83.96	153.14	454.65	470.50	434.27	453.61	390.06	12.27
474.43	88.47	131.29	726.59	321.31	502.54	489.77	374.24	9.28
391.57	89.78	117.30	649.66	340.56	517.24	514.42	376.12	7.82
403.34	92.11	117.89	671.78	495.58	530.29	534.92	380.38	6.33
405.40	90.90	117.93	697.25	550.07	538.19	553.88	381.67	4.85
354.64	89.77	111.55	654.29	518.49	546.37	565.62	379.22	3.97
340.81	88.98	110.66	608.90	474.93	546.45	564.71	381.71	3.30
293.24	90.46	105.10	529.82	575.42	519.39	546.12	382.80	3.09
269.81	85.41	102.23	464.51	545.69	493.36	519.83	376.96	3.01
253.08	84.32	99.38	424.35	525.82	470.31	496.75	372.55	2.82

  
03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

## E&E Tunnel Traverse Worksheet

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
A CENTER	0.028	124	0.1658
B CENTER	0.028	121	0.1658
A1	0.025	122	0.1581
A2	0.028	122	0.1658
A3	0.025	122	0.1581
A4	0.018	118	0.1323
B1	0.023	120	0.1500
B2	0.025	121	0.1581
B3	0.023	122	0.1500
B4	0.020	118	0.1414
AVERAGE	0.024	121.08	0.1517

Static Pressure:

**PITOT  
CONSTANT** 0.9150

Tunnel Diameter (in):   
Tunnel Area (ft2) 0.349066  
Tunnel Static Pressure

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03/26/12

Manufacturer SBI  
Model XTD 1.9  
Project G100456088

## E&E FUEL LOAD DATA SHEET

Test Load Weight:  
Lower Ideal Upper  
Firebox Volume:  cu. ft     
Load Volume:  cu. ft Loading Density: 5.771 lbs./ft3  
Number of Spacers:  Load Density: #DIV/0! lbs./ft3  
VERSION 1.2 2/5/2010

Thick	Piece Size:			Weight lbs	Meter Moisture Content		
	x Wide	x	Length		Dry Uncorrected %		
2	4		12	1.15	21.3	19.5	22.5
2	4		12	1.15	21.7	19	21.7
2	4		12	1.15	21.3	19.2	21.1
2	4		12	1.15	21	19.8	21.9
2	4		16	1.35	21.6	18.9	22.1
2	4		16	1.30	20.00	17.90	19.90
2	4		16	1.70	21.60	19.40	21.50
2	4		16	1.70	22.40	17.90	23.60
2	4		16	1.70	24.30	21.20	23.90

Test Load Weight  lbs.

Dry Weight  kg.

### Average Pretest Moisture Content: %

Dry

two pin: (dry)

Wet:

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03/26/12

Manufacturer SBI  
 Model XTD 1.9  
 Project G100456088

Firebox Volume:  cu. ft      Lower  Ideal  Upper

Load Volume:  cu. ft      Loading Density: 6.495 lbs./ft3

Number of Spacers:       Load Density: 213.504 lbs./ft3

Piece Size:				Weight lbs	Meter Moisture Content			
Thick	x	Wide	x		Length	Dry Uncorrected %		
	2		4	15.75	1.60	20.00	19.80	19.40
	2		4	15.75	1.60	19.20	20.00	18.90
	2		4	15.75	1.75	21.90	21.10	23.60
	4		4	15.75	3.65	19.20	19.50	18.70
	4		4	15.75	3.20	19.70	19.50	19.20
			Spacers		2.10			

Test Load Weight  lbs.

Dry Weight  kg.

Average Moisture Content: %

Dry:

Wet:

Pre-test moisture content: %

Wet:

Coal Bed Range:  lbs.

to  lbs.

20% to 25% of test load

*Wright*  
 03/26/12

**Run 5**

PROJECT / TEST INFORMATION	
Project Number:	G100456088
Manufacturer:	SBI
Model:	XTD 1.9
Sample ID Number:	MTL1108221414-001
Test Date:	26-Aug-11
Test Run Number:	5
Date tunnel cleaned:	8/18/2011
Purpose of Test	Cat 4



Appliance Information		
Appliance Type:	2	1 - Catalytic 2 - Non - Catalytic 3 - Pellet 4 - Hydronic
Firebox Volume, ft <sup>3</sup> :	2.14	N/A for pellet type
Convection Blower	2	1 - No Fan 2 - Fan Optional 3 - Fan Standard

Test Settings	
Primary Air:	Fully open
Secondary Air:	Fixed
Control Board:	N/A
Blower/Fan:	Off the first 30 minutes and turned On-Low after 30 minutes for the reminder of the test
Pre- Burn Activities	
Time (min.)	Activity
	Closed the primary air when the scale indicated 8.00 pounds
45	Stirred the Coal Bed
70	Added 1.6 lb of fuel consisting of 2x4 pieces of 4" of length
90	Leveled the Coal Bed and activated - the door was left ajar at 1/4" for 30 seconds. This manipulation lasted 55 seconds.
Start-Up Procedure	
Loading of fuel, sec. :	Loaded by 40 seconds
Fuel-loading door :	Left ajar at 1/4" for 60 seconds
Primary air:	Fully open.
Secondary air:	Fixed
Control board:	N/A
Blower / fan:	Off the first 30 minutes and turned On-Low after 30 minutes for the reminder of the test
Other Notes	
Coal Bed range: 2.9-3.5 lb	

*Thayer*  
03/26/12

VERSION 1.2

2/5/2010

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 26-08-2011  
 Run: 5  
 Control #: G100456088  
 Test Duration: 120

	Start	End
Barometer (in.Hg):	29.97	29.7
Dry Bulb (F):	87	87
Humidity (%):	23	23

\*Blower turned on at 30 min-low position.

Moisture content of wood (wet basis): 16.2479


		Average										
		0.55	6.10	13.67	507.56	84.79	144.16	637.50	644.73	571.39	606.49	415.93
		*	*	*	*	*	*	*	*	*	*	*
Elapsed Time	Weight Remaining	CO	CO2	O2	Flue Gas	Room Temp	Tunnel Dry Bulb	Unit Top	Unit Back	Unit R.Side	Unit L.Side	Unit Bottom
0	14.05	0.31	13.14	6.93	656.4	78.8	174.0	715.3	562.1	514.0	546.0	453.6
10	11.28	0.21	9.41	10.47	659.3	81.3	175.7	814.0	604.5	537.1	570.4	446.9
20	8.64	0.23	9.59	10.78	600.8	84.5	182.8	793.6	635.8	544.2	598.0	433.3
30	6.81	0.18	9.63	10.15	595.5	85.4	181.9	744.5	660.7	535.2	624.8	423.6
40	5.25	0.19	8.32	11.58	580.5	84.1	157.8	777.3	681.1	578.7	647.5	414.2
50	3.88	0.24	5.49	14.38	548.9	86.1	151.8	740.1	700.4	602.7	652.4	407.8
60	2.37	0.3	5.82	14.3	493.9	85.0	141.1	664.8	705.3	628.8	650.5	405.7
70	1.49	0.62	4.16	15.49	459.3	87.7	133.2	583.0	692.1	618.1	639.2	403.5
80	0.99	0.75	3.81	15.77	437.9	89.4	130.0	546.5	674.5	606.7	627.1	406.0
90	0.60	0.92	3.15	16.35	415.0	88.7	125.3	511.1	648.1	579.8	606.0	405.0
100	0.29	1	2.88	16.57	393.1	84.7	121.8	481.3	620.3	569.0	586.4	403.9
110	0.01	1.05	2.26	17.12	379.1	84.7	119.4	458.2	598.4	557.0	568.1	401.7
120	0.00	1.1	1.59	17.77	378.6	83.9	119.0	457.8	598.2	556.9	567.9	401.9



03/26/12

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 26-08-2011  
 Run: 5  
 Control #: G100456088

448.55	81.12	80.88	85.41	490.06	80.82	80.76	85.87	0.02	0.000	0.00	575.21		
*	*	*	*	*	*	*	*	*	*	*	Visual	Average	Change in
DGM 1	DGM 1	DGM 1	Filter 1	DGM 2	DGM 2	DGM 2	Filter 2	Tunnel	Chimney	Smoke	Stove	Surface	Elapsed
Reading	Inlet T	Outlet T	Temp	Reading	Inlet T	Outlet T	Temp	Velocity	Draft	Observed	Temp	Temp.	Time
442.376	80.0	79.7	88.9	483.865	79.7	79.7	89.5	0.023			558.2	0	0
443.410	80.3	79.9	88.1	484.911	79.9	79.9	88.9	0.023			594.6	36.368	10
444.398	80.6	80.2	86.2	485.908	80.1	80.2	80.6	0.023			601.0	42.784	20
445.395	80.9	80.5	85.3	486.905	80.4	80.4	82.2	0.023			597.7	39.528	30
446.440	80.9	80.6	84.5	487.941	80.5	80.6	86.6	0.023			619.7	61.533	40
447.505	81.0	80.8	83.5	489.010	80.6	80.6	88.4	0.023			620.7	62.472	50
448.545	81.2	81.0	82.4	490.048	81.0	80.9	86.1	0.023			611.0	52.806	60
449.555	81.4	81.2	81.5	491.061	81.2	81.0	83.7	0.023			587.2	28.949	70
450.603	81.5	81.3	85.4	492.093	81.3	81.1	85.6	0.023			572.2	13.953	80
451.652	81.6	81.4	86.3	493.153	81.4	81.3	86.4	0.023			550.0	-8.2094	90
452.710	81.7	81.5	86.1	494.209	81.4	81.3	86.3	0.023			532.2	-26.031	100
453.775	81.7	81.7	86.1	495.270	81.6	81.4	86.0	0.023			516.7	-41.506	110
454.850	81.7	81.6	86.1	496.350	81.6	81.4	86.0	0.023			516.5	-41.678	120

  
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Manufacturer:	SBI								
Model:	XTD 1.9								
Date:	26-08-2011								
Run:	5								
Project #:	G100456088								
Test Duration:	120								
Total Gas Volume (DGM 1):	12.133					Pitot Factor	0.82		
Total Gas Volume (DGM 2):	12.099						(0.99 standard,		
Average Barometric Pressure:	29.835						0.84 or Cal. Factor for S-Type)		
Molecular Weight:	28.56								
Pitot Correction:	0.9616								
Calibration Factor (DGM #1):	1.0000								
Calibration Factor (DGM #2):	0.9960								
	(1) VS:			0.0697					
	(2) VS:			0.0699					
							Filter Face	Filter Face	
DGM 1	DGM 1	DGM 1	DGM 2	DGM 2	DGM 2	Tunnel	Velocity	Velocity	
Reading	Inlet T	Outlet T	Reading	Inlet T	Outlet T	Dry Bulb	DGM 1	DGM 2	
442.376	80.0	79.7	483.865	79.664485	79.691	174.04			
443.410	80.3	79.9	484.911	79.891642	79.912	175.7	8.69	8.75	
444.398	80.6	80.2	485.908	80.119421	80.202	162.81	8.29	8.34	
445.395	80.9	80.5	486.905	80.373522	80.448	161.93	8.37	8.34	
446.440	80.9	80.6	487.941	80.522855	80.561	157.8	8.77	8.66	
447.505	81.0	80.8	489.010	80.64603	80.605	151.82	8.93	8.94	
448.545	81.2	81.0	490.048	80.963026	80.879	141.13	8.72	8.67	
449.555	81.4	81.2	491.061	81.18308	81.011	133.24	8.47	8.46	
450.603	81.5	81.3	492.093	81.259849	81.104	129.96	8.78	8.62	
451.652	81.6	81.4	493.153	81.408024	81.255	125.33	8.79	8.85	
452.710	81.7	81.5	494.209	81.442825	81.323	121.84	8.86	8.81	
453.775	81.7	81.7	495.270	81.596558	81.45	119.4	8.92	8.85	
454.850	81.7	81.6	496.350	81.565239	81.42	119.03	9.00	9.01	

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03/26/12

Proportional Rate Calculations				(EPA Formulas from PR5G)				
Stack area (ft2):		0.3491		Manufacturer: SBI				
Wood moisture (% wet):		16.248		Model: XTD 1.9				
Load Weight (lbs wet):		14.05		Date: 26-08-2011				
Burn Rate (Dry kg/hr):		2.669		Run: 5				
Final Temperature (DGM #1) Degrees Rankin:				541.000				
Final Temperature (DGM #2) Degrees Rankin:				540.788				
Final Tunnel Temperature Degrees Rankin:				604.156				
Final Tunnel Velocity (feet per second):				8.513885				
Standardized Tunnel Flow (dscfm):				149.12				
		Average Inlet + Outlet	Average Inlet + Outlet					
				99.75	99.75	#1 dDGM	#2 dDGM	
Tunnel Velocity	Tunnel Velocity	Temp. Meter 1	Temp. Meter 2			Vol.Std. (ft3)	Vol.Std. (ft3)	Time
Delta-P	Ft/Sec	Deg. R	Deg. R	PR1	PR2			
0.023	8.723	539.9	539.7					0
0.023	8.735	540.1	539.9	102.21	103.30	1.008	1.016	10
0.023	8.645	540.4	540.2	96.61	97.41	0.962	0.968	20
0.023	8.639	540.7	540.4	97.37	97.30	0.970	0.967	30
0.023	8.611	540.8	540.5	101.70	100.74	1.017	1.005	40
0.023	8.569	540.9	540.6	103.12	103.43	1.036	1.036	50
0.023	8.494	541.1	540.9	99.78	99.50	1.012	1.006	60
0.023	8.438	541.3	541.1	96.23	96.43	0.982	0.981	70
0.023	8.414	541.4	541.2	99.56	97.95	1.019	1.000	80
0.023	8.381	541.5	541.3	99.24	100.19	1.019	1.026	90
0.023	8.356	541.6	541.4	99.77	99.50	1.028	1.022	100
0.023	8.339	541.7	541.5	100.21	99.74	1.035	1.027	110
0.023	8.336	541.7	541.5	101.13	101.50	1.045	1.045	120

*[Signature]*  
03/26/12

Intertek Testing Services

## SFBA EPA ADJUSTED EMISSION RESULTS

Manufacturer: SBI  
 Model: XTD 1.9  
 Date: 26-08-2011  
 Run: 5  
 Project #: G100456088  
 Test Duration (Minutes): 120  
 Test Duration (Hours): 2.00

## RESULTS

Average Adjusted Emissions Rate:	2.87
Average Unadjusted Emission Rate	1.73
Burn Rate (Dry kg/hr):	2.87

## BAROMETRIC PRESSURE

Average: 29.835  
 Start: 29.97  
 End: 29.7

## TEMPERATURE FACTORS

DGM #1: 0.9760  
 DGM #2: 0.9764

## DRY GAS METER VALUES

## VOLUMES SAMPLED

DGM #1: 12.140  
 DGM #2: 12.107

DGM #1 Final: 454.85  
 Initial: 442.376

DGM #2 Final: 496.35  
 Initial: 483.865

TOTAL TUNNEL VOLUME (scf):

17894

## SAMPLE RATIOS

Sample Train 1: 1474.0  
 Sample Train 2: 1478.1

## TEMPERATURES (DEG. RANKIN)

DGM #1: 541.00  
 DGM #2: 540.79

## TOTAL EMISSIONS

Sample Train 1 (g): 3.54  
 Sample Train 2 (g): 3.40  
 Ave: 3.47

## CALIBRATION FACTORS

DGM #1: 1.000  
 DGM #2: 0.996

## EMISSION RATES

Sample Train 1 (g/hr): 1.77  
 Sample Train 2 (g/hr): 1.70  
 Ave: 1.73

TUNNEL FLOW RATE: 149.1

## PARTICULATE CATCH (mg)

## Sample Train 1:

Filters: 1.8  
 Probe: 0.6  
 Total: 2.4

## ADJUSTED EMISSION RATES

Sample Train 1 (g/hr): 2.92  
 Sample Train 2 (g/hr): 2.83  
 Ave: 2.87

## Sample Train 2:

Filters: 1.9  
 Probe: 0.4  
 Total: 2.3

DEVIATION: 1.65%

If deviation is greater than 7.5% due to low particulate catch  
 The two emission rates shall not differ by 7.5%  
 of the weighted average emission rate limit (4.1 or 7.5) (5g-3)


Use the following:

Catalytic units 2.32%  
 7.5% of 4.1 g/hr

Non catalytic units 1.27%  
 7.5% of 7.5 g/hr


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REPORT DATA							
Client:		SBI					
Run:		5					
Date:		26-08-2011					
Project:		G100456088					
Model:		XTD 1.9					
Fuel Moisture (Dry):		19.4					
Stack Static (neg):		0.075					
Barometer:		29.835					
Average Room Temp:		84.79					
Change in stove temp:		0					
Burn Rate:		2.669					
Adjusted Emission Rate:		2.874					
System 1:		2.922					
System 2:		2.827					
Deviation:		1.65%					
Filter 1:		85.41					
Filter 2:		85.87					
Tunnel:		144.16					
DGM 1:		81.00					
DGM 2:		80.79					
Water Collected:							
Room Temp		Bar Pressure		Relative Humidity		Air Velocity	
Before	After	Before	After	Before	After	Before	After
87	87	29.97	29.70	23	23	0	0

  
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Manufacturer SBI  
Model XTD 1.9  
Project G100456088

Flue	Room	Tunnel	Unit	Unit	Unit	Unit	Unit	Scale
Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom	weight
512.93	73.55	183.08	320.54	124.12	147.54	119.78	70.18	14.56
664.48	74.46	176.21	671.06	219.64	221.18	204.59	108.24	11.38
694.47	82.97	182.70	819.07	184.36	350.31	316.80	181.11	8.23
602.06	88.56	160.17	769.42	322.71	497.90	424.33	278.21	5.98
541.43	89.48	147.53	701.57	480.67	568.46	497.13	355.82	4.53
532.83	87.49	145.68	686.40	534.40	600.31	547.82	413.36	3.18
445.13	88.34	188.96	590.11	586.29	576.50	563.51	439.80	4.77
457.34	79.43	133.83	564.30	589.27	556.16	551.67	444.24	3.76
439.63	81.31	128.86	538.24	584.95	540.92	543.57	447.41	2.98

  
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VERSION 1.2

2/5/2010

## E&E Tunnel Traverse Worksheet

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT	Static Pressure:
A CENTER	0.022	161	0.1483	<b>PITOT CONSTANT</b> 0.9616
B CENTER	0.023	162	0.1500	
A1	0.020	160	0.1414	
A2	0.023	160	0.1500	
A3	0.023	160	0.1500	
A4	0.018	157	0.1323	
B1	0.020	160	0.1414	
B2	0.023	160	0.1500	
B3	0.023	160	0.1500	
B4	0.018	157	0.1323	
AVERAGE	0.02095	159.94	0.1434	

Tunnel Diameter (in):   
Tunnel Area (ft2) 0.349066  
Tunnel Static Pressure

  
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Manufacturer SBI  
Model XTD 1.9  
Project G100456088

## E&E FUEL LOAD DATA SHEET

Test Load Weight:  
Lower Ideal Upper  
Firebox Volume:  cu. ft     
Load Volume:  cu. ft Loading Density: 6.145 lbs./ft3  
Number of Spacers:  Load Density: 201.984 lbs./ft3  
VERSION 1.2 2/5/2010

Piece Size:			Weight lbs	Meter Moisture Content		
Thick x	Wide x	Length		Dry Uncorrected %		
2	4	12	1.2	20.2	20	20.3
2	4	12	1.25	21.2	20.8	21.3
2	4	12	1.25	21.1	19.7	21.4
2	4	12	1.3	21.4	20.3	21.2
2	4	16	1.65	21.3	19.8	21.6
2	4	16	1.65	20.30	19.50	21.30
2	4	16	1.65	22.00	21.20	20.00
2	4	16	1.60	22.10	19.90	21.40
2	4	16	1.60	22.00	19.30	21.20

Test Load Weight  lbs.

Dry Weight  kg.

### Average Pretest Moisture Content: %

Dry:

two pin: (dry)

Wet:

*Handwritten signature*  
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Manufacturer SBI  
Model XTD 1.9  
Project G100456088

VERSION 1.2

2/5/2010

## E&E FUEL LOAD DATA SHEET

Test Load Weight:  
Lower Ideal Upper  
Firebox Volume:  cu. ft     
Load Volume:  cu. ft Loading Density: 6.596 lbs./ft3  
Number of Spacers:  Load Density: #DIV/0! lbs./ft3

Thick	Piece Size:			Weight lbs	Meter Moisture Content		
	x	Wide	x Length		Dry Uncorrected %		
2		4	15.75	1.45	19.20	19.90	19.00
2		4	15.75	1.55	19.30	19.50	19.00
2		4	15.75	1.65	19.10	19.20	19.20
4		4	15.75	3.65	19.50	21.10	18.60
4		4	15.75	3.35	19.70	19.50	19.20
			Spacers	2.40			

Test Load Weight  lbs.

Dry Weight  kg.

Average Moisture Content: %

Dry:

Wet:

Pre-test moisture content: %

Wet:

Coal Bed Range:  lbs. to  lbs. 20% to 25% of test load

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03/26/12