

TEST REPORT

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

MODEL: BIS PANORAMA

Client: SECURITY CHIMNEYS INTERNATIONAL LTD.
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Attention: Mr. Eric Dufour

TESTED BY:
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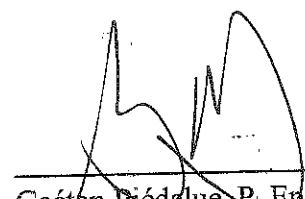
TEST DATES: From July 26th to August 3rd, 2000
REPORT DATE: October 17th, 2000
Project number: 192-5233

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1.0 INTRODUCTION

1.1 GENERAL

From July 26th to August 3rd, 2000, ITS, Lachine, Québec, conducted tests on the BIS PANORAMA catalytic stove from Security Chimneys International, to determine compliance with U.S. EPA emissions regulations.

As per your letter dated April 12, 2001, this program, except the first run, had been cancelled because the manufacturer had been involved in the test load charge insertion in the unit.

This revised test report includes the new runs performed from April 23rd, 2001 to April 26th, 2001 and June 6th, 2001.

Tests were conducted by Claude Paré and Gaétan Piédalue. The tests were conducted at the ITS laboratory located at 1829, 32nd Avenue, Lachine, Québec. The laboratory elevation is 860 feet above sea level. Tests were conducted to EPA Method 28 and 5G-3 criteria, February 1988.

1.2. TEST UNIT DESCRIPTION

"BIS VISION" is the name of the product written on the test data sheet, however, the product name has been changed to "BIS PANORAMA". The BIS PANORAMA is a catalytic unit having air combustion intakes located at the bottom of the unit with its controls located on the left hand side of the unit. It was delivered for testing with a fan device.

1.3. RESULTS

The unit as tested produced a weighted average emissions rate of 4.1 grams/hour and did not exceed any of the emission rate caps specified in the EPA regulations. The unit thus meets EPA certification requirements for 1990.

1.4. PRETEST INFORMATION

The test unit was received at ITS in Lachine, Québec on July 10th via there own transport. The unit was inspected upon receipt and found to be in good condition. The unit was set up following the manufacturer's instructions.

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Following assembly, the unit was placed on the test stand and the instrumented thermocouples were hooked up to our logging system. Prior to emission testing, a fifty (50) hours break-in period was then performed during which the unit was set to operate at high to medium burn rate. During the break-in period, the unit was found to operate satisfactory.

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

On April 20th, 2001, the unit was set-up for testing.

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1.5. REPORT ORGANIZATION

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

2.0 SUMMARY OF TEST RESULTS

2.1 EMISSIONS

Run Number	Test Date	Burn Rate (kg/hr)	Adjusted Emission Rate (g/hr)	Heating Efficiency (% Overall)
1R	23/04/01	1.565	3.979	n/a
2R	23/04/01	2.581	4.108	n/a
3R	25/04/01	0.791	5.010	n/a
4R	26/04/01	1.152	3.239	n/a
5R	06/06/01	1.368	3.894	n/a

2.2. WEIGHTED AVERAGE CALCULATION

Run Number	Burn Rate	Adjusted Emission Rate g/hr	(OHE)	Output (BTU/hr)	Prob	(K) Weighing Factor
2R	0.791	5.010	n/a	10900.61	.2137	.4924
3R	1.152	3.239	n/a	15875.48	.4924	.4551
5R	1.368	3.894	n/a	18852.13	.6688	.4781
1R	2.581	4.108	n/a	35568.24	.9705	.3312
					Sum:	1.7568

Weighted Average Emissions Rate: 4.0775 g/hr

2.3 TEST FACILITY CONDITIONS

Run Number	Room Temperature		Barometric pressure		Relative humidity		Air Velocity	
	Before (F)	After (F)	Before (in.Hg)	After (in.Hg)	Before (%)	After (%)	Before (ft/min)	After (ft/min)
1R	78	87	30.15	29.97	32	30	0	0
2R	82	79	29.86	29.65	30	33	0	0
3R	78	80	30.25	30.20	30	30	0	0
4R	78	80	30.26	30.06	28	29	0	0
5R	79	83	29.94	29.94	43	41	0	0

2.4 FUEL QUALITIES

Run Number	Pre-test load			Test load					
	Loading Weight Wet Basis (lbs)	Moisture Content Dry basis (%)	Coal bed Weight (lbs)	Weight Wet basis (lbs)	Density Wet Basis (lbs/ft ³)	Moisture Content Dry basis (%)	Piece Length (in.)	Number of 2 x 4's	Number Of 4 x 4's
1R	22.10	23.4	4.00	18.30	36.52	20.6	15.81	4	2
2R	21.90	22.5	4.15	18.10	35.56	19.8	16.19	4	2
3R	21.50	20.6	4.15	18.50	39.75	21.4	15.06	4	2
4R	22.00	23.1	3.65	18.20	40.97	21.6	14.38	4	2
5R	20.90	22.6	3.85	18.75	39.85	20.4	14.94	4	2

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

Average dilution tunnel Measurements				Sample Data			
Run Number	Burn Time (Min)	Volumetric Flow Rate (dscf/min)	Total Temperatures (°R)	Volume sampled (DSCF)		Particulate catch (mg)	
				1	2	1	2
1R	160	149.63	625.18	19.93	20.44	5.6	6.4
2R	520	145.53	565.87	70.19	70.45	24.9	29.7
3R	360	147.86	582.43	49.61	49.62	10.9	11.5
4R	340	150.95	586.37	45.47	46.12	8.9	10.5
5R	310	143.30	597.75	42.09	42.16	11.8	12.7

2.6 DILUTION TUNNEL DUAL TRAIN PRECISION

Run Number	Sample Ratio		Total Emission (g)		
	Train 1	Train 2	Train 1	Train 2	% Deviation
1R	1201.37	1171.45	6.73	7.50	2.25
2R	1078.18	1074.15	26.85	31.90	3.57
3R	1073.02	1072.84	11.70	12.34	1.11
4R	1128.62	1112.73	10.05	11.68	3.13
5R	1055.44	1053.83	12.45	13.38	1.49

2.7 GENERAL SUMMARY OF RESULTS

Run Number	Burn Rate (kg/hr)	Average Surface Temperature (F)	Change in surface Temperature (F)	Initial Draft (in. H ² O)	Primary Air Setting	Run Time (min)
1R	2.581	393.55	17.00	0.075	Fully opened	160
2R	0.791	263.76	-57.40	0.045	Fully closed with residual (fixed) air intake at 0.200 in.	520
3R	1.152	292.92	-33.20	0.060	Opened with pin gauge 0.200"	360
4R	1.198	322.17	-18.60	0.055	Opened with pin gauge 0.200"	340
5R	1.368	343.42	-29.20	0.058	Opened with pin gauge 0.500"	310

3.0 PROCESS DESCRIPTION

3.1 DISCUSSION

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

3.2 UNIT DIMENSIONS

Catalyst

Location: Below the flue exit

Dimensions: 15¾" x 11¾" x 3 3/8"

Material: Stainless steel

Bypass mechanism: description, drawing no. 2073

Bricks

Location: Floor: all over (1¼" thick)

Sides: all over (1¼" thick)

Back: all over up to the catalyst (1¼" thick)

Flue gas exit

Location: Top of unit, centerline 9½" from back and 16¾" from sides
Dimensions: 7" diameter, 0.027" thick
Material: Stainless steel

Gasket

Location: Door frame: around the door.
Glass: between the glass and the main door frame to seal the glass
Dimensions: 5/8" diameter (door), 5/16" diameter (glass)
Material: Glass fiber (door frame: TXP020 graphite; glass: TXP050 graphite)

Overall unit dimension

45½" high, 30 1/8" to 38" wide, 23½" deep

Firebox

Dimensions: 13 1/8" deep x 17¾" to 20" wide x 19¾" high
Usable volume: 2.87 cubic feet

3.3 AIR SUPPLY SYSTEM

The air supply system is made with three different air channels, one of them being a main adjustable air intake located at the left side of the unit. Two secondary air intakes are present to feed the combustion chamber.

The following table shows the inlet and outlet sections of each system. The air introduction system number is referred on a set of drawings in Appendix E.

AIR INTRODUCTION SYSTEM		INLET (I) sq. in.			OUTLET (sq. in.)
Identification	Type	I _{min}	I _{max}	Controlled	
A	Secondary	---	0.64	No	0.67
B	Secondary	---	0.17	No	0.43
C	Main	0.03	6.61	Yes	4.91

Legend:

Identification: Tag name referred on drawings in Appendix E, section airflow pattern

Type: Characterisation of air intake

I_{min}: Minimum air intake of a particular air channel

I_{max}: Maximum air intake of a particular air channel

Controlled: Determines if a provision for air control is present

Outlet: Total air outlet of a particular air channel

NOTE: Surfaces are expressed in sq. inches

3.4 OPERATION DURING TEST

Run #1R:

This run lasted 160 minutes. It was performed on April 23rd, 2001.
The burn rate achieved is a Category 4 with 2.581 kg/hr.

Refer to the front page of test run data #1R in Appendix A for the detailed test sequence.

Run #2R:

This run lasted 520 minutes. It was performed on April 23rd, 2001.
The burn rate achieved is a Category 1 with 0.791 kg/hr.

Refer to the front page of test run data #2R in Appendix A for the detailed test sequence.

Run #3R:

This run lasted 360 minutes. It was performed on April 25th, 2001.
The burn rate achieved is a Category 2 with 1.152 kg/hr.
It was performed for the confirmation fan test.

Refer to the front page of test run data #3R in Appendix A for the detailed test sequence.

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Run #4R:

This run lasted 340 minutes. It was performed on April 26th, 2001.
The burn rate achieved is a Category 2 with 1.198 kg/hr.

Refer to the front page of test run data #4R in Appendix A for the detailed test sequence.

Run #5R:

This run lasted 310 minutes. It was performed on June 6th, 2001.
The burn rate achieved is a Category 3 with 1.368 kg/hr.

Refer to the front page of test run data #5R in Appendix A for the detailed test sequence.

3.5 START-UP OPERATION

1 Loading preparation

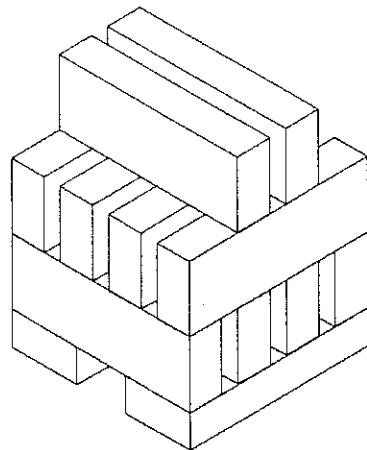
1.1 Lighting procedure (kindling):

- Place 12 crumpled up balls of newspaper (approx. 3" dia.) in 3 rows so as to cover the whole surface of the firebox.
- Add small pieces of kindling, until you reach **4.5 lbs.**

1.2 Pre-test fuel charge:

- Cut two 2 x 4 lumber in twelve pieces of **11"** long (do not chop the wood).
- The weight of the pre-test has to be about **22.00 lbs.** Add another piece of 2 x 4 lumber if necessary in order to reach the desired weight.
- The pre-load of wood must be arranged according to the lay-out shown below:

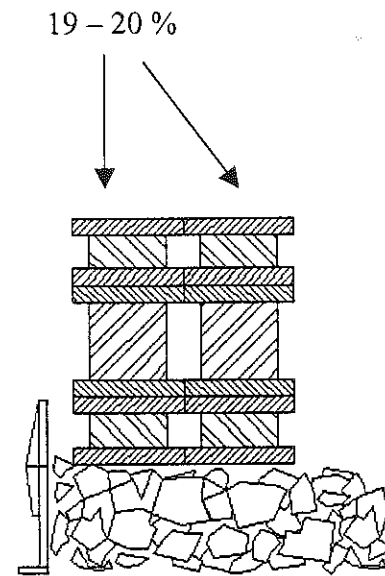
Figure 1



1.3 Test fuel charge :

- The load of wood should weigh **about 18.10 lbs** including the weight of the spacers. Cut the pieces of wood so that the weight meets the requirements (18.10 lbs is the minimum weight for a 2.87 cu_ft volume).
- The test fuel charge consist of **4 pieces of 1.5 x 1.5 and 2 pieces of 1.5 x 3.5** cut to a length of **between 15 inches and 17 inches**. The logs have to be long enough to weigh about **18.10 lbs** and respect the moisture content shown in figure 2 .
- When loading the fireplace for testing, the wood must be arranged as shown below:

Figure 2



2 Minimum burn rate testing procedure (Burn rate under 1 kg/hr)

2.1 Lighting procedure (kindling)

- Follow the lighting procedure as described in section 1.1 of this document.
- Set the combustion air control and the by-pass wide open.
- Light the newspaper and leave the door half opened until the fire is well established, then close the door. As you light the fire, start the timer.

Note: - It might be necessary to reopen the door if the wood does not ignite well.

- At 1.8 lb, open the door, and spread the embers evenly, using a poker. Then, add the pre-load of wood and arrange it as shown on *figure 1*.

2.2 Pre-testing

- Wait the 15 minutes mark before closing the door.
- Wait the 30 minutes mark before closing the by-pass.
- At 11 lbs close the combustion air control half way.
- At 7 lbs set the combustion air control at the minimum opening.
- Let the pre-load burn for 1 hour or until it reaches the Target weight (Between 25% and 20% of the test load).

Note : - If the fire goes out while pre testing, open the door to relight the load.

2.3 Testing

- At Target :
 - Open the combustion air control and by-pass fully and then open the door.
 - Pack down the embers in order to get them parallel to the bottom of the firebox (place all the embers behind the andirons before loading the unit).
 - Place the load of wood in the firebox as shown on *figure 2*.
 - Begin testing : Start the chronometer and begin to collect the particles
 - Check the space between the embers and the load of wood. If the space is not large enough, move the embers using a poker.
 - Keep the door opened until the wood is ignited (about two minute) and then close the door.
 - Keep the by-pass opened for the first 4 minutes.
 - Keep the air control open for 5 minutes (after beginning the test), then, close the control completely.

3 Testing procedure category # 2 (Burn rate between 0.80 and 1.25 kg/hr)

Perform another minimum burn rate Test.

4 Testing procedure category # 3 (Burn rate between 1.25 and 1.80 kg/hr)

4.1 Lighting procedure (kindling)

- Follow the lighting procedure as described in section 1.1 of this document.
- Set the combustion air control and the by-pass wide open.
- Light the newspaper and leave the door half opened until the fire is well lit, then close the door. As you light the fire, start the timer.

Note: - It might be necessary to re-open the door if the wood does not ignite well.

- At 1.8 lb, open the door, and spread the embers evenly, using a poker. Then, add the pre-load of wood and arrange it as shown on *figure 1*.

4.2 Pre-testing

- Wait the 15 minutes mark before closing the door.
- Wait the 30 minutes mark before closing the by-pass.
- At 10.5 lbs close the control until you get a 0.500" opening. (Use the appropriate pin gauge).
- Let the pre-load burn for 1 hour or until it reaches the Target weight (Between 25% and 20% of the test load)

Note : - If the fire goes out while pre testing, open the door to relight the load.

4.3 Testing

- At Target :
 - Open the combustion air control and by-pass fully and open the door.
 - Pack down the embers in order to get them parallel to the bottom of the firebox (place all the embers behind the andirons before loading the unit).
 - Place the load of wood in the firebox as shown on *figure 2*.
 - Begin testing : Start the chronometer and begin to collect the particles
 - Check the space between the embers and the load of wood. If the space is not large enough, move the embers using a poker.

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- Keep the door open until the wood is ignited (about 2 minutes) and then close the door.
- Keep the by-pass opened for the first 4 minutes.
- Keep the air control open for 5 minutes (after beginning the test), then, close the control until you get a *0.500"* opening. (Use the appropriate pin gauge).

5 Maximum burn rate testing procedure (Burn rate > 1.80 kg/hr)

5.1 Lighting procedure (kindling)

- Follow the lighting procedure as described in section 1.1 of this document.
- Set the combustion air control and by-pass wide open.
- Light the newspaper and leave the door half opened until the fire is well established, then close the door. As you light the fire, start the timer.

Note: - It might be necessary to reopen the door if the wood does not ignite well.

- At 1.8 lb, open the door, and spread the embers evenly, using a poker. Then, add the pre-load of wood and arrange it as shown on *figure 1*.

5.2 Pre-testing

- Wait the 15 minutes mark before closing the door.
- Wait the 30 minutes mark before closing the by-pass.
- Let the pre-load burn (with the air control fully open) until it reaches the Target weight (Between 25% and 20% of the test load)

5.3 Testing

- At Target :
 - Open the combustion air control and by-pass fully and open the door.
 - Pack down the embers in order to get them parallel to the bottom of the firebox (place all the embers behind the andirons before loading the unit).
 - Place the load of wood in the firebox as shown on *figure 2*.

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- Begin testing : Start the chronometer and begin to collect the particles
- Check the space between the embers and the load of wood. If the space is not large enough, move the embers using a poker.
- Keep the door opened until the wood is ignited (about 2 minutes) and then close the door.
- Keep the by-pass opened for 4 minutes.
- Keep the air control fully open until the test is completed.

4.0 SAMPLING SYSTEMS

4.1 SAMPLING LOCATIONS

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

4.2 DRAWINGS

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

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4.3 EMISSIONS/EFFICIENCY TESTING EQUIPMENT LIST

ITEM DESCRIPTION	WH #	MANUFACTURER	MODEL	SERIAL #
1. CO, CO ₂ & O ₂ Analyzer	180-169	NOVA	7800CP3A	3819
2. Dry Gas Meter 1	180-175	American Meter Co. Ltd	DTM-200A	96X547016
3. Dry Gas Meter 2	180-176	American Meter Co. Ltd	DTM-200A	96X547017
4. Rotameter (1)	180-092	Omega	FL3839ST	064605
5. Rotameter (2)	180-131	Omega	FL3839ST	092489
6. Hot Wire Anemometer	180-222	Omega	HHf51	3436211
7. Inclined Manometer	180-139	Dwyer	125-AV	---
8. Pitot Tube	180-184	---	1605-18	---
9. Pressure gages (2)	180-250 / 180-251	Basco	0-15 PSI	---
10. Vacuum gages (2)	180-252 / 180-253	Basco	-30 - 0 in. Hg	---
11. Draft Indicator	180-156	Dwyer	2000-00	W42F
12. Scale, 1000lbs Cap./Record.	180-130	Papp	30" x 30"	---
13. Readout for 1000lbs Scale	180-129	Papp	UMC600AAAC	L6990
14. Scale, 8 kgs Capacity	180-083	Mettler	PC8000	826741
15. Analytical Balance	180-170	Ohaus	AP310S-0	1114501141
16. Diaphragm Pumps (2)	180-125	Barnant	400-1901	L94001630
	180-126	Barnant	400-1901	L94001743
17. Gases; Calibration, Zero, Span	---	Matheson	---	---
18. Moisture Meter	180-219	Delmhorst	J2000	14740
19. Humidity Chamber	180-160	Shop Built	---	---
20. Dilution Tunnel	180-142	Shop Built	---	---
21. Reference Dry Gas Meter	180-221	American Meter	DTM-200A	98Y990002
22. Spirometer	180-161	Shop built	---	---
23. Data Acquisition System	180-004	Fluke	2240-B	985022
24. Drying Oven	180-159	Quincy Lab. Inc.	21-350	9502106
25. Filter Holders, 47 mm (8)	180-157 & 180-158	Millipore	SX0004700	---
26. Type J T/C Plugs	---	Gordon	HMP	---
27. Sling Psychrometer	180-220	Omega	RHSP	A4Q
28. Dessicator cabinet	---	Nalgene	5317-0180	---
29. Exhaust blower	180-141	---	---	---
30. Drying columns	180-143	W.A. Hammond	---	---
	180-144	Drierite Co.	26800	---
31. Impinger train	180-140	Shop Built	---	---

Prepared June 1st, 2000 by Gaétan Piédalue

5.0 SAMPLING METHODS

5.1 PARTICULATE SAMPLING

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

6.0 QUALITY ASSURANCE

6.1 INSTRUMENT CALIBRATION

6.1.1 Dry Gas Meters

At the conclusion of each test program the dry gas meters are verified using the reference dry gas meter. This process involves sampling the train operation for 1 cubic foot of volume. With readings made to .001 ft³, the resolution is .1%, giving an accuracy higher than the $\pm 2\%$ required by the standard.

6.1.2 Stack Sample Rotameter

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

6.1.3 Gas Analyzers

The continuous analyzers are zeroed and spanned before each test with NBS traceable gases. A mid-scale multi-component calibration gas is then analyzed (values are recorded). At the conclusion of a test, the instruments are checked again 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 and 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.

6.2 TEST METHOD PROCEDURES

6.2.1 Leak Check Procedures

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

6.2.2 Tunnel Velocity/Flow Measurement

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

Pitot tubes are cleaned before each test and leak checks are conducted after each test.

6.2.3 Pm Sampling Proportionality (5g-3)

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

APPENDIX A
Data and Calculation Forms

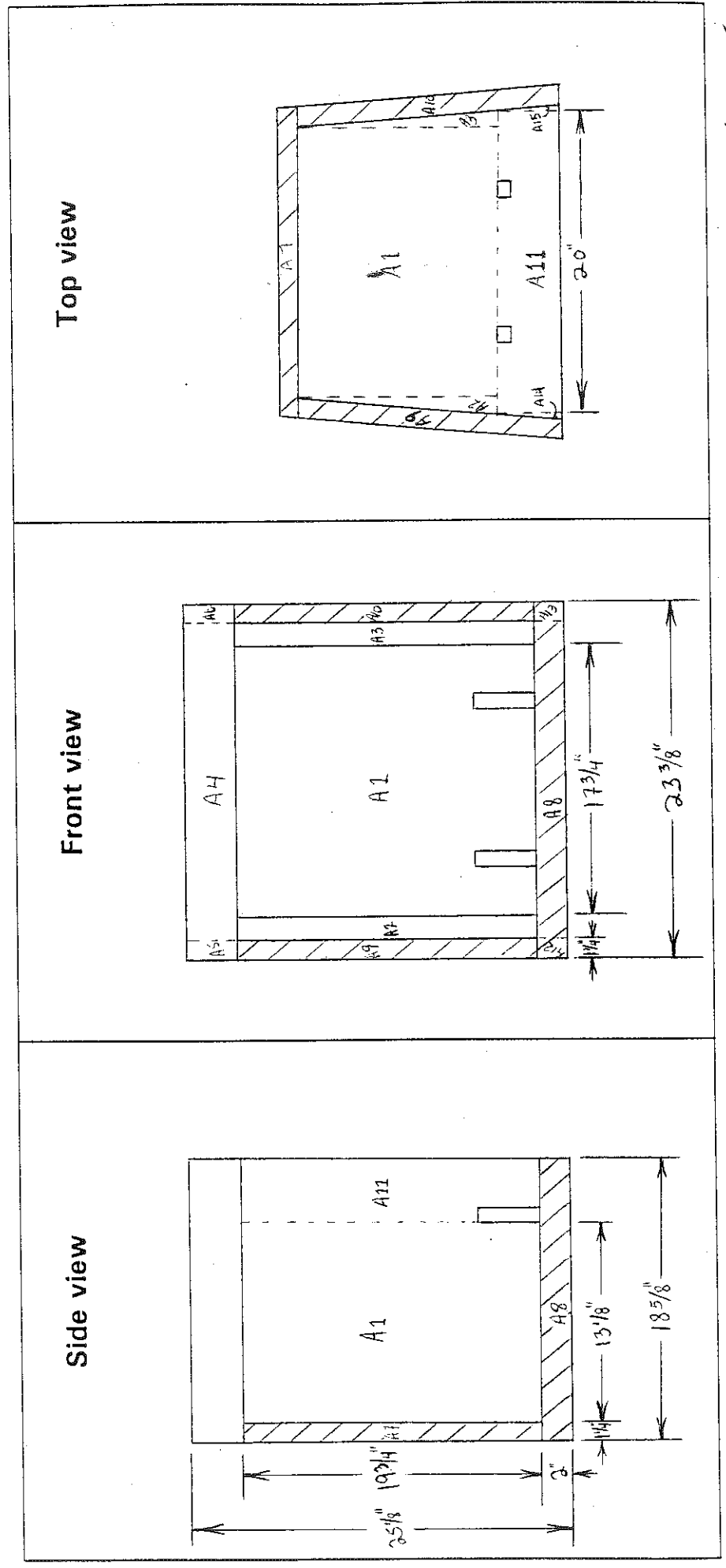
							Type of	
							Stove:	1
					Weighted Average		1=cat	
							2=noncat	
							3=pellet	
		(E)						
		Ave.		Heat		(K)		
	Burn	Emission		Output		Weighting		
Test No.	Rate	Rate g/hr	(OHE)	(BTU/HR)	Prob.	Factor	(KxE)	KxOHE
1	0.791	5.010		10900.61	0.2137	0.4924	2.4669	0.00
2	1.152	3.239		15875.48	0.4924	0.4551	1.4739	0.00
3	1.368	3.894		18852.13	0.6688	0.4781	1.8616	0.00
4	2.581	4.108		35568.24	0.9705	0.3312	1.3607	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
				0.00	1.0000	0.0000	0.0000	0.00
4				0.00				
						1.75678	7.1632	0.00
Weighted average emissions rate:							4.0775	
	Weighted Average OHE						0.00	



Intertek Testing Services

Date: 2000-10-17
Manufacturer: CHEMINÉE SÉCURITÉ
Project no.: 192-S233

Model: BIS VISION
Tech.: CLAUDE PAKÉ



ITS Intertek Testing Services

Date: 2000-10-17

page 2 of 5

Manufacturer: CHEMINÉE SÉCURITÉ

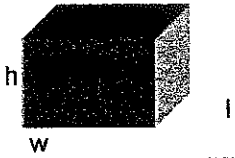
Model: BIS VISION

Project no.: 192-S233

Tech.: CLAUDE PARÉ

Addition ☒

Subtraction ☐

Volume: A1 	l: 13.125 in. w: 17.750 in. h: 19.750 in.	l*w*h 4601.133 in.cu.
Volume: A2 + A3 	l: 13.125 in. w: 1.125 in. h: 19.750 in.	l*w*h/2 145.8105 in.cu. 291.6211 in.cu.
Volume Total:	A1+A2+A3 V.T. in.cu. 4892.754	A1+A2+A3 V.T. cu.f. 2.831455

[Handwritten signature]

Date: 2000-10-17 page 3 of 5

Manufacturer: CHEMINÉE SÉCURITÉ Model: BIS VISION

Project no.: 192-5233 Tech.: CLAUDE PARÉ

Addition ☐

Substraction ☒

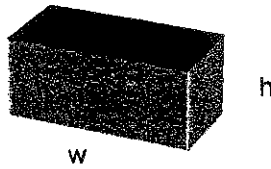
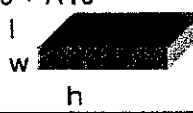
Volume: Atotal 1 	l: 18.625 in. w: 20.250 in. h: 25.125 in.	l*w*h 9476.051 in.cu.
Volume: Atotal 2 	l: 18.625 in. w: 1.5625 in. h: 25.125 in.	l*w*h/2 365.5884 in.cu. 731.1768 in.cu. A.T. 10207.23
Volume A4 	l: 14.375 in. w: 20.25 in. h: 3.375 in.	l*w*h 982.4414 in.cu.
Volume: A5 + A6 	l: 14.375 in. w: 1.1875 in. h: 3.375 in.	l*w*h/2 28.80615 in. cu. 57.6123
Volume: A11 	l: 4.125 in. w: 22.625 in. h: 25.125 in.	l*w*h 2344.869 in. cu.
Volume: A14 + A15 	l: 4.125 w: 0.375 h: 25.125	l*w*h/2 19.43262 in. cu. 38.86523 in. cu.

Date: 2000-10-17 page 4 of 5

Manufacturer: CHEMNEE SECURITE Model: BIS VISION

Project no.: 192-5233 Tech.: CLAUDE PARÉ

Addition ☐ Substraction ☒

Volume: A7 	l: 1.25 in. w: 17.75 in. h: 19.75 in.	l*w*h 438.2031 in.cu.
Volume: A8 	l: 13.125 in. w: 20.25 in. h: 2 in.	l*w*h 531.5625 in.cu.
Volume: A12 + A13 	l: 13.125 in. w: 1.1875 in. h: 2 in.	l*w*h/2 15.58594 in.cu. 31.17188 in.cu.
Volume: A9 + A10 	l: 14.375 in. w: 1.25 in. h: 19.75 in.	l*w*h 354.8828 in. cu. 709.7656 in.cu.
Volume:	(ATotal1+Atotal2)-(A4+A5+A6+A11+A14+A15+A7+A8+A12+A13+A9+A10) V.T. in. cu. 5072.737	2.935612

Handwritten signature

Date: 2000-10-17

Manufacturer: CHEMURG SÉCURITÉ

Model: BLS VISION

Project no.: 192-5233

Tech.: CLAUDE PARÉ

	ADDITION		SUBTRACTION	
	ft**3	Volume	ft**3	Volume
V measured	2.83	A1+A2+A3	2.94	
V ashlip	—	—	—	—
%	—	—	—	—
V usable	2.83		2.94	

Usable firebox volume: 2.87

Test load weight: 20.09 Minimum: 18.08 Maximum: 22.10

Deviation: 3.81
(5% max.)

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

RESULTS

Manufacturer:	Chem. Sec.		
Model:	Bis Panorama		
Date:	2001-04-23	AVERAGE ADJUSTED EMISSION RATE:	4.108
Run:	1		
Project #:	192-5233	Burn Rate (Dry kg/hr):	2.581
Test Duration:	160		
(minutes)			

PRESSURE FACTOR	1.00468	BAROMETRIC PRESSURE	
		Average:	30.06
TEMPERATURE FACTORS		Start:	30.15
		End:	29.97
DGM #1:	0.98356		
DGM #2:	0.98383		
		DRY GAS METER VALUES	
VOLUMES SAMPLED		DGM #1	Final: 662.329
			Initial: 642.041
DGM #1:	19.92762		
DGM #2:	20.43676		
		DGM #2	Final: 977.923
			Initial: 957.309
TOTAL TUNNEL VOLUME (scf):	23940.538		
SAMPLE RATIOS		TEMPERATURES (DEG. RANKIN)	
Sample Train 1:	1201.375	DGM #1:	536.824
Sample Train 2:	1171.445	DGM #2:	536.676
TOTAL EMISSIONS		CALIBRATION FACTORS	
Sample Train 1 (g):	6.7277	DGM #1:	0.9940
Sample Train 2 (g):	7.4972	DGM #2:	1.0030
EMISSION RATES		TUNNEL FLOW RATE:	149.628
Sample Train 1 (g/hr):	2.5229		
Sample Train 2 (g/hr):	2.8115	PARTICULATE CATCH (mg)	
		Sample Train	5.6000
ADJUSTED EMISSION RATES		Sample Train	6.4000
Sample Train 1 (g/hr):	3.9233		
Sample Train 2 (g/hr):	4.2923		
DEVIATION:	2.25%		



Intertek Testing Services

Date: 2001-04-23

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 1

Tech: CLAUDE PARÉ

COMMENTS

00:00 START FIRE WITH KINDLING

00:06 CLOSE THE DOOR

00:15 OPEN THE DOOR, STIR THE FIRE

00:17 ADD PRETEST LOAD

00:25 CLOSE THE DOOR

00:28 OPEN THE DOOR

00:33 CLOSE THE DOOR

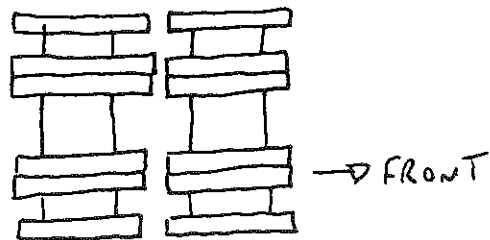
00:47 CLOSE THE BYPASS

01:57 POKÉ THE PIRE, ADD TEST LOAD

01:59 CLOSE THE DOOR

02:01 CLOSE THE BYPASS

TEST LOAD CONFIGURATION



ITS Intertek Testing Services

Date: 2001-04-23

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 1

Tech: CLAUDE PARÉ

Moisture Meter Calibration Check:

Pre/Post Checks		
Time: <u>—</u>	12: <u>—</u>	22: <u>—</u>

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity.....	<u>< 50</u> fpm	<u>< 50</u> fpm
Smoke Capture Check.....	<u>OK</u>	<u>OK</u>

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....	<u>2001-04-20</u>	
Date Dilution Tunnel Cleaned.....	<u>2001-04-20</u>	
Induced Draft Check.....	<u>< 0.005</u>	<u>OK</u>
Tunnel Velocity.....	<u>OK</u>	
Flow Rate 140 cfm $\pm$ 10%.		<u>149.63</u>

Pitot Leak Check:

Side A.....	<u>OK</u>	<u>OK</u>
Side B.....	<u>OK</u>	<u>OK</u>

Temperature System:

Ambient (65° - 90°F).....	<u>87.24</u> °F
Wood Heater Surface ($\pm$ 125°F).....	<u>17.0</u> °F

Proportional Checks:

CO Analyzer Drift Check.....	<u>—</u>
CO ₂ Analyzer Check.....	<u>—</u>
O ₂ Analyzer Check.....	<u>—</u>
Thermocouple check.....	<u>OK</u>

Sampling Train ID Numbers:

	Train 1	Train 2
Probe.....	<u>1</u>	<u>3</u>
Filter Front.....	<u>1</u>	<u>3</u>
Filter Back.....	<u>2</u>	<u>4</u>
Filter Thermocouple.....	<u>13</u>	<u>16</u>
Filter 5G-3 (<90°F).....	<u>86</u>	<u>85</u>

Termocouple Identification Number

Flue	1	Room	2
Dilution Tunnel Wet Bulb	4	Unit Top	5
Unit Right Side	7	Unit Left Side	8
Catalyst/Combustion Chamber	10		

Dilution Tunnel Dry Bulb	3
Unit Back	6
Unit Bottom	9

ITS Intertek Testing Services

Date: 2001-04-23Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 1Tech: CLAUDE PARÉ

SAMPLING EQUIPMENT CHECK OUT

Leakage Checks Tunnel Samplers

	SYSTEM 1		SYSTEM 2	
Unplugged Flow Rate = .25cfm	Pre-Test	Post-Test	Pre-Test	Post-Test
Vacuum (inches Hg.)	5	5	5	5
Final 1minute DGM (ft ³)	642.045	662.348	957.311	977.953
Initial 1minute DGM (ft ³)	642.043	662.347	957.307	977.950
Change (C) (ft ³)	0.002	0.001	0.004	0.003
Allowable leakage .04 x Sample rate or .02cfm	0.005	0.005	0.005	0.005
Check OK	OK	OK	OK	OK

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)		
Rotometer Reading (mm)		
Flow Rate (CFM)		
Allowable (.04 x Sample Rate)		
Check OK		


192-n-9904

Date: 2001-04-23Manufacturer: CHÉMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 1Tech: CLAUDE PARÉ

Pre-Test Scale Audit

Scale Type	Audit Weight	Measured Weight
Platform	6.60 lbs, Class F	6.60 lbs
Wood	2.20 lbs, Class F	2.20 lbs
Analytical	0.1000 mg, Class S	0.1000 mg

Post-Test Scale Audit

Scale Type	Audit Weight	Measured Weight
Platform	lbs, Class F	lbs
Wood	lbs, Class F	lbs
Analytical	mg, Class S	mg

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mgPLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%WOOD SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%

ITS Intertek Testing Services

Date: 2001-04-23

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 1

Tech: CLAUDE PARÉ

FUEL DATA
PRE-TEST LOAD

FUEL DESCRIPTION:

FUEL DESCRIPTION:
Kindling weight: 4.45 lbs. Consisting of: DOUGLAS FIR

Fire lit Time: 00:00

Pre-test load weight: 22.10 lbs. Consisting of: 2X4X 11 inches

Time loaded: 00:17

Pre-test moisture content: Corrected Dry: 23.4 % Wet: 19.0 %

Test Air Control Settings: COMPLETELY OPENED Time: 00:00

Test Unit Fan Settings: FAN ON Time: 00:00

TEST LOAD

	Lower Limit	Ideal	Upper Limit
Test Load Weight:	18.08 lbs.	20.09 lbs.	22.10 lbs.
Fire Box Volume:	2.87 ft. ³	Ideal Length:	15 3/4 inches
Load Volume:	0.42 ft. ³	Loading Density:	6.38 lbs/ft ³
Number of Spacers	24 3/4x1 1/2x5	Load Density:	36.52 lbs/ft ³

Piece Size	Weight	Meter	Moisture Content (% dry)*
15 ¹³ / ₁₆ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	1.88 lbs.	19.7 %	20.9 %
15 ¹³ / ₁₆ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	1.92 lbs.	21.0 %	22.1 %
15 ¹³ / ₁₆ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	1.91 lbs.	21.2 %	21.9 %
15 ³ / ₄ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	1.89 lbs.	21.2 %	20.5 %
15 ¹³ / ₁₆ x 3 ¹ / ₂ x 3 ¹ / ₂ in.	3.87 lbs.	18.4 %	20.6 %
15 ³ / ₄ x 3 ¹ / ₂ x 3 ¹ / ₂ in.	3.87 lbs.	20.0 %	20.6 %
x x in.	lbs.	%	%

*uncorrected range = 17.9% to 23.1%

TEST LOAD WEIGHT: 18.31 lbs DRY WEIGHT: 6.89 kg.

AVERAGE MOISTURE CONTENT:

CORRECTED TO TWO PIN: (DRY) 20.6 % (WET) 17.1 %

COAL BED RANGE: 3.66 lbs. to 4.58 lbs. (20% to 25% of test load)

TEST CHARGE:

Time loaded: 01:57 Coal bed weight: 4.00 lbs. Coal bed weight = 21.8 % of test load weight

CHARCOALIZATION: good | - | ~~X~~ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | poor

192-o-9904

Date: 2001-04-23

Manufacturer: CHEMVEE SECURITE

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 1

Tech: CLAUDE PARÉ

DILUTION TUNNEL PARTICULATE SAMPLER DATA

FILTER TYPE: Gelman 47mm A/E

Samples in Desiccator

Date:

Time:

SYSTEM 1		SYSTEM 2	
Probe and Front Half Housing # 1	Filter Numbers 1 + 2	Probe and Front Half Housing # 3	Filter Numbers 3 + 4

Post Test Weight:	56.6340 grams	0.2357 grams	53.2631 grams	0.2385 grams
Pre Test Weight:	56.6339 grams	0.2302 grams	53.2629 grams	0.2323 grams
Gain:	0.0001 grams	0.0055 grams	0.0002 grams	0.0062 grams
	a1	b1	a2	b2

Total Gain:

$$a_1 + b_1 = 0.0056 \text{ grams}$$
$$a^2 + b^2 = 0.0064 \quad \text{grams}$$

Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	Probe & Housing Number	Front Filter Number	Back Filter Number	TEMP	HUMID
Date	Time	1	1	2	3	3	4	°F	%
01-04-23	6h19	56.6339	0.1143	0.1159	53.2630	0.1153	0.1170		
01-04-23	8h19	56.6339	0.1143	0.1159	53.2629	0.1153	0.1170		
		Total			Total				

[illegible]

ITS Intertek Testing Services

Date: 2001-04-23Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 1Tech: CLAUDE PARÉ

PRETEST DILUTION TUNNEL TRAVERSE RUN

Barometric pressure (P_{bar}) 30.15 (inches Hg.) Static pressure (P_s) .175 (inches w.c.)Inside diameter: Port A .6in. Port B .6in. Tunnel cross sectional area: 0.1963Ft²

Pitot tube type: Standard

Traverse Point	Position (inches)	Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)	$\sqrt{\Delta_p}$
A-Centroid	3.00	.075	166	0.2739
B-Centroid	3.00	.070	162	0.2646
A-1	0.40	.0775	166	0.2784
A-2	1.50	.080	167	0.2828
A-3	4.50	.0675	166	0.2598
A-4	5.60	.065	125	0.2550
B-1	0.40	.080	165	0.2828
B-2	1.50	.080	166	0.2828
B-3	4.50	.0625	158	0.2500
B-4	5.60	.0675	125	0.2598
		AVERAGE	155	0.2689

Adjustment factor application

$$V_s = K_p C_p F_p (\sqrt{\Delta_p})_{AVG} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

0.9989

Where:

 C_p = pitot tube coefficient = 0.84 for type S pitot Δ_p = manometer reading (inches H₂O) T_s = average absolute dilution tunnel temperature (°F + 460) P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_s$
inches H₂O P_s = static pressure
13.6

$$F_p = \frac{(\sqrt{\Delta_p})_{avg}}{(\sqrt{\Delta_p})_{centroid}}$$

Adjustment factor for alternative pitot tube placement:

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured) K_p = 35.49 pitot tube constant, (conversion factor for english units) $(\sqrt{\Delta_p})_{avg}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point. $(\sqrt{\Delta_p})_{centroid}$ = average of the square roots of the velocity heads measured at the tunnel centroid (inches of H₂O)

192-r-9904

Date: 2001-04-23Manufacturer: CHEMINGE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 1Tech: CLAUDE PARÉ

TEST DATA LOG

RAW DRY GAS METER READINGS

	System 1	System 2
Final (ft ³)	662.329	977.923
Initial (ft ³)	642.041	957.309

AMBIENT CONDITIONS

	Start	End
Barometer. (inches Hg)	30.15	29.97
Wet Bulb (°F)	59	62
Dry Bulb (°F)	77	82
Humidity (%)	32	30

Project #: 192-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-04-23

Run #: ____

Sheet # 9 of 10

Time loaded: 01:57

[illegible]

Technician: CLAUDE PARE

☒ *Pre Test*

□ *Test*

Project #: 192-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-04-23

Run #: 1

Sheet # 10 of 10

Time loaded: 01:57

Elapsed time	Weight remaining	CO	CO ²	O ²	Flue gas temp	Room temp.	Tunnel temp.	Unit top	Unit back	Unit R. Side	Unit L. Side	Unit bottom	Cat. Exit	Cat. Center	Gas samp Rotameter	Dry gas meter # 1	Rotam	Dry gas meter # 2	Rotam	Dry gas meter # 1			Dry gas meter # 2			Tun velo	Draft	smoke
																				Temp Inlet	Temp Outlet	Filter Temp	Temp Inlet	Temp outlet	Filter temp			
0	18.30	—	—	—	483	78	263	225	479	478	477	233	884	569	—	642.041	55	957.309	50	76	76	82	76	76	81	0.060	0.075	OK
10	16.10	—	—	—	609	82	164	197	487	456	469	249	896	1089	—	643.339	55	958.614	50	76	76	86	76	76	85	0.065	0.075	OK
20	13.85	—	—	—	694	83	166	212	465	440	449	258	1142	1227	—	644.546	55	959.879	50	76	76	84	76	76	82	0.065	0.080	OK
30	11.70	—	—	—	713	86	169	242	449	445	450	261	1167	1233	—	645.716	55	961.096	50	76	76	80	76	76	79	0.065	0.080	OK
40	9.95	—	—	—	706	88	167	254	442	461	461	262	1175	1324	—	646.878	55	962.360	50	76	76	78	76	76	76	0.065	0.080	OK
50	8.20	—	—	—	740	88	170	263	444	483	469	260	1208	1353	—	648.259	55	963.760	50	77	77	77	77	76	76	0.065	0.080	OK
60	6.60	—	—	—	744	89	171	269	453	501	481	259	1180	1182	—	649.578	55	965.107	50	77	77	77	77	76	76	0.065	0.0825	OK
70	5.30	—	—	—	714	90	171	261	468	508	493	258	1086	1119	—	650.818	55	966.387	50	77	77	77	77	76	77	0.065	0.080	OK
80	4.20	—	—	—	667	89	167	250	486	510	501	257	997	1047	—	652.122	55	967.637	50	77	77	78	77	77	78	0.065	0.0775	OK
90	3.25	—	—	—	639	89	163	239	510	509	512	255	964	1029	—	653.404	55	968.930	50	77	77	78	77	77	78	0.065	0.0775	OK
100	2.40	—	—	—	616	89	159	234	537	508	521	254	988	988	—	654.617	55	970.161	50	77	77	80	77	77	79	0.065	0.0725	OK
110	1.75	—	—	—	587	90	154	236	557	509	524	252	880	903	—	655.867	55	971.414	50	77	77	81	77	77	81	0.065	0.0725	OK
120	1.35	—	—	—	559	89	150	222	564	506	525	253	829	864	—	657.134	55	972.693	50	77	77	81	77	77	81	0.065	0.070	OK
130	0.95	—	—	—	541	89	147	201	565	501	521	255	815	853	—	658.423	55	973.993	50	77	77	82	77	77	82	0.065	0.0675	OK
140	0.60	—	—	—	525	89	144	197	563	495	515	258	794	803	—	659.720	55	975.303	50	77	77	82	77	77	82	0.0675	0.0675	OK
150	0.25	—	—	—	514	88	142	192	553	487	508	262	784	795	—	661.023	55	976.615	50	78	78	82	78	77	83	0.0675	0.0675	OK
160	0.00	—	—	—	504	87	141	190	545	479	498	265	775	789	—	662.329	55	977.923	50	78	78	83	78	77	83	0.065	0.065	OK

Technician: CLAUDE PARE

☐ *Pre Test*

☒ *Test*

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

RESULTS

Manufacturer:	Chem. Sec.		
Model:	Bis Panorama		
Date:	2001-04-23	AVERAGE ADJUSTED EMISSION RATE:	5.010
Run:	2		
Project #:	192-5233	Burn Rate (Dry kg/hr):	0.791
Test Duration:	520		
(minutes)			

PRESSURE FACTOR	0.99449	BAROMETRIC PRESSURE	
TEMPERATURE FACTORS		Average:	29.755
DGM #1:	0.98167	Start:	29.86
DGM #2:	0.98188	End:	29.65
VOLUMES SAMPLED		DRY GAS METER VALUES	
DGM #1:	70.18804	DGM #1	Final: 734.691
DGM #2:	70.45159		Initial: 662.362
TOTAL TUNNEL VOLUME (scf):	75675.515	DGM #2	Final: 1049.903
SAMPLE RATIOS			Initial: 977.969
Sample Train 1:	1078.183	TEMPERATURES (DEG. RANKIN)	
Sample Train 2:	1074.149	DGM #1:	537.858
TOTAL EMISSIONS		DGM #2:	537.745
Sample Train 1 (g):	26.8467	CALIBRATION FACTORS	
Sample Train 2 (g):	31.9022	DGM #1:	0.9940
EMISSION RATES		DGM #2:	1.0030
Sample Train 1 (g/hr):	3.0977	TUNNEL FLOW RATE:	145.530
Sample Train 2 (g/hr):	3.6810	PARTICULATE CATCH (mg)	
ADJUSTED EMISSION RATES		Sample Train	24.9000
Sample Train 1 (g/hr):	4.6519	Sample Train	29.7000
Sample Train 2 (g/hr):	5.3682		
DEVIATION:	3.57%		

Date: 2001-04-23

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 2

Tech: CLAUDE PARE

COMMENTS

00:00 START FIRE WITH KINDLING

00:05 CLOSE THE DOOR

00:08 STIR THE FIRE, ADD PRETEST LOAD

00:23 CLOSE THE DOOR

00:38 CLOSE THE BYPASS

00:59 CLOSE AIR INTAKE UP TO MID POSITION

01:17:35 CLOSE AIR INTAKE

01:33 OPEN THE DOOR AND REPLACE SOME PIECE OF WOOD

02:00 STIR THE FIRE

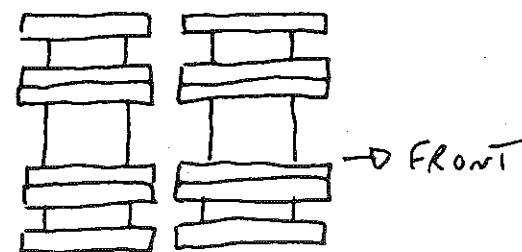
02:18 POKE THE FIRE, ADD TEST LOAD

02:21 CLOSE THE DOOR

02:22 CLOSE THE BY PASS

02:23 CLOSE AIR INTAKE

TEST LOAD CONFIGURATION



ITS Intertek Testing Services

Date: 2001-04-23Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 2Tech: CLAUDE PARÉ

Moisture Meter Calibration Check:

Pre/Post Checks

Time: — 12: — 22: —**Facility Conditions:**

Air Velocity.....

Pre-Test

Post-Test

Smoke Capture Check.....

<u>250</u> fpm	<u>250</u> fpm
<u>OK</u>	<u>OK</u>

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

2001-04-20

Date Dilution Tunnel Cleaned.....

2001-04-20

Induced Draft Check.....

20.005OK

Tunnel Velocity.....

OKFlow Rate 140 cfm $\pm 10\%$.145.53**Pitot Leak Check:**

Side A.....

OKOK

Side B.....

OKOK**Temperature System:**

Ambient (65° - 90°F).....

80.30 °FWood Heater Surface ($\pm 125^\circ\text{F}$).....-57.4 °F**Proportional Checks:**

CO Analyzer Drift Check.....

—CO₂ Analyzer Check.....—O₂ Analyzer Check.....—

Thermocouple check.....

OK**Sampling Train ID Numbers:**

Probe.....

Train 1

Train 2

Filter Front.....

47

Filter Back.....

57

Filter Thermocouple.....

68Filter SG-3 ($<90^\circ\text{F}$).....1316Filter SG-3 ($<90^\circ\text{F}$).....8485**Termocouple Identification Number**

Flue 1
 Dilution Tunnel Wet Bulb 4
 Unit Right Side 7
 Catalyst/Combustion Chamber 10

Room 2
 Unit Top 5
 Unit Left Side 8

Dilution Tunnel Dry Bulb 3
 Unit Back 6
 Unit Bottom 9

ITS Intertek Testing Services

Date: 2001-04-23Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5033Run: 2Tech: CLAUDE PARÉ

SAMPLING EQUIPMENT CHECK OUT

Leakage Checks Tunnel Samplers

	SYSTEM 1		SYSTEM 2	
Unplugged Flow Rate = .25cfm	Pre-Test	Post-Test	Pre-Test	Post-Test
Vacuum (inches Hg.)	5	5	5	5
Final 1minute DGM (ft ³)	662.363	734.728	977.910	1049.931
Initial 1minute DGM (ft ³)	662.360	734.725	977.967	1049.928
Change (C) (ft ³)	0.003	0.003	0.003	0.003
Allowable leakage .04 x Sample rate or .02cfm	0.006	0.006	0.006	0.006
Check OK	OK	OK	OK	OK

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)		
Rotometer Reading (mm)		
Flow Rate (CFM)		
Allowable (.04 x Sample Rate)		
Check OK		

ITS Intertek Testing Services

Date: 2001-04-23

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 2

Tech: CLAUDE PARÉ

FUEL DATA
PRE-TEST LOAD

FUEL DESCRIPTION:

Kindling weight: 4.40 lbs. Consisting of: DOUGLAS FIR

Fire lit Time: 00:00

Pre-test load weight: 21.90 lbs. Consisting of: 2X4X 11 inches

Time loaded: 00:08

Pre-test moisture content: Corrected Dry: 22.5 % Wet: 18.4 %

Test Air Control Settings: COMPLETELY CLOSED Time: 01:17:35

Test Unit Fan Settings: FAN ON Time: 00:00

TEST LOAD

	Lower Limit	Ideal	Upper Limit
Test Load Weight:	18.08 lbs.	20.09 lbs.	22.10 lbs.
Fire Box Volume:	2.87 ft. ³	Ideal Length:	15 3/4 inches
Load Volume:	0.43 ft. ³	Loading Density:	6.31 lbs/ft ³
Number of Spacers	24 3/4x1 1/2x5	Load Density:	35.56 lbs/ft ³

Piece Size	Weight	Meter Moisture Content (% dry)*
16 ³ / ₁₆ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	1.79 lbs.	18.1 %
16 ³ / ₁₆ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	2.00 lbs.	19.7 %
16 ³ / ₁₆ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	1.78 lbs.	21.2 %
16 ³ / ₁₆ x 3 ¹ / ₂ x 1 ¹ / ₂ in.	1.98 lbs.	20.1 %
16 ³ / ₁₆ x 3 ¹ / ₂ x 3 ¹ / ₂ in.	3.85 lbs.	18.1 %
16 ³ / ₁₆ x 3 ¹ / ₂ x 3 ¹ / ₂ in.	3.89 lbs.	20.2 %
x x in.	lbs.	%

*uncorrected range = 17.9% to 23.1%

TEST LOAD WEIGHT: 18.10 lbs DRY WEIGHT: 6.86 kg

AVERAGE MOISTURE CONTENT:
CORRECTED TO TWO PIN: (DRY) 19.8 % (WET) 16.5 %

COAL BED RANGE: 3.62 lbs. to 4.53 lbs. (20% to 25% of test load)

TEST CHARGE:
Time loaded: 02:18 Coal bed weight: 4.15 lbs. Coal bed weight = 22.9 % of test load weight

CHARCOALIZATION: good | - | ~~X~~ | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | poor

Tech: CLAUDE PARÉ

FILTER TYPE: Gelman 47mm A/E

Time:

ITS Intertek Testing Services

Date: 2001-04-23Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 142-5233Run: 2Tech: CLAUDE PARE

PRETEST DILUTION TUNNEL TRAVERSE RUN

Barometric pressure (P_{bar}) 29.86 (inches Hg.) Static pressure (P_s) .1625 (inches w.c.)Inside diameter: Port A 6in. Port B 6in. Tunnel cross sectional area: 0.1963Ft²

Pitot tube type: Standard

Traverse Point	Position (inches)	Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)	$\sqrt{\Delta_p}$
A-Centroid	3.00	.065	124.9	0.2550
B-Centroid	3.00	.065	128.2	0.2550
A-1	0.40	.075	126.7	0.2739
A-2	1.50	.0775	127.8	0.2784
A-3	4.50	.0675	123.1	0.2598
A-4	5.60	.0625	112.1	0.2500
B-1	0.40	.0825	128.9	0.2872
B-2	1.50	.0775	129.0	0.2784
B-3	4.50	.0625	128.9	0.2500
B-4	5.60	0.025	142.2	0.2500
		AVERAGE	124	0.2660

Adjustment factor application

$$V_s = K_p C_p F_p (\sqrt{\Delta_p})_{AVG} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

1.0432

Where:

 C_p = pitot tube coefficient = 0.84 for type S pitot Δ_p = manometer reading (inches H₂O) T_s = average absolute dilution tunnel temperature (°F + 460) P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_s$ P_s = static pressure 13.6

$$F_p = \frac{(\sqrt{\Delta_p})_{avg}}{(\sqrt{\Delta_p})_{centroid}}$$

Adjustment factor for alternative pitot tube placement:

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured) K_p = 35.49 pitot tube constant, (conversion factor for english units) $(\sqrt{\Delta_p})_{avg}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point. $(\sqrt{\Delta_p})_{centroid}$ = average of the square roots of the velocity heads measured at the tunnel centroid (inches of H₂O)

192-r-9904

ITS Intertek Testing Services

Date: 2001-04-23Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 2Tech: CLAUDE PARE

TEST DATA LOG

RAW DRY GAS METER READINGS

	System 1	System 2
Final (ft ³)	734.691	1049.903
Initial (ft ³)	662.362	977.969

AMBIENT CONDITIONS

	Start	End
Barometer. (inches Hg)	29.86	29.65
Wet Bulb (°F)	62	60
Dry Bulb (°F)	80	78
Humidity (%)	30	33

Intertek Testing Services

Project #: 192-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-04-23

Run #: 2

Sheet # 12 of 12

Time loaded: 02:18

[illegible]

Technician: CLAUDE PARÉ

□ *Pre Test*

☒ *Test*

Project #: 192-5233

Client: CHEMINÉ G. SÉCURITÉ

Date: 2001-04-23

Run #: 2

Sheet # 11 of 12

Time loaded: 02:18

Elapsed time	Weight remaining	CO	CO2	Temp	Tunnel temp.	Unit top	Unit back	Unit R. Side	Unit L. Side	Unit bottom	Cat. Exit	Cat. Center	Gas samp Rotameter	Dry gas meter # 1	Rotam	Dry gas meter # 2	Rotam	Dry gas meter # 1			Dry gas meter # 2			Tun velo	Draft	smoke		
																		Temp Inlet	Temp Outlet	Filter Temp	Temp Inlet	Temp outlet	Filter temp					
240	4.70				466	82	117	170	375	347	360	195	1166	717		696.046	60	1011.842	55	78	78	73	78	78	73	0.050	0.0625	OK
250	4.40				452	82	116	162	387	353	367	195	1051	633		697.462	60	1013.265	55	78	78	73	78	78	75	0.050	0.0625	OK
260	4.15				419	82	114	155	395	355	369	193	891	602		698.871	60	1014.605	55	78	78	73	78	78	75	0.050	0.0575	OK
270	3.90				397	82	112	149	403	354	368	193	860	585		700.276	60	1015.970	55	78	78	75	78	78	75	0.050	0.0575	OK
280	3.70				383	81	111	145	410	352	366	193	841	577		701.683	60	1017.386	55	78	78	75	78	78	75	0.050	0.0575	OK
290	3.50				373	81	109	142	415	351	364	192	824	570		703.062	60	1018.805	55	78	78	76	78	78	76	0.050	0.055	OK
300	3.25				365	81	108	140	418	349	363	192	810	566		704.428	60	1020.154	55	78	78	76	78	77	76	0.050	0.0525	OK
310	3.10				359	81	107	139	419	348	362	192	814	577		705.793	60	1021.479	55	78	78	76	78	77	77	0.050	0.0525	OK
320	2.90				355	81	107	139	415	348	361	192	809	575		707.162	60	1022.805	55	78	78	76	78	77	77	0.050	0.0525	OK
330	2.70				350	81	106	138	411	348	359	192	798	574		708.539	60	1024.131	55	77	78	76	78	77	77	0.050	0.050	OK
340	2.50				346	81	105	137	408	348	358	192	792	571		709.909	60	1025.457	55	77	78	76	77	77	77	0.050	0.050	OK
350	2.35				341	81	105	137	404	347	356	192	782	572		711.281	60	1026.783	55	77	78	76	77	77	77	0.050	0.050	OK
360	2.15				339	81	104	137	402	345	355	192	784	564		712.658	60	1028.111	55	77	78	76	77	77	76	0.050	0.050	OK
370	2.00				338	81	104	136	399	344	354	192	774	556		714.029	60	1029.440	55	77	78	76	77	77	76	0.050	0.050	OK
380	1.80				334	80	104	135	395	342	352	192	766	555		715.408	60	1030.770	55	77	77	76	77	77	76	0.050	0.050	OK
390	1.65				331	81	103	135	390	340	351	191	757	549		716.783	60	1032.100	55	77	77	76	77	77	76	0.050	0.0475	OK
400	1.50				328	80	103	134	386	337	350	192	748	545		718.156	60	1033.449	55	77	77	76	77	77	76	0.050	0.0475	OK
410	1.35				325	80	103	134	383	335	348	192	740	541		719.536	60	1034.821	55	77	77	76	77	77	76	0.050	0.0475	OK
420	1.20				324	80	102	133	380	333	347	192	731	532		720.908	60	1036.193	55	77	77	76	77	77	76	0.050	0.045	OK
430	1.05				306	80	101	132	379	332	344	192	619	527		722.284	60	1037.560	55	77	77	75	77	77	76	0.050	0.0425	OK
440	0.90				295	80	100	130	378	330	340	192	596	519		723.664	60	1038.933	55	77	77	75	77	77	76	0.050	0.0425	OK
450	0.75				288	80	100	129	375	328	336	193	593	510		725.039	60	1040.306	55	77	77	75	77	77	76	0.050	0.0425	OK
460	0.60				283	80	99	128	370	325	332	194	587	515		726.425	60	1041.675	55	77	77	75	77	77	76	0.050	0.0425	OK
470	0.45				280	80	98	128	363	324	329	195	590	508		727.796	60	1043.044	55	77	77	75	77	77	75	0.050	0.040	OK

Technician: CLAUDE PARÉ

☐ Pre Test

☒ Test

Project #: 192-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-04-23

Run #: 2

Sheet # 10 of 12

Time loaded: 02:18

Elapsed time	Weight remaining	CO	CO ₂	O ₂	Flue gas temp	Room temp	Tunnel temp	Unit top	Unit back	Unit R. Side	Unit L. Side	Unit bottom	Cat. Exit	Cat. Center	Gas samp Rotameter	Dry gas meter #1	Rotam	Dry gas meter #2	Rotam	Dry gas meter #1			Dry gas meter #2			Tun velo	Draft	smoke
																				Temp Inlet	Temp Outlet	Filter Temp	Temp Inlet	Temp outlet	Filter temp			
0	18.10				300	82	171	157	404	390	385	290	584	373		662.362	60	977.969	55	78	79	84	79	79	85	0.0575	0.045	OK
10	17.50				303	81	112	142	380	360	357	294	422	406		663.766	60	979.374	55	79	79	83	79	79	84	0.0625	0.045	OK
20	17.15				297	81	106	131	341	327	324	291	402	375		665.150	60	980.792	55	79	79	81	79	79	82	0.0625	0.045	OK
30	16.80				280	80	103	124	310	300	299	284	366	342		666.564	60	982.240	55	79	79	79	79	79	80	0.0625	0.0425	OK
40	16.45				261	80	101	119	289	279	278	275	344	338		667.935	60	983.667	55	79	79	78	79	79	78	0.0575	0.040	OK
50	16.00				252	80	99	118	283	263	263	265	331	318		669.350	60	985.120	55	79	79	77	79	79	77	0.0575	0.040	OK
60	15.60				247	79	98	114	262	251	251	256	331	316		670.822	60	986.617	55	79	79	76	79	78	76	0.0575	0.040	OK
70	15.15				245	79	97	112	254	242	242	247	346	323		672.303	60	988.107	55	79	79	75	79	78	75	0.0525	0.0375	OK
80	14.70				244	79	96	111	248	235	236	240	378	336		673.757	60	989.557	55	79	79	74	79	78	74	0.055	0.0375	OK
90	14.25				254	79	96	111	245	231	231	233	398	350		675.139	60	990.990	55	79	79	73	79	78	74	0.055	0.040	OK
100	13.85				275	79	97	112	245	228	229	227	505	368		676.504	60	992.419	55	78	79	73	78	78	73	0.0525	0.040	OK
110	13.40				302	79	99	113	248	227	229	222	777	383		677.936	60	993.850	55	78	78	73	78	78	74	0.050	0.0425	OK
120	12.95				323	79	100	114	253	228	230	218	819	406		679.331	60	995.219	55	78	78	73	78	78	74	0.050	0.0475	OK
130	12.50				338	79	102	116	260	231	234	214	843	422		680.733	60	996.572	55	78	78	73	78	78	74	0.050	0.0475	OK
140	12.00				353	79	103	118	268	235	240	210	881	443		682.137	60	998.021	55	78	78	73	78	78	74	0.050	0.050	OK
150	11.45				370	79	105	120	278	241	247	207	925	465		683.520	60	999.491	55	78	78	73	78	78	74	0.050	0.0525	OK
160	10.85				385	79	107	123	290	249	256	205	964	485		684.912	60	1000.933	55	78	78	73	78	78	74	0.050	0.055	OK
170	10.20				402	79	108	126	302	257	267	203	1016	513		686.286	60	1002.289	55	78	78	73	78	78	74	0.050	0.0575	OK
180	9.40				425	80	110	130	314	268	280	201	1094	566		687.647	60	1003.636	55	78	78	73	78	78	74	0.050	0.0575	OK
190	8.55				446	80	113	140	327	280	294	200	1158	633		689.019	60	1005.003	55	78	78	73	78	78	74	0.050	0.060	OK
200	7.50				481	81	116	159	341	296	312	199	1232	1172		690.411	60	1006.331	55	78	78	73	78	78	72	0.050	0.065	OK
210	6.60				463	82	117	175	356	323	334	198	1082	1145		691.745	60	1007.672	55	78	78	72	78	78	71	0.050	0.0625	OK
220	6.10				453	82	116	168	360	336	345	198	1093	651		693.161	60	1009.072	55	78	78	71	78	78	71	0.050	0.0625	OK
230	5.35				463	82	117	167	364	340	350	196	1179	734		694.649	60	1010.485	55	78	78	72	78	78	72	0.050	0.0625	OK

Technician: CLAUDE PARÉ

☐ Pre Test

☒ Test

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

RESULTS

Manufacturer:	Chem. Sec.		
Model:	Bis Panorama		
Date:	2001-04-25	AVERAGE ADJUSTED EMISSION RATE:	3.239
Run:	3		
Project #:	192-5233	Burn Rate (Dry kg/hr):	1.152
Test Duration:	360		
(minutes)			

PRESSURE FACTOR	1.01019	BAROMETRIC PRESSURE	
		Average:	30.225
TEMPERATURE FACTORS		Start:	30.25
		End:	30.2
DGM #1:	0.98493		
DGM #2:	0.98515		
		DRY GAS METER VALUES	
VOLUMES SAMPLED		DGM #1	Final: 784.903
			Initial: 734.744
DGM #1:	49.60705		
DGM #2:	49.61539		
		DGM #2	Final: 99.654
			Initial: 49.948
TOTAL TUNNEL VOLUME (scf):	53229.579		
SAMPLE RATIOS		TEMPERATURES (DEG. RANKIN)	
Sample Train 1:	1073.024	DGM #1:	536.081
Sample Train 2:	1072.844	DGM #2:	535.959
TOTAL EMISSIONS		CALIBRATION FACTORS	
Sample Train 1 (g):	11.6960	DGM #1:	0.9940
Sample Train 2 (g):	12.3377	DGM #2:	1.0030
EMISSION RATES		TUNNEL FLOW RATE:	147.860
Sample Train 1 (g/hr):	1.9493		
Sample Train 2 (g/hr):	2.0563	PARTICULATE CATCH (mg)	
		Sample Train	10.9000
ADJUSTED EMISSION RATES		Sample Train	11.5000
Sample Train 1 (g/hr):	3.1672		
Sample Train 2 (g/hr):	3.3108		
DEVIATION:	1.11%		

ITS Intertek Testing Services

Date: 2001-04-25

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BUS PANORAMA

WHI LTO#: 192-5233

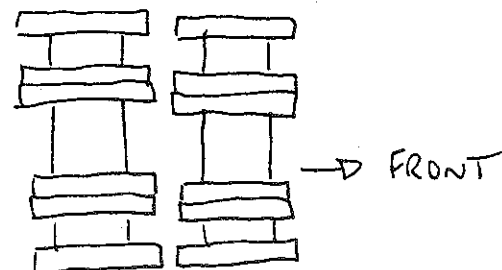
Run: 3

Tech: CLAUDE PARÉ

COMMENTS

00:00 START FIRE WITH KINDLING
 00:07 STIR THE FIRE, ADD PRETEST LOAD
 00:22 CLOSE THE DOOR
 00:37 CLOSE THE BYPASS
 00:50 CLOSE AIR INTAKE UP TO MID POSITION
 01:00 CLOSE AIR INTAKE UP TO 0.200" ROD
 02:00 POKE THE FIRE, ADD TEST LOAD
 02:02 CLOSE THE DOOR
 02:04 CLOSE THE BYPASS
 02:05 CLOSE AIR INTAKE UP TO 0.200" ROD

TEST LOAD CONFIGURATION



ITS Intertek Testing Services

Date: 2001-04-25

Manufacturer: CHIMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 3

Tech: CLAUDE PARÉ

Moisture Meter Calibration Check:

Pre/Post Checks		
Time:	12:	22:

Facility Conditions:

Air Velocity.....

Pre-Test	Post-Test
< 50 fpm	< 50 fpm
OK	OK

Smoke Capture Check.....

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

2001-04-20

Date Dilution Tunnel Cleaned.....

2001-04-20

Induced Draft Check.....

20.005 OK

Tunnel Velocity.....

OK

Flow Rate 140 cfm $\pm$ 10%.

147.86

Pitot Leak Check:

Side A.....

OK OK

Side B.....

OK OK

Temperature System:

Ambient (65° - 90°F).....

79.19 °F

Wood Heater Surface ($\pm$ 125°F).....

-33.2 °F

Proportional Checks:

CO Analyzer Drift Check.....

—

CO₂ Analyzer Check.....

—

O₂ Analyzer Check.....

—

Thermocouple check.....

OK

Sampling Train ID Numbers:

Probe.....

Train 1	Train 2
9	10

Filter Front.....

9	11
---	----

Filter Back.....

10	12
----	----

Filter Thermocouple.....

13	16
----	----

Filter 5G-3 (< 90°F).....

81	82
----	----

Thermocouple Identification Number

Flue 1
Dilution Tunnel Wet Bulb 4
Unit Right Side 7
Catalyst/Combustion Chamber 10

Room 2
Unit Top 5
Unit Left Side 8

Dilution Tunnel Dry Bulb 3
Unit Back 6
Unit Bottom 9

ITS Intertek Testing Services

Date: 2001-04-25Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 3Tech: CLAUDE PARE

SAMPLING EQUIPMENT CHECK OUT

Leakage Checks Tunnel Samplers

	08 SYSTEM 1 14		05 SYSTEM 2 24	
Unplugged Flow Rate = .25cfm	Pre-Test	Post-Test	Pre-Test	Post-Test
Vacuum (inches Hg.)	5	5	5	5
Final 1minute DGM (ft ³)	734.745	784.925	49.951	99.681
Initial 1minute DGM (ft ³)	734.742	784.922	49.945	99.668
Change (C) (ft ³)	0.003	0.003	0.006	0.003
Allowable leakage .04 x Sample rate or .02cfm	0.006	0.006	0.006	0.006
Check OK	OK	OK	OK	OK

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)		
Rotometer Reading (mm)		
Flow Rate (CFM)		
Allowable (.04 x Sample Rate)		
Check OK		

ITS Intertek Testing Services

Date: 2001-04-25Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 3Tech: CLAUDE PARÉ

Pre-Test Scale Audit

Scale Type	Audit Weight		Measured Weight	
Platform	6.60	lbs, Class F	6.60	lbs
Wood	2.20	lbs, Class F	2.20	lbs
Analytical	0.1000	mg, Class S	0.1000	mg

Post-Test Scale Audit

Scale Type	Audit Weight		Measured Weight	
Platform		lbs, Class F		lbs
Wood		lbs, Class F		lbs
Analytical		mg, Class S		mg

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mgPLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%WOOD SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%

Tech: CLAUDE PARÉ

Test Unit Fan Settings: FAN ON Time: 00:00

192-o-9904

Date: 2001-04-26

Manufacturer: CHEMINEE SECURITE

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 4

Tech: CLAUDE PARE

COMMENTS

00:00 START FIRE WITH KIMDLING

00:07 STIR THE FIRE, ADD PRETEST LOAD

00:22 CLOSE THE DOOR

00:37 CLOSE THE BYPASS

01:09 CLOSE AIR INTAKE UP TO MID POSITION

01:29 CLOSE AIR INTAKE UP TO 0.200" ROD

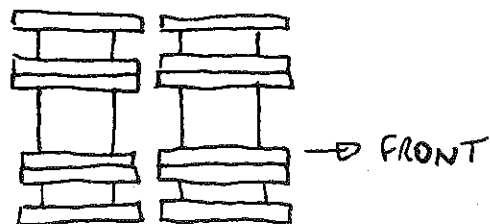
02:29 POKE THE FIRE, ADD TEST LOAD

02:32 CLOSE THE DOOR

02:33 CLOSE THE BYPASS

02:34 CLOSE AIR INTAKE UP TO 0.200" ROD

TEST LOAD CONFIGURATION



ITS Intertek Testing Services

Date: 2001-04-25Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 3Tech: CLAUDE PARÉ

DILUTION TUNNEL PARTICULATE SAMPLER DATA

FILTER TYPE: Gelman 47mm A/E

Samples in Desiccator

Date:

Time:

SYSTEM 1		SYSTEM 2	
Probe and Front Half Housing # <u>9</u>	Filter Numbers <u>9 + 10</u>	Probe and Front Half Housing # <u>10</u>	Filter Numbers <u>11 + 12</u>

Post Test Weight:	<u>55.0638</u> grams	<u>0.2428</u> grams	<u>55.7293</u> grams	<u>0.2436</u> grams
Pre Test Weight:	<u>55.0636</u> grams	<u>0.2321</u> grams	<u>55.7292</u> grams	<u>0.2322</u> grams
Gain:	<u>0.0002</u> grams	<u>0.0107</u> grams	<u>0.0001</u> grams	<u>0.0114</u> grams
	a1	b1	a2	b2

Total Gain: a1 + b1 = 0.0109 grams a2 + b2 = 0.0115 grams

		SYSTEM 1			SYSTEM 2			TEMP	HUMI D
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	Probe & Housing Number	Front Filter Number	Back Filter Number			
Date	Time	<u>9</u>	<u>9</u>	<u>10</u>	<u>10</u>	<u>11</u>	<u>12</u>	°F	%
<u>01-04-23</u>	<u>19h40</u>	<u>55.0640</u>	<u>0.1148</u>	<u>0.1173</u>	<u>55.7294</u>	<u>0.1165</u>	<u>0.1157</u>		
<u>01-04-25</u>	<u>8h08</u>	<u>55.0636</u>	<u>0.1148</u>	<u>0.1173</u>	<u>55.7292</u>	<u>0.1165</u>	<u>0.1157</u>		
Total		Total			Total				

		SYSTEM 1			SYSTEM 2			TEMP	HUMI D
Post-test Weight Record	Probe & Housing Number	Combined Filter Weight Number		Probe & Housing Number	Combined Filter Weight Number				
Date	Time	<u>9</u>	<u>9</u>	<u>10</u>	<u>10</u>	<u>11</u>	<u>12</u>	°F	%
<u>01-04-26</u>	<u>7h55</u>	<u>55.0638</u>	<u>0.1252</u>	<u>0.1176</u>	<u>55.7293</u>	<u>0.1275</u>	<u>0.1161</u>		
<u>01-04-26</u>	<u>14h10</u>	<u>55.0638</u>	<u>0.1252</u>	<u>0.1176</u>	<u>55.7293</u>	<u>0.1275</u>	<u>0.1161</u>		

ITS Intertek Testing Services

Date: 2001-04-25Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 3Tech: CLAUDE PARÉ

PRETEST DILUTION TUNNEL TRAVERSE RUN

Barometric pressure (P_{bar}) 30.25 (inches Hg.) Static pressure (P_s) .155 (inches w.c.)Inside diameter: Port A 6in. Port B 6in. Tunnel cross sectional area: 0.1963Ft^2

Pitot tube type: Standard

Traverse Point	Position (inches)	Velocity Head Δ_p (inches H_2O)	Tunnel Temperature ($^{\circ}\text{F}$)	$\sqrt{\Delta_p}$
A-Centroid	3.00	.07	129	0.2646
B-Centroid	3.00	.0650 .0725	130	0.2693
A-1	0.40	.070	128	0.2646
A-2	1.50	.075	129	0.2739
A-3	4.50	.065	130	0.2550
A-4	5.60	.0625	114	0.2500
B-1	0.40	.0725	130	0.2693
B-2	1.50	.075	130	0.2739
B-3	4.50	.0625	130	0.2500
B-4	5.60	.060	120	0.2449
		AVERAGE	126	0.2602

Adjustment factor application

$$V_s = K_p C_p F_p (\sqrt{\Delta_p})_{AVG} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

0.9748

Where,

 C_p = pitot tube coefficient = 0.84 for type S pitot Δ_p = manometer reading (inches H_2O) T_s = average absolute dilution tunnel temperature ($^{\circ}\text{F} + 460$) P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_s$ P_s = static pressure 13.6

$$F_p = \frac{(\sqrt{\Delta_p})_{avg}}{(\sqrt{\Delta_p})_{centroid}}$$

Adjustment factor for alternative pitot tube placement:

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured) K_p = 35.49 pitot tube constant, (conversion factor for english units) $(\sqrt{\Delta_p})_{avg}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point. $(\sqrt{\Delta_p})_{centroid}$ = average of the square roots of the velocity heads measured at the tunnel centroid (inches of H_2O)

ITS Intertek Testing Services

Date: 2001-04-25Manufacturer: CHAMWEE SECURITEModel: BIS PANORAMAWHI LTO#: 192-5233Run: 3Tech: CLAUDE PARE

TEST DATA LOG

RAW DRY GAS METER READINGS

	System 1	System 2
Final (ft ³)	784.903	99.654
Initial (ft ³)	734.744	49.948

AMBIENT CONDITIONS

	Start	End
Barometer. (inches Hg)	30.25	30.20
Wet Bulb (°F)	59	59
Dry Bulb (°F)	78	78
Humidity (%)	30	30

Project #: 192-5233

Client: CHÉMINÉE SÉCURITÉ

Date: 2001-04-25

Run #: 3

Sheet # 11 of 11

Time loaded: 02:00

[illegible]

Technician: CLAUDE PARE

□ *Pre Test*

☒ *Test*



Project #: 92-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-04-26

Run #: 4

Sheet # 9 of 14

Time loaded: 02:29

[illegible]

Technician: CLAUDE PARE

☒ *Pre Test*

□ *Test*

Project #: 192-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-04-25

Run #: 3

Sheet # 10 of 11

Time loaded: 02:00

Elapsed time	Weight remaining	CO	CO ₂	O ₂	Flue gas temp	Room temp.	Tunnel temp.	Unit top	Unit back	Unit R. Side	Unit L. Side	Unit bottom	Cat. Exit	Cat. Center	Gas samp Rotameter	Dry gas meter #1	Rotam	Dry gas meter #2	Rotam	Dry gas meter #1			Dry gas meter #2			Tun velo	Draft	smoke
																				Temp Inlet	Temp Outlet	Filter Temp	Temp Inlet	Temp outlet	Filter temp			
0	18.508			242	397	78	246	190	397	420	388	213	1033	407		734.744	60	49.948	55	74	74	79	74	74	80	0.065	0.060	OK
10	17.659			246	421	78	125	165	380	401	367	218	702	466		736.191	60	51.407	55	74	74	81	74	74	82	0.070	0.0575	OK
20	17.2578			240	387	77	116	149	348	365	339	221	666	415		737.617	60	52.858	55	74	74	79	74	74	79	0.070	0.0575	OK
30	16.8076			190	370	77	113	139	319	332	313	221	887	397		739.036	60	54.307	55	75	74	78	75	74	78	0.070	0.055	OK
40	16.3574			184	363	77	110	131	296	308	294	219	709	426		740.483	60	55.749	55	75	75	77	75	74	77	0.070	0.0525	OK
50	15.7515			193	379	77	111	130	281	292	280	216	810	639		741.931	60	57.182	55	75	75	76	75	74	77	0.065	0.055	OK
60	15.0068			205	399	77	112	131	272	287	274	213	891	591		743.79	60	58.607	55	75	75	76	75	75	76	0.065	0.0575	OK
70	14.2565			40	421	77	113	133	269	287	274	211	946	592		744.821	60	60.026	55	75	75	76	75	75	76	0.065	0.060	OK
80	13.5562			218	425	78	115	136	273	290	277	208	930	521		746.251	60	61.430	55	75	75	75	75	75	75	0.065	0.060	OK
90	12.7558			237	460	78	118	141	277	292	280	206	1088	548		747.670	60	62.803	55	75	75	75	75	75	75	0.060	0.0625	OK
100	11.9054			251	484	78	120	146	282	297	286	205	1147	589		749.040	60	64.171	55	75	75	75	75	75	74	0.060	0.065	OK
110	10.9049			266	511	78	124	153	291	306	295	204	1221	655		750.387	60	65.496	55	76	76	75	76	75	75	0.060	0.0675	OK
120	9.6041			240	555	79	130	175	306	321	311	203	1236	1127		751.717	60	66.855	55	76	76	75	76	75	75	0.060	0.0725	OK
130	8.6037			275	527	79	128	180	326	348	338	203	1170	726		753.109	60	68.283	55	76	76	75	76	75	75	0.060	0.070	OK
140	7.7535			282	540	79	130	177	342	356	347	202	1233	748		754.468	60	69.644	55	76	76	74	76	75	75	0.060	0.070	OK
150	6.8031			288	552	80	131	181	362	365	357	201	1249	775		755.884	60	70.959	55	76	76	74	76	76	74	0.060	0.070	OK
160	6.0027			280	551	79	131	182	387	377	368	200	1222	786		757.292	60	72.362	55	76	76	74	76	76	74	0.060	0.070	OK
170	5.2021			285	545	80	132	180	412	388	379	200	1202	763		758.658	60	73.765	55	76	76	74	76	76	74	0.060	0.070	OK
180	4.452			284	543	80	131	181	431	397	388	200	1197	771		760.088	60	75.190	55	76	76	74	77	76	76	0.060	0.070	OK
190	3.8017			284	543	80	131	182	446	406	396	200	1207	783		761.438	60	76.522	55	77	76	76	77	76	78	0.060	0.070	OK
200	3.3015			280	532	81	130	181	457	413	403	200	1152	745		762.777	60	77.827	55	77	76	76	77	76	78	0.060	0.070	OK
210	3.0014			257	495	80	128	176	461	413	405	201	979	714		764.122	60	79.134	55	77	77	77	77	76	78	0.060	0.065	OK
220	2.7513			240	467	80	125	170	462	409	403	201	928	691		765.491	60	80.480	55	77	77	77	77	76	78	0.060	0.065	OK
230	2.5012			232	450	80	123	164	461	405	400	201	920	687		766.888	60	81.859	55	77	77	78	77	76	79	0.060	0.0625	OK

Technician: CLAUDE PARÉ

☐ Pre Test

☒ Test

ITS Intertek Testing Services

Date: 2001-04-26

Manufacturer: CHEMINER SECURITE

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 4

Tech: CLAUDE PARÉ

Moisture Meter Calibration Check:

Pre/Post Checks		
Time: —	12: —	22: —

Facility Conditions:

	Pre-Test	Post-Test
Air Velocity.....	<50 fpm	<50 fpm
Smoke Capture Check.....	OK	OK

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....	2001-04-20	
Date Dilution Tunnel Cleaned.....	2001-04-20	
Induced Draft Check.....	40.005	OK
Tunnel Velocity.....	OK	
Flow Rate 140 cfm ±10%.		150.95

Pitot Leak Check:

Side A.....	OK	OK
Side B.....	OK	OK

Temperature System:

Ambient (65° - 90°F).....	79.31 °F
Wood Heater Surface (±125°F).....	-18.6 °F

Proportional Checks:

CO Analyzer Drift Check.....	—
CO ₂ Analyzer Check.....	—
O ₂ Analyzer Check.....	—
Thermocouple check.....	OK

Sampling Train ID Numbers:

	Train 1	Train 2
Probe.....	1	3
Filter Front.....	13	15
Filter Back.....	14	16
Filter Thermocouple.....	15	16
Filter SG-3 (<90°F).....	82	81

Termocouple Identification Number

Flue	1	Room	2
Dilution Tunnel Wet Bulb	4	Unit Top	5
Unit Right Side	7	Unit Left Side	8
Catalyst/Combustion Chamber	10		

Dilution Tunnel Dry Bulb	3
Unit Back	6
Unit Bottom	9

192-1-9904

ITS Intertek Testing Services

Date: 2001-04-26Manufacturer: CHAMINÉE SÉCURITÉModel: BIS PAVORAMAWHI LTO#: 192-5233Run: 4Tech: CLAUDE PARÉ

SAMPLING EQUIPMENT CHECK OUT

Leakage Checks Tunnel Samplers

	SYSTEM 1		SYSTEM 2	
Unplugged Flow Rate = .25cfm	Pre-Test	Post-Test	Pre-Test	Post-Test
Vacuum (inches Hg.)	5	5	5	5
Final 1minute DGM (ft ³)	784.965	831.067	99.700	146.021
Initial 1minute DGM (ft ³)	784.961	831.064	99.698	146.019
Change (C) (ft ³)	0.004	0.003	0.002	0.002
Allowable leakage .04 x Sample rate or .02cfm	0.006	0.006	0.006	0.006
Check OK	OK	OK	OK	OK

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)		
Rotometer Reading (mm)		
Flow Rate (CFM)		
Allowable (.04 x Sample Rate)		
Check OK		

ITS Intertek Testing Services

Date: 2001-04-26

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 4

Tech: CLAUDE PARÉ

Pre-Test Scale Audit

Scale Type	Audit Weight		Measured Weight	
Platform	6.60	lbs, Class F	6.60	lbs
Wood	2.20	lbs, Class F	2.20	lbs
Analytical	0.1000	mg, Class S	0.1000	mg

Post-Test Scale Audit

Scale Type	Audit Weight		Measured Weight	
Platform		lbs, Class F		lbs
Wood		lbs, Class F		lbs
Analytical		mg, Class S		mg

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg

PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%

WOOD SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%

ITS Intertek Testing Services

Date: 2001-04-26

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIG PANORAMA

WHI LTO#: 192-5233

Run: 4

Tech: CLAUDE PARE

FUEL DATA
PRE-TEST LOAD

FUEL DESCRIPTION:

Kindling weight: 4.50 lbs. Consisting of: Douglas Fir Fire lit Time: 00:00

Pre-test load weight: 22.00 lbs. Consisting of: 2X4X 11 inches Time loaded: 00:07

Pre-test moisture content: Corrected Dry: 23.1 % Wet: 18.8 %

Test Air Control Settings: CLOSE UP TO 0.200" ROD Time: 01:29

Test Unit Fan Settings: FAN OFF Time:

TEST LOAD

	Lower Limit	Ideal	Upper Limit
Test Load Weight:	18.08 lbs.	20.09 lbs.	22.10 lbs.
Fire Box Volume:	2.87 ft. ³	Ideal Length:	15 3/4 inches
Load Volume:	0.38 ft. ³	Loading Density:	6.34 lbs/ft ³
Number of Spacers	24 3/4x1 1/2x5	Load Density:	40.97 lbs/ft ³

Piece Size	Weight	Meter Moisture Content (% dry)*					
14 3/8 x 3 1/2 x 1 1/2 in.	1.90 lbs.	21.9	%	21.4	%	19.8	%
14 3/8 x 3 1/2 x 1 1/2 in.	1.89 lbs.	21.7	%	21.5	%	22.8	%
14 3/8 x 3 1/2 x 1 1/2 in.	1.93 lbs.	22.1	%	22.2	%	22.8	%
14 3/8 x 3 1/2 x 1 1/2 in.	1.93 lbs.	22.2	%	21.9	%	22.4	%
14 3/8 x 3 1/2 x 3 1/2 in.	3.92 lbs.	20.9	%	20.9	%	22.6	%
14 3/8 x 3 1/2 x 3 1/2 in.	4.00 lbs.	23.1	%	21.3	%	19.4	%
x x in.	lbs.		%		%		%

*uncorrected range = 17.9% to 23.1%

TEST LOAD WEIGHT: 18.21 lbs DRY WEIGHT: 6.79 kg

AVERAGE MOISTURE CONTENT:

CORRECTED TO TWO PIN: (DRY) 21.6 % (WET) 17.8 %

COAL BED RANGE:

3.64 lbs. to 4.55 lbs. (20% to 25% of test load)

TEST CHARGE:

Time loaded: 02:29 Coal bed weight: 3.65 lbs. Coal bed weight = 20.0 % of test load weight

CHARCOALIZATION:

[illegible]

ITS Intertek Testing Services

Date: 2001-04-26

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 4

Tech: CLAUDE PARE

DILUTION TUNNEL PARTICULATE SAMPLER DATA

FILTER TYPE: Gelman #7mm A/E

Samples in Desiccator

Date:

Time:

SYSTEM 1		SYSTEM 2	
Probe and Front Half Housing # 1	Filter Numbers 13 + 14	Probe and Front Half Housing # 3	Filter Numbers 15 + 16

Post Test Weight:	56.6312 grams	0.2393 grams	53.2613 grams	0.2441 grams
Pre Test Weight:	56.6310 grams	0.2306 grams	53.2610 grams	0.2339 grams
Gain:	0.0002 grams	0.0087 grams	0.0003 grams	0.0102 grams
	a1	b1	a2	b2

Total Gain:

$$a_1 + b_1 = 0.0089$$

grams

$$a^2 + b^2 = 0.0105$$

grams

Pre-test Weight Record		Probe & Housing Number	Front Filter Number	Back Filter Number	Probe & Housing Number	Front Filter Number	Back Filter Number	TEMP	HUMID
Date	Time	1	13	14	3	15	16	°F	%
01-04-25	18406	56.6312	0.1150	0.1157	53.2613	0.1153	0.1186		
01-04-26	7455	56.6310	0.1150	0.1156	53.2610	0.1153	0.1186		
Total					Total				

[illegible]

ITS Intertek Testing Services

Date: 2001-04-26

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

Run: 4

Tech: CLAUDE PARÉ

PRETEST DILUTION TUNNEL TRAVERSE RUN

Barometric pressure (P_{bar}) 30.26 (inches Hg.) Static pressure (P_s) .160 (inches w.c.)Inside diameter: Port A 6in. Port B 6in. Tunnel cross sectional area: 0.1963Ft²

Pitot tube type: Standard

Traverse Point	Position (inches)	Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)	$\sqrt{\Delta_p}$
A-Centroid	3.00	.070	132	0.2646
B-Centroid	3.00	.060	128	0.2449
A-1	0.40	.0725	131	0.2693
A-2	1.50	.076	132	0.2646
A-3	4.50	.060	132	0.2449
A-4	5.60	.060	119	0.2449
B-1	0.40	.0725	129	0.2693
B-2	1.50	.0725	130	0.2693
B-3	4.50	.055	130	0.2345
B-4	5.60	.060	130	0.2449
		AVERAGE	129	0.2552

Adjustment factor application

1.0018

$$V_s = K_p C_p F_p (\sqrt{\Delta_p})_{AVG} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

Where,

 C_p = pitot tube coefficient = 0.84 for type S pitot Δ_p = manometer reading (inches H₂O) T_s = average absolute dilution tunnel temperature (°F + 460) P_s = absolute dilution tunnel gas pressure or $P_{atm} + P_s$ P_s = static pressure inches H₂O

13.6

$$F_p = \frac{(\sqrt{\Delta_p})_{avg}}{(\sqrt{\Delta_p})_{centroid}}$$

Adjustment factor for alternative pitot tube placement:

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured) K_p = 85.49 pitot tube constant, (conversion factor for english units) $(\sqrt{\Delta_p})_{avg}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point. $(\sqrt{\Delta_p})_{centroid}$ = average of the square roots of the velocity heads measured at the tunnel centroid (inches of H₂O)

192-r-9904

ITS Intertek Testing Services

Date: 2001-04-26Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 4Tech: CLAUDE PARE

TEST DATA LOG

RAW DRY GAS METER READINGS

	System 1	System 2
Final (ft ³)	831.040	145.995
Initial (ft ³)	784.967	99.697

AMBIENT CONDITIONS

	Start	End
Barometer. (inches Hg)	30.26	30.06
Wet Bulb (°F)	59	58
Dry Bulb (°F)	79	77
Humidity (%)	28	29

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

RESULTS

Manufacturer:	Chem.Sec.		
Model:	Bis Panorama		
Date:	2001-04-26	AVERAGE ADJUSTED EMISSION RATE:	3.123
Run:	4		
Project #:	192-5233	Burn Rate (Dry kg/hr):	1.198
Test Duration:	340		
(minutes)			

PRESSURE FACTOR:	1.00802	BAROMETRIC PRESSURE	
		Average:	30.16
TEMPERATURE FACTORS		Start:	30.26
DGM #1:	0.98505	End:	30.06
DGM #2:	0.98534		

VOLUMES SAMPLED		DRY GAS METER VALUES	
DGM #1:	45.47369	DGM #1	Final: 831.040
DGM #2:	46.12303		Initial: 784.967
		DGM #2	Final: 145.995
TOTAL TUNNEL VOLUME (scf):	51322.695		Initial: 99.697

SAMPLE RATIOS		TEMPERATURES (DEG. RANKIN)	
Sample Train 1:	1128.624	DGM #1:	536.014
Sample Train 2:	1112.735	DGM #2:	535.857

TOTAL EMISSIONS		CALIBRATION FACTORS	
Sample Train 1 (g):	10.0448	DGM #1:	0.9940
Sample Train 2 (g):	11.6837	DGM #2:	1.0030

EMISSION RATES		TUNNEL FLOW RATE:	150.949
Sample Train 1 (g/hr):	1.7726		
Sample Train 2 (g/hr):	2.0618	PARTICULATE CATCH (mg)	

ADJUSTED EMISSION RATES		Sample Train 1	8.9000
Sample Train 1 (g/hr):	2.9270	Sample Train 2	10.5000
Sample Train 2 (g/hr):	3.3182		

DEVIATION:	3.13%
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Project #: 192-5233

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Sheet # 9 of 11

Time loaded: 02:00[illegible]

Technician: CLAUDE PARÉ

Project #: 192-5233

Client: _____

Sheet # 10 of 11

Time loaded: 02:29

Elapsed time	Weight remaining	CO	CO ₂	O ₂	Flue gas temp	Room temp.	Dry gas meter # 2				Tun velo	Draft	smoke
							Filter Temp	Temp Inlet	Temp outlet	Filter temp			
0	18.20	—	—	—	358	78	80	75	75	80	0.060	0.055	ok
10	17.35	—	—	—	375	78	82	75	75	81	0.075	0.055	ok
20	16.85	—	—	—	368	77	79	75	75	78	0.0725	0.0525	ok
30	16.35	—	—	—	366	77	78	75	75	77	0.070	0.0525	ok
40	15.90	—	—	—	370	77	77	75	75	76	0.0675	0.050	ok
50	15.30	—	—	—	383	77	76	76	75	75	0.065	0.050	ok
60	14.55	—	—	—	405	78	75	76	75	74	0.0625	0.0525	ok
70	13.70	—	—	—	428	78	74	76	75	74	0.060	0.055	ok
80	13.05	—	—	—	433	78	74	76	75	73	0.060	0.0575	ok
90	12.25	—	—	—	469	78	74	76	75	73	0.060	0.0625	ok
100	11.50	—	—	—	492	79	74	76	75	73	0.060	0.0675	ok
110	10.45	—	—	—	525	79	74	76	75	73	0.060	0.070	ok
120	9.20	—	—	—	565	79	74	76	75	73	0.060	0.0725	ok
130	8.20	—	—	—	570	80	74	76	76	73	0.060	0.075	ok
140	7.40	—	—	—	572	80	74	76	76	74	0.060	0.075	ok
150	6.40	—	—	—	574	80	75	76	76	74	0.060	0.075	ok
160	5.65	—	—	—	573	81	75	76	76	74	0.060	0.075	ok
170	4.85	—	—	—	570	81	75	76	76	74	0.060	0.0725	ok
180	4.10	—	—	—	568	80	76	76	76	75	0.060	0.0725	ok
190	3.50	—	—	—	558	80	76	76	76	75	0.060	0.0725	ok
200	3.00	—	—	—	539	80	76	76	76	75	0.060	0.0725	ok
210	2.70	—	—	—	520	80	77	76	76	75	0.060	0.070	ok
220	2.45	—	—	—	495	80	77	76	76	76	0.060	0.070	ok
230	2.21	—	—	—	475	80	77	76	76	76	0.060	0.070	ok

Technician: CLAUDE PARÉ



Intertek Test

Project #: 192-5233

Client

Sheet # 11 of 11

Time loaded: 02:29

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Technician: CWANE PARÉ

192-v-9904

INTERTEK TESTING SERVICES NA Ltd.

SFBA EPA ADJUSTED EMISSION RESULTS

RESULTS

Manufacturer:	Chem. Sec.		
Model:	Bis Panorama		
Date:	2001-06-06	AVERAGE ADJUSTED EMISSION RATE:	3.894
Run:	5		
Project #:	192-5233	Burn Rate (Dry kg/hr):	1.368
Test Duration:	310		
(minutes)			

PRESSURE FACTOR	1.00067	BAROMETRIC PRESSURE	
		Average:	29.94
TEMPERATURE FACTORS		Start:	29.94
		End:	29.94
DGM #1:	0.98367		
DGM #2:	0.98381		
		DRY GAS METER VALUES	
VOLUMES SAMPLED		DGM #1	Final: 293.418
			Initial: 250.399
DGM #1:	42.09070		
DGM #2:	42.15510		
		DGM #2	Final: 288.775
			Initial: 246.083
TOTAL TUNNEL VOLUME (scf):	44424.153		
SAMPLE RATIOS		TEMPERATURES (DEG. RANKIN)	
Sample Train 1:	1055.439	DGM #1:	536.766
Sample Train 2:	1053.826	DGM #2:	536.688
TOTAL EMISSIONS		CALIBRATION FACTORS	
Sample Train 1 (g):	12.4542	DGM #1:	0.9940
Sample Train 2 (g):	13.3836	DGM #2:	1.0030
EMISSION RATES		TUNNEL FLOW RATE:	143.304
Sample Train 1 (g/hr):	2.4105		
Sample Train 2 (g/hr):	2.5904	PARTICULATE CATCH (mg)	
		Sample Train	11.8000
ADJUSTED EMISSION RATES		Sample Train	12.7000
Sample Train 1 (g/hr):	3.7776		
Sample Train 2 (g/hr):	4.0102		
DEVIATION:	1.49%		

ITS Intertek Testing Services

Date: 2001-06-06

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BIS PANORAMA

WHI LTO#: 192-5233

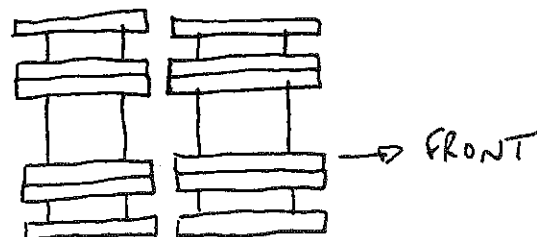
Run: 5

Tech: CLAUDE PARÉ

COMMENTS

00:00 START FIRE WITH KINDLING
 00:09 STIR THE FIRE, ADD PRE-TEST LOAD
 00:19 CLOSE THE DOOR
 00:35 CLOSE THE BYPASS
 00:55:30 CLOSE AIR INTAKE UP TO 1/2"
 01:57 POKE THE FIRE, ADD TEST LOAD
 02:00 CLOSE THE DOOR
 02:01 CLOSE THE BYPASS
 02:02 CLOSE AIR INTAKE UP TO 1/2"

TEST LOAD CONFIGURATION



ITS Intertek Testing Services

Date: 2001-06-06Manufacturer: CHEMNEE SECURITEModel: BIS PANORAMAWHI LTO#: 190-5233Run: 5Tech: CLAUDE PARÉ

Moisture Meter Calibration Check:

Pre/Post Checks		
Time: <u> </u>	12: <u> </u>	22: <u> </u>

Pre-Test

Post-Test

Facility Conditions:

Air Velocity.....	<u>< 50</u> fpm	<u>< 50</u> fpm
Smoke Capture Check.....	<u>OK</u>	<u>OK</u>

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....	<u>2001-06-05</u>	
Date Dilution Tunnel Cleaned.....	<u>2001-06-05</u>	
Induced Draft Check.....	<u>< 0.005</u>	<u>OK</u>
Tunnel Velocity.....	<u>OK</u>	
Flow Rate 140 cfm $\pm$ 10%.		<u>143.30</u>

Pitot Leak Check:

Side A.....	<u>OK</u>	<u>OK</u>
Side B.....	<u>OK</u>	<u>OK</u>

Temperature System:

Ambient (65° - 90°F).....	<u>80.66</u> °F
Wood Heater Surface ($\pm$ 125°F).....	<u>-29.2</u> °F

Proportional Checks:

CO Analyzer Drift Check.....	<u> </u>
CO ₂ Analyzer Check.....	<u> </u>
O ₂ Analyzer Check.....	<u> </u>
Thermocouple check.....	<u>OK</u>

Train 1

Train 2

Sampling Train ID Numbers:

Probe.....	<u>4</u>	<u>7</u>
Filter Front.....	<u>1</u>	<u>3</u>
Filter Back.....	<u>2</u>	<u>4</u>
Filter Thermocouple.....	<u>13</u>	<u>16</u>
Filter 5G-3 (<90°F).....	<u>85</u>	<u>86</u>

Thermocouple Identification Number

Flue	1	Room	2	Dilution Tunnel Dry Bulb	3
Dilution Tunnel Wet Bulb	4	Unit Top	5	Unit Back	6
Unit Right Side	7	Unit Left Side	8	Unit Bottom	9
Catalyst/Combustion Chamber	10				

ITS Intertek Testing Services

Date: 2001-06-06Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 5Tech: CLAUDE PARÉ

SAMPLING EQUIPMENT CHECK OUT

Leakage Checks Tunnel Samplers

	04 SYSTEM 1 07		31 SYSTEM 2 25	
	Pre-Test	Post-Test	Pre-Test	Post-Test
Unplugged Flow Rate = .25cfm				
Vacuum (inches Hg.)	5	5	5	5
Final 1minute DGM (ft ³)	250.399	293.444	246.086	288.794
Initial 1minute DGM (ft ³)	250.394	293.440	246.084	288.790
Change (C) (ft ³)	0.005	0.004	0.002	0.002
Allowable leakage .04 x Sample rate or .02cfm	0.006	0.006	0.006	0.006
Check OK	OK	OK	OK	OK

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)		
Rotometer Reading (mm)		
Flow Rate (CFM)		
Allowable (.04 x Sample Rate)		
Check OK		

ITS Intertek Testing Services

Date: 2001-06-06Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 5Tech: CLAUDE PARÉ

Pre-Test Scale Audit

Scale Type	Audit Weight		Measured Weight	
Platform	6.60	lbs, Class F	6.60	lbs
Wood	2.20	lbs, Class F	2.20	lbs
Analytical	0.1000	mg, Class S	0.1000	mg

Post-Test Scale Audit

Scale Type	Audit Weight		Measured Weight	
Platform		lbs, Class F		lbs
Wood		lbs, Class F		lbs
Analytical		mg, Class S		mg

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%

ITS Intertek Testing Services

Date: 2001-06-06

Manufacturer: CHEMINÉE SÉCURITÉ

Model: BLS PANORAMA

WHI LTO#: 192-5233

Run: 5

Tech: CLAUDE PARÉ

FUEL DATA

PRE-TEST LOAD

FUEL DESCRIPTION:

Kindling weight: 4.95 lbs. Consisting of: DOUGLAS FIR Fire lit Time: 00:00

Pre-test load weight: 20.90 lbs. Consisting of: 2X4X 11 inches Time loaded: 00:09

Pre-test moisture content: Corrected Dry: 22.6 % · Wet: 18.4 %

Test Air Control Settings: 1/2" OPENED Time: 00:55:30

Test Unit Fan Settings: FAN ON Time: 00:00

TEST LOAD

	Lower Limit	Ideal	Upper Limit
Test Load Weight:	18.08 lbs.	20.09 lbs.	22.10 lbs.
Fire Box Volume:	2.87 ft. ³	Ideal Length:	15 3/4 inches
Load Volume:	0.39 ft. ³	Loading Density:	6.53 lbs/ft ³
Number of Spacers	24 3/4x1 1/2x5	Load Density:	39.85 lbs/ft ³

Piece Size	Weight	Meter Moisture Content (% dry)*					
1/4" x 3 1/2" x 1 1/2" in.	1.94 lbs.	19.0	%	19.4	%	19.9	%
1/4" x 3 1/2" x 1 1/2" in.	1.96 lbs.	19.7	%	18.9	%	19.5	%
1/4" x 3 1/2" x 1 1/2" in.	1.96 lbs.	20.4	%	20.2	%	18.9	%
1/4" x 3 1/2" x 1 1/2" in.	1.88 lbs.	21.3	%	21.3	%	21.3	%
1/4" x 3 1/2" x 3 1/2" in.	3.91 lbs.	20.5	%	20.5	%	20.9	%
1/4" x 3 1/2" x 3 1/2" in.	3.89 lbs.	21.7	%	20.9	%	21.9	%
x x in.	lbs.		%		%		%

*uncorrected range = 17.9% to 23.1%

TEST LOAD WEIGHT: 18.75 lbs DRY WEIGHT: 7.07 kg.

AVERAGE MOISTURE CONTENT:
CORRECTED TO TWO PIN: (DRY) 20.4 % (WET) 16.9 %

COAL BED RANGE: 3.75 lbs. to 4.69 lbs. (20% to 25% of test load)

TEST CHARGE:
Time loaded: 01:57 Coal bed weight: 3.85 lbs. Coal bed weight = 20.5 % of test load weight

CHARCOALIZATION: good | - ~~X~~ - - - - - | poor

Tech: CLAUDE PARÉ

FILTER TYPE: Gelman 47mm A/E

Time:

192-p-9904

ITS Intertek Testing Services

Date: 2001-06-06Manufacturer: CHEMINEX SECURITEModel: BIS PANORAMAWHI LTO#: 198-5233Run: 5Tech: CLAUDE PARÉ

PRETEST DILUTION TUNNEL TRAVERSE RUN

Barometric pressure (P_{bar}) 29.94 (inches Hg.) Static pressure (P_s) 0.16 (inches w.c.)Inside diameter: Port A 6in. Port B 6in. Tunnel cross sectional area: 0.1963Ft^2

Pitot tube type: Standard

Traverse Point	Position (inches)	Velocity Head Δ_p (inches H_2O)	Tunnel Temperature ($^{\circ}\text{F}$)	$\sqrt{\Delta_p}$
A-Centroid	3.00	0.0725	141	0.2693
B-Centroid	3.00	0.0700	144	0.2646
A-1	0.40	0.0700	142	0.2646
A-2	1.50	0.0725	143	0.2693
A-3	4.50	0.0675	143	0.2598
A-4	5.60	0.0525	109	0.2291
B-1	0.40	0.0650	144	0.2550
B-2	1.50	0.0725	144	0.2693
B-3	4.50	0.0750	143	0.2739
B-4	5.60	0.0550	105	0.2345
		AVERAGE	134	0.2569

Adjustment factor application

$$V_s = K_p C_p F_p (\sqrt{\Delta_p})_{AVG} \sqrt{\frac{T_s}{P_s M_s}}$$

$$V_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{T_s}{P_s M_s}}$$

0.9625

Where,

 C_p = pitot tube coefficient = 0.84 for type S pitot Δ_p = manometer reading (inches H_2O) T_s = average absolute dilution tunnel temperature ($^{\circ}\text{F} + 460$) P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_s$
inches H_2O P_s = static pressure
13.6

$$F_p = \frac{(\sqrt{\Delta_p})_{avg}}{(\sqrt{\Delta_p})_{centroid}}$$

Adjustment factor for alternative pitot tube placement:

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured) K_p = 35.49 pitot tube constant, (conversion factor for english units) $(\sqrt{\Delta_p})_{avg}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point. $(\sqrt{\Delta_p})_{centroid}$ = average of the square roots of the velocity heads measured at the tunnel centroid (inches of H_2O)

192-r-9904

ITS Intertek Testing Services

Date: 2001-06-06Manufacturer: CHEMINÉE SÉCURITÉModel: BIS PANORAMAWHI LTO#: 192-5233Run: 5Tech: CLAUDE PARE

TEST DATA LOG

RAW DRY GAS METER READINGS

	System 1	System 2
Final (ft ³)	293.418	288.775
Initial (ft ³)	250.399	246.083

AMBIENT CONDITIONS

	Start	End
Barometer. (inches Hg)	29.94	29.94
Wet Bulb (°F)	63	65
Dry Bulb (°F)	78	81
Humidity (%)	43	41

Project #: 192-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-06-06

Run #: 5

Sheet # 10 of

Time loaded: 01:57

Elapsed time	Weight remaining	CO	CO ²	O ²	Flue gas temp	Room temp.	Tunnel temp.	Unit top	Unit back	Unit R. Side	Unit L. Side	Unit bottom	Cat. Exit	Cat. Center	Gas samp Rotameter	Dry gas meter #1	Rotam	Dry gas meter #2	Rotam	Dry gas meter #1			Dry gas meter #2			Tun velo	Draft	smoke
																				Temp Inlet	Temp Outlet	Filter Temp	Temp Inlet	Temp outlet	Filter temp			
0	18.75				441	79	267	525	425	430	421	222	909	547		250.399	60	246.083	55	75	75	80	75	75	81	0.0775	0.0575	OK
10	17.80				403	79	134	387	423	398	393	228	683	438		251.868	60	247.561	55	75	75	85	75	75	86	0.0775	0.060	OK
20	17.35				369	78	125	324	384	358	355	229	621	392		253.325	60	249.043	55	76	75	83	76	75	84	0.075	0.0575	OK
30	17.00				330	78	118	281	343	325	321	228	536	364		254.775	60	250.523	55	76	75	82	76	75	82	0.075	0.0575	OK
40	16.70				286	78	111	254	311	301	295	224	391	344		256.225	60	251.995	55	76	76	80	76	75	81	0.075	0.0475	OK
50	16.40				254	77	106	234	286	282	274	220	353	326		257.677	60	253.470	55	76	76	79	76	75	79	0.070	0.0425	OK
60	15.95				236	77	104	229	268	271	258	215	367	365		259.128	60	254.954	55	76	76	79	76	76	79	0.065	0.040	OK
70	15.30				239	78	103	234	256	266	247	211	419	442		260.577	60	256.418	55	76	76	79	76	76	79	0.060	0.040	OK
80	14.65				270	77	105	266	251	273	243	207	590	466		262.004	60	257.870	55	76	76	78	76	76	78	0.060	0.0425	OK
90	13.90				321	78	111	321	253	291	248	203	792	558		263.404	60	259.303	55	76	76	78	76	76	78	0.060	0.050	OK
100	13.15				369	79	117	381	260	306	259	200	935	586		264.796	60	260.677	55	76	76	78	76	76	79	0.060	0.0575	OK
110	12.35				405	79	123	396	266	320	267	197	1011	609		266.159	60	262.066	55	76	76	78	77	76	79	0.0575	0.060	OK
120	11.50				437	80	129	436	274	324	278	195	1048	713		267.531	60	263.398	55	76	76	79	77	76	80	0.0575	0.0625	OK
130	10.45				474	80	133	473	286	353	294	195	1285	623		268.851	60	264.669	55	77	77	80	77	76	80	0.060	0.0675	OK
140	9.25				554	80	145	561	300	361	308	194	1421	709		270.223	60	265.960	55	77	77	80	77	76	80	0.0575	0.075	OK
150	8.00				628	80	158	623	319	372	326	194	1446	755		271.634	60	267.388	55	77	77	80	77	76	80	0.055	0.080	OK
160	6.85				655	81	163	658	343	387	349	194	1458	790		272.955	60	268.665	55	77	77	81	77	76	80	0.055	0.080	OK
170	5.80				654	82	166	647	368	403	370	195	1423	758		274.418	60	270.020	55	77	77	80	77	77	80	0.055	0.080	OK
180	5.00				615	83	163	584	386	414	385	196	1333	702		275.725	60	271.406	55	77	77	80	77	77	81	0.055	0.0775	OK
190	4.35				596	83	160	542	395	420	394	198	1269	675		277.044	60	272.737	55	77	77	82	77	77	83	0.055	0.0775	OK
200	3.65				582	82	158	531	402	421	399	199	1286	689		278.327	60	274.030	55	77	77	83	77	77	84	0.0575	0.0775	OK
210	3.05				574	83	157	526	410	422	403	200	1240	679		279.655	60	275.325	55	77	77	83	77	77	85	0.0575	0.075	OK
220	2.60				522	84	152	496	419	422	407	202	966	687		281.008	60	276.638	55	77	77	84	78	77	85	0.060	0.070	OK
230	2.25				478	83	144	462	430	422	414	203	893	670		282.328	60	277.975	55	78	77	84	78	77	85	0.060	0.0675	OK

Technician: CLAUDE PARÉ

☐ Pre Test

☒ Test

Project #: 192-5233

Client: CHEMINÉE SÉCURITÉ

Date: 2001-06-06

Run #: 5

Sheet # 11 of 11

Time loaded: 01:57

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Technician: CLAUDE PARÉ

□ *Pre Test*

☒ *Test*

192-v-9904

Project #: 192-5233

Client: CHEMINÉE SECURITE

Date: 2001-06-06

Run #: 5

Sheet # 9 of

Time loaded: 01:57[illegible]

Technician: CLAUDE PARÉ

☒ *Pre Test*

□ *Test*

APPENDIX B
Laboratory Operating Procedures

SFBA EMISSIONS AND EFFICIENCY TESTING
LABORATORY OPERATING PROCEDURE

INTRODUCTION

This document provides a step by step guide for the technician conducting tests to Oregon and/or EPA standard requirements. Procedures outlined here, when followed, will result in tests in conformance with Oregon Department of Environmental Quality Method Om42 and EPA Methods 28 and 5G.

The primary measurements to be made are particulate emissions rates for EPA and particulate and efficiency measurements for Oregon. The Warnock Hersey E&E test procedures are largely automated with a computer monitoring the test. The technician's duties include the following steps.

1. Incoming inspection of test units.
2. Set-up of test units.
3. Preliminary testing to establish unit operating procedures and familiarity with operating controls.
4. Calibration of test equipment.
5. Set-up, checking and operation of sampling apparatus.
6. Conduct of tests including complete record keeping and data recording for non-automated functions.
7. Operation of hardware and software included in automatic data acquisition system.
8. Review and analysis of data at test completion to ensure test validity.

The technician running this test must be familiar with the following documents, which are to be kept in the laboratory at all times.

1. EPA METHODS

- a. Method 28
- b. Method 28a
- c. Method 2
- d. Method 3
- e. Method 4
- f. Method 5
- g. Method 5G
- h. Method 5H
- i. Method 10

2. OREGON METHODS

- a. Wood Stove Certification Regulations, Chapter 340, Division 21, Sections 100-166.
- b. OM7
- c. OM4
- d. OM42
- e. OM5

SFBA EMISSIONS AND EFFICIENCY TESTING
LABORATORY OPERATING PROCEDURE

Test forms and checks lists are provided for all critical steps.

I. APPLIANCE INSPECTION AND SET-UP

A. INCOMING INSPECTION

1. Check for completeness of unit including parts, accessories, installation and operating instructions, drawings and specifications etc. Note any discrepancies or missing parts or information.
2. Check for shipping damage. If damage has occurred, notify the laboratory manager. In some cases, repairs may be made, provided the manufacturer and laboratory manager concur that repairs will not affect the unit's performance. If damage is irreparable, a new unit will need to be obtained.
3. Note whether unit is catalytic or non-catalytic.
4. Mark unit with manufacturer's name, model number, work order number and date received.
5. If unit is safety listed, note label data including listing agency and serial number. If unit is not listed, mark all data sheets "UNLISTED". Test results will not be released until unit passes safety tests without modification unless authorized by laboratory manager.

B. UNIT SET-UP

1. All new units must be operated for a breaking in period as follows.
 - a) Non-catalytic units: Ten (10) hours at medium burn rate with Douglas Fir scrap or cordwood.
 - b) Catalytic units: Fifty (50) hours at medium burn rate with Douglas Fir scrap or cordwood.

During these break-in runs the unit may be connected to a lab chimney. For catalytic units, a thermocouple must be installed in the catalyst.

Record catalyst temperature at 1-hour intervals or on chart recorder. Operating should continue until data shows at least fifty (50) hours of operation with catalyst temperature in excess of 800 degrees Fahrenheit (active range).

For non-catalytic units a stack thermocouple should be installed and stack temperature recorded at 1-hour intervals. Ten (10) hours minimum burn time with a stack temperature of at least 250 degrees Fahrenheit is required.

2. Once break-in is completed, allow unit to cool. Clean unit thoroughly.

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3. Unit is to be placed on scale for testing. Prior to placing unit on scale, scale should be turned on and allowed to warm up for one (1) hour minimum. Zero scale and check calibration with standard weights. Two (2) 100 pound weights, two (2) 75 pound weights, one (1) 50 pound weight, one (1) 10 pound weight and one (1) 5 pound weight are provided for this purpose. Use scale calibration test form to record results. If scale fails to reproduce weights within tolerance, check with laboratory manager before proceeding.
4. If scale checks out, place unit on scale and align so chimney will be centered in hood. Note unit weight.
5. Attach chimney connector and chimney. Be sure all joints are sealed below sampling points. Chimney and connector should be cleaned with a wire brush. Be sure chimney connector terminates and chimney starts at proper level above scale platform. Chimney must be supported from scale so that it does not touch test enclosure or hood walls.
6. Thermocouples should be attached to surfaces of unit prior to testing. EPA requires a thermocouple on the bottom of the firebox. This must be installed prior to putting the unit on the scale. In some cases, the required thermocouple locations will be inaccessible on finished units. These units should have thermocouples installed by the manufacturer during construction. Check with the laboratory manager if problems are encountered in proper thermocouple attachment.
7. Measure firebox dimensions and record on appropriate data form. Make a three dimensional sketch of the firebox including firebrick, baffles and obstructions. Calculate firebox volume in cubic feet. See Section 6.2.4 of EPA Method 28 for details of firebox volume determination.
8. If unit is catalytically equipped, additional thermocouples must be installed upstream and downstream of catalyst. Thermocouples should also be placed in the primary and secondary combustion chambers of all units.
9. Plug thermocouples into data acquisition system jacks making a record of location and jack number for each specification file through the use of the LABTEK software.
10. Note that inserts are tested as if they are freestanding stoves.
11. Dilution tunnel should be cleaned prior to each certification test series and at anytime a higher burn rate follows a lower test burn rate.

II. SAMPLING SYSTEM – SET-UP

A. GAS ANALYSIS

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

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2. Calibrate analyzers as follows:

NOTE : Prior to calibrating, make sure that the outlet pressure on each calibration gas bottle reads 10 PSI. Adjust flow meter if necessary at each instrument to required flow value.

- a) With calibration switch at "SPAN" adjust span control to values specified on calibration gas label.
- b) Switch to "ZERO" and adjust zero controls to provide a 0.00 analyzer readout.
- c) Repeat a) and b) until no further adjustment is required.
- d) Switch to "CAL." and check readout vs. calibration gas label.

The CO₂ and CO analyzers are "ZEROED" on nitrogen. The O₂ analyzer is spanned on air and set for 20.93%. It is zeroed on nitrogen as well.

3. Check for response time synchronization.

- a) With switch at "SAMPLE" and no fire in unit, allow reading to stabilize (O₂ should be 20.93, CO and CO₂ should equal 0).
- b) Switch to "CAL" setting and start stop watch. Note the time required for each unit to reach the calibration gas bottle value. If all three analyzers reach this value within 5 seconds of each other, synchronization is adequate. If not, contact the laboratory manager. Synchronization is adjusted by internal instrument setting.

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

- a) Load impingers as follows:
Impinger #1: 100 ml distilled water and 5 ml H₂SO₄
Impinger #2: 100 ml distilled water and 5 ml H₂SO₄
Impinger #3: Empty
Impinger #4: 200 - 300 grams silica gel (dry)
- b) Weigh and record each impinger.
- c) Place impingers in container and connect with "U TUBES". Grease carefully on bottom half of ball joint so that grease will not get into tubes.
- d) Connect filter to first impinger and sample line to last impinger.

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e. Leak check system so follows.

- 1) Plug probe.
- 2) Turn on sample system.
- 3) Observe sample flow rotometer and vacuum gauge. If necessary, use vacuum; adjust valve to set vacuum to 15 inches Hg.
- 4) If the float in rotometer does not stabilize below 10 on scale, system must be resealed.
- 5) Repeat leak check procedure until satisfactory results are obtained.

f) Just prior to starting test, fill impinger container with water and ice.

B. DILUTION TUNNEL SAMPLE TRAIN SET-UP

1. Filters and holders.

- a) Clean probes and filter holder front housings carefully and desiccate for at least 24 hours prior to use.
- b) Filters should be numbered and filter and probe combinations labeled prior to use.
- c) Weigh desiccated filters and probe-filter units on analytical balance. Record weights on appropriate form. Note that probe and front half of front filter are to be weighed as a unit.
- d) Carefully assemble filter holder units and connect to sampling systems. Check "DRIERITE" columns for adequate dry absorbent (blue).

2. Leak checking.

- a) Each sample system is to be checked for leakage prior to inserting probes in tunnel.
- b) Plug probes and start samplers, adjust pump bypass valve to produce a vacuum reading of 5 inches Hg. (NOTE: During test, vacuum must not exceed 5 inches unless posttest leak check shows acceptable results.)

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- c) Allow vacuum indication to stabilize for two (2) minutes, then record time and rotometer and dry gas (DGM₁) and (DGM₂) meter readings. Wait ten (10) minutes and record dry gas meter readings again (DGM₃, DGM₄). NOTE: If mark, system is leaking too much and all seals should be checked. If the ball is bouncing, use dry gas meter reading to determine leakage rate.
- d) Calculate leakage rate as follows.

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

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

If CFM₁ or CFM₂ is greater than .02 CFM, leakage is unacceptable and system must be resealed.

If CFM₁ or CFM₂ is greater than 0.04 X sample rate, leakage is unacceptable. For most tests, the sample rate will be about 0.3 CFM, thus leakage rates in excess of 0.04 X 0.3 = 0.012 CFM are not acceptable.

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

III. TEST CONDUCT

A. FUEL LOAD

1. Determine optimum load weight by multiplying firebox volume in cubic feet by 7. This is the load weight on an as-fired basis.
2. Determine piece size mix i.e. < 1.5 cubic feet volume use 2 X 4's; 1.5 - 3.0 ft³ use a mix of 2 X 4's and 4 X 4's; > 3.0 ft³ use 4 X 4's. Length is to be 5/6 longest firebox dimension.
3. Weigh out test load and appropriate number of spacers and adjust weight by shortening all pieces equally if necessary.
4. Construct two test loads by attaching spacers as shown in standards.

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5. Measure and record moisture content of each fuel piece using Delmhorst moisture meter. Determine if fuel load moisture content is in required range. If not, construct new load using wood with required moisture content. All wood in the humidity chamber is Douglas Fir and should be within range. Contact laboratory manager if you cannot find suitable pieces.
6. When cutting test load, clean saw before starting and collect sawdust. Mix sawdust well and retain a sample for calorimeter analysis. Also retain a 3 to 6 inch piece of each 2 X 4 or 4 X 4 used for oven dry moisture content determination.

B. UNIT START-UP

1. Before lighting a fire, turn on dilution tunnel and set flow rate to 140 SCFM if burn rate is to be less than 3 kg/hr or to an appropriate rate from table provided in laboratory for higher burn rates.
2. Check draft imposed on cold stove with all inlets closed and a draft gauge in the chimney. If draft is greater than 0.005 inches water column, adjust tunnel to stack gap until draft is less than 0.005.
3. Check for ambient airflow around unit with hot wire anemometer. Must be less than 50 ft/min.
4. Check all equipment for proper operation. Analyzers should be on and in sample mode. Computer should be loaded with test program and awaiting test start command.
5. Zero scale and start fire with newspaper and Douglas Fir kindling.
6. Once kindling is burning well add scraps of Douglas Fir fuel to approximate test load weight. Operate at high fire for sufficient time to get fuel load burning well. Then adjust settings to intended test run levels.
7. When fuel load weight indicated reaches 50% of test charge weight, start computer for data logging. The computer will sound an audible prompt and provide instructions for start of test run.

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C. TEST RUN

1. When pretest fuel load reaches 40% of standard charge weight, the coal bed is to be checked. If necessary, poke and stir the fire to provide for a more uniform charcoal bed at this time. This should be done in the minimum amount of time necessary.

Make the appropriate entry to the log sheet once this operation is completed.

2. When the fuel bed reaches 25% of the test charge weight, the test is to be started as follows.

- a) Insert the sample probes into the tunnel being careful not to hit sides of tunnel with probe tip.
- b) Check tunnel pitot tube for proper position. (Pitot should be carefully cleaned prior to each test.)
- c) Turn on probe sample systems and stack sampler.
- d) Open stove door, rake coals and load stove.
- e) Close door or follow manufacturer's start-up procedures. (Five (5) minutes maximum time before all doors and controls must be set to final positions for duration of test.)
- f) The computer will sound an alarm at the (10) minutes intervals and display a time throughout the test. This signals a reading interval. You must record at each interval the following readings on the data form:

- 1) Rotometer readings.
- 2) Tunnel pitot tube reading.
(Zero regularly between readings)
- 3) Dry gas meter readings.
- 4) Pressure gauge readings.
- 5) Observations of any unusual or non-routine events.

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

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

IV. POST TEST PROCEDURES

A. SAMPLE RECOVERY – FILTER TRAINS

1. Carefully clean outside of probes and filter housings with alcohol.
2. Disassemble filter holder and transfer filters to clean petri dish. Scrape gasket with scalpel and collect any loose material on filters.
3. Place probe and front half of first filter holders (still assembled) and filters in desiccator. Allow 24-hour desiccation before weighing.
4. Weigh probe filter holder units and filters at two (2) hour intervals until weight change between weighings is less than 0.5 mg. Record all weights taken on appropriate data form.

B. STACK WATER MEASUREMENT

1. Disassemble impinger train and clean grease from ball joints.
2. Carefully clean and dry outside of impingers.
3. Weigh impingers and record final weight on data form.
4. Calculate weight gain as indicated.

C. CALCULATION OF RESULTS

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

D. OTHER TESTS

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

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GENERAL

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

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

APPENDIX C
Sampling Proportionality Results

(EPA Formulas from PR5G)

Manufacturer: Chem. Sec.
Model: Bis Panorama
Date: 2001-04-23
Run: 1

536.824
536.676
625.176
15.59554
149.6284

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
102.39	101.28	1.277	1.295	10
95.36	98.33	1.187	1.256	20
92.66	94.83	1.151	1.208	30
91.88	98.33	1.143	1.255	40
109.25	109.07	1.356	1.388	50
104.43	105.03	1.295	1.336	60
98.18	99.80	1.218	1.269	70
102.92	97.06	1.280	1.239	80
100.86	100.08	1.259	1.281	90
95.12	94.98	1.191	1.220	100
97.63	96.28	1.227	1.242	110
98.63	97.96	1.244	1.267	120
100.10	99.32	1.266	1.288	130
98.59	97.97	1.274	1.298	140
98.70	97.87	1.277	1.299	150
100.73	99.35	1.280	1.295	160

(EPA Formulas from PR5G)

Manufacturer: Chem. Sec.
Model: Bis Panorama
Date: 2001-04-23
Run: 2

537.858
537.745
565.868
13.87048
145.5298

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
91.93	92.48	1.360	1.373	10
90.14	92.84	1.340	1.386	20
91.85	94.56	1.369	1.415	30
92.68	96.98	1.328	1.394	40
95.49	98.57	1.370	1.420	50
99.25	101.56	1.425	1.464	60
104.41	105.69	1.434	1.457	70
100.06	100.40	1.408	1.418	80
95.10	99.22	1.338	1.402	90
96.32	101.46	1.323	1.399	100
103.82	104.30	1.389	1.401	110
101.23	99.87	1.353	1.340	120
101.92	98.88	1.360	1.324	130
102.16	105.99	1.362	1.418	140
100.81	107.71	1.342	1.439	150
101.64	105.85	1.350	1.412	160
100.42	99.62	1.333	1.327	170
99.64	99.14	1.320	1.319	180
100.71	100.87	1.331	1.338	190
102.45	98.25	1.350	1.300	200
98.26	99.30	1.294	1.313	210
104.21	103.58	1.374	1.371	220
109.61	104.63	1.444	1.383	230
102.90	100.48	1.355	1.328	240
104.21	105.28	1.374	1.393	250
103.52	98.97	1.367	1.312	260
103.04	100.64	1.363	1.336	270
103.10	104.30	1.365	1.386	280
100.87	104.44	1.338	1.390	290
99.83	99.20	1.325	1.322	300
99.67	97.35	1.324	1.298	310
99.96	97.42	1.328	1.299	320
100.55	97.34	1.337	1.299	330
99.95	97.34	1.330	1.300	340
100.10	97.34	1.332	1.300	350
100.37	97.40	1.337	1.302	360
99.94	97.48	1.331	1.303	370
100.61	97.55	1.340	1.304	380
100.23	97.46	1.336	1.304	390
100.09	98.85	1.334	1.323	400
100.60	100.54	1.341	1.346	410
99.92	100.45	1.334	1.346	420
100.13	100.00	1.337	1.341	430
100.33	100.35	1.341	1.347	440
99.96	100.35	1.336	1.347	450
100.67	99.96	1.347	1.343	460
99.50	99.87	1.333	1.343	470
100.08	100.31	1.340	1.349	480
100.06	99.64	1.341	1.341	490
99.84	100.22	1.338	1.349	500
100.26	100.06	1.345	1.348	510
99.61	99.62	1.336	1.342	520

(EPA Formulas from PR5G)

Manufacturer: Chem.Sec.
Model: Bis Panorama
Date: 2001-04-25
Run: 3

536.081
535.959
582.432
14.27988
147.8599

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
98.10	99.79	1.437	1.462	10
95.93	98.48	1.416	1.454	20
95.12	98.00	1.408	1.450	30
96.66	97.27	1.434	1.443	40
100.46	100.40	1.435	1.434	50
100.55	99.83	1.435	1.425	60
100.22	99.50	1.429	1.419	70
99.56	98.62	1.417	1.404	80
103.10	100.64	1.406	1.373	90
99.71	100.45	1.358	1.368	100
98.19	97.53	1.332	1.324	110
97.45	100.55	1.316	1.358	120
101.82	105.47	1.377	1.427	130
99.57	100.70	1.344	1.360	140
103.83	97.28	1.401	1.312	150
103.25	103.79	1.393	1.400	160
100.25	103.88	1.351	1.400	170
104.86	105.32	1.414	1.421	180
98.90	98.45	1.334	1.328	190
97.92	96.37	1.322	1.301	200
98.19	96.36	1.328	1.303	210
99.69	98.98	1.352	1.342	220
101.56	101.23	1.379	1.375	230
101.09	99.06	1.375	1.348	240
100.70	99.47	1.372	1.356	250
99.76	100.06	1.359	1.364	260
100.08	99.65	1.367	1.362	270
99.54	99.26	1.362	1.359	280
100.23	99.74	1.374	1.368	290
99.14	99.51	1.360	1.366	300
99.77	98.92	1.370	1.359	310
99.32	99.63	1.365	1.370	320
99.44	99.45	1.369	1.370	330
99.44	99.16	1.369	1.366	340
99.35	99.36	1.369	1.370	350
99.42	99.51	1.370	1.372	360

(EPA Formulas from PR5G)

Manufacturer: Chem.Sec.
Model: Bis Panorama
Date: 2001-04-26
Run: 4

536.014
535.857
586.371
14.70826
150.9491

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
92.58	93.17	1.375	1.403	10
93.53	93.85	1.374	1.398	20
94.42	94.48	1.364	1.384	30
95.87	97.04	1.360	1.396	40
97.90	98.18	1.361	1.385	50
99.59	100.86	1.357	1.394	60
102.30	102.53	1.363	1.386	70
102.24	103.06	1.361	1.392	80
101.74	102.79	1.352	1.386	90
102.68	103.21	1.361	1.388	100
102.12	102.65	1.350	1.377	110
102.09	103.15	1.345	1.379	120
102.28	101.67	1.344	1.355	130
100.57	101.92	1.320	1.356	140
101.19	102.54	1.326	1.362	150
101.19	101.19	1.326	1.345	160
101.56	100.58	1.331	1.338	170
101.85	100.95	1.336	1.344	180
102.15	100.80	1.340	1.342	190
101.91	101.46	1.338	1.351	200
101.97	100.77	1.341	1.345	210
101.50	100.68	1.336	1.345	220
100.52	99.03	1.325	1.324	230
97.13	97.45	1.282	1.305	240
96.75	97.67	1.278	1.309	250
97.63	97.13	1.292	1.304	260
99.00	96.88	1.313	1.304	270
100.00	96.92	1.329	1.306	280
99.93	98.09	1.329	1.323	290
100.12	100.29	1.333	1.354	300
100.20	100.51	1.334	1.357	310
99.89	100.64	1.331	1.360	320
99.81	101.38	1.330	1.370	330
100.03	100.47	1.333	1.358	340

(EPA Formulas from PR5G)

Manufacturer: Chem. Sec.
Model: Bis Panorama
Date: 2001-06-06
Run: 5

536.766
536.688
597.750
14.33882
143.3037

PR1	PR2	#1 dDGM Vol.Std. (ft3)	#2 dDGM Vol.Std. (ft3)	Time
				0
94.39	95.68	1.442	1.464	10
94.35	96.69	1.429	1.467	20
93.33	95.98	1.422	1.465	30
92.68	94.88	1.421	1.457	40
95.64	97.98	1.423	1.460	50
99.01	102.02	1.422	1.467	60
102.82	104.66	1.420	1.447	70
101.44	103.99	1.398	1.436	80
100.05	103.17	1.372	1.417	90
100.00	100.89	1.364	1.378	100
100.54	101.64	1.335	1.352	110
101.72	99.40	1.344	1.316	120
95.95	93.17	1.291	1.255	130
102.90	97.64	1.342	1.275	140
109.36	111.61	1.380	1.411	150
102.80	100.21	1.292	1.261	160
114.12	106.49	1.431	1.337	170
101.71	108.67	1.278	1.368	180
102.40	104.10	1.290	1.313	190
97.26	98.75	1.255	1.276	200
100.58	98.82	1.299	1.278	210
99.91	97.59	1.323	1.295	220
96.75	98.73	1.290	1.318	230
98.67	99.21	1.320	1.329	240
100.82	98.51	1.353	1.324	250
101.15	98.86	1.360	1.331	260
100.77	98.62	1.357	1.330	270
100.74	98.89	1.359	1.336	280
100.58	98.39	1.358	1.330	290
100.50	98.56	1.358	1.334	300
100.70	97.95	1.362	1.327	310

APPENDIX D
Calibration Data

EQUIPMENT LIST

and

CALIBRATION MATRIX

<u>NO. EQUIP.</u>	<u>EQUIPMENT</u>	<u>FREQUENCY</u>	<u>AGENCY</u>
180-220	Sling psychrometer	none (mercury type)	n/a
180-169	Gas Analyzer	each test (initial and final)	ITS
180-265	Calibration gases	on purchase	Air Liquide
180-156	Draft Indicator	annual	Chevrier
180-252/253	Vacuum gauges	annual	Chevrier
180-250/251	Pressure gauges	annual	Chevrier
180-221	Reference Dry Gas Meter	annual	Canadian Meter
180-175/176	Dry Gas Meter (metering system)	semi-annual and each series	ITS
180-184	Pitot type "S"	semi-annual	ITS
180-222	Hot Wire Anemometer	semi-annual	ITS
180-170	Analytical scale	semi-annual	ITS and Papp
180-083	Scale 0-8000 gr.	annual	Papp
180-129/130	Readout for 1000 lbs scale	annual	Papp
180-110/195/266	Calibration weights	5 years	Marconi
180-219	Moisture meter	each series	ITS
180-223	Calibrator t/c	annual	Primo
180-231/230	Temperature recorder	semi-annual	ITS

DRAFT GAUGE

Certificat d'étalonnage-Pression Différentielle Calibration Certificate-Differential Pressure

Description	Manomètre Différentiel Magnehelic Dwyer modèle 2000-00	Numéro de série Serial number	-
Plage Range	0/0.25 "H ₂ O	Identification	180/156
Précision Accuracy	±4% P.É.	Reçu conforme Received in specs	Oui
Client / Customer	ITS SERVICES D'ESSAIS INTERTEK 1802	Quitte conforme Leaving in specs	Oui
Bon de travail Work order #	3673-05	Réparation (o/n) Repaired (y/n)	Non
Conditions d'étalonnage à l'ambiante Ambient conditions at time of calibration	24°C	42%HR	30.28 poHg
Remarque(s) Comments			

Appliquée Applied "H ₂ O"	Lectures Readings		Lectures Readings	
	(ascendantes) (ascending)	Erreur Error	(descendantes) (descending)	Erreur Error
0,0000	0,000	0,0000	0,000	0,0000
0,0592	0,055	-0,0042	0,055	-0,0042
0,1191	0,115	-0,0041	0,115	-0,0041
0,1805	0,185	0,0045	0,185	0,0045
0,2490	0,255	0,0060	0,255	0,0060

L'instrument ci-haut mentionné a été étalonné selon la méthode de comparaison en conformité avec ANSI B40.1-1985

The above instrument was calibrated using the comparison method in conformance with ANSI B40.1-1985

Étalons utilisés retraceable au C.N.R.C / N.I.S.T.- Standards used C.N.R.C / N.I.S.T. Traceable

CHEV029, Simulateur/manomètre numérique différentiel Furness Controls, modèle PPC500, n/s 960294, certificat #FC100-145-02 référencé au NIST. Date due 24 mai 2001.

CHEV029, DIFFERENTIAL PRESSURE CALIBRATOR PPC500 FROM FURNESS CONTROLS S/N 960294, NIST TRACEABLE CERTIFICATE #FC100-145-02, DUE DATE MAY 24TH, 2001.

Certifié par
Certified by

Benoit Lamber

Date

2000/11/06

Date due
Due Date

2001/11/06

Numéro du certificat
Certificate number

3673-05-1802

C.Q.
B.L.

C.Q.
DC

PITOT TUBE
TYPE "S"

FICHE DE CALIBRATION

Tech: CLAUDE PARÉ Date: 2000-12-21

ÉQUIPEMENT

	Instrument à calibrer	Référence	Montage
TYPE	PITOT TYPE S	PITOT STANDARD	TUNNEL
NO. ÉQUIPEMENT	180-184	180-183	180-254

CONDITIONS

TEMPÉRATURE DE L'AIR:	72.2	(°F)
HUMIDITÉ:	23	(%)
PRESSION BAROMÉTRIQUE:	29.97	("Hg)

RÉSULTATS

REFERENCE			INSTRUMENT	
V _t	V _p	dP _(st)	dP _s	C _{p(s)}
300	300	0.0056	0.006	0.966
400	396	0.0098	0.013	0.868
500	497	0.0154	0.021	0.856
750	748	0.0349	0.051	0.827
1000	998	0.0621	0.093	0.817
1500	1503	0.1408	0.206	0.827
2000	1997	0.2488	0.353	0.840
/	/	/	/	/
/	/	/	/	/
/	/	/	/	/

$$V_p = K_p C_{p(st)} (dP_{(s)})^{1/2} (T_s / (P_s M_s))^{1/2} \quad \text{et}$$

$$C_{p(s)} = (dP_{(st)} / dP_{(s)})^{1/2}$$

ou

V_t: Vitesse cible du tunnel, pi/min

C_{p(s)}: Constante du pitot type S

V_p: Vitesse du pitot, pi/sec

$$K_p = 85.49 \text{ pi/sec}$$

$$C_{p(st)} = 0.99$$

$$M_s = 28.56 \text{ lb/lb-mol}$$

dP: Dépression, " H₂O

T_s: Température air, (°F+460 °R)

$$P_s = P_{bar} + P_g, " H_g$$

P_{bar}: Pression barométrique, "H_g

P_g: Pression statique, "H_g

[Signature]

HOT WIRE
ANEMOMETER

Certificat d'étalonnage-Vélocité Calibration Certificate-Velocity

Description	Thermo-anémomètre Oméga (Kane May) HHF51	Numéro de série Serial number	34362/1
Plage Range	10/6000 pi/min	Identification	180/222
Précision Accuracy	±3% V.M. ou ±1% P.É.	Reçu conforme Received in specs	Non
Client / Customer	ITS Services d'essais Intertek 1802	Quitte conforme Leaving in specs	Oui
Bon de travail Work order #	3673-09	Réparation (o/n) Repaired (y/n)	Non
Conditions d'étalonnage à l'ambiante Ambient conditions at time of calibration	21.0°C	42%HR	30.20poHg
Remarque(s) Comments			

Appliquée Applied	Lectures Avant Before Readings	Lectures Après After Readings	Erreur Error
pi/min			
100	150	160	60
1500	1460	1560	60
3000	2770	2960	-40
4500	4090	4370	-130
5000	4730	5050	50

Mode d'étalonnage CHEV031 Tuyère de calibration Airflow Developments type 83 FSL #VM7154670 et plaques orifices étalonnées. Différentiel de pression mesuré avec manomètre incliné type 4/5 de Airflow Developments n/s 45150, précision ±0.3% v.m., certifié NIST #991012CHEV.032, date due 12 octobre 2000. Tube de Pitot Airflow #VAA7251001, F.C. .997, et simulateur/manomètre numérique différentiel de Furness Controls, modèle PPC500, n/s 960294, certificat FCI99-126-01 référencé au NIST, date due 24 mai 2001.

Calibration CHEV031 Airflow Developments Calibration Tunnel, type 83 FSL #VM7154670 with orifice plates. Differential pressure measured with an inclined manometer type 4/5 from Airflow Developments s/n 45150 NIST certified #991012CHEV.032, due date October 12th, 2000. Airflow Pitot Tube #VAA7251001, C.F. .997, and simulator/digital differential pressure gauge from Furness Controls, model PPC500, s/n 960294, certificate FCI99-126-01, traceable to NIST, calibration due May 24th 2001.

Certifié par
Certified by

Marc-André Gilbert

Date 2000/11/06

Date due
Due Date 2001/11/06

Numéro du certificat
Certificate number 3673-09-1802

CALIBRATION WEIGHTS

TRACEABLE CERTIFICATE

Purchase Order Number 1684
 Company GENEQ INC
 Address 8047 JARRY ST E
 MONTREAL, PQ H1S 1H6
 CANADA
 City & State
 Date Received 8-28-96
 Date of Test 9-16-96
 Temperature 22°C
 RH 45%
 mmHg 731.8
 Description of Weights 10mg-500mg Polished Kit, Class "1", S/N S864



Density (g/cm³) Assumed 7.95 g/cm³

Traceable Report Number 228853

(Rice Lake Weighing Systems) NIST Certificate Number 822/254143-94

Tested By 03 Balance Used 634-Q

Weighing Design Modified Substitution

Last Date Primary Standard Was Calibrated 11-2-94 Due 11-2-04

Last Date Working Standard Was Calibrated 6-13-96 Due 10-13-96

Standards Used 594-Q

NOMINAL MASS VALUE	AS FOUND vs. 8.0 g/cm³	AS LEFT vs. 8.0 g/cm³	TOLERANCE	UNCERTAINTY MILLIGRAMS
10 mg	0.003 mg	0.003 mg	0.010 mg	0.003 mg
20 mg	0.004 mg	0.004 mg	0.010 mg	0.002 mg
20 mg w/dot	0.003 mg	0.003 mg	0.010 mg	0.002 mg
50 mg	0.000 mg	0.000 mg	0.010 mg	0.003 mg
100 mg	0.001 mg	0.001 mg	0.010 mg	0.005 mg
200 mg	0.004 mg	0.004 mg	0.010 mg	0.005 mg
200 mg w/dot	0.004 mg	0.004 mg	0.010 mg	0.005 mg
500 mg	0.000 mg	0.000 mg	0.010 mg	0.006 mg

☐ This report contains data not covered by ANSI/NCSL Z540-1

Check with your local state agency for certification of compliance on legal-for-trade items.

Prepared By:

Page 1 of 1

Dated 09-16-96



230 West Coleman Street • Rice Lake, WI 54868 • USA
 TEL: 715-234-9171 • FAX: 715-234-6967

Signed Debbie Scheffler
 Title LAB TECHNICIAN

This report is not to be used to claim product endorsement by Rice Lake Weighing Systems or any agency of the U.S. Government.
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PN 35659 4/96



COMPAGNIE MARCONI CANADA
CANADIAN MARCONI COMPANY

600, Boulevard Dr.-Frederik-Philips
Ville Saint-Laurent (Québec), Canada H4M 2S9
Téléphone: (514) 748-3148 Fax: (514) 748-3014

Certificat/Certificate 27295-542

CERTIFICAT D'ÉTALONNAGE - CALIBRATION CERTIFICATE

Client
Customer GENEQ INC.

Instrument WEIGHTS Type 294-Pd

Fabricant
Manufacturer CHAUS No de série
Serial No -

No de stock du client
Customer inventory No 5882 Procédé d'étalonnage
Calibration procedure NIST HANDBOOK III

Cycle d'étalonnage
Calibration cycle 1 YEAR Date d'échéance
Due date 07 OCT '97

La présente sert à certifier que l'on a procédé à l'étalonnage de l'instrument décrit ci-dessus, avec les étalons de la Société, qui sont approuvés par le Conseil national de recherches - Canada ou par le National Institute of Standards and Technology des E.-U. (ou les deux). L'étalonnage a été effectué selon vos exigences.

This is to certify that the instrument listed above was calibrated against Company Standards which are directly traceable to the National Research Council, Canada and/or the National Institute of Standards, U.S.A. Calibration was performed in accordance with your requirements.

ÉTAT DE L'INSTRUMENT/CONDITIONS OF INSTRUMENT

À la réception / Received

☒ ☐ ☐
Selon les spéc. Hors des spéc. Réparation nécessaire
IN specs. OUT of specs. Required repair

Au retour / Returned

☒ ☐
Selon les spéc. Hors des spéc.
IN specs. OUT of specs.

CONDITIONS DE MESURE/MEASUREMENT CONDITIONS

Température 20.02°C Humidité 44.67 %
Temperature Humidity



COMPAGNIE MARCONI CANADA
CANADIAN MARCONI COMPANY

Étalons utilisés / Transfer standards B0 5477, 101713

COMMENTAIRES / REMARKS

07 OCT '96

Date

L. S. M. D.
Technicien / Technician

Approuvé par / Approved by



COMPAGNIE MARCONI CANADA
CANADIAN MARCONI COMPANY

600, Boulevard Dr.-Frederik-Philips
Ville Saint-Laurent (Québec), Canada H4M 2S9
Téléphone: (514) 748-3148 Fax: (514) 748-3014

Certificat/Certificate 27295-543

CERTIFICAT D'ÉTALONNAGE - CALIBRATION CERTIFICATE

Client
Customer GENEG INC.

Instrument WEIGHTS Type 1 & 2 kg.

Fabricant
Manufacturer - No de série
Serial No S-862/S-863

No de stock du client
Customer inventory No - Procédé d'étalonnage
Calibration procedure NIST HANDBOOK III

Cycle d'étalonnage
Calibration cycle 1 YEAR Date d'échéance
Due date 07 OCT '97

La présente sert à certifier que l'on a procédé à l'étalonnage de l'instrument décrit ci-dessus, avec les étalons de la Société, qui sont approuvés par le Conseil national de recherches - Canada ou par le National Institute of Standards and Technology des E.-U. (ou les deux). L'étalonnage a été effectué selon vos exigences.

This is to certify that the instrument listed above was calibrated against Company Standards which are directly traceable to the National Research Council, Canada and/or the National Institute of Standards, U.S.A. Calibration was performed in accordance with your requirements.

ÉTAT DE L'INSTRUMENT/CONDITIONS OF INSTRUMENT

À la réception / Received



Selon les spéc.
IN specs.



Hors des spéc.
OUT of specs.



Réparation nécessaire
Required repair

Au retour / Returned



Selon les spéc.
IN specs.



Hors des spéc.
OUT of specs.

CONDITIONS DE MESURE/MEASUREMENT CONDITIONS

Température 20.0 Humidité 43.8
Temperature °C Humidity %



COMPAGNIE MARCONI CANADA
CANADIAN MARCONI COMPANY

Étalons utilisés / Transfer standards 101733, 603447, 603448

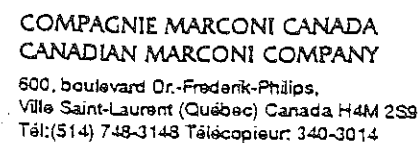
COMMENTAIRES / REMARKS

7 Oct '96

Date

[Signature]
Technicien / Technician

[Signature]
Approuvé par / Approved by



N° O.T. CMC 27295-5
CMC W/O NO.

Page 2 de 2
Sheet of

DONNÉES SUR L'ÉTALONNAGE — CALIBRATION DATA SHEET

INSTRUMENT WEIGHTS TYPE 1 & 2 kg

NUMÉRO DE SÉRIE
SERIAL NUMBER 5 862 / 5 863

[illegible]

7 Oct '96
DATE

TECHNICIEN - TECHNICIAN

APPROVE PART- APPROVED BY

LABORATOIRES DE NORMALISATION
STANDARD CALIBRATION LABORATORIES



Mesures
Canada

La mesure, juste pour tous

Measurement
Canada

Fair Measure For All

CALIBRATION CERTIFICATE
(Gravimetric Standards)
CERTIFICAT D'ÉTALONNAGE
(Étalons gravimétriques)

Issued to - Émis à Mettler Toledo		Agent set no. - No. du jeu de poids M P	
Address - Adresse 8262 boul Pie 1X M-T-L		Issue date - Date d'émission févr 22 2000	
Contact Claude Mainville		Telephone no. - No de téléphone 514 376-8788	Recalibration due - Date prévue du re-étalonnage févr 22 2001

I, the undersigned, being authorized by the Minister of Industry Canada to exercise the power of the Minister pursuant to Section 13.(1) of the Weights and Measures Act hereby

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

a) certify that the standard(s) identified below has (have) been calibrated in accordance with Part III of the Weights and Measures Regulations and in relation to Measurement Canada's reference standards which in turn have been calibrated in relation to Canada's Prototype for the kilogram whose calibration is traceable to the International prototype for the kilogram maintained by the Bureau International des Poids et Mesures.

a) certifie que l' (les) étalon(s) identifié(s) ci-dessous a (ont) été étalonné(s) conformément à la Partie III du Règlement sur les poids et mesures et par rapport aux étalons de référence de Mesures Canada, qui à leur tour ont été étalonnés par rapport au prototype Canadien du kilogramme qui est étalonné et traçable au prototype international du kilogramme conservé par le Bureau International des Poids et Mesures.

Identification No. Numéro d'identification	Nominal Value Valeur nominale	Identification No. Numéro d'identification	Nominal Value Valeur nominale	Identification No. Numéro d'identification	Nominal Value Valeur nominale	Identification No. Numéro d'identification	Nominal Value Valeur nominale
101	20 kg						
102	20 kg						
103	20 kg						
104	20 kg						
105	20 kg						
106	20 kg						
107	20 kg						
108	20 kg						
109	20 kg						
110	20 kg						

An organization
d'Industrie Canada

An Agency of
Industry Canada

Canada

District Montreal	Certificate No. - No du certificat 1064167	Local standard used - Etalon local utilisé M32605
Signature 	Date 00-02-22	Position Title - Titre du poste MS PACTE

CERTIFICAT D'ÉTALONNAGE

Client: Mettler-Toledo N° de certificat: ME81310.46
Adresse: 8262, boul. Pie IX, Montréal Certification CCN n°: 24
Code postal: H1Z 3T6 Certification CLAS n°: 2000-01
Masse: 5 kg à 500 mg Classe d'exactitude: OIML-M1
N° de série: Marcel Paquette N° d'inventaire: _____
Fabricant: Mettler-Toledo Densité assumée: 8,0
Date d'étalonnage: 05-06-2000 Date du prochain étalonnage: 05-06-2001
Condition d'essai: Temp. °C: 22,4 Pression kPa: 101,75 Humidité %: 42

Valeur nominale Pd / n°	Masse conventionnelle correction avant étalonnage (mg)	Masse conventionnelle correction après étalonnage (mg)	Tolérance (+ ou -) (mg)	Incertitudes (+ ou -) (mg)	Références utilisées	
					N° de série	Date d'étalonnage
5 kg - 100	-27,3	-27,3	250,0	3,1	850-3	30-11-1999
5 kg - 101	-27,1	-27,1	250,0	2,4	850-3	30-11-1999
2 kg - H107	42,9	42,9	100,0	1,4	850-3	30-11-1999
1 kg - 5	-10,6	-10,6	50,0	1,0	850-2	30-11-1999
1 kg - 5 A	-17,8	-17,8	50,0	1,2	850-2	30-11-1999
500 g - 5	10,2	10,2	25,0	0,7	850-2	30-11-1999
500 g - T307	4,5	4,5	25,0	0,7	850-2	30-11-1999
200g - K100A	-3,118	-3,118	10,000	0,124	850-2	30-11-1999
100g - K100B	-0,788	-0,788	5,000	0,096	850-1	30-11-1999
100 g - 5	2,250	2,250	5,000	0,097	850-1	30-11-1999
100 g - T	-2,607	-2,607	5,000	0,097	850-1	30-11-1999
50 g - 2	0,429	0,429	3,000	0,043	850-1	30-11-1999
20 g - 1	0,553	0,553	2,500	0,018	850-1	30-11-1999
10 g - 1	-1,207	-1,207	2,000	0,015	850-1	30-11-1999

Pour la vérification des poids, nous utilisons les procédures du Conseil national de recherches du Canada (CNRC), procédure n° N.R.C.C. 25819. Notre étalon de référence est étalonné chaque année par le CNRC sous le numéro: INMS MS-297. Nos étalons de travail sont calibrés chaque six mois. Ce certificat ne peut être reproduit sans la permission écrite de Technisol inc.

Remarques: _____

Effectué par: S. Hamel Approuvé par: J. Chénard Date: 17-05-2000

Page 1 de 4

Effectué par Technisol inc. (Certificat CLAS du C.C.N.) pour Mettler-Toledo inc.

CERTIFICAT D'ÉTALONNAGE

Client: Mettler-Toledo N° de certificat: ME81310.46
Adresse: 8262, boul. Pie IX, Montréal Certification CCN n°: 24
Code postal: H1Z 3T6 Certification CLAS n°: 2000-01
Masse: 5 kg à 500 mg Classe d'exactitude: OIML-M1
N° de série: Marcel Paquette N° d'inventaire: _____
Fabricant: Mettler-Toledo Densité assumée: 8,0
Date d'étalonnage: 05-06-2000 Date du prochain étalonnage: 05-06-2001
Condition d'essai: Temp. °C: 22,4 Pression kPa: 101,75 Humidité %: 42

Valeur nominale (g-n°) pd / n°	Masse conventionnelle correction avant étalonnage (mg)	Masse conventionnelle correction après étalonnage (mg)	Tolérance (+ ou -) (mg)	Incertitudes (+ ou -) (mg)	Références utilisées	
					N° de série	Date d'étalonnage
10 g -1 •	0,323	0,323	2,000	0,023	850-1	30-11-1999
5 g -1	0,1993	0,1993	1,5000	0,0134	850-1	30-11-1999
5 g -2	0,1325	0,1325	1,5000	0,0074	850-1	30-11-1999
500 mg	0,0578	0,0578	0,8000	0,0018	850-1	30-11-1999
500 mg •	0,0133	0,0133	0,8000	0,0016	850-1	30-11-1999
500 mg ••	0,0273	0,0273	0,8000	0,0021	850-1	30-11-1999
500 mg •••	0,0087	0,0087	0,8000	0,0015	850-1	30-11-1999

Pour la vérification des poids, nous utilisons les procédures du Conseil national de recherches du Canada (CNRC), procédure n° N.R.C.C. 25819. Notre étalon de référence est étalonné chaque année par le CNRC sous le numéro: INMS MS-297. Nos étalons de travail sont calibrés chaque six mois. Ce certificat ne peut être reproduit sans la permission écrite de Technisol inc.

Remarques: _____

Effectué par: S. Hamel Approuvé par: J. Chénard Date: 27-01-2000

Page 3 de 4

Effectué par Technisol inc. (Certificat CLAS du C.C.N.) pour Mettler-Toledo inc.

METERING SYSTEM 1 & 2

INTERTEK TESTING SERVICES NA LTD.
LACHINE, QUÉBEC, CANADA
POST TEST DRY GAS METER CALIBRATION DATA

Page 1 of 1

MANUFACTURER: CHEMINÉE SÉCURITÉ MODEL: 615 62084WA LTO: 192-5232 DATE: 2001-05-03 TECHNICIAN: CLAUDE PARE
BAROMETRIC PRESSURE: 29.96 CALIBRATION FACTOR DGM#1: 0.994 DGM#2: 1.003 STANDARDIZED DGM#3: 1.001

STANDARD METER

METER #1

TRAIL NO.	PRESS DROP	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD FT. ³	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD FT. ³	CAL. FACTOR
1	0	380.800	380.600	0.200	77.7	0.197	853.269	853.069	0.200	78.0	0.197	1.001
2	0	381.200	381.000	0.200	77.6	0.197	853.667	853.465	0.200	78.0	0.199	0.991
3	0	381.600	381.400	0.200	77.6	0.197	854.070	853.871	0.199	78.0	0.196	1.006

AVERAGE CALIBRATION FACTOR: 0.999

PREVIOUS CAL. FACTOR	MINUS	AVERAGE CAL. FACTOR	DIVIDED BY	PREVIOUS CAL. FACTOR	MULTIPLIED *100	EQUALS	DEVIATION PERCENT
0.994	-	0.999	/	0.994	*100	=	-0.5 %

STANDARD METER

METER #2

TRAIL NO.	PRESS DROP	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD FT. ³	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD FT. ³	CAL. FACTOR
1	0	382.100	381.900	0.200	77.6	0.197	168.474	168.280	0.194	78.0	0.191	1.032
2	0	382.500	382.300	0.200	77.5	0.197	168.879	168.670	0.209	78.0	0.205	0.962
3	0	382.900	382.700	0.200	77.5	0.197	169.277	169.079	0.198	78.0	0.195	1.011

AVERAGE CALIBRATION FACTOR: 1.002

PREVIOUS CAL. FACTOR	MINUS	AVERAGE CAL. FACTOR	DIVIDED BY	PREVIOUS CAL. FACTOR	MULTIPLIED *100	EQUALS	DEVIATION %
1.003	-	1.002	/	1.003	*100	=	0.1 %

192-am-9904

INTERTEK TESTING SERVICES NA LTD.
LACHINE, QUÉBEC, CANADA
SIX MONTH DRY GAS METER CALIBRATION DATA

MANUFACTURER: MODEL: LTO: DATE: 2001-02-19 TECHNICIAN: CLAUDE PARE
BAROMETRIC PRESSURE: 29.94 CALIBRATION FACTOR DGM#1: 0.994 DGM#2: 1.003 STANDARDIZED DGM#3: 1.001

STANDARD METER

METER #1

FLOW RATE FT. ³	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD. FT. ³	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD. FT. ³	CAL. FACTOR
0.043/min	372.086	372.000	0.086	73.0	0.085	674.012	673.920	0.092	73.8	0.091	0.935
0.096/min	372.441	372.250	0.191	72.9	0.189	674.384	674.198	0.186	73.9	0.184	1.028
0.171/min	373.142	372.800	0.342	73.0	0.339	675.121	674.780	0.341	74.2	0.337	1.007
0.256/min	374.211	373.700	0.511	73.0	0.507	676.223	675.712	0.511	74.3	0.505	1.005
0.345/min	375.590	374.900	0.690	73.0	0.684	677.627	676.941	0.686	74.4	0.678	1.010

AVERAGE CALIBRATION FACTOR: 0.997

STANDARD METER

METER #2

FLOW RATE FT. ³	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD. FT. ³	FINAL FT. ³	INITIAL FT. ³	CHANGE FT. ³	TEMP °F	STD. FT. ³	CAL. FACTOR
0.030/min	377.460	377.400	0.060	73.1	0.059	64.467	64.416	0.051	73.8	0.050	1.181
0.077/min	377.753	377.600	0.153	73.0	0.152	64.787	64.636	0.151	74.0	0.149	1.021
0.147/min	378.293	378.000	0.293	73.0	0.290	65.358	65.070	0.288	74.1	0.285	1.019
0.232/min	379.164	378.700	0.464	73.1	0.460	66.264	65.803	0.461	74.1	0.456	1.010
0.336/min	380.471	379.800	0.671	73.1	0.665	67.609	66.945	0.664	74.1	0.657	1.013

AVERAGE CALIBRATION FACTOR: 1.049

ANALYTICAL SCALE

METTLER-TOLEDO INC.
FEUILLE DE TRAVAIL D'ÉTALONNAGE

CLIENT: ITS D. Anteck Adresse: 1724 32^{me} Rue Pichette
☒ Inspection régulière ☐ Inspection Intérimaire Rapport (C.S.A.)#: NOT-in-lieu

balance: location: # série: 111501147
 fabricant: Ohaus modèle: AP 310S tolérance en service: ± 1.70
 capacité: 310 g graduation: 1.0001 (selon la norme SOR/CORS 74/113 de Poids & Mesures Canada)

☐ 25% capacité ☐ 25% ☐ 50% ☐ 75% ☐ 100%
☐ poids autres ☐ Poids autres ☐ Poids autres ☐ Poids autres
 Poids utilisés lbs 310 Résultats d'essais lbs ☒ kg

TEST DE COINS			
2	Lecture	4	Lecture
	77.5001		77.5001
	Ajustement		Ajustement
	<u>0</u>		<u>0</u>
	Final		Final
	77.5001		77.5001
1	Lecture	3	Lecture
	77.5001		77.5001
	Ajustement		Ajustement
	<u>0</u>		<u>0</u>
	Final		Final
	77.5001		77.5001

	25% cap.	50% cap.	75% cap.	100%
Poids stand.	77.5001	155.0001	232.5001	310.0001
Lecture	77.5001	155.0001	232.5001	310.0001
Ajust.	Oui <u>(Non)</u>	Oui <u>(Non)</u>	Oui <u>(Non)</u>	Oui <u>(Non)</u>
Final	77.5001	155.0001	232.5001	310.0001

Les résultats des essais sont en KG ou en LBS

1 KG = 2.2046 lbs 1 LB = 0.4535 kg

Les poids certifiés utilisés pour la calibration des balances sont calibrés et certifiés par
Poids & Mesure Canada selon la norme SOR/90/118 Section I II III

** NOTE: Le total des poids certifiés utilisés dépend de la capacité de la balance et des restrictions physiques
à l'application des poids certifiés. Les poids utilisés pour bâtir la charge de la balance seront
considérés comme autres.

Poids certifiés utilisés #: Voir les 10 sur Ordre Certificat # ME 81310.44 Étalonnage dû: 05/06/01
 Poids certifiés utilisés #: Certificat #: Étalonnage dû:
 Signature du technicien: [Signature] Date: 07/11
 Nom du technicien: M. RAQUETTE DATE PROCHAINE INSPECTION: 07/01
 (en lettres moulées s.v.p.)

METTLER-TOLEDO INC.

Remarques:

Ce formulaire complété doit être conservé par le contremaître pendant deux ans.
 La certification des poids certifiés est rapportée aux Normes canadiennes à Ottawa,
 au Centre National de Recherche.

APPROUVE: STA5438F/ISO

DATE D'EMISSION: 27 octobre 1995

SIGNATURE: [Signature]

COPIE CONTRÔLÉE: Mettler-Toledo Inc.

POUR SERVICE SUPPLÉMENTAIRE LIGNE DIRECTE: 1-800-663-5456

SCALE 0-8000 gr.

No. 2076

METTLER TOLEDO

Rapport d'étalonnage de la balance

Société I.T.S. INTERTEK

Adresse 1829 32^{eme} Avenue

Ville et province LACHINE, QUEBEC

Code postal H8T 3J1 Service/salle



Fabricant METTLER

Modèle PB8001-S Numéro de série 1119053879

Capacité 8000g Graduation 0.1g

2^{ème} Capacité (Précision) / Graduation /

ESSAI D'ÉTALONNAGE

Poids d'essai 8000g $\pm$ 40mg 8000.0g 8000.0g
Tol. d'étalon $\pm$ 0.1g
Tel qu'observé ☒ Accepté ☒
Tel que laissé ☐ Refusé ☐

Essai d'étalonnage: exécuté au point d'étalonnage applicable au modèle indiqué ci-dessus

ESSAI DE LINÉARITÉ

Poids d'essai 4x2000g $\pm$ 10mg 2000.0g 2000.0g
Tol. $\pm$ 0.1g 2000.1g 2000.1g
Méthode 2000.0g 2000.0g
Cumulative ☐ 2000.1g 2000.1g
De substitution ☒
Tel qu'observé ☒ Accepté ☒
Tel que laissé ☐ Refusé ☐

Essai de linéarité: exécuté conformément aux consignes de Mettler-Toledo pour le modèle indiqué.

ESSAI DE CHARGE EN COIN

Poids d'essai 4000g Tol. $\pm$ 0.3g
Tel qu'observé Tel que laissé
1: 0.0g 0.0g
2: +0.1g +0.1g
3: 0.0g 0.0g
4: -0.1g -0.1g
CTRE: ☒ Accepté ☒
☐ Refusé ☐

Essai de charge en coin: valeurs affichées tarées au zéro.

Remarques: installation + calibration initiale.

Type d'ensemble de poids

☐ Analytique☒ De précision

No d'identification Mettler-Toledo des poids d'essai utilisés:

Date d'étalonnage des poids d'essai utilisés par Mettler-Toledo:

Numéro d'essai du National Institute of Standards & Technology:

Étalonnage des poids d'essai prévu pour le:

Un an de la date indiquée ci-dessus

Deux ans de la date indiquée ci-dessus

Technicien de service: LUCIAN VOICULET

Date prévue du prochain étalonnage: OCTOBRE 2001

Date d'étalonnage: OCTOBRE 4, 2000

Procédure de Mettler-Toledo: VP-0029

L'APPAREIL FAISANT L'OBJET DE CE RAPPORT A ÉTÉ NETTOYÉ, LUBRIFIÉ, RÉGLÉ, VÉRIFIÉ ET ÉTALONNÉ SELON LES CARACTÉRISTIQUES TECHNIQUES DE METTLER-TOLEDO. TOUS LES ESSAIS ONT ÉTÉ EFFECTUÉS CONFORMÉMENT AUX DIRECTIVES DE METTLER-TOLEDO. LES POIDS D'ESSAI UTILISÉS TIRENT LEUR ORIGINE DU NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY, ET SONT CONFORMES AUX NORMES MIL-STD 45662 ET ANSI/NCCL Z540-1-1984 AU MOMENT DE L'ÉTALONNAGE.

CE RAPPORT D'ÉTALONNAGE EST CONFORME À LA NORME ANSI/NCCL Z540-1-1984 ET NCCL RP 11 AU MOMENT DE L'ÉTALONNAGE.

Page 1 de 1

PLATFORM SCALE

METTLER-TOLEDO INC.
FEUILLE DE TRAVAIL D'ÉTALONNAGE

CLIENT: ITS Intertech Adresse: 1829 - 32^e Ave Lachine
☒ Inspection régulière ☐ Inspection Intérimaire Rapport (C.S.A.)#: NOT-IN-BAN

balance: location: # série: L-6990
 fabricant: Caton modèle: UMC 600
 capacité: 500g graduation: 0.2 tolérance en service: ± 1.7g
(selon la norme SOR/DORS 74/413 de Poids & Mesures Canada)
☐ 25% capacité ☐ 25% ☐ 50% ☐ 75% ☐ 100%
☐ poids autres ☐ Poids usés ☐ Poids usés ☐ Poids usés ☐ Poids usés
 Poids utilisés lbs 200 kg Résultats d'essais lbs ☒ kg

TEST DE COINS			
2	Lecture	4	Lecture
	99.98		99.98
	Ajustement		Ajustement
	0		0
	Final		Final
	99.98		99.98
1	Lecture	3	Lecture
	99.98		99.98
	Ajustement		Ajustement
	0		0
	Final		Final
	99.98		99.98

	25% cap.	50% cap.	75% cap.	100%
Poids stand.	100g	200g	—	—
Lecture	99.98	199.98	—	—
Ajust.	(Oui) Non	(Oui) Non	Oui Non	Oui Non
Final	100g	200g	—	—

Les résultats des essais sont en KG ou en LBS
 1 KG = 2.2046 lbs 1 LB = 0.4535 kg
 Les poids certifiés utilisés pour la calibration des balances sont calibrés et certifiés par
 Poids & Mesure Canada selon la norme SOR/90/118 Section I II III

** NOTE: Le total des poids certifiés utilisés dépend de la capacité de la balance et des restrictions physiques à l'application des poids certifiés. Les poids utilisés pour bâtir la charge de la balance seront considérés comme autres.

Poids certifiés utilisés #: 101 @ 110 Certificat #: 1064/67 Etalonnage dû: 07/12/95
 Poids certifiés utilisés #: Certificat #: Etalonnage dû:
 Signature du technicien: M. Paquette Date: 07/11/95
 Nom du technicien: M. PAQUETTE DATE PROCHAINE INSPECTION: 07/96
(en lettres moulées s.v.p.)

METTLER-TOLEDO INC.

Remarques: Fast calibration

Ce formulaire complété doit être conservé par le contremaître pendant deux ans.
 Le certificat des poids certifiés est répertorié aux Normes canadiennes à Ottawa,
 au Centre National de Recherche.

APPROUVE: STAS438F/ISO DATE D'EMISSION: 27 octobre 1995
 SIGNATURE: / COPIE CONTRÔLÉE: Mettler-Toledo Inc.

POUR SERVICE SUPPLÉMENTAIRE LIGNE DIRECTE: 1-800-663-5456

CALIBRATOR T/C

CERTIFICATE OF CALIBRATION CERTIFICAT DE CALIBRATION



CERTIFICATE No / Certificat No : **20941**
 CUSTOMER / Client : **SERV. D'ESSAIS INTERTEK LTEE**
 DESCRIPTION / Description : **CALIBRATEUR**
 MANUFACTURER / Manufacturier : **OMEGA**
 MODEL / Modèle : **CL25**

SERIAL No / No serie

ASSET No / No d'appareil

T192959

	YES / Oui	NO / Non
REPAIR / Réparation :	☐	☒
CONDITION / Etat :	Out of spec. / hors normes	In spec. / selon les normes
RECEIVED / Arrivé :	☒	☐
RETURNED / Départ :	☐	☒

DATE / Date : **19-mai-2000**

DUE DATE / Date due : **19-mai-2001**

TEMPERATURE :
 Température : **22.9°C**

HUMIDITY :
 Humidité : **35%**

STANDARDS USED : **PR0078**
 Standards utilisés :

The standards used are traceable to NRCC and / or NIST.
 Les standards utilisés sont identifiés et retraçables NRCC et / ou NIST.

OTHERS / Autres :

NOTES / Notes :

Recalibration complète

TECHNICIAN :
 Technicien : **J. BOURBONNIERE**

QUALITY CONTROL :
 Contrôle Qualité :



REGISTERED
 ENREGISTRÉ

ISO 9002

PRIMO INSTRUMENT

CERTIFICATE No / Certificat No :	20941
CUSTOMER / Client :	SERV. D'ESSAIS INTERTEK LTEE
DESCRIPTION / Description :	CALIBRATEUR
MANUFACTURER / Manufacturier :	OMEGA
MODEL / Modèle :	CL25

DESCRIPTION Description	LIMITS Limites	READING Lectures	LIMITS Limites
<i>Lectures après calibration</i>			
TEMPÉRATURE TYPE K			
Entrée	-300 °F	-301.0	-299.0
	75.2 °F	74.7	75.7
	1000 °F	999.5	1000.5
	2500 °F	2499.5	2500.5
Sortie	-300 °F	-299.41	-299.00
	32 °F	32.38	32.50
	300 °F	300.34	300.50
	600 °F	600.30	600.50
	1200 °F	1200.16	1200.50
	2000 °F	2000.46	2000.80
TEMPÉRATURE TYPE T			
Entrée	-300 °F	-301.0	-299.0
	75.2 °F	74.7	75.7
	300 °F	300.0	300.5
	600 °F	600.1	600.5
Sortie	-300 °F	-299.33	-299.00
	75.2 °F	75.29	75.70
	300 °F	300.95	300.50
	600 °F	600.90	600.50
TEMPÉRATURE TYPE J			
Entrée	-300 °F	-301.0	-299.0
	75.2 °F	74.7	75.7
	300 °F	300.9	300.5
	1000 °F	999.9	1000.5
Sortie	-300 °F	-299.40	-299.00
	32 °F	32.05	32.50
	300 °F	300.15	300.50
	800 °F	800.11	800.50
	1200 °F	1200.15	1200.50
VÉRIFICATION °C		Défect. ☐	Ok ☒

TECHNICIAN : 
Technicien : J. BOURBONNIERE

C: CERTIFICAT MANUFACTURIER OMEGA CL25
No DE REFERENCE : OME111
FORME : REV-16-JUN-95

QUALITY CONTROL :
Contrôle Qualité :



TEMPERATURE RECORDER

Date: 2000-11-14

Technicien: CLAUDE PARE

d'équipement: 180-055

Vérifié avec l'appareil #: 180-223

(°F)

T/C Calibrateur	Δerreur	T/C lecteur	ΔT/C
32.0		32.3	0.3
77.0		76.2	-0.8
212.0		211.4	-0.6
392.0		391.8	-0.2
572.0		572.1	0.1
752.0		752.4	0.4
932.0		932.8	0.8
1112.0		1113.2	1.2
1292.0		1293.4	1.4
1382.0		1383.3	1.3
Précision de l'appareil:			1.04 %

192bf0001

Date: 2000-11-14

Technicien: CLAUDE PARÉ

d'équipement: 180-056

Vérifié avec l'appareil #: 180-223

(OF)

T/C Calibrateur	Δ erreur	T/C lecteur	Δ T/C
32.0		31.8	-0.2
77.0		75.7	-1.3
212.0		210.9	-1.1
392.0		391.4	-0.6
572.0		571.7	-0.3
752.0		752.0	0.0
932.0		932.3	0.3
1112.0		1112.7	0.7
1292.0		1293.0	1.0
1382.0		1382.9	0.9
Précision de l'appareil:			1.7%

Date: 2000-11-14

Technicien: CLAUDE PARÉ

d'équipement: 180-058

Vérifié avec l'appareil #: 180-223

T/C Calibrateur °F	Δerreur	T/C lecteur	ΔT/C
30.0		32.1	0.1
27.0		76.0	-1.0
212.0		211.1	-0.9
392.0		391.6	-0.4
572.0		571.9	-0.1
752.0		752.2	0.2
932.0		932.6	0.6
1112.0		1113.0	1.0
1292.0		1293.2	1.2
1382.0		1383.2	1.2
Précision de l'appareil:			1.3%

Date: 2000-11-14

Technicien: CLAUDE PARÉ

d'équipement: 180-059

Vérifié avec l'appareil #: 180-223

(°F)

T/C Calibrateur	Δ erreur	T/C lecteur	Δ T/C
32.0		32.1	0.1
77.0		76.0	-1.0
212.0		211.1	-0.9
392.0		391.6	-0.4
572.0		571.8	-0.2
752.0		752.2	0.2
932.0		932.6	0.6
1112.0		1113.0	1.0
1292.0		1293.2	1.2
1382.0		1383.2	1.2
Précision de l'appareil:			1.3°

MOISTURE METER

Date: 2001-01-11

Tech: CLAUDE PARÉ

CALIBRATION DATA LOG SHEET OVEN DRY METHOD

EQUIPMENT

Make <u>DELMHORST</u>	Model <u>J-2000</u>	WH No. <u>180-219</u>
--------------------------	------------------------	--------------------------

RESULTS

Wood sample weight (g)		Moisture content: M_d ☒ M_w ☐		% Deviation
W_i	W_d	Calculated	Measured	
<u>798.4</u>	<u>652.5</u>	<u>22.4</u>	<u>22.3</u>	<u>0.5%</u>

AVERAGE DEVIATION:

WET BASIS: (M_w) _____ %

DRY BASIS: (M_d) _____ %

CALCULATIONS:

$$M_d = (W_i - W_d) / W_d \times 100$$

$$M_w = (W_i - W_d) / W_i \times 100$$

WHERE

M_d = MOISTURE CONTENT ON THE DRY BASIS

M_R = WEIGHT OF MOISTURE REMOVED IN THE OVEN

M_w = MOISTURE CONTENT ON THE WET BASIS

W_d = WEIGHT OF OVEN DRY WOOD

W_i = INITIAL WEIGHT OF WOOD INCLUDING MOISTURE

Intertek Testing Services NA Ltd.

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192-at-9906