

Certification Test Report

CFM Corporation Wood Fireplace Insert Model: Montpelier

Prepared for: CFM Corporation
P.O. Box 501
Bethel, VT 05032

Prepared by: OMNI-Test Laboratories, Inc.
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Test Period: January 15, 2008 through January 18, 2008

Report Date: January 2008

Report Number: 259-S-13-3

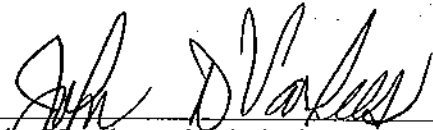
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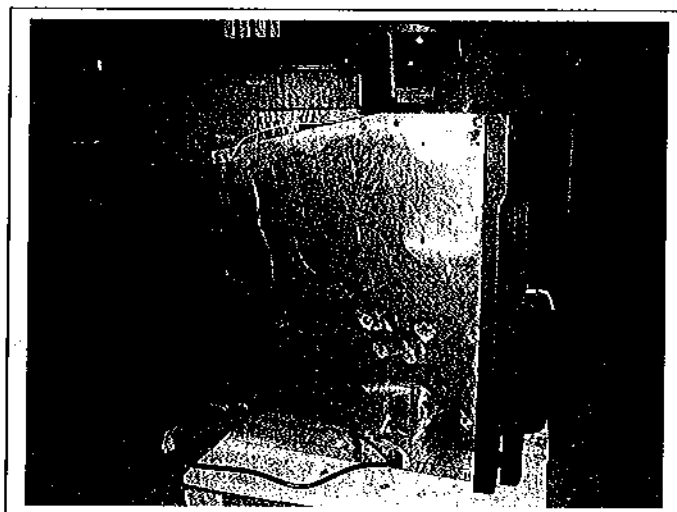
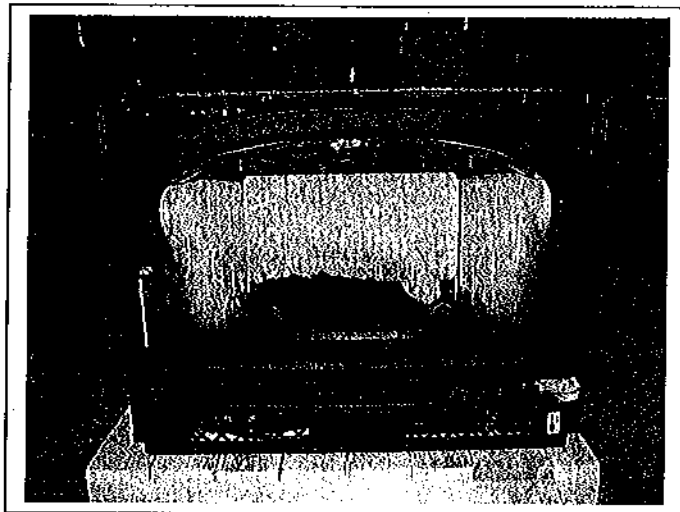
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Section 1

Fuel Photographs/Appliance Description/Drawings

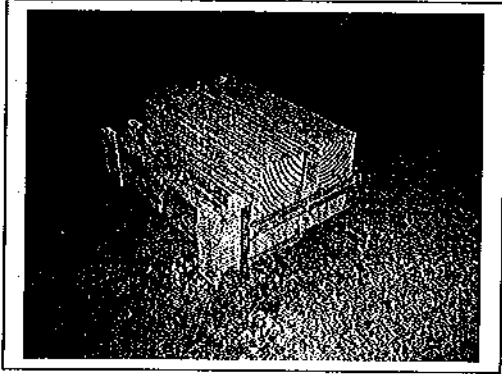
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CFM Corporation
Montpelier
Test Dates: January 15, 2008 through January 18, 2008

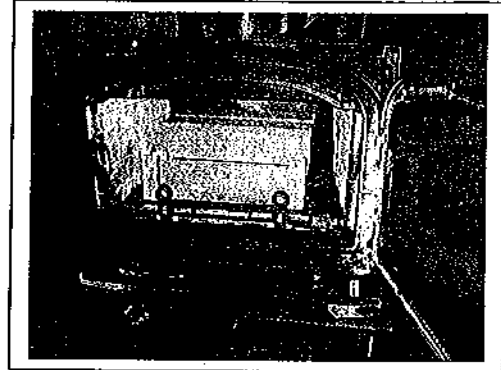


CFM Corporation Montpelier

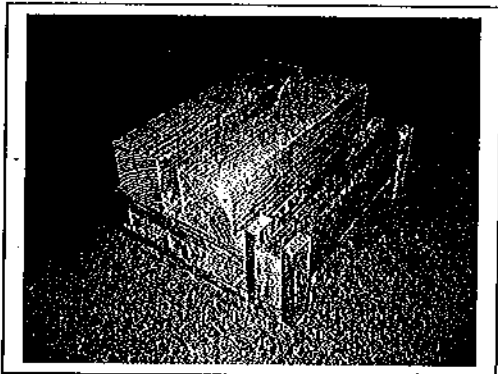
Run 1 – Fuel



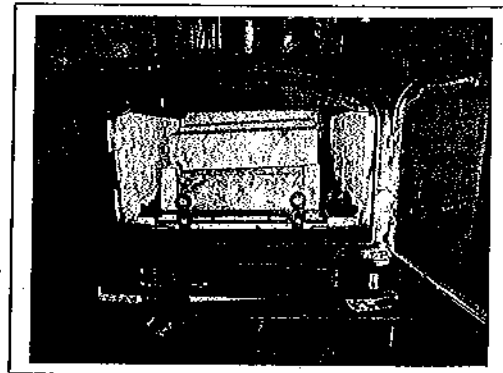
Run 1 – Newly Loaded Stove



Run 2 – Fuel



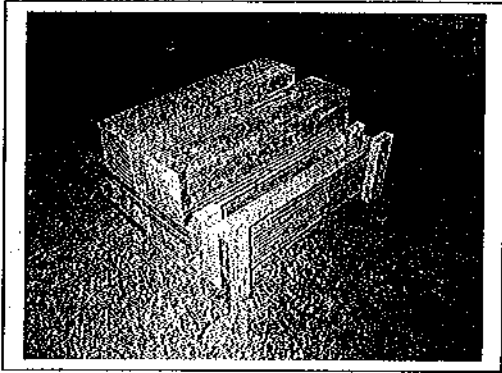
Run 2 – Newly Loaded Stove



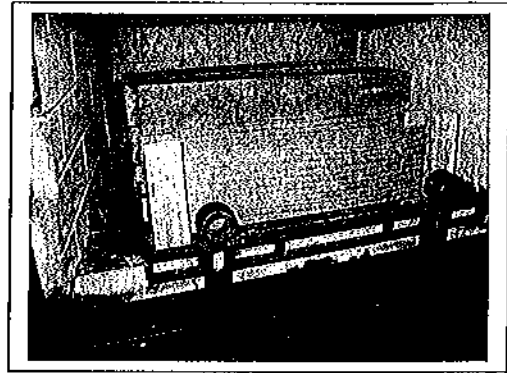
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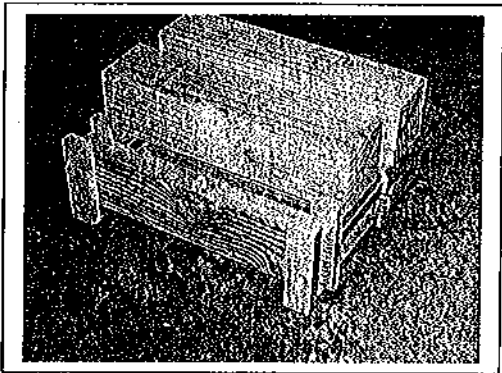
Run 3 – Fuel



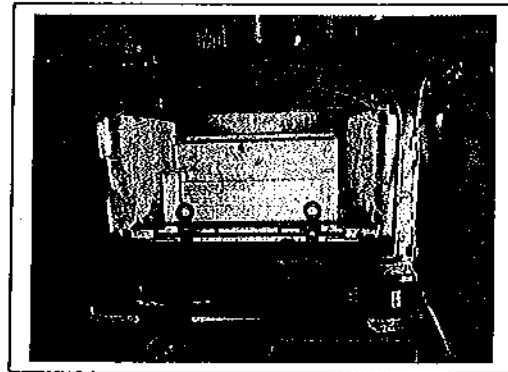
Run 3 – Newly Loaded Stove



Run 4 – Fuel



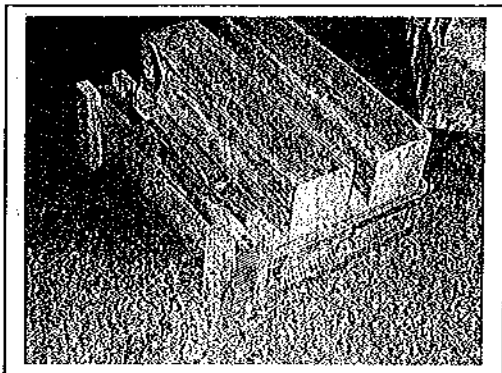
Run 4 – Newly Loaded Stove



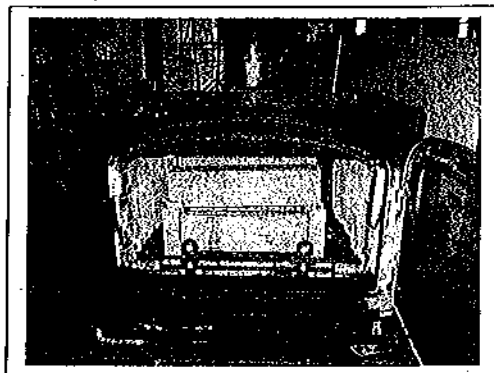
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CFM Corporation Montpelier

Run 5 – Fuel



Run 5 – Newly Loaded Stove



WOOD HEATER DESCRIPTION

Appliance Manufacturer: CFM Corporation

Wood Stove Model: Montpelier

Type: Air circulating-type fireplace insert

WOOD HEATER INFORMATION

Materials of Construction: The unit is constructed primarily of mild steel. The firebox is lined with cast refractory. The feed door has a 22-inch by 13.5-inch glass panel and 3/8-inch fiberglass rope gaskets.

Air Introduction System: Air enters the firebox through an opening located at the front of the appliance above the fuel-loading door. Secondary air enters the appliance through the bottom front corners and is channeled internally to both sides of the firebox supplying four 3/4-inch diameter tubes.

Combustion Control Mechanisms: The combustion air inlet is controlled by a handle located above the fuel-loading door on the left corner of the appliance.

Combustor: N/A.

Internal Baffles: A ceramic fiber baffle is mounted in the upper portion of the firebox. The flame path is forced to the front of the firebox where it travels up through the opening between the baffle and primary air manifold.

Other Features: Optional fan accessory.

Flue Outlet: The 6-inch diameter flue outlet is located in the top of the unit.

WOOD HEATER OPERATING INSTRUCTIONS

Specific Written Instructions: See Section 3 of this report. All markings and instruction materials were reviewed for content prior to printing.

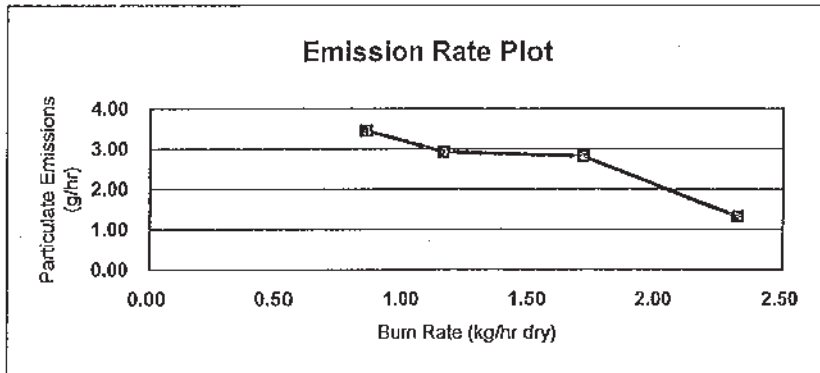
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Section 4

Test Data by Run

EPA Weighted Average Emissions EPA Method 28

Client: CFM Vermont	Status: Final
Stove Model: Montpelier	Stove Type: Non-Catalytic Stove
Test Dates: January 15, Through January 18, 2008	
Project Number: 259-S-13-3	
Tracking Number: 1168	
Signature/Date: <i>[Signature]</i> 2-5-08	Weighted Average (g/hr) 2.9



Run #	1	
Burn Rate (dry kg/hr)	0.85	
Catagory	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	3.45	
Cap (g/hr)	15	
Weighting Factor	0.502	29.64%
Heat Output (BTU/hr)	10094	

Run #	3	
Burn Rate (dry kg/hr)	1.16	
Catagory	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	2.92	
Cap (g/hr)	15	
Weighting Factor	0.589	34.81%
Heat Output (BTU/hr)	13775	

Run #	5	
Burn Rate (dry kg/hr)	1.71	
Catagory	3	
Overall Efficiency (%)	63%	
Emissions (g/hr)	2.81	
Cap (g/hr)	18	
Weighting Factor	0.445	26.30%
Heat Output (BTU/hr)	20307	

Run #	2	
Burn Rate (dry kg/hr)	2.32	
Catagory	4	
Overall Efficiency (%)	63%	
Emissions (g/hr)	1.32	
Cap (g/hr)	18	
Weighting Factor	0.157	9.25%
Heat Output (BTU/hr)	27550	

Model: Montpelier
CFM Corporation
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Run 1

Wood Heater Test Data - EPA Method 5G

Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Project No.: 259-S-13-3
 Tracking No.: 1168
 Run: 1
 Test Date: 01/15/08

Burn Rate	0.85 kg/hr dry
Average Tunnel Temperature	93 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.5 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8168.9 dscf/hour
Average Delta p	0.038 inches H2O
Average Delta H	0.00 inches H2O
Total Time of Test	360 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	46.20 cubic feet	45.47 cubic feet	46.93 cubic feet
Average Gas Meter Temperature	75 degrees Fahrenheit	75 degrees Fahrenheit	75 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	44.1 dscf	43.4 dscf	44.7 dscf
Total Particulates - mn		12.1 mg	11.2 mg
Particulate Concentration (dry-standard)	0.00026 grams/dscf	0.00028 grams/dscf	0.00025 grams/dscf
Particulate Emission Rate	2.16 grams/hour	2.28 grams/hour	2.05 grams/hour
Adjusted Emissions	3.45 grams/hour	3.60 grams/hour	3.30 grams/hour
Difference from Average		0.15 grams/hour	0.15 grams/hour
7.5% of the average emission rate	0.26		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: CFM Vermont
 Model: Montpelier
 Project No.: 259-S-13-3
 Tracking No.: 1168

Equipment Numbers: _____

Run #: 1
 Train #: A
 Date: 01/15/08

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E152	120.1	109.9	10.2
B. Rear filter catch	Filter	E153	119.6	119.7	-0.1
C. Probe catch	Probe	3	84565.3	84563.3	2.0

Total Particulate, mg :	12.1
-------------------------	------

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: BD

Date: 1-29-08

Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>CFM Vermont</u>	Equipment Numbers: _____	Run #: <u>1</u>
Model: <u>Montpelier</u>	_____	Train #: <u>B</u>
Project No.: <u>259-S-13-3</u>	_____	Date: <u>01/15/08</u>
Tracking No.: <u>1168</u>	_____	

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E154	128.0	118.0	10.0
B. Rear filter catch	Filter	E155	120.0	120.1	-0.1
C. Probe catch	Probe	4	79066.8	79065.5	1.3

Total Particulate, mg :	11.2
-------------------------	------

Component	Equations:
A. Front filter catch	$\text{Final (mg)} - \text{Tare (mg)} = \text{Particulate, mg}$
B. Rear filter catch	$\text{Final (mg)} - \text{Tare (mg)} = \text{Particulate, mg}$
C. Probe catch	$\text{Final (mg)} - \text{Tare (mg)} = \text{Particulate, mg}$

Analyst: B. [Signature] Date: 1-29-08

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: CFM Vermont Project #: 259-5-13-3 Tracking #: 1168
 Date: 1-15-08 Test Crew: BDAus Run #: 1
 OMNI Equipment ID #: _____

Preburn Test	Fuel		Delta Weight	Stack Draft	Coal Bed: Data: 0 = ∅					TEMPERATURES (oF)				Actual: Coal Bed: 3.2	
	Weight	Weight			Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst			
0	10.0			-0.87	70	783	222	359	257	261	556				
10	9.0	1.0		-0.58	71	545	270	351	292	307	292				
20	7.9	1.1		-0.74	71	650	296	331	307	325	399				
30	6.7	1.2		-0.75	71	750	312	334	314	337	407				
40	5.8	0.9		-0.71	71	741	316	357	327	346	388				
50	4.4	1.4		-0.78	69	812	323	369	343	364	429				
60	3.7	0.7		-0.67	69	755	324	380	360	373	384				
70	3.4	0.3		-0.54	69	627	323	386	374	387	302				
79.80	3.2	0.2		-0.48	71	551	332	385	382	391	274				
90															
00															
10															
20															
30															
40															
50															
60															
70															
80															
90															
AVG															

Technician signature: BDAus Date: 1-29-08

FUEL DATA

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-29-08

Test Crew: B DAVIS

Run #: 1

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B DAVIS

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:	Cal Value (1) = 12%	Actual Reading	<u>12</u>		
	Cal Value (2) = 22%	Actual Reading	<u>22</u>		
Piece	Length	Readings			Type
1	<u>8</u> ft	<u>22.4</u>	<u>24.9</u>	<u>25.4</u>	<u>2x4</u>
2	_____ ft	_____	_____	_____	_____
3	_____ ft	_____	_____	_____	_____
Length of cut pieces: <u>21 & 6"</u> inches		Pre-Burn Fuel Average Moisture: <u>24.23 %</u>			
Time (clock): <u>0810</u>		Room Temperature (F): <u>67</u>	Initials: <u>BD</u>		

TEST FUEL					
FUEL TYPE AND AMOUNT:	<u>2</u> <u>4</u>	<u>3</u>	<u>4</u> <u>4</u>	<u>2</u>	
CALCULATED LOAD WEIGHT:	<u>14.2</u>	ACTUAL LOAD WEIGHT:	<u>6.3</u>	<u>7.3</u>	(2 4) (4 4)
FUEL PIECE LENGTH:	<u>15</u>		<u>13.6</u>		Total
MOISTURE CONTENT (METER -- DRY BASIS)					
PIECE	READINGS			TYPE	
1	<u>22.0</u>	<u>21.4</u>	<u>22.4</u>	<u>2x4</u>	
2	<u>21.7</u>	<u>20.4</u>	<u>20.1</u>	<u>2x4</u>	
3	<u>23.8</u>	<u>22.5</u>	<u>22.6</u>	<u>2x4</u>	
4	<u>19.7</u>	<u>20.9</u>	<u>20.1</u>	<u>4x4</u>	
5	<u>21.0</u>	<u>22.1</u>	<u>21.2</u>	<u>4x4</u>	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
OVERALL TEST FUEL LOAD MOISTURE AVERAGE:					<u>21.46</u>
Time (clock): <u>0810</u>		Room Temperature (F): <u>67</u>	Initials: <u>BD</u>		

Technician signature: B DAVIS

Date: 1-29-08

Run Notes

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Run #: 1 Date: 1-15-08

Test Crew: B. Davis

OMNI Equipment ID #(s): _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

fully closed

SECONDARY: fixed

TERTIARY: NA

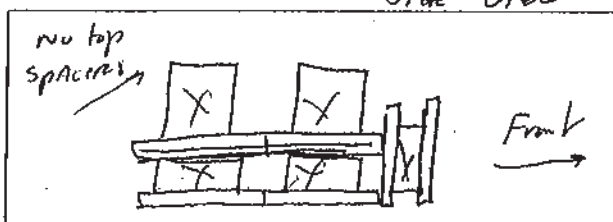
FAN: on low

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	Testing					
41					x	→
80					x	→

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: NA

FUEL LOADING: By 35 sec

DOOR: closed by 45 sec

PRIMARY AIR: NA test setting full S: w

OTHER: NA

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

fully closed

SECONDARY: fixed

TERTIARY: NA

FAN: on low

Technician signature: B. Davis

Date: 1-29-08

Supplemental Data EPA 5G/5H

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-15-08 Run #: 1 Booth: _____

Test Crew: B Davis Start Time: 10:07 Stop Time: 14:07

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: NA

Initial: NA

Final: _____

Final: _____

Calibrations: Span Gas CO₂: _____ O₂: _____ CO: _____ CO₂(DT): _____

Time	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	<u>NA</u>						
O ₂							
CO ₂							
CO							
CO ₂ (DT)							

Stack Diameter (inches): 6"

Air Velocity (ft/min): Initial: 250 Final: 250

Scale Audit (lbs): Pretest: 10.0 Post Test: 10.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 @ 3.0 Post: 0.0 @ 3.1

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-14-08 Initials: BA

	Initial	Middle	Ending
Pb (in/Hg)	<u>29.24</u>	<u>29.17</u>	<u>29.17</u>
Room Temp (°F)	<u>71</u>	<u>74</u>	<u>72</u>

Technician signature: B Davis Date: 1-29-08

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Run 2

Wood Heater Test Data - EPA Method 5G

Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Project No.: 259-S-13-3
 Tracking No.: 1168
 Run: 2
 Test Date: 01/16/08

Burn Rate	2.32 kg/hr dry
Average Tunnel Temperature	146 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	16.1 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	9069.9 dscf/hour
Average Delta p	0.051 inches H2O
Average Delta H	0.00 inches H2O
Total Time of Test	140 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	17.82 cubic feet	18.14 cubic feet	17.50 cubic feet
Average Gas Meter Temperature	76 degrees Fahrenheit	76 degrees Fahrenheit	77 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	17.2 dscf	17.6 dscf	16.9 dscf
Total Particulates - mn		1.5 mg	1.1 mg
Particulate Concentration (dry-standard)	0.00008 grams/dscf	0.00009 grams/dscf	0.00007 grams/dscf
Particulate Emission Rate	0.68 grams/hour	0.77 grams/hour	0.59 grams/hour
Adjusted Emissions	1.32 grams/hour	1.47 grams/hour	1.17 grams/hour
Difference from Average		0.15 grams/hour	0.15 grams/hour
7.5% of the average emission rate	0.10		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: 2
 Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Tracking No.: 1168
 Project No.: 259-S-13-3
 Test Date: 16-Jan-08
 Beginning Clock Time: 09:20
 Recording Interval: 10 min.
 Total Sampling Time: 140 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.044	0.054	0.054	0.048	0.046	0.058	0.054	0.048
Initial Temp.	144	144	145	145	145	144	144	143

OMNI Equipment Numbers: _____

PM Control Module: _____
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole
 Dilution Tunnel H2O: 4.00 percent
 Dilution Tunnel Static: -0.170 "H2O
 Pitot Tube Cp: 0.99
 Meter Box Y Factor: 0.992 (1) 0.989 (2)
 Barometric Pressure: Begin Middle End Average
 29.70 29.7 29.7 29.70 "Hg

Signature/Date: [Signature] 2-5-08
 Tunnel Velocity: 16.12 ft/sec.
 Initial Tunnel Flow: 151.2 scfm
 Average Tunnel Flow: 151.2 scfm
 Tunnel Area: 0.1883 ft²
 Post-Test Leak Check (1): .002@6 cfm@"Hg
 Post-Test Leak Check (2): .002@4 cfm@"Hg
 Fuel Moisture (dry basis %): 21.69
 Total Particulate (1): 1.5
 Total Particulate (2): 1.1

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF													Stack	
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O	
0	896.200	563.350	/	/	0.00	0.00	71	73	0	0	144	0.051	/	/	14.5	/	633	292	381	422	435		432.6	400	66	62			69	-0.080	
10	897.460	564.630	0.13	0.13			71	73	1	1	182	0.051	102	107	11.9	-2.6	822	303	331	418	429		460.6	716	69	69			69	-0.111	
20	898.720	565.890	0.13	0.13			74	74	1	1	190	0.051	102	106	9.2	-2.7	949	293	299	416	415		474.4	740	74	70			70	-0.111	
30	900.040	567.150	0.13	0.13			74	74	1	1	190	0.051	107	106	6.7	-2.5	1016	278	308	437	413		490.4	742	74	66			70	-0.110	
40	901.350	568.410	0.13	0.13			75	75	1	1	171	0.051	104	104	5.0	-1.7	921	270	346	459	422		483.6	639	73	66			68	-0.100	
50	902.680	569.690	0.13	0.13			78	76	1	1	159	0.051	104	104	3.7	-1.3	836	263	391	477	434		480.2	585	69	65			69	-0.094	
60	903.940	570.950	0.13	0.13			80	78	1	1	146	0.051	97	101	2.8	-0.9	742	259	413	482	441		467.4	521	72	70			70	-0.086	
70	905.280	572.180	0.13	0.12			77	79	1	1	143	0.051	104	98	2.1	-0.7	664	257	413	480	441		451.0	486	74	72			72	-0.082	
80	906.570	573.420	0.13	0.12			79	79	1	1	138	0.051	99	99	1.5	-0.6	639	250	408	469	436		440.4	474	81	79			72	-0.080	
90	907.860	574.680	0.13	0.13			77	79	1	1	130	0.051	99	100	1.1	-0.4	579	244	422	457	430		426.4	429	86	84			72	-0.072	
100	909.150	575.890	0.13	0.12			79	79	1	1	123	0.051	98	95	0.9	-0.2	528	242	422	444	418		410.8	398	81	79			73	-0.067	
110	910.470	577.160	0.13	0.13			79	79	1	1	121	0.051	100	100	0.6	-0.3	491	238	409	426	404		393.6	378	81	76			74	-0.064	
120	911.750	578.380	0.13	0.12			78	78	1	1	121	0.051	97	96	0.3	-0.3	478	233	382	408	389		378.0	382	80	76			74	-0.065	
130	913.050	579.630	0.13	0.13			76	76	1	1	115	0.051	99	98	0.1	-0.2	460	230	345	391	378		360.8	361	83	81			74	-0.060	
140	914.342	580.851	0.13	0.12			76	78	1	1	114	0.051	98	96	0.0	-0.1	441	228	323	376	367		347.0	352	80	81			74	-0.059	
Avg/Total	18.142	17.501	0.13	0.13	0.00	0.00	76.27	76.67	/	/	145.82	0.051	100.68	100.74	/	/	/	/	/	/	/	/	86	/	76.20	73.07	#DIV/0!	#DIV/0!	/	-0.083	

**Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations**

Client Name: CFM Vermont Equipment Numbers: _____ Run #: 2
 Model: Montpelier Train #: A
 Project No.: 259-S-13-3 Date: 01/16/08
 Tracking No.: 1168

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E158	123.4	122.4	1.0
B. Rear filter catch	Filter	E159	123.4	124.0	-0.6
C. Probe catch	Probe	II	91531.0	91529.9	1.1

Total Particulate, mg :	1.5
-------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: BOD Date: 1-29-08

**Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations**

Client Name: <u>CFM Vermont</u>	Equipment Numbers: _____	Run #: <u>2</u>
Model: <u>Montpelier</u>	_____	Train #: <u>B</u>
Project No.: <u>259-S-13-3</u>	_____	Date: <u>01/16/08</u>
Tracking No.: <u>1168</u>	_____	

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E156	110.1	109.6	0.5
B. Rear filter catch	Filter	E157	117.6	118.1	-0.5
C. Probe catch	Probe	P	92761.5	92760.4	1.1

Total Particulate, mg :	1.1
-------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: B.D. Date: 1-29-08

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: CFM Vermont Project #: 259-s-13-3 Tracking #: 1168
 Date: 1-16-08 Test Crew: B. Davis Run #: 2
 OMNI Equipment ID #: _____

Preburn Test	Coal Bed:										Actual:	
	Fuel Weight	Delta Weight	Stack Draft	Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst	
0	17.9		-0.69	70	696	114	280	157	161	369		
10	17.0	0.9	-0.55	71	422	143	246	203	214	292		
20	14.8	2.2	-1.12	69	710	159	204	218	228	715		
30	11.8	3.0	-1.13	71	939	185	204	236	243	803		
40	9.0	2.8	-1.12	72	993	207	243	279	283	763		
50	6.8	2.2	-1.07	71	935	230	295	327	335	667		
60	5.0	1.8	-1.104	72	919	254	349	378	382	661		
70	4.0	1.0	-1.092	70	786	268	344	408	408	559		
80	3.3	0.7	-1.083	69	686	281	381	420	431	495		
90												
00												
10												
20												
30												
40												
50												
60												
70												
80												
90												
AVG												

Technician signature: B. Davis Date: 1-29-08

FUEL DATA

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-16-08

Test Crew: B. Davis

Run #: 2

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B. Davis

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:	Cal Value (1) = 12%	Actual Reading <u>12</u>			
	Cal Value (2) = 22%	Actual Reading <u>22</u>			
Piece	Length	Readings		Type	
1	<u>8</u> ft	<u>221</u>	<u>215</u>	<u>20.8</u>	<u>2x4</u>
2	<u>8</u> ft	<u>238</u>	<u>220</u>	<u>234</u>	<u>2x4</u>
3	_____ ft	_____	_____	_____	_____
Length of cut pieces: <u>28x6</u> inches				Pre-Burn Fuel Average Moisture: <u>22.27%</u>	
Time (clock): <u>0720</u>		Room Temperature (F): <u>65</u>		Initials: <u>BD</u>	

TEST FUEL					
FUEL TYPE AND AMOUNT:		<u>2</u> <u>4</u> <u>3</u>	<u>4</u> <u>4</u> <u>2</u>		
CALCULATED LOAD WEIGHT:		<u>14.2</u>	ACTUAL LOAD WEIGHT:	<u>6.5</u>	(2 4)
				<u>8.0</u>	(4 4)
FUEL PIECE LENGTH:		<u>15</u>		<u>14.5</u>	Total
MOISTURE CONTENT (METER -- DRY BASIS)					
PIECE	READINGS			TYPE	
1	<u>22.6</u>	<u>20.9</u>	<u>20.8</u>	<u>2x4</u>	
2	<u>22.1</u>	<u>20.1</u>	<u>21.1</u>	<u>2x4</u>	
3	<u>23.1</u>	<u>21.5</u>	<u>23.5</u>	<u>2x4</u>	
4	<u>22.5</u>	<u>20.9</u>	<u>20.5</u>	<u>4x4</u>	
5	<u>21.4</u>	<u>22.7</u>	<u>21.6</u>	<u>4x4</u>	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>21.69</u>					
Time (clock): <u>0825</u>		Room Temperature (F): <u>65</u>		Initials: <u>BD</u>	

Technician signature: B. Davis

Date: 1-29-08

Run Notes

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Run #: 2 Date: 1-16-08

Test Crew: B Davis

OMNI Equipment ID #(s): _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

full open

SECONDARY: fixed

TERTIARY: NA

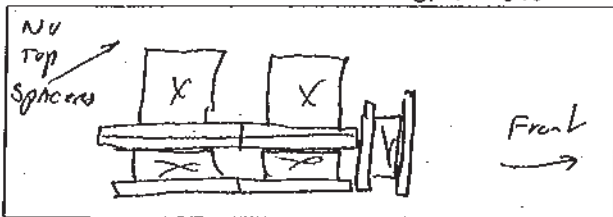
FAN: on High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
54	Test setting				x	

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: NA

FUEL LOADING: By 40 sec

DOOR: closed by 45 sec

PRIMARY AIR: @ test setting full 5:00

OTHER: NA

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

fully open

SECONDARY: Fixed

TERTIARY: NA

FAN: on High

Technician signature: B Davis

Date: 1-29-08

Supplemental Data EPA 5G/5H

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-16-08 Run #: 2 Booth: _____

Test Crew: B. Davis Start Time: 0920 Stop Time: 11:40

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: NA

Initial: _____

Final: _____

Final: _____

Calibrations: Span Gas CO₂: _____ O₂: _____ CO: _____ CO₂(DT): _____

	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	<u>NA</u>						
O ₂							
CO ₂							
CO							
CO ₂ (DT)							

Stack Diameter (inches): 6"

Air Velocity (ft/min): Initial: 250 Final: 250

Scale Audit (lbs): Pretest: 10.0 Post Test: 10.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 e 3.0 Post: 0.0 e 3.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-14-08 Initials: JA

	Initial	Middle	Ending
Pb (in/Hg)	<u>29.70</u>	<u>29.70</u>	<u>29.70</u>
Room Temp (°F)	<u>69</u>	<u>72</u>	<u>74</u>

Technician signature: B. Davis Date: 1-31-08

*Model: Montpelier
CFM Corporation
P.O. Box 501
Bethel, VT 05032*

Run 3

Wood Heater Test Data - EPA Method 5G

Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Project No.: 259-S-13-3
 Tracking No.: 1168
 Run: 3
 Test Date: 01/16/08

Burn Rate	1.16 kg/hr dry
Average Tunnel Temperature	99 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.4 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8210.0 dscf/hour
Average Delta p	0.038 inches H2O
Average Delta H	0.00 inches H2O
Total Time of Test	260 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	33.77 cubic feet	34.11 cubic feet	33.44 cubic feet
Average Gas Meter Temperature	74 degrees Fahrenheit	74 degrees Fahrenheit	74 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	32.9 dscf	33.3 dscf	32.5 dscf
Total Particulates - mn		7.4 mg	6.8 mg
Particulate Concentration (dry-standard)	0.00022 grams/dscf	0.00022 grams/dscf	0.00021 grams/dscf
Particulate Emission Rate	1.77 grams/hour	1.82 grams/hour	1.72 grams/hour
Adjusted Emissions	2.92 grams/hour	3.00 grams/hour	2.85 grams/hour
Difference from Average		0.07 grams/hour	0.07 grams/hour
7.5% of the average emission rate	0.22		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: 3
 Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Tracking No.: 1168
 Project No.: 259-S-13-3
 Test Date: 16-Jan-08
 Beginning Clock Time: 13:58
 Recording Interval: 10 min.
 Total Sampling Time: 260 min.

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.038	0.040	0.048	0.036	0.032	0.040	0.040	0.032
Initial Temp	99	99	99	99	99	99	99	99

OMNI Equipment Numbers: _____

PM Control Module: _____
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole
 Dilution Tunnel H2O: 0.00 percent
 Dilution Tunnel Static: -0.180 "H2O
 Pitot Tube Cp: 0.99
 Meter Box Y Factor: 0.992 (1) 0.987 (2)
 Barometric Pressure: 29.76 29.81 29.87 Average 29.81 "Hg
 Signature/Date: BA 2-0-08
 Tunnel Velocity: 13.42 ft/sec
 Initial Tunnel Flow: 136.6 scfm
 Average Tunnel Flow: 136.8 scfm
 Tunnel Area: 0.1883 ft²
 Post-Test Leak Check (1): _____ cfm@"Hg
 Post-Test Leak Check (2): _____ cfm@"Hg
 Fuel Moisture (dry basis %): 22.46
 Total Particulate (1): 7.4
 Total Particulate (2): 6.8

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF														Stack	
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O		
0	914.487	580.987			0.00	0.00	75	73	0	0	99	0.038			13.6		483	388	460	421	418		434.0	293	67	65			71	-0.051		
10	915.880	582.380	0.14	0.14			74	74	1	1	95	0.038	107	109	13.1	-0.5	417	392	390	405	398		400.4	273	67	67			71	-0.052		
20	917.200	583.680	0.13	0.13			73	75	1	1	100	0.038	102	102	12.2	-0.9	504	380	338	382	375		395.8	364	69	67			73	-0.067		
30	918.490	584.970	0.13	0.13			75	73	1	1	107	0.038	100	102	10.9	-1.3	599	364	305	361	355		396.8	381	70	69			71	-0.069		
40	919.830	586.260	0.13	0.13			75	75	1	1	109	0.038	104	102	9.9	-1	650	346	292	349	338		395.0	411	73	71			71	-0.074		
50	921.120	587.520	0.13	0.13			76	76	1	1	117	0.038	100	100	8.7	-1.2	764	333	298	348	335		415.6	476	71	71			73	-0.083		
60	922.440	588.830	0.13	0.13			73	75	1	1	118	0.038	103	104	7.3	-1.4	796	319	319	358	340		426.4	459	73	73			71	-0.079		
70	923.770	590.150	0.13	0.13			73	73	1	1	113	0.038	104	105	6.1	-1.2	726	308	347	373	353		421.4	440	73	73			71	-0.077		
80	925.050	591.400	0.13	0.13			74	74	1	1	116	0.038	100	99	5.4	-0.7	742	300	367	389	360		431.6	445	74	72			72	-0.078		
90	926.340	592.650	0.13	0.13			76	76	1	1	114	0.038	100	99	4.5	-0.9	746	295	390	403	369		440.6	440	71	74			69	-0.077		
100	927.660	593.960	0.13	0.13			76	76	1	1	112	0.038	102	103	3.6	-0.9	744	291	419	419	382		451.0	425	72	74			72	-0.074		
110	928.950	595.220	0.13	0.13			73	73	1	1	107	0.038	100	100	3.0	-0.6	689	291	430	430	391		446.2	375	72	74			69	-0.066		
120	930.280	596.520	0.13	0.13			74	76	1	1	103	0.038	103	102	2.6	-0.4	613	289	445	432	401		436.0	352	72	72			69	-0.062		
130	931.560	597.770	0.13	0.13			76	76	1	1	101	0.038	98	98	2.2	-0.4	587	288	456	426	406		432.6	340	69	71			69	-0.060		
140	932.880	599.080	0.13	0.13			74	74	1	1	100	0.038	101	103	1.9	-0.3	560	289	467	424	404		428.8	323	69	69			71	-0.057		
150	934.230	600.400	0.14	0.13			75	75	1	1	94	0.038	103	103	1.7	-0.2	528	288	477	414	401		421.6	305	69	69			71	-0.054		
160	935.480	601.620	0.13	0.12			73	75	1	1	94	0.038	96	95	1.5	-0.2	505	288	479	407	394		414.6	292	69	69			69	-0.050		
170	936.880	602.990	0.14	0.14			73	75	1	1	92	0.038	107	107	1.3	-0.2	472	287	478	400	385		404.4	279	69	69			69	-0.048		
180	938.130	604.200	0.13	0.12			75	75	1	1	89	0.038	95	94	1.2	-0.1	448	287	472	392	377		395.2	268	66	68			68	-0.045		
190	939.440	605.490	0.13	0.13			72	74	1	1	97	0.038	101	101	1.0	-0.2	432	289	463	382	367		386.6	263	66	66			68	-0.045		
200	940.740	606.760	0.13	0.13			71	73	1	1	88	0.038	99	99	0.9	-0.1	423	284	451	375	356		377.8	256	65	65			67	-0.044		
210	942.130	608.120	0.14	0.14			71	73	1	1	86	0.038	106	106	0.7	-0.2	412	282	438	366	347		369.0	253	65	67			67	-0.043		
220	943.360	609.330	0.12	0.12			72	70	1	1	87	0.038	94	95	0.6	-0.1	404	279	426	359	339		361.4	248	64	66			68	-0.042		
230	944.670	610.810	0.13	0.15			74	76	1	1	89	0.038	100	115	0.4	-0.2	397	279	418	355	336		357.0	245	69	69			71	-0.040		
240	946.030	611.940	0.14	0.11			77	75	1	1	87	0.038	103	87	0.3	-0.1	383	277	401	346	327		346.8	238	75	73			71	-0.039		
250	947.300	613.190	0.13	0.13			75	75	1	1	85	0.038	96	97	0.1	-0.2	372	272	389	335	320		337.6	231	75	72			70	-0.037		
260	948.596	614.422	0.13	0.12			75	74	1	1	84	0.038	98	95	0.0	-0.1	360	269	384	326	310		329.8	229	75	75			73	-0.036		
Avg/Total	34.109	33.435	0.13	0.13	0.00	0.00	74.07	74.41			99.37	0.038	100.77	100.75									104		69.96	70.00	#DIV/0!	#DIV/0!		-0.057		

**Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations**

Client Name: CFM Vermont Equipment Numbers: _____ Run #: 3
 Model: Montpelier _____ Train #: A
 Project No.: 259-S-13-3 _____ Date: 01/16/08
 Tracking No.: 1168 _____

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E160	115.5	110.1	5.4
B. Rear filter catch	Filter	E161	116.4	116.2	0.2
C. Probe catch	Probe	5	76855.1	76853.3	1.8

Total Particulate, mg :	7.4
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Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *B.P.* Date: 1-29-08

Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: CFM Vermont Equipment Numbers: _____ Run #: 3
 Model: Montpelier _____ Train #: B
 Project No.: 259-S-13-3 _____ Date: 01/16/08
 Tracking No.: 1168 _____

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E162	126.7	121.6	5.1
B. Rear filter catch	Filter	E163	119.7	119.9	-0.2
C. Probe catch	Probe	6	76255.1	76253.2	1.9

Total Particulate, mg :	6.8
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Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: *B.D.* Date: 1-29-08

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: CEM Vermont Montpelier Project #: 2578-13-3 Tracking #: 1168
 Date: 1-16-08 Test Crew: B Davis Run #: 3

OMNI Equipment ID #:

Time	Fuel Weight	Delta Weight	Stack Draft	Coal Bed:						Actual: 3 /
				Ambient	Top	Bottom	Back	Left	Right	
0	10.0		-0.96	78	869	371	492	377	385	573
10	8.8	1.2	-0.81	78	700	384	477	395	414	438
20	7.2	1.4	-0.88	77	846	388	453	394	431	509
30	6.0	1.2	-0.87	77	883	380	456	399	434	506
40	4.9	1.1	-0.81	72	843	372	469	413	439	476
50	4.0	0.9	-0.75	74	801	369	495	436	447	428
60	3.6	0.4	-0.59	72	639	370	495	441	443	387
70	3.4	0.2	-0.53	71	559	371	484	434	436	306
80	3.2	0.2	-0.51	71	511	379	466	427	425	292
85:20	3.1	0.1	-0.50	71	503	384	462	420	420	290
00										
10										
20										
30										
40										
50										
60										
70										
80										
90										
AVG										

Technician signature: B Davis Date: 1-29-08

FUEL DATA

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-16-08

Test Crew: B. Davis

Run #: 3

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B. Davis

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:	Cal Value (1) = 12%	Actual Reading	<u>12</u>		
	Cal Value (2) = 22%	Actual Reading	<u>22</u>		
Piece	Length	Readings	Type		
1	<u>12</u> ft	<u>21.6</u>	<u>23.5</u> <u>23.3</u>	<u>2x4</u>	
2	_____ ft	_____	_____	_____	
3	_____ ft	_____	_____	_____	
Length of cut pieces: <u>22 or 6"</u> inches			Pre-Burn Fuel Average Moisture: <u>22.80%</u>		
Time (clock): <u>12:10</u>		Room Temperature (F): <u>65</u>	Initials: <u>BD</u>		

TEST FUEL					
FUEL TYPE AND AMOUNT:		<u>2</u> <u>4</u> <u>3</u>	<u>4</u> <u>4</u> <u>2</u>		
CALCULATED LOAD WEIGHT:		<u>14.2</u>	ACTUAL LOAD WEIGHT: <u>6.1</u> (2 4)		
			<u>7.5</u> (4 4)		
FUEL PIECE LENGTH: <u>15</u>			<u>13.6</u> Total		
MOISTURE CONTENT (METER -- DRY BASIS)					
PIECE	READINGS			TYPE	
1	<u>22.6</u>	<u>22.5</u>	<u>22.4</u>	<u>2x4</u>	
2	<u>23.6</u>	<u>23.7</u>	<u>23.1</u>	<u>2x4</u>	
3	<u>22.5</u>	<u>22.8</u>	<u>24.8</u>	<u>2x4</u>	
4	<u>21.6</u>	<u>21.4</u>	<u>23.2</u>	<u>4x4</u>	
5	<u>21.3</u>	<u>20.6</u>	<u>20.8</u>	<u>4x4</u>	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>22.46</u>					
Time (clock): <u>12:10</u>		Room Temperature (F): <u>65</u>	Initials: <u>BD</u>		

Technician signature: BD

Date: 1-29-08

Run Notes

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Run #: 3

Date: 1-16-08

Test Crew: B Davis

OMNI Equipment ID #(s): _____

PREBURN

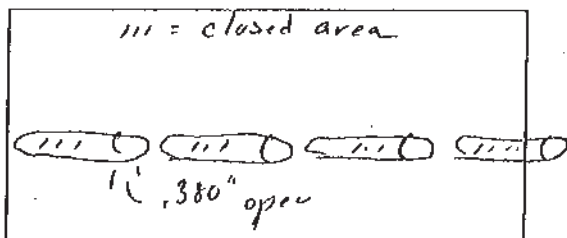
DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

SECONDARY: fixed

TERTIARY: NA

FAN: on low

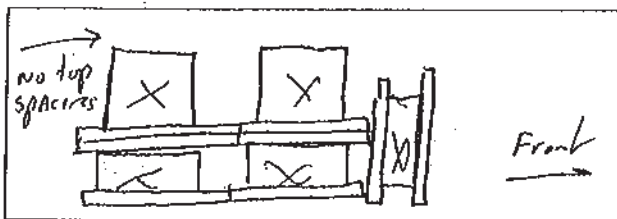


PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	Test Setting					
41					x	→
86					x	→

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: NA

FUEL LOADING: By 35 sec

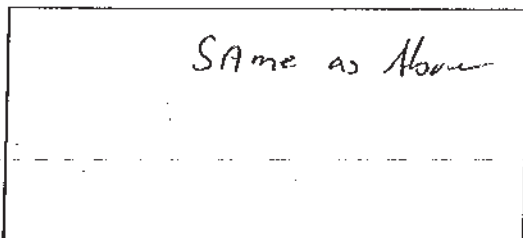
DOOR: closed by 45 sec

PRIMARY AIR: at test setting full 5:00

OTHER: NA

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



Same as Above

SECONDARY: fixed

TERTIARY: NA

FAN: on low

Technician signature: B Davis

Date: 1-29-08

Supplemental Data EPA 5G/5H

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-16-08

Run #: 3 Booth: _____

Test Crew: B Davis Start Time: 13:58 Stop Time: 18:18

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: NA

Initial: _____

Final: _____

Final: _____

Calibrations: Span Gas CO₂: _____ O₂: _____ CO: _____ CO₂(DT): _____

	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	<u>NA</u>						
O ₂							
CO ₂							
CO							
CO ₂ (DT)							

Stack Diameter (inches): 6

Air Velocity (ft/min): Initial: 250 Final: 250

Scale Audit (lbs): Pretest: 100 Post Test: 100

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 e 3.2 Post: 0.0 e 3.0

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-14-08 Initials: BA

	Initial	Middle	Ending
Pb (in/Hg)	<u>29.76</u>	<u>29.81</u>	<u>29.87</u>
Room Temp (°F)	<u>71</u>	<u>69</u>	<u>73</u>

Technician signature: B Davis Date: 1-27-08

*Model: Montpelier.
CFM Corporation
P.O. Box 501
Bethel, VT 05032*

Run 4

Wood Heater Test Data - EPA Method 5G

Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Project No.: 259-S-13-3
 Tracking No.: 1168
 Run: 4
 Test Date: 01/17/08

Burn Rate	1.06 kg/hr dry
Average Tunnel Temperature	102 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.9 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8470.4 dscf/hour
Average Delta p	0.041 inches H2O
Average Delta H	0.00 inches H2O
Total Time of Test	290 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	37.41 cubic feet	38.00 cubic feet	36.82 cubic feet
Average Gas Meter Temperature	75 degrees Fahrenheit	75 degrees Fahrenheit	75 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	36.6 dscf	37.3 dscf	35.9 dscf
Total Particulates - mn		5.4 mg	5.7 mg
Particulate Concentration (dry-standard)	0.00015 grams/dscf	0.00014 grams/dscf	0.00016 grams/dscf
Particulate Emission Rate	1.29 grams/hour	1.23 grams/hour	1.34 grams/hour
Adjusted Emissions	2.24 grams/hour	2.16 grams/hour	2.33 grams/hour
Difference from Average		0.08 grams/hour	0.08 grams/hour
7.5% of the average emission rate	0.17		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: 4
 Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Tracking No.: 1168
 Project No.: 259-S-13-3
 Test Date: 17-Jan-08
 Beginning Clock Time: 09:44
 Recording Interval: 10 min.
 Total Sampling Time: 290 min.

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.038	0.044	0.044	0.042	0.036	0.046	0.038	0.038	*H2O
Initial Temp.	100	100	100	100	100	100	100	100	oF

OMNI Equipment Numbers: _____

PM Control Module: _____
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole
 Dilution Tunnel H2O: 4.00 percent
 Dilution Tunnel Static: -0.150 *H2O
 Pitot Tube Cp: 0.99
 Meter Box Y Factor: 0.992 (1) 0.987 (2)
 Barometric Pressure: Begin Middle End Average
 29.95 29.95 29.95 29.95 *Hg

Signature/Date: *[Signature]* 2-5-08
 Tunnel Velocity: 13.86 ft/sec
 Initial Tunnel Flow: 141.4 scfm
 Average Tunnel Flow: 141.2 scfm
 Tunnel Area: 0.1883 ft²
 Post-Test Leak Check (1): .006@4 cfm@*Hg
 Post-Test Leak Check (2): .008@6 cfm@*Hg
 Fuel Moisture (dry basis %): 22.17
 Total Particulate (1): 5.4
 Total Particulate (2): 5.7

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF														Stack	
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O		
0	948.647	614.472	/	/	0.00	0.00	70	68	0	0	100	0.041	/	/	13.7	/	526	517	541	400	398		476.4	285	70	59			66	-0.050		
10	950.010	615.850	0.14	0.14			69	69	1	1	91	0.041	105	109	13.4	-0.3	424	532	481	398	390		445.0	264	69	62			67	-0.052		
20	951.340	617.120	0.13	0.13			68	68	1	1	100	0.041	103	102	12.6	-0.8	528	530	433	379	364		446.8	366	68	68			66	-0.071		
30	952.660	618.410	0.13	0.13			70	68	1	1	104	0.041	103	104	11.6	-1	590	521	463	363	344		456.2	392	69	65			70	-0.072		
40	953.960	619.680	0.13	0.13			71	71	1	1	111	0.041	101	102	10.4	-1.2	667	507	388	353	329		448.8	416	70	66			68	-0.076		
50	955.280	620.960	0.13	0.13			71	71	1	1	116	0.041	103	103	9.2	-1.2	756	497	390	353	327		464.6	466	71	66			71	-0.083		
60	956.570	622.220	0.13	0.13			74	71	1	1	116	0.041	101	102	8.0	-1.2	786	484	406	360	332		473.6	471	74	67			70	-0.078		
70	957.880	623.510	0.13	0.13			72	72	1	1	114	0.041	102	104	6.9	-1.1	776	476	426	378	345		480.2	441	74	68			72	-0.078		
80	959.160	624.810	0.13	0.13			73	73	1	1	113	0.041	100	104	6.1	-0.8	730	470	448	396	361		481.0	431	75	68			72	-0.078		
90	960.470	626.010	0.13	0.12			73	73	1	1	115	0.041	102	97	5.2	-0.9	772	461	474	412	375		498.8	444	75	69			71	-0.078		
100	961.820	627.320	0.14	0.13			75	73	1	1	114	0.041	105	105	4.3	-0.9	767	455	505	425	388		508.0	436	74	69			71	-0.077		
110	963.070	628.530	0.13	0.12			74	74	1	1	114	0.041	97	97	3.6	-0.7	755	454	531	437	400		515.4	430	74	70			72	-0.075		
120	964.380	629.790	0.13	0.13			74	74	1	1	108	0.041	101	101	3.1	-0.5	703	452	564	446	406		514.2	391	74	68			72	-0.070		
130	965.690	631.060	0.13	0.13			75	75	1	1	109	0.041	101	101	2.7	-0.4	665	450	611	448	413		517.4	379	72	68			72	-0.067		
140	966.990	632.320	0.13	0.13			75	75	1	1	103	0.041	100	100	2.4	-0.3	612	453	661	449	421		519.2	338	73	69			73	-0.059		
150	968.300	633.570	0.13	0.13			75	75	1	1	101	0.041	101	99	2.2	-0.2	598	453	678	444	423		519.2	327	73	67			71	-0.057		
160	969.620	634.830	0.13	0.13			76	76	1	1	99	0.041	101	99	2.0	-0.2	555	453	687	440	421		511.2	319	71	67			74	-0.065		
170	970.920	636.120	0.13	0.13			77	77	1	1	99	0.041	99	102	1.8	-0.2	540	456	689	437	419		508.2	315	72	68			74	-0.054		
180	972.240	637.370	0.13	0.13			77	77	1	1	97	0.041	101	98	1.7	-0.1	517	456	677	430	415		499.0	300	70	68			72	-0.051		
190	973.550	638.680	0.13	0.13			76	76	1	1	95	0.041	100	103	1.5	-0.2	502	454	654	424	411		489.0	296	70	66			74	-0.050		
200	974.910	639.870	0.14	0.12			77	77	1	1	96	0.041	104	93	1.4	-0.1	494	454	635	417	404		480.8	291	70	66			75	-0.050		
210	976.160	641.180	0.13	0.13			77	77	1	1	96	0.041	95	103	1.2	-0.2	487	454	620	411	398		474.0	289	70	66			74	-0.048		
220	977.460	642.440	0.13	0.13			77	77	1	1	96	0.041	99	99	1.0	-0.2	483	453	601	407	398		468.4	285	70	66			75	-0.048		
230	978.790	643.710	0.13	0.13			77	77	1	1	94	0.041	101	100	0.9	-0.1	474	452	584	403	387		460.0	281	70	66			74	-0.047		
240	980.090	644.960	0.13	0.13			75	77	1	1	96	0.041	99	98	0.7	-0.2	463	452	562	396	379		450.4	275	71	66			75	-0.046		
250	981.410	646.250	0.13	0.13			75	77	1	1	94	0.041	101	101	0.6	-0.1	457	455	550	390	372		444.8	272	71	64			75	-0.046		
260	982.700	647.510	0.13	0.13			81	81	1	1	98	0.041	98	98	0.4	-0.2	452	460	543	389	369		442.6	274	79	77			75	-0.045		
270	984.020	648.760	0.13	0.13			80	80	1	1	97	0.041	100	98	0.3	-0.1	445	460	535	380	362		436.4	269	80	78			74	-0.045		
280	985.350	650.060	0.13	0.13			79	79	1	1	94	0.041	101	102	0.1	-0.2	436	462	526	373	355		430.4	264	82	80			73	-0.044		
290	986.647	651.294	0.13	0.12			77	79	1	1	94	0.041	99	96	0.0	-0.1	420	461	515	363	350		421.8	252	79	79			72	-0.042		
Avg/Total	38.000	36.822	0.13	0.13	0.00	0.00	74.67	74.57	/	/	102.47	0.041	100.75	100.74	/	/	/	/	/	/	/	/	55	/	72.67	68.20	#DIV/0!	#DIV/0!	/	-0.060		

Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations

Client Name: CFM Vermont Equipment Numbers: _____ Run #: 4
Model: Montpelier Train #: A
Project No.: 259-S-13-3 Date: 01/17/08
Tracking No.: 1168

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E164	116.3	112.2	4.1
B. Rear filter catch	Filter	E165	122.0	121.7	0.3
C. Probe catch	Probe	7	86367.4	86366.4	1.0

Total Particulate, mg :	5.4
-------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: BD Date: 1-29-08

Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: <u>CFM Vermont</u>	Equipment Numbers: _____	Run #: <u>4</u>
Model: <u>Montpelier</u>	_____	Train #: <u>B</u>
Project No.: <u>259-S-13-3</u>	_____	Date: <u>01/17/08</u>
Tracking No.: <u>1168</u>	_____	

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E166	125.1	120.9	4.2
B. Rear filter catch	Filter	E167	118.3	118.4	-0.1
C. Probe catch	Probe	8	78261.6	78260.0	1.6

Total Particulate, mg :	5.7
-------------------------	-----

Component	Equations:
A. Front filter catch	$Final\ (mg) - Tare\ (mg) = Particulate,\ mg$
B. Rear filter catch	$Final\ (mg) - Tare\ (mg) = Particulate,\ mg$
C. Probe catch	$Final\ (mg) - Tare\ (mg) = Particulate,\ mg$

Analyst: BPD Date: 1-29-08

STOVE TEMPERATURE TEST DATA - METHOD 5G

Page (of)

Client/Model: CFM Vermont Project #: 259-S-133 Tracking #: 1168
 Date: 1-17-08 Test Crew: BDAD Run #: 4

OMNI Equipment ID #:

Time	Fuel Weight	Delta Weight	Stack Draft	Coal Bed:				Left	Right	Flue	Catalyst
				Ambient	Top	Bottom	Back				
0	10.0		-085	75	798	260	477	226	298	480	
10	8.5	1.5	-074	75	582	329	461	264	288	375	
20	7.2	1.3	-089	69	741	377	446	277	299	428	
30	5.9	1.3	-087	69	800	423	460	302	320	482	
40	4.8	1.1	-079	70	732	463	499	335	341	437	
50	3.7	1.1	-071	71	705	377	385	379	377	383	
60	3.4	0.3	-064	68	633	506	547	389	385	343	
70	3.2	0.2	-057	68	562	513	545	398	394	315	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Preburn Test
 Data: 0 = Range: 2.8 - 3.4
 Actual: 3.2 Coal Bed: 3.2

Technician signature: BD Date: 1-22-08

FUEL DATA

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-17-08

Test Crew: B DAVIS

Run #: 4

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B DAVIS

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:		Cal Value (1) = 12%	Actual Reading	<u>12</u>	
		Cal Value (2) = 22%	Actual Reading	<u>22</u>	
Piece	Length		Readings		Type
1	<u>12</u> ft	<u>23.1</u>	<u>20.8</u>	<u>21.3</u>	<u>2x4</u>
2	_____ ft	_____	_____	_____	_____
3	_____ ft	_____	_____	_____	_____
Length of cut pieces: <u>22 @ 6"</u> inches			Pre-Burn Fuel Average Moisture: <u>21.73%</u>		
Time (clock): <u>0750</u>		Room Temperature (F): <u>65</u>	Initials: <u>BD</u>		

TEST FUEL					
FUEL TYPE AND AMOUNT:		<u>2</u> <u>4</u> <u>3</u>	<u>4</u> <u>4</u> <u>2</u>		
CALCULATED LOAD WEIGHT:		<u>14.2</u>	ACTUAL LOAD WEIGHT:	<u>6.0</u>	(2x4)
				<u>2.7</u>	(4x4)
FUEL PIECE LENGTH: <u>15"</u>				<u>13.7</u>	Total
MOISTURE CONTENT (METER -- DRY BASIS)					
PIECE	READINGS			TYPE	
1	<u>23.4</u>	<u>23.0</u>	<u>23.7</u>	<u>2x4</u>	
2	<u>23.8</u>	<u>23.1</u>	<u>23.4</u>	<u>2x4</u>	
3	<u>21.0</u>	<u>21.0</u>	<u>20.5</u>	<u>2x4</u>	
4	<u>22.1</u>	<u>21.3</u>	<u>20.5</u>	<u>4x4</u>	
5	<u>21.5</u>	<u>22.5</u>	<u>21.7</u>	<u>4x4</u>	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
OVERALL TEST FUEL LOAD MOISTURE AVERAGE:				<u>22.17</u>	
Time (clock): <u>0810</u>		Room Temperature (F): <u>65</u>	Initials: <u>BD</u>		

Technician signature: B DAVIS

Date: 1-29-08

Run Notes

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Run #: 4 Date: 1-17-08

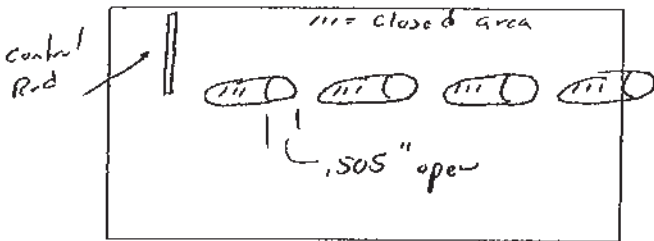
Test Crew: B. Davis

OMNI Equipment ID #(s): _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



SECONDARY: Fixed

TERTIARY: WA

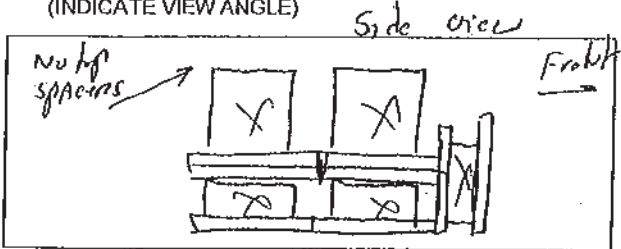
FAN: off

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	Test setting					
41					x	→
71					x	→

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: WA
 FUEL LOADING: By 40 sec
 DOOR: closed by 50 sec
 PRIMARY AIR: at test setting full size

OTHER: WA

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:

Same as Above

SECONDARY: Fixed

TERTIARY: WA

FAN: off

Technician signature: B. Davis

Date: 1-29-08

Supplemental Data EPA 5G/5H

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-17-08 Run #: 4 Booth: _____

Test Crew: B Davis Start Time: 09:44 Stop Time: 14:34

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: NA

Initial: _____

Final: _____

Final: _____

Calibrations: Span Gas CO₂: _____ O₂: _____ CO: _____ CO₂(DT): _____

Time	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
	<u>NA</u>						
O ₂							
CO ₂							
CO							
CO ₂ (DT)							

Stack Diameter (inches): 6"

Air Velocity (ft/min): Initial: 450 Final: 450

Scale Audit (lbs): Pretest: 10.0 Post Test: 10.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 e 3.1 Post: 0.0 e 3.1

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-14-08 Initials: BL

	Initial	Middle	Ending
Pb (in/Hg)	<u>29.95</u>	<u>29.95</u>	<u>29.95</u>
Room Temp (°F)	<u>66</u>	<u>73</u>	<u>72</u>

Technician signature: B Davis Date: 1-29-08

*Model: Montpelier
CFM Corporation
P.O. Box 501
Bethel, VT 05032*

Run 5

Wood Heater Test Data - EPA Method 5G

Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Project No.: 259-S-13-3
 Tracking No.: 1168
 Run: 5
 Test Date: 01/18/08

Burn Rate	1.71 kg/hr dry
Average Tunnel Temperature	120 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	14.6 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8465.7 dscf/hour
Average Delta p	0.043 inches H2O
Average Delta H	0.00 inches H2O
Total Time of Test	180 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	22.61 cubic feet	23.23 cubic feet	21.98 cubic feet
Average Gas Meter Temperature	74 degrees Fahrenheit	74 degrees Fahrenheit	74 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	21.6 dscf	22.3 dscf	20.9 dscf
Total Particulates - mn		4.3 mg	4.3 mg
Particulate Concentration (dry-standard)	0.00020 grams/dscf	0.00019 grams/dscf	0.00021 grams/dscf
Particulate Emission Rate	1.69 grams/hour	1.63 grams/hour	1.74 grams/hour
Adjusted Emissions	2.81 grams/hour	2.73 grams/hour	2.89 grams/hour
Difference from Average		0.08 grams/hour	0.08 grams/hour
7.5% of the average emission rate	0.21		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		
Results Are Acceptable			

Wood Heater Test Data - EPA Method 5G

Run: 5
 Manufacturer: CFM Vermont Castings
 Model: Montpelier
 Tracking No.: 1168
 Project No.: 259-S-13-3
 Test Date: 18-Jan-08
 Beginning Clock Time: 09:55
 Recording Interval: 10 min.
 Total Sampling Time: 180 min.

Velocity Traverse Data								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8
Initial dP	0.036	0.048	0.046	0.040	0.038	0.046	0.048	0.042
Initial Temp.	134	134	134	134	134	134	134	134

OMNI Equipment Numbers: _____

PM Control Module: _____
 Dilution Tunnel MW(dry): 29.00 lb/lb-mole
 Dilution Tunnel MW(wet): 28.56 lb/lb-mole
 Dilution Tunnel H2O: 4.00 percent
 Dilution Tunnel Static: -0.150 "H2O
 Pitot Tube Cp: 0.99
 Meter Box Y Factor: 0.992 (1) 0.982 (2)
 Barometric Pressure: Begin Middle End Average
 29.24 29.24 29.25 29.24 "Hg

Signature/Date: *[Signature]* 2-5-08
 Tunnel Velocity: 14.63 ft/sec.
 Initial Tunnel Flow: 139.3 scfm
 Average Tunnel Flow: 141.1 scfm
 Tunnel Area: 0.1883 ft²
 Post-Test Leak Check (1): .006@5 cfm@"Hg
 Post-Test Leak Check (2): .004@5 cfm@"Hg
 Fuel Moisture (dry basis %): 22.09
 Total Particulate (1): 4.3
 Total Particulate (2): 4.3

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF													Stack	
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O	
0	986.700	651.400			0.00	0.00	69	72	0	0	134	0.043			13.8		484	258	345	397	404		377.6	310	63	63			67	-0.057	
10	988.040	652.690	0.13	0.13			72	70	1	1	110	0.043	104	106	13.1	-0.7	448	250	272	376	380		345.2	365	65	63			67	-0.067	
20	989.360	653.950	0.13	0.13			69	69	1	1	125	0.043	104	105	11.5	-1.6	595	243	230	349	352		353.8	493	66	64			68	-0.087	
30	990.660	655.170	0.13	0.12			69	67	1	1	140	0.043	104	104	9.8	-1.7	708	232	215	339	334		365.6	570	67	67			67	-0.094	
40	992.060	656.420	0.14	0.13			72	71	1	1	146	0.043	112	106	7.9	-1.9	800	224	224	347	332		385.4	617	72	69			70	-0.099	
50	993.250	657.640	0.12	0.12			72	72	1	1	140	0.043	95	103	6.3	-1.6	809	222	246	393	348		403.6	560	71	68			68	-0.091	
60	994.560	658.860	0.13	0.12			73	73	1	1	139	0.043	104	102	5.0	-1.3	814	218	285	385	366		413.6	545	73	71			68	-0.090	
70	995.820	660.060	0.13	0.12			73	73	1	1	137	0.043	100	101	3.9	-1.1	800	219	329	401	381		426.0	535	73	71			69	-0.088	
80	997.110	661.280	0.13	0.12			73	73	1	1	126	0.043	101	101	3.0	-0.9	722	216	377	416	396		425.4	475	73	69			71	-0.080	
90	998.390	662.480	0.13	0.12			73	73	1	1	124	0.043	100	99	2.3	-0.7	659	215	442	425	406		429.4	479	71	69			69	-0.075	
100	999.680	663.710	0.13	0.12			74	74	1	1	119	0.043	101	101	1.9	-0.4	613	215	480	430	410		429.6	416	71	67			69	-0.071	
110	1000.980	664.940	0.13	0.12			74	74	1	1	113	0.043	101	101	1.4	-0.5	585	213	494	430	410		426.4	395	70	70			70	-0.067	
120	1002.260	666.160	0.13	0.12			77	77	1	1	111	0.043	98	99	1.2	-0.2	541	214	491	428	409		416.6	368	79	75			70	-0.062	
130	1003.540	667.360	0.13	0.12			77	77	1	1	107	0.043	98	97	1.0	-0.2	494	216	461	424	403		399.6	340	79	79			70	-0.057	
140	1004.810	668.550	0.13	0.12			75	78	1	1	105	0.043	98	96	0.8	-0.2	464	217	418	414	390		380.6	325	81	81			73	-0.054	
150	1006.110	669.780	0.13	0.12			75	77	1	1	103	0.043	100	99	0.6	-0.2	444	214	379	401	379		363.4	316	81	79			73	-0.052	
160	1007.370	670.980	0.13	0.12			77	77	1	1	103	0.043	96	97	0.4	-0.2	427	215	362	387	368		351.8	307	81	81			73	-0.051	
170	1008.660	672.180	0.13	0.12			77	77	1	1	101	0.043	98	97	0.2	-0.2	410	212	336	379	325		332.4	299	81	81			73	-0.049	
180	1009.935	673.376	0.13	0.12			76	76	1	1	100	0.043	97	97	0.0	-0.2	391	209	315	365	344		324.8	297	79	79			73	-0.046	
Avg/Total	23.235	21.976	0.13	0.12	0.00	0.00	73.53	73.68			120.16	0.043	100.66	100.70									53		73.47	71.89	#DIV/0!	#DIV/0!		-0.070	

Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: CFM Vermont Equipment Numbers: _____ Run #: 5
 Model: Montpelier _____ Train #: A
 Project No.: 259-S-13-3 _____ Date: 01/18/08
 Tracking No.: 1168 _____

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	VC1	126.4	123.7	2.7
B. Rear filter catch	Filter	VC2	116.1	116.5	-0.4
C. Probe catch	Probe	Q	93311.2	93309.2	2.0

Total Particulate, mg :	4.3
-------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: BD Date: 1-29-08

**Final Laboratory Report - Method 5G Dual Train
Dilution Tunnel Particulate Calculations**

Client Name: <u>CFM Vermont</u>	Equipment Numbers: _____	Run #: <u>5</u>
Model: <u>Montpelier</u>	_____	Train #: <u>B</u>
Project No.: <u>259-S-13-3</u>	_____	Date: <u>01/18/08</u>
Tracking No.: <u>1168</u>	_____	

Sample Component	Reagent	Filter # or Probe #	Weights		
			Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	VC3	124.4	122.1	2.3
B. Rear filter catch	Filter	VC4	123.7	123.8	-0.1
C. Probe catch	Probe	K	92569.2	92567.1	2.1

Total Particulate, mg:	4.3
------------------------	-----

Component	Equations:
A. Front filter catch	Final (mg) - Tare (mg) = Particulate, mg
B. Rear filter catch	Final (mg) - Tare (mg) = Particulate, mg
C. Probe catch	Final (mg) - Tare (mg) = Particulate, mg

Analyst: BDO Date: 1-29-08

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: CFM Vermont Project #: 259-S-13-3 Tracking #: 1168
 Date: 1-18-08 Test Crew: B. Adams Run #: 5
 OMNI Equipment ID #: _____

Time	Fuel Weight	Delta Weight	Stack Draft	Coal Bed:					Flue	Catalyst	
				Ambient	Top	Bottom	Back	Left			Right
0	14.0		-0.65	74	562	132	302	188	170	372	
10	13.3	0.7	-0.45	75	386	163	238	219	225	208	
20	11.7	1.6	-0.81	75	518	191	200	236	241	468	
30	10.5	1.2	-0.80	76	583	208	198	249	254	447	
40	9.0	1.5	-0.90	70	658	225	205	257	274	526	
50	7.0	2.0	-0.97	71	808	233	236	285	305	592	
60	5.4	1.6	-0.93	71	804	238	278	325	356	557	
70	4.1	1.3	-0.89	69	827	241	306	351	389	536	
80	2.2	0.9	-0.74	72	677	256	322	391	404	439	
90	3.0	0.2	-0.57	68	827	264	349	401	465	329	
100											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Preburn Test Data: Range: 28-34 Actual: 30
 Coal Bed: 30

TEMPERATURES (oF)

Technician signature: B. Adams Date: 1-29-08

FUEL DATA

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-18-08

Test Crew: B Davis

Run #: 5

OMNI Equipment ID #: _____

FUEL LOAD PREPARED BY: B Davis

FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL					
MOISTURE CONTENT (METER -- DRY BASIS)					
CALIBRATION:		Cal Value (1) = 12%	Actual Reading	<u>12</u>	
		Cal Value (2) = 22%	Actual Reading	<u>22</u>	
Piece	Length		Readings		Type
1	<u>13</u> ft	<u>22.0</u>	<u>19.7</u>	<u>20.9</u>	<u>2x4</u>
2	_____ ft	_____	_____	_____	_____
3	_____ ft	_____	_____	_____	_____
Length of cut pieces: <u>24.6</u> " inches			Pre-Burn Fuel Average Moisture: <u>20.87%</u>		
Time (clock): <u>0755</u>		Room Temperature (F): <u>65</u>	Initials: <u>BL</u>		

TEST FUEL					
FUEL TYPE AND AMOUNT:		<u>2</u> <u>4</u> <u>3</u>	<u>4</u> <u>4</u> <u>2</u>		
CALCULATED LOAD WEIGHT:		<u>14.2</u>	ACTUAL LOAD WEIGHT:	<u>6.4</u>	(2 4)
				<u>7.4</u>	(4 4)
FUEL PIECE LENGTH: <u>15</u>				<u>13.8</u>	Total
MOISTURE CONTENT (METER -- DRY BASIS)					
PIECE	READINGS			TYPE	
1	<u>22.6</u>	<u>22.8</u>	<u>23.3</u>	<u>2x4</u>	
2	<u>23.0</u>	<u>23.0</u>	<u>27.2</u>	<u>2x4</u>	
3	<u>22.1</u>	<u>22.0</u>	<u>22.4</u>	<u>2x4</u>	
4	<u>20.9</u>	<u>21.5</u>	<u>21.7</u>	<u>4x4</u>	
5	<u>20.6</u>	<u>21.0</u>	<u>20.3</u>	<u>4x4</u>	
6	_____	_____	_____	_____	
7	_____	_____	_____	_____	
8	_____	_____	_____	_____	
9	_____	_____	_____	_____	
10	_____	_____	_____	_____	
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: <u>22.09</u>					
Time (clock): <u>0800</u>		Room Temperature (F): <u>65</u>	Initials: <u>BL</u>		

Technician signature: B. Davis Date: 1-29-08

Run Notes

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Run #: 5 Date: 1-18-08

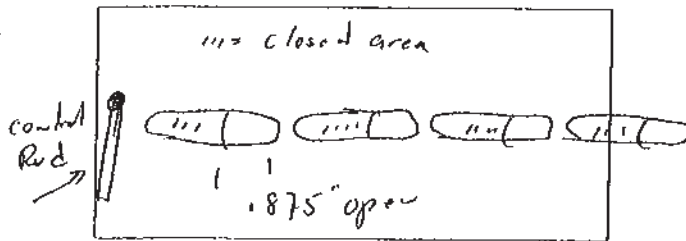
Test Crew: B. Davis

OMNI Equipment ID #(s): _____

PREBURN

DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



SECONDARY: fixed

TERTIARY: NA

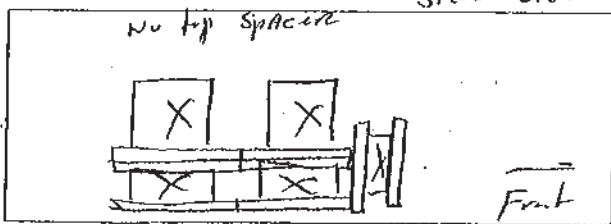
FAN: on High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
6 44	Test setting				x	

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: NA

FUEL LOADING by 45 sec.

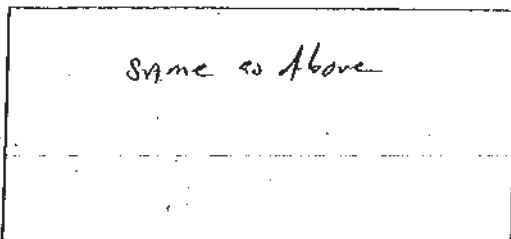
DOOR: cracked open until 3:30 then closed

PRIMARY AIR: at test setting full 5:00

OTHER: NA

DESCRIBE OR SKETCH TEST SETTINGS BELOW:
(SETTINGS MUST BE ACCURATE AND REPRODUCIBLE)

PRIMARY:



SECONDARY: fixed

TERTIARY: NA

FAN: on high

Technician signature: B. Davis Date: 1-29-08

Supplemental Data EPA 5G/5H

Client: CFM Vermont

Model: Montpelier

Project #: 259-S-13-3

Tracking #: 1168

Date: 1-18-08

Run #: 5 Booth: _____

Test Crew: B. Davis

Start Time: 0955 Stop Time: 1255

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack:

Dilution Tunnel (Method 5G Only):

Initial: NA

Initial: _____

Final: _____

Final: _____

Calibrations: Span Gas CO₂: _____ O₂: _____ CO: _____ CO₂(DT): _____

	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time	<u>NA</u>						
O ₂							
CO ₂							
CO							
CO ₂ (DT)							

Stack Diameter (inches): 6"

Air Velocity (ft/min): Initial: 250 Final: 250

Scale Audit (lbs): Pretest: 10.0 Post Test: 10.0

Induced Draft: 0.0 %Smoke Capture: 100%

Pitot Tube Leak Test: Pre: 0.0 ± 3.0 Post: 0.0 ± 3.2

Flue Pipe Cleaned Prior to First Test in Series: Date: 1-14-08 Initials: BD

	Initial	Middle	Ending
Pb (in/Hg)	<u>29.24</u>	<u>29.24</u>	<u>29.25</u>
Room Temp (°F)	<u>67</u>	<u>69</u>	<u>73</u>

Technician signature: B. Davis Date: 1-29-08

*Model: Montpelier
CFM Corporation
P.O. Box 501
Bethel, VT 05032*

Section 5

Sampling Procedures and Test Results

INTRODUCTION

CFM Corporation retained *OMNI* to perform U.S. Environmental Protection Agency (EPA) certification testing on the Montpelier wood stove. The Montpelier wood stove is a non-catalytic, air circulating-type room heater. The firebox is constructed of mild steel. The usable firebox volume was measured to be 2.0 cubic feet. The stove is vented through a 6-inch diameter flue collar located at the top of the unit.

The testing was performed at CFM's facilities in Bethel, VT. The unit was logged in on January 14, 2008, then assigned and labeled with *OMNI* ID #1168. *OMNI* representative Bruce Davis conducted the certification testing and completed all testing by January 18, 2008. The EPA was notified of the testing dates in a letter dated January 8, 2008. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Mark Champion of CFM Corporation and is on file at *OMNI*'s testing facility.

The Montpelier wood fireplace insert was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 5G). Particulate emissions were measured using a Method 5G sampling train consisting of two filters (front and back). The weighted average emissions of the four test runs included in the results indicate a particulate emission level of 2.9 grams per hour. Run #4, a fan confirmation test run, was performed and was not used in the weighted average emission results. Test runs were conducted in each of three burn rate categories (0.80-1.25 kg/hr, 1.25-1.90 kg/hr, and maximum). Emissions for each of their individual test runs did not exceed the cap. The Montpelier results are within the emission limit of 7.5 grams per hour for non-catalytic affected facilities manufactured on or after July 1, 1990, or sold at retail on or after July 1, 1992.

The wood heater was sealed after completion of testing in compliance with the EPA regulation as follows:

- “DO NOT TAMPER” labels were placed on the door and on all other openings.
- Plastic material sealed with “DO NOT TAMPER” labels and tape was wrapped around the unit.
- The unit was sealed in a wood box constructed for the unit and secured with steel banding.
- “DO NOT TAMPER” labels were placed on all outer surfaces of the box.

This report is organized in accordance with the EPA-recommended outline and is summarized in the Table of Contents immediately preceding this report. The results in this report are limited to the item submitted.

Table 1.1 – Particulate Emissions

Run	Burn Rate (kg/hr dry)	Method 5G Emissions (g/hr)
1	0.85	3.45
2	2.32	1.32
3	1.16	2.92
5	1.71	2.81
Weighted particulate emission average of four test runs: 2.9 grams per hour.		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	71	72	29.24	29.17	<50	<50
2	69	74	29.70	29.70	<50	<50
3	71	73	29.76	29.87	<50	<50
5	67	73	29.24	29.25	<50	<50

Table 1.3.1 – Fuel Measurement and Crib Description Summary – PRETEST

Run	Pretest Fuel Weight (Starting weight in lbs)	Pretest Moisture (Dry basis - %)	Coal Bed Weight (lbs)
1	10.0	24.2	3.2
2	17.9	22.3	3.3
3	10.0	22.8	3.1
5	14.0	20.9	3.0

Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft ³)	Fuel Loading Density Wet Basis (lbs/ft ³)	Fuel Moisture Content Dry (%)	Piece Length (in)	2x4s Used	4x4s Used
1	13.6	2.0	6.80	21.5	15	3	2
2	14.5	2.0	7.25	21.7	15	3	2
3	13.6	2.0	6.80	22.5	15	3	2
5	13.8	2.0	6.90	22.1	15	3	2

Table 1.4 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	360	13.49	136.1	93.3
2	140	16.12	151.2	145.8
3	260	13.42	136.8	99.4
5	180	14.63	141.1	120.2

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temperature Average ^a	Ending Surface Temperature Average ^a	Surface Delta T ^b
1	408.2	289.2	119
2	432.6	347.0	86
3	434.0	329.8	104
5	377.6	324.8	53

a. All temperatures are in degrees F.
 b. Represents the difference between beginning and ending average surface temperatures.

Table 1.6 – Pretest Configuration

Run	Combustion Air (in)	Fuel Added	Fuel Removed	Time (min)
1	Fully Closed	10.0 lbs at start; no addition; coal bed 3.2 lbs	0.0	79
2	Fully Open	17.9 lbs at start; no addition; coal bed 3.3 lbs	0.0	80
3	Open 0.380"	10.0 lbs at start; no addition; coal bed 3.1 lbs	0.0	85
5	Open 0.875"	14.0 lbs at start; no addition; coal bed 3.0 lbs	0.0	90

Table 1.7 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (H ₂ O)	Primary Air Setting (in)	Run Time (min)	Average Draft (H ₂ O)
1	0.85	0	Fully Closed	360	-0.043
2	2.32	0	Fully Open	140	-0.083
3	1.16	0	Open 0.380"	260	-0.057
5	1.71	0	Open 0.875"	180	-0.070

Table 1.8 – Test Configurations

Run	Five-Minute Startup	Combustion Air
1	<u>Bypass</u> : N/A. <u>Fuel Loading</u> : Loaded by 35 seconds. <u>Door</u> : Closed by 45 seconds. <u>Primary Air</u> : At test setting for full 5.0 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On low.	Fully Closed
2	<u>Bypass</u> : N/A. <u>Fuel Loading</u> : Loaded by 40 seconds. <u>Door</u> : Closed by 45 seconds. <u>Primary Air</u> : At test setting for full 5.0 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	Fully Open
3	<u>Bypass</u> : N/A. <u>Fuel Loading</u> : Loaded by 35 seconds. <u>Door</u> : Closed by 45 seconds. <u>Primary Air</u> : At test setting for full 5.0 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On low.	Open 0.380"
5	<u>Bypass</u> : N/A. <u>Fuel Loading</u> : Loaded by 45 seconds. <u>Door</u> : Cracked open until 3:30, then closed. <u>Primary Air</u> : At test setting for full 5.0 minutes. <u>Other</u> : N/A. <u>Secondary</u> : Fixed. <u>Tertiary</u> : N/A. <u>Fan</u> : On high.	Open 0.875"

Model: Montpelier
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TEST RESULTS AND DISCUSSION

A total of five test runs were performed on the Montpelier wood stove. Four test runs were conducted in the following categories and included in the weighted average emission level results: two in the 0.80 to 1.25 kg/hr dry category; one in the 1.25 to 1.90 kg/hr dry category; and one at maximum.

The weighted particulate emission level was measured to be **2.9 g/hr**.

The proportionality results for all four test runs were acceptable. Quality check results for each test run are presented in Section 2 of this report.