

## **TEST REPORT**

**SCOPE: EMISSIONS AND OUTPUT** 

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

**TEST STANDARD: EPA** 

**MODEL: FP-12 WOOD FIREPLACE** 

Notice to reader: Our FP-12 wood fireplace was tested as part of our Monaco 2008 firebox. Therefore, the Monaco 2008 is referenced throughout the attached test report.



# **Certification Test Report Stove Builder International**

**Wood Fireplace Insert Model: Monaco 2008** 

Report Number: 338-F-68-3

Part 1 of 2

OMNI-Test Laboratories, Inc.

**Product Testing & Certification** 

Mailing: Post 0 Street: 5465

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# **Certification Test Report**

# Stove Builder International Wood Fireplace Insert

Model: Monaco 2008

Prepared for:

Stove Builder International

1700, Léon-Harmel

Québec (Québec), Canada

G1N 4R9

Prepared by:

OMNI-Test Laboratories, Inc.

5465 SW Western Avenue, Suite G

Beaverton, OR 97005

(503) 643-3788

Test Period:

December 11, 2007 through December 13, 2007

Report Date:

January 2008

Report Number:

338-F-68-3

All data and information contained in this report are confidential and proprietary to Stove Builder International. Its significance is subject to the adequacy and representative character of the samples and to the comprehensiveness of the tests, examinations, or surveys made. The contents of this report cannot be copied or quoted, except in full, without specific, written authorization from Stove Builder International and OMNI-Test Laboratories, Inc. No use of the OMNI-Test Laboratories, Inc. name, logo, or registered mark (O-TL) is permitted, except as expressly authorized by OMNI-Test Laboratories, Inc. in writing.

## **AUTHORIZED SIGNATORIES**

This report has been reviewed and approved by the following authorized signatories:

Alana Smith, Senior Manager OMNI-Test Laboratories, Inc.

John Voorhees, Technical Services Director OMNI-Test Laboratories, Inc.

Ken Morgan, Emissions Testing Technician OMNI-Test Laboratories, Inc.

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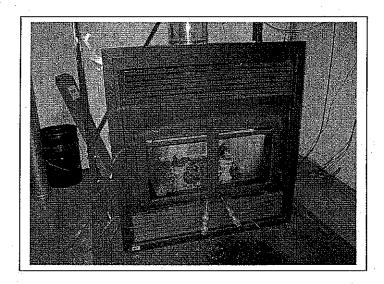
## Section 1

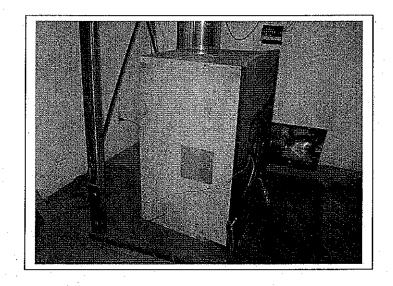
Fuel Photographs/Appliance Description/Drawings

## Stove Builder International

Monaco 2008

Test Dates: December 11, 2007 through December 13, 2007





## Section 2

Quality Assurance/Quality Control

## QUALITY ASSURANCE/QUALITY CONTROL

*OMNI* follows the guidelines of ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories," and the quality assurance/quality control (QA/QC) procedures found in *OMNI*'s Quality Assurance Manual.

OMNI's scope of accreditation includes, but is not limited to, the following:

- ANSI (American National Standards Institute) for certification of product to safety standards.
- To perform product safety testing by the International Approval Service (formerly ICBO ES) under accreditation as a testing laboratory designated TL-130.
- To perform product safety testing as a "Certification Organization" by the Standards Council of Canada (SCC).
- Serving as a testing laboratory for the certification of wood heaters by the U.S. Environmental Protection Agency.

This report is issued within the scope of *OMNI*'s accreditation. Accreditation certificates are available upon request.

# Sample Analysis Analysis Worksheets

Analysis Worksheets
Tared Filter and Beaker Data
Solvent Blank Data

Client: <u>SBI</u>				
Model: Monaco 2008				
Project #: 338-F-68-3 Tracking #: 1161		-		
Date: 12-11-07 Test C	Crew: K. Morgan	Run #:	1	
Sample Train #: 🔀	_ Train assembled by:	K. MorgAN		
Balance ID #: OMNI - 00023	_ Thermo/Hygro meter II	) #. <u>OMNÍ -</u>		
Audit weight ID #: OMNI - 00131	_ (Balance audit mfr. std:	: 500 ± 0.72 mg)	•	
				k,

	Weighing Record						
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1151	.5001	20	77	14
Lab ID# ID#(	12-19-07	09:30	.1151	,5001	17	66	14 -
Tare wt/046							
D/T in desiccator		-			-		
Preliminary wt.:							·
Rear Filter	12-18-07	16:30	.1187	.5001	20	77	K
Lab ID # ID # <b>z</b>	12-19-07	09:30	.1186	.5001	17	66	14 -
Tare wt		,		<b>.</b>			
D/T in desiccator: 12-11-07 08:00							
Preliminary wt.:				·		·	
Probe Lab ID#	12-18-07	16:30	171.8694	,5001	20	77	14
Probe #! Tare wt! Cleaned by:	12-19-07	09:30	171,8693	. 5001	17	66	14 -
D/T in desiccator: 68:00							
Preliminary wt.:							

Technician signature: 16 Morga Date: 12-19-07

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Client: <u>SBI</u>		* * * * * * * * * * * * * * * * * * *		
Model: Monaco 2008				
Project #: 338-F-68-3 Tracking #	<i>‡</i> : 1161			
Date: 12-11-07	Test Crew: K. Morgan	Run #		
Sample Train #: B	Train assembled by: _K.	Morana	· · · · · · · · · · · · · · · · · · ·	
Balance ID #: <u>OMNI - 00023</u>	Thermo/Hygro meter ID			
Audit weight ID #: OMNI - 00131	1 (Balance audit mfr. std:			
		5,		

		Weighing Record						
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials	
Front Filter	12-18-07	16:30	./32/.	. 5001	20	77	14	
Lab ID # ID #3	12-19-07	09:30	./32/	,5061	17	66	1h -	
Tare wt								
D/T in desiccator 12-17-07 08:00								
Preliminary wt.:				,		;		
Rear Filter	12-18-07	16:30	./231	.5001	70	77	14	
Lab ID # ID # <i>4</i> Tare wt	12-19-07	09:30	./232	.5001	17	66	14 -	
D/T in desiccator:								
Preliminary wt.:			-					
Probe Lab ID #	12-18-07	16:30	187.74/18	.5001	20	77	14	
Probe # Z Tare wt. <u>187.7420</u> Cleaned by:	12-19-07	09:30	187.7416	.5001	17	66	11	
D/T in desiccator:  12-17-07 08:00  Preliminary wt.:								
187.7432								

Technician signature:	 1. Morga	Date:	12-19-07	
	1			

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Client: <u>SBI</u>		•		
Model: Monaco 2008	•			
Project #: 338-F-68-3 Tracking #	: <u>1161</u>	,		
Date: 12-12-07	Test Crew: K. Morg AN	Run #:	2	
Sample Train #:A	Train assembled by:	K. MorgAN		
Balance ID #: <u>OMNI - 00023</u>	Thermo/Hygro meter	ID#: OMNI -		-
Audit weight ID # OMNI 00131	(Ralance audit mfr. etc	d. 500 ± 0.72 mg)		

			V	leighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	,1192	, 5001	20	77	12
Lab ID# ID#	12-19-07	09:30	.1191	,5001	17	66	11 -
Tare wt					, -		
D/T in desiccator							
Preliminary wt.:	1					-	·
Rear Filter	12-18-07	16:30	.1242	.5001	20	77	14
Lab ID# ID#6	12-19-07	09:50	.1241	.5001	17	66	14 -
Tare wt							
D/T in desiccator: 08:00						-	
Preliminary wt.:							
Probe	12-18-07	16:30	188.0818	,5001	20	77	14
Lab ID #	12-19-07	09:30	188,0815	,5001	17	66	/L -
D/T in desiccator:  12-17-07 08:00  Preliminary wt.:							
188.0834							
		· .					

Technician signature: 161. Morga Date: 12-19-07

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Requeston OP	•

Client: SBI	
Model: Monaco 2008	
 Project #: 338-F-68-3 Tracking #: 1161	
Date: 12-12-07 Test C	Crew: K. Morgan Run #: 2
Sample Train #:	Train assembled by: K. Morgan
Balance ID #: OMNI - 00023	Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131	(Balance audit mfr. std: 500 ± 0.72 mg)
	_ · · · · · · · · · · · · · · · · · · ·

	Weighing Record						
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	,1388	,5001	20	77	1L
Lab ID #	12-19-07	09:30	./387	,5001	17	66	11 -
Tare wt/221							
D/T in desiccator 12-17-07 08100							
Preliminary wt.:							
Rear Filter	12-18-87	16:30	,/272	,5001	20	フフ	K
Lab ID # ID #	12-19-07	09:30	.1272	,5001	17.	66	11 -
Tare wt	-						
D/T in desiccator: 08:00							
Preliminary wt.:							
Probe Lab ID #	12-18-07	16:30	197,3886	,5001	20	77	14
Probe #	12-19-07	09:30	197,3884	,5001	17	66	11
D/T in desiccator:  12-17-07 08:00  Preliminary wt.:							
197. 3904							

Technician signature:	16 1. Mary	. Date:	12-19-07	

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Client: SBI			-			
Model: Monaco 2008					•	
Project #: 338-F-68-3	Tracking #: <u>116</u>	1 / 11	**************************************			
Date: <u>/2-/2-07</u>	Test	Crew: K. Morgan	Run #: _	3		
Sample Train #:	A	Train assembled by:	K. Morg AN			
Balance ID #: OMNI -	00023	Thermo/Hygro meter	ID #: <u>OMNI -</u>			
Audit weight ID #: OM	NI – 00131	(Balance audit mfr. st	d: 500 ± 0.72 mg)			
		•				

	-		· <b>VV</b> :	eighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	,1083	.5001	20	77	14
Lab ID # ID #9 Tare wt1048	12-19-07	09:30	.1082	,5061	17	66	14-
D/T in desiccator 08:00							
Preliminary wt.:				·			
Rear Filter	12-18-07	16:30	.1179	. 5001	20	77	12
Lab ID # ID #	12-19-07	09:30	.1179	,5001	7716	66	12 -
Tare wt1175							
D/T in desiccator: /2-/7-07 08:00							
Preliminary wt.:							
Probe Lab ID #	12-(8-07	16:30	188,2559	. 5001	20	77	12
Probe # <u>3</u> Tare wt. <u>188,2558</u> Cleaned by:	12-19-07	09:30	188,2559	,5001	17	66	14
D/T in desiccator: 12-11-07 08:00							
Preliminary wt.:							
				-			

				-			
Technician sign	ature:	16 1.1	Morgan	Date: _	12-19	1-07	
		,	/		ş*		

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Client: <u>SBI</u> Model: <u>Monaco</u> 2008				
Project #: 338-F-68-3 Tracking #: 1161	1			· ·
Date: <u>12-12-07</u> Test	Crew: K. MORGAN	Run #:	3	•
Sample Train #:B	Train assembled by: K.	MorgAN		
Balance ID #: OMNI - 00023	Thermo/Hygro meter ID #:			
Audit weight ID #: OMNI - 00131	(Balance audit mfr. std: 50			
				*

			V	eighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-67	16:30	.1246	.5001	20	77	14
Lab ID # ID # tı	12-19-07	09:30	.1247	.5001	. 17	46	16 -
Tare wt							
D/T in desiccator 12-17-07 08:00						<u>.                                    </u>	
Preliminary wt.:		-					
Rear Filter	12-18-07	16:30	.1254	.5001	20	77.	14
Lab ID # ID #	12-19-07	09:30	.1255	.5001	17	66	1/ -
Tare wt			į			_	
D/T in desiccator; 12-11-01 08:00							
Preliminary wt.:							
Probe Lab ID #	12-18-07	16:30	188,1227	,5061	20	77	16
Probe #	12-19-07	09:30	188.1228	,5001	17	66	14 -
D/T in desiccator:  12-17-07 08:00  Preliminary wt.:			,				
188.1247	·						
		·					

Technician signature:	16 1. M	lorge Da	ate:	12-19-07	•
	,				

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<u>1161</u>			
	Run #:	4	
Train assembled by: _ <i>K</i>	. MorgAN		
Thermo/Hygro meter ID	#: <u>OMNI -</u>		•
(Balance audit mfr. std:	500 ± 0.72 mg)		
	Test Crew: <u>                                     </u>	Test Crew: K. Morgan Run #: Run #: Run #: Train assembled by: K. Morgan Thermo/Hygro meter ID #: OMNI -	Test Crew: K. Worgan Run #: 4 Train assembled by: K. Morgan Thermo/Hygro meter ID #: OMNI -

			V	eighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1254	,5001	20	77	14
Lab ID# ID#_ <i>_EI46</i>	12-19-07	09:30	1254	,5001	17	66	12 -
Tare wt							
D/T in desiccator 12-17-07 08:00							
Preliminary wt.:							
Rear Filter	12-18-07	16:30	.1269	.5001	20	フフ	12
Lab ID # ID # <i>E144</i>	12-19-07	09:30	,1270	,5001	17	66	12 -
Tare wt				·			
D/T in desiccator: 12-17-07 08:00							
Preliminary wt.:				·			
Probe Lab ID #	12-18-07	16:30	114,7390	,5001	20	77	1/2
Probe #	12-19-07	09:30	114.7389	,5001	17	66	14 -
D/T in desiccator: /2-/7-07 08:00							
Preliminary wt.:							

		,	-				
Technician signa	iture:	16.1	Morga	_ Date: _	12-19-0	7	
		/		 		•	
			2				

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Client: <u>SBI</u>			••
Model: Monaco 2008			
Project #: 338-F-68-3 Tracking	#: <u>1161</u>		
Date: 12-13-07	Test Crew: K. Morgan	Run #:	4
Sample Train #: _ <b>B</b>	Train assembled by:	K. MorgAN	
Balance ID #: OMNI - 00023	Thermo/Hygro meter I	ID #: OMŃI -	
Audit weight ID #: OMNI - 0013	1 (Balance audit mfr. sto	d: $500 \pm 0.72 \text{mg}$	
			•

			V	eighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	./253	.5001	20	77	IL
Lab ID# ID# <i>εμ</i> ς	12-19-07	09:30	./253	,5001	17	66	14
Tare wt		·					
D/T in desiccator							
Preliminary wt.:					-		
Rear Filter	12-18-07	16:30	,1183	.5001	20	フフ	11
Lab ID # ID # _ ει43	12-19-07	09:30	.//83	.5001	17	66	11
Tare wt							
D/T in desiccator:		·					
Preliminary wt.:							
Probe Lab ID #	12-18-07	16:30	114.1431	.5001	20	77	14
Probe # 38 Tare wt	12-19-07	09:30	114.1430	5001	17	66	12
D/T in desiccator: 12-11-07 08:100							
Preliminary wt.:							

		·						
Technicia	an signatui	re:/	1. M	rgz	_ Date: _	12-19-	01	
	e E							

Client SBI		·			
Model: Monaco 2008	•		•		
Project #: 338-F-68-3 Tracking #:					
Date: 12-13-07	est Crew: K. MorgAN	Run #:	5		
Sample Train #:	Train assembled by: _ <i>_</i>	K. Morgan			
Balance ID #: OMNI - 00023	Thermo/Hygro meter II	) #: <u>OMNI -</u>	. ",		
Audit weight ID #: OMNI - 00131	(Balance audit mfr. std:	$500 \pm 0.72 \mathrm{mg}$	•		

			·	eighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1122	,500/	20	77	14
Lab ID# ID#/3	12-19-07	09:30	.1123	,5001	17	66	12 -
Tare wt							·
D/T in desiccator							
Preliminary wt.:					-		
Rear Filter	12-18-07	16:30	,1278	.5001	20	- 77	14
Lab ID # ID #/ <u>//</u>	12-19-07	09:30	./228	,5001	17	66	14
Tare wt							
D/T in desiccator: 12-17-07 08:00				· · · · · · · · · · · · · · · · · · ·			
Preliminary wt.:		·			r	ų	
Probe Lab ID #	12-18-07	16:30	179,9083	.5001	20	77	14
Probe #	12-19-07	09:30	199.9085	,5001	!7	66	14
D/T in desiccator:  12-17-07 08:00  Preliminary wt.:		:					
(99.9107							
						,	

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Technician signature:	/h / Morga	Date:	12-19-07	·
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			•	

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Client: SBI				
Model: Monaco 2008		*		
Project #: 338-F-68-3 Tracking #: 1161				
Date: 12-13-07 Test (	Crew: K. Worgan	Run #:	5	
Sample Train #: <b>B</b>	Train assembled by: K. More	and		
Balance ID #: OMNI - 00023	Thermo/Hygro meter ID #: OMI			
Audit weight ID #: OMNL 00131	(Polonno oudit note and ECC +	0.70		 

		Weighing Record								
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials			
Front Filter	12-18-67	16:30	,1267	,5001	20	77	14			
Lab ID #	12-19-07	09:30	.1267	.5001	/7	66	16			
D/T in desiccator										
Preliminary wt.:										
Rear Filter	12-18-07	16:30	.1266	15001	20	77	12			
Lab ID #	12-19-07	09:30	. 1267	,5001	17	66	14.			
D/T in desiccator: 12-17-07 08:00  Preliminary wt.:						4 12 30				
<b>Prob</b> e Lab ID #	12-18-67	16:30	199.0950	,5001	20	77	14			
Probe # 16 38 8 Tare wt. 199,0947 Cleaned by:	12-19-67	09:30	199.0950	,5001	17	66	12 -			
D/T in desiccator: 12-17-07 68:00 L Preliminary wt.:							·			
199.0967			-							
		. ,								

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				4							
		the second second			and the second second						
Control No.	L-SFZ-0004 (Dual Train	- Dilution Tunne	el Method 5G	Analysis .	Worksheet) doc	Effective date:	04/04/2007		Page 1	of 1	
					,		0 // 0 // 2001	€	4 22 4	Ĕ÷.	_ :

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																																				7
			_						-	-	-	-	+			-	<u> </u>  -					+	-												-	
				·																																1
			12-11-07	04:01		-	1																						171.8688 -	187,7420-	188, 2558-	- 5180.881	197,3876-	188,1228-	- \$806'66'	
			12-10-07	13:00		0.1046 +	- 81110	- 5611.0	0,1224	- 1/101'O	0.1232	0,1221	0.1262+	0.1048 -	- 51110	0.1210	0,1250	26010	0.1227	0.1238	011263	1801.0	0.1207	0,1203-	0,1228-			T		187,7418	188.2525	188,0811	91,3878	188.1229 1	19919086	t
		1	7007-12-08	14401		0,1645	081110	0,1192	2561,0	0,1042	0:1233	0.1231	0.1363	0501.0	0.1176	0.1208	6/10	0.1102	4551,0	0.1243	0,1265	6401.0	0.1206	0.1202	0,1230			$\dashv$	┪				. 0		一	Ì.
	ZZ-11-/00Z	- 1	82-11-4007	15450		5/10/10	0,1180	0.1190	0.1324	0.1042	0.1232	Cerio	0.1863	0,1048	0.1175	9.1209	5.1947	0.1099	0.1325	0.1240	0.1265	0801.0	9081,0	608/10	$\vdash$				20				731	188,1076	199,8938	100
			Date	lime																																
Date placed in description	ic placed if the			47 mm Filters III	Nati Dei	-   0	7 0	3	4	5	9	7	8	6	10	17	12	13	14	75	16	17	18	19	20		Probe	I Nulliper	(	7	ν,	4	5)	9 1		œ

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	AE Glass 47 mm Filter Tares OMNI-Test Laboratories, Inc. antiadurer	Monaco 2008  Monaco 2008  Monaco 2008  Monaco 2008
OMNI-00023 OMNI-00131	AE Glass 47 mm Filte OMNI-Test Laboratories, Inc	
Balance ID Number Audit Weight ID Number Owni-00		0   SBI   O   O   SBI   O   O   O   O   O   O   O   O   O
06-Dec-07	12/7/2007 1.35 PM] 23 76 Morgan 0.5001	0.1283 X X 0.1268 X 0.1214 X X 0.1221 X 0.
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Run, Train Project No. Probe Tares
OMNI-Test Laboratories, Inc Monaco 2008 Appliance OMNI-00023 Audit Weight ID: Number OMNI-00131 Thermomater/Hygrometer ID: Number Manufacturer Balance ID Number 0.5001 Morgan 11:00 AM 114.7384 X 0.5001 Morgan 0.5001 Time Placed in Desiccator Date Placed in Desiccator Technician Morgan Date: RH %: T(F): Tech.: D Number Audit:

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## **Calibrations**

## Methods 28 and 5G

ID#	Lab Name/Purpose	Log Name	Attachment Type
362	Stopwatch	Stopwatch - Sportline	Calibration Log
373	TC Simulator	T/C Calibrator	Calibration Log
SBI-008	Temperature Data Logger		
SBI-012	Test Fuel Scale		
SBI-014	Platform Scale		
SBI-016	Moisture Meter		
SBI-020	Incline Manometer		
SBI-046	DGM-1		
SBI-047	DGM-2		
SBI-096	TC Simulator		
SBI-102	Analytical Scale		
SBI-103	DTM 200A		
SBI-104	Pitot		
SBI-105	Magnehelic Gauge		
	Quebec Airport Barometer Readings		

NIST Stopwatch Calibration, Time Proficiency Testing Procedure and Data Sheet
Prass   Fall
NIST traceable stop watch OMNI Tracking Number: #292 Last Cal: 2.7.06
Stopwatch to be tested for time proficiency OMNI Tracking Number: on wi- cost
<ol> <li>Start the NIST traceable stopwatch; at a predetermined time (i.e., 1.00 minutes), the technician shall start the watch being tested. When 15.00 seconds have passed (i.e. NIST traceable stopwatch reads 1 minute, 15 seconds), the technician shall stop the being tested. Record the target time interval (i.e., 15.00 seconds). Repeat this step t and record the data.</li> </ol>
2. Repeat step #1 for each of the following target time intervals: 30.00 seconds, 10.00 minutes, and 30 minutes.
3. If the delta between the target time and measured time is less than 5% of the target time interval or 2.00 seconds (whichever is less), then the technician has demonstrated proficiency with the specific instrument utilized in the proficiency test. The proficiency valid for a period of twelve months.
4. Archive the proficiency test data and information, including the effective date and expidate of the proficiency, in the equipment record for the instrument involved.
Target fime: 15.00 seconds #1 Measured time: 661457 #2 Measured fime: 14.94 #3 Measured time: 14.94
Target time: 30.00 seconds #1 Measured time: 30.38 #2 Measured time: 30.03 #3 Measured time: 29.80  Target time: 10.00 minutes #1 Measured time: 10:00.15 #2 Measured time: 10:00.06 #3 Measured time: 10:00.13
Target time: 30.00 minutes #1 Measured time: 30:00.00 #2 Measured time: 30:00.27 #3 Measured time: 30.00.00
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# Thermal Metering System Calibration Y and dH@

 Manufacturer:
 American Meter Company

 Model:
 DTM 200A

 Serial Number:
 07J264834

 OMNI Tracking No.:
 SBI-103

Average Orifice Meter dH@		Average Gas Meter y Factor
0.000		0.976
Calibration Date:	12/14	/07
Calibrated by:	Ken Morgan	
Calibration Frequency:	6 Mo	nth
Next Calibration Due:	06/13/08	
Instrument Range:	1.000	cfm
Standard Temp.:	68	3 oF
Standard Press.:	29.92	– ? "Hg
Barometric Press.:	29.88	– 3 "Hg
Signature/Date:		_

Previous Calibration Comparision

	XXVII ON CHILD WITH COMPANION									
Date	n/a	Acceptable								
dH@ Value	n/a	Deviation (5%)	Deviation							
y Factor	n/a	0	0.976							
Acceptance	Out of	Limits								

**Current Calibration** 

Acceptable y D	eviation	0.020
Maximum y D	0.003	
Acceptable dH	0.200	
Maximum dH(	0.000	
Acceptance	ptable	

	Reference	Standard *	
Standard	Model	Standard Test 1	Meter
Calibrator	S/N	1	
	Calib. Date	03-May-07	
	Calib. Value	0.9980	y factor (ref)

Calibration Parameters	Run 1	Run 2	Run 3
Vacuum ("Hg)	0.00	0.00	0.00
dH ("H2O)	0.00	0.00	0.00
Initial Reference Meter	232.5	237.693	243.126
Final Reference Meter	237.643	242.78	248.478
Initial DGM	78.063	83.393	88.957
Final DGM	83.343	88,597	94.413
Temp. Ref. Meter (°F), Tr	73.0	73.0	73.0
Temperature DGM (°F), Td	73.0	73.0	73.0
Time (Minutes)	64.0	36.0	16.0
Net Volume Ref. Meter, Vr	5.143	5.087	5.352
Net Volume DGM, Vd	5.28	5.204	5.456
Gas Meter y Factor =	0.972	0.976	0.979
Gas Meter y Factor Deviation (from avg.)	0.003	0.000	0.003
Orifice dH@	0.00	0.00	0.00
Orifice dH@ Deviation (from avg.)	0.000	0.000	0.000

where:

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

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

# Certificate of Compliance

balance was 100% manufactured in the United States and it has met or exceeded all of the quality Scientech is an American owned and registered ISO9000 Company. We certify that the following calibration weights used to verify the product's quality and calibration are routinely maintained standards as specified by Scientech's ISO9000 Quality System. All of the intruments, tools, and using reference standards traceable to the National Institute of Standards and Technology.

Balance Model: 8A310

Serial Number: 25626

Technician:

10/13/06

calibrate the balance, at your site, both prior to its use and periodically. Please follow the set up between the manufacturer's facility and yours. Good Laboratory Practices suggest that you This balance has been calibrated at the factory. However, any balance's calibration will be affected by differences in altitude, latitude, electrostatics, magnetism, and static buoyancy procedures as outlined in Scientech's operator's manual

Electronic Weighing ▶ Laser Power/Energy Measurement 5649 Arapahoe Avenue ▶ Boulder, Colorado 80303-1399 Phone: (800) 525-0522 ▶ (303) 444-1361 ▶ Fax: (303) 444-9229 Web Site: http://www.scientech-inc.com ▶ E-Mail: inst@scientech-inc.com

P\N 11161 Rev. 0

## RAPPORT D'ESSAI EXHAUSTIF

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	Marque/N° de modèle			Ohaus E	Explorer		N° de série E		D019024982	0019024982			
	Capacité 6100g			kg □	lb	Nb.Divisions	ons 61000		Taille divisions	.1g			
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## **BULLETIN NO. A-27B**

## Magnehelic® Differential Pressure Gage OPERATING INSTRUCTIONS



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MAGNEHELIC.

## **SPECIFICATIONS**

Dimensions: 4-3/4" dia. x 2-3/16" deep.

Weight: 1 lb. 2 oz. (510 g)

Finished: Baked dark gray enamel.

Connections: 1/8" female NPT high and low pressure taps, duplicated, one pair side and one pair back.

Accuracy: Plus or minus 2% of full scale, at 70°F (21.1°C). (Model 2000-0, 3%; 2000-00, 4%).

Pressure Rating: 15 PSI (1.03 bar)

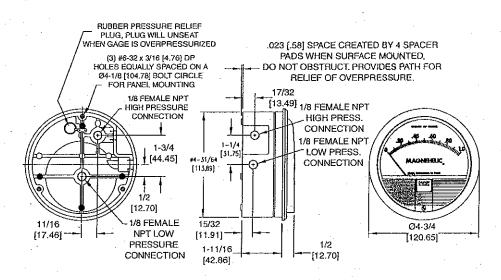
Ambient Temperature Range: 20° to 140°F (-7 to 60°C).

Standard gage accessories include two 1/8" male NPT plugs for duplicate pressure taps, two 1/8" male NPT pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.

Caution: For use with air or compatible gases only.

For repeated over-ranging or high cycle rates, contact factory.

Not for use with Hydrogen gas. Dangerous reactions will occur.



DWYER: INSTRUMENTS, INC. Phone: 219/879-8000 = www.dwyer-instcol P.O. BOX 373 • MICHIGAN CITY, INDIANA 46361, U.S.A. = Fax: 219/872-9057 | 22 e-mail: Info@dwyer-

e-mail: info@dwyer-inst.com

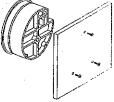
## **MAGNEHELIC® INSTALLATION**

Overpressure Protection: Standard Magnehelic gages are rated for a maximum pressure of 15 psig and should not be used where that limit could be exceeded. Newer models employ a rubber plug on the rear which functions as a relief valve by unseating and venting the gage interior when over pressure reaches approximately 25 psig. To provide a free path for pressure relief, there are four spacer pads which maintain .023" clearance when gage is surface mounted. Do not obstruct the gap created by these pads.

1.Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F (60°C). Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines my be run any necessary distance. Long tubing lengths will not affect accuracy but will increase response time slightly. Do not restrict lines. If pulsating pressures or vibration cause excessive pointer oscillation, consult the factory for ways to provide additional damping.

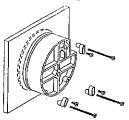
2. All standard Magnehelic gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions with only rezeroing. Low range Model 2000-00 and metric equivalents must be used in the vertical position only.

## 3. Surface Mounting



Locate mounting holes, 120° apart on a 4-1/8" dia. circle. Use No. 6-32 machine screws of appropriate length.

## 4. Flush Mounting



Provide a 4-9/16" dia. opening in panel. Insert gage and secure in place with No. 6-32 machine screws of appropriate length, with adapters, firmly secured in place. To mount gage on 1-1/4"-2" pipe, order optional A-610 pipe mounting kit.

## 5. To zero the gage after installation

Set the indicating pointer exactly on the zero mark, using the external zero adjust screw on the cover at the bottom. Note that the zero check or adjustment can only be made with the high and low pressure taps both open to atmosphere.

## Operation

Positive Pressure: Connect tubing from source of pressure to either of the two high pressure ports. Plug the port not used. Vent one or both low pressure ports to atmosphere.

Negative Pressure: Connect tubing from source of vacuum or negative pressure to either of the two low pressure ports. Plug the port not used. Vent one or both high pressure ports to atmosphere.

Differential Pressure: Connect tubing from the greater of two pressure sources to either high pressure port and the lower to either low pressure port. Plug both unused ports.

When one side of the gage is vented in dirty, dusty atmosphere, we suggest an A-331 Filter Vent Plug be installed in the open port to keep inside of gage clean.

A. For portable use of temporary installation use 1/8" pipe thread to rubber tubing adapter and connect to source of pressure with rubber or Tygon tubing.

B. For permanent installation, 1/4" O.D., or larger, copper or aluminum tubing is recommended. See accessory bulletin S-101 for fittings.

## **MAINTENANCE**

Maintenance: No lubrication or periodic servicing is required. Keep case exterior and cover clean. Occasionally disconnect pressure lines to vent both sides of gage to atmosphere and re-zero. Optional vent valves, (bulletin S-101), should be used in permanent installations.

Calibration Check: Select a second gage or manometer of known accuracy and in an appropriate range. Using short lengths of rubber or vinyl tubing, connect the high pressure side of the Magnehelic gage and the test gage to two legs of a tee. Very slowly apply pressure through the third leg. Allow a few seconds for pressure to equalize, fluid to drain, etc., and compare readings. If accuracy unacceptable, gage may be returned to factory for recalibration. To calibrate in the field, use the following procedure.

Calibration:

- 1. With gage case, held firmly, loosen bezel, by turning counterclockwise. To avoid damage, a canvas strap wrench or similar tool should be used.
- 2. Lift out plastic cover and "O" ring.
- 3. Remove scale screws and scale assembly. Be careful not to damage pointer.
- 4. The calibration is changed by moving the clamp. Loosen the clamp screw(s) and move slightly toward the helix if gage is reading high, and away if reading low. Tighten clamp screw and install scale assembly.
- 5. Place cover and O-ring in position, Make sure the hex shaft on inside of cover is properly engaged in zero adjust screw.
- 6. Secure cover in place by screwing bezel down snug. Note that the area under the cover is pressurized in operation and therefore gage will leak if not properly tightened. 7. Zero gage and compare to test instrument.
- Make further adjustments as necessary,

## Ordering Instructions:

When corresponding with the factory regarding Magnehelic® gage problems, be sure to include model number, pressure range, and any special options. Field repair is not recommended; contact the factory for repair service.

Caution: If bezel binds when installing, lubricate threads sparingly with light oil or molybdenum disulphide compound.

Warning: Attempted field repair may void your warrenty. Recalibration or repair by the user is not recommended. For best results, return gage to the factory. Ship prepaid to:

Dwyer Instruments, Inc.

Attn: Repair Dept.

102 Indiana Highway 212

Michigan City, IN 46360

Trouble Shooting Tips:

- ·Gage won't indicate or is sluggish.
- 1. Duplicate pressure port not plugged.
- 2. Diaphragm ruptured due to overpressure.
- 3. Fittings or sensing lines blocked, pinched, or leaking.
- 4. Cover loose or "O"ring damaged, miss-
- 5. Pressure sensor, (static tips, Pitot tube, etc.) improperly located.
- 6. Ambient temperature too low. For operation below 20°F (-7°C), order gage with low temperature, (LT) option.
- •Pointer stuck-gage can't be zeroed.
- 1. Scale touching pointer,
- 2. Spring/magnet assembly shifted and touching helix.
- 3. Metallic particles clinging to magnet and interfering with helix movement.
- 4. Cover zero adjust shaft broken or not properly engaged in adjusting screw.

We generally recommend that gages needing repair be returned to the factory. Parts used in various sub-assemblies vary from one range of gage to another, and use of incorrect components may cause improper operation. After receipt and inspection, we will be happy to quote repair costs before proceeding.

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only.

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Printed in U.S.A. 6/02

FR# 12-440212-04 Rev. 2

## DWYER INSTRUMENTS, INC.

D. BOX 973 • MICHIGAN CITY: INDIANA 46361, U.S.A.

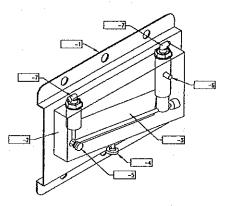
www.dwyer-inst.com Fax: 219/872-9057 Lit-By Fax: 888/891-4963

Bulletin D-3

## Dwyer,

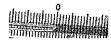
## Inclined and Vertical Stationary Manometers

Operating Instructions and Parts List



Specify model number if manometer as a prefix to above part numbers. For example, scale for No. 200 Inclined manometer is designated as part no. 200-3.

- -1) Panel
- -2) Gage Body -3) Scale
- Scale Screw and Washer
- ( -5) Leveling Screw, Nut and
- ( -6) Mounting Screw and
- Washer Molded Nylon Connector-rapid shut off
- type (-8) 3/4 oz. bottle Red Gage Oil (not shown)
- 1. Mount panel securely on a vertical surface, avoiding excessive heat. (Temperatures over 135°F, will damage the gage.)
- Vent gage to atmosphere.
   With an inclined manometer, release level adjustment screw, center bubble between cross hairs on spirit level and tighten level. screw securely.
- 4. Slide scale to zero mark lies directly behind oil meniscus, as shown below.



Align oil meniscus and the reflected image to eliminate parallax

- Add or remove oil as necessary.
- Run connection provided to left side of gage or plus (above atmospheric) pressures. Connect to right side for minus (below atmospheric) pressures. Connect to both sides for differential pressures, as with a pitot tube.

Use only Dwyer gage oil. Clean with mild soap and water only. Other fluids, solvents or cleaning agents may damage the gage.

## DWYER INSTRUMENTS INC. MICHIGAN CITY, IN 46360 U.S.A.

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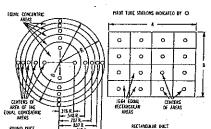
Printed in U.S.A. 5/03

## AIR VELOCITY

The total pressure of an air stream flowing in a duct is the sum of the static or bursting pressure exerted upon the sidewalls of the duct and the impact or velocity pressure of the moving air. Through the use of a pitot tube connected differentially to a manometer, the velocity pressure alone is indicated and the corresponding air velocity determined.

For accuracy of plus or minus 2%, as in laboratory applications, extreme care is required and the following precautions should be observed:

- 1. Duct diameter 41
- (8.64 mm) or greater. 2. Make an accurate traverse per sketch at right and average
- the readings. Provide smooth. straight duct sections 10 diameters in length both upstream and downstream from the pitot tube
- Provide an egg crate type straightener upstream from the pitot tube.



in making an air velocity check, select a location as suggested above, con-nect tubing leads from both pitot tube connections to the manometer and insert in the duct with the tip directed into the air stream, if the manometer Insert in the cluck with the lip directed into the air stream. It the manometer shows a minus indication reverse the tubes. With a direct reading manometer, air velocities will now be shown in feet per minute. In other types, the manometer will read velocity pressure in inches of water and the corresponding velocity will be found from the curves in Bulletin H-11. If circumstances do not permit an accurate traverse, center the pitot tube in the duct, determine the center velocity and multiply by a factor of .9 for the approximate average velocity. Field tests run in this manner should be accurate within plus or minus 5%.

The velocity indicated is for dry air at 70°F (21.3°C), 29.9" Barometric Pressure and a resulting density of .075=/cu. ft. For air at a temperature other than 70°F, refer to the curves in Bulletin H-11. For other variations from these conditions, corrections may be based upon the following data:

Air Velocity=1096.7  $\sqrt{\frac{P_v}{D}}$ 

where Pv=velocity pressure in inches of water D=Air density in lbs/cu. ft. Air Density=1.325 x  $P_{\rm B}$ 

where P<sub>u</sub> = Barometric Pressure in inches of mercury

T = Absolute Temperature (indicated temperature plus 460)
Flow in cu. ft. per min. = Duct area in square feet x air velocity in ft.

per minute.

STATIC PRESSURE

In checking inlet and discharge fan and blower pressures, balancing ventilation and dust collection systems, checking exhaust systems and similar installations, air velocities above 700 ft. per min. (12.81 kms/hr) can cause an appreciable error. It is recommended that the static connection of the an appreciate ends. It is recommended that the static connection of the pitot tube or a static pressure tip be used. In using the static pressure tip or pitot tube, the tip should be directed into the air stream. For permanent installation, static pressure tips are recommended. If not available, make connections, enter the duct perpendicular to the air stream and finish off flush and smooth on the inside.

FURNACE DRAFT

FURNACE DRAFT

Connect the terminal tube to the minus pressure gage opening and insert it into the combustion chamber for over fire draft reading. If a drilled port is not available insert through fire door but seal the crack. For last pass or smoke pipe draft, connect into the breeching on the furnace side of any draft control or damper. To determine draft loss through the furnace, make connection as indicated for smoke pipe draft and add a second tube, connecting the manometer differentially to the combustion chamber.

ALR ENTER TEST.

AIR FILTER TEST

To determine the pressure drop across an air filter, connect the manometer differentially with one tubing from the downstream or blower side of the filter to the right hand or minus pressure gage connection. Run the second tubing from the upstream side of the filter to the other gage connection. Use static pressure tips if available, with the tips directed into the air stream, to eliminate possibility of error due to air velocity. Read the pressure drop across the filter in inches of water and follow the filter manufacturer's recommendations for filter cleaning or replacement.

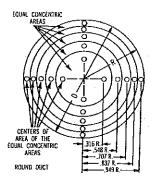
FR# 30-440079-00 Rev.1



# Series 160S "S" Type Pitot Tubes

## Operating Instructions





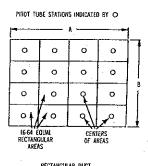


FIG. 4 - TRAVERSE ON ROUND AND SQUARE DUCT AREAS

Series 160S Pitot Tubes are designed to meet the need of the environmental testing field for an inexpensive, yet accurate and reliable way to measure the flow of particulate-laden air or gas streams. These pitot tubes use large 5/16" diameter stainless steel tubing for both total and static pressures to avoid plugging. Versatile 1/8" female NPT connections enable use with any type of piping or tubing. Two barbed tubing adapters are included for use with 3/16" I.D. rubber or vinyl tubing.

This instrument was built to allow measurement of flows by the procedures detailed in U.S. Environmental Protection Agency publication 40 CFR Change 1, Application A, Method 2. For complete information, refer to that publication and the procedures contained within.

#### INTRODUCTION

The **total pressure** of a flowing air stream in a duct or pipe is the sum of the **static** or bursting pressure exerted on the sidewalls and the **velocity** or impact pressure of the moving air. The difference between **total** and **static** pressure is called **velocity pressure**, which can be used to determine the linear rate of air movement expressed in FPM (feet per minute). A pitot tube has two tubes arranged to sense both pressures simultaneously. By connecting these two tubes differentially to a manometer, **velocity pressure** is indicated directly and the corresponding air velocity can be calculated after applying the appropriate correction factor. For maximum accuracy of ±2%, as in laboratory applications, care is required and the following recommendations should be followed.

- 1. Duct diameter should be 4" or larger.
- Point total pressure opening upstream facing flow and static pressure opening downstream pointing in the direction of the flow. The faces of both openings must be perpendicular to the airflow.
- 3. Make an accurate traverse per drawings; calculate the the velocities at each point and average them.
- 4. Take readings in a smooth, straight duct section a minimum of 8½ duct diameters in length upstream and 1½ diameters downstream from the pitot tube.
- Provide an egg-crate type straightener upstream from the pitot tube.

#### TAKING AIR VELOCITY READINGS

To measure air velocity with a Series 160S Pitot Tube, make a 13/16" (20 mm) opening in side of duct. Permanent-mount models require a 1" female NPT opening. Note: permanent mounting is not recommended with insertion lengths over 24" (61 cm) due to risk of excessive deflection. Connect tubing from total pressure port to high pressure side of manometer and from static pressure port to the low pressure side. If reading is negative, reverse connections.

Make a series of readings traversing the duct in horizontal and vertical planes. Using velocity pressures recorded at each location, calculate velocities and average them for final velocity value. If circumstances do not permit or require an accurate traverse, center the pitot tube in the duct, determine the pressure differential (velocity pressure), calculate actual center velocity, and multiply this value by 0.9. Tests run in this manner should be accurate within ±5%.

#### **CALCULATING VELOCITY**

Air Velocity = 1096.2 (C<sub>p</sub>) 
$$\sqrt{\frac{P_V}{D}}$$
 where:

P<sub>V</sub> = Sensed pressure difference (velocity pressure) in inches of water column

D = Air density in lbs./ft.3 (dry air = .075)

 $C_p$  = Pitot tube coefficient: 0.84

Air Density = 1.325 X 
$$\frac{P_B}{T}$$

Pв = Barometric pressure in inches of mercury

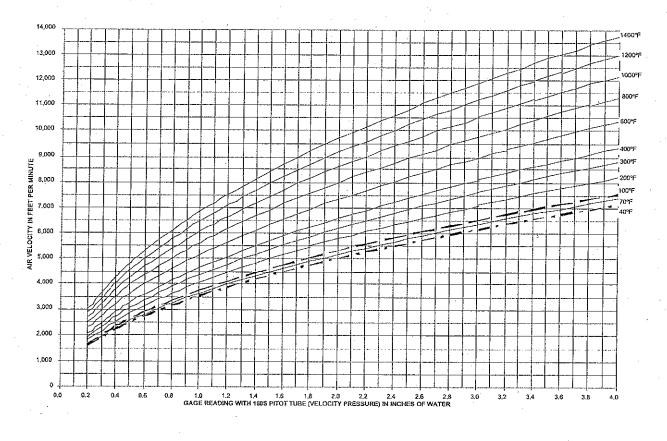
T = Absolute Temperature (Indicated Temperature in °F plus 460)

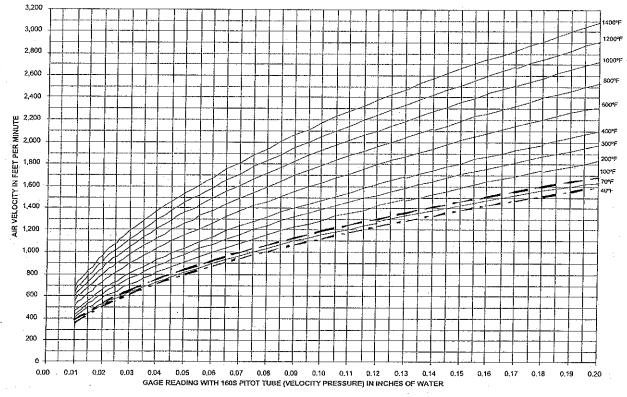
Flow in cubic feet per minute equals duct cross sectional area in square feet x air velocity in feet per minute.

With dry air at 29.9 inches of mercury, air velocity can be read directly from temperature correction charts on reverse.

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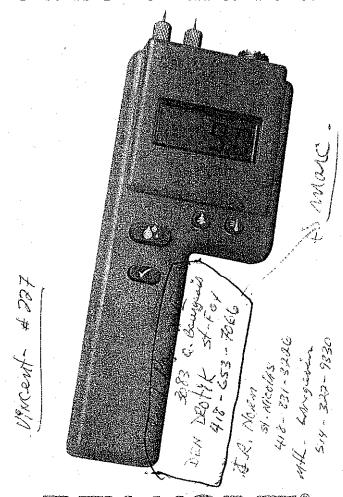
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# J-2000

owners manual



DELVAROS INSTRUMENT CO.

(800)-222-0638 www.delmhorst.com e-mail - info@delmhorst.com

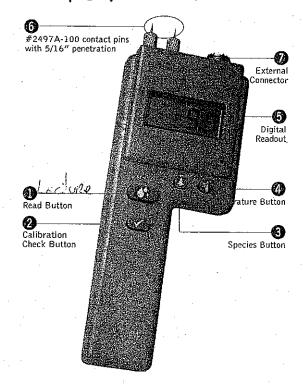
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- 2 J-2000 Features
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- 8 To Reset Meter
- 9 Pin Talk
- 9 Care of Your Meter
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- 11 Warranty

Species Correction Chart on Back Cover

# DELIMETORST JEZOOO

# AVEC MARTEAU (222) pesser 3 et 2



## J-2000 FEATURES

- ► Resistance technology recognized worldwide as the most accurate method for measuring moisture
- ▶ 6% to 40% moisture range
- ▶ Digital readout
- Averages up to 100 accumulated readings
- ▶ Built-in correction for 48 different species
- ► Built-in temperature compensation both Fahrenheit and Celsius
- ► Proven microcontroller circuit for increased reliability and accuracy
- Easy one-hand operation
- ► Includes (1) 9-Volt Battery
- Includes sturdy carrying case
- ▶ One-year warranty
- Over fifty years of proven quality, accuracy and service

## BEFORE YOU BEGIN

## **Button Functions**

- READ BUTTON Reads the Percent Moisture Content value (%MC), corrected for temperature and species.
- CALIBRATION CHECK BUTTON Checks meter calibration. It also displays the average of up to 100 accumulated readings; displays the maximum stored reading; erases the readings.
- SPECIES BUTTON Sets the species code for the wood you are using. Species are numbered from 1 to 48 and are listed on the Species Code Chart. This button also acts as a scroll key, depending on the function.
- 4 TEMPERATURE BUTTON Sets the wood temperature and changes the temperature mode (Fahrenheit or Celsius). This button also acts as a scroll key, depending on the function.

## CHECK CALIBRATION (7)



Press the calibration check button **2** and read button **1** simultaneously. Meter is in calibration if it displays 12% (+ or - .2).

If you check the calibration and the meter does not display 12% it is likely an indication of a low battery. If this occurs, change the battery immediately. Continued use with a low battery may cause the meter to go out of calibration. If you have a fresh battery and the instrument still does not indicate a proper calibration, return it to DELMHORST for service. See "Service for your Meter" section.

When the battery is removed and then reconnected, the meter displays its software version for one second and then turns itself off. After replacing the battery, you must reset the meter as described in "Resetting the Meter" section.

2

3

# SET SPECIES 🏖



The J-2000 defaults to Species Code #1 - Douglas Fir - the USDA standard and basis for all calibrations. Because the electrical characteristics of different species vary, all species read differently at the same moisture content. For this reason you need to adjust for species. If you are working with a species other than Douglas Fir, set the species code using the species button 3, and the meter will make the necessary corrections.

- ▶ To change species press the species button <3. The meter</p> will display the current species code for one second.
- ► To scroll forward through the species list hold the species button 3 while the current species code is displayed and scroll to the species number desired.
- ► To scroll backward through the species list, press and hold the temperature button 4 within one second of pressing the species button 3. Release the species button 3 and continue to hold the temperature button (4) and the species number will decrease.
- ▶ When scrolling in either direction, release the button to stop at your desired species.

If you prefer to make manual corrections, a species correction chart and temperature slide rule have been provided. Be sure to set the meter to the #1 species code, Douglas Fir, and the temperature to 70°F when making manual corrections.

The J-2000 can be used to test more than just wood. It will also give a relative reading on plywood, OSB, particleboard and MDF or can be fitted with a 26-ES slide hammer for specific applications. Call Delmhorst at 800-222-0638 or e-mail info@delmhorst.com for information on how to interpret the readings for other materials.

## Species Code Chart

	• •		the state of the s
COD	E / SPECIÉS	CODE	E/ SPECIES
1	Fir, Douglas	25	Magnolia
2	Pine, Southern	26	Mahogany, African (also Khaya
3	SPF	27	Mahogany, Honduras
4	Alder	28	Mahogany, Philippine
5	Apitong	29	Maple, Hard/Soft
6	Aspen	30	Meranti, Dark Red
7	Ash, White	31	Oak, Red
8 .	Basswood	32	Oak, White
9	Birch	33	Pecan
. 10	Cedar, Eastern Red	34	Pine, Longleaf
11	Cedar, Incense	35	Pine, Ponderosa
12	Cherry	36	Pine, Shortleaf
13	Cottonwood	37	Pine, Sugar
14	Cypress	38	Pine, White
15	Elm, American	39	Poplar, Yellow
16	Fir, Red	40	Ramin
17	Fir, White	41	Radiata Pine
18	Gum, Black	42	Redwood
19	Gum, Red	43	Spruce, Sitka
20	Hemlock, Western	44	SPF, COFI*
21	Hackberry	45	Teak
22	Hickory	46	Virola
- 23	Keruing	47	Walnut, Black
24	Larch	48	Western Hemlock - COFI*

<sup>\*</sup>Species and temperature correction data for both Western Hemlock-COFI (code #48) and SPF-COFI (code #44) were developed by COFI. When comparing readings between the model RDM-2/COFI or the RDM-2S/COFI, used with type 26-E electrode with insulated pins, and the J-2000, be sure both meters are set to 2-pin electrode (insulated pins).

# SET TEMPERATURE

The J-2000 defaults to a temperature of 70°F. As wood temperature increases, its electrical resistance decreases and indicated moisture content rises. Lower wood temperatures result in lower indicated moisture content. A correction is necessary if the wood temperature is outside the range of 50°F (10°C) to 90°F (32°C). Set the temperature accordingly and the meter will make the correction.

- ▶ To change temperature press and release the temperature button 4. The meter will display the current temperature for one second.
- ▶ To scroll forward through the temperature settings, press and hold the temperature button 🥝 while the current temperature is displayed.
- To scroll backward press and hold the species button within one second of pressing the temperature button (1). Release the temperature button 4 and continue to hold the species button (3) and the temperature will decrease.
- When scrolling in either direction, release the button to stop at the desired temperature.

## Set Temperature Mode 🏑 🛴 🤫

- ► To change from Fahrenheit to Celsius mode or Celsius to Fahrenheit mode press the temperature button 4.
- Press the calibration check button within one second and release when you are in the mode needed.
- ►The meter will display the current temperature setting in the new mode and will wait one more second until shutting off so that you may change the temperature value as described above.

If the meter is in Fahrenheit mode, the letter "F" will display in the left-hand corner. If it is in Celsius mode, no letter will appear in the display.

In the Fahrenheit mode, the temperature will change in increments of 5°F. In Celsius, the temperature will change in increments of either 2°C or 3°C depending on its conversion from Fahrenheit. If you desire a reading closer to your temperature for greater accuracy, we have included a temperature correction slide rule. This will give you correction values for your meter readings in small gradual increments.

In the Fahrenheit mode, the temperature value will display in whole numbers. In the Celsius mode, positive values will display in whole numbers; negative values will display with a decimal point and a "-" sign in the left-hand corner. (i.e.: -17.0)

## SET PIN CALIBRATION ( )



The basic factory calibration of the J-2000 is for use with uninsulated pins — either the integral pins 60 or with an optional external electrode, such as the #4-E. The difference in readings between insulated and uninsulated pins is small below 10% moisture content. The difference increases as moisture content increases above 10%. When using an electrode with insulated pins, such as the 26-ES, you can change the calibration to compensate for this difference.

- To change the pin setting, press and release the species button (3), then press the calibration check button (2) within one second.
- ▶ The meter will display the current pin calibration as either 222 for insulated or 444 for uninsulated pins.
- ▶ If you continue to hold the calibration check button ② the meter will change pin calibration. The new calibration will remain in "memory" until you change it again, or you remove the battery.

## TAKING A READING

The contact pins 6 provided are best for stock up to 6/4. On stock over 6/4 or for hardwoods over 4/4 we recommend using a remote probe such as the 26-ES ram-type electrode. Mount the 26-ES directly to the external connector D. See additional information under the "Pin Talk" section.

- ▶ Remove the protective cover to expose the pins. Check that the contact pins 6 are firmly hand tightened.
- ▶ To take a reading, align the contact pins 60 parallel to the grain and push them to their full penetration into the wood, if possible. Insulated pins read only at the tip and can be driven to the desired depth.
- Press the read button and read the moisture content on the meter scale. The meter displays the %MC for two seconds.
- ▶ To add a reading to the sum of all the previously stored readings, release the read button within 2 seconds.

## INFORMATION ABOUT YOUR READINGS

Readings below 6% will be displayed as a numeric value, (-##.#), and will not be added to accumulation. A reading below 6% which is due to temperature and species adjustments will be shown as a numeric value with no minus sign and this reading will be added to the accumulation.

Readings above 40% are always displayed as 999 and are not added to the accumulation.

The meter will accumulate up to 100 readings. After all 100 readings are stored it will not add new readings until the memory has been cleared. It will also continue to display the average of all 100 readings as a reminder that the mem-

When taking and storing readings for a specific wood species, be sure to "clear" the meter before moving on to the next species if you do not want to group all of the readings

## TO CHECK ACCUMULATED READINGS

This feature allows you to view the total number of all accumulated readings, the average of those readings, and the highest stored reading.

- ▶ To view the readings press and release the calibration check button 2. First the meter displays the number of accumulated readings for one second, then the average of those readings for two seconds. Then it displays the highest stored reading for two seconds. The total "cycle" time is five seconds.
- ► To erase readings hold the calibration check button < down for 5 seconds. All accumulated readings will be erased and the meter will display "0".

## TO RESET METER

- Press and release the calibration check button 2.

- Within one second press the species button 33.
- ► The meter will reset itself and display "170" to indicated Species #1 (Douglas Fir) at 70°F. All of the readings in memory will be cleared.

#### PIN TALK

There are two types of contact pins - uninsulated, which were provided with your meter, and insulated. When using uninsulated pins, push them in to the wood to their full length, if possible. This will give you the highest measured reading. Insulated pins read only at the tip and can be driven to a desired depth to gather shell and core (gradient) information. Additional types and lengths of both the insulated and uninsulated pins are available for specific applications.

## CARE OF YOUR METER

To keep your meter in good working order:

- Store your meter in a clean, dry place. The protective carrying case provided is an ideal storage place when the meter is not in use.
- ► Change the 9-Volt battery as needed. Continued use with a low battery may cause the meter to go out of calibration.
- Change contact pins as needed. Keep contact pins hand tightened.
- Clean the meter and contact pins with any biodegradable cleaner. Use the cleaner sparingly and on external parts only. Keep cleaner out of the external connector .
- Remove the battery if the meter will not be used for one month or longer.

## SERVICE FOR YOUR METER

- ▶ Pack your meter securely. Enclose a purchase order or letter with a brief description of the problem.
- ► There is no need to call us for a return authorization number if you are within the U.S. Customers outside the U.S. must contact us for more specific instructions prior to returning a meter.
- ➤ Include your name, address, daytime phone and fax numbers or e-mail address. If you believe the meter is under warranty, please provide the original sales slip or invoice
- ▶ Ship via UPS, Express Mail, Priority Mail, or any overnight courier who provides prompt service. Do not use standard parcel post.
- ► Insure your instrument for its full value and ship prepaid.

  We are not responsible for damage in transit.
- ► We do not accept COD shipments or cover any incoming freight or duty charges on returned merchandise
- Turnaround time on repairs is approximately two weeks.
- ► We will call you with an estimate if you specifically request one, or if we determine that the meter may be too costly to repair.
- ▶ Non-warranty repairs will be returned via UPS/COD unless you have already established other payment terms. There is no COD service outside the U.S. To pay by credit card, include the card number and expiration date with your repair. We accept Visa/MasterCard, American Express, and Discover.
- ► Warranty repairs will be returned at no charge if shipped within the U.S. via UPS Ground Service. Freight charges for expedited services (i.e., Federal Express, UPS/2 Day, UPS/1 Day, etc.) are the customer's responsibility and will be charged as per the above terms.

## WARRANTY

Delmhorst Instrument Co., referred to hereafter as Delmhorst, guarantees its J-2000 meter for one year from date of purchase and any optional electrodes against defects in material or workmanship for 90 days. If, within the warranty period, you find any defect in material or workmanship return the meter following the instructions in the "Service for Your Meter" section. This limited warranty does not cover abuse, alteration, misuse, damage during shipment, improper service, unauthorized or unreasonable use of the meter or electrodes. This warranty does not cover batteries or contact pins. If the meter or any optional electrodes have been tampered with, the warranty shall be void. At our option we may replace or repair the meter.

Delmhorst shall not be liable for incidental or consequential damages for the breach of any express or implied warranty with respect to this product or its calibration. With proper care and maintenance the meter should stay in calibration; follow the instructions in the "Care of Your Meter" section.

Under no circumstances shall Delmhorst be liable for any incidental, indirect, special, or consequential damages of any type whatsoever, including, but not limited to, lost profits or downtime arising out of or related in any respect to its meters or electrodes and no other warranty, written, oral or implied applies. Delmhorst shall in no event be liable for any breach of warranty or defect in this product that exceeds the amount of purchase of this product.

The express warranty set forth above constitutes the entire warranty with respect to Delmhorst meters and electrodes and no other warranty, written, oral, or implied applies. This warranty is personal to the customer purchasing the product and is not transferable.

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or more detailed information about using a wood moisture meter, call us toll-free at 1-800-222-0638. Ask for your free copy of "Measuring Wood Moisture Content: Straight Talk from Delmhorst". Or find it on our web site at www.delmhorst.com. For over 50 years, Delmhorst has been the leading manufacturer of high-quality resistance moisture meters. Today we offer the innovative KIL-MO-TROL® in-kiln monitoring system, and Loadmaster®, a fully automated weight-based kiln control system for the ultimate in accuracy. We also offer a complete line of portable moisture meters for woodworking/lumber, agriculture, construction and paper. 12

		METE	R REAL	DINGS	1 HTIW	VON-II	VSULA	TED PIN	NS .	•	
SPECIES	7	8	´ 9	1.0	12	14	16	18	20	22	24.
ALDER	8	9	10	11	13	15	17.5	19.5	21.5	24	27
APITONG	8	9	10	11	13	15	17	20	22	24	27
ASPEN		8	9	10	11.5	13	15	16.5	18	20	21
ASH, WHITE	6.5	7.5	8	9	11	13	14.5	16	18	19.5	21
BASSWOOD	7.	8	8	9	10.5	13	15	17	19	20.5	22
BIRCH	8	9	10	11	13	15	17	19	21,5	23.5	25.5
CEDAR, EAST. RED	8	9.5	10.5	12	14	17	19	21	23	25	26
CEDAR, INCENSE	7	. 8	9.5	10.5	12.5	15	17	19	21	23	25
CHERRY	8	9	10	11	13.5	15.5	18	20	22	24	26
COTTONWOOD	6	7.5	8.5	9.5	12	14	15	17	19.5	21	23
CYPRESS	7	8	9	10	12	14	16	18	19.5	21.5	23.5
ELM, AMERICAN	7	7.5	8	8.5	10	11.5	13	15	16	18	19
FIR, DOUGLAS	7	8	9	10	12	14	16	18	20	22	24
FIR,RED	7	8	9	10	12.5	15	17	19	21	23	25
FIR, WHITE	8	9	9.5	10.5	12.5	15	17	19	21	23	25
GUM, BLACK	7.5	9	10 .	11	13	15	16	18	19	20.5	22
GUM, RED	7	8	9	10	12.5	14.5	16.5	19	20.5	22.5	24
HEMLOCK, WESTERN	7	8	9	10.5	13	15	17	19	20.5	22	23.5
HACKBERRY	7	8.5	9	9.5	12	13	15	17	18.5	20	22
HICKORY	8	8.5	9	10	11	12.5	14	15.5	17	19	20.5
KERUING	8	9	10	11	13	15	17	20	22	24	27
LARCH	7.5	9	10 .	11	13	15	17	19	21	23	25.5
MAGNOLIA	7.5	9	10	11.5	14	16	17.5	19	21	22.5	24.5
MAHOGANY, AFRICAN	8	9.5	10.5	12	15	17	19.5	22	24	26	28
(ALSO KHAYA)		<del> </del>	ļ			<u> </u>					
MAHOGANY, HOND.	7	8	9	10.5	12.5	14.5	16	18	19.5	21.5	22.5
MAHOGANY, PHIL.	6	7	7.5	8	9.5	11	13	14	15.5	17	18
MAPLE, HARD/SOFT	8	9	9.5	10	12	14	_ 16	18	20	22.5	25
MERANTI, DARK RED	8.5	9.5	10.5	11.5	12.5	16	18	20.5	22.5	24.5	26.5
OAK, RED	7	8	9	10	12	14	16	18	20	22	24
OAK, WHITE	7	8	8.5	9.5	11.5	13.5	15	17	18.5	20	22
PECAN	6.5	8	9.5	11	12.5	14	16	17.5	19	22	24
PINE, LONGLEAF	8	8.5	10	11	13	15.5	17.5	19.5	21	23	25
PINE, PONDEROSA	7.5	8.5	10	11	13.5	15.5	17.5	19.5	21	23	25.5
PINE, SHORTLEAF	7.5	9	10	11	13	15.5	17.5	19.5	21.5	23.5	25
PINE, SO. YELLOW*	8	9.5	10.5	12	14.5	16.5	19	21	23	25	28
PINE, SUGAR	7	8	9	10	12	15	17	19	21	23	25
PINE, WHITE	7	8	9	10	13	15	17	19	21	23	25.5
POPLAR, YELLOW	8	8.5	10	11	13	15.5	17.5	19.5	22	24	26
RAMIN	7	8	9	10	11	13	15	16	18	20	21
RADIATA PINE	10	11	11	12	14	16	18	20	23	25	27
REDWOOD	7	8	9	10	12	13.5	15	17	19	22	24
SPRUCE, SITKA	_7	8	9	10	12.5	14.5	17	19	21	23.5	26
SPF**	9	10	11.5	13	15.5	18	20.5	23	25	28	30
SPF/C0FI	8	9	10	11	13	15	17	19	21	23	25
TEAK	7	8	-8.5	9	11	12	14	15	17	18.5	20
VIROLA	6.5	. 7	8	9	11	12.5	14	16	18	18.5	20.5
WALNUT, BLACK	7.5	8.5	9.5	10.5	12.5	14.5	16	18	20	22	23.5

<sup>\*</sup>Meter readings taken with 26-E 2-pin electrode. Do not apply 2-pin correction.

<sup>\*\*</sup>SPF correction based on 2-pin 26-E reading with insulated pins. It is based on USDA/Forintek data and can be used for the following species:

Lodgepole Pine

Alpine Fir

CALIBRATION CERTIFICATE

		<del></del>
	SO S	160
S T N N T S S	NG ERR	150
OUTGOING %ERROR 0.1 0.2 -0.1 -0.2	-#-OUTGOING ERROR	140
OUTGOING %PROOF 99.9 99.8 100.1 100.2		130
		120
% CAPACITY (AIR) 15 30 30 48 65 83 100		110
		100
FLOWRATE (AIR) CFH 30 60 96 130 166 200		90 ITY
		80 9 % CAPACITY
0 N O		70 %
INCOMING %ERROR	<b>#</b>	09
NCOMING %PROOF		20
		40
% CAPACITY (AIR)		30
% O O O		
FLOWRATE (AIR) CFH		20
FLOV (AIR		10
		0
FAST	% <b>ЕККОК</b>	SLOW

% Proof = (Vp/Vm) x 100; Vm = Meter Volume % Error =[(Vm-Vp / Vp] x 100; Vp = Prover Volume

 $_{\rm H}^{20}$  Accuracy = (Vm/Vp) x 100 J L = 0.001 cu.M. = 0.03531 cu.ft.

 $\sim$ Calibrated with air to Eister Canadian Meter flow standards with a process accuracy of  $\pm~0.2\%$ Awhich are traceable to the National Research Council - Ottawa Canada.

Meter tested on Certified Bell Prover QA-2BM-1

TECH. SERVICES:

Date: Mar

METER MODEL: DTM-200A

Conval Quebec s/o 10087950 01-May-2007 CUSTOMER: DATE:

2 5 PSIG P!N (in. w.c.): M.A.O.P.:

07J264834 SERIAL NO.:

INDEX READING: 0176 Ft<sup>3</sup>

SBI-103



# **Certificate of Accuracy**

Cert-02 Revision E

American Meter Company Quality System Original September 24th, 1996. Certificate No. 006697 ISO 9001-2000 certified November 6, 2004. Meters under 500CU-FT/HR ANSI-B109.1 – April 13, 2000 Meters 500CU-FT/HR and over ANSI-B102.2 - April 13, 2000 Residential Regulators ANSI-B109.4 – April 23, 1998 & CGA 6.18-M95

Elster American Meter 2221 Industrial Road Nebraska City, NE 68410 U.S.A

+1 402 873 8200 F +1 402 873 7616

www.americanmeter.com

American Meter Company certifies that the following named product is accurate to the specifications listed.

**Customer Order Number:** 

10088109

CMCO # 1055531

**Product Description:** 

DTM-200A

Manufacturing Number:

07J264834

thru

Working Pressure (Psi):

10

Test Pressure (Psi):

15

Accuracy @

200.0

CFH

Accuracy @

65.0

CFH

99.9

100.1

%

Prover Number/s:

XK-1179, XU-3530

Certified By:\_

Date: 4/19/2007

Quality Assurance Manager

Data obtained on prover certified accurate using PI tape #04190452, NIST #821/263310-00, and digital caliper #0056464, NIST #821/267216-02.

ISO 9001: 2000



Certificate No. 006697

( <del>P</del> )	AM	er	IC	AN
463	METE	E C	MIP	VMX

# **GAS METER TEST RECORD**

Page:

Date: 04/24/2007

Sold To Name:

CANADIAN METER - Cambridge

SOLD TO ID:

P1401

Qty Ordered:

SALES ORDER NO:

10088109

SHOP ORDER NO:

2128149

Sold To Order No:

1055531

PROOF TYPE:

proof

SERIES ID: 200A

Type:

Drive: 0.1FT

Remote Rdr:

Top:

Index:

MFG Badge No	SOLD TO BADGE NO	REMOTE READER NO	OPEN	СНЕСК
07J264834			100.1	99.9



Ulrich Métrologie inc. Ulrich Metrology Inc. 9912, Côte-de-Liesse Montréal (Québec) H8T 1A1 Tél. (514) 631-6653 Fax (514) 631-6122 info@ulrich.ca www.ulrich.ca

C	Α	L	I	В	R	A	T	1	0	N	I	C	E	R	T	I	F	ı	C	Δ	T	Ε

Certificate no.:

88544

Instrument ID:

ID-179543

Type:

MANOMETER, DWYER MAGNEHELIC

Size:

0 TO 0.5 IN WATER

Manufacturer:

DWYER

Model no.:

MAGNEHELIC

Calibration date:

July 27, 2007

Certificate issued: August 03, 2007

interval:

12 months

Due date:

July 27, 2008

Procedure:

See notes below.

Environment:

See notes below.

Temperature:

See notes below.

Humidity:

See notes below.

Metrologist:

AMK

Property of:

SBI

1700, RUE LEON HAMEL

QUEBEC, QC G1N 4R9

Approved by:

Nuccio Mercuri, Lab Manager

This calibration certificate is issued in accordance with the applicable requirements of ISO/IEC 17025 and QM-07. Measurement results provided are traceable to either the National Research Council Canada (NRC), the National Institute of Standards and Technology (NIST), a national laboratory of another country signatory to the CIPM Mutual Recognition Arrangement (MRA), or a calibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

#### CALIBRATION STANDARDS

See notes below.

#### MEASUREMENT UNCERTAINTY

See notes below.

#### **MEASUREMENT RESULTS**

This gauge was subcontracted. See next page for measurement results.



4850, bd Gouin est Montréal-Nord, Qc Canada H1G 1A2 Tél. (514) 328-2550 I 800 522-1226 Fax (514) 327-0604

www.chevrierinstruments.com

info@chevrierinstruments.com

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

## Certificat d'étalonnage Calibration certificate

Description	Manomè	tre différentiel Magne Modèle : 2000D-(		:	Numéro de série Serial number	· · · · · · · · · · · · · · · · · · ·
Plage Range		0/0.5 "CE			Identification	ID-179543
Précision Accuracy	-	±2% p.é.			Reçu conforme Received in specs	- Oui
Client / Customer		Ulrich Métrologie In 17311	ic.		Quitte conforme Leaving in specs	Oui
Bon de travail Work order#	17041-02	État instrument Condition		<u>Sortie/Out</u> Bon	Réparation (o/n) Repaired (y/n)	Non
Conditions d'étalons Ambient conditions			20 ± 1 °C		35-55% H.R.	
Remarque(s) Comments						

Appliquee Applied "CE	Lectur Readin (ascendantes) (ascending)		Appliquée Applied "CE	Lecture Reading (descendantes) (descending)	A Charles Street, and
0.0000	0.00	0.0000	0.0000	0.00	0.0000
0.0981	0.10	0.0019	0.0926	0.10 -	0.0074
0.2556	0.25	-0.0056	0.2431	0.25	0.0069
0.3495	0.35	0.0005	0.3418	0.35	0.0082
0.4971	0.50	0.0029	0.4971	0.50	0.0029

L'instrument ci-haut mentionné a été étalonné selon la méthode de comparaison en conformité avec la procédure PR004 The above instrument was calibrated using the comparison method in conformance with the procedure PR004

Étalons utilisés traçable au C.N.R.C / N.I.S.T.— Standards used C.N.R.C / N.I.S.T. Traceable CHEV029, manomètre/simulateur différentiel Fumess Controls PPC500 n/s 960294, 0.0008/80°CE, 0/20 mA, 0/20 Vcc précision pression: ±0.008°CE 0 à 8°CE ailleurs: ±(0.1% v.m. +1 chiffre), précision voltage et courant ±(0.05%v.m. + 1 chiffre), certifié NIST, Certificat FC06-303-B01, date due 30 octobre 2007.

Certifié par Certified by

Julien Bernier

TB

Date

2007-juil-27

Date due Due Date 2008-juil-27

H:\WPAT\CERTIFIC\Save\17041-02-17311 doc Enregistre par le BNQ selon SO 9001

C. Q J. B

Numéro du certificat Certificate number

17041-02-17311

C.Q.

Reproduction interdite sans consentement écrit

ingins description, le ratio d'incertitude étalon/instrument est d'au moins 4 pour 1. The test uncertainty ratio exceeds four to one unless otherwise indicate (aintspon-conforméen binbrage. Out of tolerance readings shaded.

Page 1 de 1

2-45 OF 2-6



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CALIBRATION	CE	RT	IF	IC	ATE	Ξ
-------------	----	----	----	----	-----	---

Certificate no.:

82536

Instrument ID:

SBI-096

Type:

CALIBRATOR, OMEGA CL23A

Size:

TC K/J/T

Manufacturer:

**OMEGA** 

Model no.:

CL23A

Serial no.:

Property of:

T-256137

1700, RUE LEON HAMEL QUEBEC, QC G1N 4R9

SBI

Approved by:

Calibration date:

interval:

Due date:

Procedure:

**Environment:** 

Temperature:

**Humidity:** 

Metrologist:

Certificate issued:

CLAS Type 2 Laboratory

June 27, 2007

June 27, 2007

12 months

June 27, 2008

MET/CAL

23 ± 2°C

MAR

35 - 55% RH

Nuccio Mercuri, Lab Manager

This calibration certificate is issued in accordance with the applicable requirements of ISO/IEC 17025 and QM-07. Measurement results provided are traceable to either the National Research Council Canada (NRC), the National Institute of Standards and Technology (NIST), a national laboratory of another country signatory to the CIPM Mutual Recognition Arrangement (MRA), or a culibration laboratory accredited by an accrediting body with which Canada has an equivalence agreement.

#### CALIBRATION STANDARDS

See notes below.

## MEASUREMENT UNCERTAINTY

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

#### MEASUREMENT RESULTS

See next page for measurement results.

#### Notes:

9V battery replaced.



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## **CALIBRATION DATA**

Certificate No. 82536

Instrument ID:

SBI-096

Type:

CALIBRATOR THERMOMETER

Serial no.:

T-256137

Procedure:

Omega CL23A: 5520A-M

Result:

**PASS** 

Condition: FOUND-LEFT

**CALIBRATION STANDARDS** 

Standard ID Type Manufacturer Model no. Cal. Date Due Date

8608002

CALIBRATOR

**FLUKE** 

5520A

2006/10/14 2008/10/14

	TRUE	TEST	ACCEPTAN	ICE LIMITS	PASS/	
PARAMETER	VALUE	RESULT	LOW	HIGH	FAIL	TUR
DISPLAY CALIBRATION	·					
Did all segments of the displa Result of Operator Evaluation	y illuminate?				PASS	
THERMOMETER CALIBRATION						
( Type Thermocouple						
-200.0degF		-200.5	-201.0	-199.0	PASS	1.7
-60.0degF		-59.9	-61.0	-59.0	PASS	3.1

-40.0degF	-40.2	-40.5	-39.5	PASS	1.5
32.0degF	31.7	31.5	32.5	PASS	1.7
1240.0degF	1239.7	1239.5	1240.5	PASS	1.1

* .	· ·				-	
1260.0degF		1259.7	1259.5	1260.5	PASS	1.1
	*					
2500.0degF		2499.2	2499.0	2501.0	PASS	1.4

### J Type Thermocouple

-200.0degF		-200.8	-201.0	-199.0	PASS 2.1
-60.0degF		-60.4	-61.0	-59.0	PASS 3.5

					11 1 4	
-40.0degF		-40.4	-40.5	-39.5	PASS	1.7
	3			4		
32.0degF	**	31.5	31.5	32.5	PASS	2.0

1240.0degF 1239.5 1239.5 1240.5 PASS

> Rtrslt01 Page 1 of 3.

1.6

Calibration Data for Certificate No. 82536

- 65



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	TRUE	TEST	-	NCE LIMITS	PASS/	QUITT-
PARAMETER	VALUE	RESULT	LOW	HIGH	FAIL /	TUR
1260.0degF		1259.5	1259.5	1260.5	PASS	.16
1400.0degF		1399.7	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-200.1	-201.0	-199.0	PASS	2.3
-60.0degF		-60.1	-61.0	-59.0	PASS	2.3
-40.0degF		-39.9	-40.5	-39.5	PASS	1.2
32.0degF		31.9	31.5	32.5	PASS	1.7
750.0degF		749.9	749.5	750.5	PASS	2.0
CALIBRATOR CALIBRATION						
( Type Thermocouple						
200.0degF		-199.3	-201.0	-199.0	PASS	1.7
60.0degF		-59.7	-61.0	-59.0	PASS	3.1
40.0degF		-39.8	-40.5	-39.5	PASS	1.5
32.0degF		32.1	31.5	32.5	pass	1.7
1240.0degF		1239.7	1239.5	1240.5	PASS	1.1
1260.0degF		1259.7	1259.5	1260.5	PASS	1.1
2500.0degF		2499.7	2499.0	2501.0	PASS	1.4
Type Thermocouple						
200.0degF		-199.2	-201.0	-199.0	PASS	2.1
60.0degF		-59.7	-61.0	-59.0	PASS	3.5
40.0degF		-39.6	-40.5	-39.5	PASS	1.7
32.0degF		32.2	31.5	32.5	PASS	2.0
1240.0degF		1240.0	1239.5	1240.5	PASS	1.6
1260.0degF		1259.9	1259.5	1260.5	PASS	1.6
L400.0degF		1399.5	1399.4	1400.6	PASS	1.8
Type Thermocouple						
200.0degF		-200.2	-201.0	-199.0	PASS	2.3
50.0degF	٠	-60.2	-61.0	-59.0	PASS	2.3



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	rur
-40.0degF -40.0 -40.5 -39.5 PASS	LUX
	1.2
32.0degF 31.8 31.5 32.5 PASS	1 - 7
750.0degF 749.7 749.5 750.5 PASS	2.0

End of Test Data

	and the second s	arvenia vena a variante e e e e e e e e e e e e e e e e e e	Santa and an an ann an	Control to the Control of the Contro	
POT INVESTIGATION	mag	mabelic Cealibrash	58I-165	<b>5</b>	
in the second se	- Che	lucel agins+	incline me	urecuren #	5BI - 020
AND	meli		magnahelic		
Andrewson Andrew	.218		.225		
MANAGEMENTAL TO THE PROPERTY OF THE PROPERTY O	.080		.085		
No.	, o 40	<b>?</b>	.040		
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of the con-					

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# Last 24 hours

Tuesday, 11 Dec 2007

Observation		kap komenome ki kapada sa sa kababan sa sa ka		energy and a second of	y control whereas	- and a commence of View according village	and the second s	in a south control and region a structure.		
Victory	Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	
TUE 17		-8	-10	· -	To the same of the	85	101.93	1.6	600	30,10
TUE 16	د کی	-8	-10	. ~		85	102.02	3.2 _ Run		30.13
TUE 15		-9	-10	-		92	102.09	2.4	700	
TUE 14		-9	-11		SW 9	85	102.18	4.8	600	30,17
TUE 13		9	-11	-16	SW 19	85	102.27₩	4.8	600	
TUE 12	رگ	-10	-12	-18	W 20	85	102.40-	4.8	500	
TUE 11	۵	-11	-13	-17	W 11	85	102.44	4.8	10000	
TUE 10		-12	-13	-19	W 13	92	102.58 <del>-</del>	2.4	500	
TUE 09		-12	-14	-20	W 17	85	102.62-	1.0	200	* * * * * * * * * * * * * * * * * * *
TUE 08	ھے	-14	-16	-	NE 4	85	102.62.	4.8	400	
TUE 07		-13	-15		NE 7	85	102.61-	2.4	300	
TUE 06		-12	-14	-19	W 15	85	102.62	0.6	100	# # # # # # # # # # # # # # # # # # #
TUE 05	3	-12	-14	-20	SW 20	85	102.59_	1.6	100	•
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# Last 24 hours

Wednesday, 12 Dec 2007

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	Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	
WED 22		-13	-20	-20	W 13	56	102.48	24	unlimited	30.26
WED 21	C	-13	-20	-21	W 19	. 56	102.32	24 Run <sup>3</sup>	unlimited	30.22
WED 20		-12	-19	-21	W 22	56	102.18	24	unlimited	
WED 19		-12	-18	-20	W 19	61	102.07	<u></u> 24	unlimited	30.14
WED 18		-10	-17	-18	W 19	56	101.93	24	unlimited	
WED 17		-9	-16	-17	NW 24	57	101.73	24	unlimited	
WED 16	Q,	-7	-15	-16	NW 33	53	(101.52_	24	unlimited	29,98
WED 15	<b>\$</b>	-6	-13	-14	W 31	58	101.33.	24	unlimited	
WED 14		-5	-11	-13	W 28	63	(101.13	24 _ RUN 7	4000	29.86
WED 13		-5	-11	-13	www.	63	100.97	24	unlimited	
WED 12		4	-11	-13	W 41	58	100.84	24	unlimited	29.78
WED 11	43	-3	-8	-10	NW 28	. 68	100.76_	24	4000	
WED 10		-3	-8	-10	W 30	68	100.68🛋	24	7000	
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12-12-07

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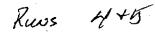


# Last 24 hours

Wednesday, 12 Dec 2007

		Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	
	WED 22	L	-13	-20	-20	W 13	. 56	102.48	24	unlimited	30.26
	WED 21	L	-13	-20	-21	W 19	56	102.32	24 Rw <sup>3</sup>	unlimited	30.22
	WED 20		-12	-19	-21	W 22	56	102.18	24.	unlimited	
	WED 19		-12	-18	-20	W 19	61	(102.072)	24	unlimited	30114
-	WED 18		-10	-17	-18	W 19	56	101.93🛋	24	unlimited	
:	WED 17	Q,	-9	-16	-17	NW 24	57	101.73	24	unlimited	
	WED 16	Q	<b>-7</b>	-15	-16	NW 33	53	(101.52.)	24	unlimited	29,98
	WED 15	<b>₹</b>	· -6	-13	-14	W 31	58	101.33.	24	unlimited	
	WED 14	43	-5	-11	-13	W 28	63	101.13.	24 _ Rup 7	4000	29.86
	WED 13	令	-5	-11	-13	W 31	63	100.97🛋	24	unlimited	* V
	WED 12	49	-4	-11	-13	W 41	58	(100.84)	24	unlimited	29.78
	WED 11	食の	-3	-8	-10	NW 28	68	100.76_	24	4000	
	WED 10		-3	-8	-10	W 30	68	100.68	24	7000	

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# Last 24 hours

Thursday, 13 Dec 2007

O	b	s	е	r	٧	a	t	į	o	n	S
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:	Ceiling (ft)	Visibility (km)	Pressure (kpa)	Relative Humidity (%)	Wind (Km/h)	Feels Like	Dewpoint	Temp (° C)	Sky	
30:15	13000	24	102.11	60	NE 11	-22	-21	-15	(4)	THU 20
30,19	13000	- Ruh!	102.24	60	NE 9	-	-21	- <b>15</b>	4	THU 19
30.2.7	12000	24	102.34	55	E4	-	-22	-15	(4)	THU 18
	13000	24	102.42₩	60	NE 6	<del>-</del>	-21	-15	ال	THU 17
:	13000	48	102.51👞	60	N 6	-	-21	-15	<b>(4)</b>	THU 16
30.25	23000	7 48	102.45	55	. <del>-</del>	, <b>-</b> .	-21	-14	(22)	THU 15
	¥ 14000	48	102.61←	55	SW 11	-20	-21	-14	<b>(2)</b>	THU 14
30,31	22000	48	102.64	60	SW 15	-23	-21	-15	<b>(2)</b>	THU 13
30,29	22000	48	102.58	46	W 4	-	-23	-14		THU 12
	unlimited	48	102.76→	50	W 4	T. T.	-23	-15		THU 11
	unlimited	48	102.79 <del></del>	55	NE 4	Sec., A reprint year and what is not	-23	-16	(3)	THU 10
	unlimited	48	102.98▲	54	S 9	Antimotopie a sesse pri que	-25	-18	袋	THU 09
	unlimited	48	102.95▲	53	W 7	The state of the s	-27	-20	<b>\$</b>	THU 08
		anne province de la companya de la c	Generally				veneraliteman		Vive constant or females	Special Control

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# Last 24 hours

Thursday, 13 Dec 2007

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	considerable per story and are	100 of 100

	Observatio	Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Celling (ft)	
1800000	THU 20	(4)	-15	-21	-22	NE 11	60	(102.11-)	24	£	30:15 A
Company to Control	THU 19	6	-15	-21	I	NE 9	60.	102.24	- Ruh	13000	30,19
	THU 18	(4)	-15	-22		E4	55	102.34	24	12000	30.22
ATTORISM Vantage	THU 17	(4)	-15	-21	-	NE 6	60	102.42→	24	13000	
Dell'OMVANO	THU 16	4	-15	-21	<u>-</u>	N 6	60	102.51	48	13000	
	THU 15		-14	-21	<u>.</u>	manderen e sines e seu construire de la	55	(102.45	7 48	23000	30.25
-	THU 14		-14	-21	-20	SW 11	55	102.61~	48	\frac{14000}{	
	THU 13		-15	-21	-23	SW 15	60	102.64	48	22000	30,31
	THU 12		-14	-23		W 4	46	102.58	<u></u>	22000	30,29
	THU 11		-15	-23	<del>-</del>	W 4	50	102.76 <del>↓</del>	48	unlimited	
	THU 10	<b>@</b>	-16	-23	- Andrews	NE 4	55	102.79₩	48 '	unlimited	
	THU 09		-18	-25		S 9	54	102.98▲	48	unlimited	
	THU 08		-20	-27		W 7	53	102,95.	48	unlimited	
				dispersion constitution of the constitution of				Voor-lega grammassass			

Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada GIN 4R9

# **Example Calculations**

Note: OMNI uses the Lotus 1-2-3 computer program for all Method 5G and 5H calculations. The program automatically carries 14 decimal points in all calculations. The numbers on the printouts have been rounded for display only.

# Equations and Sample Calculations - Method 5G

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

BR Dry burn rate, kg/hr

m<sub>n</sub> Total particulate matter collected, mg

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

v<sub>s</sub> Average dilution tunnel gas velocity, ft/sec

C<sub>s</sub> Particulate concentration, g/dscf

Q<sub>sd</sub> Average dilution tunnel gas flow rate, dscf/min

E Particulate emission rate, lbs/hr

PR Proportional rate variation, %

## Dry Burn Rate

Using equation 28-3:

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

Where,

BR = Dry burn rate, lb/hr

 $W_{wd}$  = Mass of wood burned (wet basis) during test run, lb

 $\theta$  = Total time of test run, minutes

%M<sub>w</sub> = Average moisture content of test fuel charge, wet basis percent

Sample Calculation:

Dry basis moisture of fuel = 20.03%

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

$$\%M_{\rm w} = \frac{20.03 \times 100}{20.03 + 100}$$

$$\% M_w = 16.69\%$$

The wet weight of the fuel charge was 7.8

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

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

$$BR = 0.98 \ kg/hr = 2.17 \ lb/hr$$

# Total Particulate Matter Collected

$$m_n = F_1 + F_2 + R - (V_a \times B_a)$$

Where:

 $m_n$  = Total particulate matter collected, mg

F<sub>1</sub> = Particulate matter collected on front filter, mg

F<sub>2</sub> = Particulate matter collected on rear filter, mg

R = Residue from evaporated probe and filter holder acetone rinse, mg

V<sub>a</sub> = Volume of acetone evaporated probe and filter holder actone rinse, ml

B<sub>a</sub> = Acetone blank value, mg/ml

$$m_n = 12.6 - 0.4 + 4.7 - (180 \ 0.0040)$$

$$m_n = 16.2 \text{ mg}$$

# Volume of Gas Sampled Corrected to Dry Standard Conditions

Using equation 5-1:

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

Where:

 $K = 17.64 \,^{\circ}\text{R/in. Hg}$ 

 $T_{std} = 528 \, {}^{\circ}R$ 

 $P_{std} = 29.92 \text{ in. Hg}$ 

 $V_m$  = Volume of gas sample measured at the dry gas meter, dcf

Y = Dry gas meter calibration factor, dimensionless

P<sub>b</sub> = Barometric pressure at the testing site, in. Hg

 $\Delta H$  = Average pressure differential across the orifice meter, in.  $H_2O$ 

 $T_m$  = Absolute average dry gas meter temperature,  ${}^{\circ}R$ 

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

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

## Dilution Tunnel Gas Velocity

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

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

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

Where:

v<sub>s</sub> = Average dilution tunnel gas velocity, ft/sec

$$k_p$$
 = Pitot tube constant:  $85.49 \frac{ft}{sec} \left[ \frac{(lb/lb-mole) \times (inches Hg)}{(^oR) \times (inches H_2O)} \right]^{\frac{1}{2}}$ 

C<sub>p</sub> = Pitot tube coefficient (0.99 for standard pitot tube; 0.84 may be used for S-type pitot tubes constructed according to Method 2 procedures), unitless

 $\Delta P$  =  $\Delta P$  measured during the pre-test flow traverse of the dilution tunnel; the square root of the  $\Delta P$  values are averaged for this calculation, in. H<sub>2</sub>O

P<sub>b</sub> = Barometric pressure at test site, in. Hg

P<sub>g</sub> = Static Pressure of tunnel, in. Hg

 $P_s$  = Absolute tunnel pressure, =  $P_b + P_g$ 

 $M_s$  = Molecular weight of tunnel gas; assume  $M_d$  =29 lb/lb-mole (per method 5G)

 $B_{ws}$  = Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)

 $T_s$  = Dilution tunnel temperature, °R; (°R = °F + 460)

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

$$v_s = 85.49 \times 0.99 \times \sqrt{0.0351} \times \sqrt{\frac{(548)}{(30.03 + \frac{-0.45}{13.6}) \times (28.56)}}$$
 $v_s = 12.69 \frac{ft}{sec}$ 

# Particulate Concentration

Using equation 5G-2:

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

Where:

C<sub>s</sub> = Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscf

m<sub>n</sub> = Total mass of particulate matter collected in the sampling train, mg

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

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

$$C_s = 0.000163 \ g/dscf$$

# Average Dilution Tunnel Gas Flow Rate

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

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

Where:

 $Q_{sd}$  = Gas flow rate corrected to dry, standard conditions, dscf/hr

3600 = Conversion from seconds to hours

B<sub>ws</sub> = Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)

v<sub>s</sub> = Average dilution tunnel gas velocity, ft/sec

A = Cross sectional area of dilution tunnel,  $ft^2$ 

 $T_{std}$  = Standard absolute temperature, 538°R

 $T_{s(avg)}$  = Average absolute dilution tunnel temperature, °R, (°R = °F + 460)

P<sub>b</sub> = Barometric pressure at test site, in. Hg

 $P_g$  = Dilution tunnel static pressure, in. Hg

 $P_s$  = Absolute dilution tunnel gas pressure, in Hg,  $(Hg = P_b + P_g)$ 

 $P_{std}$  = Standard absolute pressure, 29.92 in Hg

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

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

# Particulate Emission Rate

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

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

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

Where:

E = Particulate emission rate, g/hr

E<sub>adj</sub> = Particulate emission rate, adjusted, g/hr

C<sub>s</sub> = Concentration of particulate matter in the stack, corrected to dry, standard

conditions, g/dscf

Q<sub>sd</sub> = Average dilution tunnel gas flow rate, dscf/hr

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

$$E = 0.000163 \times 8313.36 \times 60$$

$$E = 1.36 g/hr$$

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

$$E = 2.35 g/hr$$

## Proportional Rate Variation

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

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

Where:

PR = Percent proportional rate

 $\theta$  = Time of test, min

S<sub>i</sub> = Measured tracer gas concentration for the "i" interval, in this case, the inverse of the calculated flow in the stack based on CO<sub>2</sub> concentrations in the stack and in the dilution tunnel

 $V_{mi(std)}$  = Volume of gas sample measured by the dry gas meter during the "ith" 10 minute interval, dscf

 $V_m$  = Volume of gas sample as measured by dry gas meter, dscf

 $V_{si}$  = Average gas velocity in the dilution tunnel during each 10 minute interval, i, of the test run, m/sec

V<sub>s</sub> = Average gas velocity in the dilution tunnel, m/sec

 $T_{mi}$  = Absolute average dry gas meter temperature during each 10 minute interval, i, of the test run,  ${}^{\circ}R$ 

T<sub>m</sub> = Absolute average dry gas meter temperature, °R

T<sub>si</sub> = Absolute average gas temperature in the dilution tunnel during each 10 minute interval, i, of the test run, °R

T<sub>s</sub> = Absolute average gas temperature in the dilution tunnel, °R

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

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

PR = 103.8%



# **Certification Test Report Stove Builder International**

**Wood Fireplace Insert Model: Monaco 2008** 

Report Number: 338-F-68-3

Part 2 of 2

OMNI-Test Laboratories, Inc.
Product Testing & Certification

Mailing: Street: Post Office Box 743 5465 SW Western Avenue ◆ Suite G Beaverton, Oregon 97075 USA



Phone: (503) 643-3788 Fax: (503) 643-3799

Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada GIN 4R9

# **Section 4**

Test Data by Run

# **EPA Weighted Average Emissions EPA Method 28**

Client: SBI

Status: FINAL

Stove Model: Monaco 2008

Stove Type: Non-Catalytic Stove

Test Dates: 12/11/07 - 12/13/07

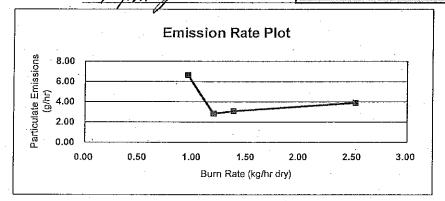
Project Number: 338-F-68-3

Weighted Average

Tracking Number: 1161 Signature/Date:

Run#

(g/hr)



Burn Rate (dry kg/hr)	0.95	
Catagory	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	6.64	
Cap (g/hr)	15	
Weighting Factor	0.538	32.85%
Heat Output (BTU/hr)	11479	
Run #	4	
Burn Rate (dry kg/hr)	1.19	
Catagory	2	
Overall Efficiency (%)	63%	
Emissions (g/hr)	2.82	
Cap (g/hr)	-15	
Weighting Factor	0.342	20.91%
Heat Output (BTU/hr)	14379	
Run#	3	
Burn Rate (dry kg/hr)	1.37	
Catagory	3	28
Overall Efficiency (%)	63%	
Emissions (g/hr)	3.08	
Cap (g/hr)	15	
Weighting Factor	0.428	26.11%
Heat Output (BTU/hr)	16554	
Run #	5	

Run#	5
Burn Rate (dry kg/hr)	2.52
Catagory	4
Overall Efficiency (%)	63%
Emissions (g/hr)	3.89
Cap (g/hr)	18
Weighting Factor	0.330 20.13%
Heat Output (BTU/hr)	30450

Model: Monaco 2008 Stove Builder International Stove Buttaer International 1700, Léon-Harmel Québec (Québec), Canada GIN 4R9

# Run 1

# Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI

Model: Monaco 2008 Project No.: 338-F-68-3

Tracking No.: 1161

Run: 1

Test Date: 12/11/07

Burn Rate	0.95 kg/hr dry
Average Tunnel Temperature Average Gas Velocity in Dilution Tunnel - vs	104 degrees Fahrenheit 13.3 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8508.6 dscf/hour
Average Delta p Average Delta H Total Time of Test	0.052 inches H20 0.00 inches H20 230 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm Average Gas Meter Temperature	23.26 cubic feet	21.07 cubic feet	25.45 cubic feet
Total Sample Volume (Standard Conditions) - Vmstd	77 degrees Fahrenheit 22.4 dscf	77 degrees Fahrenheit 20.3 dscf	78 degrees Fahrenheit 24.5 dscf
Total Particulates - mn		11.8 mg	13.2 mg
Particulate Concentration (dry-standard)	0.00056 grams/dscf	0.00058 grams/dscf	0.00054 grams/dscf
Particulate Emission Rate	4.76 grams/hour	4.93 grams/hour	4.58 grams/hour
Adjusted Emissions	6.64 grams/hour	6.85 grams/hour	6.44 grams/hour
Difference from Average		0.21 grams/hour	0.21 grams/hour
7.5% of the average emission rate	0.50		
Weighted Average Emission Rate Limit	4.10 grams/hour	·	* .
7.5% of the weighted average emission rate limit	0.31		1

SBI Monaco 2008

Manufacturer:

Model Monaco 2008
Tracking No. 3161
Project No. 3162
Beginning Clock Trainer. 14.28
Recording Interval. 14.28
Total Sampling Time. 230

# Wood Heater Test Data - EPA Method 5G

Signature/Date: 1/1/1/1/1/1/1/21-08
Tunnel Velocity: 13.31 1/8ec.

140.2

Intial Tunnel Flow:

PM Control Module: SBI 046,47	Dilution Tunnel MW(dry): 29.00 lb/lb-mole	Dilution Tunnel MW(wet): 28.56 lb/lh-mole	Dilution Tunnel H2O: 4:00 nement	Dilution Tunnel Static: -0.120 "H2O	Pitot Tube Cp: 0.84	Meter Box Y Factor: 0.975 (1) 0.97		13
	•							
		Pt.8	0.053 "H2O	115				
		Pt.7	0.055	115				
		Pt.6	0.053	116				
	se Data	. Pt.5	0.050	116				
	Velocity Traverse	Pt.4	0.050	117				
	Veloci	Pt.3	0.050	117				
		Pt.2	0.053	318				
		Pt.1	0.055	118		Numbers:		
			Initial dP	Initial Temp		JMNI Equipment Numbers:		
					ć	OMP		
							1	
				-				
						E I	III	

scfm	£2	0@10 cfm@"Hg	002(@10 cm(@"Hg		13.2		Stack	Draft In.	DZH	-0.053	-0.063	-0.065	-0.068	-0.073	-0.078	-0.080	-0.078	-0.075	-0.070	-0.065	-0.065	-0.065	-0.055	-0.060	-0.060	-0.055	-0.053	-0.053	-0.055	-0.055	-0.055	-0.053	-0.053	-0.063
140.2	0.1963 ft2	00010	Fuel Moisture (dry basis %):	culate (1):	culate (2):			Ambient		78	77	77	78	78	78	79	80	80	08	79	80	08	08	79	79	79	79	79	62	6,2	79	79	79	
el Flow: nel Flow:	Area:	reck (1):	eck (z): isture (dr.	Total Particulate (1):	Total Particulate (2):			Impinger	(z)																									#DIV/0!
Intial Tunnel Flow: Average Tunnel Flow	Tunnel Area:	Post-Test Leak Check (1):	rost-rest Leak Uneck (2): (2) Fuel Moisture (4)		"Hg			Impinger							1							_							_		-			#DIV/0! #1
Ý		Post-Ic	7081-16 (2)	Average	30,13 "!			Filter 1	+	11	82	83	83	83	83	85	98	98	98	85	85	85	84	84	84	83	83	83	82	22-Mar	82	82	82	83.33 #1
			0.974		1.1			Filter	3	1	8	18	08	81	81	82	23	82	82	82	82	82	82	82	81	81	81	81	- 18	81	18	18	08	80.18
28.56 lb/lb-mole	percent	OZH.	.≘	Middle	30.13		Data, oF	Stack		310	306	323	353	394	444	477	458	423	392	373	384	377	346	327	309	297	288	287	284	283	278	272	506	
28.56	4.00	OZH 07170	0.975 (1)	Begin	30.17	1	perature	Average	Dui Iace	430.6	410.8	400.4	405.2	427.0	462.8	488.4	485.2	475.4	466.4	458.8	464.4	471.4.	453.4	442.6	432.4	422.6	416.4	413.0	410.4	408.2	400.2	390.6	383.0:	8
tw(dry): fW(wet):	nel H2O:	Ditot Tube Co.	Factor:	ressure:	1 1		Wood Heater Temperature Data, oF	Catalyst					+		1	1			_												_		_	
Dilution Tunnel MW(wet)	Dilution Tunnel H20	Dutation Turnel Statte:	Meter Box Y Factor:	Barometric Pressure:			Wood H	Firebox (	11.00	308	345	970	308	303	577	345	361	370	380	383	387	391	391	383	374	366	361	350	345	340	335	325	322	
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	0.053 "H2O	٦						Firebox Fi	+	+	+	+	0/5	+	+	255	1	+	+	+	-	325 5		-	-	-	-		-	-	_		-	
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H	0.050 0.0	1				-	4	ate (6)	(7)	1	+	+	1	+	+	╁	+	+	+	+	+	+	+	+	4	+	+	+	1	+	+	0.1	-	0. 
H	0.050 0.0	-						ate 6)		377	+	+	ŀ	+	+	+	+		+	+	+	+	+	+	+	+	5 :	+	+	+	+	-	110	71 100.70
H	-	-							050	1	102	÷	102	+		+	+	707	+	+	+	707	4	4		101	- -	4	4	-	-	4	101	100.71
+	-	-	ers:				-	äë	-	╁	5 0	+	t	t	+	8 0.052	t	$^{+}$	+		T	7	7	7	7	0.052	T	T	Т	T	7	1	0.052	2 0.052
14	dP 0.055 emp. 118		nent Numb				H	/ac. Dilution 5. Tunnel	╀	501	101	103	100	118	121	118		d 5	1 10	/01	10 2	/01	SO 1	201	3	6 8	8 8	8	દ	28	74	94	93	104.02
	Initial Temp.		OMNI Equipment Numbers:				- }-	c.   Meter Vac.   In. Hg.	7 0	-	0	-	c	c	0		, ,			0			0 0	0 0	0	0		9		0		0	0	
			0			Poto	Data	Meter Vac. In. Hg.	0	c	o	c	0	C	0	0				٥		٥		0	0	0		٥	٠	0		0	0	
						Particulate Campling Data	ambining	oF OF		77	77	77	11	11	77	77	11	11	102	0 8	10/07	9 9	× 2	8 8	8/ 5	8/ 02	0 [	//	8/	8/	0	6/	$\overline{}$	77.58
						S afel uni	Collate o	Se oF	+-	H	+	├	H	H	┝	╀	H	+	+	- -	11	+	+	+	+	8 E	+	+	2/8/	200	۱ /ه	8/		77.00
	. ]	-	1			Part	ומוור	ice Orifice 1) dH(2)	0000	000	+	t	-	✝	t	+	+-	+	+	$^{+}$	+	+	+	+	+	+	+	+	$^{+}$	+	+	+	+	0.00
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								Sample Rate, cfm		0.10	0.11	0.11	0.11	0.10	0.11	0.11		5 6	2	0.12	1.0	5 6		100	0.11	11.0		1.0	11.0	11.0	17.0	71.0	0.12	0 7
1161	11-Dec-07	14:28	10	720				Sample Rate, cfm		60:0	60:0	0.09	0.09	0.09	0.09	0.09	- 60 0	000	000	000	000	000	60.0	60.00	60.0	0.00	000	60.0	00.0	60.03	0.07	0.09	0.09	60.0
Tracking No.:	Test Date:	lock Time:	Recording Interval:	iing i me:			1,1	Cubic Feet	660.392	661.398	662.512	663.594	664.672	665.720	666.821	0967.99	560 699	670.150	671 320	507 779	673.495	509 929	507 542	070.070	677 000	678 975	890 089	900.000	000.100	002.200	007.500	020.600	063.640	25.454
Tra		Beginning Clock Time:	Recordin	total Sampling 1 me:			+	Cubic Feet (	828.828	660.732	029 199	662.610	663.530	664,440	665.355	666.265	667 182	+	╁	+	╁	t	+	+	+	┿	$^{+}$	+	+	$^{+}$	$^{+}$	+	+	21.074
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£ .

Run 1

OMNI-Test	Laboratories.	Inc.

Client Name:	SBI	·	·	Equipment N	fumbers:	·		Run #:	1
Model:	Monaco 2008					•	- ,	Train #:	A
Project No .:	338-F-68-3		·					Date:	12/11/07
Tracking No.:			1161						

Sample Component	Reagent	Filter # or	Weights				
		Probe #	Final, mg	Tare, mg	Particulate, mg		
A. Front filter catch	Filter	1	115.1	104.6	10.5		
B. Rear filter catch	Filter	2	118.6	117.8	0.8		
C. Probe catch	Probe	1	171869.3	171868.8	0.5		

11.8

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: 1/1. Mary Date: 1-21-08

Document Control No. P-SSX-0003, Effective Date: 8/7/2006

Page 1 of 1

Lab 1 A

Client Name:	SBI	Equipment Number	s:	Run #:	1
Model:	Monaco 2008			Train #:	В
Project No.:	338-F-68-3			Date:	12/11/07
Tracking No.:	1161	• -		-	

Sample Component	Reagent	Filter # or		Weights	
	1	Probe #	Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	3	132.1	119.3	12.8
B. Rear filter catch	Filter	4	123.2	122.4	0.8
C. Probe catch	Probe	2	187741.6	187742.0	-0.4

Total Particulate, mg:	13.2

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: 16 1. Morga Date: 1-21-08

Account and Account	
COLLEGE	-
	543-3788
abdies,	Phone (503) 643-3788
MANT Labornies,	Beaverton, OR

STOVE TEMPERATURE TI	OVE TEMPERATURE TEST DATA - METHOD 5G Page of	
lient/Model: SBI / Monaco 2008Project #: _338-F-68-3	38-F-68-3Tracking #: 1161	
ate: 12-11-07 Test Crew: K. Meran	Run#:	
iMNI Equipment ID #:		

Prebu	Preburn [文]			Coal Bed:						\	
Test				Data:	0	*	Range:	7.0-2.4		Coal Bod: 7.7	N N
j		Delta	Stack				EMPERAT	TEMPERATURES (oF			Not Usen
Lime	Weight	Weight	Draft	Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst
0				77	886	1114	332	182	261	165	
10	4.6	610	-,078	78	286	417	392	33/	312	78/1	
20	3.7	610	-,075	78	366	450	429	355	347	47/7	
39	3,0	0.7	-,070	78	817	393	460	375	2/4	2777	
4	2,6	4.0	-,068	78	736	393	187	381	373	7/74	-
20	2,3	5'0	-,065	78	819	20jn	hbt	378	377	2/2	
90	2,2	0'1	-,053	18	284	423	507	372	27.8	2,4	-
70											
80											
06											+
8											1
10											
20											
30											
40						-					1
20											_
9											
70								-			
80											
8											<b>&gt;</b>
AVG											
		_		-					•	-	

# FUEL DATA

Client: SBI	
Model: Monaco 2008	•
Project #: 338-F-68-3 Tracking #: 1161	
Date: 12-11-07 Test Crew: K. Morgan	Run #:
OMNI Equipment ID #:	
Date: 12-11-07 Test Crew: K, Morgan  OMNI Equipment ID #:  FUEL LOAD PREPARED BY: K. Morgan, CLAUDE PARE	
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRAIDIMENSIONAL LUMBER.	DE OR BETTER,
	· · · · · · · · · · · · · · · · · · ·
PRE-BURN FUEL MOISTURE CONTENT (METER DRY BASIS)	
CALIBRATION: Cal Value (1) = 12% Actual Reading $12.0$ Cal Value (2) = 22% Actual Reading $22.0$	
Piece         Length         Readings           1         \$\mathbb{g}\$ ft         19.4         19.9         19.7           2         ft	Type
1 8 ft 19.4 19.9 19.7	2x4
2tt	
3ft	· · ·
Length of cut pieces: 86 9.75 inches Pre-Burn Fuel Average Mo	isture: 19.67/
Time (clock): //:/5 Room Temperature (F): 75 Initials: //	
TEST FUEL	
FUEL TYPE AND AMOUNT: 2 x 4 Z 4 x 4 Z	
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT:	3,4 (2 × 4)
12.01/	6,4 (4 × 4)
FUEL PIECE LENGTH: 13.0'	9.8 Total
MOISTURE CONTENT (METER DRY BASIS)	
PIECE READINGS	TYPE
1 71.7 71.4 71.2	2 8 4
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	2×4 2×4
3 22.0 23.1 21.2	4 x 4
4 21,3 23,1 21,9	4 × 4
5	
0	<del></del>
8	
9	
OVERALL TEST FUEL LOAD MOISTURE A VERAGE: 2	1.691
O VERTED TEST FORD BOOK I ORD A VERAGE.	1
Time (clock):	Initials: //
Technician signature: 16 f. Morgn Da	oto: 12 16-07
rechinician signature. 10 1, vitorop.	ate: 12-11-07
· · · · · · · · · · · · · · · · · · ·	

		· R	Run Note	es .			
	l: Monaco 2008		·	· .			
	ct #: <u>338-F-68-3</u> ing #: <u>1161</u>						
Run#		_ Date:/	2-11-07				· -
OMNI	Equipment ID #(s):						
DESCF (SETTI	RIBE OR SKETCH AIR O NGS MUST BE ACCURA	R THERMOMS	PREBURN STAT SETTIN RODUCABLE	IGS BEL	OW:		
PRIMA	RY:			SEC	CONDARY	(: Fully (	Controlle
	Fully Closeo				TIARY:	NA	
				FAN	:	ON - H	ligh
	PRE	BURN SET	_ TINGS AN	D ACTI	<u>VITIES</u>		
TIME	AIR (THERMO) <u>CH</u> PRIMARY/SECONDAR	IANGES Y/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	СОММЕ
Ø	test setting.						
60							Leveller
				·			
INDICATE	JEL CONFIGURATION S EVIEW ANGLE)	<b>&gt;</b>	FUE DOC PRIM OTH	OR: MARY AII	NG Loud AJAR R: Fully ABRU	until 41 open 510 uptly Usea ng at 5.0	Seci min, 40 sec Min - I to test
DESCRIE SETTINGS PRIMAR	BE OR SKETCH TEST SI MUST BE ACCURATE AND F Y:	ETTINGS BEL REPRODUCIBLE)	OW:	SECC	NDARY:	Fully Clos	seo Posin
	SAME as above			TERT	IARY:	NA	
-				FAN:		on-High	
					4.4		

			emental				
Client:					•		
	Monaco 20						
	#: <u>338-F-68</u>		Tracking	•			,
Date: _	12-11-07 ew: <u>K. Morg</u>			Run #	_/_ Bootl	າ:	· · · · · · · · · · · · · · · · · · ·
	· ·		Start Tin	ne: <u>14;28</u>	Stop Time:_	18:18	÷
OMNIE	Equipment #	(s):		· · · · · · · · · · · · · · · · · · ·			·
Gas An	alyzer Train	Leak Check	C.				
	Stack:			ution Tunne	I (Method 50	GONIV)	
	Initial:				nitial:		-
		1.4				1	÷
Calibrat	Final: ions: Span	Gas CO <sub>2</sub> :	MA O	2: N/A	CO: NA	CO <sub>2</sub> (DT):	NA
			, ,		<del>-/</del>	~ ( /	/
	N <sub>2</sub> Span	N₂ Span	N₂ Span	N₂ Span	N <sub>2</sub> Span	N₂ Span	N <sub>2</sub> Spa
Time				•			
O <sub>2</sub>							
CO <sub>2</sub>			1///				
CO		/	10/11				
CO <sub>2</sub> (DT)			/				
Stack D	iameter (incl	nes):	6.0			•	
	city (ft/min):	,		 Final:	4.56		
	udit (lbs):		-				
Induced	Draft:	e	%S	moke Captu	ıre:	<u> </u>	_
Pitot Tul	be Leak Tes	t: Pre:	7 @ 3.4 w.e.	Р	ost: <u>ø@</u>	3.1 "wie,	
Flue Pip	e Cleaned F	rior to First	Test in Serie	es: Date: _/	2-10-07	Initials: /	
	·		·.				-
		Init	ial	Mic	ldle	Enc	ling
Pb (ir	n/Hg)	78	·K 30.17 4	<del>-8</del>	* 1 30.13 a	7	7-16 30.1
Room Te	emp (°F)	78		80	0	70	í
	÷	: 16/1	Morgn				

Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada G1N 4R9

# Run 2

# Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI

Model: Monaco 2008

Project No.: 338-F-68-3

Tracking No.: 1161 Run: 2

Test Date: 12/12/07

Burn Rate	1.00 kg/hr dry
Average Tunnel Temperature Average Gas Velocity in Dilution Tunnel - vs	107 degrees Fahrenheit 13.6 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8578.8 dscf/hour
Average Delta p	0.054 inches H20
Average Delta H	0.00 inches H20
Total Time of Test	240 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	27.29 cubic feet	25.19 cubic feet	29.40 cubic feet
Average Gas Meter Temperature	79 degrees Fahrenheit	78 degrees Fahrenheit	79 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	26.0 dscf	24.0 dscf	28.0 dscf
Total Particulates - mn		15.8 mg	18.4 mg
Particulate Concentration (dry-standard)	0.00066 grams/dscf	0.00066 grams/dscf	0.00066 grams/dscf
Particulate Emission Rate	5.64 grams/hour	5.64 grams/hour	5.64 grams/hour
Adjusted Emissions	7.65 grams/hour	7.65 grams/hour	7.65 grams/hour
Difference from Average		0.00 grams/hour	0.00 grams/hour
7.5% of the average emission rate	0.57		
Weighted Average Emission Rate Limit	4.10 grams/hour	· ·	· ·
7.5% of the weighted average emission rate limit	0.31		}
	F	Results Are Acceptab	le

# Wood Heater Test Data - EPA Method 5G

OMNI-Test Laboratories, Inc.

	Velocity	//////////////////////////////////////	Initial dP 0.045 0.052 0.046	Initial Temp. 116 114 112		OMNI Equipment Numbers:		
SBI	Monaco 2008	1161	338-F-68-3	12-Dec-07	12:18	10 min.	240 min.	
Manufacturer:	Model	Tracking No.:	Project No.:	Test Date:	Beginning Clock Time:	Recording Interval:	Total Sampling Time:	

	ft/sec.	scfm	scfm	ft2	0@5 cfm@"Hg	@5 cfm@"Hg	21.06	15.8	18.4	
	13.60 ft/sec	137.3 sc	143.0 scfm	0.1963 ft2	0@5	0@5	y basis %):	iculate (1):	Total Particulate (2):	
	Tunnel Velocity:	ntial Tunnel Flow:	verage Tunnel Flow	Tunnel Area:	Check (1):	Check (2):	Fuel Moisture (dry basis %	Total Particulate (1	Total Part	
Digitatul C.Date.		-	⋖		ost-Test Leak Check (1):	Post-Test Leak Check (2):	Fuel	ago ago	29.87 "Hg	
					P.	Po	8	Average	29.8	
							0.974	End	29.98	
		lb/lb-mole	lb/lb-mole	percent	"H20		Ξ	Middle End A	29.86	
	SBI 046,47	29.00	28.56	4.00	-0.118	0.84	0.975 (	Begin	29.78	
	PM Control Module:	vilution Tunnel MW(dry): 29.00 lb/lb-mole	ilution Tunnel MW(wet);	Dilution Tunnel H2O:	Dilution Tunnel Static;	Pitot Tube Cp.	Meter Box Y Factor:	Barometric Pressure:		
		Dile	Dill							
				٠,					-	
		٠.		"H2O	oF.					
			Pt.8	0.052	102					
							Ì			

Stack	Draft In. H2O	-0.065	-0.065	-0.070	-0.070	-0.073	-0.080	-0.080	-0.075	-0.070	-0.068	-0.065	-0.065	-0.065	-0.065	-0.063	-0.063	-0.060	-0.060	-0.060	-0.060	-0.058	-0.055	-0.053	-0.053	-0.053	-0.065
	Ambient	79	78	67	79	8	81	81	82	81	18	18	81	18	81	81	81	08	80	08	80	80	80	80	08	79	
	Impinger exit (2)															-				-				-			DIV/0!
	Impinger In													-				-			_						#DIV/0  #DIV/0
	Filter (2)	79	83	84	84	85	98	88	98	84	18	80	79	80	81	82	82	83	83	83	84	83	84	28	84	83	83.00 #
	Filter (1)	08	83	83	83	83	84	84	83	18	18	08	79	08	80	18	18	82	.82	82	82	82	82	23	82	82	81.76
Data, oF	Stack	320	338	371	400	432	483	486	446	414	388	375	385	393	375	350	334	. 321	. 310	303	305	295	287	278	368	257	
mperature	Average Surface	423.2	423.2	425.8	435.8	450.4	491.4	501.6	485.2	474.2	9.294	463.2	471.6	483.4	476.4	460.8	451.6	443.2	433.0	426.0	425.0	416.8	407.8	398.6	386.0:	370.6	53
Wood Heater Temperature Data,	Catalyst Exit															,											
Wood	Firebox	369	356	328	322	329	349	373	388	390	394	394	389	404	409	405	405	400	389	379	373	367	356	345	332	319	
	Firebox	391	372	354	353	357	372	389	400	398	394	392	399	403	403	399	393	387	380	374	368	363	356	350	341	329	
	Firebox Back	491	517	473	452	458	480	518	540	551	572	588	592	290	591	595	593	588	579	569	555	537	519	503	493	477	
	Firebox	361	363	354	342	332	326	320	315	313	312	312	312	312	313	317	323	326	328	328	336	347	356	360	355	343	
	Firebox	504	808	620	710	776	930	806	783	719	999	989	999	708	999	588	544	515	489	480	493	470	452	435	409	385	
ght, lb	Weight		1.1-	6.0-	8.0-	-	-1.1	-0.9	9:0-	-0.5	-0.5	-0.4	-0.4	-0.5	-0.3	-0.2	-0.2	-0.2	-0.2	-0.1	-0.2	-0.1	-0.2	-0.1	-0.1	-0.1	
Fuel Weight, 1	Scale Reading	10.7	9.6	8.7.	7.9	6.9	5.8	4.9	4.3	3.8	3.3	2.9	2.5	2.0	1.7	1.5	1.3	1.1	6.0	8.0	9.0	0.5	0.3	0.2	0.1	0.0	
	Pro. Rate (10%) (2)		66	96	101	101	16	118	106	103	103	103	- 26	66	101	100	100	95	24	100	66	66	100	100	101	100	100.62
	Pro. Rate (10%) (1)		901	103	104	104	101	103	103	101	103	101	100	100	101	66	66	66	66	66	66	. 66	66	86	66	86	100.62
	Dilution Tunnel dP	0.050	0.050	0.053	0,053	0.053	0.055	0.053	0.053	0.053	0.053	0.053	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.055	0.054
	Dilution Tunnel Temp.	109	109	108	112	116	123	124	118	114	114	109	109	110	801	105	102	100	66	66	66	86	26	96	95	. 94	106.68
	Meter Vac. In. Hg. (2)	0	0	0	0	0	0	0	0	0	0	0	0	. 0	0	0	0	0	0	0	Ó	0	0	0	0	0	
Data	Meter Vac. In. Hg. (1)	0	0	0	0	. 0	0	0	0	0	0	0	0	0	0	0	0 .	0	0	0	0	0	0	0	0	0	
Particulate Sampling Data	Meter oF (2)	78	78	78	79	. 79	79	79	61	79	79 .	1.79	80	80	62.	80	80	80	80	80	80	08	80	80	80	08	79.40
ulate Sa	Meter oF	11	77	77	11	78	78	78	78	78	78	79	79	79	79	79	79	79	.79	79	79	79	79	79	79	79	78.44
Partic	Orifice ) dH(2)	0.00	0.00	0.00	0.00	00.0	0.00	0.00	00:0	0.00	0.00	.00:0	0.00	0.00	0.00	0.00	0.00	0.00	000	0.00	0.00	0.00	00:0	0.00	0.00	0.00	00.00
	Orifice dH(1)	000	00:00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00:00	00:0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Sample Rate, cfm (2)		0.12	0.12	0.12	0.12	0.12	0.14	0.13	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.13	0.12	0.12
	Sample Rate, cfm (1)		0.11	0.11	0.11	0.11	0.10	0.10	0.11	0.10	0.11	0.10	0.10	0.10	0.11	0.10	0.11	0.10	0.10	0.10	0.10	0.10	0.11	0.10	0.11	0.10	0.10
	Gas Meter Cubic Feet (2)	686.841	687.995	689.146	690.352	691.555	692.725	694.125	695.387	696.615	697.850	699.085	700.270	701.485	702.720	703.950	705.185	706.365	707.570	708.806	710.035	711.264	712.500	713.740	715.000	716.240	29.399
	Gas Meter Cubic Feet (1)	681.713	682.766	683.821	684.885	685.945	286.989	688.035	689.085	690.125	691.180	692,225	693.275	694.320	695.380	696.425	697.475	698.525	075.669	700.615	-	+	703.760	704.800	705.855	706.898	25.187
H	Elapsed (	0	10	1	7	1	+	1			7	-		1			-	-	+	+	+				230	240	Avg/Total
			_		1-					٠ا				_	_			_ :	_		- 1	- 1					

Client Name:	SBI		Equipment Numbers:		Run#:	2
Model:	Monaco 2008		: 	,	Train #:	. A
•	338-F-68-3		* * · · · · · · · · · · · · · · · · · ·		Date:	12/12/07
Tracking No.:		1161				

Sample Component	Reagent	Filter # or		Weights	-
		Probe #	Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	5	119.1	104.2	14.9
B. Rear filter catch	Filter	6	124.1	123.2	0.9
C. Probe catch	Probe	4	188081.5	188081.5	0.0

<u> </u>	
	1
Total Particulate, mg:	15.8
	ļ

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: /h/Morg Date: 1

Client Name:	SBI		Equipment N	Jumbers:	 	Run #:	2	
, Model:	Monaco 2008	·				Train #:	В	
Project No.:	338-F-68-3		•			Date:	12/12/07	
Tracking No.:		1161	-	-		-		_

Sample Component	Reagent	Filter # or		Weights	
		Probe #	Final, mg	Tare, mg	Particulate, m
A. Front filter catch	Filter	. 7	138.7	122.1	16.6
B. Rear filter catch	Filter	.8	127.2	126.2	1.0
C. Probe catch	Probe	5	197388.4	197387.6	0.8

Total Particulate, mg:	18.4

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: 1/ 1. Morga

Date: 1-21-08

Programmer.	
Stroto Current	
MM Late ries,	Seaverton, OR Phone (503) 643-3788
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2008 Project #: _338-F-68-3 Tracking # sst Crew:			Page of
K. Morann	lient/Model: SBI / Monaco 2008	Project #: _338-F-68-3	Tracking #: 1161
	-	K. Worgens	Run# 2

Test	Drob.	[1]						_				-
Fuel Delta Stack Ambient Top Bottom Back Left Right Flue Coal Bed	יים ביים ביים ליים	<b>ヹ</b> ゚			Coal Bed		•				Actual	
Fuel Delta Stack  Weight Weight Draft Ambient Top Bottom Back Left Right Flue Co. 0.083 77 804 337 237 237 247 524 550 1.0 0.073 78 8/3 352 328 332 294 4/55 3.4 0.07 0.07 79 744 349 4/09 373 34/6 4/23 2.1 0.1 0.070 79 674 350 4/52 383 359 4/04 2.1 0.070 79 674 350 4/52 383 359 4/04 2.1 0.070 79 674 359 4/04 359 4/04 350 0.1 0.007 79 674 350 755 370 370 375 370 375 2.1 0.1 0.055 4/72 79 5/1 0.055 7/72 370 359 370 375 375 370 375 370 375 370 375 370 375 375 370 375 370 375 370 375 375 375 375 375 375 375 375 375 370 375 375 375 375 375 375 375 375 375 375	lest		ï		Data:	0		Range.	2.2 - 2.6		nool Book	7
Weight Weight Draft Ambient Top         Bottom         Back Left         Right Flue           6.0        085         77         804         337         287         247         524           6.0        073         78         8/3         352         328         332         294         4/56           4.2         0.8        073         79         349         328         357         394         4/56           3.5         0.7        070         79         474         349         379         340         4/23           2.15         0.1        065         80         6.19         359         4/64         376         376         376           2.3         0.1        065         479         358         525         392         370         350           2.3         0.1        065         479         358         525         392         370         350           2.3         0.1        065         479         358         525         392         370         350		Fuel		Stack				MPERAT	URES (A)		voal bed.	R ( )
64.0       -1.085       77       804       337       237       237       247       247       524         55.0       11.0       -1.073       78       813       352       328       332       249       452         41.2       0.8       -1.070       79       79       349       365       357       374       445         2.4       0.6       -1.070       79       474       349       449       373       346       462         2.5       0.7       -1.065       80       619       354       476       371       375         2.3       0.1       -1.065       479       75       358       359       404         2.3       0.1       -1.065       479       77       358       525       391       370       350         2.3       0.1       -1.065       479       77	Time	Weight		Draft	Ambient	Top	Bottom	Back	) <del> </del> d	~.l		אפין האנל
5,0     1,0     -,073     78     813     352     328     332     271       4,2     0,4     -,073     79     790     349     345     357     354       3,5     0,5     -,070     79     744     749     409     373     346       2,3     0,6     -,070     79     674     350     453     383     359       2,3     0,1     -,065     80     619     354     476     371       2,3     0,2     -,065     80     619     358     555     392     370       3     0,2     -,065     80     619     358     525     392     370       4     3     3     3     358     372     370	0	9,0		~,085	77	708	337	190	797	11611	ani i	Catarys!
41.2       01.8       -1.073       79       79       349       345       357       526         3.4       0.0       -1.070       79       744       349       345       357       346         2.3       0.0       -1.070       79       674       359       473       359       357         2.3       0.0       -1.065       476       358       525       370         2.3       0.1       -1.065       476       358       525       370         3       0.1       -1.065       476       358       525       392       370	10	2,0	011	-,073	78	2/8	267	2000	220	100	47.5	
3.5       0.7      070       79       744       349       409       357       346         2.9       6.6      070       79       674       346       409       373       346         2.5       6.6      070       79       674       350       453       359       359         2.3       0.1      065       470       70       740       740       350       370         2.3       0.1      065       470       70       350       370       370         3       0.1      065       470       70	20	4.2	8'0	-,073	St.	, pt	20/2	21/1	3 2	1/7	756	
2.9 6.16 -1.070 79 674 350 453 383 359 359 2.3 6.14 -1.065 80 6.19 359 496 331 371 2.3 6.12 -1.065 879 79 561 358 525 392 370 370 370 370 370 370 370 370 370 370	30	7	10	070	Bf	- Jului	110	3	200	3 3	544	
2.3 0.1 -1.065 80 619 359 453 383 359 2.3 0.1 -1.065 k79-79 561 358 525 372 370 370 370 370 370 370 370	40	2.9	7.4	020	200	777	77.7	404	2/2	346	423	
2.3 0,7 -,065 80 619 354 496 371 2.3 0,2 -,065 479 78 561 358 525 392 370	50		9.70	2/0/2	//	479	38	453	383	359	404	
2.3 ©12 -1065 Pro-79 Stel 358 S25 392 370		2,5	t io	-,065	80	619	354	496	32/	37/	375	_
	20	2.3	6,4	-,065	K7079	Se	358	525	392	370	350	-
80 90 10 10 20 30 40 50 60 60 60 80 80 80 80 80 80 80 80 80 80 80 80 80	70											
90 00 10 20 30 40 50 60 60 60 70 80 80 80 80 80 80 80 80 80 80 80 80 80	80											
00 10 20 30 40 40 50 60 60 70 80 80 80 80 80 80 80 80 80 80 80 80 80	90											
10 20 30 40 50 60 60 70 80 80 80 AVG	00											
20 30 40 50 60 60 70 80 80 90 AVG	10			-								
30 40 50 60 70 80 80 AVG	20											
30 40 50 60 60 70 80 80 90 AVG	1 0									•		
40 50 60 70 80 80 80 AVG	30					٠						
50         60         70         80         90         AVG	40											
60 70 80 90 AVG	20											,
70 80 90 AVG	9											1
80 90 AVG	70											
90 AVG	80											>
AVG	06				-							
	AVG											

Technician signature:

Date:

# FUEL DATA

Model: Monaco 2008	•			·	•
Model: <u>Monaco 2008</u> roject #: <u>338-F-68-3</u> Date:	Tracking #: 1161				•
Date: 12/12/07	7 Test Crew:	K. Meroan		Run #:	2
MNI Equipment ID #:	i			<del></del>	
UEL LOAD PREPARI	EDBY: Killowan	-			
UEL: DOUGLAS-FI IMENSIONAL LUME					
		PRE-BURN		· · · · · · · · · · · · · · · · · · ·	
CALIBRATION:	$\frac{\text{MOISTURE}}{\text{Cal Value (1)}} = 12$	CONTENT (ME	TER DRY BAS	SIS)	
CALIBICATION.	Cal Value (1) = 12 Cal Value (2) = 22	% Actual I	Reading 22.0	<u> </u>	
<u>Piece</u>	Length			Tyma	
	ft	19.1 Readin		ZX4	•
2	ft	·			
3	ft		· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
Length of cut piec	es: <b>8@ 9.5</b> inches	Pre	-Burn Fuel Average	Moisture: 19.	63%
Time (cleate): 10	:00 Room Temp	anatuma (EV. 7	<b>✓</b> Taikiala.	1/	
Time (clock): 70	Room Temp	berature (F):	initials:	/	
· · · · · · · · · · · · · · · · · · ·					
	**************************************				
		מוזים יוניסייני	י אמן		
ELIEL TVDE AND A	MOLINIT. 2 P	TEST FUI		·	
FUEL TYPE AND A		4	484	Z	(2 🕊 4)
CALCULATED LOA	AD WEIGHT:	4	484		(2 × 4) (4 × 4)
	AD WEIGHT:	4	484	IT: 3.8	(4 ×4)
CALCULATED LOA	TH: /2.75	4 <u>2</u> ACTU	4 × 4	T: 3.8 6.9 /0.7	(4 ×4)
CALCULATED LOA	TH: /2.75	4 <u>2</u> ACTU	484	T: 3.8 6.9 /0.7	(4 ×4)
CALCULATED LOA	ND WEIGHT: TH: /2.75 // MOISTURE	4 <u>2</u> ACTU	4 × 4	T: 3.8 6.9 /0.7	(4 ×4)
FUEL PIECE LENGT	ND WEIGHT: TH: /2.75 "  MOISTURE E	4 Z ACTU  CONTENT (MET  READINGS	4 × 4 JAL LOAD WEIGH TER – – DRY BAS	TYPE	(4 ×4)
FUEL PIECE LENGT	MOISTURE  ZL.1	4 Z ACTU  CONTENT (MET  READINGS	4 × 4 JAL LOAD WEIGH TER – – DRY BAS	TYPE  2 × 4	(4 <b>k</b> 4)
FUEL PIECE LENGT	ND WEIGHT: TH: /2.75 "  MOISTURE E	4 Z ACTU  CONTENT (ME  READINGS  21.5  21.7	4 × 4	TYPE	(4 <b>k</b> 4)
FUEL PIECE LENGT	MOISTURE  21.1  21.0	4 Z ACTU  CONTENT (MET  READINGS	4 × 4 JAL LOAD WEIGH TER – – DRY BAS	TYPE  2 × 4  2 × 4	(4 ×4)
FUEL PIECE LENGT	MOISTURE  21.1  21.0  19.4	4 Z ACTU  CONTENT (ME  READINGS Z1.5 Z1.7 Z2.2	4 × 4	TYPE  2 × 4  2 × 4  4 × 4	(4 ×4)
FUEL PIECE LENGT	MOISTURE  21.1  21.0  19.4	4 Z ACTU  CONTENT (ME  READINGS Z1.5 Z1.7 Z2.2	4 × 4	TYPE  2 × 4  2 × 4  4 × 4	(4 ×4)
FUEL PIECE LENGT  PIEC	MOISTURE  21.1  21.0  19.4	4 Z ACTU  CONTENT (ME  READINGS Z1.5 Z1.7 Z2.2	4 × 4	TYPE  2 × 4  2 × 4  4 × 4	(4 ×4)
FUEL PIECE LENGT	MOISTURE  21.1  21.0  19.4	4 Z ACTU  CONTENT (ME  READINGS Z1.5 Z1.7 Z2.2	4 × 4	TYPE  2 × 4  2 × 4  4 × 4	(4 ×4)
PIECE LENGT  PIECE LENGT  1 2 3 4 5 6 7 8 9	MOISTURE  21.1  21.0  19.4	4 Z ACTU  CONTENT (ME  READINGS Z1.5 Z1.7 Z2.2	4 × 4	TYPE  2 × 4  2 × 4  4 × 4	(4 ×4)
PIECE LENGT  PIECE LENGT  1 2 3 4 5 6 7 8 9 10	MOISTURE  21.10 19.4 21.4	4 Z ACTU  CONTENT (ME  READINGS  21,5  21,7  22,2  22,5	4×4	TYPE  2 * 4  2 * 4  4 * 4  4 * 4	(4 <b>k</b> 4)
PIECE LENGT  PIECE LENGT  1 2 3 4 5 6 7 8 9 10	MOISTURE  21.1  21.0  19.4	4 Z ACTU  CONTENT (ME  READINGS  21,5  21,7  22,2  22,5	4×4	TYPE  2 * 4  2 * 4  4 * 4  4 * 4	(4 ×4)
PIECE LENGT  PIECE LENGT  1 2 3 4 5 6 7 8 9 10	MOISTURE  MOISTURE  Z. (. )  Z	ACTU  CONTENT (MET  READINGS  Z1, 5  Z1, 7  22, 2  22, 5  EL LOAD MOIS	4 × 4	TYPE  2×4  4×4  4×4  4×4  21.06/	(4 <b>x</b> 4)
PIECE LENGT  PIECE LENGT  1 2 3 4 5 6 7 8 9 10	MOISTURE  MOISTURE  Z. (. )  Z	4 Z ACTU  CONTENT (ME  READINGS  21,5  21,7  22,2  22,5	4 × 4	TYPE  2 * 4  2 * 4  4 * 4  4 * 4	(4 <b>x</b> 4)
PIECE LENGT  PIECE LENGT  1 2 3 4 5 6 7 8 9 10	MOISTURE  MOISTURE  Z. (. )  Z	ACTU  CONTENT (MET  READINGS  Z1, 5  Z1, 7  22, 2  22, 5  EL LOAD MOIS	4 × 4	TYPE  2×4  4×4  4×4  4×4  21.06/	(4 <b>x</b> 4)

		R	un Note	S	,	î.	
Mod Proj Trad	nt: <u>SBI</u> el: <u>Monaco 2008</u> ect #: <u>338-F-68-3</u> king #: <u>1161</u> #: <b>2</b>	_ Date:/	12-12-07				
Test	Crew: K. Morgan II Equipment ID #(s):						
DES	CRIBE OR SKETCH AIR O	<u>E</u> DR THERMOMS			DW:		· .
PRIM	ARY:		· · ·	SEC	ONDARY	FIXED	, - to PR
	Gauged 0.030			TER	TIARY:	N/A	
				FAN	:	ON-Hi	gh
•	<u>PR</u>	EBURN SET	_ TINGS ANI	O ACTIV	/ITIES		
TIME	AIR (THERMO) C PRIMARY/SECONDA	HANGES RY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	СОММЕ
60	TEST SETTING					x	- Levellus
(INDICA DESC	FUEL CONFIGURATION  ITE VIEW ANGLE)  FRONT  RIBE OR SKETCH TEST  IGS MUST BE ACCURATE AND  IRY:	> SETTINGS BEL	FUE DOC PRII OTI-	MARY AII	N/M NG Load Azar R: Full Abrup ut 5.	ed by 50 water 4.5 open can the chosed omin	secr univ fil siom to test s
1 INIVIE	Same a above				TARY:	NA	w(1 //

Control No. P-SFAK-0006 (Run Notes) doc, Effective date: 05/08/2007

4-19 OF 4-47

	OMNI- Beaverton	Test Laborai	toriè∪, ∴ıc.			SE		
	Boaverton	, O, C	Suppl	emental	Data EP	A 5G/5H		
	Client:	SBI						
	•	Monaco 20	08					
		#: <u>338-F-68</u>		Tracking	#: <u>1161</u>	•		
	Date: _	12-12-07	-	_	·	Z Booti	h:	·
	Test Cr	rew: K. W.	MorgAN	Start Tir	ne: <u>/2:/8</u>	Stop Time:	16:18	
		Equipment #(		·				
	Gas An	alyzer Train	Leak Check	ς:				
	3	Stack:	•	Dil	ution Tunne	l (Method 50	G Only):	
	•	Initial:				nitial:		
		Final: ˌ ions: Span (	NA		F	inal: <i>N/K</i>	<del>/</del>	
-	Calibrat	ions: Span (	Gas CO₂:	<u>N/A</u> 0	2: N/A	CO: <u>N/A</u>	CO <sub>2</sub> (DT): _	NA
		N₂ Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N₂ Span	N₂ Span	N₂ Spa
	Time				/		1	
	O <sub>2</sub>		·	1/	/1			
-	CO <sub>2</sub>			///	1			
	СО							
	CO <sub>2</sub> (DT)							
	Stack D	iameter (incl	nes):	6.0"				
	Air Velo	city (ft/min):	Initial:	< <b>5</b> 0	Final:	< 50	•	
	Scale A	udit (lbs):	Pretest: _	10.0		st: /0,0		
	Induced	Draft: _&		_ %S	moke Captu	ıre: <i>100</i>		
	Pitot Tul	oe Leak Test	t: Pre: <u>a</u>			ost: 🗷 🗷	3.1" will	
	Flue Pip	e Cleaned P	rior to First	Test in Serie	es: Date: <u>//</u>	2-10-07	Initials: /4	<u>.                                    </u>
Γ			Init	ial	Mid	dle	Enc	ling
L	Pb (in	ı/Hg)	79	16 29.780	<del>8</del> /	14 29.86 0	29.9	180
L	Room Te	emp (°F)	79		81		79	
	Technici	an signature	- //	1 111		)ate:		1

Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada GIN 4R9

# Run 3

# Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI

Model: Monaco 2008 Project No.: 338-F-68-3

Tracking No.: 1161 Run: 3

Test Date: 12/12/07

	Burn Rate	1.37	kg/hr dry
Į	Average Tunnel Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd	13.4	degrees Fahrenheit feet/second dscf/hour
Į.	Average Delta p Average Delta H Total Time of Test	0.00	inches H20 inches H20 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm Average Gas Meter Temperature Total Sample Volume (Standard Conditions) - Vmstd	18.66 cubic feet 78 degrees Fahrenheit 18.0 dscf	17.53 cubic feet 78 degrees Fahrenheit 16.9 dscf	19.79 cubic feet 79 degrees Fahrenheit 19.1 dscf
Total Particulates - mn Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00023 grams/dscf 1.88 grams/hour 3.08 grams/hour	3.9 mg 0.00023 grams/dscf 1.93 grams/hour 3.13 grams/hour	4.2 mg 0.00022 grams/dscf 1.84 grams/hour 3.02 grams/hour
Difference from Average 7.5% of the average emission rate Weighted Average Emission Rate Limit 7.5% of the weighted average emission rate limit	0.23 4.10 grams/hour 0.31	0.06 grams/hour	0.06 grams/hour
	R	Results Are Acceptab	le

# Wood Heater Test Data - EPA Method 5G

Manufacturer - SBI				12	0.0	Æ	ty Tr			
00 2008				125	0.055	Pt.3	Velocit			
co 2006 -68-3 -607 min.				127	0.058	Pt.2				
co 2006 -68-3 -607 min.	ultilities.	umbers.		129	0.050	Pt.1				
co 2006 -68-3 -607 min.	rdeibiicat 14	Equipment N		itial Temp.	Initial dP					
Manufacturer   SBI   Moneco 2008   Model   Moneco 2008   Tracking No.   1161   Project No.   3138-E-68-3   Test Date   12-Dec-07   uig Clock Tine:   1943   min.	O. P. L. L.	OMNI		ū				,		
Manufacturer SBI  Model: Monseo 2008  Tracking vo. 1161  Project No. 3154-68-3  Test Date. 12-Dec-07  ing Clock Time. 1943  min.										
Manufacturer   SBI						,				
Manufacturer   SBI										
Manufacturer . SBI Model Monaco 2008 Tracking No. 1161 Project No. 338-E-68-3 Text Date 12-Dec-07 uing Clock Trine. 19-43		min.								
Manufacturer: S Model: N Tracking No.: 3 Project No.: 3 Test Date: 1 Ting Clock Time: 1 rocording Interval: 1	200	. 0	9:43	2-Dec-07	38-F-68-3	161	Jonaco 2008	381		
	Total Sampling Time: 1	ecording Interval: 1	ming Clock Time: 1				~1	Manufacturer: . \$		
Run: 3	-	~	ij.,						3	

OMNI-Test Laboratories, Inc.

			Velocit	Velocity Traverse Data	se Data				_
Pt.1	.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	_
0.050	20	0.058	0.055	0.058	0.050	0.055	0.050	0.048	"H20
27	29	127	125	123	122	121	120	119	Ho

	80-12	ft/sec.	sefm	ZI	0@5 cfm@"Hg	fm@"Hg 20.72	3.9	4.2		Stack	Draft In.	HZO	0.070	-0.080	-0.085	-0.085	-0.085	-0.080	-0,075	-0.075	-0.075	-0.075	-0.075	-0.070	-0.068	-0.065	-0.065	-0.063	-0.060	-0.060	-0.073
:	Signature/Date: 14/11/10/9- 1-21-08	13.36 £	140.4	0.1963 ft2	0@5 0	0 @ 5 c	ulate (1):	ulate (2):	l			Ambient	18	08	×	82	81	82	╁	t	81	18	81	81	80	80	08	08	_	. 62	
,	11/1/11	Tunnel Velocity:	el Flow:	Area:	heck (1):	Fuel Moisture (dry basis %):	Total Particulate (1):	Total Particulate (2):			Impinger				l		-														JIV/0!
	nature/Date	Tunnel V	Intial Tunnel Flow:	Tunnel Area:	Post-Test Leak Check (1)	Post-Test Leak Check (2): (2) Fuel Moisture (d		"Hg			Impinger	exit (1)																		1	#DIV/0! #DIV/0!
	Sign		,		Post-7		Average	30.21			Filter	(2)	78	83	82	82	82	82	83	83	84	84	84	85	84	84	84	83	83	82	82.83 #
			0 6			0.974	End	30.26			Filter	Ξ	79	28	8	80	08	08 ·	80	18	81	81	81	82	81	81	81	18	8	08 -	95.08
		7	29.00 lb/lb-mole	4.00 percent	-0.128 "H2O	(E)	_ Middle	30.22		: Data, oF	Sec. of	Stack	354	480	505	527	526	495	463	440	424	420	417	386	368	. 354	345	331	321	315	
		SBI 046,4	29.00	4.00	-0.128	0.975 (1)	Begin	30.14		mperature	Average	Surface	487.6	537.0	547.0	547.8	557.0	539.4	530.0	522.0	518.2	518.0	\$22.8	508.0	496.4	489.0	481.8	470.2	461.0	451,4	36
		PM Control Module: SBI 046,47	MW(dry): MW(wet):	nnel H20:	Tunnel Static	Meter Box Y Factor:	Pressure:			Wood Heater Temperature Data, oF	Catalyst	Exit																			
		PM Contr	Dilution Tunnel MW(dry): Dilution Tunnel MW(wet)	Dilution Tunnel H2O	Dilution Tunnel Static	Meter Boy	Barometric Pressure:			Wood	Firebox	Right	421	412	406	408	421	424	441	438	440	442	446	445	439	434	427	413	401	391	
											Firebox	Left	433	428	414	419.	435	441	448	449	447	450	454	450	443	435	428	419	410	401	
				"H20	10						Firebox	Back	989	631	609	602	609	619	614	. 622	634	642	644	647	849	647	140	630	621	605	
ood tradical a cat Data - Ala Intelliga Do			Pt.8	0.048	113	-					Firebox	Bottom	401	416	410	398	387	381	383	382	379	378	373	374	373	377	378	383	383	382	
7 777			Pt.7	0.050	120						Firebox	Тор	547	798	968	912	933	832	764	719	169	678	697	624	579	552	535	200	490	478	
, הוני הוני			Pt.6	0.055	171					Fuel Weight, Ib	Weight	Change		-1.9	-1.2	-1.3	1.1	-0.8	9.0-	-0.5	-0.5	-0.4	-0.5	-03	0.3	-0.2	7.0	7.0	7.0-	10.1	
700			Pt.5	0.050	177					rue! we	Scale	Reading	10.3	8.4	7.2	5.9	4.8	4.0	3.4	2.9	2.4	2.0	5]	1.2	60	7.0	3 3	3	- 6	0.0	
Toron I		H. 47	Pt.4	0.058	123						Pro. Rate (10%)	(2)		103	100	107	6	66	100	104	83	101	102	101	S .	001	3 3	3 3	20 2	20	100.82
*		Volum	Pt.3	0.055	(2)	•					Pro. Rate Pro. Rate (10%) (10%)	(1)		104	104	109	96	102	66	103	100	100	103	86	66	6	3 3	3 5	3 8	2	100.84
:			Pt.2	0.058	-						Dilution	Ð	0.053	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.053	0.053	0.050	0.053	0.053	500.0	0.000	0000	0.053	0.000	0.052
			Pt.1	0.050	1	Numbers:					Dilution Tunnel	Тетр.	123.	132	132	134	134	129	124	120	117	116	116	17 001	801	901	103	100	101	īnī	117.40
				Initial dP Initial Temn	dinor minut	OMNI Equipment Numbers:					Meter Vac. In. Hg.	(3)	0	0	0	0	0	0	0	0	0	0	0	5 0	0	> 0	0		0	THE PROPERTY OF	
						OMI			Joto	Jala	Meter Vac. In. Hg.	(1)	0	0	0	0	0	0	0	0	0	0		0	0						***************************************
							Ċ	•	I wallan	inpung 1	Meter	(2)	79	79	62	29	2	79	2	79	29	5 6	6 6	6/ 0/	9 6	0,00	2 00	2 6	282	2 5	78.67
									Particulate Campling Data	Hall Ga	4	Ξ	78	78	78	78	78	8/	78	78	78	8/ 8	0/	0/	1 1	1 1	12	- 12	17	;;	1,977
		 1		ı	1	, 1 1	1		Partic	I di lic	Orifice		00.00	000	000	00.0	000	0.00	000	000	000	000	8 8	8 6	900	000	000	000	000	200	00.0
						min.	min				Orifice	E) IIII	0.00	00.0	00.0	0.00	0.00	00.0	0.00	00:0	0.00	00:0	00.00	8 8	8 8	000	000	000	000	8	0.00
		38									Rate, cfm	(2)		0.12	0.11	0.12	0.11	11.0	11.0	0.12	0.12	0.12	0.12	0.12	0 12	0.10	0.12	0.12	0.12	2 2	0.12
	SBI	Monaco 2008		338-F-68-3 12-Dec-07	19:43	10	•			0	Rate, cfm	(1)		0.10	0.10	0.11	0.10	0.10	0.10	0.10	0.10	0.10	010	010	010	010	010	010	0.10	0.10	0,10
	□ Manufacturer: SBI	Model	Tracking No.:	Project No.: Test Date:	Beginning Clock Time:	Recording Interval	rotat Samping 1 me.			Con Motor	Cubic Feet	(5)	716.458	010.717	/18./30	719.930	722.140	722.140	724.450	725 630	705.610	727.055	729 140	730,310	731 485	732,670	733.850	735.040	736.246	10.799	17.100
	3		Ţ		Beginning (	Record Total Sam	10121 3211			Gar Matar	Cubic Feet	Ξ	707.033	700.000	860.607	711 136	712 155	712 150	714 100	715 220	716.260	717.305	718.320	719.355	720 395	721 430	722.475	723.520	724.559	17.526	020.11
	Run:									Planced	Time		0 9	01 6	07	2 8	3 5	3 5	8 8	2 8	2 8	2 2	110	120	130	140	150	160	170	A vo/Total	Was voice

Client Name:	SBI	Equipment N	lumbers:	· 	Run #:	3
Model:	Monaco 2008	e.			Train #:	A
Project No.:	338-F-68-3				Date:	12/12/07
Tracking No.:	1161				. •	

Sample Component	Reagent	Filter # or		Weights	
		Probe#	Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	9	108.2	104.8	3.4
B. Rear filter catch	Filter	. 10	117.9	117.5	0.4
C. Probe catch	Probe	. 3	188255.9	188255.8	0.1

Total Particulate, mg:	3.9

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: 16 f. Mogn Date: 1-21-08

Client Name:	SBI	Equipment Numbers:	Run #:	3
Model:	Monaco 2008		Train #:	B
Project No.:	338-F-68-3		Date:	12/12/07
Tracking No.:	1161	: :	•	

Sample Component	Reagent	Filter# or		Weights	
		Probe #	Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	11	124.7	121.0	3.7
B. Rear filter catch	Filter	12	125.5	125.0	0.5
C. Probe catch	Probe	6	188122.8	188122.8	0.0

Total Particulate, mg:	4.2
9	

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: 14 1. Morg

Date: 1-21-08

12-12-07

Date:

8		
TOTAL CONTRACTOR		
Contestion		
Specific Section 19		FILL
Carbon State Control of the Control		< <u>+</u>
		LOU!
Separate Manager and Parkers a		ПП
and expressions		
BOOL STOCKED		
Printer and Parket and		STOVE TEMPERATION TRAFF

Beaverton, OR Phone (503), 643-3788

Page of P	Project #: _338-F-68-3 Tracking #: 1161	Run #: 3	
	Project #:	K. Morgan	
	lient/Model: SBI / Monaco 2008	late: 12-12-07 Test Crew:	

Test   1	Prebu	Preburn   X			200 200							
Fuel Delta Stack  Weight Weight Draft Ambient Top Bottom Back Left Right Flue  7.0  7.0  7.0  7.0  7.0  7.0  7.0  7.	- <del> </del>	7. F			Coal Deu						Actinal.	
Fuel Delta Stack  Weight Weight Draft Ambient Top Bottom Back Leff Right Flue  7.0	ารถ บ				Data:	0		Rance.	21-25		יוטימון.	,
Weight Weight Draft Ambient Top         Bottom         Back Left         Right         Flue           7.0         7.0         329         378         346         379         538           5.9         4.1        085         81         845         316         468         537         538           4.6         1.3        085         82         933         326         494         465         359         559           3.5         1.1        083         83         947         356         554         494         465         354         553           2.1         0.1        070         81         547         401         536         434         435           2.1         0.1        070         81         547         401         636         433         421         354           2.1         0.1        070         81         547         401         435         421         354           2.1         0.2        070         81         547         401         433         421         354	į			Stack				EMPERAL	URES (0	Ĺ	Coal Bed.	1/1/07/1
7.0 7.085 81 822 295 447 346 294 538 446 1.3085 81 865 316 468 379 329 505 446 1.3085 82 933 326 494 465 369 359 505 314 0.4070 82 704 569 611 445 435 421 455 212 0.1070 81 547 401 636 433 421 354 435 212 0.1070 81 547 401 636 433 421 354	- IMe		1	Draft	Ambient	Top	Bottom	Back	######################################	- 1		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
5,9     h,1     -1,085     81     51,085     81     52,0     46     379     329       4,6     h,3     -1,085     82     933     326     468     379     329       3.5     h,1     -083     83     947     336     429     429     351       2.4     0.7     -080     82     843     350     554     444     424     424       2.1     0.4     -070     81     547     401     636     434     424       2.1     0.4     -070     81     547     401     636     434     424       2.1     0.2     -070     81     547     401     636     434     424       2.1     0.2     -070     81     547     401     636     433     424       2.2     0.2     -070     81     547     401     636     433     424       2.2     0.2     -070     81     547     401     636     433     424       3.2     0.2     0.2     0.2     0.2     433     424     33       4.2     0.2     0.2     0.2     0.2     434     33     424     33	ں	7,0		-,085	18	828	1080	1000	LOIL V	11000	TING	Laralyst
416     1,3     -,085     52     933     326     468     379     329       3.5     1,1     -,083     83     947     336     404     465     361       2.8     0.7     -,080     82     843     350     554     444     424     424       2.4     0.4     -,070     81     547     401     636     434     424       2.2     0.2     -,070     81     547     401     636     434     424       3.4     0.4     -,070     81     547     401     636     433     424       3.4     0.4     -,070     81     547     401     636     433     424       3.5     0.2     -,070     81     547     401     636     433     424       3.5     0.2     -,070     81     547     401     636     433     424       3.6     0.3     0.4     0.4     433     424     33     424     33       4.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.5     0.	10	2400-in	14	780	0	120	2	124	346	160	538	
3.5 1,1083 83 326 494 465 361 2.8 0.7080 82 847 350 520 429 394 121 2.4 0.4070 82 704 569 611 445 434 121 2.1 0.1070 81 547 401 636 433 424 121 2.1 0.1070 81 547 401 636 433 424 121	20		21	100	3 1	96.7	516	168	379	329	505	_
2.4 0.7083 83 947 336 520 429 394 24 24 24 444 424 424 424 424 424 424	30			500/-	20	525	326	464	405	361	534	
2.8 0.7080 82 843 350 554 4444 424 2.4 0.4070 82 704 569 611 445 434 2.1 0.2070 81 547 401 636 433 421			/"/	-083	83	444	330	025	624	205	17	
2,4 0,4 -,070 82 704 569 611 445 424 2,2 0,2 -,070 81 547 401 636 433 421	4		7.0	-,080	28	843	- ONE	755	mil	12.6	100	1
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	707			2/2/	à	547	104	636	433	421	354	
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10 20 30 30 40 50 50 60 70 80 80 90 AVG	90											$\frac{1}{1}$
10 20 30 40 50 60 70 80 90	8											
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50 50 60 70 80 80 8V AVG	3 6						•					
40 50 60 70 80 80 90 4VG	8			·								
50 60 70 80 90 90 4VG	40											
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70 80 90 AVG	9											
80 90 AVG	70											
90 AVG	80											
AVG	90											-
	AVG								-			,

# FUEL DATA

Model: Monaco 2008  Project #: 338-F-68-3	
Project #: 338-F-68-3 Tracking #: 1161  Date: 12 12-07 Test Crew: H. Morgan Run #: 3  OMNI Equipment ID #:	
Date: 12-12-07 Test Crew: H. Morgan Run #: 3  OMNI Equipment ID #:	
OMNI Equipment ID #:	
PUTEL LOAD DOUBLE DE DE LA AA ALANA DA	
FUEL LUAD PREPARED BY: K. IVIOTOGA CLAUVE PARE	
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 12.6  Cal Value (2) = 22% Actual Reading 22.0	
Cal Value (2) = 22% Actual Reading ZZ.0	
Piece Length /9,3 Readings Type	
1 8 ft 12 18,8 18,9 19.1 2x4	
2ft	
Length of cut pieces: 809.5 inches Pre-Burn Fuel Average Moisture: 19.10 %	/
· · · · · · · · · · · · · · · · · · ·	
Time (clock): 17:40 Room Temperature (F): 75 Initials:	
TEST FUEL	
FUEL TYPE AND AMOUNT: 2 X4 Z 4X4 Z	-
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT: 3.2 (2 x	4)
TEST FUEL.  FUEL TYPE AND AMOUNT: 2 x4	4)
POBLITICE DENGTH: 10ta	
MOISTURE CONTENT (METER DRY BASIS)	
	.
PIECE READINGS TYPE	i
1 20.4 18.8 19.3 7.44	
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	
3 21.1 21.7 22.4 4x4	
4 19.4 22.4 19.4 414	
5	
6	
•	
8	
8 9 10	
8 9 10	
OVERALL TEST FUEL LOAD MOISTURE A VERAGE:	
10	
OVERALL TEST FUEL LOAD MOISTURE AVERAGE: _zo.72%	
OVERALL TEST FUEL LOAD MOISTURE A VERAGE: <u>20.72</u> %	

•	K	un Note	S			
Client: SBI						
Model: Monaco 2008						
Project #: 338-F-68-3	•					,
Tracking #: <u>1161</u>	D (					
Run #:	Date:	12-12-0	<u>/</u>		•	
Test Crew: K. Morgan  OMNI Equipment ID #(s):						
				·		
DESCRIBE OR SKETCH AIR OR (SETTINGS MUST BE ACCURAT	THERMOM			OW:		
PRIMARY:			SEC	ONDARY	: TANDOM -	with-
.,	,188 "					
INDEXED WITH	172 K		TER	TIARY:	NONE	,
INDEXED WITH DIAMETER DRILL	WITI		. —, (		1.3 14 . 3 . 7	
			FAN		ON-HIGH	
			· I AIN	•	UNO TITAL	7
					· · · · · · · · · · · · · · · · · · ·	
PRE	BURN SET	TINGS AN	D ACTI\	<u> VITIES</u>		
AIR (THERMO) CH	ANGES	FAN	ADD	ADD	RAKE	0014
PRIMARY/SECONDARY		SETTING CHANGE	FUEL + WT.	FUEL   - WT	COAL	COM
& Test setting		OT DATE		7,77		
37				-	_	Adju
60					_ X -	leve
	•				. *	
		<u>TEST</u>				
TEST FUEL CONFIGURATION S	KETCH			_	LUP PROCEE	URES
(INDICATE VIEW ANGLE)			PASS:	NG Load	led 64 35	5 sec
		DO			2 70R 3,0	
	÷	PRI	MARY AI	R: Ful	apen for s	
FRONT -	<b>&gt;</b>			Abrup	e at 5.0 u	
	•	OT	1ER:	Noble	7 60. 3,0 0.	
DESCRIBE OR SKETCH TEST SI	ETTINGS BE	I OM·			•	
			_		and the second of the	510
(SETTINGS MUST BE ACCURATE AND F			SEC	ONDARY:	TANDOM W	1th P
(SETTINGS MUST BE ACCURATE AND F PRIMARY:						-
			TERT	ΠARY:	NONE	
PRIMARY:	E		TER	ΠARY:	NONE	
	E			ΓIARY:		
PRIMARY:	E		TERT	ΓIARY:	NONE ON - High	

Control No. P-SFAK-0006 (Run Notes).doc, Effective date: 05/08/2007

	OMNI- Beaverton	Test Labora	toriều, Pic.					
- 11-		, 5	Suppl	emental	Data EP	4 5G/5H		
	Client:	<u>SBI</u>	·.		•			
	Model:	Monaco 20	<u>08</u>			•		
	Project	#: <u>338-F-68</u>	3-3	Tracking	#: <u>1161</u>			
	Date: _	12-12-07			Run #:	3 Boot	h:	
	Test Cr	ew: K. Morg	mal	Start Tir	Run #: ne: <u>/9:43</u>	Stop Time:	22:33	
		/ Equipment #6						
	Caa An	object Tuele	I I. Ol. 1					
		alyzer Train Stack:	reak Check			1 / 1		•
				DII	ution Tunnel	•	3 Only):	
		Initial:	$-\sqrt{A}$	Ad-Adayyd	Ir _	nitial:	<u></u>	
	0.111 (	Finai:		<del>.</del>	F /	inal:/'/	CO <sub>2</sub> (DT): _	$J^{-1}$
	Calibrat	ions: Span (	Gas CO <sub>2</sub> :	: <u>N/A</u> C	) <sub>2</sub> : <u>N/A</u>	CO: <u><i>N/A</i></u>	_CO <sub>2</sub> (DT): _	N/A
		N <sub>2</sub> Span	N₂ Span	N <sub>2</sub> Span	N₂ Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N₂ Spar
	Time			·				
	O <sub>2</sub> -	·		,	/1			
	CO <sub>2</sub>	·		N//	4			
	СО			/-				
	CO <sub>2</sub> (DT)							
	Stack D	iameter (incl	nes):	6.0				
		•	,		Final:	< 50		
					Post Te			
		Draft:	•		moke Captu			
				*	Po		3.1 " IN . C.	
							Initials: //	7
			Liver in the second					
			Init	ial	Mid	dle	End	ing
	Pb (in	ı/Hg)	St,	16 30.14 CT	8+1	C 30,22 CF	79	IC 30.26 C
	Room Te	emp (°F)	81		81		79	
	Technici	an signature	. 1/	1 Mars	-	) oto	Im 47	4
,	t ecittiio	an əlgilatüle	16	7. privign	<u> </u>	Date:/2	-12-01	······································

Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada GIN 4R9

Run 4

# Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI

Model: Monaco 2008 Project No.: 338-F-68-3

Tracking No.: 1161 Run: 4

Test Date: 12/13/07

Burn Rate	1.19	kg/hr dry
Average Tunnel Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd	13.0	degrees Fahrenheit feet/second dscf/hour
Average Delta p Average Delta H Total Time of Test	0.00	inches H20 inches H20 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	20.96 cubic feet	19.70 cubic feet	22.23 cubic feet
Average Gas Meter Temperature	79 degrees Fahrenheit	79 degrees Fahrenheit	80 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	20.3 dscf	19.1 dscf	21.4 dscf
Total Particulates - mn		4 mg	4.4 mg
Particulate Concentration (dry-standard)	0.00021 grams/dscf	0.00021 grams/dscf	0.00021 grams/dscf
Particulate Emission Rate	1.69 grams/hour	1.71 grams/hour	1.67 grams/hour
Adjusted Emissions	2.82 grams/hour	2.84 grams/hour	2.79 grams/hour
Difference from Average		0.03 grams/hour	0.03 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 Acceptab	le

Page 1 of 1

Manufacturer: SBI Model: Monaco 2008

Run:

| Model | Monaco 2008 | Tracking | Monaco 2008 | Tracking | Project No. 3 | 164 | Project No. 3 | 165 | Projec

# Wood Heater Test Data - EPA Method 5G

	Pt.8	0.050	
		0.0	110
	Pt.7	0.048	110
	Pt.6	0.050	112
se Data	51d -	0.048	114
ty Travers	Pt.4	0.045	114
Velocit	Pt.3	0.048	116
	Pt.2	0.048	118
	Pt.1	0.043	120
		Initial dP	Initial Temp.
			_

OMNI Equipment Numbers:

il il

| 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 | 13.1 |

PM Control Module: SB1046,47

Dilution Turnel MW(dxy): 29.00 lb/fb-mole
Dilution Turnel MW(vev): 28.56 lb/lb-mole
Dilution Turnel H2O: 4.00 percent
Dilution Turnel Static: -0.115 "P2O

Pitor Turne Cp: 0.58

Meter Box Y Factor: 0.575 (1)

Meter Box Y Factor: 0.575 (1)

Barometric Pressure: 36.29 30.31 30

Signature/Date. | H. f. f. flug. 1.21-28
Tunnel Velocity: 12.97 12.4

_	,	-			_	·	·	·			,		_	.,			, .					
Stack	Draft In. H2O	-0.075	-0.080	-0.085	-0.085	-0.085	-0.083	-0.075	-0.078	-0.075	-0.070	-0.070	-0.073	0.070	-0.065	-0.063	-0.060	-0.060	-0.060	-0.055	-0.055	-0.071
	Ambient	08	79	08	18	08	82	82	82	82	82	82	82	83	22	18	81	188	81	18	18	
	Impinger exit (2)	-	T										T					-	-			#DIV/0
	Impinger Imexit (1) ex						-								-						-	#DIV/0I #E
	Filter fr (2)	18	85	98	85	84	84	84	83	82	82	81	82	2	83	83	83	84	83	84	84	83.10 #1
	Filter 1	18	84	84	81	80	08	79	78	78	78	78	78	74	77	81	82	83	83	83	83	80.25 8.
ata, oF	Stack	323	462	200	522	535	509	468	439	414	401	402	406	372	349	332	322	315	302	301	293	8
 perature D	Average Surface	455.4	505.0	524.0	538.8	547.4	550.0	525.8	516.6	507.0	498.4	499.2	505.4	485.0	469.4	454.8	445.2	439.0	432.4	425.4	414.2	14
Wood Heater Temperature Data, oF	Catalyst Exit										-					-						
Wood He	Firebox C Right	394	390	387	393	404	422	434	433	432	429	428	432	433	421	406	395	384	374	366	356	
	Firebox Fi	415	407	400	410	423	435	435	433	432	429	431	430	424	H	407	399	392	386		371	
٠.	Firebox Fii	563	552 4	525	531	204	602	919	624	626	624 4	620 4	612 4	611 4		598	588 3	581	572 3	559 3	540 3	
	Firebox Fir	374	388	381	371 5	361 5	359 6	356 6	354 6	354 6	352 6	349 6	346 6	346 6	H	347 5	348 5	350 5	354 5	357 5	357 5	
	Firebox Fir	531	788	927 3	686	985 3	932 3	788 3	739 3	691 3	658 3	668 3	3 3		555 3	516 3	496	488 3	476 3.	465 3	447 3.	
t, lb	Weight Fire		-1.5	-1.2	-1.3	1.1	6.0	-0.6	-0.5	-0.4	-0.4	-0.4	-0.5	-0.2 611	-0.2 5	-0.2	-0.2 49	-0.2 48	-0.1	-0.1	-0.1 44	
Fuel Weight,	Scale W.	10.1	9.8	7.4	6.1	5.0	4.1	3.5	3.0 -(	2.6	2.2	1.8	13	1	6.0	)- (0	0.5(	0.3	0.2	0.1	0.0	
F	Pro. Rate (10%) Re (2)		104	102	901	104	103	103	101	103	101	901	2.6	100	66	66	66	) 66	66	66	86	100.74
	Pro. Rate Pro. (10%)		101	101	105	104	104	104	101	104	102	100	- 26	100	86	66	86	66	8	98	100	100.72
	Dilution I Tunnel dP	0.048	0.048	0.048	0.045	0.048	0.048	0.048	0.050	0.048	0.048	0.050	0.053	0.050	0.050	0.050	0.050	0.050	0.048	0.050	0.050	0.049
	Dilution Tunnel Temp.	114	130	135	137	139	134	127	121	118	115	115	115	Ξ	107	105	104	103	102	101	001	116.66
	Meter Vac. In. Hg. (2)	0	0	0	0	. 0	0.	.0	0	0	0	0	0	0	0	0	0	0	0	0	0	
ita	Meter Vac. In. Hg. (1)	0	0	0	0	0	. 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
pling D	Meter oF (2)	61	79	79	79	79	79	- 62	. 62	79	08	80	80	.08	80	08	- 08	08	80	08	80	79.55
Particulate Sampling Data	Meter oF	77	78	78	78	78	78	78	78	78	62	79	79	79	79	61	- 62	79	62	. 62	- 62	78.50
Particu	Orifice dH (2)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	00.0	0.00	00:00
	Orifice dH (1)	00.0	00:0	00.0	0.00	00.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	Sample Rate, cfm (2)		0.12	0.11	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
	Sample Rate, cfm (1)		0.10	0.10	01.0	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.11	0.10
	Gas Meter Cubic Feet (2)	736.984	738.165	739.312	740.475	741.650	742.815	743.990	745.165	746.340	747.500	748.675	749.845	751.025	752.195	753.370	754.540	755.715	756.870	758.045	759.210	22.226
	Gas Meter Cubic Feet (1)	725.130	726.150	727.155	728.175	729.215	730.260	731.305	732,350	733.400	734,440	735.485	736.530	737.575	738.605	739.650	740.685	741.730	742.760	743.770	744.831	19.701
J	Elapsed C Time C	0	10	. 20	30	┪	20	09	20	. 08	06	. 001	110	120	130	140	150	160	170	180	190	Avg/Total

Client Name:	SBI	Equipment Numbers	s: - '	Run#:	4
Model:	Monaco 2008	·		Train #:	Α.
Project No.:			• .	Date:	12/13/07
Tracking No.:		÷ '		- -	

Sample Component	Reagent	Filter # or		Weights	
		Probe #	Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E146	125.4	122.1	3.3
B. Rear filter catch	Filter	E144	127.0	126.8	0.2
C. Probe catch	Probe	28	114738.9	114738.4	0.5

Total Particulate, mg:	4.0

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: 1/4 1. Morga

Client Name:	SBI	Equipment Numbers:	Run #:	4
Model:	Monaco 2008		Train #:	В
Project No.:	338-F-68-3		Date:	12/13/07
Tracking No.:	1161			

Sample Component	Reagent	Filter # or		Weights	
		Probe #	Final, mg	Tare, mg	Particulate, mg
A. Front filter catch	Filter	E145	125.3	121.4	3.9
B. Rear filter catch	Filter	E143	118.3	118.3	0.0
C. Probe catch	Probe	38	114143.0	114142.5	0.5

Total Particulate,	mg:	4.4	

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: 14 Morga

al ries	Phone (503) 643-3788
DMN	Beaverton, OR

# STOVE TEMPERATURE TEST DATA - METHOD 5G

age of		7	
Pag	Tracking #: _1161	Run #:	
	Project #: _338-F-68-3		,
	Project #:	W. K. Morgen	
	/ Monaco 2008	Test Crew:	:# 
	Nient/Model: SBI / Monac	Jate: 12-13-07	MNI Equipment ID #

Data: 0= Range: 2.1-2.5 Cool Data: 0= TEMPERATURES (oF)  The Weight Draft Ambient Top Bottom Back Left Right  1.2 -1.080	Preburn [x]	<b>Z</b>			Cost Red							
Fuel Delta Stack Weight Weight Draft Ambient Top Bottom Back Left Right Flue  7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.0 7.	 				מים במים						Actual:	
Fuel Delta Stack  Weight Weight Draft Ambient Top Bottom Back Left Right Flue  7.0  7.0  7.0  7.0  7.0  7.0  7.0  7.	lest				Data:	II 0		Range:	2,1-25		Coal Bad.	Ń
Weight         Draft         Ambient         Top         Bottom         Back         Left         Right         Flue           7.0         7.085         78         72.         280         246         536           5.8         1.2        080         77         95/1         30         245         536           4.18         1.0        080         77         98/4         310         389         335         209         478           3.4         0.7        080         878         334         465         389         446           3.4         0.5        075         80         74/5         350         570         407         389         446           2.1         0.13        075         80         531         374         563         4/5         374         323           2.1         0.13        075         80         531         374         563         4/5         374         375           3.6        075         80         531         374         563         4/5         374         375           4.0        075         80         531         374         563			Delta	Stack				<b>MPERAT</b>	URES (oF		000	Mat 11son
7.0     -,085     78     92/1     280     357     280     246     536       4/8     // 0     -,083     77     95/1     30/1     363     315     273     4/8       4/8     // 0     -,080     79     95/2     320     4/3     324     4/65     389     326     4/8       3.4     0.8     80     878     334     4/65     389     346     4/8       3.4     0.5     -,075     80     53/1     374     56.3     4/8       3.1     0.3     -,075     80     53/1     374     56.3     4/7     389     349       3.1     0.3     -,075     80     53/1     374     56.3     4/7     389     349       3.1     0.3     -,075     80     53/1     374     56.3     4/7     389     349       3.1     0.3     -,075     80     53/1     374     56.3     4/7     389     349       3.1     0.3     -,075     80     53/1     374     389     34     36       3.2     3.2     3.2     3.2     3.2     3.2     3.2     3.2       3.2     3.2     3.2     3.2	Ime		Weight	Draft	Ambient	Top	Bottom	Back	Left	.I	Flue	Catalvet
5/8       1/2       -,080       77       95/1       36/3       3i.S       2783         4/8       1/0       -,080       79       984       310       389       328       309         3.8       1/0       -,080       79       955       320       43/3       36/4       339       346         3.4       0.9       -,080       878       334       465       389       368         2.1       0.0       -,075       80       53/1       374       563       4/15       394         2.1       0.0       -,075       80       53/1       374       563       4/15       394         3.4       0.0       -,075       80       53/1       374       563       4/15       394         3.4       0.0       -,075       80       53/1       374       563       4/15       394				-,085	82	921	282	337	280	24%	53%	Salah ya
4,8       1,0       -,083       78       984       310       389       335       309         3,8       1,0       -,080       79       955       320       431       364       335         2,1       0,9       -,080       80       878       334       465       389       348         2,1       0,0       -,075       80       745       350       510       407       389         2,1       0,13       -,075       80       531       374       563       4/15       394         2,1       0,13       -,075       80       531       374       563       4/15       394         3,1       5,1       5,1       5,1       4/15       374       539       4/15       374         4,0       7,1	9		1.2	080'-	11	156	B	363	315	783	486	
3.8 11.0080 79 955 320 431 364 335 2.4 0.9080 80 818 334 465 389 346 2.4 0.5075 80 745 350 510 407 389 2.1 0.13075 80 531 374 563 4/5 394	70		011	280'-	78	186	310	289	328	209	798	\ 
2.4     0.9    080     80     848     334     4465     389     348       2.4     0.5    075     80     745     350     407     389       2.1     0.13    075     80     531     374     563     415     394       3.1     0.13    075     80     531     374     563     415     394       4.1     5.2     374     563     415     394       4.1     5.2     415     394       4.1     5.2     415     394       4.1     5.2     415     394       4.1     5.2     415     394       4.1     5.2     415     394       4.1     5.2     415     394       4.1     5.2     415     394       4.1     5.2     415     394       4.1     5.2     415     394       5.1     5.2     415     394       6.1     5.2     415     394       7.1     5.2     415     394       8.2     8.2     415     394       8.2     8.2     415     394       8.2     8.2     415     394       8.2 </td <td>30</td> <td></td> <td>011</td> <td>080'-</td> <td>29</td> <td>556</td> <td>320</td> <td>13</td> <td>364</td> <td>1 2 2 2</td> <td>2005</td> <td></td>	30		011	080'-	29	556	320	13	364	1 2 2 2	2005	
2.4 0.5075 80 745 350 510 407 389 2.1 0.13075 80 531 374 563 4/5 3394  2.2 0.13075 80 531 374 563 4/5 3394	4		6.0	080'-	8	848	734	465	389	272	7077	
2.1 0,3 -,075 80 53, 374 563 4/15 394 	20		0.5	-,075	8	745	350	510	407	389	777	
	8		5,0	2.075	80	53/	374	563	4/15	394	222	
80 90 10 10 20 30 40 50 60 60 70 80 80 AVG	70											
90 00 10 20 30 30 40 50 60 60 70 80 80 80 80 80 80 80 80 80	80											
00 10 20 30 40 50 60 60 70 80 80 80 80 80 80 80 80 80 80 80 80 80	90											
10 20 30 40 50 60 60 70 80 80 80 80 80 80 80 80 80 80 80 80 80	00											1
20 30 40 50 60 60 70 80 80 80 8V AVG	10											
30 40 50 60 70 80 80 90 90 AVG	20						-					
40         50         60         70         80         90         90         AVG	30											
50         60         70         80         90         90         AVG	40											
60         70         80         90         AVG	50	4 Ta										
70 80 90 AVG	90											
80 90 AVG	70											
90 AVG	80											
AVG	8											
	AVG											

Technician signature:

12-13-07

# FUEL DATA

MINDEL BANKSON BOOK		•	•		
Model: Monaco 2008  Project #: 338 F 68 3	Tracking #: 1161	1			
Project #: 338-F-68-3	Test Craw	16 Mama		D 4.	u.
Date: <u>12-13-07</u> OMNI Equipment ID #: FUEL LOAD PREPAR	TEST CIEW			Kun #:	. <i>T</i>
FUEL LOAD PREPAR	FD RV: 16.16	love.			
FUEL: DOUGLAS-FI	IR SPECIES LINITRE	ATED AIR-DRIE	TO STANDARD	GRADE OR RET	TED
DIMENSIONAL LUMI		arrob, min-bril	b, stanbard	ORADE OR BET	ILK,
	· ·	PRE-BURN I	FUEL		
CALIBRATION:	MOISTURE Cal Value (1) = 12 Cal Value (2) = 22	E CONTENT (ME 2% Actual R 2% Actual R	TER – – DRY BA Reading Reading	ASIS)	
Piece	Lenoth	Readin	gs	Type	<u>.</u> ;4
1 2		19.1 19.9 14.2 23,5	20,3		- <i>( -</i>
3	<u>4</u> ft _ 7	22.	4 23.1		<del>-</del>
Length of cut piec	es: 8@9.75 inches	Pre-	Burn Fuel Avera	ge Moisture: Z	3.23/
Time (clock): _o	9:50 Room Temp	perature (F):	75 Initials:	16	
` '					<del>-</del>
	·			<del> </del>	
1. 11. 11.					•
		***************************************		***************************************	
		TEST FUE	L		
FUEL TYPE AND A	MOUNT: 2 ×	4 <u>Z</u>	4×4		
FUEL TYPE AND A	MOUNT: 2 ×	4 <u>Z</u>	4×4	3.2 3.2	(2 <b>x</b> 4)
FUEL TYPE AND A CALCULATED LOS FUEL PIECE LENG	AD WEIGHT:	4 <u>Z</u>	4×4		(4 × 4)
CALCULATED LOA	AD WEIGHT:	4 <u>Z</u>	4 × 4 AL LOAD WEIG	GHT: 3.2 6.9 10.1	(4 × 4)
CALCULATED LOA	TH: /3.0 ''  MOISTURE	4 Z ACTU.	4 × 4 AL LOAD WEIG	GHT: 3.2 6.9 10.1	(4 × 4)
FUEL PIECE LENG	TH: /3.0 °'  MOISTURE	4 Z ACTU.  CONTENT (MET	4 × 4 AL LOAD WEIG `ER — DRY BA	SHT: 3.2 6.9 /0./ SIS)	(4 × 4)
FUEL PIECE LENG	TH: /3.0 ''  MOISTURE	4 Z ACTU.  CONTENT (MET  READINGS	4 × 4 AL LOAD WEIG	SIS)	(4 × 4)
CALCULATED LOA  FUEL PIECE LENG  PIEC	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  26.7	ACTU.  CONTENT (MET  READINGS  21.0  20.5  21.7	4 × 4 AL LOAD WEIG ER DRY BA	SHT: 3.2 6.9 10.1 SIS) TYPE 2 x 4	(4 × 4)
CALCULATED LOA  FUEL PIECE LENG  PIEC	AD WEIGHT:  TH: /3.0 ''  MOISTURE  18.6	ACTU.  CONTENT (MET  READINGS  21.0  20.5	4 × 4 AL LOAD WEIG ER DRY BA 	SHT: 3.2 6.9 10.1 SIS) TYPE 2 x 4	(4 × 4)
CALCULATED LOA  FUEL PIECE LENG  PIEC	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  26.7	ACTU.  CONTENT (MET  READINGS  21.0  20.5  21.7	4 × 4 AL LOAD WEIG ER DRY BA	SHT: 3.2 6.9 10.1 SIS) TYPE 2 x 4	(4 × 4)
CALCULATED LOA  FUEL PIECE LENG  PIEC	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  26.7	ACTU.  CONTENT (MET  READINGS  21.0  20.5  21.7	4 × 4 AL LOAD WEIG ER DRY BA	SHT: 3.2 6.9 10.1 SIS) TYPE 2 x 4	(4 × 4)
CALCULATED LOA  FUEL PIECE LENG  PIEC	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  26.7	ACTU.  CONTENT (MET  READINGS  21.0  20.5  21.7	4 × 4 AL LOAD WEIG ER DRY BA	SHT: 3.2 6.9 10.1 SIS) TYPE 2 x 4	(4 × 4)
FUEL PIECE LENG  PIEC  1 2 3 4 5 6 7 8 9	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  26.7	ACTU.  CONTENT (MET  READINGS  21.0  20.5  21.7	4 × 4 AL LOAD WEIG ER DRY BA	SHT: 3.2 6.9 10.1 SIS) TYPE 2 x 4	(4 × 4)
FUEL PIECE LENG  PIEC  1 2 3 4 5 6 7 8	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  26.7	ACTU.  CONTENT (MET  READINGS  21.0  20.5  21.7	4 × 4 AL LOAD WEIG ER DRY BA	SHT: 3.2 6.9 10.1 SIS) TYPE 2 x 4	(4 × 4)
FUEL PIECE LENG  PIEC  1 2 3 4 5 6 7 8 9 10	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  26.7	ACTU.  CONTENT (MET  READINGS  21.0  20.5  Z1.9  Z2.5	4 × 4	SHT: 3.2 6.9 10.1  SIS)  TYPE 2×4 2×4 4×4 4×4	(4 × 4)
FUEL PIECE LENG  PIEC  1 2 3 4 5 6 7 8 9 10	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  2.17  21.4   OVERALL TEST FU	ACTU.  CONTENT (MET  READINGS  Z110  Z0.5  Z1.7  Z2.5  EL LOAD MOIST	4 × 4AL LOAD WEIGHT ALLOAD	SHT: 3.2 6.9 10.1  SIS)  TYPE 2×4 2×4 4×4 4×4	(4 × 4)
FUEL PIECE LENG  PIEC  1 2 3 4 5 6 7 8 9 10	AD WEIGHT:  TH: /3,0 ''  MOISTURE  18.6  18.1  2.17  21.4   OVERALL TEST FU	ACTU.  CONTENT (MET  READINGS  21.0  20.5  Z1.9  Z2.5	4 × 4AL LOAD WEIGHT ALLOAD	SHT: 3.2 6.9 10.1  SIS)  TYPE 2×4 2×4 4×4 4×4	(4 × 4)

	on, OR	R	un Note	S			
Clion	CDI						
	: <u>SBI</u> I: <u>Monaço 2008</u>						
	ot #: 338-F-68-3						
	ing #: <u>1161</u>	•					
	: 4	Date:	12-13-07				·
	rew: K. WORGAN	Duto.		<del></del>			
	Equipment ID #(s):				-		
DESCI	RIBE OR SKETCH AIR O NGS MUST BE ACCURA	R THERMOMS	PREBURN STAT SETTIN	GS BELO	DW:		
PRIMA		TE AND IVER	CODOCABLE			TANDOM	with t
			7	SEC	UNDARY		
	Prilled INDEX uses	r as				an Conta	lo( ·
	Drilled INDEX uses a gauge = 9/64	(.141")		TER	TIARY:	NONE	·
							1.1
				FAN		ON - H	ligh
			<u>.</u>				
	PRE	BURN SET	TINGS ANI	O ACTIN	<u>/ITIES</u>		
TIME	AIR (THERMO) CH	IANGES	FAN SETTING	ADD FUEL	ADD FUEL	RAKE	СОММЕ
	PRIMARY/SECONDAR	Y/TERTIARY	CHANGE	+ WT.	- WT.	COAL	
8	TEST setting						
60						k	Levell
W-0			i i				
40	:						1
		· · · · · · · · · · · · · · · · · · ·			* .		
	· · · · · · · · · · · · · · · · · · ·						
			TEST	<del></del>		<u> </u>	
TEST F	UEL CONFIGURATION S	SKETCH				T UP PROCE	DURES
TEST F	UEL CONFIGURATION S E VIEW ANGLE)	SKETCH	ВҮР	ASS:	N/A		
TEST F		SKETCH	ВҮР	L LOADI	N/A NG <u>Loads</u>		Se conp
TEST F		SKETCH	BYP FUE DOC	L LOADI DR:	N/A NG <u>Loads</u> AJAR R: Full	ed by 40 LINTIL 3 OPEN UNT	Scanop imin, 5 si IU 5,00
TEST F	E VIEW ANGLE)		BYP FUE DOC	L LOADI DR:	N/A NG <u>Loads</u> AJAR R: <u>Full</u> ABRU	ed by 40 lutil 3 open unt prey ADJL	Scano imin, 5 so IC 5.0 d estad to
TEST F			BYP FUE DOC PRII	L LOADI DR: MARY AII	N/A NG <u>Loads</u> AJAR R: <u>Full</u> ABRU	ed by 40 to lentil 3 open unt poly ADJU 19 AT 5.0	Scano imin, 5 so IC 5.0 d estad to
TEST F	E VIEW ANGLE)		BYP FUE DOC	L LOADI DR: MARY AII	N/A NG <u>Loads</u> AJAR R: Full ABRU SEHIN	ed by 40 to lentil 3 open unt poly ADJU 19 AT 5.0	Scano imin, 5 so IC 5.0 d estad to
TEST F	E VIEW ANGLE)  FRONT	<b>-</b>	BYP FUE DOC PRII	L LOADI DR: MARY AII	N/A NG <u>Loads</u> AJAR R: Full ABRU SEHIN	ed by 40 to lentil 3 open unt poly ADJU 19 AT 5.0	Sconp imin, 5 so IC 5.0 p estad to
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	IL LOADI DR: MARY AII IER: —	N/A NG <u>Load</u> AJAB R: Full ABRU SeHIA NON	ed by 40 to live 1 so with 1 so see when the see we will be see with 1 so see when the see with 1 so see when the see we will be seen with 1 so see we will be seen with 1 so see with 1 so see with 1 so see we will be seen with 1 so see with	Sconp min, 5 so IC 5.0 p ested to minutes
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	IL LOADI DR: MARY AII IER: —	N/A NG <u>Load</u> AJAB R: Full ABRU SeHIA NON	ed by 40 to lentil 3 open unt poly ADJU 19 AT 5.0	Sconp min, 5 so IC 5.0 p ested to minutes
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	IL LOADI DR: MARY AII IER: —	N/A NG <u>Load</u> AJAB R: Full ABRU SeHIA NON	ed by 40 to live 1 so with 1 so see when the see we will be see with 1 so see when the see with 1 so see when the see we will be seen with 1 so see we will be seen with 1 so see with 1 so see with 1 so see we will be seen with 1 so see with	Sconp min, 5 Se IL 5.0 P ested to minutes
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND LY:	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	L LOADI DR: MARY AII IER: —	N/A NG <u>Load</u> AJAB R: Full ABRU SeHIA NON	ed by 40 to live 1 so with 1 so see when the see we will be see with 1 so see when the see with 1 so see when the see we will be seen with 1 so see we will be seen with 1 so see with 1 so see with 1 so see we will be seen with 1 so see with	Sconp min, 5 so IC 5.0 p ested to minutes
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND LY:	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	L LOADI DR: MARY AII IER: —	N/A NG Loads AJAA R: Full ABRU Settin NON	La by 40 Led by 40 Led by 40 Led by 40 Led by ADSLE BY ADSLE BY AT SIO	Sconp min, 5 so IC 5.0 p ested to minutes
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	L LOADI DR: MARY AII IER: — SECC	N/A NG Loads AJAA R: Full ABRU Settin NON	LA by 40 POLY ADSIDE TANDOM I	Sconp min, 5 so IC 5.0 p ested to minutes
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND LY:	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	L LOADI DR: MARY AII IER: —	N/A NG Loads AJAA R: Full ABRU Settin NON	La by 40 Led by 40 Led by 40 Led by 40 Led by ADSLE BY ADSLE BY AT SIO	Sconp min, 5 so IC 5.0 p ested to minutes
TEST F (INDICAT	E VIEW ANGLE)  FRONT  BE OR SKETCH TEST S S MUST BE ACCURATE AND LY:	ラ ETTINGS BEL	BYP FUE DOC PRII OTH	L LOADI DR: MARY AII IER: — SECC	N/A NG Loads AJAA R: Full ABRU Settin NON	LA by 40 POLY ADSIDE TANDOM I	Sconp min, 5 Se IL 5.0 P ested to minutes

Control No. P-SFAK-0006 (Run Notes).doc, Effective date: 05/08/2007

A-37 OF 4-47

Olviivi- Beavertor	Test Labora , or	101165, 2.16.				: -	
		Supple	emental	Data EP	4 5G/5H	÷ .	
Client:	SBI						
	Monaco 20	008				·	
Project	#: <u>338-F-6</u>	<u>8-3</u>	Tracking	#: <u>1161</u>			
Date: _	12-13-07	-		Run #:	<u>4</u> Booti	า:	
Test Ci	ew: 15 Ma	myAN	Start Tir	ne: <u>12:22</u>	Stop Time:_	15:32	
				· · · · · · · · · · · · · · · · · · ·			. ~.
						•	-
•	alyzer Train	Leak Check		· + ·			
	Stack:	-		ution Tunnel	•	<i>J</i> /	
	initial:	NA		Ir F 1 <sub>2</sub> : <u>N/A</u> (	nitiai:	<del></del>	
Calibra	rijidi.	Can CO		F	Inal: <u>///</u>		
Calibra	ions. Span	Gas CO <sub>2</sub> :	<u> </u>	1 <sub>2</sub> . <u>~//*</u> (	CO: <u>N/#</u>	CO <sub>2</sub> (D1): _	N/A
	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N₂ Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Spar
Time							
O <sub>2</sub>				/			
CO <sub>2</sub>			1//	1			
СО			1077		·	-	
CO <sub>2</sub> (DT)					·		
Stack D	iameter (inc	hes):	la . 0				
				 Final:	450		
	· .			Post Tes		· ·	
			•	moke Captu			
				<u>.     </u> Ро			<del>-</del> .
			•	 es: Date:			<u></u>
		Init	ial	Mid	dle	End	ling
Pb (ir	n/Hg)	30.29	CF	30.3	1 07	30.2	5 - 67-
Room Te	emp (°F)	70	80 25	82	2	8	
Technic	an signature	e: 1/1	Mora_		)ata:	2-13-07	
1 0 0 1 11 11 0					<i>30</i> 110: 7		

# Run 5

# Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI

Model: Monaco 2008 Project No.: 338-F-68-3

Tracking No.: 1161

Run: 5

Test Date: 12/13/07

Burn Rate	2.52 kg/hr dry
Average Tunnel Temperature	164 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	14.5 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8375.9 dscf/hour
Average Delta p	0.056 inches H20
Average Delta H	0.00 inches H20
Total Time of Test	100 minutes

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2					
Total Sample Volume - Vm Average Gas Meter Temperature	10.91 cubic feet 79 degrees Fahrenheit	10.06 cubic feet 79 degrees Fahrenheit	11.76 cubic feet 80 degrees Fahrenheit					
Total Sample Volume (Standard Conditions) - Vmstd	10.5 dscf	9.7 dscf	11.3 dscf					
Total Particulates - mn		2.7 mg	3.6 mg					
Particulate Concentration (dry-standard)	0.00030 grams/dscf	0.00028 grams/dscf	0.00032 grams/dscf					
Particulate Emission Rate	2.50 grams/hour	2.33 grams/hour	2.67 grams/hour					
Adjusted Emissions	3.89 grams/hour	3.68 grams/hour	4.11 grams/hour					
Difference from Average		0.22 grams/hour	0.22 grams/hour					
7.5% of the average emission rate	0.29	3	J					
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 - FPA Method 5G

OMNI-Test Laboratories, Inc.

			-			٠.			0.973
		DM Control Module: SDI 046 47	Dilution Tunnel MW(dry): 29.00 1b/lb-mole	Dilution Tunnel MW(wer) 28.56 Ik/lh-mole	Dilution Trunel H2O: 4.00 persent	Dilution Trupal Station 0 155 1130	Direction Follows States, 20,105 FLZO	Fitot Tube Cp: 0.84	Meter Box Y Factor: 0.975 (1)
)d )d					H20	· ir			
Merri				Pt.8	0.058 "HZO	161			
WOOD LICATED TEST DATA - EFA METITOD SO				Pt.7	0.055	191			
- מומ				Pt.6	Initial dP   0.058   0.065   0.055   0.055   0.055   0.060   0.055	162			
LCSL			se Data	Pt.5	0.055	162			
Learen		1	Velocity Traverse Dat	Pt.4	0.053	162			
7700			Veloc	Pt.3	0.055	. 163			
•				Pt.2	0.065	163		•	
				7r.1	0.058	p. 163		t Numbers	
					Initial dP	Initial Tem		OMNI Equipment Numbers:	
					-			OWD	
					.				
								mim	mir
			0 2008		58-3	-07			
		ar. SBI	el: Monac	1911	338-1-	e: 13-Dec-07	e: 18:44	al: 10	e: 100
		Manufactur	Mod	racking No.:	Project No	lest Date:	ing Clock Time;	ecording Interva	al Sampling Time
	5	_					Beginning	Recor	Total Sa
	Run:								
	_								

ft/sec.	sulm sulm	scfm	£21	cfm(@"Hg	.001@5 cfm@"Hg	22.13	2.7	3.6	2		Stack	Draft In.	H20	0000	-0.050	-0.095	-0.095	860.0-	860.0-	-0.090	-0.085	-0.085	-0.083	-0.083	-0.080	- 0.089
14.46	1414	139.6	0.1963 ft2	0@5	.001@5	basis %):	culate (1);	culate (2):	(1)			Ambian	Allibrain	63	3	82	84	82	98	98	85	84	84	83	83	1///
elocity:	el Flow	mel Flow	Area:	heck (1):	eck (2):	Fuel Moisture (dry basis %):	Total Particulate (1)	Total Particulate (2)				Impinger	exit (2)	ľ												#DIV/0!
Tunnel Velocity:	Intial Tunnel Flow	Average Tunnel Flow	Tunnel Area:	Post-Test Leak Check (1):	Post-Test Leak Check (2):	Fuel M		"Ha	p.			~~	exit (1)		1	1	1		_			-				#DIA/0i
		¥		Post-T	Post-Te		Average	30.19			Ì		3	ā	5 8	02	98	87	87	87	98	84	83	82	82	84.64 #
-		40				0.973	End	30.15				Filter	3	ž	;	į į	83	83	84	83	82	82	18	81	18	82.27
	lb/lb-mol	28.56 lb/lb-mole	percent	_"H2O		(E)	Middle	30.19		To story	Dalla, Ur	Stack		583	3	600	80	730	723	652	591	557	541	515	487	
PM Control Module: SBI 046,47	29.00			ı	0.84	0.975 (1)	Begin	30.22		Wood Heater Temperature Date of	III per autre	Average	Surface	562.4	0000	0.600	87/79	642.2	653.2	640.6	622.2	612.2	609.4	603.0	584.0	22
ol Module;	MW(dry):	MW(wet):	nnel H20:	nel Static;	Pitot Tube Cp.	Y Factor:	Pressure:			Yester To	Tranci To	Catalyst	Exit													
PM Contr	Dilution Tunnel MW(dry)	Dilution Tunnel MW(wet):	Dilution Tunnel H2O:	Dilution Tunnel Static;	Pito	Meter Box Y Factor:	Sarometric Pressure:			Wood		Firebox	Kight	1441	466	200	400	218	546	261	556	548	548	543	538	
	Dilu	Dilu										Firebox	Lett	439	464	707	1,0	301	526	545	546	537	532	525	513	
			"H20								-	×	Баск	989	52.9	640	9 5	7#0	629	713	757	777	797	804	790	
		П	8	161 oF							-		Bottom	-462	486	469	200	704	441	438	436	433	437	432	428	
		Pt.7	0.055	161							-	×	dor	834	954	1050	0001	0601	1094	946	816	766	733	711	651	
		$\vdash$	1	162						ht. lb			Cliange		-2.4	-1.5	2,4	17	-	1	200	9.0	9.0	4	-0.1	
	Data	+	1	162						Fuel Weight, Ib	-	Scale			8.9	H	-	+	+	+	+	+	+	+	0.0	
٤	velocity I raverse Data	+	1	162							+-		(3)		20	8	2	201	3 5	/01	101	50 5	8	98	001	06.001
177.1	Velocit	Pt 3	0.055	163							Pro Pate Pro Pate	(10%)	(E)		104	103	12	707	301	\$ 8	× 8	8 1	16	88	66	100.94
		Pt.2	0000	103							Dilution	Tunnel	æ	0.057	0.055	0.055	0.057	2500	0.000	0000	80.0	0.038	0.038	0.055	0.055	950.0
		Pt.1	-1	501	Minnhone:	Y Y					Dilution	Tunnel	Temp.	162	178	183	188	100	13	671	120	101	9	141	92	163.74
			Title OF	muai remp.	OMMI Equipment Mumbers	manudimber					Aeter Vac	In. Hg.	(3)	0	0	0	0		0 0					0	0	
_			. 19	<u>.</u>	OWNI					r.	Meter   Meter   Meter Vac   Meter Vac   Dilution	In. Hg.	€	0	0	0	C		, ,					> 0		
								ļ		Particulate Sampling Data	Meter Me	oF.	6	62	08	08	08	80	8 8	3 8	8 8	000	8 8	00	08	16.61
										late Sam	Meter	oF		62	79	79	79	or or	92	2 2	2 2	2 9	2 6	2 6	-	79.00 7
	1		í							Partico		dH(1) dH(2)		_	0.00	0.00	0.00	000	000	000	000	8	8	3 6	7	0.00
					min.	min.					.:	dH (1)		33.0	0.00	0.00	0.00	000	000	000	000	000	000	000	0.00	0.00
											Sample	Rate, cfm			0.12	0.11	0.12	0.12	0.12	010	010	110	150	110	0.14	0.12
Model: Monaco 2008	171	338-F-68-3	13-Dec-07	18:44	0	100					Sample	Rate, cfm			0.10	0.10	0.10	0.10	0.10	010	0.10	0.10	2	010		0.10
Model: A	loine Ma .	Project No : 3									Gas Meter		(7)	2000.60	760.550	761.675	762.850	764,045	765,250	766.455	767.685	768 830	096 692	771 145		11.759
	T	P. P.		Beginning Clock Time:	Recording	Total Sampling Time:					Gas Meter C	Cubic Feet Cubic Feet	145,000	+	+	747.020	748.023	749.055	750.060	╁	H	╁	╁	╁	ł	10.062
				1					-			Time		+	+	20 7	30	. 40	50 7	09	70 7	80	2 06	+	┸	rvg/10tal

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

Client Name:	SBI	Equipment Numbers:	Run #:	5-
Model:	Monaco 2008	<u> </u>	Train #:	Α .
Project No.:	338-F-68-3		Date:	12/13/07
Tracking No.:	1161			

Sample Component	Reagent	Filter # or	Weights				
		Probe #	Final, mg	Tare, mg	Particulate, m		
A. Front filter catch	Filter	13	112.3	109.8	2.5		
B. Rear filter catch	Filter	14	122.8	122.7	0.1		
C. Probe catch	Probe	7	199908.5	199908.4	0.1		

Total Particulate, mg:	2.7
. , , , ,	

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:

121. Morgan

Date: 1-21-08

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

Client Name:	SBI	Equipment Numbers:	4 to 1	Run #:	5 ·
Model:	Monaco 2008	·		Train #:	В
Project No.:	338-F-68-3			Date:	12/13/07
Tracking No.:	1161			-	

Sample Component	Reagent	Filter # or	Weights			
		Probe#	Final, mg	Tare, mg	Particulate, mg	
A. Front filter catch	Filter	15	126.7	123.8	2.9	
B. Rear filter catch	Filter	16	126.7	126.3	0.4	
C. Probe catch	Probe	8	199095.0	199094.7	0.3	

	Total Particulate, mg:	3.6
Ц.		

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: 14. Morga

Date: 1-21-08

# STOVE TEMPERATURE TEST DATA - METHOD 5G

MANN. Labo lies, Escreton, OR Phone (503) 643-3788

Pageof	Tracking #: 1161	Run#: 5	
	Project #: _338-F-68-3	est Crew: K. Waryaw	
	/ Monaco 2008	Test Cr	D#:
	Client/Model: SBI / Monaco	Date: 12-13-07	OMNI Equipment ID #:

Preburn X	Z Z			Coal Bed:						A 04: 10 l.	
Test	.· . <del> </del>			Data	: -		0 0	7		היוחות היים	7.7
	- L	1		סממ	)   		Ralige.	アンソーバック		Coal Bed: 🕶	, ,
ŀ	Luei	Delta	Stack				EMPERAL	TEMPERATURES (oF)			Not Used
IIII	Weight	Weight	Draft	Ambient	Тор	Bottom	Back	Left	Right	Flue	Catatvst
Ö	12,7		090'-	81	422	197	206	235	100 100 100	435	
10	11.4	7.3	065	0%	348	249	35/	792	242	777	_
20	4.7	1.7	-,073	-83	458	293	386	294	7.6.7	420	
30	7.8	7.5	-,080	)8	707	247	417	316	286	204	
40	6.7	1.5	-,085	28	818	377	###	337	116	560	
50	5,1	116	-,090	200	950	104	187	370	45,3	2/7	-
90	3.7	1.4	060'-	83	#66	430	555	2001	400	127	
70	2.7	1.0	8,80'-	28	834	29/1	416	62 A	1/4/1	200	_
80										000	
90											_
00											
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80											
06											<b>\</b>
AVG											
\								GROSS CONTRACTOR OF THE PARTY O			

Technician signature: \_

## FUEL DATA

Model: Monaco 2008		
Project #: 338-F-68-3 Tracking	ng#: <u>1161</u>	
Date: 12-13-07 Te	est Crew: K. Morgan	Run #: 5
JMNI Equipment ID #:	M. M.	
TIPL DOLICE AS EID SPROTES	1. Morgan	
DIMENSIONAL LUMBER.	S, UNTRÉATED, AIR-DRIED, STAND	OARD GRADE OR BETTER,
M	PRE-BURN FUEL OISTURE CONTENT (METER – – DR	Y BASIS)
CALIBRATION: Cal Valu	Let $(1) = 12\%$ Actual Reading	2.0
Cal Valu	$1e(2) = 22\% \qquad Actual Reading 7$	2.0
Piece Length	Readings	<u>Type</u>
1ft	22.2 21.9 22	14 2X4
$\frac{2}{3}$ $\frac{4}{\text{ft}}$	21.4 21.2 21	214
Length of cut pieces: 809.8	inches Pre-Burn Fuel A	Average Moisture: 21.70%
Time (clock): 17:02 p.	oom Temperature (F): 75 Initi	ala.
Time (clock).	oon remperature (r): _ r min	ais: /~
	TEST FUEL	
FUEL TYPE AND AMOUNT:	TEST FUEL  2 × 4	4
CALCULATED LOAD WEIGHT	TEST FUEL  2 × 4	WEIGHT:3.8 (2 ×4)
CALCULATED LOAD WEIGHT	TEST FUEL  2 × 4	WEIGHT:3.8 (2 ×4)
FUEL TYPE AND AMOUNT: CALCULATED LOAD WEIGHT FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4)
FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (7/13 Total
FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)
FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (7/13 Total
FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2 2 3 2 3	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2 2 3 2 3	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2 2 3 2 3	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2 2 3 2 3	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2 2 3 2 3	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2 2 3 3 2 3	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
FUEL PIECE LENGTH:  MO  PIECE  1 2 2 2 3 2 3	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 ×4) (4 ×4) (4 ×4) Total  Y BASIS)  TYPE
CALCULATED LOAD WEIGHT  FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 x4)
CALCULATED LOAD WEIGHT  FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 x4) (4 x4) (4 x4) Total  Y BASIS)  TYPE  2 x 4
CALCULATED LOAD WEIGHT  FUEL PIECE LENGTH:	TEST FUEL  2 × 4	WEIGHT: 3.8 (2 x4)

	on, OR	R	un Note	S			
Clien	t: <u>SBI</u>						
Mode	l: <u>Monaco 2008</u>			· ·		4	
Proje	ct #: <u>338-F-68-3</u>						
	ing #: 1161			•			
A CONTRACTOR OF THE PARTY OF TH	‡: <u>5</u>	Date: <u>/</u> :	2-13-07		<del></del>		·
	Crew: K. Morgan	<u> </u>					
OMM	Equipment ID #(s):		· ·		,		· · · · · · · · · · · · · · · · · · ·
DESCI (SETTI	RIBE OR SKETCH AIR ( NGS MUST BE ACCUR	OR THERMOMS	PREBURN STAT SETTIN RODUCABLE	IGS BELO	OW:		
PRIMA	RY:		· .	SEC	ONDAR	Y: Fully Of	PEN
	Full OPEN			TER	TIARY:	NONE	
	1 200 9 200						
İ				FAN		ON- Hig	
				1744		020 1.19	
L							
	<u>PR</u>	REBURN SET	TINGS AN	D ACTI	<u> VITIES</u>		÷
7018.65	AIR (THERMO) C	 CHANGES	FAN	ADD	ADD	RAKE	
TIME	PRIMARY/SECONDA	RY/TERTIARY	SETTING CHANGE	FUEL + WT.	FUEL - WT.	COAL	COV
Ð	test setting		OTATOL		- 001.		
70			<u></u>		<u> </u>	× -	Le
			·		<u></u>		
· .			<u>TEST</u>			÷	
	UEL CONFIGURATION E VIEW ANGLE)	SKETCH	DVI	1400	STAR	T UP PROCEI	DURES
(INDIOA)		<del></del>		PASS: IL LOADI	NG 1.60	g Let	
T	不		DOC		ASan		
$\times$			PRII	MARY All	R: <u>→ Nº</u>	ADJUSTMU	ur
<u> </u>		· · · · · · · · · · · · · · · · · · ·					
	FRONT-	7	-ITO.	IER:	— <u> Non</u>	E	
				-		<del></del>	· · · · · · · · · · · · · · · · · · ·
DESCRI	BE OR SKETCH TEST	SETTINGS BEL	.OW:				
PRIMAR	S MUST BE ACCURATE AND Y:	) REPRODUCIBLE)		SECO	NDARY	Fully O	DEN .
r							CHI
1 '				TEDT	TA DVA TO	1/14	
	SAME AS ABOVE			IEKI	IARY:	NONE	
	LAME HS ITBOVE						
	3AME 43 17800E					/	_
	3AME H3 11800E			FAN.	:	ON-Hia	rt

* .		Supple	emental l	Jata EPA	1 5G/5H		* *
Client:	<u>SBI</u>						
Model:	Monaco 20	<u>08</u> .					
Project	#: <u>338-F-68</u>	<u>1-3</u>	Tracking a	#: <u>1161</u>			
Date: _	12-13-07		-		5 Booth	າ:	<u>.                                    </u>
Test Cr	ew: K. Mon	PAN	Start Tim	ne: <u>/8:44</u>	Stop Time:_	20:24	
OMNI E	=quipment #(	s):					
					<i>v</i> .		
	alyzer Train	Leak Check					•
	Stack:				(Method 5G		
	Initial:			In	itial:		
	Initial: Final: tions: Span (	NA		F)	inal: <u>////</u>		/.
Calibrat	tions: Span (	Gas CO <sub>2</sub> :	<i>N/A</i> O;	$_{2}$ : $_{N/A}$ (	CO: <u>N/A</u>	CO <sub>2</sub> (DT): _	N/A
	N <sub>2</sub> Span	N₂ Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N <sub>2</sub> Span	N. Sn
Time	112 Opan	142 Opan	142 Opan	142 Opan	N <sub>2</sub> Span	N <sub>2</sub> Opan	N <sub>2</sub> Sp
O <sub>2</sub>			,				
CO <sub>2</sub>			1//				
CO							
CO <sub>2</sub> (DT)							
002 (D1)							
	iameter (incl	nes):	6,0	<u>.</u>		٠.	
Stack D	city (ft/min):	Initial:	< 50	Final:	150	<u> </u>	
	• ,			Deat Ta	a.f		
Air Velo	udit (lbs):	Pretest: _	10.0	Post re	St. <u>10.0</u>		
Air Velo		_				0	<del></del>
Air Velo Scale A Induced	udit (lbs):	7	_ %S	moke Captu	ire: 100		<del>-</del>
Air Velo Scale A Induced Pitot Tu	udit (lbs): I Draft: <i>-&amp;</i>	t: Pre: <u></u>	%S	moke Captu	ost: <u>Ø @</u>	3.2" W.L.	- - <u>//</u>
Air Velo Scale A Induced Pitot Tu	udit (lbs): I Draft: <del>/</del> be Leak Tes	t: Pre: <u>Ø</u> Prior to First	%S <i>- ⊘ 3₁1 ′W</i> Test in Serie	moke Captu <u>C.</u> Po es: Date:	ost: <u>Ø</u> @	3.2" W.L.	- - <u>L</u>
Air Velo Scale A Induced Pitot Tu Flue Pip	udit (lbs): I Draft:e be Leak Tes be Cleaned F	t: Pre: <u>Ø</u> Prior to First	%S	moke Captu	ost: <u>Ø</u> @	<b>3.2″₩.८</b> Initials: <u>/</u>	- // ding
Air Velo Scale A Induced Pitot Tu Flue Pip	udit (lbs): I Draft: <del>/</del> be Leak Tes	t: Pre: Prior to First Init	%S <i>- ⊘ 3₁1 ′W</i> Test in Serie	moke Captu <u>.c.</u> Po es: Date: Mid	re: 100 ost: 60 12-10-07 Idle	<b>3.2″₩.८</b> Initials: <u>/</u>	

# **Section 5**

**Sampling Procedures and Test Results** 

### INTRODUCTION

Stove Builder International retained *OMNI* to perform U.S. Environmental Protection Agency (EPA) certification testing on the Monaco 2008 wood stove. The Monaco 2008 wood fireplace insert is a non-catalytic, radiant-type room heater. The firebox is constructed of mild steel. The usable firebox volume was measured to be 1.5 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 Stove Builder International facilities in Québec, Canada. The unit was logged in on December 7, 2007, then assigned and labeled with *OMNI* ID #1161. *OMNI* representative Ken Morgan conducted the certification testing and completed all testing by December 13, 2007. The EPA was notified of the testing dates in a letter dated November 21, 2007. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Claude Paré of Stove Builder International and is on file at *OMNI*'s testing facility.

The Monaco 2008 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 4.4 grams per hour. An extra run (Run #5) was performed to throw out an outlyer. 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 Monaco 2008 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	<b>Burn Rate</b> (kg/hr dry)	Method 5G Emissions (g/hr)
1	0.95	6.64
3	1.37	3.08
4	1.19	2.82
5	2.52	3.89
Weighted particulate en	nission average of four test runs:	4.4 grams per hour.

Table 1.2 - Test Facility Conditions

	Room Temperature (°F)		Barometric (He		Air Velocity (ft/min)		
Run	Before	After	Before	After	Before	After	
1	78	79	30.17	30.10	<50	<50	
3 .	81	79	30.14	30.26	<50	<50	
4	80	81	30.29	30.25	<50	<50	
5	83	83	30.22	30.15	<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	5.5	19.7	2.2
3	7.0	19.1	2.2
4	7.0	23.2	2.1
5	12.7	21.7	2.7

Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft³)	Fuel Loading Density Wet Basis (lbs/ft³)	Fuel Moisture Content Dry (%)	Piece Length (in)	2x4s Used	4x4s Used
1	9.8	1.5	6.53	21.7	13	2	2
3	10.3	1.5	6.87	20.7	13	2	2
4	10.1	1.5	6.73	21.4	13	2	2
5	11.3	1.5	7.53	22.1	13	2	2

Table 1.4 - Dilution Tunnel Gas Measurements and Sampling Data Summary

	Average Dilution Tunnel Gas Measureme			
Run	Length of Test (min)	<b>Velocity</b> (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	230	13.31	141.8	104.0
3	170	13.36	139.4	117.4
4	190	12.97	135.9	116.7
5	100	14.46	1,39.6	163.7

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temperature Average <sup>a</sup>	Ending Surface Temperature Average <sup>a</sup>	Surface Delta T <sup>b</sup>		
1	430.6	383.0	48		
3	487.6	451.4	36		
4	455.4	414.2	41		
5	562.4	584.0	22		
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	5.5 lbs at start; no addition; coal bed 2.2 lbs	0.0	60
3	Indexed with 0.188" Drill Bit	7.0 lbs at start; no addition; coal bed 2.2 lbs	0.0	60
4	Indexed with 0.141" Drill Bit	7.0 lbs at start; no addition; coal bed 2.1 lbs	0.0	60
5	Fully Open	12.7 lbs at start; no addition; coal bed 2.7 lbs	0.0	70

Table 1.7 - Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (H₂O)	Primary Air Setting (in)	Run Time (min)	Average Draft (H₂O)
1	0.95	0	Fully Closed	230	-0.063
3	1.37	0	Indexed with 0.188" Drill Bit	170	-0.073
4	1.19	0	Indexed with 0.141" Drill Bit	190	-0.071
5	2.52	0	Fully Open	100	-0.089

## Table 1.8 - Test Configurations

120 miles & 100 miles		
Run	Five-Minute Startup	Combustion Air
1	Bypass: N/A. Fuel Loading: Loaded by 45 seconds. Door: Ajar for 4 minutes, 40 seconds. Primary Air: Fully open for 5.0 minutes, then abruptly closed to test setting. Other: None. Secondary: Fully closed. Tertiary: N/A. Fan: On high.	Fully Closed
3	Bypass: N/A. Fuel Loading: Loaded by 35 seconds. Door: Ajar for 3.0 minutes. Primary Air: Fully open for 5.0 minutes, then abruptly adjusted to test setting. Other: None. Secondary: Tandem with primary. Tertiary: None. Fan: On high.	Indexed with 0.188" Drill Bit
4	Bypass: N/A.  Fuel Loading: Loaded by 40 seconds.  Door: Ajar for 3 minutes, 5 seconds.  Primary Air: Fully open for 5.0 minutes, then abruptly adjusted to test setting.  Other: None.  Secondary: Tandem with primary.  Tertiary: None.  Fan: On high.	Indexed with 0.141" Drill Bit
5	Bypass: N/A. Fuel Loading: Loaded. Door: Ajar for 3.0 minutes. Primary Air: No adjustment. Other: None. Secondary: Fully open. Tertiary: None. Fan: On high.	Fully Open

Model: Monaço 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada  $\overline{G}1N4R9$ TEST RESULTS AND DISCUSSION A total of five test runs were performed on the Monaco 2008 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 4.4 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.