

TEST REPORT

SCOPE: EMISSIONS AND OUTPUT

FUEL: EPA TEST FUEL (CRIBS)

TEST STANDARD: EPA

MODEL: SOLUTION 2.5 ZC WOOD FIREPLACE

Notice to reader: Our Solution 2.5 ZC 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 Office Box 743 Street: 5465 SW Western Avenue • Suite G Beaverton, Oregon 97075 USA

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(503) 643-3788 (503) 643-3799

Certification Test Report

Stove Builder International Wood Fireplace Insert Model: Monaco 2008

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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.

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AUTHORIZED SIGNATORIES

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

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

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

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

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Section 1

Fuel Photographs/Appliance Description/Drawings

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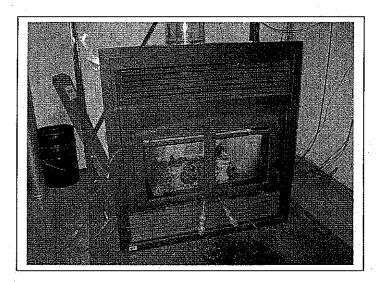
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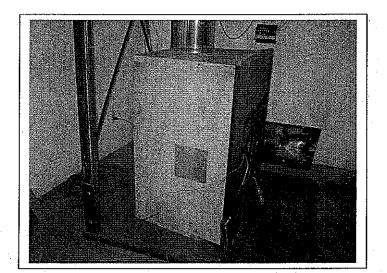
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Stove Builder International Monaco 2008 Test Dates: December 11, 2007 through December 13, 2007





OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \\Omnisrv\users\Testing\SBI - Stave Builder International\338-S-68-3 Monaco 2008\338-F-68-3 1-2 of 1-153

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Quality Assurance/Quality Control

OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \\Onnisrv\users\Testing\SBI - Stove Builder International\338-S-68-3 Monaco 2008\338-F-68-3 2-1 of 2-65

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.

OMNP'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 *OMNP*'s accreditation. Accreditation certificates are available upon request.

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Sample Analysis Analysis Worksheets

Analysis Worksheets Tared Filter and Beaker Data Solvent Blank Data

OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \\Omnisrvhusers\Testing\SBI - Stove Builder International\338-S-68-3 Monaca 2008\338-F-68-3 2-3 of 2-65

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Dilution Tunnel (Method 5G) Analysis Worksheet

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

			W	eighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1151	.5001	20	77	12
Lab ID # ID # (12-19-07	09:30	.1/51	,5001	17	66	1K -
Tare wt. <u>./04/6</u>							
D/T in desiccator <u>12-17-07</u> 08:00		-			-		
Preliminary wt.: .// <i>5</i> 2						- -	
Rear Filter	12-18-07	16:30	.1187	. 5001	20	77	IL ;
Lab ID # ID #	12-19-07	09:30	.1186	.5001	17	66	14 -
Tare wt <i>.1178</i>		-				•	
D/T in desiccator: 12-11-07 08:00							
Preliminary wt.: 							
Probe	12-18-07	16:30	171.8694	,5001	20	77	14
Probe # Tare wt /71.8688 Cleaned by:	12-19-07	09:30	171,8693	5001	17	66	14 -
D/T in desiccator: 12-17-07 08:00							
Preliminary wt.: /7/, 87//		· · · · · ·					
					· · ·		
<i>'</i>							

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___ Date: ___

12-19-07

Control No. L-SFZ-0004 (Dual Train - Dilution Tunnel Method 5G Analysis Worksheet). doc, Effective date: 04/04/2007 Page 1 of 1 2 - 4 0 F 2 - 6 5

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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: <u>SBI</u> Model: <u>Monaco 2008</u>							
Project #: 338-E-68-3 T	racking #: <u>-</u>	1161 Sast Crown	16 Marca	. 1	- "		· .
Date: <u>12-11-07</u> Sample Train #: <u>B</u>	I	est Crew. Tra	in accomble	d by: <u>K. <i>Mo</i>r</u>	Run #:	1	
Sample Train #: <u>B</u> Balance ID #: <u>OMNI -</u>	00023	11d Th	assembled	1 UY. <u>K. <i>[VI O</i>/</u> potor ID #: OK	gan		 -
Audit weight ID #: <u>OMN</u>	-00131	(Ba	alance audit n	nerei 10 #. <u>OK</u> nfr. std: 500 4	$\frac{1}{10}$ 72 mg		
J		(50		ini. sta. 500 a	. 0.72 mg/		
			V	Veighing Re	cord		·
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1321.	, 5001	20	77	14
Lab ID # ID #3	12-19-07	09:30	.1321	,5001	17	66	14 -
Tare wt. <u>1193</u>							
D/T in desiccator 12-17-07 08:00							
Preliminary wt.: ./32/							
Rear Filter	12-18-07	16:30	.1231	.5001	20	77	K
Lab ID # ID #4	12-19-07	09:30	.1232	. 5001	17	66	16 -
Tare wt	-					· ·	
D/T in desiccator:							
Preliminary wt.:							
Probe	12-18-07	16:30	187.7418	.5001	20	77	14
Probe # <u>z.</u> Tare wt. <u>187.7420</u> Cleaned by:	12-19-07	09:30	187.7416	,5001	17	66	14
D/T in desiccator: <u>12.17-07</u> 08:00 Preliminary wt.:							· ·
187.7432		· . ·	· · ·				···

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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: <u>SBI</u>				
Model: Monaco 2008				
Project #: 338-F-68-3 Tracking #: 1161		· · ·		
Date: 12-12-07 Test (Crew: K. MorgAN	Run #:	Z	
Sample Train #: A	_ Train assembled by: _	K. MorgAN		
Balance ID #: <u>OMNI - 00023</u>	_ Thermo/Hygro meter I	D #: <u>OMNI</u>		
Audit weight ID #: <u>OMNI – 00131</u>	 (Balance audit mfr. sto 	1: 500 ± 0.72 mg)		

.

			M	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 # <u>5</u>	12-19-07	09:30	,1191	,5001	17	66	16 -
Tare wt. <u>./042</u>					с ^т		
D/T in desiccator						<u> </u>	
Preliminary wt.: .//93						-	
Rear Filter	12-18-07	16:30	.1242	. 5001	20	77	1L
Lab ID # ID #6	12-19-07	09:50	,1241	. 5001	17	66	14 -
Tare wt 72 32						а. - к	-
D/T in desiccator: 12-17-07 08:00						-	
Preliminary wt.:							
Probe	12-18-07	16:30	188.0818	,5001	26	77	12
Probe # Tare wt <u>/ 8 8.08/5</u> Cleaned by:	12-19-07	09:30	188,0815	, 5001	17	66	/L -
D/T in desiccator: 12-17-07 08;00 Preliminary wt.:							
<u>188,0834</u>							
		· · · ·					

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Date: 12-19-07

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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: <u>SBI</u> Model: <u>Monaco 2008</u>						• •••	
Project #: 338-F-68-3 Tr	racking #: 1	161					
Date: 12-12-07	T	est Crew:	K. Mory	en .	Run, #:	2	
Sample Train #: <u>B</u> Balance ID #: OMNI -			in assembled				· · · · · ·
Audit weight ID #: <u>OMNI</u>			ermo/Hygro m lance audit m				
· · · · · · · · · · · · · · · · · · ·			anoo adarem	11. ota. 000 1	0.72 mg)		
			M	/eighing Red	cord		# * · · ·
Train Part		1			1		1 .
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	,1388	,5001	20	77	12
Lab ID # ID #7	12-19-07	09:30	,1387	,5001	17	66	16 -
Tare wt							
D/T in desiccator							
12-17-07 08:00							
Preliminary wt.: ,/385							
Rear Filter				<u>.</u>	_ <u></u>		
	12-18-07	16:30	,1272	,5001	20	77	K
Lab ID #	12-19-07	09:30	.1272	, 5001	17.	66	11 -
ID#		01.70	11212	, 5007.			16 -
Tare wt							
D/T in desiccator:			· ·	<u></u>	-		
12-17-07 08:00			ł				
					•		
Preliminary wt.:						4. A	
./272							
Probe	12-18-07	16:30	197,3886	,5001	-	7-1	1/2
Lab ID #	12-10-07	16.30	111,3086	,5001	20	77	12
Probe # 5			(
Tare wt. 197, 3876	12-19-07	09:30	197,3884	,5001	17	66	K -
Cleaned by:							
D/T in desiccator:							
12-17-07 08:00							
Preliminary wt.:							
197.3904		an a					
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2.

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: <u>SBI</u>				
Model: <u>Monaco 2008</u>	· · ·			
Project #: <u>338-F-68-3</u> Tracking #: <u>1161</u>	1 . 44			
Date: /2-/2-07 Test C	rew: K. Morgan	_ Run #:	3	
Sample Train #:A	Train assembled by: K. Mon	rAN		· · ·
Balance ID #: <u>OMNI - 00023</u>	Thermo/Hygro meter ID #: OM	NI -		· •
Audit weight ID #: OMNI – 00131	(Balance audit mfr. std: 500 ±	0.72 mg)		

	-		W	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 wt <i>1048</i>	12-19-07	09:30	.1082	,5001	17	66	16-
D/T in desiccator <u>12-17-07</u> 08;00							
Preliminary wt.: . <i></i>							
Rear Filter	12-18-07	16:30	.1179	. 5001	20	77	1L
Lab ID # ID # Tare wt. •//75	12-19-07	09:30	,1179	,5001	7716	66	12 -
D/T in desiccator:							
Preliminary wt.: .//15							
Probe	12-18-07	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: /z-/1-07 08:00		· ·					
Preliminary wt.: /88.2578							

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Date: 12-19-07

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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: <u>SBI</u>							
Model: Monaco 2008				· · · ·		•	
Project #: 338-F-68-3 Tra	acking #: <u>1</u> 1	<u>161</u>	1 44	1			
	Τε		K. MORGA		_ Run #:		
Sample Train #: B			n assembled i				
	0023		rmo/Hygro me				
Audit weight ID #: <u>OMNI</u>	<u> 00131 </u>	(Bala	ance audit mf	r. std: 500 ±	0.72 mg)		
		· · · · · · · · · · · · · · · · · · ·	W	eighing Rec	ord		
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1246	.5001	20	77	14
Lab ID # ID #	12-19-07	09:30	.1247	,5001	. 17	66	16 -
Tare wt							
D/T in desiccator 12-17-07 08:00							
	1 1	i	, I	í		i +	·

12-17-07 08:00						, ,	
Preliminary w <u>t</u> .: _4216 1241		-		-			
Rear Filter	12-18-07	16:30	.1254	.5001	20	77	IL
Lab ID # ID # Tare wt,/2 <i>5</i> 0	12-19-07	09:30	. 12.55	.5001	17	66	K
D/T in desiccator: 12-11-01 08:00		-					· · ·
Preliminary wt.: ./z53							
Probe	12-18-07	16:30	188,1227	, 5061	20	77	16
Probe # Tare wt <i><u>/88,1228</u> Cleaned by:</i>	12-19-07	09130	188,1228	,5001	17	66	12
D/T in desiccator: <u>12-17-07</u> 08:00 Preliminary wt.:				· ·			
_188.1247							
							-

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Control No. L-SF2-0004 (Dual Train - Dilution Tunnel Method 5G Analysis Worksheet).doc, Effective date: 04/04/2007 Page 1 of 1 2 - 9 0 F 2 - 6 5

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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: <u>SBI</u> Model: <u>Monaco 2008</u>		. · ·	• •				
Project #: <u>338-F-68-3</u> Tr Date: <u>12-13-07</u>	acking #: <u>1</u> Te	<u>161</u> est Crew:	K. Morgan	1	Run #:	4	
Sample Train #: <u>A</u>		Tra	in assembled	by: <u>K. Mor</u>	9AN		
Balance ID #: <u>OMNI - (</u> Audit weight ID #: <u>OMNI</u>			ermo/Hygro me lance audit mi				
			W	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	12
Lab ID # ID # <i>E146</i>	12-19-07	09:30	.12.54	,5001	17	64	14 -
Tare wt							
D/T in desiccator 12-17-07 08:00							
Preliminary wt.: ./250							
Rear Filter	12-18-07	16;30	.1269	.5001	20	77	12
Lab ID # ID # <i>£144</i>	12-19-07	09:30	,1270	,5001	17	66	12 -
Tare wt68							
D/T in desiccator:							·
Preliminary wt.:							
Probe	12-18-07	16:30	114,7390	,5001	20	77	1/L
Probe # Tare wt <u>//4,7384</u> Cleaned by:	12-19-07	09:30	114.7389	. 5001	17	66	1L -
D/T in desiccator: /2-/7-07 08:00							
Preliminary wt.: 114.1401		· · · ·				· · · · · · · · · · · · · · · · · · ·	
					· · · · ·		

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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI							
Model: Monaco 2008		,		· ·			
Project #: <u>338-F-68-3</u> Tr					· · ·	,	
Date: <u>12-13-07</u>	Te	est Crew:	K. MorgAN	/	_ Run #:	4	
Sample Train #: <u>B</u> Balance ID #: <u>OMNI -</u>	00022		in assembled srmo/Hygro m			· · · · · · · · · · · · · · · · · · ·	
Audit weight ID #: OMN		(Ba	lance audit m			· · · · · · · · · · · · · · · · · · ·	·
	00101	(Du			y, r z mg)		· -
		· · ·		/-:			
			VV	leighing Rec	ora	·.	
Train Part			Weight	Audit	54100	Temp.	1
	Date	Time	(grams)	(grams)	R/H %	(F)	Initials
Front Filter					· · · · ·		
	12-18-07	16:30	.1253	,5001	20	77	K
Lab ID #							·
ID#_E145	12-19-07	09:30	.1253	,5001	17	66	14 +
Tare wt/2.14						·····	· · ·
D/T in desiccator							
12-17-07 08:00							
_							
Preliminary wt.:	İ				_		
.1250							
Rear Filter	12-18-07	16:30	,1183	.5001	20	77	IL.
			,1102				/~
Lab ID #	12-19-07	07:30	.1183	.5001	17	64	14 -
ID# ει43	1014 07						10.
Tare wt83							
D/T in desiccator:							
12-17-07 08:00	ļ						
12-11-01-08/00							
Preliminary wt.:			1. A.				
, 1183							1.
Probe							
· · · · · · · · · · · · · · · · · · ·	12-18-07	16:30	11.4, 14/31	.5001	20	77	1L
Lab ID #							
Probe # <u>38</u>	10.07		114.1430		ب ر		
Tare wt. <u>114,1425</u>	12-19-07	09:30	117.1730	5001	17	66	K
Cleaned by:			-			1	
D/T in desiccator:							
<u>12-17-07</u> 08:00 Preliminary wt.:							
// <i>4./444</i>		1					
// <i>1/177</i>							
					•		
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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI					
Model: Monaco 2008	· · · · ·				
Project #: <u>338-F-68-3</u> Tra	cking #: <u>1161</u>				
Date: 12-13-07	Test Crew: K. MorgAN	Run #:	5	· ·	
Sample Train #:	Train assembled by: _A	K. Morgan			
Balance ID #: OMNI - 00	0023 Thermo/Hygro meter ID	D #: <u>OMNI -</u>			
Audit weight ID #: <u>OMNI -</u>	- 00131 (Balance audit mfr. std:	: 500 ± 0.72 mg)	•		
				• .	
	Weighi	ng Record			

			٧V	eigning Reco	ora	,	
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1122	.5001	20	77	12
Lab ID # ID #/ 3 Tare wt <i>,10</i> 98	12-19-07	09:30	.1/23	,5001	17	66	12 -
D/T in desiccator							
Preliminary wt.: .// 2.2				- <u>.</u>	-		· ·
Rear Filter	12-18-07	16:30	,1228	.5001	20	.77	14
Lab ID # ID # <u>/4</u> Tare wt <u>,1227</u>	12-19-07	09:30	.1228	,5001	17	66	14 -
D/T in desiccator: 12-17-07 08;00					.		
Preliminary wt.: .1zz3					r .	4	
Probe Lab ID #	12-18-07	16:30	199,9083	.5001	20	77	1L
Probe # <u>7</u> Tare wt. <u>199,9084</u> Cleaned by:	12-19-07	09:30	199.9085	,5001	17	66	16 -
D/T in desiccator: 12 - 17 - 67 68;00 Preliminary wt.:							
(99.9107							~

Technician signature:

Date: 12-19-07

Page 1 of 1

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Control No. L-SFZ-0004 (Dual Train - Dilution Tunnel Method 5G Analysis Worksheet).doc, Effective date: 04/04/2007

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OMNI-Test Laboratories

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Dilution Tunnel (Method 5G) Analysis Worksheet

Client: <u>SBI</u> Model: <u>Monaco 2008</u> Project #: <u>338-F-68-3</u> Tr Date: <u>12-13-07</u> Sample Train #: <u>B</u> Balance ID #: <u>OMNI</u> - Audit weight ID #: <u>OMNI</u>	T	est Crew: Tra The	rmo/Hygro m	eter ID #: ON	ÍNI -	5	
			M	/eighing Rec	ord	·····	
Train Part	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	,1267	, 5001	20	77	12
Lab ID # ID # <i>15</i>	12-19-07	09:30	.1267	.5001	17	66	12
Tare wt			· · · · · · · · · · · · · · · · · · ·			<u></u>	
D/T in desiccator					· · · · · · · · · · · · · · · · · · ·		· .
Preliminary wt.: .1266					-	~	
Rear Filter	12-18-07	16:30	.1266	.5001	20	77	12
Lab ID # ID #/6	12-19-07	09:30		,5001	17	66	16 -
Tare wt <u>/263</u>							
D/T in desiccator:							
Preliminary wt.: J265							
Probe Lab ID #	12-18-07	16:30	199.0950	.5001	20	77	14
Probe # <u>16 38 8</u> Tare wt. <u>199.0947</u> Cleaned by:	12-19-07	09:30	199.0950	,5001	17	66	12-
D/T in desiccator:							
Preliminary wt.: 199.0967							

Technician signature:

Date: 12-19-07

Control No. L-SFZ-0004 (Dual Train - Dilution Tunnel Method 5G Analysis Worksheet).doc, Effective date: 04/04/2007

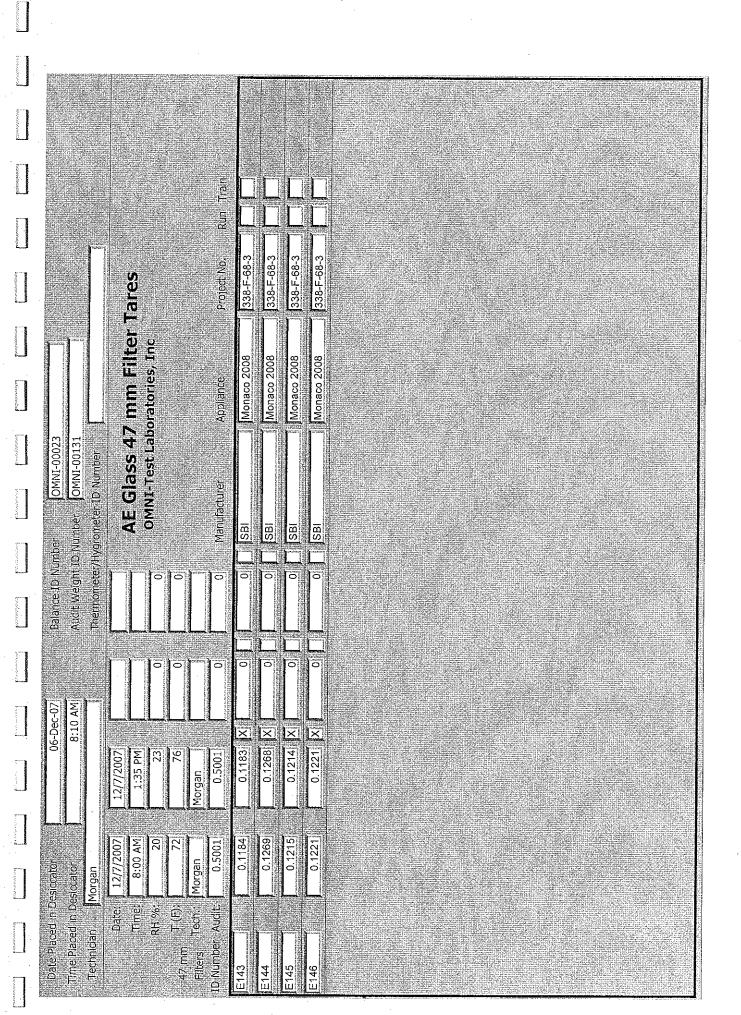
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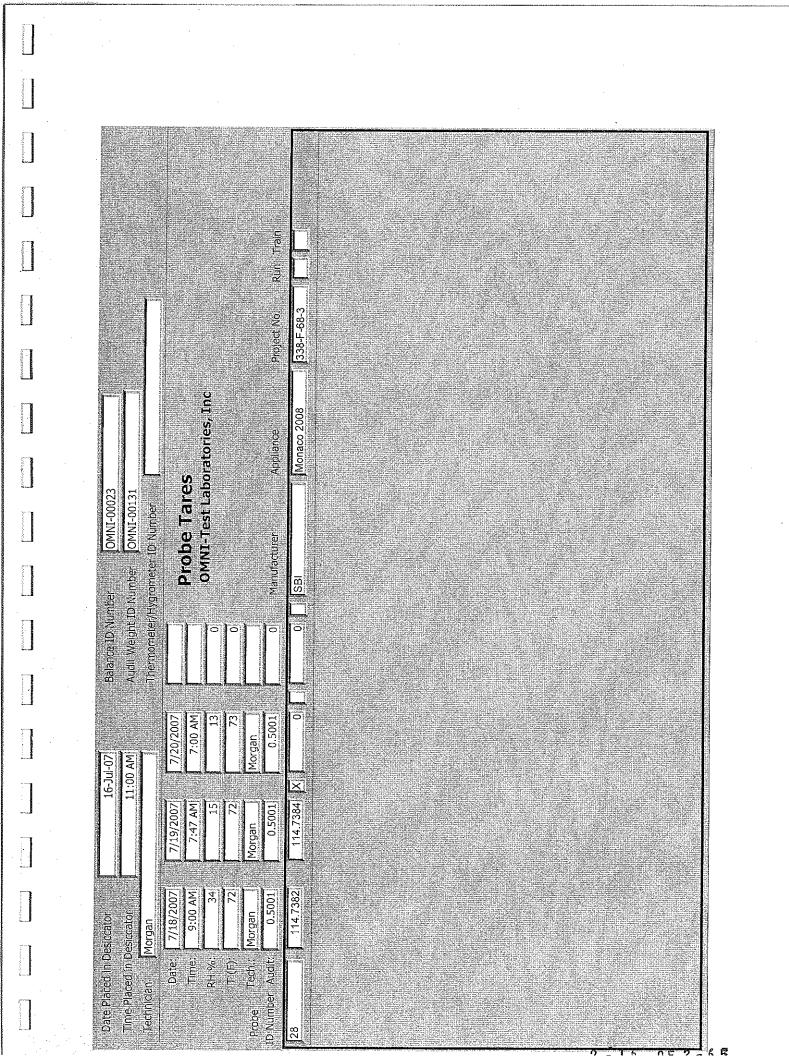
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	Date	26-11-502	1-11-28 2007-12-08	12-10-07	12-11-07			
47 mm Filters	Time	15450	10441	13:00	10:40			
- (0,1045	0.1046			-	
7		0.1180	0,1180	0,1178				
m		0.1190	0,1192	0.1193				
4		0.1224	2461,0	0.1224-				
Ω.		0.1042	0,1042	0.1042 -				
9		0.1233	0:1233	0.1232				
2		Cerlad	0.1221	0.1221				
ω		0.1263	0.1362	0.1262				
ი		01048	0,050	0,1048				
10		0.1175	0.1146	0.1175				
11		60,61,0	0.1208	0.1210				
12		4.4e1.0	64610	0.1250				
13			0.1102	0,1095	1	-		
14			0,1227	0.1227				
15			0.1243	0.1238				
16		0.1265	0,1265	011263				
17		0.1080	62010	- 18010				
18			0.1206	0.1207				
19			0.1202	0.1203				
20			01230	0,1228-	1			
Probe								
		-1	171,8559	171. 8689	171.8638 -			
2		187.7266	187.7272	8144181	187, 7420-	1		
ო		188.2405	188,2420	188.2525	188.2558-			
4			182,0681	182,0811	188.0815-			
2			197,3736	8785.79	-7282 661			
9			_	188.1229	188.1228 -			
- 2		199,8938		199,9086	199,9084			
8		199,0789		199,0946	199,0947-			
		•	ł					

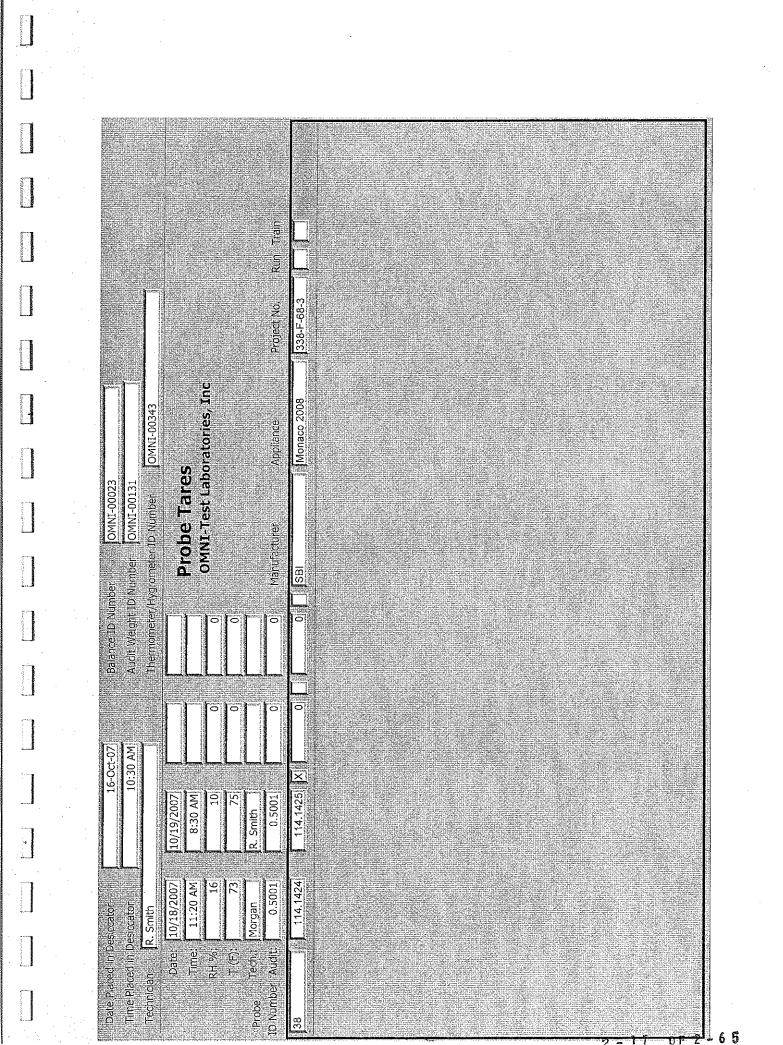
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Calibrations

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		

OMNI Environmental, Inc. OMNI-Test Laboratories, Inc. Beaverton, OR (503) 643-3788

NIST Stopwatch Calibration, Time Proficiency Testing Procedure and Data Sheet

Date: 1 181,07 User/Dechnician: Michelle Dolman Plass D Fail

NIST traceable stop watch OMNI Tracking Number: $^{\pm}292$

Stopwatch to be tested for time proficiency OMNI Tracking Number: On NI-0086 2

- 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., the NIST traceable stopwatch reads 1 minute, 15 seconds), the technician shall stop the watch being tested. Record the target time interval (i.e., 15.00 seconds). Repeat this step twice and record the data.
- 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 is valid for a period of twelve months.
- 4. Archive the proficiency test data and information, including the effective date and expiration date of the proficiency, in the equipment record for the instrument involved.

			** Y
Target time: 1	15.00 seconds	#1 Measured time:	\$\$1457	#2 Measured time:	14.94	#3 Measured time:	14.94
	·	#1 Measured time:				#3 Measured time:	
Target time: <u>1</u>	10.00 minutes	#1 Measured time:	15:00.26	#2 Measured time:	10:00.0b	#3 Measured time:	10:00.13
Target time: 3	30.00 minutes	#1 Measured time:	30:00.00	#2 Measured time:	30:00.29	#3 Measured time:	30,00.03

 \leq

Technician Signature: 222. Juli Date: 1.31-07

2.7.06

Last Cal:

12-11-07 SB1 MONACO 2008 10 16 = 10.00 TUNNEL Versey Colorado Calibration Omni tc 373 Leave and the Thue AWB \FI Bot Right TOP BACK DB Left. Amb 13 -1.5 - 2 900-2 ø -1.1 ∽li(-2.6 -26 -1,8 -1.8 -1.7 100 450 98.5 99.5 99.5 98,1 98.4 98.2 98.8 98.1 98.6 300 2995 299.7 299.8 300,2 249,8 298.6 298,9 299.5 299.5 299.3 1007 500,2 500 5005 499.6 499.6 500.4 500.9 499.5 5000 500.5 500.2 Rol 3 -700 701,1 TO1.2 700.2 700.3 700.2 700,7 100.1 700,7 901.0 902.3 900,7 901.4 704 900 901.2 901,4 901.6 mi-out mz-IN m-z-out mi -in -1.7 -2.2 -1.3 -2.6 Þ..... کר [] 741 ibυ 73.0 73.0 73.9 tij) 98.1 98.7-99.0 99.0 148.3 144.5 149.0 149.2 50 SBI-ANALYTICAL SCALE Scientech MODEL SH 310 wt. RESPONSE 0,0000 0 0,100Z 100 mg 200 mg 0.2000 99.9983 100 g 200g 200.0006 150 g 150,0008

obligate News

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OMNI-Test Laboratories, Inc.

Thermal Metering System Calibration Y and dH@

Manufacturer:	American Meter Con	прапу
Model:	DTM 200A	
Serial Number:	07J264	1834
OMNI Tracking No	SBI-1	03
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 Mor	1th
Next Calibration Due:	06/13/08	
Instrument Range:	1.000	cfm
Standard Temp.:	68	oF
Standard Press.:	29.92	"Hg
Barometric Press .:	29.88	- "Hg
Signature/Date:		-

Previous Calibration Comparision

	Date	n/a	Acceptable	
	dH@ Value	n/a	Deviation (5%)	Deviation
	y Factor	n/a	0	0.976
i	Acceptance	Out of	Limits	

Current Calibration

Acceptance	Acce	eptable	
Maximum dH(@ Deviation	0.000	
Acceptable dH	Acceptable dH@ Deviation		
Maximum y D	eviation	0.003	
Acceptable y I	Deviation	0.020	

·	Reference	e 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. $dH@ = 0.0317 \text{ x } dH / (Pb (Td + 460)) \text{ x } [(Tr + 460) \text{ x time}) / Vr]^2$

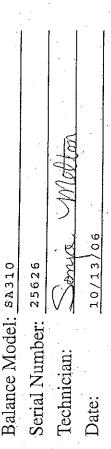
* Reference calibration is traceable to NIST through NIST Test # 40674, Kimble ASTM E1272

Control No. C-SSB-0004 (Thermal Testing Dry Gas Meter Calibration) xls, Effective Date: 11/06/2002

DGM SBI103

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.



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 PVN 11161 Rev. 0



RAPPORT D'ESSAI EXHAUSTIF

Nom du client SBI inc.			N° DU TICKET SAV/ORDRE D'INTERVENTION			
Emplacement u	nité	Laboratoire		N° du client	SB1012	
Marque/N° de n	nodèle	Ohaus Explore	۲ ۲	N° de série	D019024982	
Capacité	6100g	kg 🔲 Ib	Nb.Divisions	- 6100	10 Taille divisions	.1g

L'équipement de pesage mentionné sur le présent rapport a été vérifié et/ou calibré en conformité avec la procédure Mettler Toledo Réf. VP0023IR, et la norme canadienne et/ou le manuel NIST N°., le cas échéant

VÉRIFICATIONS DES COINS

Poids Appliqué: 900



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2	3	
1	4	
<u>-</u>	J	

Dans la tolérance sans réglage

Erreur permissive

Dans la tolérance après réglage

Hors tolérance

Essai progressif	Poids Appliqué	Lecture tel que trouvé	Erreur: plus ou moins (d)	Erreur permissive (d)	Lecture tel que remis	Dans la ToléranceO/N
_éro	10.09	10,00			10.0 5	
	50.09	50, Oc			50-2 G	
	100-05	100,05			100.0 5	
	100-05 500.09.	500.29			500.09	
Charge Maximale*	1000.89.	1000.55			1000.0 g	
	DKg.	2001.00			2000.00	
· · · ·	515	5002.39			4979.99	0 🗌 N 🖸
	64.	6002.85			6000.09	
Zéro		· ·				

Dans la tolérance sans réglage

OBSERVATIONS:

Bol New Legal

NUMÉROS D'IDENTIF	FICATION DES POIDS;	300 2 544	Kirk	T14		
N° du certificat de traçabilité du poids:	1200425	DATE D'ÉT POUR CLIE	ALONNAGE	11	PROCHAIN ÉTALLONNAGE POUR CLIENT:	
RÉALISER PAR:	HE	NRI OREGO, BA	5	Ani	The	
		Nom du technicien (en lettres o	apitales)		Signature du technicien	
-			1			
j cas échéant:		Nom du client (en lettres can	tales		Signature du client	

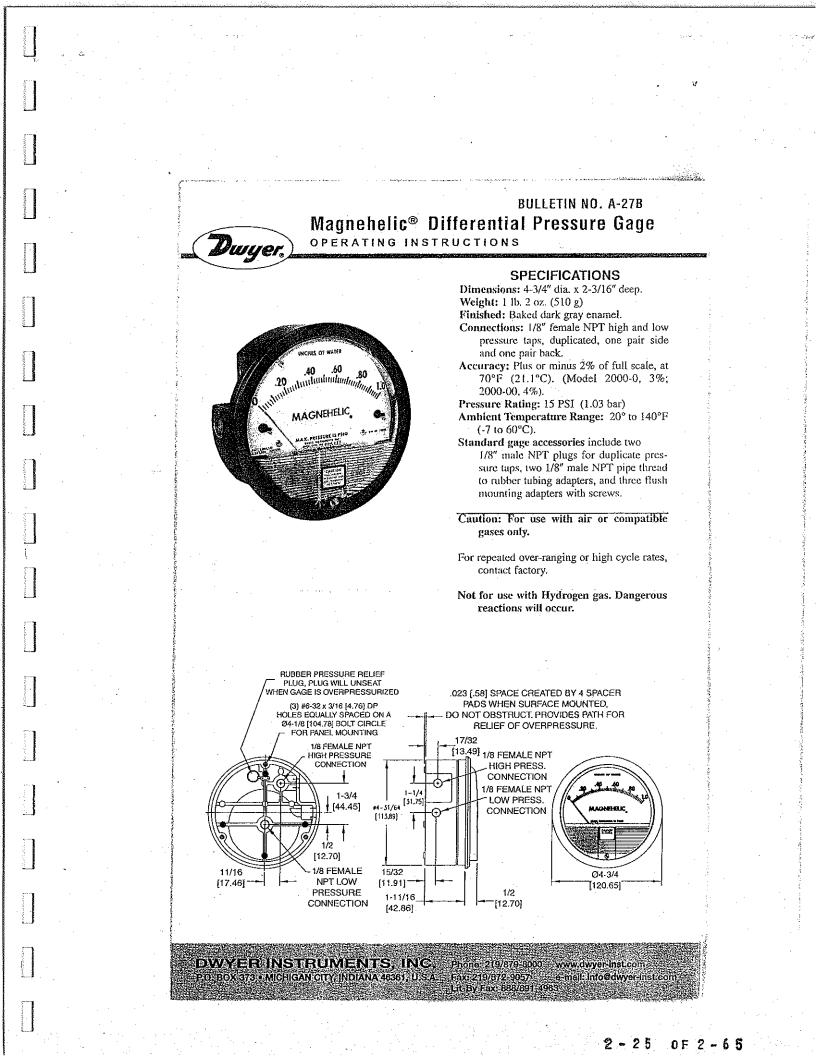


RAPPORT D'ESSAI EXHAUSTIF

Nom du clien	SBI inc.			N° DU TICKET SAV/ORDRE D'INTERVENTION			
Emplacement	t unité	Laboratoire		N° du client	SBI014		
Marque/N° de	e modèle	Weightronix WI	-110	N° de série	29009		
Capacité	500lb	kg⊡lbx	Nb.Divisions	10000	Taille divisions	.05lb	

L'équipement de pesage mentionné sur le présent rapport a été vérifié et/ou calibré en conformité avec la procédure Mettler Toledo Réf. VP0023IR, et la norme canadienne et/ou le manuel NIST N°., le cas échéant

Tel que trouvé $2, 00$ $[7,96]$ $2, 00$ $[7,96]$ 2 3 2 1 1 3 2 1 1 3 2 3 2 3 1 1 4 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 <	VÉRIFICATIONS	DES COINS	Poids Appliqué:	20/69	Erreur permis	síve
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Maximale* / OC. Ook, 99.98 k -1d O N & & & & & & & & & & & & & & & & & & &	Charge	÷ 1				
Boths 75-98 k -1d O N Goths Goths Goths O N 40 k 39-98 k -1d O N 40 k 39-98 k -1d O N Zéro 20 k 39-98 k -1d Zéro 20 k 20.00 k 0 N *Charge maximale utilisé pour l'essai 0 N N Dans la tolérance sans réglage 0 N OBSERVATIONS: VBCR floor 0 2.02 2.00 Congradue Non sensible Non Legic NUMÉROS D'IDENTIFICATION DES POIDS: 500 2.544 Non sensible Non Legic NUMÉROS D'IDENTIFICATION DES POIDS: 500 2.544 Non du technicien (en lettres capitales) REALISER PAR: HENR: Gothes Gothes Henric Mark Nom du technicien (en lettres capitales) Signétutifé du technicien		20.00k, 99.98	3k - 1d			
Go K Go. Co K O N 40 K 39.98 K -1d Zéro 20 K O N *Charge maximale utilisé pour l'essai Dans la tolérance sans réglage OBSERVATIONS: VBATS floor Dã NUMÉROS D'IDENTIFICATION DES POIDS: 500 à 544 Num du certificat de tracabilité du polds: 1300 735 POUR CLIENT: / 3/1 N NOG REALISER PAR: HENR: MERNE: Conte Goi RE Nom du technicien (en lettres capitales) Signétute du technicien	δ					
40 kg 39.98 kg -1d 0 N Zéro 20 kg 20 kg 0 N 0 *Charge maximale utilisé pour l'essai Dans la tolérance sans réglage 0 N OBSERVATIONS: VARTAGE CON DE .02 E .04 Con guodrualian Unin sensible NON LEGL NUMÉROS D'IDENTIFICATION DES POIDS: DO 2.544 MUMÉROS D'IDENTIFICATION DES POIDS: DO 2.544 Pour cuenti: 1300435 REALISER PAR: HENR: GAE Goi RE Nom du technicien (en leitres capitales) Signature du technicien	6		7			
Zéro 20 kg. 20.00k 0 d *Charge maximale utilisé pour l'éssai 0 N Dans la tolérance sans régtage 0 N OBSERVATIONS: 0 N 0 VBRTATions: VBRTATions: Non LeyL NUMÉROS D'IDENTIFICATION DES POIDS: 500 à 544 Nº du certificat de traçabilité du poids: 1200435 RÉALISER PAR: HENR: CARE Goi RE Nom du technicien (en lettres capitales) Signáture du technicien						
*Charge maximale utilisé pour l'essai Dans la tolérance sans réglage OBSERVATIONS: <i>V D.R.; fl con</i> DE . 02 = . 04 Con globuation Tim sensible NON LEGL NUMÉROS D'IDENTIFICATION DES POIDS: 500 à 544 N° du certificat de tracabilité du poids: 1200435 POUR cilent: / 3/120060 PROCHAIN ÉTALLONNAGE POUR CLIENT: / 3/120060 POUR CLIENT: RÉALISER PAR: HENR: CONE GOIRE HOUR CLIENT: Signature du technicien Nom du technicien (en lettres capitales) Signature du technicien						
OBSERVATIONS: <i>VBASSIGEON</i> DE.022.04 Con groduation fin sensible NON LEYL <u>NUMÉROS D'IDENTIFICATION DES POIDS</u> 500 à 544 <u>N° du certificat de</u> traçabilité du poids: <u>RÉALISER PAR</u> : <u>HENR</u> : <u>HENR</u> : <u>GRE GOIRE</u> <u>Nom du technicien (en lettres capitales)</u> <u>Nom du technicien (en lettres capitales)</u> <u>Signature du technicien</u>	*Charge maximale utilisé p	our l'essai		·····	I	
VBRIJERN DE. 02 E. 04 Cov grobustion Two sensible NON LEGL NUMÉROS D'IDENTIFICATION DES POIDS: 500 à 544 N° du certificat de traçabilité du poids: 1200435 POUR CLIENT: / 3 / Jii V OG/ POUR CLIENT: RÉALISER PAR: HENR: Nom du technicien (en lettres capitales) Signátute du technicien	Dans la tolérance sans	réglage				
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N° du certificat de traçabilité du poids: 1300735 DATE D'ÉTALONNAGE POUR CLIENT: PROCHAIN ÉTALLONNAGE POUR CLIENT: RÉALISER PAR: HENR: GRE GOIRE Mom du technicien (en lettres capitales) PROCHAIN ÉTALLONNAGE POUR CLIENT:	NUMÉROS D'IDENTIFICATION	DES POIDS: 500 à	544			
REALISER PAR: HENR. GAE GOIRE Nom du technicien (en lettres capitales) Signature du technicien	N° du certificat de		DATE D'ÉTALONNAGE	S USLA	PROCHAIN ÉTA	ALLONNAGE
		HENR: (SKE GOIRE	Join C	lenin M.	
e cas échéant: Nom du client (en lettres capitales) Signature du client		Nom du tech	inicien (en lettres capitales)		Signature	u techniclen
	e cas échéant:	Nom du cl	ent (en lettres capitales)		Signature	du client



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.

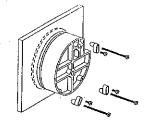
1.Select a location free from excessive vibration and where the ambient temperature will not exceed 140°F (60°C). Also, avoid direct sunlight which accelerates discoloration of the clear plastic cover. Sensing lines my be run any necessary distance. Long tubing lengths will not affect accuracy but will 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.

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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.

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Caution: If bezel binds when installing, htbricate 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, missing.

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, (1.T) option.

•Pointer stuck-gage can't be zeroed.

1. Scale touching pointer,

2. Spring/magnet assembly shifted and touching helix.

3. Metallic particles ellinging to magnet and interfering with hells 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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Fax 2

219/879-8000

Fax: 219/872-9057 Lit-By Fax: 888/891-4963

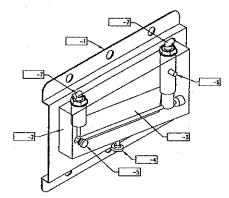
FR# 12-440212-04 Rev. 2

e-mail: info@dwyer-inst.com

www.dwyer-inst.com

DWYER INSTRUMENTS, INC. BOX 973 • MICHIGAN CITY, INDIANA 46361, U.S.A

Bulletin D-3 **Inclined and Vertical Stationary Manometers** Dwyer, **Operating Instructions and Parts List**



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

- -1) Panel
- -2) Gage Body -3) Scale
- Scale Screw and -4)

Washer (-5) Leveling Screw, Nut and Washer

- (-6) Mounting Screw and Washer Molded Nylon (-7)
 - 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 error.

- Add or remove oil as necessary. 5.
- 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. 6,

CAUTION:

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 con-nected 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:



- (8.64 mm) or greater. 2. Make an accurate traverse per sketch at right and average the readings.
- 3. Provide smooth. straight duct sections 10 diameters in length both upstream and downstream

type straightene

upstream from the pitot tube.



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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 duct with the tip directed into the air stream, it the manoneter shows a minus indication reverse the tubes. With a direct reading manome-ter, air velocities will now be shown in feet per minute. In other types, the manometer will read velocitly pressure in inches of water and the corre-sponding velocity will be found from the curves in Bulletin H-11. If circum-stances 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 approxi-mate 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 \underline{P}_{θ}

where $P_u = Barometric Pressure in inches of mercury$ 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 error, in the commended that the static pressure tip or 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 con-trol or damper. To determine draft loss through the furnace, make connec-tion as indicated for smoke pipe draft and add a second tube, connecting the manometer differentially to the combustion chamber. All FILTER 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 tub-ing 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 rec-ommendations for filter cleaning or replacement.

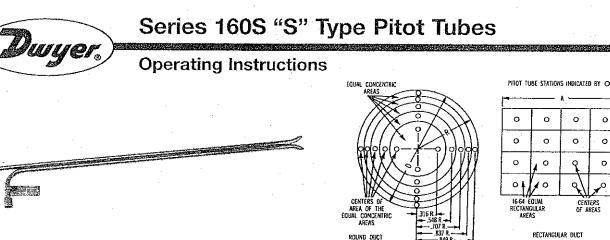
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Bulletin H-12

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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.
- 2. 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.

Take readings in a smooth, straight duct section a minimum of 81/2 duct diameters in length upstream and 11/2 diameters downstream from the pitot tube.

5. Provide an egg-crate type straightener upstream from the pitot tube.

FIG. 4 - TRAVERSE ON ROUND AND SQUARE DUCT AREAS

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. Permanentmount 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_p) $\sqrt{\frac{P_V}{D}}$

where:

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- P_{v} = 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 =
$$1.325 \times \frac{P_B}{2}$$

- Pв = Barometric pressure in inches of mercury
 - Absolute Temperature (Indicated == Temperature in °F plus 460)

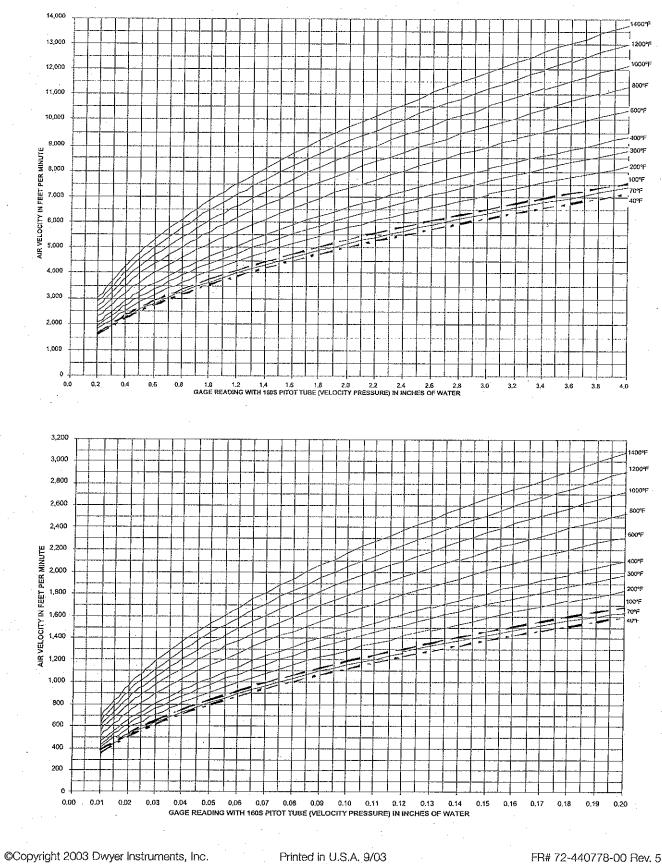
Flow in cubic feet per minute equals duct cross sectional area in square feet x air velocity in feet per minute.

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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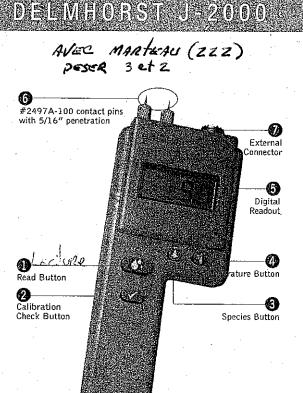
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J-2000 FEATURES

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.

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

Press the calibration check button 2 and read button 3 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.

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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 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 (2) 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 <u>info@delmhorst.com</u> for information on how to interpret the readings for other materials.

Species Code Chart

COD	E/SPECIÉS	, CODE	/ SPECIES
1	Fir, Douglas	25	Magnolia
2 3	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*

*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).

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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 . The meter will display the current temperature for one second.
- To scroll forward through the temperature settings, press and hold the temperature button (2) while the current temperature is displayed.
- To scroll backward press and hold the species button within one second of pressing the temperature button Release the temperature button and continue to hold the species button and the temperature will decrease.
- When scrolling in either direction, release the button to stop at the desired temperature.

Set Temperature Mode 15 à 32 °

- ► To change from Fahrenheit to Celsius mode or Celsius to Fahrenheit mode press the temperature button ④.
- Press the calibration check button 2 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 is 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 () 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 (). 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 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 (1) 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 (1) 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 memory is full.

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 together.

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

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- Press and release the calibration check button 2.
- Within one second press the species button 3.
- ► 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 **7**.
- 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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For 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.

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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.

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METER READINGS WITH NON-INSULATED PINS

		MELE	- HEAL	JINGS	VVIIHN	ION-IN	ISULAT	EDPIN	JS		
SPECIES	. ⁺ 7	8	. 9	10 -	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	7	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
<u>HEMLOCK, WESTERN</u>	7	Š	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)											
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 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	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	<u>29.5</u> 28	30
SPF/C0FI	8	9	10	11	13	15	17	19	21	23	25
									17		
ТЕАК	7	8	-8.5	9 /	11	- 1Z	1.4			10.7	<u></u>
TEAK VIROLA	7 6.5	8 7	<u> </u>	9	<u>11</u> 11	12 12.5	14 14	15 16	18	18.5 18.5	20 20.5

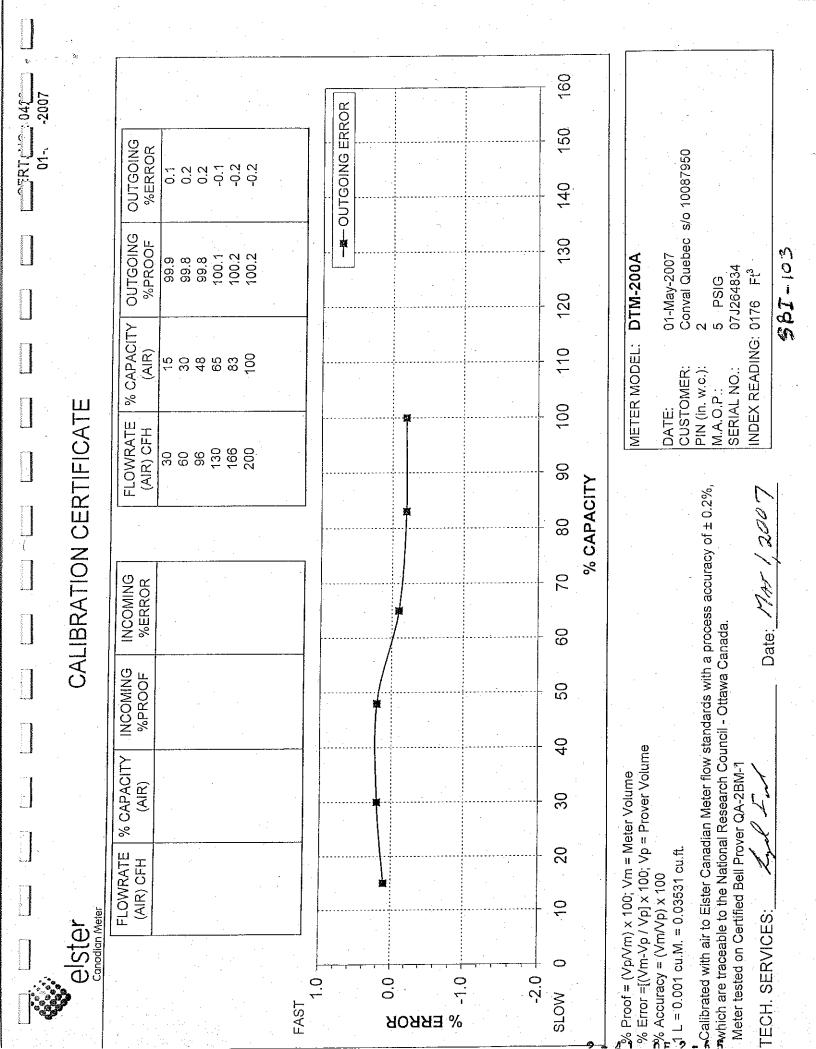
*Meter readings taken with 26-E 2-pin electrode. Do not apply 2-pin correction.

**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

6 5

Alpine Fir

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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

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

Customer Order Number:	1008	8109	CMCO # 1	055531	
Product Description:	DTM-200A				
Manufacturing Number:	07J264	834	thru	I	
Working Pressure (Psi):	10	.]	Test Pressure	e (Psi):	15
Accuracy @	200.0	CFH	100.1	%	
Accuracy @	65.0	CFH	99.9	%	

XK-1179, XU-3530

Jelon

Prover Number/s:

Wayne Nelson

Certified By:_

Date: 4/19/2007

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

Quality Assurance Manager

ISO 9001: 2000

Certificate No. 006697

- 42

0F 2 - 65

2221 Industrial Road Nebraska City, NE 68410 U.S.A +1 402 873 8200 +1 402 873 7616

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Elster American Meter

www.americanmeter.com



GAS METER TEST RECORD

Page:

Date: 04/24/2007

1

Qty Ordered:	CANADIAN METE I 1055531	ER - Cambridge		SALES ORD SHOP ORD	SOLD TO ID: SALES ORDER NO: SHOP ORDER NO: PROOF TYPE:		
SERIES ID: 200A	Туре:	Drive: 0.1FT	Remote Rdr:	Тор:	Index:	proo	
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Ulrich Métrologie inc. Ulrich Metrology Inc. 9912, Côte-de-Liesse Montréal (Québec) H8T 1A1

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

CALIBRATION CERTIFICATE

Certificate no.:	88544	Calibration date:	July 27, 2007
Instrument ID:	ID-179543	Certificate issued:	August 03, 2007
Туре:	MANOMETER, DWYER MAGNEHELIC	Interval:	12 months
Size:	0 TO 0.5 IN WATER	Due date:	July 27, 2008
Manufacturer:	DWYER	Procedure:	See notes below.
Model no.:	MAGNEHELIC	Environment:	See notes below.
		Temperature:	See notes below.
		Humidity:	See notes below.
		Metrologist:	АМК
Property of:	SBI		· · · ·
	1700, RUE LEON HAMEL		Milerio Mercuri
	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.

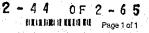
MEASUREMENT UNCERTAINTY

See notes below.

MEASUREMENT RESULTS

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

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Tél. (514) 328-2550 I 800 522-1226 Fax (514) 327-0604 4850, bd Gouin est Montréal-Nord, Qc Canada H1G 1A2 www.chevrierinstruments.com info@chevrierinstruments.com Instruments de mesure et de régulation pour les procédés industriels et laboratoire d'étaionnage

Certificat d'étalonnage **Calibration certificate**

Description	Manomèt	re différentiel Magne Modèle : 2000D-0		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	с.		Quitte conforme Leaving in specs	Ουί
Bon de travail Work order #	17041-02	État instrument Condition	<u>Arrivée/In</u> Bon	<u>Sortie/Out</u> Bon	Réparation (o/n) Repaired (y/n)	Non
Conditions d'étalonn Ambient conditions a				20±1°C		35-55% H.R.
Remarque(s)						

Comments

Appliquée Applied "CE	Lectun Readin (ascendantes) (ascending)		Appliquée Applied "CE	Lecturi Readin (descendantes) (descending)	A Start Contained
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

Étaions 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

ТB Julien Bernier

Date 2007-juil-27 Numéro du certificat Certificate number

Date due 2008-juil-27 Due Date 17041-02-17311

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C.Q. DC

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révision.070727, Reproduction interdite sans consentement ecrit

ion, le raijo d'incertitude étalon/instrument est d'au moins 4 pour 1. ombrage. Out of tolerance readings shaded.

Page 1 de 1

Enregistre par le BNQ selon ISO 9001 The test uncertainty ratio exceeds four to one unless otherwise indicated



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CALIBRATION CERTIFICATE

Certificate no.:	82536	Calibration date:	June 27, 2007
Instrument ID:	SBI-096	Certificate issued:	June 27, 2007
Type:	CALIBRATOR, OMEGA CL23A	Interval:	12 months
Size:	TC K/J/T	Due date:	June 27, 2008
Manufacturer:	OMEGA	Procedure:	MET/CAL
Model no.:	CL23A	Environment:	CLAS Type 2 Laboratory
Serial no.:	T-256137	Temperature:	23 ± 2°C
-		Humidity:	35 - 55% RH
		Metrologist:	MAR
Property of:	SBI		
	1700, RUE LEON HAMEL		(Nuecro Mercun
	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

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.

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MEASUREMENT RESULTS

See next page for measurement results.

Notes:

9V battery replaced.



Calibration Data for Certificate No. 82536

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Lachine, QC H8T1A1 Fax (514) 631-6122 www.ulrich.ca info@ulrich.ca

CALIBRATION DATA Certificate No. 82536 Instrument ID: SBI-096 PASS Result: Type: CALIBRATOR THERMOMETER -Condition: FOUND-LEFT Serial no.: T-256137 Procedure: Omega CL23A: 5520A-M CALIBRATION STANDARDS Standard ID Type Manufacturer Model no. Cal. Date Due Date 8608002 CALIBRATOR FLUKE 5520A 2006/10/14 2008/10/14 MEASUREMENT RESULTS (Per MET/CAL) TRUE ACCEPTANCE LIMITS TEST PASS/ PARAMETER VALUE RESULT LOW HIGH FAIL TUR DISPLAY CALIBRATION Did all segments of the display illuminate? Result of Operator Evaluation PASS THERMOMETER CALIBRATION K 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 PASS 1239.7 1239.5 1240.5 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 -199.0 PASS -201.0 2.1 -60.0degF -60.4 -61.0 -59.0 PASS 3.5 -40.0degF 1.7 -40.4 -40.5 -39.5 PASS 32.0degF 31.5 31.5 32.5 PASS 2.0 1240.0degF 1239.5 1239.5 1240.5 PASS 1:6



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PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTAN LOW	CE LIMITS HIGH	PASS/ FAIL	TUR
1260.0degF		1259.5	1259.5	1260.5	PASS	1.6
1400.0degF		1399.7	1399.4	1400.6	PASS	1.8
Type Thermocouple			алар (1997) Алар	· · · · · · · · · · · · · · · · · · ·	 	
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
ALIBRATOR 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						· • .
00.0degF		-199.2	-201.0	-199.0	PASS	2.1
0.0degF		-59.7	-61.0	-59.0	PASS	3.5
0.0degF		-39.6	-40.5	-39.5	PASS	1.7
2.0degF		32.2	31.5	32.5	PASS	2.0
240.0degF		1240.0	1239.5	1240.5	PASS	1.6
260.0degF	· · ·	1259.9	1259.5	1260.5	PASS	1.6
400.0degF		1399.5	1399.4	1400.6	PASS	1.8
Type Thermocouple	en tra cui Statu		•		4 * <u>.</u>	
00.0degF		-200.2	-201.0	199.0	PASS	2.3
0.0degF		-60.2	-61.0	-59.0	PASS	2.3

Calibration Data for Certificate No. 82536



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Uirich Métrologie inc. - Ulrich Metrology Inc.9912, Côte-de-LiesseTél. (514) 631-6653Lachine, QC H8T1A1Fax (514) 631-6122www.ulrich.cainfo@ulrich.ca

· · · · · ·	TRUE	TEST	ACCEPTAN	NCE LIMITS	PASS/	
PARAMETER	VALUE	RESULT	LOW	HIGH	FAIL	TUR
-40.0degF		-40.0	-40.5	-39.5	PASS	1.2
32.0degF	алар (1993) Алар (1993)	31.8	31.5	32.5	PASS	1.7
750.0degF		749.7	749.5	750.5	PASS	2.0

End of Test Data

magnetulic Calibration 581-105 - checked against incline Manun # 585-020 meline magnahelie .218 .225 .158 .155 .085 ,080 .040 ,040 . . -----

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 Help / FAQ En françois Last 24 hours Tuesday, 11 be: 2007 Quebec: Alrport Observations TUE 17 TUE 17 Barting Barting Barting TUE 18 Barting Barting Barting TUE 18 Barting Barting<	 Site I 	Мар					(· · · ·	
Last 24 hours Tuesday, 11 Dec 2007 Quebec Airport Observations V = 10 TUE 16 TUE 16 TUE 16 TUE 16 TUE 14 TUE 14 TUE 14 TUE 12 TUE 14 TUE 12 TUE 14 TUE 14 TUE 14 TUE 14 TUE 14 TUE 15 TUE 14 TUE 14 TUE 14 TUE 14 TUE 14 TUE 15 TUE 14 TUE 15 TUE 15 TUE 15 TUE 16 TUE 16 TUE 06 TUE 05 TUE 05	 Help 	/ FAQ					÷.				· · · · · · · · · · · · · · · · · · ·
Tuesday, 11 Bac 2007 Quebec: Airport Observations Sky Term (°) Dewpoint Eals Wind (Km/h) Relative Humidity Pressure Visibility Ceiling (Km) Ceiling (Km) TUE 17 Sky -8 -10 - - 85 101.03 1.6 600 30.10 TUE 16 -8 -10 - - 85 102.09 2.4 700 TUE 15 -9 -11 - SW 9 85 102.27 4.8 600 30.17 TUE 13 -9 -11 -16 SW 9 85 102.27 4.8 600 TUE 13 -9 -11 -16 SW 19 85 102.40 4.8 500 TUE 11 -11 -13 -17 W 11 85 102.40 4.8 500 TUE 14 -11 -13 -17 W 11 85 102.40 4.8 500 TUE 10 -12 -13 -19 W 13 92 102.62 1.0 200				•	44/125	Weather					
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12-12-07

Last 24 hours

Wednesday, 12 Dec 2007

Quebec Airport

Observations

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	Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	· · · · · · · · · · · · · · · · · · ·
VED 22	Ć	-13	-20	-20	W 13	56	(102.48	24	unlimited	30.26
VED 21	Ċ	-13	-20	-21	W 19	56	102.32	24	unlimited	30.22
VED 20	Q.	-12	-19	-21	W 22	56	102.18	24	unlimited	
VED 19	Q.	-12	-18	-20	W 19	61	102.07	J 24	unlimited	30.14
VED 18	E.	-10	-17	-18	W 19	56	101.93	24	unlimited	
VED 17	æ	-9	-16	-17	NW 24	57	101.73	24	unlimited	
/ED 16	Ę,	-7	-15	-16	NW 33	53	(101.52_	24	unlimited	29,98
/ED_15	\$	-6	-13	-14	W 31	58	101.33	24	unlimited	Λ
/ED 14		-5	-11	-13	W`28	63	101.13	24 RUND 7	4000	29.86
/ED 13	@	-5	-11	-13	W 31	63	100.97	24	unlimited	
/ED 12	愛	-4	-11	-13	W 41	58	100.84) 24	unlimited	29.78
/ED 11	Ê	-3	-8	-10	NW 28	68	100.76	24	4000	
'ED 10		-3	-8	-10	W 30	68	100.68	24	7000	
	/ED 21 /ED 20 /ED 19 /ED 18 /ED 17 /ED 16 /ED 15 /ED 14 /ED 13 /ED 12 /ED 11	VED 22 () VED 21 () VED 20 () VED 19 () VED 17 () VED 16 () VED 15 () VED 16 () VED 15 () VED 16 () VED 17 () VED 16 () VED 17 () VED 18 () VED 13 () VED 12 () VED 13 () VED 14 () VED 15 () VED 16 () VED 17 ()	Sky C) VED 222 Image: Comparison of the com	NED 22 () 13 -20 VED 21 () -13 -20 VED 21 () -13 -20 VED 20 () () -13 VED 19 () () -12 -18 VED 18 () -10 -17 VED 17 () -9 -16 VED 16 () -7 -15 VED 15 () -6 -13 VED 14 () -5 -11 VED 13 () -5 -11 VED 14 () -4 -11 VED 12 () -3 -8	Ky C) Dewpoint Like VED 22 Image: Comparison of the comparison of	Sky C) Dewpoint Like (Km/h) VED 22 I -13 -20 -20 W 13 VED 21 I -13 -20 -21 W 19 VED 20 I -13 -20 -21 W 19 VED 20 I -12 -19 -21 W 22 VED 19 I -12 -18 -20 W 19 VED 18 I -10 -17 -18 W 19 VED 17 I -9 -16 -17 NW 24 VED 16 I -7 -15 -16 NW 33 VED 15 I -6 -13 -14 W 31 VED 14 I -5 -11 -13 W 28 VED 15 I -5 -11 -13 W 31 VED 14 I -5 -11 -13 W 31 VED 15 I -5 -11 -13 W 31 <t< td=""><td>Sky Temp t C) Dewpoint Feers Like Wind (Km/h) Humidity (%) VED 22 () -13 -20 -20 W 13 56 VED 21 () -13 -20 -21 W 19 56 VED 20 () -12 -19 -21 W 22 56 VED 19 () -12 -19 -21 W 22 56 VED 18 () -12 -18 -20 W 19 61 VED 18 () -10 -17 -18 W 19 56 VED 17 () -9 -16 -17 NW 24 57 VED 16 () -7 -15 -16 NW 33 53 VED 15 () -6 -13 -14 W 31 58 VED 16 () -5 -11 -13 W 31 63 VED 15 () -4 -11 -13 W 41 58 <t< td=""><td>Sky Templ C Dewpoint Like Wind Km/h Humidity (%) Pressure (kpa) VED 22 Image: Single C -13 -20 -20 W 13 56 IO2.48. 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VED 15 Image: Single C -11 -13 W 28 63 IO1.13.</td><td>SkyTermp (C)DewpointPeers Like(Km/h)Humidity (Km/h)Pressure (kpa)(Km/h)VED 22\checkmark-13-20-20W 1356$\underbrace{02.49}{(kpa)}$24VED 21$\checkmark$-13-20-21W 1956$\underbrace{102.32}{(2.32)}$24VED 20$\checkmark$-12-19-21W 2256$102.18_{\bullet}$24VED 19$\checkmark$-12-18-20W 1961$\underbrace{002.07_{\bullet}}$24VED 18$\checkmark$-10-17-18W 1956$101.93_{\bullet}$24VED 17$\checkmark$-9-16-17NW 2457$101.73_{\bullet}$24VED 16$\checkmark$-7-15-16NW 3353$\underbrace{101.33_{\bullet}}$24VED 15$\oiint$-6-13-14W 3158$101.33_{\bullet}$24VED 14$\vcenter$-5-11-13W 2863$\underbrace{101.13}_{\bullet}$24VED 15$\checkmark$-6-11-13W 2863$\underbrace{100.97_{\bullet}}$24VED 12$\checkmark$-4-11-13W 4158$\underbrace{100.97_{\bullet}}$24ED 12$\checkmark$-4-11-13NW 2868$100.76_{\bullet}$24</td><td>Skyrein (C)Dewpointreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreens<thr< th="">reensreensreens<thr< td=""></thr<></thr<></td></t<></td></t<>	Sky Temp t C) Dewpoint Feers Like Wind (Km/h) Humidity (%) VED 22 () -13 -20 -20 W 13 56 VED 21 () -13 -20 -21 W 19 56 VED 20 () -12 -19 -21 W 22 56 VED 19 () -12 -19 -21 W 22 56 VED 18 () -12 -18 -20 W 19 61 VED 18 () -10 -17 -18 W 19 56 VED 17 () -9 -16 -17 NW 24 57 VED 16 () -7 -15 -16 NW 33 53 VED 15 () -6 -13 -14 W 31 58 VED 16 () -5 -11 -13 W 31 63 VED 15 () -4 -11 -13 W 41 58 <t< td=""><td>Sky Templ C Dewpoint Like Wind Km/h Humidity (%) Pressure (kpa) VED 22 Image: Single C -13 -20 -20 W 13 56 IO2.48. 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VED 15 Image: Single C -11 -13 W 28 63 IO1.13.</td><td>SkyTermp (C)DewpointPeers Like(Km/h)Humidity (Km/h)Pressure (kpa)(Km/h)VED 22\checkmark-13-20-20W 1356$\underbrace{02.49}{(kpa)}$24VED 21$\checkmark$-13-20-21W 1956$\underbrace{102.32}{(2.32)}$24VED 20$\checkmark$-12-19-21W 2256$102.18_{\bullet}$24VED 19$\checkmark$-12-18-20W 1961$\underbrace{002.07_{\bullet}}$24VED 18$\checkmark$-10-17-18W 1956$101.93_{\bullet}$24VED 17$\checkmark$-9-16-17NW 2457$101.73_{\bullet}$24VED 16$\checkmark$-7-15-16NW 3353$\underbrace{101.33_{\bullet}}$24VED 15$\oiint$-6-13-14W 3158$101.33_{\bullet}$24VED 14$\vcenter$-5-11-13W 2863$\underbrace{101.13}_{\bullet}$24VED 15$\checkmark$-6-11-13W 2863$\underbrace{100.97_{\bullet}}$24VED 12$\checkmark$-4-11-13W 4158$\underbrace{100.97_{\bullet}}$24ED 12$\checkmark$-4-11-13NW 2868$100.76_{\bullet}$24</td><td>Skyrein (C)Dewpointreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreensreens<thr< th="">reensreensreens<thr< td=""></thr<></thr<></td></t<>	Sky Templ C Dewpoint Like Wind Km/h Humidity (%) Pressure (kpa) VED 22 Image: Single C -13 -20 -20 W 13 56 IO2.48. 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12-12-07

Last 24 hours

Wednesday, 12 Dec 2007

Quebec Airport

Observations

	Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	
WED 22	C	-13	-20	-20	W 13	56	(102.48.	24	unlimited	30.26
WED 21	C	-13	-20	-21	W 19	56	102.32	24	unlimited	30.22
WED 20	R.	-12	-19	-21	W 22	56	102.18	- Runs - 24.	unlimited	
WED 19	E.	-12	-18	-20	W 19	61	102.07	24	unlimited	30.14
WED 18	æ	-10	-17	-18	W 19	56	101.93	24	unlimited	
WED 17	æ	-9	-16	-17	NW 24	57	101.73	24	unlimited	
WED 16	æ	-7	-15	-16	NW 33	53	101.52	24	unlimited	29.98
WED 15	愛	-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	國	-5	-11	-13	W 31	63	100.97.	24	unlimited	
WED 12	愛	-4	-11	-13	W 41	58	100.84	24	unlimited	29.78
WED 11		-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

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Quebec Airport

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annan ann an an ann an an ann an ann an	Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	
THU 20	6	-15	-21	-22	NE 11	60	102.11	24	13000	30,15
THU 19	G	-15	-21	-	NE 9	. 60 .	102.24	- RUN 24	13000	30,19
THU 18	G	-15	-22	, -	E 4	55	(102.34-	24	12000	30.21
THU 17	Ś	-15	-21	-	NE 6	60	102.42-	24	13000	-
THU 16	G	-15	-21	-	N 6	60	102.51	48	13000	- - -
THU 15	\$\$	-14	-21	`	· · · · · · · · · · · · · · · · · · ·	55	102.45	4 8	23000	30.25
THU 14	¢D)	-14	-21	-20	SW 11	55	102.61-	48 - RUAN	4 ¹⁴⁰⁰⁰	
THU 13	徽	-15	-21	-23	SW 15	60	102.64	48	22000	30,31
THU 12	翰	-14	-23	-	W 4	46	102.58	48	22000	30,29
THU 11		-15	-23	× -	W 4	50	102.76-	48	unlimited	
THU 10		-16	-23	-	NE 4	55	102.79 ~	48	unlimited	
Г HU 09	愛	-18	-25	-	S 9	54	102.98	48	unlimited	
THU 08	慶	-20	-27	-	W 7	53	102.95	48	unlimited	• • • •
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Last 24 hours

Thursday, 13 Dec 2007

Quebec Airport

Observations	

		Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	•
	THU 20	6	-15	-21	-22	NE 11	60	102.11	24		30115
	THU 19	G	-15	-21		NE 9	60.	(102.24)	- Ruh 24	7 13000	30,19
	THU 18	G	-15	-22		E4	55	102.34-	24	12000	30.22
	THU 17	G	-15	-21	_	NE 6	60	102.42 ~	24	13000	
	THU 16	G	-15	-21		N6	60	102.51	48	13000	· · · ·
	THU 15	御	-14	-21	· ·		55	102.45	48	23000	30.25
·	THU 14	Ś	-14	-21	-20	SW 11	55	102.61🔫	48 0t	भ ¹⁴⁰⁰⁰	A A
	THU 13	- COD	-15	-21	-23	SW 15	60	102.64	48	22000	30,31
	THU 12		-14	-23		W 4	46	102.58	48	22000	30,29
	THU 11		-15	-23		W 4	50	102.76	48	unlimited	
	THU 10		-16	-23	—	NE 4	55	102.79-	48 [·]	unlimited	
	THU 09		-18	-25	and the second sec	S 9	54	102.98	48	unlimited	
:	THU 08	學	-20	-27	-	W 7	53	102,95	48	unlimited	· · ·
· · . • 1		199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199 - 199			in the second			ng voorlegy yn Hyjen			

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

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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.

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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

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

Dry Burn Rate

Using equation 28-3:

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

Where,

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BR	=	Dry burn rate, lb/hr
W_{wd}	=	Mass of wood burned (wet basis) during test run, lb
θ	=	Total time of test run, minutes
%M _w	=	Average moisture content of test fuel charge, wet basis percent

Sample Calculation:

Dry basis moisture of fuel = 20.03%

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

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

 $\% M_w = 16.69\%$

The wet weight of the fuel charge was 7.8

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

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

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

Total Particulate Matter Collected

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

Where:

m _n	=	Total particulate matter collected, mg
\mathbf{F}_1		Particulate matter collected on front filter, mg
F_2	= .	Particulate matter collected on rear filter, mg
R	.=	Residue from evaporated probe and filter holder acetone rinse, mg
V_a	===	Volume of acetone evaporated probe and filter holder actone rinse, ml
B,	· = .	Acetone blank value, mg/ml

Sample Calculation:

 $m_n = 12.6 - 0.4 + 4.7 - (180 \quad 0.0040)$ $m_n = 16.2 \text{ mg}$

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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:

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Service and respectively.

K		17.64 °R/in. Hg
$\mathrm{T}_{\mathrm{std}}$	÷	528 °R
$\boldsymbol{P}_{\text{std}}$	=	29.92 in. Hg
$\mathbf{V}_{\mathbf{m}}$	-	Volume of gas sample measured at the dry gas meter, dcf
Y	.	Dry gas meter calibration factor, dimensionless
P _b	=	Barometric pressure at the testing site, in. Hg
ΔH	=	Average pressure differential across the orifice meter, in. H_2O
Tm	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

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

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

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_s

k,

 C_p

ΔP

 P_{b}

=

=

Average dilution tunnel gas velocity, ft/sec

= Pitot tube constant:

$$85.49 \frac{ft}{sec} \left[\frac{(lb/lb-mole) \times (inches Hg)}{(^{o}R) \times (inches H_2O)} \right]^{\frac{1}{2}}$$

2-61 DF 2-65

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 ΔP measured during the pre-test flow traverse of the dilution tunnel; the square root of the ΔP values are averaged for this calculation, in. H₂O

= Barometric pressure at test site, in. Hg

 $P_g = Static Pressure of tunnel, in. Hg$ $P_s = Absolute tunnel pressure, = P_b + P_g$ $M_s = Molecular weight of tunnel gas; assume M_d = 29 lb/lb-mole (per method 5G)$ $B_{ws} = Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)$ $T_s = Dilution tunnel temperature, °R; (°R = °F + 460)$

Sample calculation:

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

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

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

Particulate Concentration

Using equation 5G-2:

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

Where:

 C_s

and marked

Construction of the

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

 $m_n = V_{m(std)}$

Total mass of particulate matter collected in the sampling train, mg Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

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

 $C_{s} = 0.000163 \ g/dscf$

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:

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Q_{sd}	=	Gas flow rate corrected to dry, standard conditions, dscf/hr
3600	=	Conversion from seconds to hours
\mathbf{B}_{ws}	= '	Moisture content of dilution tunnel gas, ratio; assume 4% (per method 5G)
Vs	` =	Average dilution tunnel gas velocity, ft/sec
А	=	Cross sectional area of dilution tunnel, ft ²
$\mathrm{T}_{\mathrm{std}}$		Standard absolute temperature, 538°R
$T_{s(avg)}$	=	Average absolute dilution tunnel temperature, °R, (°R = °F + 460)
\mathbf{P}_{b}	=	Barometric pressure at test site, in. Hg
P_g	=	Dilution tunnel static pressure, in. Hg
P _s		Absolute dilution tunnel gas pressure, in Hg, $(Hg = P_b + P_g)$
P _{std}	=	Standard absolute pressure, 29.92 in Hg

Sample calculation:

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

 Q_{sd} = 8313.36 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:

ortogradi

Е	=	Particulate emission rate, g/hr
E_{adj}	=	Particulate emission rate, adjusted, g/hr
C_s	=	Concentration of particulate matter in the stack, corrected to dry, standard
		conditions, g/dscf
Q _{sd}	_=	Average dilution tunnel gas flow rate, dscf/hr
K3	=	Constant, 1.82 for metric units, 0.643 for English units

Sample calculation:

 $E = 0.000163 \times 8313.36 \times 60$

 $E = 1.36 \, g/hr$

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

 $E = 2.35 \ g/hr$

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:

θ

 $T_{\rm si}$

 T_s

PR = Percent proportional rate

= Time of test, min

 $S_i = Measured tracer gas concentration for the "ith" interval, in this case, the inverse of the calculated flow in the stack based on CO₂ concentrations in the stack and in the dilution tunnel$

$$V_{mi(std)} =$$
 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_s = Average gas velocity in the dilution tunnel, m/sec

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

 T_m = Absolute average dry gas meter temperature, °R

Absolute average gas temperature in the dilution tunnel during each 10
 minute interval, i, of the test run, °R

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



Phone: (5 Fax: (5

(503) 643-3788 (503) 643-3799

Mailing: Street:

Antorecelone

Post Office Box 743 5465 SW Western Avenue • Suite G Beaverton, Oregon 97075 USA Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada GIN 4R9

Conversion Assoc

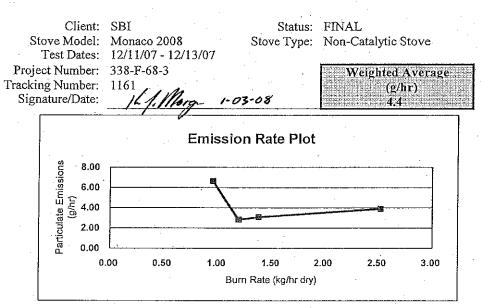
Section 4

Test Data by Run

OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \\Omnisr\users\Testing\SBI - Stove Builder International\338-S-68-3 Monaco 2008\338-F-68-3

4-1 of 4-47

EPA Weighted Average Emissions EPA Method 28



Run #	1		
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		
	- 1		
Run #	3		
Burn Rate (dry kg/hr)	1.37		
Catagory	3	and the second	
Overall Efficiency (%)	63%		
Emissions (g/hr)	3.08		
Cap (g/hr)	15		
Weighting Factor	0.428	26.11%	
Heat Output (BTU/hr)	16554		•
		•	1
Run #	5	· *.	
Burn Rate (dry kg/hr)	2.52		
Catagory	4		1.11
Overall Efficiency (%)	63%		
Emissions (g/hr)	3.89		
Cap (g/hr)	18		
Weighting Factor	0.330	20.13%	•
Heat Output (BTU/hr)	30450		
1			

Document Control No. P-SSF-0007 (EPA Method 28 Weighted Average Emissions).xls, Effective Date: 02/09/2005



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

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Run 1

OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \\Omnisrv\users\Testing\SBI - Stove Builder International\338-S-68-3 Monaco 2008\338-F-68-3

4-3 of 4-47

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South States

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Wood Heater Test Data - EPA Method 5G

			e et transfer de la companya de la c
Manufacturer: Model: Project No.: Tracking No.: Run: Test Date:	Мопасо 2008 338-F-68-3 1161 1		
Burn Rate	0.95 kg/hr dry		
Average Tunnel Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd	104 degrees Fahrenheit 13.3 feet/second 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 Total Sample Volume (Standard Conditions) - Vmstd	23.26 cubic feet 77 degrees Fahrenheit 22.4 dscf	21.07 cubic feet 77 degrees Fahrenheit 20.3 dscf	25.45 cubic feet 78 degrees Fahrenheit 24.5 dscf
Total Particulates - mn Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00056 grams/dscf 4.76 grams/hour 6.64 grams/hour	11.8 mg 0.00058 grams/dscf 4.93 grams/hour 6.85 grams/hour	13.2 mg 0.00054 grams/dscf 4.58 grams/hour 6.44 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	0.50 4.10 grams/hour 0.31	0.21 grams/hour	0.21 grams/hour
	R	lesults Are Acceptab	le

Page 1 of 1

4 7

OF 4 -

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	- Aí	ri .			3"Hg	21.60	60'17	13.2		Stack	Draft In. H2O	0.053	223	200	890	513	178	080	810	175	020	65	65	65	55	60	60	SS	53	53		55	55	23	S	8
	N	31 ft/sec.		0.1963 ft2	0@10 cfm@"Hg	002@10 cfin@"Hg	() () () () () () () () () () () () () () 3 3 3 3		St		Τ	-	+	-	-		-	┢			┢		†		-0.060	-0.060	-0.055	-0.053	-	┢	┢	-	-	┢	-0.063
	1.Mur	ity: 13.31					Total Particulate (1).	Total Particulate (2):			nger (2) Ambient		°, <u>L</u>	LL	- 18	78	78	62	80	8	80	61	8	8	80	79	79	61	6/	61	62	62	62	62	6L	101
	Signature/Date: // /////	Tunnel Velocity:	Average Trinnel Flow	Tunnel Area:	Post-Test Leak Check (1):	Post-Test Leak Check (2): (2) Fuel Moisture (d	nicional ture	ļ			Inpinger Impinger exit (1) exit (2)		+	-	_			-												-				-		10//JIC# 10/
	Signatur	Tu Tu	A Vers	E	Post-Test I	Post-Test L	٩	30.13 "Hg			Filter Impi (2) exit	+		83	83	83	83	85	86	86	86	85	35	85	84	84	84	83	83	83 - 8	82	22-Mar	82	2	82	33 - #DIV/0
						0 974		'i 1			Filter F (1)				-	81	81		82	-	╞	82 8		82	- 82	82 82	81 8	81 8	81 8	81 8	8 8	81 22-		81 8	80 8	81.08 83.33
		046,47 29.00 lb/lb-mole	28.56 lh/lh-mole	4:00 percent	"H2O	Ξ	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	266	
ō		281 046,47	28.56	4.00		0.84	Regin	30.17		Wood Heater Temperature Data, oF	Average Surface	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 :	48
			MW(wet):	mel H2O:	nel Static:	Pitot Tube Cp: Box Y Factor:	Pressure			feater Ten	Catalyst Exit													_						_					-	
	0	PM Control Module: Dilution Tunnel MW/dn/)	Dilution Tunnel MW(wet):	Dilution Tunnel H2O:	Dilution Tunnel Static:	Pitot Tube Cp: Meter Box Y Factor:	Barometric Pressure			Wood F	Firebox Right	368	345	320	308	305	323	345	361	370	380	383 .	387	391	391	383	374	366	361	350	345	340	335	325	322	
		Dilut	Dilut		<u>д</u>		~				Firebox Left	373	. 360	338	330	335	350	368	387 .	391	392	390	393	399	393	385	377	369	363	358	357	355	352	346	340	
			•	"H2O							Firebox] Back	507	487	444	425	426	436	457	489	523	549	560	566	568	577	587	588	580	572	566	560	551	526	501	482	
VICTION/		Γ	Pt.8		115						Firebox F Bottom	423	422	399	376	357		332	_	-		329	_				+			_		_	_		353	
			Pt.7		115						Firebox Fi Top B.	482		501		_	_	940			-		_	_	-	-		+		-	_				418 3	
U U U U U U U U U U U U U U U U U U U			_	0.053 0	-					it, Ib	Weight Fi		-0.9	-0.6	-0.8	6.0-		_	_			-	_		-		_		+	-		-			1	
		Data	\vdash	-	110	·				Fuel Weight, Ib	Scale W Reading Ch	8.6	6.8	8.3	-	_		-	-		-	+			-		-	┽	-	+			-	0.1	0.0 -0.0	
Cattor		Velocity Traverse Data	Pt.4	0.050	11/				-		Pro. Rate (10%) R		92	101	99	-		+		_	-		66	+	+	66		+	+	-	66	+	-	•	_	100.70
		Velocity	Pt.3	0.050							Pro. Rate P (10%) (1)		94	103	103	102	101	102	102	102	16	104	100	102	102	102	16	INT	8	100	100	100		-		100.71
			Pt.2	0.053	011						Dilution Tunnel dP	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	0.052	70.0	0.052	0.052	0.052	0.052	0.052	0.052	-+-	0.052
			μĩ	0.055	_	Numbers:					Dilution Tunnel Temp.	117	105	101	103	109	- 116	121	118	114	110	107	107	107	5	100	5, 5	12	8 2	%	95	95	94	94	33	104.02
				Initial dP	undar roug.	OMNI Equipment Numbers:					Meter Vac. In. Hg. (2)	0	0	0	0	0	0	0	0	0	0	0	0	0		0	5	5	5,0		0	0	0	0	0	
		ليعيا			-	INMO				Ī	In. Hg. [1]	0	0	0	0		•	0	0	0	0		-	0			5 .0		-	5	-	0	0	0	0	
							ł	1	4	Famoulate Sampling Data	Meter Meter M oF oF (1) (2)	11	77	77	77	E E		11	11	11	2	8/ 1	<u>*</u> 1	78	8/	8/	02	0/ 00	<u>و</u> لو	//	8/	78	78	61	8/	77.58
				• •					0	culare Sar		76	76	76	76	9/	9	5	76	FI	2	2	1	11	2 8	2 5	102	5 6		8/	8/	78	78	82	18	77.00
					- '	1 1				Fartic	xe Orifice	0.00		+			+				+	+	╈		+	8.8		+	+-		+	-	0.0	0.00	00.0	0.00
						uin.	min.				n Orifice dH (1)	0.00	0.0	0.00	0.00	000	0.0	0.00	0.0	0.00	00.0	0.00	0.00	0.00	0.00	0.00	800	8	3 6	3.0	00.0	0.0	0.00	0.00	0.0	0.00
		8					-				Sample Rate, cfm (2)		0.10	0.11	0.11	0.10	0.10	0.11	0.11	0.11	11.0	71.0	0.11	1.0	0.10	110	11.0	110	11-0	11.0	0.11	0.11	11.0	0.12	0.12	0.11
	SBI	Monaco 2008	1161	338-F-68-3 11-Dec-07	14:28	10	230				Sample Rate, cfm (1)		0.09	0.09	0.09	60.0	60.0	0.09	60.0	60.0	60.0	60.0	60.0	0000	0000	0.00	0.00	000	0.00	000	60.0	60.0	60.0	60.0	60.0	0.09
	Manufacturer:			Project No.: Test Date: 1	· ·	·. ·					Uas Meter Cubic Feet (2)	660.392	661.398	662.512	663.594	2/0.400	07/ 200	666.821	006.100	060.600	000 12	307 1/0	204.210	C44.610	CU0-+10	000 929	677 880	678 975	680.068	000.000	001.100	007.28	083.390	024-02U	01-01-0	25.454
	Man		Trac	н Ч	Beginning Clock Time:	Recording Interval:	Total Sampling Time:			H	Cubic Feet C Cubic Feet C (1)	-	+		662.610 6	+	-	000,300	+	001.182 0	+-		╈	+	+	+		╋	+	+		+	+	0 0701080	+	21.0/4 2
	Run:				ň	,			-	1	Time Cut		+	╈	99 99		+	00	+	90 P0	+	┿	-	╈	+	+	┿	┢	+	╈	+	+		120 027		Avg/10tal 21.
	Ü									Ē	<u>i</u> H							1			1	-		1		1	1		12	1	- č	4 0	v ĉ	4 6	1	Avg

Wood Heater Test Data - EPA Method 5G

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Page 1 of 1

Control No. P-SSU:0003 (Dual Train - 5G Emission Calculations).xls, Effective date: 10/19/2004

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

	Client Name:	SBI		Equipment N	Jumbers:			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	
· [n. (. // .	TP1 1		b

		Probe #	Final, mg	l'are, 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

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 f. Morg

Date: 1-21-08

Total Particulate, mg :

11.8

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

Lab 1 A

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

Client Name:	SBI	Equipment	Numbers:		· · ·	Run #:	. 1
Model:	Monaco 2008		· ·			Train #:	В
Project No.:	338-F-68-3					Date:	12/11/07
Tracking No.:	1161	-					
•							
S.	Sample Component	······	Reagent	Filter # or		Weights	
	· · · · ·			Probe #	Final, mg	Tare, mg	Particulate, mg
A Front filter of			D ¹¹		100.1	110.0	10.0

A. From inter 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

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

Analyst: 16 J. Morga

Date: 1-21-08

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

Page 1 of 1

Lab 1 B

Beaverton, OR Phone (503) 643-3788 MNR. Lables, L

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: SBI / Monaco 2008 Project #: _338-F-68-3 Date: <u>/z-/1-07</u> Test Crew: <u>K. Mergan</u>

IllData: $0 =$ Range:FuelDeltaStack $$ TEMPERATIWeightWreightDraftAmbientTopBottomBack $$5.5$ \checkmark $?7$ 98% $4!7$ 332 $$4.6$ 0.9 078 78 84.6 $4!7$ 332 3.7 0.7 076 78 84.6 $4!7$ 332 3.0 0.7 076 78 84.6 $4!7$ 332 2.6 0.7 076 78 84.7 373 481 2.12 0.7 066 78 736 393 481 2.2 0.1 065 78 407 497 497 2.12 0.1 065 78 422 427 497 2.12 0.1 065 78 497 497 491 2.12 0.1 065 78 422 427 497 2.12 0.1 065 78 497 497 497 $1000000000000000000000000000000000000$		Actual:	
FuelDeltaStackAmbientTopBottonSrS \checkmark 77 98 $4/1$ SrS $0:7$ 77 98 $4/1$ SrS $0:7$ 078 77 98 $4/1$ Sr1 0.7 078 78 846 $4/12$ 3.7 0.7 078 78 846 $4/12$ 3.7 0.7 078 78 846 $4/12$ 3.7 0.7 076 78 846 $4/12$ 3.7 0.7 076 78 846 $4/12$ 2.6 0.7 026 78 786 $4/07$ 2.15 0.1 026 78 786 $4/07$ 2.2 0.1 026 78 782 $4/07$ 2.2 0.1 025 78 $4/82$ $4/23$ 2.2 0.1 026 78 $4/82$ $4/23$ 2.2 0.1 025 78 $4/82$ $4/23$ 2.2 0.1 025 78 $4/82$ $4/23$ 2.12 0.1 0265 78 $4/07$ 78 2.12 0.1 0265 78 78 $4/07$ 2.12 0.1 0265 78 $4/17$ 2.12 0.1 0265 78 $4/17$ 2.12 0.1 0265 78 $4/17$ 1.11 1.11 1.11 1.11 1.11 1.11 1.11 <td< th=""><th>Range:</th><th>Z.O-Z.F Coal Bed.</th><th>NN</th></td<>	Range:	Z.O-Z.F Coal Bed.	NN
Weight Weight Draft Ambient Top Botton S_1S \checkmark 77 984 $4/17$ S_1S 0.7 078 78 846 $4/17$ 3.7 0.7 078 78 846 $4/10$ 3.7 0.7 070 78 847 393 3.0 0.7 070 78 $8/7$ 393 2.6 0.7 076 78 $8/7$ 393 2.15 0.5 065 78 482 407 2.2 0.1 055 78 482 423 2.2 0.1 055 78 423 2.2 0.1 055 78 423 2.2 0.1 055 78 423 2.18 482 423 423 2.18 055 78 423	TEMPERATU		Not UKEN
5.5 7.6 77 987 411 332 416 0.7 078 78 881.6 417 332 3.7 0.7 075 78 $846.$ 410 429 3.0 0.7 076 78 $846.$ 410 429 3.0 0.7 070 78 817 393 481 2.16 0.7 026 78 $736.$ 393 481 2.15 0.1 026 78 $786.$ 407 494 2.12 0.1 055 78 482 423 507 2.12 0.1 055 78 482 423 507 2.12 0.1 055 78 423 507 494 2.12 0.1 055 78 723 507 491 2.12 0.1 055 78 422 423 507 10	Botton	Left Right Flue	Catatvist
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3.7 0.7 075 78 866 410 429 3.0 0.7 070 78 817 393 460 2.6 0.4 068 78 736 393 481 2.5 0.5 068 78 736 497 494 2.5 0.5 065 78 482 423 507 2.2 0.1 053 78 482 423 507 2.2 0.1 053 78 482 423 507 2.2 0.1 053 78 482 423 507 2.2 0.1 053 78 482 423 507 100 053 78 78 723 507 78 2.2 0.1 053 78 78 78 78 78 700 053 78 78 78 78 78 78 <t< td=""><td>417 392</td><td>312</td><td>+</td></t<>	417 392	312	+
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Control No. P-SFG-0004 (Woodstove Temperature Test Data-Method 5G).xls, Effective date: 08/07/2000

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Page 1 of 1

OMNI-Test Laboratories, Inc Beaverton, OR

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-------- FUEL DATA

ан сайта (1996) Станования (1996)					
Client: SBI			· .		
Model: Monaco 2008		·	•		•
Project #: 338-F-68-3	racking #: 1161				
Date: <u>12-11-07</u> OMNI Equipment ID #: FUEL LOAD PREPARED B	Test Crew: K.	MorgAN		Run #:	1
OMNI Equipment ID #:					
FUEL LOAD PREPARED B	Y: K. MorgAN	, CLAUPE	E PARE		
FUEL: DOUGLAS-FIR SP.	ECIES, UNTREATED	, AIR-DRIED, S	TANDARD GRA	DE OR BET	TER,
DIMENSIONAL LUMBER.					· .
·			· ·		
	PI MOISTURE CON	RE-BURN FUEI TENT (METER			· .
CALIBRATION: C	al Value $(1) = 12\%$				
	al Value $(2) = 22\%$				
Diana in t				- -	
Piece Leng 1 ජ	<u>eth</u> ft 19.4	<u>Readings</u> 9,9	197	Type ZX4	
2	ft		/_//		
3	ft	· · · · · · · · · · · · · · · · · · ·			-
Length of cut pieces:	@ 8.75 inches	Pre-Burr	Fuel Average Mo	oisture: 19	1.67%
Time (le els)	-				
Time (clock): _//:/5	Room Temperatur	e (F): <u>75</u>	Initials:/2_		-
					,
		· · · · · · · · · · · · · · · · · · ·		·····	
			·····	·	
		TEST FUEL			
FUEL TYPE AND AMOU					
CALCULATED LOAD W		ACIUALL	OAD WEIGHT:	<u> </u>	(2×4) (4 \cdot 4)
FUEL PIECE LENGTH:	13.0"			9.8	
	MOISTURE CONT	<u>ENT (METER -</u>	– – DRY BASIS)		
PIECE	DI	EADINGS		TYPE	
11000	<u>N1</u>	<u>CADINOS</u>			
1	21.2	21.4	21.2	2×4	
2	21.6		51,2	2×4	
3	22.0		21.2	<u>4 x 4</u>	
- 4	21,3	23,1 :	21.9	<u>4 ×4</u>	
6	· · · · ·			•	
7	· · · · · · · · · · · · · · · · · · ·		· · ·		•
8					
9		······	·		
10	<u> </u>	· · · · · · · · · · · · · · · · · · ·			
OVER	RALL TEST FUEL LC	AD MOISTURI	E A VERAGE: 💈	1.69%	
				-	
Time (clock): _//:	<u>30</u> Room	Temperature (F): _75	Initials :	
	<u>.</u>	· ·			
Π-	abailing algorithms	16 1. Mory	- · · ·) 0401 1 73 1	6-07
Ie	chnician signature:	12 7. Verorg	<u>z</u> L	Date: 12-1	
	•				

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Control No. P-SFB-0006 (Woodstove Fuel Load Information).doc, Effective date: 04/18/2007

OMNI-Test Laboratorie Beaverton, OR

Run Notes

Client: SBI Model: Monaco 2008 Project #: 338-F-68-3 Tracking #: 1161 Run #: ____ Test Crew: K. Morgan

Date: 12-11-07

OMNI Equipment ID'#(s):

PREBURN DE SCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE)

С.

PRIMARY:

Fully Closed

SECONDARY:	Fully	Closed	Posth	an
•	(Tandouly	Contro	Ild with	primary
TERTIARY:	NA		·	

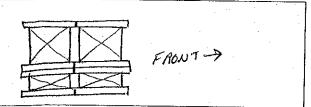
ON - High

PREBURN SETTINGS AND ACTIVITIES

FAN:

TIME	AIR (THERMO) <u>CHANGES</u> PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT	
60	test setting				K	- Levelled	
					·		

TEST FUEL CONFIGURATION SKETCH (INDICATE VIEW ANGLE)



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

SAME as above

TEST START UP PROCEDURES BYPASS: FUEL LOADING Louded by 45 Sec. AJAR UNTIL 4 min, 40 sec. DOOR: PRIMARY AIR: Fully Open 510 MIN -ABRUPHLY Closed to test SEtting at 5.0 min. OTHER: NONE

SECONDARY: Fully Closed Position

TERTIARY:

FAN:

NA ON-High

Technician signature:

Date: 12-11-07

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

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Supplemental Data EPA 5G/5H

Model: <u>Monaco 2008</u> Project #: <u>338-F-68-3</u> Date: <u>12-11-07</u> Test Crew: <u>K. Morgad</u> OMNI Equipment #(s): Gas Analyzer Train Leak Stack: Initial: Final: <u>V</u> Calibrations: Span Gas	Check: Dil			n: / <i>8: /४</i>	,
Date: <u>12-11-07</u> Test Crew: <u>K. Morgad</u> OMNI Equipment #(s): Gas Analyzer Train Leak Stack: Initial:	Start Tir Check: Dil	Run #: ne: <u>14/;28</u>		n: / <i>8: /8</i>	
OMNI Equipment #(s): Gas Analyzer Train Leak Stack: Initial:	Check: Dil			n: / <i>8: /8</i>	
OMNI Equipment #(s): Gas Analyzer Train Leak Stack: Initial:	Check: Dil			18:18	
Gas Analyzer Train Leak Stack: Initial:	Dil	ution Tunnel			
Stack: hitial:	Dil	ution Tunnel			
Initial:	1	ution Tunnel			
	1A		(Method 5G	Gonly):	
Final:	IA	In	itial:		
•	/ •	Fi	nal;N/H	!	
Calibrations: Span Gas	CO2: <u>N/H</u> C	2: N/A (0: <u>NA</u>	CO ₂ (DT):	NA
	•				
N ₂ Span N ₂ S	Span N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time					
O ₂					
CO ₂	1///	1		· · ·	
CO	XV/M				
CO ₂ (DT)					· · · · · · · · · · · · · · · · · · ·
Stack Diameter (inches):	6.0		······································		· · ·
Air Velocity (ft/min): Init		 Final:			· .
Scale Audit (lbs): Pre					· .
Induced Draft:				·	
Pitot Tube Leak Test: Pre		Smoke Captu		214	
the second s			ost: <u>ø@</u>		
Flue Pipe Cleaned Prior to	o Filst Test in Sen	es. Date: _/.	10-07	initiais: <u>/</u>	•••
	Initial	Mid	dle	End	ing
Pb (in/Hg)	-78-16 30.17 ^{cr}	-80	· <i>H</i> 30.13 ^a	-79	2-1L 30.10
Room Temp (°F)	78	80		79	9
Technician signature:	1. J. Morga	E)ate:	-11-07	

Control No. P-SFAO-0007 (Supplemental Data EPA 5G).doc, Effective date: 05/08/2007

Page 1 of 1 **4 - 1 1 '0 F 4 - 4 7** Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada GIN 4R9

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Run 2

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Wood Heater Test Data - EPA Method 5G

	· · ·		
Manufacturer:		· · · ·	
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	107 degrees Fahrenheit		
Average Gas Velocity in Dilution Tunnel - vs	13.6 feet/second		
Average Gas Flow Rate in Dilution Tunnel - Qsd	8578.8 dscf/hour		
Average Delta p	0.054 Jackar 1120		
Average Delta H	0.054 inches H20 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 Fahrenhei
Total Sample Volume (Standard Conditions) - Vmstd	26.0 dscf	24.0 dscf	28.0 dscf
Total Particulates - mn		45.0	
Particulate Concentration (dry-standard)	0.00066 grams/dscf	15.8 mg 0.00066 grams/dscf	18.4 mg 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
		, iso granianisan	, ioo gramoriou
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	l · ·	1
		Results Are Acceptab	
		courto Are Acceptan	10

1 (Dual Train - 5G Emission Calculations) xls, Effective date: 4/29/2003

Page 1 of 1

1-21-08	60 ft/sec. 3.0 scfin 3.1 scfin 3.0 scfin 3.1 scfin	Stack	Draft In. H2O	-0.065	-0.065	-0.070	-0.070	-0.073	-0.080	-0.075	-0.070	-0.068	-0.065	COU.U-	-0.065	-0.063	-0.063	-0.060	-0.060	0.060	-0.058	-0.055	-0.053	-0.053	-0.053	-0.065								, Ru	24 24 24 24	
	Signature/Date: IF / 1/1/ Turnel Velocity: 13/60 ft/ Intial Turnel Velocity: 13/60 ft/ Average Turnel Flow. 13/30 est Average Turnel Flow. 13/60 ft/ Post-Test Lask Check (1): 0(@) 6(1) Post-Test Lask Check (2): 0(@) 6(2) Post-Test Lask Check (2):		Ambient	62	78	61	62	80	81	82 1	81	81	81	10	81	81	81	80	80	08 0	80	80	80	80	61				4.						4 0 F	
11	Signature/Doiley: P 7-110-7 Tunnel Foicoty: 1316 Italia Tunnel Flow: 1315 Areage Tunnel Flow: 1433 Areage Teak Check (1): 0 84 Teat Lack Check (1): 0 94 Teat Lack Check (1): 0 94 Flet Molisture (4) Paiso age Total Particulate		Impinger exit (2)																							i0/AICI#									4 - 1	
	ignature/Da Tunnel Intial Tu Average T Average T Tunni F-Test Leak Fuel J Fuel J e "Hg		Impinger exit (1)																		. •			:		#DIV/0	2									
	Sig Post-1 Post-1 Post-7 Average		r Filter (2)	79	83	84	84	88	8	86	84	18	98 F	6/ 08	81	82	82	83	83	83	83	84	84	84		83.00				Э.						
	nole nole tr <u>(5 29,98 </u>	oF	k Filter (1)	+		-	88		+			-	20 F		╞	┢		+	88	┿	-		82	82	82	81.76									21 • • •	•
	10.46,47 29.00 bMb-mole <u>28.56</u> bMb-mole <u>4.00</u> percent <u>0.118</u> +P2O <u>0.975</u> (1) <u>Begin Middle</u> 29.78 29.86	ure Data,	ge Stack ce	2 320		+		482	-					103	+	-		•		303		+		268	257											
		remperat	t Average Surface	423.2	423.2	425.8	435.8	491.4	501.6	485.2	474.2	467.6	463.2	483.4	476.4	460.8	451.6	443.2	433.0	425.0	416.8	407.8	398.6	386.0	370.6	22										
	PM Control Module: ion Tunnel MW(dry) fon Tunnel MW(wei); fon Tunnel H2O. Dilution Tunnel H2O. Dilution Tunne Eatic. Pitot Tube Cp. Meter Box Y Factor: Barometric Pressure:	Wood Heater Temperature Data, oF	Catalyst Exit				_									ļ,																				
	PM Control Module: 5 Dilution Tunnel MW(dx)? Dilution Tunnel MW(exc). Dilution Tunnel H2CO: Dilution Tunnel Satic Pitor Tube Cp Pitor Tube Cp Barometric Pressure:	W00	Firebox Right	369	356	328	322	349	373	388	390	394	394	404	409	405	405	400	389	272	367	356	345	332	319											
			Firebox Left	391	372	354	353	105	389	400	398	394	392	665	403	399	393	387	380	368	363	356	350	341	329						ŗ					
Wood Heater Test Data - EPA Method 5G	aF oF		Firebox Back	491	517	473	452	480	518	540	551	572	288	260	591	595	593	588	579	255	537	519	503	493	477											
Aetho	Pt.8 0.052 10 102 01		Firebox Bottom	361	363	354	342	326	320	315	313	312	312	312	313	317	323	326	328	32.0	347	356	360 .	355	343											
EPA N	Pt.7 [0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.052 (0.0		Firebox F Top B			+	710	930 -	806			666	+	-	-		_	_	489	-				409	385											
ata - E	Pt6 F	, Ib	Weight Fin Change T		.1 5		-0.8				_		4.0-	-	+			-	-		-		: 				- X									
est Da		Fuel Weight, Ib	Scale We Reading Chi		6 -1				_		-	-	┼	+		5 -0.2			8 -0.2	+		+	-		0-0-0									of 1		
ater T	7 Traverse D		Pro. Rate Sc (10%) Res			-	101 7.9	+	118 4.9	\vdash		-	2.7 COI	+		100 1.5		+	7 0.9	100 0.6		$\left \right $		101 0.1	0.0	100.62				, ,			Deco	Page 1 of 1		а ,
d He	Velocity Traverse Data Pt.3 Pt.4 Pt.5 104 0.046 0.053 112 110 108		Pro. Rate Pro. (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10\%) (10			-		-	-			103	+-	-	┢		+		-	+			-	+										•		
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	147 Pt.1 147 0.045 emp. 116 ment Number					+				Ξ		+		: =		2	2	201	66 08	. 6	86	16	96		94	100.08										
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	õ	Data	Meter Vac. In. Hg.	0	0	0			0	0	0	0		0	0	0	0	ó	0		0	0	0	0	0											
		npling	Meter oF	78	78	78	70	6/	61	79	79	79	80	8 8	62.	80	8	08 8	80	80	80	80	80	8		204-67										
		ticulate S	ice Meter (2) oF	+			F 82	+	+			78	+	-	-		•	+	6 <u>7</u>	-		$\left - \right $		_		/8.44										Ż
		Par	Orifice Orifice dH(1) dH(2)			-+-	0.00	+	+	00.0		0.00	+	+ -	+			+	0000	+					+								10/19/2004	5007181.in1		
	min.						2 0.00	1	1		-	2 0.00			┢			-	0.00			$\left \right $			•	000							active deter	rective date;		
	3	-	m Rate, cfm		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	0.13	0.12	710							ions) vle F#	aous).xis, m		
	SBI Monaco 2008 1161 338.F-68-3 12.18 12:18 12:18 240	: L	Sample Rate, cfm (1)		0.11	0.11	0.11	0.10	0.10	0.11	0.10	0.11	010	0.10	0.11	0.10	0.11	0.10	010	0.10	0.10	0.11	0.10	0.11	0.10								Control No. PSSI E0003 (Dual Train - 50 Emission Calculatione) vis. Pflooline date: 10/14/20104	ssion calculat		
	Manufacturer: Model: Tracking No.: Project No.: Test Date: G Clock Time: ording Interval: ampling Time:		Gas Meter Cubic Feet (2)	686.841	687.995	689.146	691 555	692.725	694.125	695.387	696.615	00.009	700.270	701.485	702.720	703.950	705.185	012 EDF	708.806	710.035	711.264	712.500	713.740	715.000	716.240	666.62							ain - 5G Emis			
ſ	2 Manufacturer: Manufacturer: Model: Tracking No.: Project No.: Reginning Clock Time: Recording Interval: Total Sampling Time:		Gas Meter Cubic Feet	++	-+-	683.821	+	+	+		-	691.180	+	694.320	-		697.475 Cop Coc		-	┼╌	702.705	$\left \cdot \right $	-	. /	706.898	-							0003 (Dual Tr			
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OMNt-Test Laboratories, Inc.

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

· Client Name:	SBI	 	Equipment	Numbers	:			Run #:	2
Model:	Monaco 2008	 	1		1			Train #:	A
· .	338-F-68-3	 	1 - A - A - A - A - A - A - A - A - A -					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	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

Total Particulate, mg :

15.8

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: 16 1. Marga

Date: 1-21-08

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

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-Introduction

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

Client Name:	SBI		Equipment N	Jumbers:			Run #:	2
, Model:	Monaco 2008	·					Train #:	B
Project No.:	338-F-68-3						Date:	12/12/07
Tracking No.:		1161		· · · · · · · · · · · · · · · · · · ·			•	
		· ·			. :		. •	
5	Sample Component			Reagent	Filter # or		Weights	·····
					Probe #	Final, mg	Tare, mg	Particulate, mg
A. Front filter ca	itch			Filter	7	138.7	122.1	16.6
B. Rear filter cat	tch	-		Filter	.8	127.2	126.2	1.0
C. Probe catch				Probe	5	197388.4	197387.6	0.8
			· · · · · · · · · · · · · · · · · · ·	L.,	L	<u>_</u> _		<u>.</u>

Total Particulate, mg :

18.4

Train 2 Lab 4 - 4 7

15

0 F

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. Marga

Date: 1-21-08

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

Page 1 of 1

PMN Lateries, Beaverton, OR Phone (503) 643-3788

q Page N Tracking #: _1161 Run #: STOVE TEMPERATURE TEST DATA - METHOD 5G Project #: _338-F-68-3_ K. Morguer Test Crew: Client/Model: SBI / Monaco 2008_ Date: 12-12-07

OMNI Equipment ID #:

		÷	Coal Bed:						Actual:	
			Data:	Ш О		Range: 2,2-2.6	2.2-2.6		Coal Bed:	N N
	Delta	Stack			TE	TEMPERATURES (oF)	URES (ol			Not User
	Weight	Draft	Ambient	Top	Bottom	Back	Left	Right	Flue	Catatvet
1		-,085	77	804	337	287	291	レナス	520	L .
	10	- ,075	78	813	352	328	332	294	451	
	0,8	- ,073	79	064	349	345	357	326	2717	
	0,7	-,070	79	442	349	607	373	24/1	2/24	
	ó,6	-,070	79	674	350	453	383	359	404	
	0.4	-,065	80	619	354	496	39/	37/	275	
_	4	-1065	K 70 79	Sel	358	525	392	370	NA.	
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·										

Control No. P-SFG-0004 (Woodstove Temperature Test Data-Method 5G).xls, Effective date: 08/07/2000

Technician signature:

Page 1 of 1

12-12-07

Date:

		FUEL DATA	•		
•		•		• • • • • • •	
lient: <u>SBI</u>					
10del: <u>Monaco 2008</u>	Tracking #- 1161				
roject #: $338-F-68-3$ ate: $12/12/07$	7 Test Crew:	K. Margan	Rı	ın#: 2	
MNI Equipment ID #:		/			
UEL LOAD PREPARI				· •	
UEL: DOUGLAS-FI IMENSIONAL LUME	R SPECIES, UNTRE. BER.	ATED, AIR-DRIED, STAI	NDARD GRADE (OR BETTER,	
				. <u> </u>	
	MOISTIDE	PRE-BURN FUEL CONTENT (METER		· · ·	
CALIBRATION:	Cal Value $(1) = 12$	% Actual Reading % Actual Reading	12.40	· · ·	
	Cal Value $(2) = 22$	% Actual Reading _	22.0		
	Length	Readings		Type zx4	
1 2 -	ft ft	19,1 19,5	20,3	2×4	
3	ft			· · · · · · · · · · · · · · · · · · ·	
Length of cut piec	es: 8@ 9.5 inches	Pre-Burn Fu	el Average Moistu	e: 19.63./	
. –					
Time (clock): <u>10</u>	:00 Room Temp	perature (F): 75 In	nitials: <u>/</u>	· · ·	
	· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·		· · · · · · · · · · · · · · · · · · ·	
		TEST FUEL			· · · · · · · · · · · · · · · · · · · ·
FUEL TYPE AND A		4 2 4	×4 Z		
			-	3.8 (2×4)	
CALCULATED LOA	D WEIGHT:	4 2 4	-	3.8 (2 × 4) <u>6.9</u> (4 × 4) 10.7 Total	
	ND WEIGHT:	4 4 ACTUAL LOA	D WEIGHT:	<u>6.9</u> (4 ×4)	
CALCULATED LOA	ND WEIGHT:	4 2 4	D WEIGHT:	<u>6.9</u> (4 ×4)	
CALCULATED LOA	AD WEIGHT: TH: /2.75 ^{//} MOISTURE (4 4 ACTUAL LOA	D WEIGHT: DRY BASIS)	<u>6.9</u> (4 ×4)	
CALCULATED LOA	ND WEIGHT: TH: /2.75^{///} MOISTURE (E	4 <u>2</u> 4 ACTUAL LOA <u>CONTENT (METER I</u> <u>READINGS</u>	D WEIGHT: DRY BASIS) TY	6.9 (4 k4) 10.7 Total	
CALCULATED LOA	AD WEIGHT: TH: <u>/2.75</u> " MOISTURE (ZE <u>2.(.1</u> <u>2.1.0</u>	$4 \underline{2} 4$ $A CTUALLOA$ $-$ $CONTENT (METER I)$ $READINGS$ $21.5 2.1.1$	D WEIGHT: DRY BASIS) TY	6.9 (4 k4) 10.7 Total	
CALCULATED LOA FUEL PIECE LENGT <u>PIEC</u> 1	AD WEIGHT: TH: <u>/2.75</u> ^{//} MOISTURE (<u>2.(.1</u> <u>2.1.0</u> <u>19.4</u>	$4 \underline{2} 4$ $ACTUALLOA$ $CONTENT (METER I)$ $READINGS$ $21.5 21.1$ $21.7 21.1$	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE k4 <u>k4</u> (x4	
CALCULATED LOA FUEL PIECE LENGT <u>PIEC</u> 1	AD WEIGHT: TH: <u>/2.75</u> " MOISTURE (ZE <u>2.(.1</u> <u>2.1.0</u>	$4 \underline{2} 4$ $ACTUALLOA$ $CONTENT (METER I)$ $READINGS$ $21.5 2.1.1$	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE k4 k4	
CALCULATED LOA FUEL PIECE LENGT <u>PIEC</u> 1	AD WEIGHT: TH: <u>/2.75</u> ^{//} MOISTURE (<u>2.(.1</u> <u>2.1.0</u> <u>19.4</u>	$4 \underline{2} 4$ $ACTUALLOA$ $CONTENT (METER I)$ $READINGS$ $21.5 21.1$ $21.7 21.1$	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE k4 <u>k4</u> (x4	
CALCULATED LOA FUEL PIECE LENGT <u>PIEC</u> 1	AD WEIGHT: TH: <u>/2.75</u> ^{//} MOISTURE (<u>2.(.1</u> <u>2.1.0</u> <u>19.4</u>	$4 \underline{2} 4$ $ACTUALLOA$ $CONTENT (METER I)$ $READINGS$ $21.5 21.1$ $21.7 21.1$	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE k4 <u>k4</u> (x4	
CALCULATED LOA FUEL PIECE LENGT <u>PIEC</u> 1	AD WEIGHT: TH: <u>/2.75</u> ^{//} MOISTURE (<u>2.(.1</u> <u>2.1.0</u> <u>19.4</u>	$4 \underline{2} 4$ $ACTUALLOA$ $CONTENT (METER I)$ $READINGS$ $21.5 21.1$ $21.7 21.1$	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE k4 <u>k4</u> (x4	
CALCULATED LOA FUEL PIECE LENGT 1 2 3 4 5 6 7 8	AD WEIGHT: TH: <u>/2.75</u> ^{//} MOISTURE (<u>2.(.1</u> <u>2.1.0</u> <u>19.4</u>	$4 \underline{2} 4$ $ACTUALLOA$ $CONTENT (METER I)$ $READINGS$ $21.5 21.1$ $21.7 21.1$	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE k4 <u>k4</u> (x4	
CALCULATED LOA FUEL PIECE LENGT 1 2 3 4 5 6 7 8 9 10	AD WEIGHT: TH: <u>/2.75</u> ^{//} MOISTURE (<u>2.(.1</u> <u>2.(.1</u> <u>2.1.0</u> <u>19.4</u> <u>2.1.4</u> <u></u>	$4 \ 2 \ 4$ <u>ACTUAL LOA</u> <u>ACTUAL LOA</u> <u>CONTENT (METER I</u> <u>READINGS</u> <u>21,5</u> <u>21,1</u> <u>21,7</u> <u>21,1</u> <u>22,2</u> <u>20,5</u> <u>19,4</u>	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE *4 *4 *4 *4 *4 *4 *4	
CALCULATED LOA FUEL PIECE LENGT 1 2 3 4 5 6 7 8 9 10	$\frac{D \text{ WEIGHT:}}{\text{MOISTURE}}$ $\frac{12.75}{\text{MOISTURE}}$ $\frac{2.1.1}{19.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$	$4 \underline{2} 4$ $ACTUAL LOA$ $CONTENT (METER I)$ $READINGS$ $21.5 2.1.1$ $21.7 21.1$ $22.5 19.4$ $22.5 19.4$ $22.5 19.4$ $22.5 19.4$ $22.5 19.4$	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE *4 *4 *4 *4 *4 *4 *4 *4 *4 *4	
CALCULATED LOA FUEL PIECE LENGT 1 2 3 4 5 6 7 8 9 10	$\frac{D \text{ WEIGHT:}}{\text{MOISTURE}}$ $\frac{12.75}{\text{MOISTURE}}$ $\frac{2.1.1}{19.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$ $\frac{19.44}{21.4}$	$4 \ 2 \ 4$ <u>ACTUAL LOA</u> <u>ACTUAL LOA</u> <u>CONTENT (METER I</u> <u>READINGS</u> <u>21,5</u> <u>21,1</u> <u>21,7</u> <u>21,1</u> <u>22,2</u> <u>20,5</u> <u>19,4</u>	D WEIGHT:	6.9 (4 k4) 10.7 Total (PE *4 *4 *4 *4 *4 *4 *4	

Control No. P-SFB-0006 (Woodstove Fuel Load Information).doc, Effective date: 04/18/2007

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Page 1 of 1 4 - 18 OF 4 - 47

OMNI-Test Laboratori€ Beaverton, OR

Run Notes	3
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Client: <u>SBI</u> Model: Monaco 2008 Project #: 338-F-68-3 Tracking #: 1161 Run #: 2 Test Crew: K. Morgan

Date: 12-12-07

OMNI Equipment ID'#(s):

PREBURN

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

°C.

PRIMARY:

Gauged 0,030"

SECONDARY:	FIXED - to PRIMO
TERTIARY:	<u>N/</u> 4
FAN:	ON-High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) <u>CHANGES</u> PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
£ 60	TEST SETTING				X	Levelled

TEST

TEST FUEL CONFIGURATION SKETCH START UP PROCEDURES (INDICATE VIEW ANGLE) BYPASS: N/A FUEL LOADING Loaded by SO Sec. DOOR: Asar antil 4.5 min PRIMARY AIR: Full open until somin Abruptly Closed to test setting FRONT -> ut 50 min NONE OTHER: DESCRIBE OR SKETCH TEST SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE) SECONDARY: TANKOM With PRIMARY PRIMARY: TERTIARY: Same a above ON- Hive FAN: 1. Morge Technician signature: Date: 12-12-07 Page 1 of 1 4 - 19 OF 4 - 47

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

Lange Street

(reference) .

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Supplemental Data EPA 5G/5H

Client:	<u>SBI</u>	n an	• • •		•	• • •		
Model:	<u>Monaco 20</u>	08	,			• •		
Project #	#: <u>338-F-68</u>	3-3	Tracking	#: <u>1161</u>			. •	
	12-12-07			Run #			·	
Test Cre	ew: K. W	NorgAN	Start Tir	ne: 12:18	Stop Time:_	16:18		
	quipment #			· · ·	· .		· · · · · · · · · · · · · · · · · · ·	
Gas Ana	alvzer Train	Leak Check	•	·			· · ·	
	tack:	Lean oncon		ution Tunne	(Method 50	2 Optu):		
	Initial:	I	Di		nitial:	s Oniy).		
			`			1	. · · ·	
Calibratio	ons: Span (Gas CO ₂ :	- N/A 0	2. N/A	CO: N/A	/ _CO₂(DŢ∕):	NA	
		2		<u> </u>	<u> </u>		<u>.</u>	
	N ₂ Span	N ₂ Span	N₂ Span	N ₂ Span	N ₂ Span	N₂ Span	N ₂ Span	
Time				1		(· · · ·		
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CO ₂			N/	H.				
СО								
CO ₂ (DT)								
Stack Dia	ameter (incl	nes):	la,0"	• •			· · · · · · · · · · · · · · · · · · ·	
				Final:	150			
Scale Au				Post Te		· · ·		
Induced I	Draft:			moke Captu				
Pitot Tub	e Leak Test	t: Pre: 🥒		<u>, e.</u> Po		3.1" will		
+				es: Date: _/2			/	
						· · · ·	<u> </u>	
· · · · · · · · · · · · · · · · · · ·		Init	al	Mid	dle	End	ling	
Pb (in/	Hg)	79	16 29.780	81	14 29.86 0	29.98 0		
Room Ter	np (°F)	79	· · · · ·	୫/	•			
Technicia	n signature	: 16.	1. Moren	r je F)ate: /2	-12-07		
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Control No. P-SFAO-0007 (Supplemental Data EPA 5G).doc, Effective date: 05/08/2007

Page 1 of 1 4 - 20 0F 4 - 47 Model: Monaco 2008 Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada G1N 4R9

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Run 3

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Wood Heater Test Data - EPA Method 5G

Manufacturer: Model: Project No.: Tracking No.: Run: Test Date:	Monaco 2008 338-F-68-3 1161 3		
Burn Rate	1.37 kg/hr dry		
Average Tunnel Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd	117 degrees Fahrenheit 13.4 feet/second 8362.4 dscf/hour		
Average Delta p Average Delta H Total Time of Test	0.052 inches H20 0.00 inches H20 170 minutes		
L	AVERAGE	J 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/nour
	F	esults Are Acceptab	le

Run 3

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20			"Hg	3.9	4.2	1	4	t In.	0	2	80	\$2	12	52	80	22	75	75	22	75	20	88	8	5	5		1.9	
Signature/Date: K J. Marga 1-21-08		0.1963 ft2	cfm@			Stack		<u>н</u>	H2O	020.0-	-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	090.0-	0.073
(Morg-	140.4	11		Fuel Moisture (dry basis %): Total Particulate (1):	Total Particulate (2):			sr Amhient	_	81	80	18	82	81	82	.82	81	81	18	81	81	80	80	80	8	62	-79	
ate: K/	Intial Tunnel Flow: Average Tunnel Flow:	Tunnel Area:	Check (2)	Moisture (Total P.	Total P.			- Impinger																				#DIV/01 #DIV/01
gnature/D	Intial T Average	Tunnel Area: Post-Test Leak Check (1)	Post-Test Leak Check (2):		"Hg			Impinger	exit (1)																			#DIV/01
S	,	Post		+)`ì	- ^{30,21} "Hg	•		Filter	3	78	82	82	82	82	82	83	8	84	84	84	85	84	84	84	83	. 83	82	82.83
	ole			11	30.26	Ľ.			Ξ	79	18	80	80 .	80	· 80	80	- 81	81	81	81	82	81	81	18	81	80	. 80	80.56
. 11	29.00 lb/lb-mole 28.56 lb/lb-mole	4.00 percent -0.128 "H2O		egin Middle	30.22	e Data o		Stack		354	480	505	527	526	495	463	440	424	420	417	386	368	. 354	345 .	331	321	315	
SRI 046 47		4.0	0.84	Begin	30.14	mocrafur		Average	Surface	487.6	537.0	547.0	547.8	557.0	539.4	530.0	522.0	518.2	518.0	522.8	508.0	496.4	489.0	481.8	470.2	461.0	451.4	36
i Module	MW(dry): MW(wet):	mel H2O: nel Static:	Pitot Tube Cp:	r ractor. Pressure:		Wood Heater Temperature Data oF		Catalyst	EXIL									•										
PM Control Module	Dilution Tunnel MW(dry): Dilution Tunnel MW(wet)	Dilution Tunnel H2O: Dilution Tunnel Static:	Pitot Tube Cp:	Barometric Pressure:		H pooM		Firebox	Kight	421	412	406	408	421	424	441	438	440	442	446	445	439	434	427	413	401	391	
	Dilu Dilu							Firebox .	Lett	433	428	414	419.	435	441	448	449	447	450	454	450	443	435	428	419	410	401	
		"H2O of						Firebox	Back	636	631 5	609	602	609	619	614	622	634	642	644	647	648	647	641	630	621	605	
	Pt.8	0.048					-	Firebox	Bottom	401	416	410	398	387	381	383	382 .	379	378	373	374	373	377	378	383	383	382	
	Pt.7	0.050 120					\vdash	×	dor	547	798	896	912 -	933	832	764	719	169	678	697	624	579	552	535	506	490	478	
	Pt.6	0.055				ght, lb	╞	Weight Chorace	ciralige		-1.9	-1.2	-1.3	. 1'1-	-0.8	-0.6	-0.5	-0.5	-0.4	-0.5	-0.3	- - -	-0.2	-0.2	-0.2	-0.2	-0.1	
	e Data, Pt.5	0.050				Fuel Weight, Ib	H	Scale Dandinin	-	10.3	8.4	7.2	5.9	4:8	4.0	3.4	2.9	2.4	2.0	21 S	77	6.0	0.7	C 0	0.3	0.1	0.0	
	Velocity Traverse Data Pt.3 Pt.4 Pt.5	0.058				-	Pro Rate	_	(3)		103	00	107	97	66	100	104	8	101	102	101	6	001	3	100	100	102	100.82
	Velocity Pt.3	0.055					ro Rate F	(10%)	Ξ		104	104	109	96	102	66	103	0	100	103	00	77	66	<u>8</u>	100	100	99	100.84 1
	Pt.2	-					Dilution Pro Rate	Tunnel	đ	0.053	0.050	0.050	.050	0.050	0.050	0.050	050	0.053	0.053	0.050	0.000		0.033	5c0.0	0.053	0.053	0.053	0.052 10
	$ $ \vdash	0.050	umbers:				Dilution D		d			+	+							116	+	+	100	+	-		101	117.40 0.
	. 22	Initial dP Initial Temp.	OMNI Equipment Numbers:				Meter Vac.		-	0	0	0	-	0	- -			•							-		0	
l		In It	OMNI E				Meter Vac. Me	In. Hg.	0	-	-		, .	_			-								-	0	0	
						ing Data	Meter Mete		+		_	6	-		+	-			_	_			0 ~		\downarrow	_		5
						Particulate Sampling Data	Meter Me		+	_	+	8/ 8/	-	+	+		18 18	+	6/ 8/	78 70	╉	╀	-	+	+	77 78	+	77.67 78.67
	•					Particula:	-	dH (2)		-	+	0.00	+			+	nn:n	-	0.0	-	+	+-	+	+	-	+	0.00	0.00
			min	nin				dH (1) Hp		+	0.0		+	+	╋	┢	0.0	+-		+	+	╈	+	+		+	+	0.00
			1				Sample	-tim	(7)		0.12	•	0.12	0.11	T	╧	0.12		1		+	t		╈	╈	1	1	0.12
_	Monaco 2008 1161	538-1-08-3 12-Dec-07	19:43 10					Rate, cfm 3	(II) 711111111		0.10	0.10	71.0	010	, 010 , 010	010	010	010	010	0.10	0.10	010	010	010	0.10	0.10	01.0	0.10
Manufacturer: SBI		10 E						eet	(7)	8	/1/.010					╇	-			+	_		+	+	+		+	19.788 (
3 Manufi	Tracki	Te: Te:	Beginning Clock Jime: Recording Interval:	Total Sampling Time:		ł		Cubic Feet Cub	╉	+	+	+	+	+-	-	╈	+-	+		+	+	1	+	+-	+	+	╈	-
:u			Beg:	To			_		+	+	100.000		+	+-	+-	╈	+	-		+	-	┢	+	┢	-			otal 17.526
Run:							- Elapsed	Time				2 6		2	8.09	02	808	88	202	110	120	130	140	150	071	201	Ĭ	Avg/Total

Page 1 of 1

Control No. P-SSU-0003 (Dual Train - 5G Emission Calculations) xls, Effective date: 10/19/2004

Wood Heater Test Data - EPA Method 5G

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

Client Name:	SBI		Equipment N	Jumbers:		Run #:	3	
Model:	Monaco 2008						 Train #:	A
Project No.:	338-F-68-3	· · ·				Date:	12/12/07	
Tracking No.:		1161				-	····	
		· • ·						
S	Sample Component			Reagent	Filter # or		Weights	
					Probe #	Final, mg	Tare, mg	Particulate, m
A. Front filter ca	itch		-	Filter	9	108.2	104.8	3.4
B. Rear filter cat	ich			Filter	. 10	117.9	117.5	0.4
C. Probe catch	· · · · · · · · · · · · · · · · · · ·			Probe	3	188255.9	188255.8	0.1

Total Particulate, mg :

3.9

Train 1 - 47

24

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

Analyst: 1h J. Mon

Date: 1-21-08

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

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

Client N	ame:	SBI	- -	Equipment Numbers:	-	Run #:	3
М	odel:	Monaco 2008	· · · · · · · · · · · · · · · · · · ·			Train #:	B
5		338-F-68-3	-			Date:	12/12/07
Tracking	No.:		1161		· · · ·		

Sample Component	Reagent			Weights				
		Probe #	Final, mg	Tare, mg	Particulate, m			
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

Train 2

25

1 -

7

Component	Equations:	<u> </u>
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

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

		of					5 2 2	2'2	Net Den	Catalyst																						
		Page	.	<u>ب</u>		-	Actual.	Coal Bed		Flue		Sos	534	539	493	135	354	-												-		12-12-07
	56	•	Tracking # 1161							Right	162	329	361	394	424	434	421															Date:
	TEMPERATURE TEST DATA - METHOD 5G	·	Trackin			,		211-2,5	TURES (oF)	Left	346	379	405	429	Huft	445	433															
	ATA - N	·	ې بې			. . .		Range:	TEMPERA ⁻	Back	the for	468	494	SZD	554	611	636															~~~~
	TEST D		338-F-68-3	·						Bottom	295	316	326	336	350	569	104														/ / ./M	. J. More
	RATURE		Project #:	Morgan				 0			829	865	933	947	843	704	547															re://
	TEMPER			Ý			Coal Bed.	Data:		Ambient	100	A I	201	85	28	28	81			-												l echnician signature:
	STOVE .		co 2008	Test Crew:		:		i			-,085	cent	2001-	1021	-1080	-,070	-,070															l echnicia
	•		Client/Model: SBI / Monaco 2008_	N	nt ID #:			: - -		Inveigni		1.2		1	0.1	0.4	2.0															
Lab 1:28, 2388			/Model: S	12-2-07	OMNI Equipment ID #:		<u>א</u> ב		Moish#	a di second	2.9						7.7				-											•
OR			Client	Date:	INMO		Preburn	I est	Timo			20	30	4					3		0	20	ကို	40	50	60	20	80	66	AVG	-	
Beaverton						- - 		і.	: ·.		•	-		:											·						. *	

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Control No. P-SFG-0004 (Woodstove Temperature Test Data-Method 5G).xls, Effective date: 03/07/2000

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Page I of I

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FUEL DATA

Client: <u>SBI</u>	· •				. .
Model: Monaco 2008	·				
Project #: <u>338-F-68-3</u> Date: <u>12 (2-07</u> OMNI Equipment ID #: FUEL LOAD PREPARE FUEL: DOUGLAS-FIF	Tracking # 1161	. •			
Date: 12-17-07	Test Crown	K. Margare		D #.	2
MNI Fauinment ID #:	Itst Clew	- Contragent		Kun #:	,
	DDV. 11 Mars	AI AIL DE	DADE		<u> </u>
	DDI. <u>N. MOR</u>	TED AND DOLED	TANDARD OD		בו ביו ה
UEL: DOUGLAS-FIF		TED, AIR-DRIED, S	IANDARD GR	ADE OR BET	iek,
			· · · · · · · · · · · · · · · · · · ·		
		PRE-BURN FUE	Ĺ		
	MOISTURE (CONTENT (METER	DRY BASIS)	
CALIBRATION:	Cal Value $(1) = 12\%$ Cal Value $(2) = 22\%$	Actual Readi	ng 12.6		· · ·
	Cal value $(2) - 22\%$	Actual Read	ng 2210		
Piece	Length / 9,	3 Readings		Туре	
1	<u>8</u> ft /4 <u>7</u> 8	18.9	19.1	<u>Type</u>	
2	<u>_ength</u> /9, <u>8</u> ft /2 <u>/8</u> ft ft				- '
			·		
Length of cut piece	s: 809.5 inches	Pre-Burn	Fuel Average M	loisture: 19,	10%
ті	ula -				
Time (clock): <u>//</u>	40 Room Tempe	rature (F): <u>/></u>	Initials:	/~	
	······				
4					
		TEST FUEL			
FUEL TYPE AND AN	10UNT: 2 X 4	TEST FUEL 2	4×4 Z		
FUEL TYPE AND AN CALCULATED LOAN	10UNT: 2 X4 D WEIGHT:	TEST FUEL 2 ACTUAL L	4 火 4 <u>∠</u> OAD WEIGHT:	3,2	(2 × 4)
FUEL TYPE AND AN CALCULATED LOAD	10UNT: 2 X4 2 WEIGHT:	TEST FUEL 2 ACTUAL L	4¥4 <u>Z</u> OAD WEIGHT:	3,2	(2×4) (4×4)
FUEL TYPE AND AN CALCULATED LOAN FUEL PIECE LENGT	10UNT: 2 X4 <u>2 WEIGHT:</u> H: 13 D	TEST FUEL 2 ACTUAL L	4¥4 <u>Z</u> .0AD WEIGHT:	3,2 7,1 10,3	(2 × 4) (4 × 4) Total
FUEL TYPE AND AN CALCULATED LOA FUEL PIECE LENGT	1	TEST FUEL ACTUAL L ONTENT (METER		1013	(2 × 4) (4 × 4) Total
FORE FIRE FERGI	MOISTURE C	<u>ONTENT (METER –</u>		1015	(2 × 4) (4 × 4) Total
FUEL TYPE AND AN CALCULATED LOAD FUEL PIECE LENGT PIECE	MOISTURE C	• •		1013	(2 × 4) (4 × 4) Total
PIECE	MOISTURE C	ONTENT (METER - READINGS	- – DRY BASIS)	TYPE	(2 × 4) (4 × 4) Total
PIECE 1	MOISTURE C	<u>ONTENT (METER -</u> <u>READINGS</u> 	<u> DRY BASIS)</u> 9.3	<u>TYPE</u> <u>z × 4</u>	(2 × 4) (4 × 4) Total
PIECE	MOISTURE C 20,4 23,8 21,1	ONTENT (METER - <u>READINGS</u> <u> </u>	- – DRY BASIS)	TYPE	(2 × 4) (4 × 4) Total
PIECE 1	MOISTURE CO 20.4 23.8	ONTENT (METER - <u>READINGS</u> <u>18, 8</u> <u>1</u> <u>19,8</u> <u>2</u> <u>21,7</u> <u>2</u>	DR Y BA SIS) 9.3	<u>TYPE</u> <u>z x 4</u> <u>z x 4</u>	(2 × 4) (4 × 4) Total
PIECE	MOISTURE C 20,4 23,8 21,1	ONTENT (METER - <u>READINGS</u> <u> </u>	<u> DRY BASIS)</u> <u>9. 3</u> 0.1 2.4	<u>TYPE</u> <u>2 × 4</u> <u>2 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE	MOISTURE C 20,4 23,8 21,1	ONTENT (METER - <u>READINGS</u> <u> </u>	<u> DRY BASIS)</u> <u>9. 3</u> 0.1 2.4	<u>TYPE</u> <u>2 × 4</u> <u>2 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE 1	MOISTURE C 20,4 23,8 21,1	ONTENT (METER - <u>READINGS</u> <u> </u>	<u> DRY BASIS)</u> <u>9. 3</u> 0.1 2.4	<u>TYPE</u> <u>2 × 4</u> <u>2 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE 1	MOISTURE C 20,4 23,8 21,1	ONTENT (METER - <u>READINGS</u> <u> </u>	<u> DRY BASIS)</u> <u>9. 3</u> 0.1 2.4	<u>TYPE</u> <u>2 × 4</u> <u>2 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE 1 2 3 4 5 6 7 8	MOISTURE C 20,4 23,8 21,1	ONTENT (METER - <u>READINGS</u> <u> </u>	<u> DRY BASIS)</u> <u>9. 3</u> 0.1 2.4	<u>TYPE</u> <u>2 × 4</u> <u>2 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE 1 2 3 4 5 6 7 8 9 10	MOISTURE C	ONTENT (METER - READINGS	<u>9.3</u> 0.1 2.4 7.4	<u>TYPE</u> <u>2 × 4</u> <u>4 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE 1 2 3 4 5 6 7 8 9 10	MOISTURE C 20,4 23,8 21,1	ONTENT (METER - READINGS	<u>9.3</u> 0.1 2.4 7.4	<u>TYPE</u> <u>2 × 4</u> <u>4 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE 1 2 3 4 5 6 7 8 9 10 0	$\frac{z \sigma.4}{23.8}$ 21.1 19.4 VERALL TEST FUEL	ONTENT (METER - READINGS 	<u>7. 3</u> <u>7. 3</u> <u>0.1</u> <u>2. 4</u> <u>7. 4</u> <u>7. 4</u> <u>8. A VERA GE</u> : <u>-</u>	<u>TYPE</u> <u>2 × 4</u> <u>4 × 4</u> <u>4 × 4</u> <u>4 × 4</u> <u>20.72</u>	(2 × 4) (4 × 4) Total
PIECE 1 2 3 4 5 6 7 8 9 10	$\frac{z \sigma.4}{23.8}$ 21.1 19.4 VERALL TEST FUEL	ONTENT (METER - READINGS	<u>7. 3</u> <u>7. 3</u> <u>0.1</u> <u>2. 4</u> <u>7. 4</u> <u>7. 4</u> <u>8. A VERA GE</u> : <u>-</u>	<u>TYPE</u> <u>2 × 4</u> <u>4 × 4</u> <u>4 × 4</u>	(2 × 4) (4 × 4) Total
PIECE 1 2 3 4 5 6 7 8 9 10 0	$\frac{20.4}{23.8}$ $\frac{21.1}{19.4}$ $\frac{21.1}{19.4}$ $\frac{23.8}{21.1}$ $\frac{21.1}{19.4}$ $\frac{23.8}{21.1}$ $\frac{21.1}{19.4}$ $\frac{23.8}{21.1}$ $\frac{21.1}{19.4}$ $\frac{23.8}{21.1}$ $\frac{21.1}{19.4}$ $\frac{23.8}{21.1}$	ONTENT (METER - READINGS 19.8 1 21.7 2 22.4 15	<u>7. 3</u> <u>9. 3</u> <u>0.1</u> <u>2. 4</u> <u>7.4</u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u>	<u>TYPE</u> <u>2 × 4</u> <u>4 × 4</u> <u>4 × 4</u> <u>4 × 4</u> <u>20.72</u>	(2 × 4) (4 × 4) Total
PIECE 1 2 3 4 5 6 7 8 9 10 0	$\frac{z \sigma.4}{23.8}$ 21.1 19.4 VERALL TEST FUEL	ONTENT (METER - READINGS	<u>7. 3</u> <u>9. 3</u> <u>0.1</u> <u>2. 4</u> <u>7.4</u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u> <u></u>	<u>TYPE</u> <u>2 × 4</u> <u>4 × 4</u> <u>4 × 4</u> <u>4 × 4</u> <u>20.72</u>	lotal

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OF 4 - 47

Control No. P-SFB-0006 (Woodstove Fuel Load Information).doc, Effective date: 04/18/2007

PRIMARY/SECONDARY/TERTIARY CHANGE + WT. - WT. COAL Ø Test setting			Taatlaharatari	
Client: <u>SBI</u> Model: <u>Monaco 2008</u> Project #: <u>338-F-68-3</u> Tracking #: <u>1161</u> Run #: <u>3</u> Date: <u>12-12-07</u> Test Crew: <u>K. Morgan</u> OMNI Equipment ID #(s): <u>PREBURN</u> DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE) PRIMARY: <u>SECONDARY: <u>TANDOM</u> - <i>with - PA</i> <i>INDEX EO w</i> r^A +772⁻⁴/₇/₇ <i>Di Ameter Daill</i> bit, PREBURN SETTINGS AND ACTIVITIES <u>TIME</u> <u>AIR (THERMO) CHANGES</u> FAN: <u>ADD</u> <u>ADD</u> <u>RAKE</u> <u>COMMI</u> <i>O</i> <u>Test setting</u> <u>AIR (THERMO) CHANGES</u> <u>FAN:</u> <i>w</i>. <i>Adjust</i> <i>do</i> <u>Test setting</u> <u>AIR (THERMO) CHANGES</u> <u>FAN:</u> <i>ADD</i> <u>ADD</u> <u>ADD</u> <u>RAKE</u> <u>COMMI</u> <i>do</i> <u>Test setting</u> <u>AIR (THERMO) CHANGES</u> <u>FAN:</u> <i>w</i>. <i>Adjust</i> <i>do</i> <u>Test setting</u> <u>AIR (THERMO) CHANGES</u> <u>FAN:</u> <i>ADD</i> <u>ADD</u> <u>ADD</u> <u>ADD</u> <u>Advist</u> <i>w</i>. <i>Adjust</i> <i>do</i> <u>Test setting</u> <u>AIR (THERMO) CHANGES</u> <u>FAN:</u> <i>ADD</i> <u>ADD</u> <u>ADD</u> <u>ADD</u> <u>ADD</u> <u>Advist</u> <i>w</i>. <i>Adjust</i> <i>AIR</i> (THERMO) <u>CHANGES</u> <u>FAN:</u> <i>ADD</i> <u>ADD</u> <u>ADD</u> <i>w</i>. <i>Adjust</i> <i>Advist w</i>. <i>Adjust</i> <i>Advist w</i>. <i>Adjust</i> <i>Advist w</i>. <i>Adjust</i> <i>Advist w</i>. <i>Adjust</i> <i>BYPASS:</i> <u><i>M/A</i></u> FUEL LOONFIGURATION SKETCH (NDICATE VIEW ANGLE) <u>BYPASS: <i>M/A</i></u> FUEL LOADDING <u>Loaded</u> <i>by</i> <u>55 second</u></u>			n, OR	
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		n Notes	R	
Run #: 3 Date: $12-13-07$ Test Crew: K. Morgan OMNI Equipment ID #(s): DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE) PRIMARY: SECONDARY: $TANDOM - With - R$ INDEXED $0 \text{ of } A + 772^{-4} \text{ //} A$ DI Ameter Deltition PREBURN SETTINGS AND ACTIVITIES TIME AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY FAN: $0 \text{ ADD } + 164 \text{ //} ADD$ PREBURN SETTINGS AND ACTIVITIES TIME PRIMARY/SECONDARY/TERTIARY Go Test setting 37 $0 \text{ of } - RAKE + WT WT. + WT.$: <u>Monaco 2008</u> et #: <u>338-F-68-3</u>	Model Projec
PREBURN DESCRIBE OR SKETCH AIR OR THERMOMSTAT SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCABLE) PRIMARY: SECONDARY: TANDOM - With - fr INDEXED with + ++2*/L INDEXED with + ++2*/L DIAMACHIC DRILL territary: PREBURN SETTINGS AND ACTIVITIES PREBURN SETTINGS AND ACTIVITIES TIME PRIMARY/SECONDARY/TERTIARY SETTING ADD AIR (THERMO) CHANGES FAN HARY: COAL COMMIC WIT WIT WIT PREBURN SETTINGS AND ACTIVITIES TIME PRIMARY/SECONDARY/TERTIARY SETTING ADD ARKE COMMIC O TEST SETTING TEST FUEL CONFIGURATION SKETCH TEST INDICATE VIEW ANGLE) TEST MAR FUEL LOADING BYPASS: M/A FUEL LOADING Fuel LOADING BYPASS: M/A		12-12-07	crew: <u>K. Morgan</u> Date: <u></u>	Run # Test C
(SETTINGS MUST BE ACCURATE AND REPRODUCABLE) PRIMARY: SECONDARY: TANDEXED INDEXED INDEXECTION PREBURN SETTINGS AND ACTIVITIES IME IME PREBURN SETTINGS AND ACTIVITIES IME IME PREBURN SETTINGS AND ACTIVITIES IME ON- High IME PREBURN SETTINGS AND ACTIVITIES IME IME IME IME IME Image: Second<				
INDEXED with #172"/k INDEXED with #172"/k DIAMETER Deall bit, FAN: ON-HIGH PREBURN SETTINGS AND ACTIVITIES IMDEXED PREBURN SETTING FUEL PREBURN SETTING FUEL PREBURN SETTING FUEL PREBURN SETTING ADD PREBURN SETTING FUEL PREBURN SETTING K PREBURN S			NGS MUST BE ACCURATE AND REPI	(SETTI
FAN: ON-HIGH PREBURN SETTINGS AND ACTIVITIES Image: Primary/secondary/tertiary FAN ADD PRIMARY/Secondary/tertiary FAN ADD Fuel Fuel Primary/secondary/tertiary Change + WT. Primary/secondary/tertiary Fan ADD Fuel Fuel COAL COMMI Primary/secondary/tertiary wt. Primary/secondary/secondary/tertiary wt. Primary/secondary/secondary/tertiary wt. Primary/secondary/secondary/tertiary wt. Primary/secondary/secondary wt. Primary wt. Primary wt. Primary wt. Primary <t< td=""><td>SECONDARY: TANDOM - WITH - PRIMA</td><td>1</td><td>RY:</td><td></td></t<>	SECONDARY: TANDOM - WITH - PRIMA	1	RY:	
PREBURN SETTINGS AND ACTIVITIES TIME AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY FAN SETTING CHANGE ADD FUEL + WT. ADD FUEL COAL RAKE COMMI COAL COMMI COAL 0 Test setting	TERTIARY: NONE		INDEXED with 172" K Drameter Drill bit.	
TIME AIR (THERMO) <u>CHANGES</u> PRIMARY/SECONDARY/TERTIARY FAN SETTING CHANGE ADD FUEL + WT. ADD FUEL -WT. RAKE COAL COMMI COAL Ø Test setting	FAN: <u>ON-HIGH</u>			
TIME AIR (THERMO) <u>CHANGES</u> PRIMARY/SECONDARY/TERTIARY SETTING CHANGE FUEL + WT. FUEL - WT. COAL COMMI COAL Ø Test setting	CTIVITIES	INGS AND A	PREBURN SET	
37 60 x Heights TEST FUEL CONFIGURATION SKETCH (INDICATE VIEW ANGLE) TEST START UP PROCEDURES M/A FUEL LOADING Loaded by 35 Second	JEL FUEL COAL COMMENT	SETTING F	PRIMARY/SECONDARY/TERTIARY	ТІМЕ
TEST FUEL CONFIGURATION SKETCH START UP PROCEDURES (INDICATE VIEW ANGLE) BYPASS: <u>N/A</u> FUEL LOADING Loaded by 35 Second	X Adjubt X levelled		Test setting	37
TEST FUEL CONFIGURATION SKETCH START UP PROCEDURES (INDICATE VIEW ANGLE) BYPASS: <u>N/A</u> FUEL LOADING Loaded by 35 Second		<u> </u>		
PRIMARY AIR: Full open for S.O MIN	DADING Loaded by 35 seconds. ASAR FUR 3,0 minutes	BYPAS FUEL L DOOR:	•	
FRONT→ FRONT→ OTHER: None None None	setting at 5,0 min.	OTHER	FRONT ->	
DESCRIBE OR SKETCH TEST SETTINGS BELOW: (SETTINGS MUST BE ACCURATE AND REPRODUCIBLE) PRIMARY: SECONDARY: <u>TANDOM WILL PRIMARY</u>	SECONDARY: TANOOM With PRIMARY	DW:	S MUST BE ACCURATE AND REPRODUCIBLE	(SETTING
] TERTIARY: NONE SAME AS ABOVE	TERTIARY: NONE		A Amaren	
FAN: ON - High	=AN: <u>ON - High</u>		SAME AS ABOVE	
H.07 Technician signature: 1/ 1. Morg Date: 12-13-07	Date: 12-12-07	ture: <u> </u>	Technician sign	4.07

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		Supple	emental	Data EP	A 5G/5H		
Client: S	<u>BI</u>	÷.	· .				
Model: <u>M</u>	<u>Monaco 20</u>	08	•		· ·		
Project#	: <u>338-F-68</u>	3-3	Tracking	#: 1161			· .
	2-12-07			•	Boot	h:	
Test Crev	N: H. Mor	ma/	Start Tir	ne: 19:43	Stop Time:	22:33	
		(s):					· ·
· .		Leak Check	•				
	ack:				l (Method 50	.,	
	Initial:	- ALA		lr	nitial:/	1	
	Final:	N/IT	· /	F	inal: <u>///</u>	<u>,</u> CO ₂ (DT): _	1
Calibratio	ns: Span (Gas CO ₂ :	<u>_N/A</u> 0	2: <u>N/A</u>	CO: <u>N/A</u>	_CO ₂ (DT): _	<u> N/A</u>
	N₂ Span	N ₂ Span	N₂ Span	N₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time				,			
O ₂ .			. / /	1			
CO ₂			N//	1	· · ·	····	
CO							
CO ₂ (DT)							········
Stack Dia	meter (incl	nes):	6.0				
	•	Initial:		Final:	< 50		
		Pretest:					
Induced D				moke Captu			<u>.</u> .
Pitot Tube	Leak Tes	t: Pre:				3,1 " w. C.	
	. · ·					Initials: /	2
		L					
		Init	ial	Mid	ldle	End	ling
Pb (in/ŀ	lg)	-St /	4 30.14 cr	811	C 30.22 CF	79	1C 30.26 C
Room Terr	np (°F)	81		81		79	. • •
Techniciar	n signature	: <i>I</i> L.	1. Moran	- E	Date: <u>/2</u>	-12-07	1
	•	· · ·					•
Control No. P-S	SFAO-0007 (Su)	oplemental Data E	PA 5G) doc, Effe	ctive date: 05/08/	2007	Pa	ge 1 of 1

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

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Run 4

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Wood Heater Test Data - EPA Method 5G

	· · · · · · · · · · · · · · · · · · ·		
Manufacturer:	SBI		
•		· .	
Model:	Monaco 2008		and the second
Project No.:			· .
Tracking No.:	1161	· .	
Run:	4	. · · · ·	· · · ·
Test Date:	12/13/07	· · · · · · · · · · · · · · · · · · ·	
		-	
	······································	,	
Burn Rate	1.19 kg/hr dry		
	3		
Average Tunnel Temperature	117 degrees Fahrenheit		
Average Gas Velocity in Dilution Tunnel - vs	13.0 feet/second		
Average Gas Flow Rate in Dilution Tunnel - Qsd	8153.2 dscf/hour		
Average Delta p	0.049 inches H20		
Average Delta H	0.00 inches H20		
Total Time of Test	190 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 7.5% of the weighted average emission rate limit	4.10 grams/hour		
a so to the weighted average emission rate limit	0.31	1	·
	· F	Results Are Acceptab	le
	New generation of the second s		

Control No. P-SSU-0001 (Dual Train - SG Emission Calculations).de, Effective date: 4/29/2

Page 1 of 1

Run 4

																												,					
Similar 1. 1. 1. 1. 1. 1. 28	filsec .	sefm	scfm	ft2	0@5 cfm@"Hg	.001@5 cfm@"Hg	21.43	4.4		Stack	,	HZO	-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	1200-
6194 1	12.97			0.1963 ft2	0@5	.001@5	basis %): ulate (1):	ulate (2):				Ambient	8	79	80	81	80	82	82	82	82	82	82	82	82	82	81	81	81	81	81	81	
14 1.11	locity-	el Flow:	nel Flow:	Area:	teck (1):	eck (2): _	Fuel Moisture (dry basis %): Total Particulate (1):	Total Particulate (2):				exit (2)																					
oto:Doto:	Tunnel Velocity	Intial Tunnel Flow:	Average Tunnel Flow:	Tunnel Area:	Post-Test Leak Check (1):	Post-Test Leak Check (2):	Fuel Mo	^g H"				exit (1)	_											_									#DIV/01 #
Cion.	nair.		Ā		Post-Te	Post-Te	(2) Avergoe	30.28 "			F	(2)	+	85	. 98	85	84	84	84	83	82	82	81	82	81	81	83	83	84	83	84	84	82.10 #
							0.974 Fnd	1) 18	84	84 -	81	80	80	79	78	78	78	78	78	74	11	81	82	83	83	83	83	80.25
		29.00 lb/lb-mole	28.56 lb/lb-mole	percent	"H2O	:	.(I) Middle	30.31		Data, oF		Stack	323	462	500	522	535	509	468	439	414	401	402	406	372	349	332	322	315	302	301	293	
	SBI 046.47	29.00	28.56	4.00 F	-0.115 "H2O	0.84	0.975 (1) Reatin M	30.29	1	perature		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	Ę
	PM Control Module: SBI 046.47	fW(drv):	fW(wet):	nel H2O:	el Static:	Pitot Tube Cp:	/ Factor:	-	1	Wood Heater Temperature Data, oF		Exit						,															
	M Control	Dilution Tunnel MW(dry):	Dilution Tunnel MW(wet):	Dilution Tunnel H2O:	Dilution Tunnel Static:	Pitot 7	Meter Box Y Factor: Barometric Pressure			Wood H		Right	394	390	387	393	404	422	434	433	432	429	428	432	433	421	406	395	384	374	366	356	
	đ.	Dilutio	Dilutio	D	Dih		Z ₽	, i			⊢	Left F	415	407	400	410	423	435	435	-		429 4	_	_	424 .	416 4		_	392 3				
	2							.		-,						\vdash		_				-			_			399		386	380	371	
		Γ	Π		<u>ٿ</u>								563	552	525	531	564	· 602	616	624	626	624	620	612	. 611	608	598	588	581	572	559	540	
			- Pt.8	0.050	110						Link.	Bottom	374	388	381	371	361	359	356	354	354	352	349	346	346	347	347	348	350	354	357	357	111111
			Pt.7	0.048	110						Dischau	Top	531	788	927	986	985	932	788	739	169	658	668	707	611	555	516	496	488	476	465	447	
			Pt.6	0.050	112					ight, lb	Whicht	Change		-1.5	-1.2	-1.3	-1.1-	-0.9	-0.6	-0.5	-0.4	-0.4	-0.4	-0.5	-0.2	-0.2	-0.2	-0.2	-0.2	-0.1	-0.1	-0.1	XIIIII
		e Data	PL5	0.048	114					Fuel Weight, lb	Casla	Reading	10.1	8.6	7.4	6.1	5.0	4.1	3.5	3.0	2.6	2.2	1.8	13	1.1	0.9	0.7	0.5 -	0.3	0.2	0.1	0.0	
		Velocity Traverse Data	Pt.4	0.045	114						Pro. Rate	(%01)		104	102	106	104	103	103	101	103 -	101	001	97	100	66	66	66	66	66	66	98	1001
		Velocit	Pt.3	0.048	116						Pro. Rate Pro. Rate	(10%)		101	101	105	104 -	104	104	101	104	102	100	97	8	98	66	98	66	100	96	100	00 20
			Pt.2	0.048	118						ation	Tunnel	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	-
			Pt.1	0.043	120	-	nuipers:					Tunnel		130	135			-		1		1	1	.					-	102		100	116.66
			24		nitial Temp.		OMINI Equipment Numbers:				ų,	In. Hg.	(7) O	0	0	0	. 0	0	, o	0	0	0	0	0	0	0	0	0	0	0	0	0	
				ų :	Initi	11010					_				_	_				_					+							_	THAT III
										ng Data	2	h.Hg.	_	0	0	0		0	0					_	-	_	_	0		•		0	
										e Samplii	4	oF oF	+	78 79	78 79					-	_	-			-	-	+		•	79 80	•	79 - 80	50 70 55
										Particulate Sampling Data	Orifice Me		0.00	0.00						+	-	-	-	+	+	+	-+	+	-	-		0.00 75	0.00 78.50
							min.			Η	Orifice O	P (1) HP	0:00	0.00 0	0.00	-+	-+	+	+	+	+			-	┥	-		┥	-			0.00	0 000
											-	Rate, cfm		0.12		+	┥	-	+	┥		1			+			-				0.12	012
		Monaco 2008		-68-3	c-07							Rate, cfm Ra		_		-+	-		-			-			-	+	+		+	-	-	+	
	er: SBI	•	с т	сц.	1	16: 12:22								0.10			-	-	4		_	+	_	_	-		-	-	_	-		0.11	010
	Manufacturer:	Model:	Tracking No.:	Project No.:	lest Date:	Beginning Clock Time: Dataceling Internal:	Total Sampling Time:				_	Cubic Feet	736.984	738.165	739.312	740.475	741.650	742.815	743.990	745.165	746.340	747.500	748.675	749.845	20.1c/	752.195	753.370	754.540	755.715	756.870	758.045	759.210	22.226
4	Ň		L			Beginning	Total San				Gas Meter	Cubic Feet	725.130	726.150	727.155	728,175	729.215	730.260	731.305	732.350	733.400	734,440	735.485	736.530	CI.C.1.51	738.605	739.650	740.685	741.730	742.760	743.770	744.831	107.61
Run:						•					_	Time .	0		-		╉	-+	60	+	╈	+	-		+		-	+	+	+	┽	190 7	Avg/Total 1
-	1								L		ш' 		Lļ		•															-		-	Ave

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Run 4

Page 1 of 1

Control No. P-SSU-0003 (Dual Train - 5G Emission Calculations) xls, Effective date: 10/19/2004

Wood Heater Test Data - EPA Method 5G

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

Client Name:	SBI	Equipment 1	Numbers:			Run #:	4
Model:	Monaco 2008	•				Train #:	A
Project No .:	338-F-68-3		• •			Date:	12/13/07
Tracking No.:	1161					- -	
· · · · ·							
5	Sample Component		Reagent	Filter # or		Weights	• 、
				Probe #	Final, mg	Tare, mg	Particulate, mg
A. Front filter ca	atch		Filter	E146	125.4	122.1	3.3
B. Rear filter ca	tch		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/ 1. Morgan

Date: 1-21-08

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Activity (Carlor)

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

						• '
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:	····· 1
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: 12 1. Morge

Page 1 of 1

Date: 1-21-08

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

4-34 OF 4-47

Train 2.

0000 Caselon, a cafetral STOVE TEMPERATURE TEST DATA - METHOD 5G Beaverton, OR Phone (503) 643-3788

	IL N	TEMPERATURES (0F)	TEMPERA'			Stack	Delta	Fue	-
Annotation anno	Coal Bed: Z. (Range: 211-215	Range:	= 0	Data:				Test
	Actual:				Coal Bed:	-		reburn [k]	Ъ Б Г С
	-				•		ent ID #:	OMNI Equipment ID #:	IMO
	Run #: 🧹	R		(city	Crew: K. Mongra	_ Test Cre		Date: 12-13-07	Date
	1161	Tracking #:1161	-F-68-3	Project #: _338-F-68-3_	G.	co_2008	BI / Mona	Client/Model: SBI / Monaco 2008	Clie
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Preburn	Ľ Z			Coal Bed.						Actual:	
est				Data:	= 0		Range:	21-25		Coal Bed:	Ň
i	Fuel		Stack				TEMPERATURES (oF)	⁻ URES (o			
ime	Weight	Weight	Draft	Ambient	Тор	Bottom	Back	Left	Right	Flue	Gatalvet
0	710		-,085	78	921	28 2	337	280	Z 4/6	536	
9	5.8	1,2	-,080	77	951	12	363	315	283	486	
20	4.8	01	- 083	78	984	310	389	338	309	498	
30	3,8	110	-,080	- 79	555	320	431	364	225	500	
40	2.9	0.9	-,080	20	848	334	465	389	368	>877	
50	2.4	015	-,075	80	745	350	510	407	369	077	
60	2.(510	-,075	\$0	531	374	563	4/15	394	222	
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				יו כולומית	<u>; - / (c)</u>	Tu litora-		1	uate:	12-13-01	

Control No. P-SFG-0004 (Woodstove Temperature Test Data-Method 5G) xis, Effective date: 08/07/2000

OMNI-Test Laboratories, Ing Beaverton, OR

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FUEL DATA

Client: <u>SBI</u>						
Model: Monaco 2008	· ·					
Project #: <u>338-F-68-3</u>	Tracking #: <u>1161</u>					
Date: <u>12-13-07</u>			* :	Run #:		
OMNI Equipment ID #:						
UEL LOAD PREPARI		/				
UEL: DOUGLAS-FI DIMENSIONAL LUME	R SPECIES, UNTREA ER.	TED, AIR-DRIED.), STANDARD C	FRADE OR BET	TER,	
	······	PRE-BURN FL	JEL	· · · · · · · · · · · · · · · · · · ·	·	. <i>.</i>
	MOISTURE (CONTENT (METH	ER – – DRY BAS	SIS)		
CALIBRATION:	Cal Value $(1) = 12\%$ Cal Value $(2) = 22\%$	6 Actual Re 6 Actual Re	ading	<u> </u>		
	$\operatorname{Car} \operatorname{Value}(2) = 22 \operatorname{V}$		aunig	-		
	Length	Readings		$\underline{\underline{Type}}_{\underline{x}}$	iL	
1 2	<u>-8 ft19</u> ft29	7.1 <u>19.9</u> 1.2 <u>23</u> 5	20.3			
3	<u>4</u> ft <u>23</u>	5,1 22,4	23.1		<u> </u>	
T II C / T	90975 .				1	
·	es: 8@9.75 inches				•	
Time (clock): _0	Room Tempe	erature (F):7	5_ Initials:	14		
•					-	
	·		·			
	· · · · · · · · · · · · · · · · · · ·	TEST FUEL		•		
FUEL TYPE AND A CALCULATED LOA FUEL PIECE LENGT	MOUNT: 2 × 4 <u>D WEIGHT:</u> H: /3.0 * '			2 IT: <u>3.2</u> 619 	(2 x 4) (4 x 4) Total	
	H:/3.0 */		4×4 <u>2</u> L LOAD WEIGH	619 10.1	(4 🗶 4)	
	TH: <u>/3.0</u> *' MOISTURE C	Z- ACTUA	4×4 <u>2</u> L LOAD WEIGH	619 10.1	(4 🗶 4)	
FUEL PIECE LENGI	Ή: <u>/3.</u> ο" <u>MOISTURE C</u> <u>E</u>	Z- ACTUA ONTENT (METE READINGS	4 x 4 L LOAD WEIGH RDRY BAS	<u> </u>	(4 🗶 4)	
FUEL PIECE LENGT	TH: <u>/3.0</u> *' MOISTURE C	Z- ACTUA - ONTENT (METE	4×4 <u>2</u> L LOAD WEIGH	<u> </u>	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>E</u> <u>18.6</u> <u>18.1</u> <u>26.7</u>	Z ACTUA ONTENT (METE READINGS Z 110 Z 0.5 Z (1 7	$4 \times 4 $ 2 L LOAD WEIGH R DRY BAS 23.1 23.1 21.4	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>18.6</u> <u>18.1</u>	Z ACTUA ONTENT (METE READINGS Z 110 20.5	4 x 4 2 L LOAD WEIGH <u>R – – DRY BAS</u> 23.1	<u> </u>	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>E</u> <u>18.6</u> <u>18.1</u> <u>26.7</u>	Z ACTUA ONTENT (METE READINGS Z 110 Z 0.5 Z (19	$4 \times 4 $ 2 L LOAD WEIGH R DRY BAS 23.1 23.1 21.4	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>E</u> <u>18.6</u> <u>18.1</u> <u>26.7</u>	Z ACTUA ONTENT (METE READINGS Z 110 Z 0.5 Z (19	$4 \times 4 $ 2 L LOAD WEIGH R DRY BAS 23.1 23.1 21.4	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>E</u> <u>18.6</u> <u>18.1</u> <u>26.7</u>	Z ACTUA ONTENT (METE READINGS Z 110 Z 0.5 Z (19	$4 \times 4 $ 2 L LOAD WEIGH R DRY BAS 23.1 23.1 21.4	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>E</u> <u>18.6</u> <u>18.1</u> <u>26.7</u>	Z ACTUA ONTENT (METE READINGS Z 110 Z 0.5 Z (19	$4 \times 4 $ 2 L LOAD WEIGH R DRY BAS 23.1 23.1 21.4	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>E</u> <u>18.6</u> <u>18.1</u> <u>26.7</u>	Z ACTUA ONTENT (METE READINGS Z 110 Z 0.5 Z (19	$4 \times 4 $ 2 L LOAD WEIGH R DRY BAS 23.1 23.1 21.4	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	H: <u>/3.0</u> " <u>MOISTURE C</u> <u>E</u> <u>18.6</u> <u>18.1</u> <u>26.7</u>	2. ACTUA ONTENT (METE READINGS 21:0 20:5 21:7 22:5	$4 \times 4 $	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	$\frac{3.6}{2}$ $\frac{18.6}{18.1}$ $\frac{18.6}{21.7}$ $\frac{18.1}{21.4}$ $\frac{18.1}{21.4}$ $\frac{18.1}{21.4}$ $\frac{18.1}{21.4}$	2. ACTUA ONTENT (METE READINGS 21:0 20:5 21:7 22:5	4×4 2 L LOAD WEIGH R = -DRY BAS 23.1 23.1 23.1 23.8 URE A VERAGE:	$ \begin{array}{r} $	(4 🗶 4)	
FUEL PIECE LENGT	TH: $/3.0$ " MOISTURE C E 18.6 18.1 21.7 21.4 DVERALL TEST FUEN /1120 R	Z- ACTUAL ONTENT (METE READINGS Z 1:0 20.5 Z 1:7 Z2.5 L LOAD MOISTU oom Temperature	$4 \times 4 \underline{2}$ $L \text{ LOAD WEIGH}$ $R DRY BAS$ 23.1 23.1 23.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3.8 3		(4 x4) Total	
FUEL PIECE LENGT	$\frac{3.6}{2}$ $\frac{18.6}{18.1}$ $\frac{18.6}{21.7}$ $\frac{18.1}{21.4}$ $\frac{18.1}{21.4}$ $\frac{18.1}{21.4}$ $\frac{18.1}{21.4}$	Z- ACTUAL ONTENT (METE READINGS Z 1:0 20.5 Z 1:7 Z2.5 L LOAD MOISTU oom Temperature	4×4 2 L LOAD WEIGH R = -DRY BAS 23.1 23.1 23.1 23.8 URE A VERAGE:		(4 x4) Total	

Page 1 of 1 4 = 3 6 0 F 4

- 4 7

Control No. P-SFB-0006 (Woodstove Fuel Load Information).doc, Effective date: 04/18/2007

OMNI-Test Laboratorie Beaverton, OR

Run	•	No	tes

Client: <u>SBI</u>
Model: Monaco 2008
Project #: <u>338-F-68-3</u>
Tracking #: <u>1161</u>
Run #: <u>4</u>
Test Crew: K. Mongan
OMNI Equipmont ID #(a):

Date: 12-13-07

JVINI Equipment ID #(s):

PREBURN

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

C.

PRIMARY:

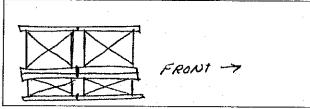
DRilled INDEX used as a gauge = 9/64 (.141")

	SECONDARY:	TANDOM	with	Primas
		an Contra	»l·	
	TERTIARY:	NONE		
ч. х н	FAN:	ON - H	ligh	······································

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) <u>CHANGES</u> PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
18 60	TEST setting				k	-Levelled

TEST FUEL CONFIGURATION SKETCH (INDICATE VIEW ANGLE)



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

SAME AS ABOVE

TEST START UP PROCEDURES **BYPASS:** NIA FUEL LOADING Loaded by 40 Sconops AJAR UNTIL Smin, 5 sec. DOOR: PRIMARY AIR: Full open UNTIL S.O MIN -ABRUPTLY ADJUSTED to test setting AT 5.0 MINUtes OTHER: NONE

SECONDARY: TANDOM with PRIMARY TERTIARY: NONE

FAN:

ON- High

Technician signature:

1. Morge

Date: 12-13-07

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

Page 1 of 1 4 - 3 7 0 F 4 - 4 7

		Supple	emental	Data EP/	4 5G/5H		-
Client:	SBI						
	Monaco 20	08				·	
	#: <u>338</u> -F-68		Tracking	#: 1161			
Date:	12-13-07			Run #:	4 Bootl	ו:	
				ne: <u>12:22</u>			
							~.
					· .		
	alyzer Train	Leak Check		· -			
	Stack:	-		ution Tunnel		5,	
	Final:	N/A		ir	nitial: inal: <i>N/A</i>		
Calibrat	ions: Span i	Gae CO.:		F 2: <u>N/A</u>	$\frac{1}{100} \frac{1}{100}$. d. e
Ganbrat		0as 00 ₂ .		2 <u>~/ n</u>	CO. N/R	CO ₂ (DT): _	<u>N/A</u>
·	N₂ Span	N ₂ Span	N₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Spa
Time							
O ₂				/			
CO ₂			NI	1		c	
CO			10/1	· · · · · · · · · · · · · · · · · · ·			
CO ₂ (DT)							
Stack D	iameter (incl	hes).	6.0				·····
				 Final:	150		
	•			Post Te			
				moke Captu			
				<u> </u>			—
				 es: Date:	2		 Z
		• ••					
		Init	ial	Mid	dle	Enc	ling
Pb (ir	n/Hg)	30.29 GF		30.31 CT		30.25 CT-	
Room Te	emp (°F)	70	80 25	52	2	8	1
Technici	an signature	11.	Mora	· · ·	Date:	2-13-07	
	J		1	E		<u>~ 13 01</u>	······································

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Run 5

OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \\Omnisr\users\Testing\SBI - Stove Builder International\338-5-68-3 Monaco 2008\338-F-68-3 4-39 of 4-47

OMNI-Test Laboratories, Inc.

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

Average Tunnel Temperature Average Gas Velocity in Dilution Tunnel - vs Average Gas Flow Rate in Dilution Tunnel - Qsd

Average Delta p Average Delta H Total Time of Test

Burn Rate

Contraction of

Contraction of the

Sector Sector

Margaret Street

164 degrees Fahrenheit 14.5 feet/second 8375.9 dscf/hour

2.52 kg/hr dry

0.056 inches H20 0.00 inches H20

100 minutes

AVERAGE

SAMPLE TRAIN 1

SAMPLE TRAIN 2

Total Sample Volume - Vm Average Gas Meter Temperature Total Sample Volume (Standard Conditions) - Vmstd	10.91 cubic feet 79 degrees Fahrenheit 10.5 dscf	10.06 cubic feet 79 degrees Fahrenheit 9.7 dscf	11.76 cubic feet 80 degrees Fahrenheit 11.3 dscf
Total Particulates - mn Particulate Concentration (dry-standard) Particulate Emission Rate Adjusted Emissions	0.00030 grams/dscf 2.50 grams/hour 3.89 grams/hour	2.7 mg 0.00028 grams/dscf 2.33 grams/hour 3.68 grams/hour	3.6 mg 0.00032 grams/dscf 2.67 grams/hour 4.11 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	0.29 4.10 grams/hour 0.31	0.22 grams/hour	0.22 grams/hour

Results Are Acceptable

No. P-SSU-0001 (Dual Train - 5G Emission Calculations) als, Effective date: 4/29/2003

Run 5

LuterDaue, <i>KMMbog.</i> 1/21/08 LuterDaue, <i>KMMbog.</i> 1/21/08 tial Tunnel Velocity. 14.46 fial Tunnel Flow. 1414 stefene. Tunnel Area: Tunnel Area: Tunne	Stack H2O -0.099 -0.098 -0.098 -0.083 -0.083 -0.083 -0.083 -0.083 -0.083 -0.083 -0.083	R B
$n_{pr}^{2} = 1/2$ $n_{pr}^{2} = 1/2$ n_{p	Ambient 83 84 84 84 84 84 84 84 85 85 85 85 85 85 85 85 85 85 85 85 85	· · · · ·
Signature/Date: MMM Tunnel Valocity: Intial Tunnel Flow Average Tunnel Flow Tunnel Atex Post-Test Leak Check (2) Post-Test Leak Check (2) (2) Fuel Motivare (d) (3) Fuel Motivare (d) (4) Puel Pariti	#DJVV0i #DJVV0i	
Signe I AAA Avenge Avenge Avenge 30.19 T	Filter Ir (2) e 81 (2) 86 86 87 87 87 83 86 83 83 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84 84<	
0.973 0.0573 0.0573	Filter (1) 81 81 83 83 84 83 85 83 81 83 82 83 81 83 81 83 82 83 81 81 81 81 81 81 81 81	
006,47 2900 b0h-mole 2300 b0h-mole 400 percent 0.0157 1120 0.0175 (10 0.012 30,19 0.02 30,19	Data, oF Stack 583 669 669 730 733 733 733 741 515 541 541 541 541	
	Average Surface 562.4 562.4 609.0 609.4 642.2 653.2 6612.2 584.0 612.2 22.0 584.0 612.2 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 585.0 584.0 584.0 584.0 584.0 584.0 585.0 584.0 585.0 584.0 585.0 584.0 585.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0 584.0000000000000000000000000000	
PM Control Module: SBI 046,47 ution Tunnel MW(ary): 22000 Dilution Tunnel MW(vet): 232.56 Dilution Tunnel SH20: -0.155 Prior Tube Cp: 0.84 Moter Box Y Factor: 0.975 Baronetric Pressure: Begin	Wood Hcater Temperature Data, of ebox Wood Hcater Temperature Data, of surface Stack Stack right Exit Surface Stack 583 H1 563.4 583 730 66 603.0 667 573 18 642.2 730 46 603.4 541 48 603.4 541 48 603.4 541 33 584.0 672 551 34 633.0 511 22 671	
PM Control Module. Dilution Turnel MW(ety). Dilution Turnel MW(ees). Dilution Turnel H20. Dilution Turnel Stata: Pitor Tube Co. Meter Box Y Factar: Barometric Pressure.	Wood H Firebox 466 466 468 556 556 556 556 556 558 538 538 538 538 538 538 538 538 538	
Dilutio Dilutio Dilutio Ba	Firebox 439 464 1 Lath 1 1 464 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
20 20		
Wood Heater Test Data - EPA Method 5G $\frac{Velocity Traverse Data}{2}$ Pr4 Pr3 Pr4 Pr3 Pr4 Pr5 Pr6 Pr3 Pr4 Pr3 Pr3 Pr3 Pr4 Pr3	xx Firebox 656 658 675 675 737 711 737 737 737 737 739 737	n an Anna Anna Anna An Anna Anna Anna An
A Met	Firebox 462 462 462 463 433 433 433 433 433 433 433 433 433	
EP	Firebox Firebox Top 334 954 1059 946 766 713 711 711 711	
t Data	Fuel Weight Ib Scale Weight Ib Rading Change 1113 Marge 1113 24 35 2.4 35 2.4 35 -1.4 12 -0.6 01 -0.5 01 -0.5 01 -0.5 01 -0.5 01 -0.5 01 -0.5	
velocity Traverse Data Velocity Traverse Data <u>rea</u> <u>Pit4</u> <u>res</u> 163 162 162		Page 1 of 1
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Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name: SBI	Equipment 1	Numbers:			Run #:	5-
Model: Monaco 2008	·			· · · · · · · · · · · · · · · · · · ·	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,
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 Part	iculate, mg :	2.7
Component		Equations:			· · · · · · · · · · · · · · · · · · ·	
A. Front filter catch			Tare (mg) =	Particulate, m	ġ	· · · ·
B. Rear filter catch				Particulate, m		
C. Probe catch		Final (mg) -	Tare (mg) $=$	Particulate, mg	<u>z</u>	
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Final Laboratory Report - Method 5G Dual Train Dilution Tunnel Particulate Calculations

Client Name:	SBI	Equipment Numbers:	÷ .	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

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

Total Particulate, mg :

3.6

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

MNN Laberies, Enclares, Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

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201-923/94 Tells

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Page of	Tracking #: _1161	Run #: S
	Project #:338-F-68-3	Margan
	Nonaco 2008	Test Crew: <u>K</u>
	Client/Model: SBI / N	Date: /2-/3-07

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 Equipment	
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Fuel Delta Stack Data Weight Weight Draft Ambient Tor 12:7	Fuel Data: $U = TEMPERATURES (oF)$ Coal Bed. e Weight Derita Stack TEMPERATURES (oF) Coal Bed. 0 12.7 7.7 obo 81 4.22 77 $50c$ 255 208 445 0 7.7 7.7 2.72 277 247 245 254 0 7.7 1.77 2.05 818 277 444 351 247 245 294 0 8.7 1.7 316 256 296 245 596 296 0 8.7 1.46 377 416 356 497 556 596 596 596 596 596 596 596 516 516 516 516 617 526 596 596 596 596 596 596 596 596 596 500 517 416	rrepurn Taet	<u>×</u> [Coal Bed:						Actual:	1 1
Fuel Delta Stack TEMPERATURES (oF) Weight Weight Draft Ambient Top Bottom Back Left Right Flue /// // // // // // // // // // // // //	Fuel Delta Stack TEMPERATURES (oF) Weight Weight Draft Ambient Top Bottom Back Left Right Flue /// // // // // // // // // // // // //	ด				vata:	Η Ο		Range:	2,3-2,		Coal Bed:	V · V
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Control No. P-SFG-0004 (Woodstove Temperature Test Data-Method 5G).xls, Effective date: 08/07/2000

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FUEL DATA

Client: <u>SBI</u>		
/lodel: Monaco 2008		•
roject #: <u>338-F-68-3</u>	Tracking #: 1161	
		Run #: 5
MNI Equipment ID #:		
UEL LOAD PREPARF	DBY: K. Morgan	
UEL: DOUGLAS-FII	R SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADI	COP PETTEP
IMENSIONAL LUMB	ER.	JOR DETTER,
· · · · · · · · · · · · · · · · · · ·	· · · · · · · · · · · · · · · · · · ·	
	PRE-BURN FUEL	
CALIBRATION:	MOISTURE CONTENT (METER DRY BASIS)Cal Value (1) = 12%Actual Reading 12.0	
	Cal Value $(2) = 22\%$ Actual Reading <u>72.0</u> Actual Reading <u>72.0</u>	
·.		
	Length Readings	Type
1 2	$\frac{4}{7} ft = \frac{22.7}{21.9} = \frac{21.9}{21.1}$	2 ×4
3	ft	
		· · · ·
Length of cut piece	s: <u>8@9,81</u> ⁵ inches Pre-Burn Fuel Average Moist	ure: 21.70%
Time (clock): /7	102 Room Temperature (F): 75 Initials: 1/2	
······ (•(••••••)	Room remperature (r) mittais	
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	TEST FUEL	
FUEL TYPE AND AN	40UNT: 2×4 <u>2</u> 4×4 <u>2</u>	
	A C C A A A A A A A A A A A A A A A A A	
CALCULATED LOAD	D WEIGHT: ACTUAL LOAD WEIGHT:	<u> </u>
	H: $13.0''$	<u>5.8</u> (2 ×4) (4 ×4)
	H: <u>13.0''</u>	
	H: $\underline{13.0''}$ MOISTURE CONTENT (METER DRY BASIS)	<u> </u>
FUEL PIECE LENGT	H: H:	(4 ×4) Total
	H: H:	<u>3.8</u> (2 ×4) (4 ×4) <u>///3</u> Total
FUEL PIECE LENGT	H: <u>13.0</u> <u>MOISTURE CONTENT (METER DRY BASIS)</u> <u>READINGS</u>	(4 ×4) Total
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FUEL PIECE LENGT	H: $13.0''$ MOISTURE CONTENT (METER DRY BASIS) E READINGS 22.4' 20.3 $23.123.1$ 21.2 $72.322.0$ 21.1 23.1	(4 ×4) Total
FUEL PIECE LENGT	H: $13.0''$ MOISTURE CONTENT (METER DRY BASIS) E READINGS 22.4' 20.3 $23.123.1$ 21.2 $72.322.0$ 21.12 $2.3.1$	(4×4) $///3$ Total $CYPE$ 2×4 2×4
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FUEL PIECE LENGT PIECE 1 2 3 4 5 6 7 8 9 10 O'	H: $13.0^{\prime\prime}$ MOISTURE CONTENT (METER DRY BASIS) E READINGS 22.4 20.3 $23.123.1$ $2(.2$ $7.2,322.0$ 21.2 $7.2,321.4$ 23.1 22.4 $1URALL TEST FUEL LOAD MOISTURE A VERAGE: 22NERALL TEST FUEL LOAD MOISTURE A VERAGE: 17.4Room Temperature (F): 75 I$	(4×4) $///3$ Total $CYPE$ 2×4 2×4 4×4
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Control No. P-SFB-0006 (Woodstove Fuel Load Information).doc, Effective date: 04/18/2007

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OMNI-Test Laboratorie Beaverton, OR

Run

Client: <u>SBI</u>
Model: Monaco 2008
Project #: <u>338-F-68-3</u>
Tracking #: 1161
Run #: 5
Test Crew: K. Morgan
OMANIE Frankling and ID III

Date: 12-13-07

OMNI Equipment ID #(s):

PREBURN

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

C.

PRIMARY:

Full OPEN

SECONDARY:	Fully OPEN
TERTIARY:	NONE
FAN:	ON-High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) <u>CHANGES</u> PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
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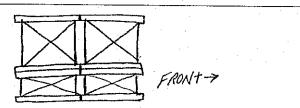
TEST

BYPASS:

DOOR:

FUEL LOADING Loaded

TEST FUEL CONFIGURATION SKETCH (INDICATE VIEW ANGLE)



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

SAME AS ABOVE

AJan 3.0 min. PRIMARY AIR: - NO ADJUSTMENT NONE OTHER: -SECONDARY: Fully Open NONE TERTIARY:

FAN:

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ON - Hist

Date: 12-13-07

START UP PROCEDURES

Technician signature:

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Supplemental Data EPA 5G/5H

Client:	<u>SBI</u>			· ·			
Model:	Monaco 20	<u>08</u>					
Project	#: <u>338-F-68</u>	<u>3-3</u>	Tracking	#: <u>1161</u>	• • · ·	. *	
Date: _,	12-13-07			Run #:	5 Booth	ו:	
Test Cr	ew: K. Mon	MAN	Start Tin	ne: <u>18:44</u>	Stop Time:	20:24	
OMNI E	quipment #	(s):					
		-			10 a. 1		
	alyzer Train	Leak Check			• • •		
. <u>S</u>	Stack:			ution Tunnel	(Method 5G	Gonly):	· ·
	Initial:	NA			nitial:		
	Final: ions: Span	NA	/	FI	inal: <u>////</u>		. /
Calibrat	ions: Span	Gas CO ₂ :	<u></u> AO;	2: <u>N/A</u>	CO: <u>N/A</u>	CO ₂ (DT): _	N/A
	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span	N ₂ Span
Time					. <u>.</u>		-
O ₂							-
CO ₂			N /H				
CO			/				
CO ₂ (DT)	·		·			-	
Stack D	iameter (incl	hes):	6,0			÷.,	
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Room Te	emp (°F)	83		86	·	83	5
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Section 5

Sampling Procedures and Test Results

OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \Omnisrvlusers\Testing\SBI - Stove Builder International\338-S-68-3 Monaco 2008\338-F-68-3 5-1 of 5-8

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.

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	Table '	1.1 –	Particulate	Emissions
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Run	Burn Rate (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

	Room Temperature (°F)		erature Barometric Pressure (Hg)		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

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Run	Pretest Fuel Weight (Starting weight in Ibs)	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 1.3.1 - Fuel Measurement and Crib Description Summary - PRETEST

Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (ft ³)	Fuel Loading Density Wet Basis (lbs/ft ³)	Fuel Moisture Content Dry (%)	Piece Length (in)	2x4s Used	4x4s Used
1	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

5-4 of 5-8

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		Average Dilution Tunnel Gas Measurements			
Run	Length of Test (min)	Velocity (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	139.6	163.7	

Table 1.4 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Table 1.5 - Heater Operation Data (Average Temperature Data)

Run	Beginning Surface Temperature Average ^a	Ending Surface Temperature Average ^a	Surface Delta T ^b			
. 1	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.						

OMNI-Test Laboratories, Inc. Certification Test Report dated January 2008: \\Omnisr\users\Testing\SBI - Stove Builder International\338-S-68-3 Monaco 2008\338-F-68-3

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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 (H ₂ O)	Primary Air Setting (in)	Run Time (min)	Average Draft (H ₂ O)
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

Certification Test Report dated January 2008: \\Omnisrv\users\Testing\SBI - Stove Builder International\338-S-68-3 Monaco 2008\338-F-68-3

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Table 1.8 – Test Configurations

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

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Conservation of the

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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.