TEST REPORT

SCOPE: EMISSIONS AND OUTPUT

FUEL: EPA TEST FUEL (CRIBS)

TEST STANDARD: EPA

MODEL: FP-10 WOOD FIREPLACE

Notice to reader: Our FP-10 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

Phone: (503) 643-3788
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Certification Test Report

Stove Builder International

Wood Fireplace Insert

Model: Monaco 2008

Prepared for:	Stove Builder International 1700, Léon-Harmel Québec (Québec), Canada G1N 4R9
Prepared by:	OMNI-Test Laboratories, Inc. 5465 SW Western Avenue, Suite G Beaverton, OR 97005 (503) 643-3788
Test Period:	December 11, 2007 through December 13, 2007
Report Date:	January 2008
Report Number:	338-F-68-3

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

AUTHORIZED SIGNATORIES

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

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

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

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

TABLE OF CONTENTS

Section 1

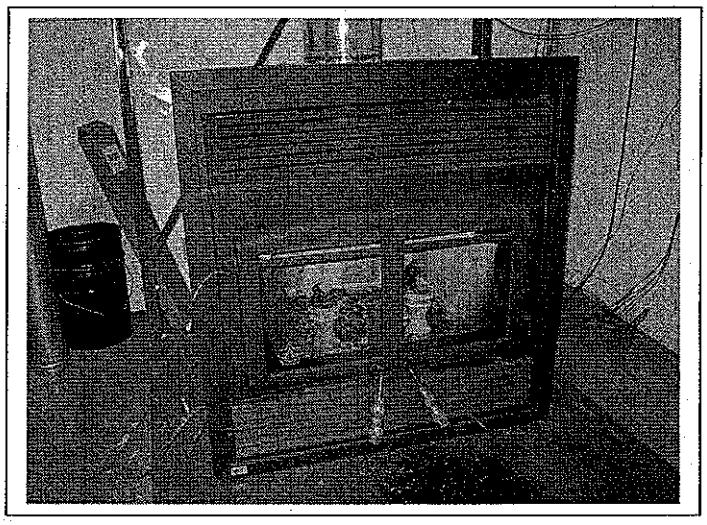
Fuel Photographs/Appliance Description/Drawings

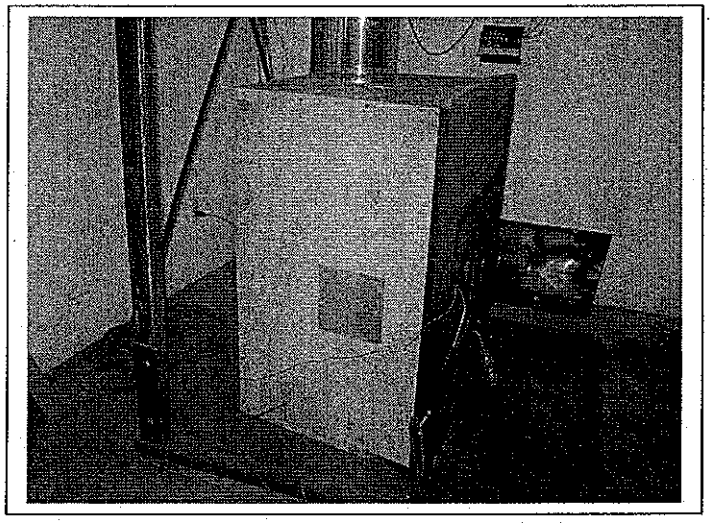
Model: Monaco 2008
Stove Builder International
1700, Léon-Harmel
Québec (Québec), Canada
G1N 4R9

Stove Builder International

Monaco 2008

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





Section 2

Quality Assurance/Quality Control

QUALITY ASSURANCE/QUALITY CONTROL

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

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

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

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

Sample Analysis

Analysis Worksheets
Tared Filter and Beaker Data
Solvent Blank Data

OMNI-Test Laboratories, Inc.
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-11-07 Test Crew: K. Morgan Run #: 1
Sample Train #: A Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter	12-18-07	16:30	.1151	.5001	20	77	IL
Lab ID #	12-19-07	09:30	.1151	.5001	17	66	IL
ID # 1							
Tare wt. .1046							
D/T in desiccator 12-17-07 08:00							
Preliminary wt.: .1152							
Rear Filter	12-18-07	16:30	.1187	.5001	20	77	IL
Lab ID #	12-19-07	09:30	.1186	.5001	17	66	IL
ID # 2							
Tare wt. .1178							
D/T in desiccator: 12-17-07 08:00							
Preliminary wt.: .1185							
Probe	12-18-07	16:30	171.8694	.5001	20	77	IL
Lab ID #	12-19-07	09:30	171.8693	.5001	17	66	IL
Probe # 1							
Tare wt. 171.8688							
Cleaned by:							
D/T in desiccator: 12-17-07 08:00							
Preliminary wt.: 171.8711							

Technician signature: IL J. Morgan Date: 12-19-07

OMNI-Test Laboratories, c.
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-11-07 Test Crew: K. Morgan Run #: 1
Sample Train #: B Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # 3 Tare wt. .1193 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1321	12-18-07	16:30	.1321	.5001	20	77	IL
	12-19-07	09:30	.1321	.5001	17	66	IL
Rear Filter Lab ID # ID # 4 Tare wt. .1224 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1232	12-18-07	16:30	.1231	.5001	20	77	IL
	12-19-07	09:30	.1232	.5001	17	66	IL
Probe Lab ID # Probe # 2 Tare wt. 187.7420 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 187.7432	12-18-07	16:30	187.7418	.5001	20	77	IL
	12-19-07	09:30	187.7416	.5001	17	66	IL

Technician signature: K. Morgan Date: 12-19-07

OMNI-Test Laboratories
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

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

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # 5 Tare wt. .1042 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1193	12-18-07	16:30	.1192	.5001	20	77	JL
	12-19-07	09:30	.1191	.5001	17	66	JL
Rear Filter Lab ID # ID # 6 Tare wt. .1232 D/T in desiccator: 12-17-07 08:00 Preliminary wt.:	12-18-07	16:30	.1242	.5001	20	77	JL
	12-19-07	09:30	.1241	.5001	17	66	JL
Probe Lab ID # Probe # 4 Tare wt. 188.0815 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 188.0834	12-18-07	16:30	188.0818	.5001	20	77	JL
	12-19-07	09:30	188.0815	.5001	17	66	JL

Technician signature: JL J. Morgan Date: 12-19-07

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Dilution Tunnel (Method 5G) Analysis Worksheet

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

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # 7 Tare wt. .1221 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1385	12-18-07	16:30	.1388	.5001	20	77	IL
	12-19-07	09:30	.1387	.5001	17	66	IL
Rear Filter Lab ID # ID # 8 Tare wt. .1262 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1272	12-18-07	16:30	.1272	.5001	20	77	IL
	12-19-07	09:30	.1272	.5001	17	66	IL
Probe Lab ID # Probe # 5 Tare wt. 197.3876 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 197.3904	12-18-07	16:30	197.3886	.5001	20	77	IL
	12-19-07	09:30	197.3884	.5001	17	66	IL

Technician signature: K. Morgan Date: 12-19-07

OMNI-Test Laboratories
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

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

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # 9 Tare wt. .1048 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1078	12-18-07	16:30	.1083	.5001	20	77	IL
	12-19-07	09:30	.1082	.5001	17	66	IL
Rear Filter Lab ID # ID # 10 Tare wt. .1175 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1175	12-18-07	16:30	.1179	.5001	20	77	IL
	12-19-07	09:30	.1179	.5001	~~77~~ IL 17	66	IL
Probe Lab ID # Probe # 3 Tare wt. 188.2558 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 188.2578	12-18-07	16:30	188.2559	.5001	20	77	IL
	12-19-07	09:30	188.2559	.5001	17	66	IL

Technician signature: IL J. Morgan Date: 12-19-07

OMNI-Test Laboratories
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

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

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # 11 Tare wt. .1210 D/T in desiccator 12-17-07 08:00 Preliminary wt.: ~~.1218~~ .1241	12-18-07	16:30	.1246	.5001	20	77	IL
	12-19-07	09:30	.1247	.5001	17	66	IL
Rear Filter Lab ID # ID # 12 Tare wt. .1250 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1253	12-18-07	16:30	.1254	.5001	20	77	IL
	12-19-07	09:30	.1255	.5001	17	66	IL
Probe Lab ID # Probe # 6 Tare wt. 188.1228 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 188.1247	12-18-07	16:30	188.1227	.5001	20	77	IL
	12-19-07	09:30	188.1228	.5001	17	66	IL

Technician signature: K. J. Morgan Date: 12-19-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-13-07 Test Crew: K. Morgan Run #: 4
Sample Train #: A Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # E146 Tare wt. .1221 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1250	12-18-07	16:30	.1254	.5001	20	77	IL
	12-19-07	09:30	.1254	.5001	17	66	IL
Rear Filter Lab ID # ID # E144 Tare wt. .1268 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1266	12-18-07	16:30	.1269	.5001	20	77	IL
	12-19-07	09:30	.1270	.5001	17	66	IL
Probe Lab ID # Probe # 28 Tare wt. 114.7384 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 114.7401	12-18-07	16:30	114.7390	.5001	20	77	IL
	12-19-07	09:30	114.7389	.5001	17	66	IL

Technician signature: K. Morgan Date: 12-19-07

OMNI-Test Laboratories
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-13-07 Test Crew: K. MorgAN Run #: 4
Sample Train #: B Train assembled by: K. MorgAN
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # E145 Tare wt. .1214 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1250	12-18-07	16:30	.1253	.5001	20	77	IL
	12-19-07	09:30	.1253	.5001	17	66	IL
Rear Filter Lab ID # ID # E143 Tare wt. .1183 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1183	12-18-07	16:30	.1183	.5001	20	77	IL
	12-19-07	09:30	.1183	.5001	17	66	IL
Probe Lab ID # Probe # 38 Tare wt. 114.1425 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 114.1444	12-18-07	16:30	114.1431	.5001	20	77	IL
	12-19-07	09:30	114.1430	5001	17	66	IL

Technician signature: K. J. Morgan Date: 12-19-07

OMNI-Test Laboratories
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-13-07 Test Crew: K. Morgan Run #: 5
Sample Train #: A Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI -- 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # 13 Tare wt. .1098 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1122	12-18-07	16:30	.1122	.5001	20	77	IL
	12-19-07	09:30	.1123	.5001	17	66	IL
Rear Filter Lab ID # ID # 14 Tare wt. .1227 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1223	12-18-07	16:30	.1228	.5001	20	77	IL
	12-19-07	09:30	.1228	.5001	17	66	IL
Probe Lab ID # Probe # 7 Tare wt. 199.9084 Cleaned by: D/T in desiccator: 12-17-07 08:00 Preliminary wt.: 199.9107	12-18-07	16:30	199.9083	.5001	20	77	IL
	12-19-07	09:30	199.9085	.5001	17	66	IL

Technician signature: K. Morgan Date: 12-19-07

OMNI-Test Laboratories
Beaverton, OR

Dilution Tunnel (Method 5G) Analysis Worksheet

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-13-07 Test Crew: K. Morgan Run #: 5
Sample Train #: B Train assembled by: K. Morgan
Balance ID #: OMNI - 00023 Thermo/Hygro meter ID #: OMNI -
Audit weight ID #: OMNI – 00131 (Balance audit mfr. std: 500 ± 0.72 mg)

Train Part	Weighing Record						
	Date	Time	Weight (grams)	Audit (grams)	R/H %	Temp. (F)	Initials
Front Filter Lab ID # ID # 15 Tare wt. .1238 D/T in desiccator 12-17-07 08:00 Preliminary wt.: .1266	12-18-07	16:30	.1267	.5001	20	77	IL
	12-19-07	09:30	.1267	.5001	17	66	IL
Rear Filter Lab ID # ID # 16 Tare wt. .1263 D/T in desiccator: 12-17-07 08:00 Preliminary wt.: .1265	12-18-07	16:30	.1266	.5001	20	77	IL
	12-19-07	09:30	.1267	.5001	17	66	IL
Probe Lab ID # Probe # IL 38 8 Tare wt. 199.0947 Cleaned by: D/T in desiccator: 12-17-07 08:00 IL Preliminary wt.: 199.0967	12-18-07	16:30	199.0950	.5001	20	77	IL
	12-19-07	09:30	199.0950	.5001	17	66	IL

Technician signature: IL J. Morgan Date: 12-19-07

Date placed in dessicator:		2007-11-22							
	Date	2007-11-28	2007-12-08	12-10-07	12-11-07				
47 mm Filters	Time	15h50	10h41	13:00	10:40				
ID Number									
1		0.1045	0.1045	0.1046	—				
2		0.1180	0.1180	0.1178	—				
3		0.1190	0.1192	0.1193	—				
4		0.1224	0.1225	0.1224	—				
5		0.1042	0.1042	0.1042	—				
6		0.1232	0.1233	0.1232	—				
7		0.1222	0.1221	0.1221	—				
8		0.1263	0.1262	0.1262	—				
9		0.1048	0.1050	0.1048	—				
10		0.1175	0.1176	0.1175	—				
11		0.1209	0.1208	0.1210	—				
12		0.1247	0.1249	0.1250	—				
13		0.1099	0.1102	0.1098	—				
14		0.1225	0.1227	0.1227	—				
15		0.1240	0.1243	0.1238	—				
16		0.1265	0.1265	0.1263	—				
17		0.1080	0.1079	0.1081	—				
18		0.1206	0.1206	0.1207	—				
19		0.1202	0.1202	0.1203	—				
20		0.1228	0.1230	0.1228	—				
Probe									
ID Number									
1		171.8558	171.8559	171.8689	171.8688	—			
2		187.7266	187.7272	187.7418	187.7420	—			
3		188.2408	188.2420	188.2555	188.2558	—			
4		188.0663	188.0681	188.0811	188.0815	—			
5		197.3721	197.3736	197.3878	197.3876	—			
6		188.1076	188.1091	188.1229	188.1228	—			
7		199.8938	199.8951	199.9086	199.9084	—			
8		199.0789	199.0803	199.0946	199.0947	—			

K. L. Morgan
12-11-07

2-14 OF 2-65

Date Placed In Desiccator:	06-Dec-07		Balance ID Number:	OMNI-00023
Time Placed in Desiccator:	8:10 AM		Audit Weight ID Number:	OMNI-00131
Technician:	Morgan		Thermometer/Hygrometer ID Number:	

AE Glass 47 mm Filter Tares

OMNI-Test Laboratories, Inc

47 mm Filters ID Number	Date:	12/7/2007	12/7/2007					Manufacturer	Appliance	Project No.	Run	Train
	Time:	8:00 AM	1:35 PM									
	RH %:	20	23	0		0						
	T (F):	72	76	0		0						
	Tech.:	Morgan	Morgan									
	Audit:	0.5001	0.5001	0		0						
E143		0.1184	0.1183	X		0		SBI	Monaco 2008	338-F-68-3		
E144		0.1269	0.1268	X		0		SBI	Monaco 2008	338-F-68-3		
E145		0.1215	0.1214	X		0		SBI	Monaco 2008	338-F-68-3		
E146		0.1221	0.1221	X		0		SBI	Monaco 2008	338-F-68-3		

Date Placed In Desiccator	16-Jul-07	Balance ID Number	OMNI-00023
Time Placed in Desiccator	11:00 AM	Audit Weight ID Number	OMNI-00131
Technician	Morgan	Thermometer/Hygrometer ID Number	

Probe Tares

OMNI-Test Laboratories, Inc

	Date:	7/18/2007	7/19/2007	7/20/2007								
	Time:	9:00 AM	7:47 AM	7:00 AM								
	RH %:	34	15	13	0							
	T (F):	72	72	73	0							
Probe	Tech.:	Morgan	Morgan	Morgan								
ID Number	Audit:	0.5001	0.5001	0.5001	0							

							Manufacturer	Appliance	Project No.	Run	Train
28	114.7382	114.7384	X	0		0	SBI	Monaco 2008	338-F-68-3		

Date Placed in Desiccator:	16-Oct-07	Balance ID Number:	OMNI-00023
Time Placed in Desiccator:	10:30 AM	Audit Weight ID Number:	OMNI-00131
Technician:	R. Smith	Thermometer/Hygrometer ID Number:	OMNI-00343

Probe Tares

OMNI-Test Laboratories, Inc

Probe ID Number								Manufacturer	Appliance	Project No.	Run	Train
	Date:	10/18/2007	10/19/2007									
	Time:	11:20 AM	8:30 AM									
	RH %:	16	10		0		0					
	T (F):	73	75		0		0					
	Tech.:	Morgan	R. Smith									
38	Audit:	0.5001	0.5001		0		0	SBI	Monaco 2008	338-F-68-3		
		114.1424	114.1425	X	0		0					

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: 1/31/07 User/Technician: Michelle Dolman ☑ Pass ☐ Fail

NIST traceable stop watch OMNI Tracking Number: #292 Last Cal: 2.7.06

Stopwatch to be tested for time proficiency OMNI Tracking Number: OMNI-00862

1. 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.

Target time: 15.00 seconds #1 Measured time: 00:14.57 (MD) #2 Measured time: 14.94 #3 Measured time: 14.94

Target time: 30.00 seconds #1 Measured time: 30.58 #2 Measured time: 30.03 #3 Measured time: 29.80

Target time: 10.00 minutes #1 Measured time: 10:00.26 #2 Measured time: 10:00.06 #3 Measured time: 10:00.13

Target time: 30.00 minutes #1 Measured time: 30:00.00 #2 Measured time: 30:00.29 #3 Measured time: 30.00.03

Technician Signature: zzz. Dolman Date: 1.31.07

12-11-07 SBI MONACO 2008

- 10 lb = 10.00

TC calibration Omni 373

	Fl	Top	Bot	Back	Left	Right	Flue DB	Amb	TUNNEL m/1 AMB	m/2	F2
0	~~2.6~~ -1.3	-1.5	-1.1	-1.1	-2.6	-2.4 ~~-2.2~~	-2.6	-1.7	-1.8	-1.8	
100	~~98.8~~	98.8	99.5	99.5	98.1	98.1	98.2	98.8	98.4	98.6	
300	~~299.6~~	299.7	299.8	300.2	299.6	299.8	298.9	299.5	299.5	299.3	
500	~~500.6~~	500.2	500.4	500.9	499.6	499.5	499.6	500.5	500.0	500.2	
700	~~701.2~~	700.9	701.1	701.2	700.2	700.3	700.2	700.7	700.7	700.7	
900	~~901.8~~	901.8	901.0	902.3	900.7	901.2	901.4	901.6	901.4	901.4	

	m1-IN	m1-out	m2-IN	m-2-out
0	-2.6	-2.2	-1.7	-1.3
100	73.0	73.0	73.9	74.1
300	98.1	98.2	99.0	99.0
500	148.3	148.5	149.0	149.2

SBI- ANALYTICAL SCALE Scimtech MODEL SA 310

wt.	RESPONSE
~~0~~	0.0000
100 mg	~~2.09~~ 0.1002
200mg	0.2000
100 g	99.9983
200g	200.0006
150 g	150.0008

Thermal Metering System Calibration
Y and dH@

Manufacturer:	American Meter Company
Model:	DTM 200A
Serial Number:	07J264834
OMNI Tracking No.:	SBI-103

Average Orifice Meter dH@	Average Gas Meter y Factor
0.000	0.976

Calibration Date:	12/14/07
Calibrated by:	Ken Morgan
Calibration Frequency:	6 Month
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
Acceptance	Out of Limits		

Current Calibration

Acceptable y Deviation	0.020
Maximum y Deviation	0.003
Acceptable dH@ Deviation	0.200
Maximum dH@ Deviation	0.000
Acceptance	Acceptable

Reference Standard *			
Standard Calibrator	Model	Standard Test Meter	
	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 x dH / (Pb (Td + 460)) x [(Tr + 460) x time) / Vr]^2

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

Certificate of Compliance

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

Balance Model: SA310

Serial Number: 25626

Technician: Sonja Matton

Date: 10/13/06

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 between the manufacturer's facility and yours. Good Laboratory Practices suggest that you calibrate the balance, at your site, both prior to its use and periodically. Please follow the set up procedures as outlined in Scientech's operator's manual.

SCIENTECH, INC.

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*

PN 11161 Rev. 0

METTLER TOLEDO

RAPPORT D'ESSAI EXHAUSTIF

Nom du client	SBI inc.		N° DU TICKET SAV/ORDRE D'INTERVENTION		
Emplacement unité	Laboratoire		N° du client	SBI012	
Marque/N° de modèle	Ohaus Explorer		N° de série	D019024982	
Capacité	6100g kg ☐ lb	Nb.Divisions	61000	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:** 500g **Erreur permissive**

Tel que trouvé	
2: 500.2	3: 500.2
1: 500.2	4: 500.2
J	

Tel que remis	
2	3
1	4
J	

Dans la tolérance sans réglage ☐

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
Zéro	10.0g	10.0g			10.0 g	O ☐ N ☐
	50.0g	50.0g			50.0 g	O ☐ N ☐
	100.0g	100.0g			100.0 g	O ☐ N ☐
	500.0g	500.2g			500.0 g	O ☐ N ☐
Charge Maximale*	1000.0g	1000.5g			1000.0 g	O ☐ N ☐
	2 kg	2001.0g			2000.0g	O ☐ N ☐
	5 kg	5002.3g			4999.9g	O ☐ N ☐
	6 kg	6002.8g			6000.0g	O ☐ N ☐
Zéro						O ☐ N ☐

*Charge maximale utilisé pour l'essai

Dans la tolérance sans réglage ☐

OBSERVATIONS: BdL non Legal

NUMÉROS D'IDENTIFICATION DES POIDS: 500 à 544 Kit T14

N° du certificat de traçabilité du poids:	200425	DATE D'ÉTALONNAGE POUR CLIENT:	PROCHAIN ÉTALONNAGE POUR CLIENT:
RÉALISER PAR:	HENRI COREGORE		Signature du technicien
	Nom du technicien (en lettres capitales)		
cas échéant:	*Nom du client (en lettres capitales)*		*Signature du client*

METTLER TOLEDO

RAPPORT D'ESSAI EXHAUSTIF

Nom du client	SBI inc.		N° DU TICKET SAV/ORDRE D'INTERVENTION		
Emplacement unité	Laboratoire		N° du client	SBI014	
Marque/N° de modèle	Weightronix WI-110		N° de série	29009	
Capacité	500lb kg ☐ lb x	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

VÉRIFICATIONS DES COINS **Poids Appliqué:** 20kg **Erreur permissive**

Tel que trouvé	
2 : 20.00	3 : 19.96
1 : 19.98	4 : 20.00
J	

Tel que remis	
2	3
1	4
J	

Dans la tolérance sans réglage ☐

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 TolérancеO/N
Zéro	20.00kg	20.00 k	0 d			O ☐ N ☐
	40.00kg	39.98 k	-1 d			O ☐ N ☐
	60.00kg	60.00 k	0 d			O ☐ N ☐
	80.00kg	79.98 k	-1 d			O ☐ N ☐
Charge Maximale*	100.00kg	99.98 k	-1 d			O ☐ N ☐
	80 kg	79.98 k	-1 d			O ☐ N ☐
	60 kg	60.00 k	0 d			O ☐ N ☐
	40 kg	39.98 kg	-1 d			O ☐ N ☐
Zéro	20 kg	20.00k	0 d			O ☐ N ☐

*Charge maximale utilisé pour l'essai

Dans la tolérance sans réglage ☐

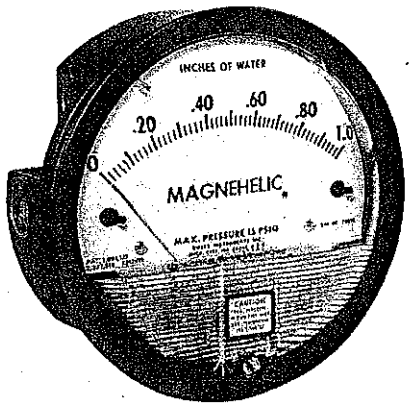
OBSERVATIONS:
Variation de .02 à .04 Car graduation Trop sensible non Legal

NUMÉROS D'IDENTIFICATION DES POIDS:	500 à 544		
N° du certificat de traçabilité du poids:	1200425	DATE D'ÉTALONNAGE POUR CLIENT: 12/JUN/06	PROCHAIN ÉTALONNAGE POUR CLIENT:
RÉALISER PAR:	HENRI COREGOIRE		Henri C
	Nom du technicien (en lettres capitales)		Signature du technicien
Le cas échéant:	*Nom du client (en lettres capitales)*		*Signature du client*

BULLETIN NO. A-27B

Magnehelic® Differential Pressure Gage

OPERATING INSTRUCTIONS



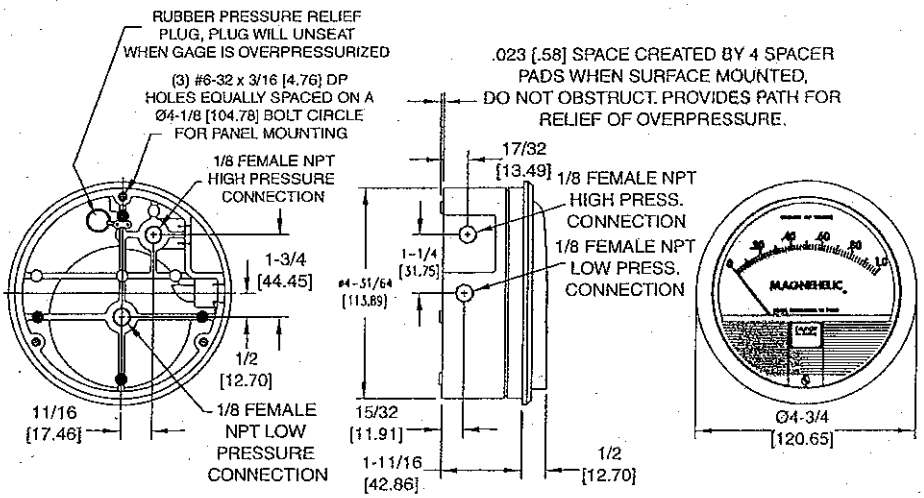
SPECIFICATIONS

Dimensions: 4-3/4" dia. x 2-3/16" deep.
Weight: 1 lb. 2 oz. (510 g)
Finished: Baked dark gray enamel.
Connections: 1/8" female NPT high and low pressure taps, duplicated, one pair side and one pair back.
Accuracy: Plus or minus 2% of full scale, at 70°F (21.1°C). (Model 2000-0, 3%; 2000-00, 4%).
Pressure Rating: 15 PSI (1.03 bar)
Ambient Temperature Range: 20° to 140°F (-7 to 60°C).
Standard gage accessories include two 1/8" male NPT plugs for duplicate pressure taps, two 1/8" male NPT pipe thread to rubber tubing adapters, and three flush mounting adapters with screws.

Caution: For use with air or compatible gases only.

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

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



DWYER INSTRUMENTS, INC.
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Fax: 219/872-9057 e-mail: info@dwyer-inst.com
Lit By Fax: 888/891-4963

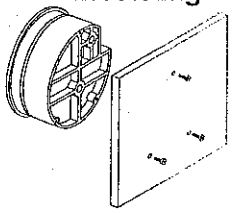
MAGNEHELIC® INSTALLATION

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

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

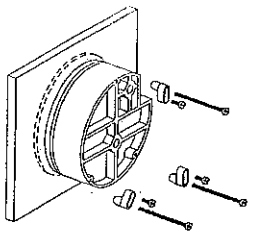
2. All standard Magnehelic gages are calibrated with the diaphragm vertical and should be used in that position for maximum accuracy. If gages are to be used in other than vertical position, this should be specified on the order. Many higher range gages will perform within tolerance in other positions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

3. Surface Mounting



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

4. Flush Mounting



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

5. To zero the gage after installation

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

Operation

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

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

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

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

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

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

MAINTENANCE

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

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

Calibration:

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

Make further adjustments as necessary.

Ordering Instructions:

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

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

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

Dwyer Instruments, Inc.
Attn: Repair Dept.
102 Indiana Highway 212
Michigan City, IN 46360

Trouble Shooting Tips:

•*Gage won't indicate or is sluggish.*

1. Duplicate pressure port not plugged.
2. Diaphragm ruptured due to overpressure.
3. Fittings or sensing lines blocked, pinched, or leaking.
4. Cover loose or "O"ring damaged, 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, (LT) option.

•Pointer stuck-gage can't be zeroed.

1. Scale touching pointer.
2. Spring/magnet assembly shifted and touching helix.
3. **Metallic particles clinging to magnet and interfering with helix movement.**
4. Cover zero adjust shaft broken or not properly engaged in adjusting screw.

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

Consult factory for assistance on unusual applications or conditions.

Use with air or compatible gases only.

Printed in U.S.A. 6/02 FR# 12-440212-04 Rev. 2

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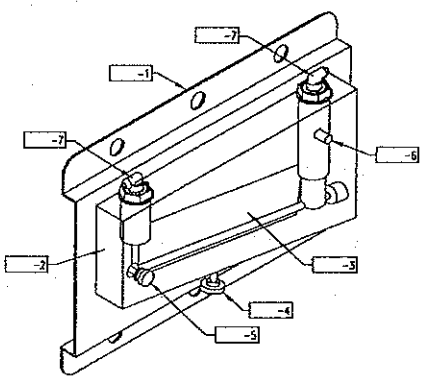
Bulletin D-3

Inclined and Vertical Stationary Manometers

Operating Instructions and Parts List



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

(-1) Panel
(-2) Gage Body
(-3) Scale
(-4) Scale Screw and Washer
(-5) Leveling Screw, Nut and Washer
(-6) Mounting Screw and Washer
(-7) Molded Nylon Connector--rapid shut off type
(-8) 3/4 oz. bottle Red Gage Oil (not shown)

1. Mount panel securely on a vertical surface, avoiding excessive heat. (Temperatures over 135°F. will damage the gage.)
2. Vent gage to atmosphere.
3. 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.
5. Add or remove oil as necessary.
6. 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.

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.

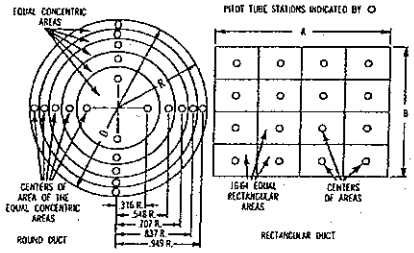
 Printed in U.S.A. 5/03

AIR VELOCITY

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

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

1. Duct diameter 4" (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 from the pitot tube.
4. Provide an egg crate type straightener upstream from the pitot tube.



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

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

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

where Pv=velocity pressure in inches of water
D=Air density in lbs/cu. ft.

$$\text{Air Density} = 1.325 \times \frac{P_B}{T}$$

where P_B = 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 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

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

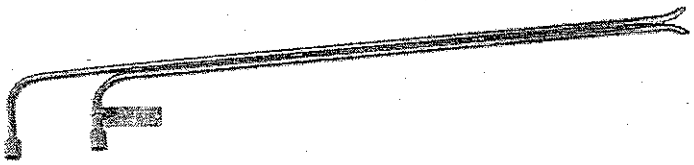
AIR FILTER TEST

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

FR# 30-440079-00 Rev.1

Series 160S "S" Type Pitot Tubes

Operating Instructions



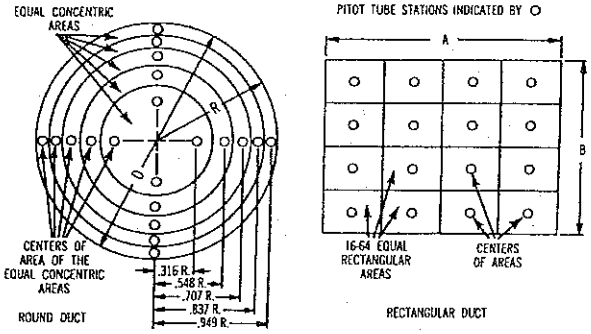


FIG. 4 – TRAVERSE ON ROUND AND SQUARE DUCT AREAS

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

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

INTRODUCTION

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

1. Duct diameter should be 4" or larger.
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.
4. Take readings in a smooth, straight duct section a minimum of 8½ duct diameters in length upstream and 1½ diameters downstream from the pitot tube.
5. Provide an egg-crate type straightener upstream from the pitot tube.

TAKING AIR VELOCITY READINGS

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

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

CALCULATING VELOCITY

Air Velocity = $1096.2\ (C_p)\ \sqrt{\frac{P_V}{D}}$

where:

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 = $1.325 \times \frac{P_B}{T}$

P_B = Barometric pressure in inches of mercury

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

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

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

DWYER INSTRUMENTS, INC.
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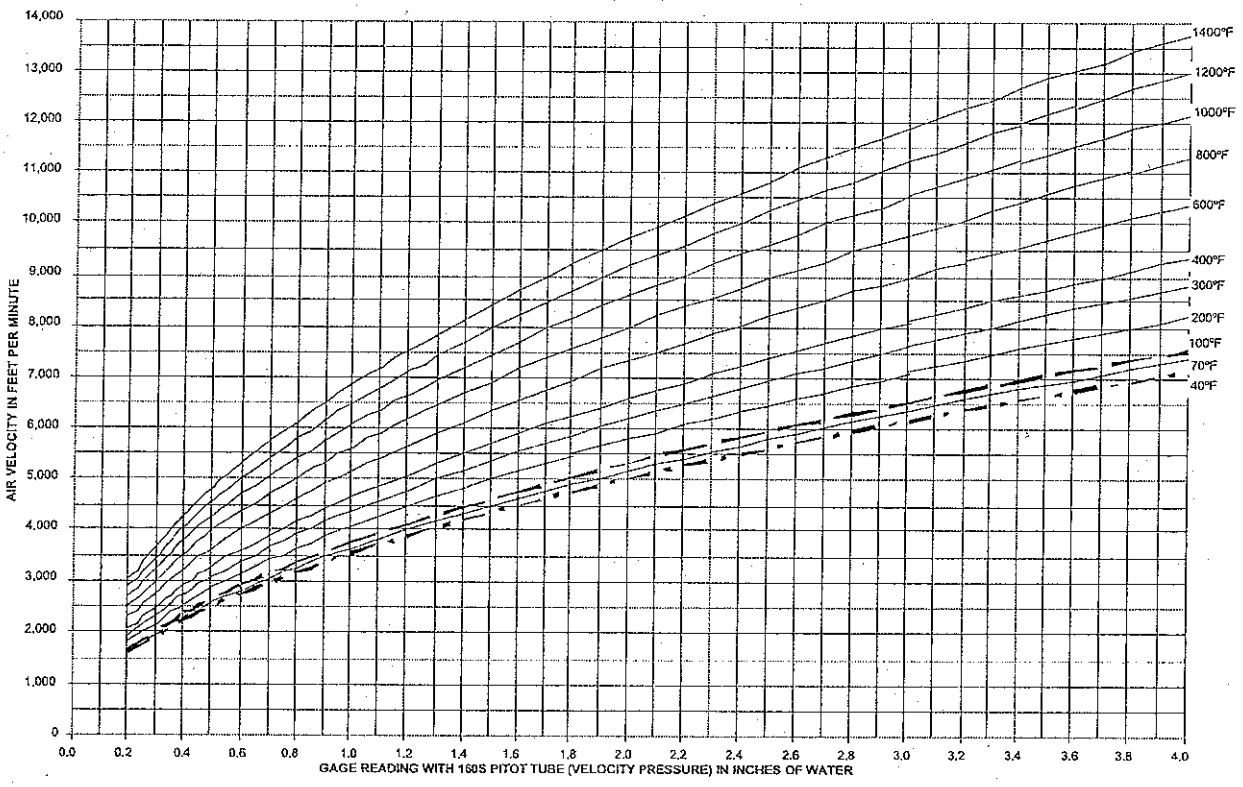

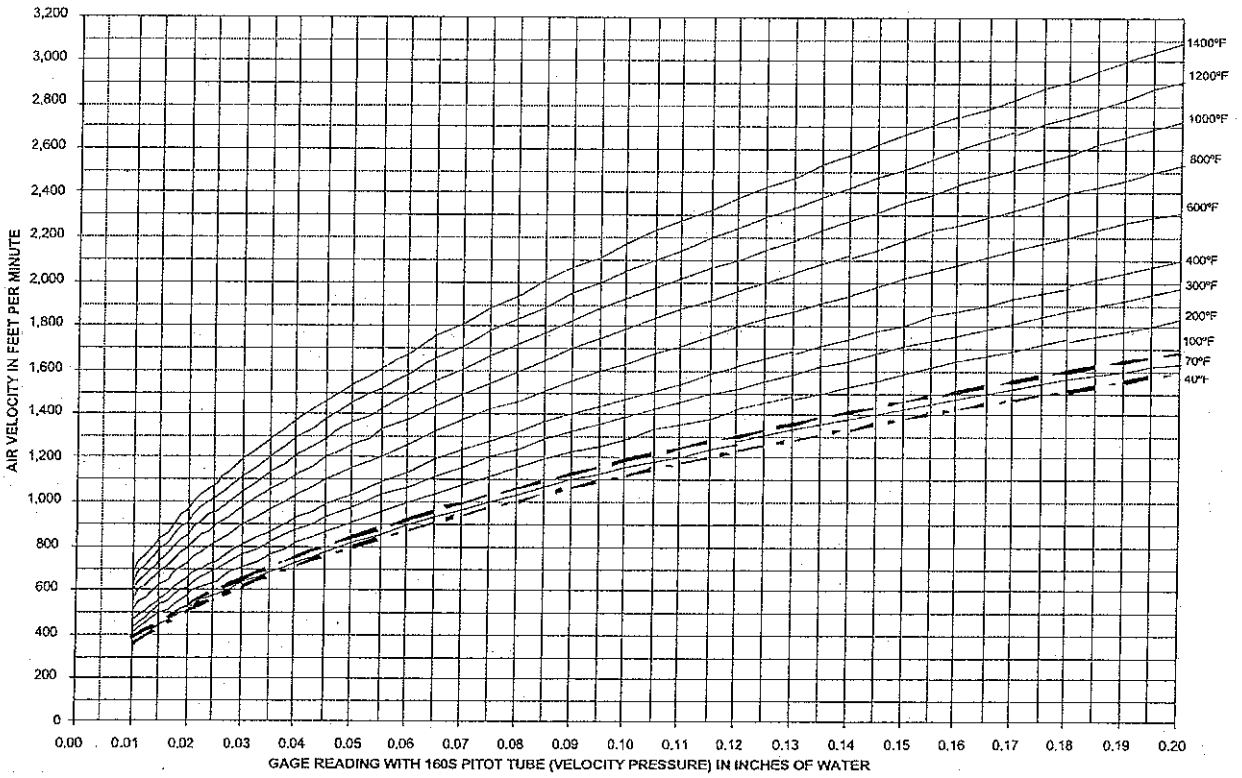

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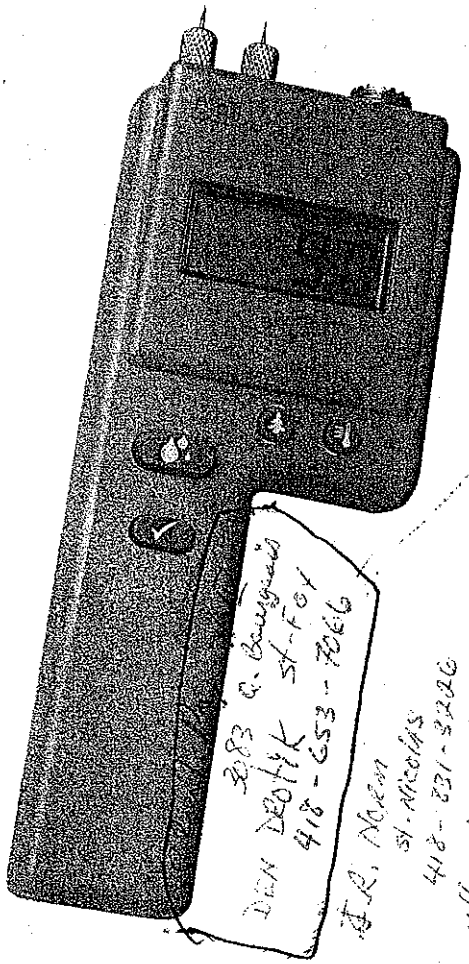
J-2000

owners manual



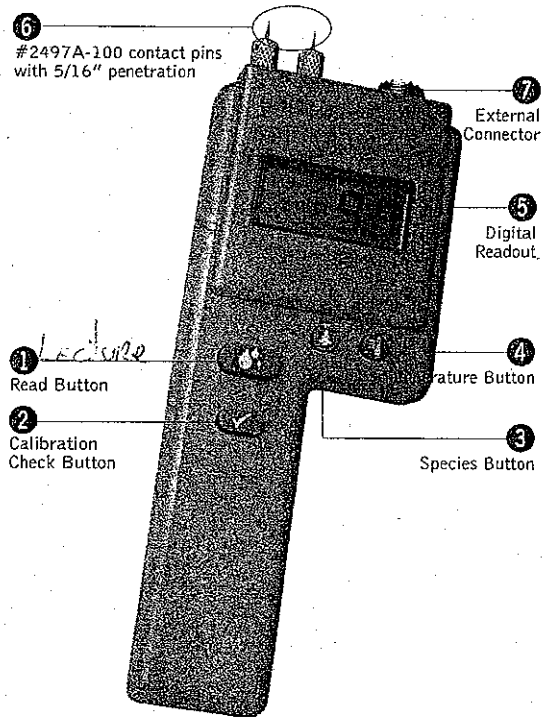
DELMHORST®
INSTRUMENT CO.

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

TABLE OF CONTENTS

DELMHORST J-2000

AVEC MARTEAU (ZZZ)
PESER 3 et 2



J-2000 FEATURES

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

BEFORE YOU BEGIN

Button Functions

1. READ BUTTON - Reads the Percent Moisture Content value (%MC), corrected for temperature and species.

2. 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.

3. SPECIES BUTTON - Sets the species code for the wood you are using. Species are numbered from 1 to 48 and are listed on the Species Code Chart. This button also acts as a scroll key, depending on the function.

4. TEMPERATURE BUTTON - Sets the wood temperature and changes the temperature mode (Fahrenheit or Celsius). This button also acts as a scroll key, depending on the function.

CHECK CALIBRATION ✓

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

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

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

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 ❸, and the meter will make the necessary corrections.

- ▶To change species press the species button ❸. The meter will display the current species code for one second.
- ▶To scroll forward through the species list hold the species button ❸ 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 ❹ within one second of pressing the species button ❸. Release the species button ❸ and continue to hold the temperature button ❹ and the species number will decrease.
- ▶When scrolling in either direction, release the button to stop at your desired species.

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

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

Species Code Chart

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

*Species and temperature correction data for both Western Hemlock-COFI (code #48) and SPF-COFI (code #44) were developed by COFI.

When comparing readings between the model RDM-2/COFI or the RDM-2S/COFI, used with type 26-E electrode with insulated pins, and the J-2000, be sure both meters are set to 2-pin electrode (insulated pins).

SET TEMPERATURE

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

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

Set Temperature Mode

- ▶To change from Fahrenheit to Celsius mode or Celsius to Fahrenheit mode press the temperature button ❹.
- ▶Press the calibration check button ❷ 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 ❻ 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 ❸, then press the calibration check button ❷ 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 ❷, 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 ❻ 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 ❼. See additional information under the "Pin Talk" section.

- ▶Remove the protective cover to expose the pins. Check that the contact pins ❻ are firmly hand tightened.
- ▶To take a reading, align the contact pins ❻ 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 ❶ 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 ❶ 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 ❷. 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 ❷ down for 5 seconds. All accumulated readings will be erased and the meter will display "0".

TO RESET METER

- **Press and release** the calibration check button ❷.
- **Within one second** press the species button ❸.
- **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 ❼.
- 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.

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.

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.

METER READINGS WITH NON-INSULATED PINS

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
HEMLOCK, WESTERN	7	8	9	10.5	13	15	17	19	20.5	22	23.5
HACKBERRY	7	8.5	9	9.5	12	13	15	17	18.5	20	22
HICKORY	8	8.5	9	10	11	12.5	14	15.5	17	19	20.5
KERUING	8	9	10	11	13	15	17	20	22	24	27
LARCH	7.5	9	10	11	13	15	17	19	21	23	25.5
MAGNOLIA	7.5	9	10	11.5	14	16	17.5	19	21	22.5	24.5
MAHOGANY, AFRICAN (ALSO KHAYA)	8	9.5	10.5	12	15	17	19.5	22	24	26	28
MAHOGANY, HOND.	7	8	9	10.5	12.5	14.5	16	18	19.5	21.5	22.5
MAHOGANY, PHIL.	6	7	7.5	8	9.5	11	13	14	15.5	17	18
MAPLE, HARD/SOFT	8	9	9.5	10	12	14	16	18	20	22.5	25
MERANTI, DARK RED	8.5	9.5	10.5	11.5	12.5	16	18	20.5	22.5	24.5	26.5
OAK, RED	7	8	9	10	12	14	16	18	20	22	24
OAK, WHITE	7	8	8.5	9.5	11.5	13.5	15	17	18.5	20	22
PECAN	6.5	8	9.5	11	12.5	14	16	17.5	19	22	24
PINE, LONGLEAF	8	8.5	10	11	13	15.5	17.5	19.5	21	23	25
PINE, PONDEROSA	7.5	8.5	10	11	13.5	15.5	17.5	19.5	21	23	25.5
PINE, SHORTLEAF	7.5	9	10	11	13	15.5	17.5	19.5	21.5	23.5	25
PINE, SO. YELLOW*	8	9.5	10.5	12	14.5	16.5	19	21	23	25	28
PINE, SUGAR	7	8	9	10	12	15	17	19	21	23	25
PINE, WHITE	7	8	9	10	13	15	17	19	21	23	25.5
POPLAR, YELLOW	8	8.5	10	11	13	15.5	17.5	19.5	22	24	26
RAMIN	7	8	9	10	11	13	15	16	18	20	21
RADIATA PINE	10	11	11	12	14	16	18	20	23	25	27
REDWOOD	7	8	9	10	12	13.5	15	17	19	22	24
SPRUCE, SITKA	7	8	9	10	12.5	14.5	17	19	21	23.5	26
SPF**	9	10	11.5	13	15.5	18	20.5	23	25	28	30
SPF/COFI	8	9	10	11	13	15	17	19	21	23	25
TEAK	7	8	8.5	9	11	12	14	15	17	18.5	20
VIROLA	6.5	7	8	9	11	12.5	14	16	18	18.5	20.5
WALNUT, BLACK	7.5	8.5	9.5	10.5	12.5	14.5	16	18	20	22	23.5

*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

Alpine Fir

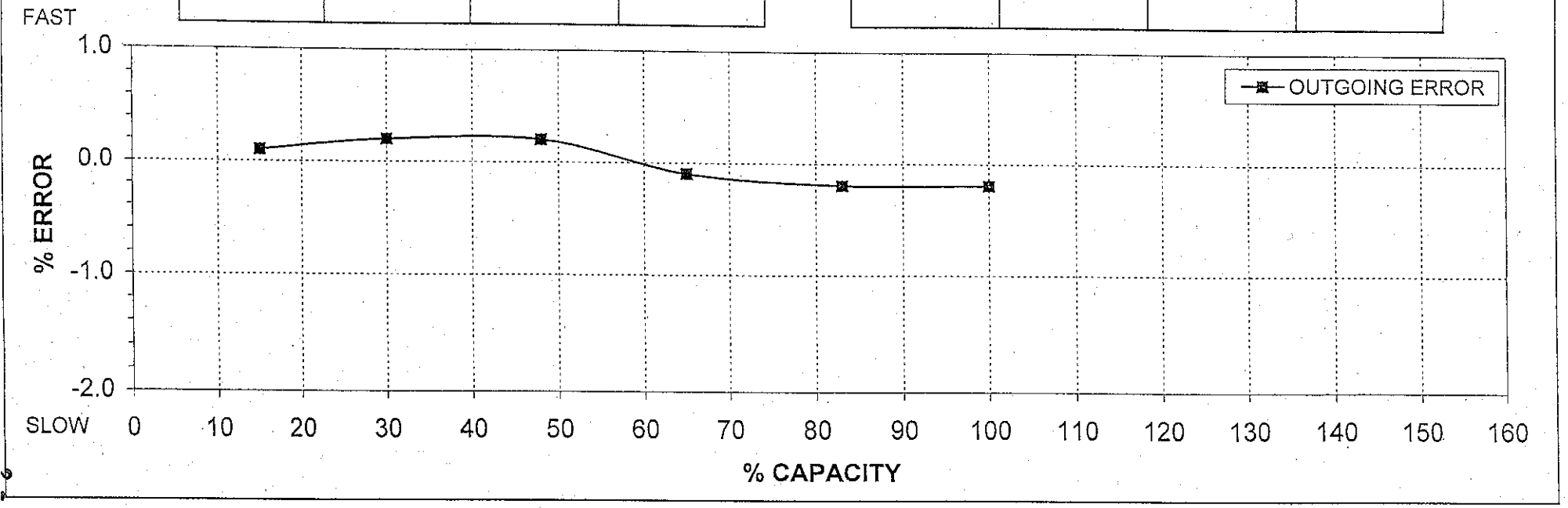
CERT. NO.: 042
01-[illegible]-2007

elster
Canadian Meter

CALIBRATION CERTIFICATE

FLOWRATE (AIR) CFH	% CAPACITY (AIR)	INCOMING %PROOF	INCOMING %ERROR

FLOWRATE (AIR) CFH	% CAPACITY (AIR)	OUTGOING %PROOF	OUTGOING %ERROR
30	15	99.9	0.1
60	30	99.8	0.2
96	48	99.8	0.2
130	65	100.1	-0.1
166	83	100.2	-0.2
200	100	100.2	-0.2



% Proof = (Vp/Vm) x 100; Vm = Meter Volume
% Error =[(Vm-Vp / Vp] x 100; Vp = Prover Volume
% Accuracy = (Vm/Vp) x 100
1 L = 0.001 cu.M. = 0.03531 cu.ft.

Calibrated with air to Elster Canadian Meter flow standards with a process accuracy of ± 0.2%, which are traceable to the National Research Council - Ottawa Canada.
Meter tested on Certified Bell Prover QA-2BM-1

TECH. SERVICES: Lyd Ent Date: MAY 1, 2007

METER MODEL:	**DTM-200A**
DATE:	01-May-2007
CUSTOMER:	Conval Quebec s/o 10087950
PIN (in. w.c.):	2
M.A.O.P.:	5 PSIG
SERIAL NO.:	07J264834
INDEX READING:	0176 Ft^3

SBI-103

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American Meter

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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: 10088109 CMCO # 1055531

Product Description: DTM-200A

Manufacturing Number: 07J264834 thru

Working Pressure (Psi): 10 **Test Pressure (Psi):** 15

Accuracy @	200.0	CFH	100.1	%
Accuracy @	65.0	CFH	99.9	%

Prover Number/s: XK-1179, XU-3530

Wayne Nelson

Certified By: Wayne Nelson **Date:** 4/19/2007
Quality Assurance Manager

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

ISO 9001: 2000

QMI REGISTERED

Certificate No. 006697

AMERICAN METER COMPANY

GAS METER TEST RECORD

Date: 04/24/2007

Sold To Name: CANADIAN METER - Cambridge
Qty Ordered: 1

Sold To Order No: 1055531

SOLD TO ID: P1401
SALES ORDER NO: 10088109
SHOP ORDER NO: 2128149
PROOF TYPE: proof

SERIES ID:	Type:	Drive:	Remote Rdr:	Top:	Index:
200A		0.1FT			

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

ULRICH

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
Type:	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:	AMK

Property of: SBI
1700, RUE LEON HAMEL
QUEBEC, QC G1N 4R9

Approved by: Nuccio Mercuri
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.

La Cie J. CHEVRIER INSTRUMENTS INC.

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

Tél. (514) 328-2550
1 800 522-1226
Fax (514) 327-0604
info@chevrierinstruments.com

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

Certificat d'étalonnage
Calibration certificate

Description	Manomètre différentiel Magnehelic Dwyer 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 Inc. 17311	*Quitte conforme Leaving in specs*	Oui
Bon de travail Work order #	17041-02	*Réparation (o/n) Repaired (y/n)*	Non

État instrument Condition	Arrivée/In	Sortie/Out
	Bon	Bon

Conditions d'étalonnage à l'ambiante Ambient conditions at time of calibration	20 ± 1°C	35-55% H.R.

Remarque(s)
Comments

Appliquée Applied "CE	Lectures Readings (ascendantes) (ascending)	Erreur Error	Appliquée Applied "CE	Lectures Readings (descendantes) (descending)	Erreur Error
0.0000	0.00	0.0000	0.0000	0.00	0.0000
0.0981	0.10	0.0019	0.0926	0.10	0.0074
0.2556	0.25	-0.0056	0.2431	0.25	0.0069
0.3495	0.35	0.0005	0.3418	0.35	0.0082
0.4971	0.50	0.0029	0.4971	0.50	0.0029

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

Étalons utilisés traçable au C.N.R.C / N.I.S.T.– Standards used C.N.R.C / N.I.S.T. Traceable
CHEV029, *manomètre/simulateur différentiel Furness 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. + 1chiffre), certifié NIST, Certificat:* FC06-303-B01, *date due 30 octobre 2007.*

Certifié par
Certified by Julien Bernier JB

Date 2007-juil-27

Date due
Due Date 2008-juil-27

Numéro du certificat
Certificate number 17041-02-17311

C. Q
J. B

C.Q.
DC

H:\WPAT\CERTIFIC\Save\17041-02-17311.doc
Enregistré par le BNQ selon ISO 9001

À moins d'exception, le ratio d'incertitude étalon/instrument est d'au moins 4 pour 1. The test uncertainty ratio exceeds four to one unless otherwise indicated
Points non-conforme en ombragé. Out of tolerance readings shaded.

AU SERVICE DE L'INDUSTRIE depuis 1975

2-45 OF 2-65

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www.ulrich.ca

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
QUEBEC, QC G1N 4R9

Approved by: Nuccio Mercuri
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.

MEASUREMENT RESULTS

See next page for measurement results.

Notes:

9V battery replaced.

2 - 46 OF 2 - 65

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Lachine, QC H8T 1A1 Fax (514) 631-6122
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CALIBRATION DATA

Certificate No. 82536

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

Result: PASS
Condition: FOUND-LEFT

CALIBRATION STANDARDS

Standard ID	Type	Manufacturer	Model no.	Cal. Date	Due Date
8608002	CALIBRATOR	FLUKE	5520A	2006/10/14	2008/10/14

MEASUREMENT RESULTS (Per METICAL)

PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
DISPLAY CALIBRATION						
Did all segments of the display illuminate? Result of Operator Evaluation					PASS	
THERMOMETER CALIBRATION						
K Type Thermocouple						
-200.0degF		-200.5	-201.0	-199.0	PASS	1.7
-60.0degF		-59.9	-61.0	-59.0	PASS	3.1
-40.0degF		-40.2	-40.5	-39.5	PASS	1.5
32.0degF		31.7	31.5	32.5	PASS	1.7
1240.0degF		1239.7	1239.5	1240.5	PASS	1.1
1260.0degF		1259.7	1259.5	1260.5	PASS	1.1
2500.0degF		2499.2	2499.0	2501.0	PASS	1.4
J Type Thermocouple						
-200.0degF		-200.8	-201.0	-199.0	PASS	2.1
-60.0degF		-60.4	-61.0	-59.0	PASS	3.5
-40.0degF		-40.4	-40.5	-39.5	PASS	1.7
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	ACCEPTANCE LIMITS LOW	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
T Type Thermocouple						
-200.0degF		-200.1	-201.0	-199.0	PASS	2.3
-60.0degF		-60.1	-61.0	-59.0	PASS	2.3
-40.0degF		-39.9	-40.5	-39.5	PASS	1.2
32.0degF		31.9	31.5	32.5	PASS	1.7
750.0degF		749.9	749.5	750.5	PASS	2.0
CALIBRATOR CALIBRATION						
K Type Thermocouple						
-200.0degF		-199.3	-201.0	-199.0	PASS	1.7
-60.0degF		-59.7	-61.0	-59.0	PASS	3.1
-40.0degF		-39.8	-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
J Type Thermocouple						
-200.0degF		-199.2	-201.0	-199.0	PASS	2.1
-60.0degF		-59.7	-61.0	-59.0	PASS	3.5
-40.0degF		-39.6	-40.5	-39.5	PASS	1.7
32.0degF		32.2	31.5	32.5	PASS	2.0
1240.0degF		1240.0	1239.5	1240.5	PASS	1.6
1260.0degF		1259.9	1259.5	1260.5	PASS	1.6
1400.0degF		1399.5	1399.4	1400.6	PASS	1.8
T Type Thermocouple						
-200.0degF		-200.2	-201.0	-199.0	PASS	2.3
-60.0degF		-60.2	-61.0	-59.0	PASS	2.3

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PARAMETER	TRUE VALUE	TEST RESULT	ACCEPTANCE LIMITS LOW	HIGH	PASS/ FAIL	TUR
-40.0degF		-40.0	-40.5	-39.5	PASS	1.2
32.0degF		31.8	31.5	32.5	PASS	1.7
750.0degF		749.7	749.5	750.5	PASS	2.0

End of Test Data

magnetic Calibration SBI-105

- checked against incline manometer # SBI-020

incline	magnetic
.218	.225
.155	.158
.080	.085
.040	.040

Run 1

- Home
- Site Map
- Contact Us
- Help / FAQ
- En français

Last 24 hours

Tuesday, 11 Dec 2007

Quebec Airport

Observations

Time	Sky	Temp (° C)	Dewpoint	Feels Like	Wind (Km/h)	Relative Humidity (%)	Pressure (kpa)	Visibility (km)	Ceiling (ft)	
TUE 17		-8	-10	-	-	85	101.93	1.6	600	30.10
TUE 16		-8	-10	-	-	85	102.02	3.2	800	30.13
TUE 15		-9	-10	-	-	92	102.09	2.4	700	
TUE 14		-9	-11	-	SW 9	85	102.18	4.8	600	30.17
TUE 13		-9	-11	-16	SW 19	85	102.27	4.8	600	
TUE 12		-10	-12	-18	W 20	85	102.40	4.8	500	
TUE 11		-11	-13	-17	W 11	85	102.44	4.8	10000	
TUE 10		-12	-13	-19	W 13	92	102.58	2.4	500	
TUE 09		-12	-14	-20	W 17	85	102.62	1.0	200	
TUE 08		-14	-16	-	NE 4	85	102.62	4.8	400	
TUE 07		-13	-15	-	NE 7	85	102.61	2.4	300	
TUE 06		-12	-14	-19	W 15	85	102.62	0.6	100	
TUE 05		-12	-14	-20	SW 20	85	102.59	1.6	100	

Run 1

12-12-07

Runs 2, 3

- Home
- Site Map
- Contact Us
- Help / FAQ
- En français

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		-13	-20	-20	W 13	56	102.48▲	24	unlimited	30.26
WED 21		-13	-20	-21	W 19	56	102.32▲	24	unlimited	30.22
WED 20		-12	-19	-21	W 22	56	102.18▲	24	unlimited	
WED 19		-12	-18	-20	W 19	61	102.07▲	24	unlimited	30.14
WED 18		-10	-17	-18	W 19	56	101.93▲	24	unlimited	
WED 17		-9	-16	-17	NW 24	57	101.73▲	24	unlimited	
WED 16		-7	-15	-16	NW 33	53	101.52▲	24	unlimited	29.98
WED 15		-6	-13	-14	W 31	58	101.33▲	24	unlimited	
WED 14		-5	-11	-13	W 28	63	101.13▲	24	4000	29.86
WED 13		-5	-11	-13	W 31	63	100.97▲	24	unlimited	
WED 12		-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	

Rwy 3

Rwy 2

12-12-07

Runs 2, 3

- Home
- Site Map
- Contact Us
- Help / FAQ
- En français

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		-13	-20	-20	W 13	56	102.48▲	24	unlimited	30.26
WED 21		-13	-20	-21	W 19	56	102.32▲	24	unlimited	30.22
WED 20		-12	-19	-21	W 22	56	102.18▲	24	unlimited	
WED 19		-12	-18	-20	W 19	61	102.07▲	24	unlimited	30.14
WED 18		-10	-17	-18	W 19	56	101.93▲	24	unlimited	
WED 17		-9	-16	-17	NW 24	57	101.73▲	24	unlimited	
WED 16		-7	-15	-16	NW 33	53	101.52▲	24	unlimited	29.98
WED 15		-6	-13	-14	W 31	58	101.33▲	24	unlimited	
WED 14		-5	-11	-13	W 28	63	101.13▲	24	4000	29.86
WED 13		-5	-11	-13	W 31	63	100.97▲	24	unlimited	
WED 12		-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	

Runs 3

Runs 2

Runs 4+5

- Home
- Site Map
- Contact Us
- Help / FAQ
- En français

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		-15	-21	-22	NE 11	60	102.11▼	24	13000	30.15
THU 19		-15	-21	-	NE 9	60	102.24▼	24	13000	30.19
THU 18		-15	-22	-	E 4	55	102.34▼	24	12000	30.22
THU 17		-15	-21	-	NE 6	60	102.42▼	24	13000	
THU 16		-15	-21	-	N 6	60	102.51▲	48	13000	
THU 15		-14	-21	-	-	55	102.45▼	48	23000	30.25
THU 14		-14	-21	-20	SW 11	55	102.61▼	48	14000	
THU 13		-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	-	S 9	54	102.98▲	48	unlimited	
THU 08		-20	-27	-	W 7	53	102.95▲	48	unlimited	

Runs 5

Run 4

Runs 4+5

- Home
- Site Map
- Contact Us
- Help / FAQ
- En français

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		-15	-21	-22	NE 11	60	102.11	24	13000	30.15
THU 19		-15	-21	-	NE 9	60	102.24	24	13000	30.19
THU 18		-15	-22	-	E 4	55	102.34	24	12000	30.22
THU 17		-15	-21	-	NE 6	60	102.42	24	13000	
THU 16		-15	-21	-	N 6	60	102.51	48	13000	
THU 15		-14	-21	-	-	55	102.45	48	23000	30.25
THU 14		-14	-21	-20	SW 11	55	102.61	48	14000	
THU 13		-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	-	S 9	54	102.98	48	unlimited	
THU 08		-20	-27	-	W 7	53	102.95	48	unlimited	

Runs 5

Runs 4

Example Calculations

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

Equations and Sample Calculations - Method 5G

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

BR	Dry burn rate, kg/hr
m_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,

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
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_a	=	Acetone blank value, mg/ml

Sample Calculation:

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

$m_n = 16.2$ mg

Volume of Gas Sampled Corrected to Dry Standard Conditions

Using equation 5-1:

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

Where:

K	=	17.64 °R/in. Hg
T_{std}	=	528 °R
P_{std}	=	29.92 in. Hg
V_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
T_m	=	Absolute average dry gas meter temperature, °R

Sample Calculation:

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

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

Dilution Tunnel Gas Velocity

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

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

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

Where:

v_s = Average dilution tunnel gas velocity, ft/sec

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

C_p = Pitot tube coefficient (0.99 for standard pitot tube; 0.84 may be used for S-type pitot tubes constructed according to Method 2 procedures), unitless

ΔP = 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. H_2O

P_b = 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	=	Concentration of particulate matter in stack gas, dry basis, corrected to standard conditions, g/dscf
m_n	=	Total mass of particulate matter collected in the sampling train, mg
$V_{m(std)}$	=	Volume of gas sampled corrected to dry standard conditions, dscf

Sample calculation:

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

$$C_s = 0.000163 \ g/dscf$$

Average Dilution Tunnel Gas Flow Rate

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

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

Where:

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

Sample calculation:

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

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

Particulate Emission Rate

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

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

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

Where:

E	=	Particulate emission rate, g/hr
E_{adj}	=	Particulate emission rate, adjusted, g/hr
C_s	=	Concentration of particulate matter in the stack, corrected to dry, standard conditions, g/dscf
Q_{sd}	=	Average dilution tunnel gas flow rate, dscf/hr
K_3	=	Constant, 1.82 for metric units, 0.643 for English units

Sample calculation:

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

$$E = 1.36\ g/hr$$

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

$$E = 2.35\ g/hr$$

Proportional Rate Variation

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

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

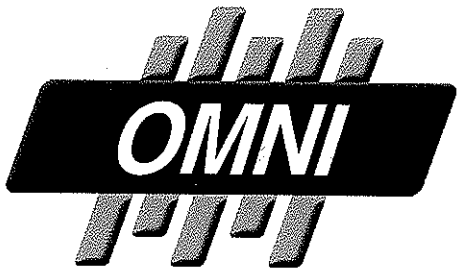
Where:

PR	=	Percent proportional rate
θ	=	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 CO_2 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
T_{si}	=	Absolute average gas temperature in the dilution tunnel during each 10 minute interval, i, of the test run, °R
T_s	=	Absolute average gas temperature in the dilution tunnel, °R

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

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

$$PR = 103.8\%$$



Certification Test Report

Stove Builder International

Wood Fireplace Insert
Model: Monaco 2008

Report Number: 338-F-68-3

Part 2 of 2

OMNI-Test Laboratories, Inc.
Product Testing & Certification

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

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

Section 4

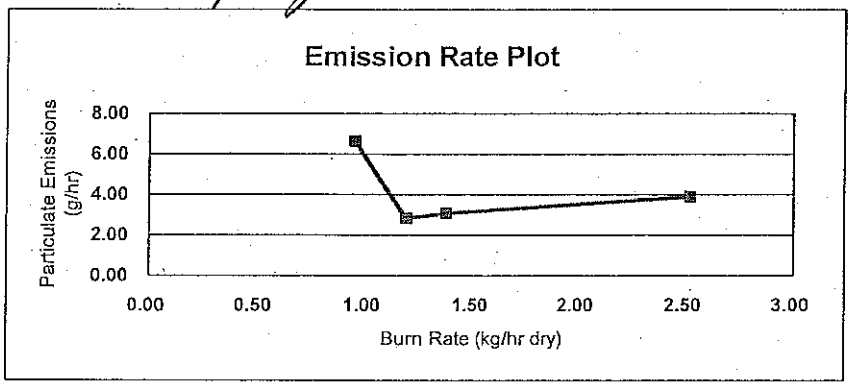
Test Data by Run

EPA Weighted Average Emissions
EPA Method 28

Client: SBI
Stove Model: Monaco 2008
Test Dates: 12/11/07 - 12/13/07
Project Number: 338-F-68-3
Tracking Number: 1161
Signature/Date: K.J. Morgan 1-03-08

Status: FINAL
Stove Type: Non-Catalytic Stove

Weighted Average (g/hr)
4.4



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	

Run #	3	
Burn Rate (dry kg/hr)	1.37	
Catagory	3	
Overall Efficiency (%)	63%	
Emissions (g/hr)	3.08	
Cap (g/hr)	15	
Weighting Factor	0.428	26.11%
Heat Output (BTU/hr)	16554	

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

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

Run 1

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: 1
Test Date: 12/11/07

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

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

Results Are Acceptable

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 1

Manufacturer: SBI
Model: Monaco 2008
Tracking No.: 1161
Project No.: 338-F-68-3
Test Date: 11-Dec-07
Beginning Clock Time: 14:28
Recording Interval: 10 min.
Total Sampling Time: 230 min.

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.055	0.053	0.050	0.050	0.050	0.053	0.055	0.053	"H2O
Initial Temp.	118	118	117	117	116	116	115	115	oF

OMNI Equipment Numbers:

PM Control Module: SBI 046,47
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.56 lb/lb-mole
Dilution Tunnel H2O: 4.00 percent
Dilution Tunnel Static: -0.120 "H2O
Pitot Tube Cp: 0.84
Meter Box Y Factor: 0.975 (1) 0.974 (2)

Barometric Pressure:	Begin	Middle	End	Average
	30.17	30.13	30.1	30.13 "Hg

Signature/Date: [signature] 1-21-08

Tunnel Velocity: 13.31 ft/sec.
Intial Tunnel Flow: 140.2 scfm
Average Tunnel Flow: 141.8 scfm
Tunnel Area: 0.1963 ft2
Post-Test Leak Check (1): 0@10 cfm@"Hg
Post-Test Leak Check (2): .002@10 cfm@"Hg
Fuel Moisture (dry basis %): 21.69
Total Particulate (1): 11.8
Total Particulate (2): 13.2

Elapsed Time	Particulate Sampling Data													Fuel Weight, lb		Wood Heater Temperature Data, oF												Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	659.878	660.392			0.00	0.00	76	77	0	0	117	0.052			9.8		482	423	507	373	368		430.6	310	77	77			78	-0.053
10	660.732	661.398	0.09	0.10	0.00	0.00	76	77	0	0	105	0.052	94	92	8.9	-0.9	440	422	487	360	345		410.8	306	80	82			77	-0.063
20	661.670	662.512	0.09	0.11	0.00	0.00	76	77	0	0	101	0.052	103	101	8.3	-0.6	501	399	444	338	320		400.4	323	81	83			77	-0.065
30	662.610	663.594	0.09	0.11	0.00	0.00	76	77	0	0	103	0.052	103	99	7.5	-0.8	587	376	425	330	308		405.2	353	80	83			78	-0.068
40	663.530	664.672	0.09	0.11	0.00	0.00	76	77	0	0	109	0.052	102	99	6.6	-0.9	712	357	426	335	305		427.0	394	81	83			78	-0.073
50	664.440	665.720	0.09	0.10	0.00	0.00	76	77	0	0	116	0.052	101	97	5.6	-1	862	343	436	350	323		462.8	444	81	83			78	-0.078
60	665.355	666.821	0.09	0.11	0.00	0.00	77	77	0	0	121	0.052	102	102	4.7	-0.9	940	332	457	368	345		488.4	477	82	85			79	-0.080
70	666.265	667.960	0.09	0.11	0.00	0.00	76	77	0	0	118	0.052	102	105	3.9	-0.8	862	327	489	387	361		485.2	458	82	86			80	-0.078
80	667.182	669.095	0.09	0.11	0.00	0.00	77	77	0	0	114	0.052	102	104	3.3	-0.6	767	326	523	391	370		475.4	423	82	86			80	-0.075
90	668.055	670.150	0.09	0.11	0.00	0.00	77	77	0	0	110	0.052	97	97	2.9	-0.4	683	328	549	392	380		466.4	392	82	86			80	-0.070
100	668.999	671.320	0.09	0.12	0.00	0.00	77	78	0	0	107	0.052	104	107	2.5	-0.4	632	329	560	390	383		458.8	373	82	85			79	-0.065
110	669.910	672.405	0.09	0.11	0.00	0.00	77	78	0	0	107	0.052	100	99	2.1	-0.4	647	329	566	393	387		464.4	384	82	85			80	-0.065
120	670.835	673.495	0.09	0.11	0.00	0.00	77	78	0	0	107	0.052	102	99	1.7	-0.4	674	325	568	399	391		471.4	377	82	85			80	-0.065
130	671.765	674.605	0.09	0.11	0.00	0.00	77	78	0	0	103	0.052	102	101	1.5	-0.2	577	329	577	393	391		453.4	346	82	84			80	-0.055
140	672.700	675.695	0.09	0.11	0.00	0.00	77	78	0	0	100	0.052	102	99	1.3	-0.2	525	333	587	385	383		442.6	327	82	84			79	-0.060
150	673.590	676.790	0.09	0.11	0.00	0.00	77	78	0	0	99	0.052	97	99	1.2	-0.1	488	335	588	377	374		432.4	309	81	84			79	-0.060
160	674.518	677.880	0.09	0.11	0.00	0.00	78	78	0	0	97	0.052	101	99	1.0	-0.2	462	336	580	369	366		422.6	297	81	83			79	-0.055
170	675.435	678.975	0.09	0.11	0.00	0.00	77	78	0	0	96	0.052	100	99	0.9	-0.1	448	338	572	363	361		416.4	288	81	83			79	-0.053
180	676.353	680.068	0.09	0.11	0.00	0.00	78	77	0	0	96	0.052	100	99	0.7	-0.2	453	338	566	358	350		413.0	287	81	83			79	-0.053
190	677.275	681.165	0.09	0.11	0.00	0.00	78	78	0	0	95	0.052	100	99	0.5	-0.2	449	341	560	357	345		410.4	284	81	82			79	-0.055
200	678.190	682.260	0.09	0.11	0.00	0.00	78	78	0	0	95	0.052	100	99	0.3	-0.2	452	343	551	355	340		408.2	283	81	22-Mar			79	-0.055
210	679.100	683.390	0.09	0.11	0.00	0.00	78	78	0	0	94	0.052	99	102	0.2	-0.1	441	347	526	352	335		400.2	278	81	82			79	-0.055
220	680.025	684.620	0.09	0.12	0.00	0.00	78	79	0	0	94	0.052	101	111	0.1	-0.1	431	350	501	346	325		390.6	272	81	82			79	-0.053
230	680.952	685.846	0.09	0.12	0.00	0.00	78	78	0	0	93	0.052	101	110	0.0	-0.1	418	353	482	340	322		383.0	266	80	82			79	-0.053
Avg/Total	21.074	25.454	0.09	0.11	0.00	0.00	77.00	77.58			104.02	0.052	100.71	100.70									48		81.08	83.33	#DIV/0!	#DIV/0!		-0.063

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 1
Train #: A
Date: 12/11/07

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

Total Particulate, mg :	11.8

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

Analyst: H. J. Morgan Date: 1-21-08

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 1
Train #: B
Date: 12/11/07

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

Total Particulate, mg :	13.2

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

Analyst: M. J. Morgan Date: 1-21-08

OMNI Labories,
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: SBI / Monaco 2008 Project #: _338-F-68-3 Tracking #: _1161

Date: 12-11-07 Test Crew: K. Morgan Run #: 1

OMNI Equipment ID #:

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: 2.0 - 2.4 Actual: Coal Bed: 2.2

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used ~~Catalyst~~
0	5.5			77	988	411	332	281	261	591	
10	4.6	0.9	-.078	78	886	417	392	331	312	485	
20	3.7	0.9	-.075	78	866	410	429	355	342	467	
30	3.0	0.7	-.070	78	817	393	460	375	364	443	
40	2.6	0.4	-.068	78	736	393	481	381	373	415	
50	2.3	0.3	-.065	78	618	407	494	378	377	363	
60	2.2	0.1	-.053	78	482	423	507	373	368	310	
70											
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. Morgan Date: 12-11-07

4-8 OF 4-97

OMNI-Test Laboratories, Inc
Beaverton, OR

FUEL DATA

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-11-07 Test Crew: K. Morgan Run #: 1
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan, CLAUDE PARE
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length		Readings		Type
1	8 ft	19.4	19.9	19.7	2x4
2	ft				
3	ft				

Length of cut pieces: 8@ 8.75" inches Pre-Burn Fuel Average Moisture: 19.67%

Time (clock): 11:15 Room Temperature (F): 75 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 x 4 2 4 x 4 2
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT: 3.4 (2 x 4)
6.4 (4 x 4)
FUEL PIECE LENGTH: 13.0" 9.8 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	21.2	21.4	21.2	2x4
2	21.6	21.1	21.2	2x4
3	22.0	23.1	21.2	4x4
4	21.3	23.1	21.9	4x4
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 21.69%

Time (clock): 11:30 Room Temperature (F): 75 Initials: K

Technician signature: K. J. Morgan Date: 12-11-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Run Notes

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3
Tracking #: 1161
Run #: 1 Date: 12-11-07
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:

Fully Closed

SECONDARY: Fully Closed Position (Tandemly Controlled with primary)

TERTIARY: N/A

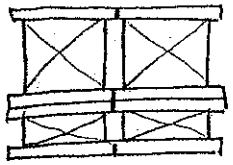
FAN: ON - High

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	test setting					
60					X	Levelled

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Loaded by 45 sec.
DOOR: AJAR until 4 min, 40 sec.
PRIMARY AIR: Fully OPEN 5:0 MIN - ABRuptly closed to test SETting at 5:0 min.
OTHER: NONE

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

SAME as above

SECONDARY: Fully Closed Position

TERTIARY: N/A

FAN: ON - High

Technician signature: K. J. Morgan Date: 12-11-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: SBI

Model: Monaco 2008

Project #: 338-F-68-3 Tracking #: 1161

Date: 12-11-07 Run #: 1 Booth: _____

Test Crew: K. Morgan Start Time: 14:28 Stop Time: 18:18

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack: Dilution Tunnel (Method 5G Only):

Initial: _____ Initial: _____

Final: N/A Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A 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							
O_2							
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: <50 Final: <50

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

Induced Draft: ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: ø @ 3.4" w.c. Post: ø @ 3.1 " w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 12-10-07 Initials: JL

	Initial	Middle	Ending
Pb (in/Hg)	~~78~~ K 30.17 CT	~~80~~ K 30.13 CT	~~79~~ K 30.10 CT
Room Temp (°F)	78	80	79

Technician signature: K. A. Morgan Date: 12-11-07

Run 2

Wood Heater Test Data - EPA Method 5G

Manufacturer: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161
Run: 2
Test Date: 12/12/07

Burn Rate	**1.00 kg/hr dry**
Average Tunnel Temperature	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 inches H20
Average Delta H	0.00 inches H20
Total Time of Test	240 minutes

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

Results Are Acceptable

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 2

Manufacturer: SBI
Model: Monaco 2008
Tracking No.: 1161
Project No.: 338-F-68-3
Test Date: 12-Dec-07
Beginning Clock Time: 12:18
Recording Interval: 10 min.
Total Sampling Time: 240 min.

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.045	0.052	0.046	0.046	0.052	0.055	0.052	0.052	"H2O
Initial Temp.	116	114	112	110	108	106	104	102	oF

OMNI Equipment Numbers:

PM Control Module: SBI 046,47
Dilution Tunnel MW(dry): 29.00 lb/lb-mole
Dilution Tunnel MW(wet): 28.56 lb/lb-mole
Dilution Tunnel H2O: 4.00 percent
Dilution Tunnel Static: -0.118 "H2O
Pitot Tube Cp: 0.84
Meter Box Y Factor: 0.975 (1) 0.974 (2)

Barometric Pressure:	Begin	Middle	End	Average
	29.78	29.86	29.98	29.87 "Hg

Signature/Date: 12-1-Mayer 1-21-08

Tunnel Velocity: 13.60 ft/sec.
Intial Tunnel Flow: 137.3 scfm
Average Tunnel Flow 143.0 scfm
Tunnel Area: 0.1963 ft2
Post-Test Leak Check (1): 0@5 cfm@"Hg
Post-Test Leak Check (2): 0@5 cfm@"Hg
Fuel Moisture (dry basis %): 21.06
Total Particulate (1): 15.8
Total Particulate (2): 18.4

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF												Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	681.711	686.841			0.00	0.00	77	78	0	0	109	0.050			10.7		504	361	491	391	369		423.2	320	80	79			79	-0.065
10	682.766	687.995	0.11	0.12	0.00	0.00	77	78	0	0	109	0.050	106	99	9.6	-1.1	508	363	517	372	356		423.2	338	83	83			78	-0.065
20	683.821	689.146	0.11	0.12	0.00	0.00	77	78	0	0	108	0.053	103	96	8.7	-0.9	620	354	473	354	328		425.8	371	83	84			79	-0.070
30	684.885	690.352	0.11	0.12	0.00	0.00	77	79	0	0	112	0.053	104	101	7.9	-0.8	710	342	452	353	322		435.8	400	83	84			79	-0.070
40	685.945	691.555	0.11	0.12	0.00	0.00	78	79	0	0	116	0.053	104	101	6.9	-1	776	332	458	357	329		450.4	432	83	85			80	-0.073
50	686.987	692.725	0.10	0.12	0.00	0.00	78	79	0	0	123	0.055	101	97	5.8	-1.1	930	326	480	372	349		491.4	483	84	86			81	-0.080
60	688.035	694.125	0.10	0.14	0.00	0.00	78	79	0	0	124	0.053	103	118	4.9	-0.9	908	320	518	389	373		501.6	486	84	88			81	-0.080
70	689.085	695.387	0.11	0.13	0.00	0.00	78	79	0	0	118	0.053	103	106	4.3	-0.6	783	315	540	400	388		485.2	446	83	86			82	-0.075
80	690.125	696.615	0.10	0.12	0.00	0.00	78	79	0	0	114	0.053	101	103	3.8	-0.5	719	313	551	398	390		474.2	414	81	84			81	-0.070
90	691.180	697.850	0.11	0.12	0.00	0.00	78	79	0	0	114	0.053	103	103	3.3	-0.5	666	312	572	394	394		467.6	388	81	81			81	-0.068
100	692.225	699.085	0.10	0.12	0.00	0.00	79	79	0	0	109	0.053	101	103	2.9	-0.4	630	312	588	392	394		463.2	375	80	80			81	-0.065
110	693.275	700.270	0.10	0.12	0.00	0.00	79	80	0	0	109	0.055	100	97	2.5	-0.4	666	312	592	399	389		471.6	385	79	79			81	-0.065
120	694.320	701.485	0.10	0.12	0.00	0.00	79	80	0	0	110	0.055	100	99	2.0	-0.5	708	312	590	403	404		483.4	393	80	80			81	-0.065
130	695.380	702.720	0.11	0.12	0.00	0.00	79	79	0	0	108	0.055	101	101	1.7	-0.3	666	313	591	403	409		476.4	375	80	81			81	-0.065
140	696.425	703.950	0.10	0.12	0.00	0.00	79	80	0	0	105	0.055	99	100	1.5	-0.2	588	317	595	399	405		460.8	350	81	82			81	-0.063
150	697.475	705.185	0.11	0.12	0.00	0.00	79	80	0	0	102	0.055	99	100	1.3	-0.2	544	323	593	393	405		451.6	334	81	82			81	-0.063
160	698.525	706.365	0.10	0.12	0.00	0.00	79	80	0	0	100	0.055	99	95	1.1	-0.2	515	326	588	387	400		443.2	321	82	83			80	-0.060
170	699.570	707.570	0.10	0.12	0.00	0.00	79	80	0	0	99	0.055	99	97	0.9	-0.2	489	328	579	380	389		433.0	310	82	83			80	-0.060
180	700.615	708.806	0.10	0.12	0.00	0.00	79	80	0	0	99	0.055	99	100	0.8	-0.1	480	328	569	374	379		426.0	303	82	83			80	-0.060
190	701.660	710.035	0.10	0.12	0.00	0.00	79	80	0	0	99	0.055	99	99	0.6	-0.2	493	336	555	368	373		425.0	305	82	84			80	-0.060
200	702.705	711.264	0.10	0.12	0.00	0.00	79	80	0	0	98	0.055	99	99	0.5	-0.1	470	347	537	363	367		416.8	295	82	83			80	-0.058
210	703.760	712.500	0.11	0.12	0.00	0.00	79	80	0	0	97	0.055	99	100	0.3	-0.2	452	356	519	356	356		407.8	287	82	84			80	-0.055
220	704.800	713.740	0.10	0.12	0.00	0.00	79	80	0	0	96	0.055	98	100	0.2	-0.1	435	360	503	350	345		398.6	278	82	84			80	-0.053
230	705.855	715.000	0.11	0.13	0.00	0.00	79	80	0	0	95	0.055	99	101	0.1	-0.1	409	355	493	341	332		386.0	268	82	84			80	-0.053
240	706.898	716.240	0.10	0.12	0.00	0.00	79	80	0	0	94	0.055	98	100	0.0	-0.1	385	343	477	329	319		370.6	257	82	83			79	-0.053
Avg/Total	25.187	29.399	0.10	0.12	0.00	0.00	78.44	79.40			106.68	0.054	100.62	100.62									53		81.76	83.00	#DIV/0!	#DIV/0!		-0.065

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 2
Train #: A
Date: 12/12/07

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

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: K. J. Morgan Date: 1-21-08

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 2
Train #: B
Date: 12/12/07

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

Total Particulate, mg :	18.4

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

Analyst: H. J. Morga Date: 1-21-08

OMNI Laboratories,
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: SBI / Monaco 2008 Project #: _338-F-68-3 Tracking #: _1161

Date: 12-12-07 Test Crew: K. Morgan Run #: 2

OMNI Equipment ID #:

Preburn [X] Test [ ]

Coal Bed: Data: 0 = Range: 2.2 - 2.6

Actual: Coal Bed: 2.3

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used ~~Catalyst~~
0	6.0		-.085	77	804	337	287	291	247	524	
10	5.0	1.0	-.073	78	813	352	328	332	294	456	
20	4.2	0.8	-.073	79	790	349	365	357	326	443	
30	3.5	0.7	-.070	79	744	349	409	373	346	423	
40	2.9	0.6	-.070	79	674	350	453	383	359	404	
50	2.5	0.4	-.065	80	619	354	496	391	371	375	
60	2.3	0.2	-.065	~~70~~ 79	561	358	525	392	370	350	
70											
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. Morgan Date: 12-12-07

4-17 OF 4-87

OMNI-Test Laboratories, In(
Beaverton, OR

FUEL DATA

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12/12/07 Test Crew: K. Morgan Run #: 2
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length		Readings			Type
1	8 ft	19.1	19.5	20.3		2x4
2	____ ft					
3	____ ft					

Length of cut pieces: 8@9.5 inches Pre-Burn Fuel Average Moisture: 19.63%

Time (clock): 10:00 Room Temperature (F): 75° Initials: JC

TEST FUEL

FUEL TYPE AND AMOUNT: 2x4 2 4x4 2
CALCULATED LOAD WEIGHT: ____ ACTUAL LOAD WEIGHT: 3.8 (2x4)
6.9 (4x4)
FUEL PIECE LENGTH: 12.75" 10.7 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	21.1	21.5	21.1	2x4
2	21.0	21.7	21.1	2x4
3	19.4	22.2	20.3	4x4
4	21.4	22.5	19.4	4x4
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 21.06%

Time (clock): 10:35 Room Temperature (F): 75° Initials: JC

Technician signature: K. Morgan Date: 12-12-07

OMNI-Test Laboratorie c.
Beaverton, OR

Run Notes

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3
Tracking #: 1161
Run #: 2 Date: 12-12-07
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:

Gauged 0.030"

SECONDARY: FIXED - to Primary

TERTIARY: N/A

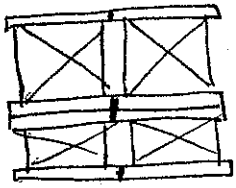
FAN: ON - High

PREBURN SETTINGS AND ACTIVITIES

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

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING Loaded by 50 sec.
DOOR: Ajar until 4:5 min
PRIMARY AIR: Full open until 5.0 min
Abruptly Closed to test setting at 5.0 min
OTHER: None

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

Same as above

SECONDARY: TANDOM with Primary

TERTIARY: N/A

FAN: ON - High

Technician signature: K. J. Morgan Date: 12-12-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: SBI

Model: Monaco 2008

Project #: 338-F-68-3 Tracking #: 1161

Date: 12-12-07 Run #: 2 Booth: _____

Test Crew: K. MorgAN Start Time: 12:18 Stop Time: 16:18

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack: Initial: _____ Final: N/A

Dilution Tunnel (Method 5G Only): Initial: _____ Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A 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							
O_2			N/A				
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0"

Air Velocity (ft/min): Initial: <50 Final: <50

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

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø @ 3.1" w.c. Post: Ø @ 3.1" w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 12-10-07 Initials: IL

	Initial	Middle	Ending
Pb (in/Hg)	79 IL 29.78 Ø	81 IL 29.86 Ø	29.98 Ø
Room Temp (°F)	79	81	79

Technician signature: K. T. Morgan Date: 12-12-07

Run 3

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: 3
Test Date: 12/12/07

Burn Rate	**1.37 kg/hr dry**
Average Tunnel Temperature	117 degrees Fahrenheit
Average Gas Velocity in Dilution Tunnel - vs	13.4 feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8362.4 dscf/hour
Average Delta p	0.052 inches H20
Average Delta H	0.00 inches H20
Total Time of Test	170 minutes

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

Results Are Acceptable

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 3

Manufacturer:	SBI
Model:	Monaco 2008
Tracking No.:	1161
Project No.:	338-F-68-3
Test Date:	12-Dec-07
Beginning Clock Time:	19:43
Recording Interval:	10 min.
Total Sampling Time:	170 min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.050	0.058	0.055	0.058	0.050	0.055	0.050	0.048	"H2O
Initial Temp.	129	127	125	123	122	121	120	119	oF

OMNI Equipment Numbers:

PM Control Module:	SBI 046,47				
Dilution Tunnel MW(dry):	29.00	lb/lb-mole			
Dilution Tunnel MW(wet):	28.56	lb/lb-mole			
Dilution Tunnel H2O:	4.00	percent			
Dilution Tunnel Static:	-0.128	"H2O			
Pitot Tube Cp:	0.84				
Meter Box Y Factor:	0.975 (1)		0.974	(2)	
Barometric Pressure:	Begin	Middle	End	Average	
	30.14	30.22	30.26	30.21	"Hg

Signature/Date: K. J. Morgan 1-21-08

Tunnel Velocity:	13.36	ft/sec.
Intial Tunnel Flow:	140.4	scfm
Average Tunnel Flow:	139.4	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check (1):	0 @ 5	cfm@"Hg
Post-Test Leak Check (2):	0 @ 5	cfm@"Hg
Fuel Moisture (dry basis %):	20.72	
Total Particulate (1):	3.9	
Total Particulate (2):	4.2	

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF												Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	707.033	716.458			0.00	0.00	78	79	0	0	123	0.053			10.3		547	401	636	433	421		487.6	354	79	78			81	-0.070
10	708.065	717.610	0.10	0.12	0.00	0.00	78	79	0	0	132	0.050	104	103	8.4	-1.9	798	416	631	428	412		537.0	480	81	82			80	-0.080
20	709.098	718.730	0.10	0.11	0.00	0.00	78	79	0	0	132	0.050	104	100	7.2	-1.2	896	410	609	414	406		547.0	505	80	82			81	-0.085
30	710.180	719.930	0.11	0.12	0.00	0.00	78	79	0	0	134	0.050	109	107	5.9	-1.3	912	398	602	419	408		547.8	527	80	82			82	-0.085
40	711.135	721.020	0.10	0.11	0.00	0.00	78	79	0	0	134	0.050	96	97	4.8	-1.1	933	387	609	435	421		557.0	526	80	82			81	-0.085
50	712.155	722.140	0.10	0.11	0.00	0.00	78	79	0	0	129	0.050	102	99	4.0	-0.8	832	381	619	441	424		539.4	495	80	82			82	-0.080
60	713.150	723.270	0.10	0.11	0.00	0.00	78	79	0	0	124	0.050	99	100	3.4	-0.6	764	383	614	448	441		530.0	463	80	83			82	-0.075
70	714.180	724.450	0.10	0.12	0.00	0.00	78	79	0	0	120	0.050	103	104	2.9	-0.5	719	382	622	449	438		522.0	440	81	83			81	-0.075
80	715.220	725.610	0.10	0.12	0.00	0.00	78	79	0	0	117	0.053	100	99	2.4	-0.5	691	379	634	447	440		518.2	424	81	84			81	-0.075
90	716.260	726.790	0.10	0.12	0.00	0.00	78	79	0	0	116	0.053	100	101	2.0	-0.4	678	378	642	450	442		518.0	420	81	84			81	-0.075
100	717.295	727.955	0.10	0.12	0.00	0.00	78	79	0	0	116	0.050	103	102	1.5	-0.5	697	373	644	454	446		522.8	417	81	84			81	-0.075
110	718.320	729.140	0.10	0.12	0.00	0.00	78	79	0	0	111	0.053	98	101	1.2	-0.3	624	374	647	450	445		508.0	386	82	85			81	-0.070
120	719.355	730.310	0.10	0.12	0.00	0.00	77	78	0	0	108	0.053	99	99	0.9	-0.3	579	373	648	443	439		496.4	368	81	84			80	-0.068
130	720.395	731.485	0.10	0.12	0.00	0.00	77	78	0	0	106	0.053	99	100	0.7	-0.2	552	377	647	435	434		489.0	354	81	84			80	-0.065
140	721.430	732.670	0.10	0.12	0.00	0.00	77	78	0	0	105	0.053	99	100	0.5	-0.2	535	378	641	428	427		481.8	345	81	84			80	-0.065
150	722.475	733.850	0.10	0.12	0.00	0.00	77	78	0	0	103	0.053	100	100	0.3	-0.2	506	383	630	419	413		470.2	331	81	83			80	-0.063
160	723.520	735.040	0.10	0.12	0.00	0.00	77	78	0	0	102	0.053	100	100	0.1	-0.2	490	383	621	410	401		461.0	321	80	83			79	-0.060
170	724.559	736.246	0.10	0.12	0.00	0.00	77	78	0	0	101	0.053	99	102	0.0	-0.1	478	382	605	401	391		451.4	315	80	82			79	-0.060
Avg/Total	17.526	19.788	0.10	0.12	0.00	0.00	77.67	78.67			117.40	0.052	100.84	100.82									36		80.56	82.83	#DIV/0!	#DIV/0!		-0.073

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 3
Train #: A
Date: 12/12/07

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

Total Particulate, mg :	3.9

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

Analyst: [signature] Date: 1-21-08

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 3
Train #: B
Date: 12/12/07

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

Total Particulate, mg :	4.2

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: M. Morgan Date: 1-21-08

OMNI Laboratories,
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: SBI / Monaco 2008 Project #: _338-F-68-3 Tracking #: _1161

Date: 12-12-07 Test Crew: K. Morgan Run #: 3

OMNI Equipment ID #:

Preburn [X] Test [ ]

Coal Bed: Data: 0 = Range: 2.1-2.5

Actual: Coal Bed: 2.2

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Catalyst (Not Used)
0	7.0		-.085	81	829	295	449	346	291	538	
10	5.9	1.1	-.085	81	865	316	468	379	329	505	
20	4.6	1.3	-.085	82	933	326	494	405	361	534	
30	3.5	1.1	-.083	83	947	336	520	429	394	539	
40	2.8	0.7	-.080	82	843	350	554	444	424	493	
50	2.4	0.4	-.070	82	704	369	611	445	434	435	
60	2.2	0.2	-.070	81	547	401	636	433	421	354	
70											
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. J. Morgan Date: 12-12-07

4-26 OF 4-47

OMNI-Test Laboratories, Inc
Beaverton, OR

FUEL DATA

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-12-07 Test Crew: K. Morgan Run #: 3
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan, CLAUDE PARE
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.6
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length		Readings		Type
1	8 ft	19.3 / ~~18.8~~	18.9	19.1	2x4
2	____ ft				
3	____ ft				

Length of cut pieces: 8@9.5 inches Pre-Burn Fuel Average Moisture: 19.10%

Time (clock): 17:40 Room Temperature (F): 75 Initials: K

TEST FUEL

FUEL TYPE AND AMOUNT: 2 X4 2 4X4 2
CALCULATED LOAD WEIGHT: ____ ACTUAL LOAD WEIGHT: 3.2 (2 x 4)
7.1 (4 x 4)
FUEL PIECE LENGTH: 13.0 10.3 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	20.4	18.8	19.3	2x4
2	23.8	19.8	20.1	2x4
3	21.1	21.7	22.4	4x4
4	19.4	22.4	19.4	4x4
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 20.72%

Time (clock): 18:20 Room Temperature (F): 75 Initials: K

Technician signature: K. Morgan Date: 12-12-07

OMNI-Test Laboratorie c.
Beaverton, OR

Run Notes

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3
Tracking #: 1161
Run #: 3 Date: 12-12-07
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:

INDEXED with .172" Diameter Drill bit. .185" K

SECONDARY: TANDOM - With - PRIMARY

TERTIARY: NONE

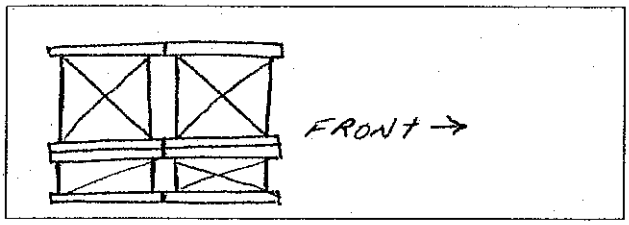
FAN: ON - HIGH

PREBURN SETTINGS AND ACTIVITIES

TIME	AIR (THERMO) CHANGES PRIMARY/SECONDARY/TERTIARY	FAN SETTING CHANGE	ADD FUEL + WT.	ADD FUEL - WT.	RAKE COAL	COMMENT
0	Test setting					
37					X	Adjust
60					X	Levelled

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING Loaded by 35 seconds.
DOOR: AJAR for 3.0 minutes
PRIMARY AIR: Full open for 5.0 min. Abruptly closed to test setting at 5.0 min.
OTHER: None

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

SAME AS ABOVE

SECONDARY: TANDOM With Primary

TERTIARY: NONE

FAN: ON - High

Technician signature: K. Morgan Date: 12-12-07

12.4.07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: SBI

Model: Monaco 2008

Project #: 338-F-68-3 Tracking #: 1161

Date: 12-12-07 Run #: 3 Booth: _____

Test Crew: K. Morgan Start Time: 19:43 Stop Time: 22:33

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack: Initial: _____ Final: N/A

Dilution Tunnel (Method 5G Only): Initial: _____ Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A 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							
O_2			N/A				
CO_2							
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: <50 Final: <50

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

Induced Draft: Ø %Smoke Capture: 100

Pitot Tube Leak Test: Pre: Ø@ 3.1" W.C. Post: Ø @ 3.1" w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 12-10-07 Initials: K

	Initial	Middle	Ending
Pb (in/Hg)	81 IC 30.14 CT	81 IC 30.22 CT	79 IC 30.26 CT
Room Temp (°F)	81	81	79

Technician signature: K. Morgan Date: 12-12-07

Run 4

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: 4
Test Date: 12/13/07

Burn Rate	**1.19 kg/hr dry**
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	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		

Results Are Acceptable

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 4

Manufacturer:	SBI
Model:	Monaco 2008
Tracking No.:	1161
Project No.:	338-F-68-3
Test Date:	13-Dec-07
Beginning Clock Time:	12:22
Recording Interval:	10 min.
Total Sampling Time:	190 min.

Velocity Traverse Data

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.043	0.048	0.048	0.045	0.048	0.050	0.048	0.050	"H2O
Initial Temp.	120	118	116	114	114	112	110	110	oF

OMNI Equipment Numbers:

PM Control Module:	SBI 046,47				
Dilution Tunnel MW(dry):	29.00	lb/lb-mole			
Dilution Tunnel MW(wet):	28.56	lb/lb-mole			
Dilution Tunnel H2O:	4.00	percent			
Dilution Tunnel Static:	-0.115	"H2O			
Pitot Tube Cp:	0.84				
Meter Box Y Factor:	0.975 (1)		0.974 (2)		
Barometric Pressure:	Begin	Middle	End	Average	
	30.29	30.31	30.25	30.28	"Hg

Signature/Date: 1-21-08

Tunnel Velocity:	12.97	ft/sec.
Intial Tunnel Flow:	134.1	scfm
Average Tunnel Flow:	135.9	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check (1):	0@5	cfm@"Hg
Post-Test Leak Check (2):	.001@5	cfm@"Hg
Fuel Moisture (dry basis %):	21.43	
Total Particulate (1):	4.0	
Total Particulate (2):	4.4	

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF												Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	725.130	736.984			0.00	0.00	77	79	0	0	114	0.048			10.1		531	374	563	415	394		455.4	323	81	81			80	-0.075
10	726.150	738.165	0.10	0.12	0.00	0.00	78	79	0	0	130	0.048	101	104	8.6	-1.5	788	388	552	407	390		505.0	462	84	85			79	-0.080
20	727.155	739.312	0.10	0.11	0.00	0.00	78	79	0	0	135	0.048	101	102	7.4	-1.2	927	381	525	400	387		524.0	500	84	86			80	-0.085
30	728.175	740.475	0.10	0.12	0.00	0.00	78	79	0	0	137	0.045	105	106	6.1	-1.3	989	371	531	410	393		538.8	522	81	85			81	-0.085
40	729.215	741.650	0.10	0.12	0.00	0.00	78	79	0	0	139	0.048	104	104	5.0	-1.1	985	361	564	423	404		547.4	535	80	84			80	-0.085
50	730.260	742.815	0.10	0.12	0.00	0.00	78	79	0	0	134	0.048	104	103	4.1	-0.9	932	359	602	435	422		550.0	509	80	84			82	-0.083
60	731.305	743.990	0.10	0.12	0.00	0.00	78	79	0	0	127	0.048	104	103	3.5	-0.6	788	356	616	435	434		525.8	468	79	84			82	-0.075
70	732.350	745.165	0.10	0.12	0.00	0.00	78	79	0	0	121	0.050	101	101	3.0	-0.5	739	354	624	433	433		516.6	439	78	83			82	-0.078
80	733.400	746.340	0.10	0.12	0.00	0.00	78	79	0	0	118	0.048	104	103	2.6	-0.4	691	354	626	432	432		507.0	414	78	82			82	-0.075
90	734.440	747.500	0.10	0.12	0.00	0.00	79	80	0	0	115	0.048	102	101	2.2	-0.4	658	352	624	429	429		498.4	401	78	82			82	-0.070
100	735.485	748.675	0.10	0.12	0.00	0.00	79	80	0	0	115	0.050	100	100	1.8	-0.4	668	349	620	431	428		499.2	402	78	81			82	-0.070
110	736.530	749.845	0.10	0.12	0.00	0.00	79	80	0	0	115	0.053	97	97	1.3	-0.5	707	346	612	430	432		505.4	406	78	82			82	-0.073
120	737.575	751.025	0.10	0.12	0.00	0.00	79	80	0	0	111	0.050	100	100	1.1	-0.2	611	346	611	424	433		485.0	372	74	81			82	-0.070
130	738.605	752.195	0.10	0.12	0.00	0.00	79	80	0	0	107	0.050	98	99	0.9	-0.2	555	347	608	416	421		469.4	349	77	81			82	-0.065
140	739.650	753.370	0.10	0.12	0.00	0.00	79	80	0	0	105	0.050	99	99	0.7	-0.2	516	347	598	407	406		454.8	332	81	83			81	-0.063
150	740.685	754.540	0.10	0.12	0.00	0.00	79	80	0	0	104	0.050	98	99	0.5	-0.2	496	348	588	399	395		445.2	322	82	83			81	-0.060
160	741.730	755.715	0.10	0.12	0.00	0.00	79	80	0	0	103	0.050	99	99	0.3	-0.2	488	350	581	392	384		439.0	315	83	84			81	-0.060
170	742.760	756.870	0.10	0.12	0.00	0.00	79	80	0	0	102	0.048	100	99	0.2	-0.1	476	354	572	386	374		432.4	302	83	83			81	-0.060
180	743.770	758.045	0.10	0.12	0.00	0.00	79	80	0	0	101	0.050	96	99	0.1	-0.1	465	357	559	380	366		425.4	301	83	84			81	-0.055
190	744.831	759.210	0.11	0.12	0.00	0.00	79	80	0	0	100	0.050	100	98	0.0	-0.1	447	357	540	371	356		414.2	293	83	84			81	-0.055
Avg/Total	19.701	22.226	0.10	0.12	0.00	0.00	78.50	79.55			116.66	0.049	100.72	100.74									41		80.25	83.10	#DIV/0!	#DIV/0!		-0.071

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 4
Train #: A
Date: 12/13/07

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

Total Particulate, mg :	4.0

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

Analyst: L. J. Morgan Date: 1-21-08

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 4
Train #: B
Date: 12/13/07

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

Total Particulate, mg :	4.4

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

Analyst: M. Morgan Date: 1-21-08

OMNI Test Laboratories
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: SBI / Monaco 2008 Project #: _338-F-68-3 Tracking #: _1161

Date: 12-13-07 Test Crew: K. Morgan Run #: 4

OMNI Equipment ID #:

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: 2.1 - 2.5 Actual: Coal Bed: 2.1

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	~~Catalyst~~ Not Used
0	7.0		-.085	78	921	280	337	280	246	536	
10	5.8	1.2	-.080	77	951	301	363	315	283	486	
20	4.8	1.0	-.083	78	984	310	389	338	309	498	
30	3.8	1.0	-.080	79	955	320	431	364	335	500	
40	2.9	0.9	-.080	80	898	334	465	389	368	485	
50	2.4	0.5	-.075	80	745	350	510	407	389	440	
60	2.1	0.3	-.075	80	531	374	563	415	394	323	
70											
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. Morgan Date: 12-13-07

OMNI-Test Laboratories, Inc
Beaverton, OR

FUEL DATA

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-13-07 Test Crew: K. Morgan Run #: 4
OMNI Equipment ID #: _____
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading _____
Cal Value (2) = 22% Actual Reading _____

Piece	Length		Readings		Type
1	~~8~~ ft	~~19.1~~	~~19.9~~	~~20.3~~	~~2x4~~
2	4 ft	24.2	23.5	23.1	
3	4 ft	23.1	22.4	23.1	

IC

Length of cut pieces: 8 @ 9.75 inches Pre-Burn Fuel Average Moisture: 23.23%

Time (clock): 09:50 Room Temperature (F): 75 Initials: IC

TEST FUEL

FUEL TYPE AND AMOUNT: 2 x 4 2 4 x 4 2
CALCULATED LOAD WEIGHT: _____ ACTUAL LOAD WEIGHT: 3.2 (2 x 4)
6.9 (4 x 4)
FUEL PIECE LENGTH: 13.0" 10.1 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	18.6	21.0	23.1	2x4
2	18.1	20.5	23.1	2x4
3	21.7	21.9	21.4	4x4
4	21.4	22.5	23.8	4x4
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 21.43%

Time (clock): 11:20 Room Temperature (F): 75 Initials: IC

Technician signature: K. J. Morgan Date: 12-13-07

OMNI-Test Laboratorie c.
Beaverton, OR

Run Notes

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3
Tracking #: 1161
Run #: 4 Date: 12-13-07
Test Crew: K. MORGAN
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:

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

SECONDARY: TANDOM with Primary air Control.

TERTIARY: NONE

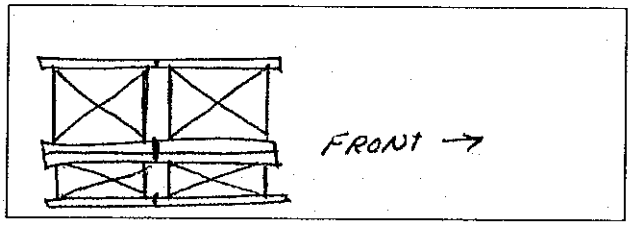
FAN: ON - High

PREBURN SETTINGS AND ACTIVITIES

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

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING: Loaded by 40 Seconds
DOOR: AJAR UNTIL 3min, 5 sec.
PRIMARY AIR: Full open UNTIL 5.0 min - ABRUPTLY Adjusted to test setting AT 5.0 minutes
OTHER: NONE

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

SAME As ABOVE

SECONDARY: TANDOM with Primary

TERTIARY: NONE

FAN: ON - High

Technician signature: K. Morgan Date: 12-13-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: SBI

Model: Monaco 2008

Project #: 338-F-68-3 Tracking #: 1161

Date: 12-13-07 Run #: 4 Booth: _____

Test Crew: K. Morgan Start Time: 12:22 Stop Time: 15:32

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack: Initial: _____ Final: N/A

Dilution Tunnel (Method 5G Only): Initial: _____ Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A 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							
O_2							
CO_2			N/A				
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: <50 Final: <50

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

Induced Draft: 0 %Smoke Capture: 100

Pitot Tube Leak Test: Pre: @ 3.1" w.c. Post: @ 3.2" w.c.

Flue Pipe Cleaned Prior to First Test in Series: Date: 12-10-07 Initials: JL

	Initial	Middle	Ending
Pb (in/Hg)	30.29 CT	30.31 CT	30.25 CT
Room Temp (°F)	70 80 CT	82	81

Technician signature: K. J. Morgan Date: 12-13-07

Run 5

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

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

	AVERAGE	SAMPLE TRAIN 1	SAMPLE TRAIN 2
Total Sample Volume - Vm	10.91 cubic feet	10.06 cubic feet	11.76 cubic feet
Average Gas Meter Temperature	79 degrees Fahrenheit	79 degrees Fahrenheit	80 degrees Fahrenheit
Total Sample Volume (Standard Conditions) - Vmstd	10.5 dscf	9.7 dscf	11.3 dscf
Total Particulates - mn		2.7 mg	3.6 mg
Particulate Concentration (dry-standard)	0.00030 grams/dscf	0.00028 grams/dscf	0.00032 grams/dscf
Particulate Emission Rate	2.50 grams/hour	2.33 grams/hour	2.67 grams/hour
Adjusted Emissions	**3.89 grams/hour**	3.68 grams/hour	4.11 grams/hour
Difference from Average		0.22 grams/hour	0.22 grams/hour
7.5% of the average emission rate	0.29		
Weighted Average Emission Rate Limit	4.10 grams/hour		
7.5% of the weighted average emission rate limit	0.31		

Results Are Acceptable

OMNI-Test Laboratories, Inc.

Wood Heater Test Data - EPA Method 5G

Run: 5

Manufacturer:	SBI
Model:	Monaco 2008
Tracking No.:	1161
Project No.:	338-F-68-3
Test Date:	13-Dec-07
Beginning Clock Time:	18:44
Recording Interval:	10 min.
Total Sampling Time:	100 min.

Velocity Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
Initial dP	0.058	0.065	0.055	0.053	0.055	0.060	0.055	0.058	"H2O
Initial Temp.	163	163	163	162	162	162	161	161	oF

OMNI Equipment Numbers:

PM Control Module:	SBI 046,47				
Dilution Tunnel MW(dry):	29.00	lb/lb-mole			
Dilution Tunnel MW(wet):	28.56	lb/lb-mole			
Dilution Tunnel H2O:	4.00	percent			
Dilution Tunnel Static:	-0.155	"H2O			
Pitot Tube Cp:	0.84				
Meter Box Y Factor:	0.975 (1)		0.973 (2)		
Barometric Pressure:	Begin	Middle	End	Average	
	30.22	30.19	30.15	30.19	"Hg

Signature/Date: K.J. Moog 1/21/08

Tunnel Velocity:	14.46	ft/sec.
Intial Tunnel Flow:	141.4	scfm
Average Tunnel Flow:	139.6	scfm
Tunnel Area:	0.1963	ft2
Post-Test Leak Check (1):	0@5	cfm@"Hg
Post-Test Leak Check (2):	.001@5	cfm@"Hg
Fuel Moisture (dry basis %):	22.13	
Total Particulate (1):	2.7	
Total Particulate (2):	3.6	

Elapsed Time	Particulate Sampling Data														Fuel Weight, lb		Wood Heater Temperature Data, oF											Stack
	Gas Meter Cubic Feet (1)	Gas Meter Cubic Feet (2)	Sample Rate, cfm (1)	Sample Rate, cfm (2)	Orifice dH (1)	Orifice dH (2)	Meter oF (1)	Meter oF (2)	Meter Vac. In. Hg. (1)	Meter Vac. In. Hg. (2)	Dilution Tunnel Temp.	Dilution Tunnel dP	Pro. Rate (10%) (1)	Pro. Rate (10%) (2)	Scale Reading	Weight Change	Firebox Top	Firebox Bottom	Firebox Back	Firebox Left	Firebox Right	Catalyst Exit	Average Surface	Stack	Filter (1)	Filter (2)	Impinger exit (1)	Impinger exit (2)	Ambient	Draft In. H2O
0	745.000	759.386			0.00	0.00	79	79	0	0	162	0.057			11.3		834	462	636	439	441		562.4	583	81	81			83	-0.090
10	746.020	760.550	0.10	0.12	0.00	0.00	79	80	0	0	178	0.055	104	102	8.9	-2.4	954	486	675	464	466		609.0	669	84	86			82	-0.095
20	747.020	761.675	0.10	0.11	0.00	0.00	79	80	0	0	183	0.055	103	99	7.4	-1.5	1059	468	648	476	488		627.8	708	83	86			84	-0.095
30	748.023	762.850	0.10	0.12	0.00	0.00	79	80	0	0	188	0.057	102	102	5.0	-2.4	1098	452	642	501	518		642.2	730	83	87			85	-0.098
40	749.055	764.045	0.10	0.12	0.00	0.00	79	80	0	0	185	0.055	106	105	3.6	-1.4	1094	441	659	526	546		653.2	723	84	87			86	-0.098
50	750.060	765.250	0.10	0.12	0.00	0.00	79	80	0	0	173	0.053	104	107	2.5	-1.1	946	438	713	545	561		640.6	652	83	87			86	-0.090
60	751.065	766.455	0.10	0.12	0.00	0.00	79	80	0	0	158	0.058	98	101	1.8	-0.7	816	436	757	546	556		622.2	591	82	86			85	-0.085
70	752.070	767.685	0.10	0.12	0.00	0.00	79	80	0	0	151	0.058	98	103	1.2	-0.6	766	433	777	537	548		612.2	557	82	84			84	-0.085
80	753.070	768.830	0.10	0.11	0.00	0.00	79	80	0	0	146	0.058	97	95	0.6	-0.6	733	437	797	532	548		609.4	541	81	83			84	-0.083
90	754.060	769.960	0.10	0.11	0.00	0.00	79	80	0	0	141	0.055	98	96	0.1	-0.5	711	432	804	525	543		603.0	515	81	82			83	-0.083
100	755.062	771.145	0.10	0.12	0.00	0.00	79	80	0	0	136	0.055	99	100	0.0	-0.1	651	428	790	513	538		584.0	487	81	82			83	-0.080
Avg/Total	10.062	11.759	0.10	0.12	0.00	0.00	79.00	79.91			163.74	0.056	100.94	100.90									22		82.27	84.64	#DIV/0!	#DIV/0!		-0.089

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 5
Train #: A
Date: 12/13/07

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

Total Particulate, mg :	2.7

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

Analyst: M. Morgan Date: 1-21-08

OMNI-Test Laboratories, Inc.

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

Client Name: SBI
Model: Monaco 2008
Project No.: 338-F-68-3
Tracking No.: 1161

Equipment Numbers:

Run #: 5
Train #: B
Date: 12/13/07

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

Total Particulate, mg :	3.6

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: K. J. Morga Date: 1-21-08

OMNI Laboratories,
Beaverton, OR Phone (503) 643-3788

STOVE TEMPERATURE TEST DATA - METHOD 5G

Client/Model: SBI / Monaco 2008 Project #: _338-F-68-3 Tracking #: _1161

Date: 12-13-07 Test Crew: K. Morgan Run #: 5

OMNI Equipment ID #:

Preburn [X] Test [ ] Coal Bed: Data: 0 = Range: 2.3-2.8 Actual: Coal Bed: 2.7

Time	Fuel Weight	Delta Weight	Stack Draft	TEMPERATURES (oF) Ambient	Top	Bottom	Back	Left	Right	Flue	Not Used Catalyst
0	12.7		-.060	81	422	197	306	235	208	435	
10	11.4	1.3	-.065	80	348	249	351	267	242	345	
20	9.7	1.7	-.073	81	458	293	386	294	267	420	
30	8.2	1.5	-.080	81	709	347	417	316	286	504	
40	6.7	1.5	-.085	82	818	377	444	337	316	560	
50	5.1	1.6	-.090	82	950	401	487	370	352	613	
60	3.7	1.4	-.090	83	994	430	555	409	398	632	
70	2.7	1.0	-.088	83	834	462	616	439	441	583	
80											
90											
00											
10											
20											
30											
40											
50											
60											
70											
80											
90											
AVG											

Technician signature: K. A. Morgan Date: 12-13-07

4-44 OF 4-47

OMNI-Test Laboratories, In
Beaverton, OR

FUEL DATA

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3 Tracking #: 1161
Date: 12-13-07 Test Crew: K. Morgan Run #: 5
OMNI Equipment ID #:
FUEL LOAD PREPARED BY: K. Morgan
FUEL: DOUGLAS-FIR SPECIES, UNTREATED, AIR-DRIED, STANDARD GRADE OR BETTER, DIMENSIONAL LUMBER.

PRE-BURN FUEL

MOISTURE CONTENT (METER – – DRY BASIS)

CALIBRATION: Cal Value (1) = 12% Actual Reading 12.0
Cal Value (2) = 22% Actual Reading 22.0

Piece	Length		Readings			Type
1	4 ft	22.2	21.9	22.4		2x4
2	4 ft	21.4	21.2	21.1		2x4
3	ft					

Length of cut pieces: 8@9.875 inches Pre-Burn Fuel Average Moisture: 21.70%

Time (clock): 17:02 Room Temperature (F): 75 Initials: JL

TEST FUEL

FUEL TYPE AND AMOUNT: 2 X 4 2 4 X 4 2
CALCULATED LOAD WEIGHT: ACTUAL LOAD WEIGHT: 3.8 (2 x4)
(4 X4)
FUEL PIECE LENGTH: 13.0" 11.3 Total

MOISTURE CONTENT (METER – – DRY BASIS)

PIECE	READINGS			TYPE
1	22.4	20.3	23.1	2 x 4
2	23.1	21.2	22.3	2 x 4
3	22.0	21.2	23.1	4 x 4
4	21.4	23.1	22.4	4 x 4
5				
6				
7				
8				
9				
10				

OVERALL TEST FUEL LOAD MOISTURE AVERAGE: 22.13%

Time (clock): 17:46 Room Temperature (F): 75 Initials: JL

Technician signature: K. Morgan Date: 12-13-07

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Beaverton, OR

Run Notes

Client: SBI
Model: Monaco 2008
Project #: 338-F-68-3
Tracking #: 1161
Run #: 5 Date: 12-13-07
Test Crew: K. Morgan
OMNI Equipment ID #(s):

PREBURN

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

PRIMARY:

Full OPEN

SECONDARY: Fully OPEN

TERTIARY: NONE

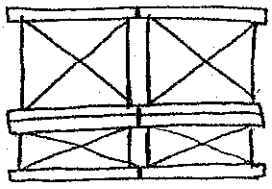
FAN: ON - High

PREBURN SETTINGS AND ACTIVITIES

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

TEST

TEST FUEL CONFIGURATION SKETCH
(INDICATE VIEW ANGLE)



START UP PROCEDURES

BYPASS: N/A
FUEL LOADING Loaded
DOOR: A Sec 3.0 min.
PRIMARY AIR: - NO Adjustment

OTHER: NONE

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

SAME As ABOVE

SECONDARY: Fully Open

TERTIARY: NONE

FAN: ON - High

Technician signature: K. J. Morgan Date: 12-13-07

OMNI-Test Laboratories, Inc.
Beaverton, OR

Supplemental Data EPA 5G/5H

Client: SBI

Model: Monaco 2008

Project #: 338-F-68-3 Tracking #: 1161

Date: 12-13-07 Run #: 5 Booth: _____

Test Crew: K. Morgan Start Time: 18:44 Stop Time: 20:24

OMNI Equipment #(s): _____

Gas Analyzer Train Leak Check:

Stack: Initial: _____ Final: N/A

Dilution Tunnel (Method 5G Only): Initial: _____ Final: N/A

Calibrations: Span Gas CO_2: N/A O_2: N/A CO: N/A 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							
O_2							
CO_2			N/A				
CO							
CO_2 (DT)							

Stack Diameter (inches): 6.0

Air Velocity (ft/min): Initial: <50 Final: <50

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

Induced Draft: 0 %Smoke Capture: 100

Pitot Tube Leak Test: Pre: 0 @ 3.1 "W.C. Post: 0 @ 3.2" W.C.

Flue Pipe Cleaned Prior to First Test in Series: Date: 12-10-07 Initials: K

	Initial	Middle	Ending
Pb (in/Hg)	30.22 CT	30.19 CT	30.15 CT
Room Temp (°F)	83	86	83

Technician signature: K. Morgan Date: 12-13-07

Section 5

Sampling Procedures and Test Results

INTRODUCTION

Stove Builder International retained *OMNI* to perform U.S. Environmental Protection Agency (EPA) certification testing on the Monaco 2008 wood stove. The Monaco 2008 wood fireplace insert is a non-catalytic, radiant-type room heater. The firebox is constructed of mild steel. The usable firebox volume was measured to be 1.5 cubic feet. The stove is vented through a 6-inch diameter flue collar located at the top of the unit.

The testing was performed at Stove Builder International facilities in Québec, Canada. The unit was logged in on December 7, 2007, then assigned and labeled with *OMNI* ID #1161. *OMNI* representative Ken Morgan conducted the certification testing and completed all testing by December 13, 2007. The EPA was notified of the testing dates in a letter dated November 21, 2007. A testing contract, including provisions for Random Compliance Audit (RCA) testing, has been signed by Claude Paré of Stove Builder International and is on file at *OMNI*'s testing facility.

The Monaco 2008 wood fireplace insert was tested in accordance with the U.S. EPA 40 CFR Part 60, Subpart AAA – Standard of Performance for Residential Wood Heaters (Appendix A, Methods 28 and 5G). Particulate emissions were measured using a Method 5G sampling train consisting of two filters (front and back). The weighted average emissions of the four test runs included in the results indicate a particulate emission level of 4.4 grams per hour. An extra run (Run #5) was performed to throw out an outlyer. Test runs were conducted in each of three burn rate categories (0.80-1.25 kg/hr, 1.25-1.90 kg/hr, and maximum). Emissions for each of their individual test runs did not exceed the cap. The Monaco 2008 results are within the emission limit of 7.5 grams per hour for non-catalytic affected facilities manufactured on or after July 1, 1990, or sold at retail on or after July 1, 1992.

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

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

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

Table 1.1 – Particulate Emissions

Run	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
Weighted particulate emission average of four test runs: 4.4 grams per hour.		

Table 1.2 – Test Facility Conditions

Run	Room Temperature (°F)		Barometric Pressure (Hg)		Air Velocity (ft/min)	
	Before	After	Before	After	Before	After
1	78	79	30.17	30.10	<50	<50
3	81	79	30.14	30.26	<50	<50
4	80	81	30.29	30.25	<50	<50
5	83	83	30.22	30.15	<50	<50

Table 1.3.1 – Fuel Measurement and Crib Description Summary – PRETEST

Run	Pretest Fuel Weight (Starting weight in lbs)	Pretest Moisture (Dry basis - %)	Coal Bed Weight (lbs)
1	5.5	19.7	2.2
3	7.0	19.1	2.2
4	7.0	23.2	2.1
5	12.7	21.7	2.7

Table 1.3.2 – Fuel Measurement and Crib Description Summary – TEST

Run	Test Fuel Wet Basis (lbs)	Firebox Volume (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

Table 1.4 – Dilution Tunnel Gas Measurements and Sampling Data Summary

Run	Length of Test (min)	Average Dilution Tunnel Gas Measurements		
		Velocity (ft/sec)	Flow Rate (dscf/min)	Temperature (°F)
1	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 1.5 - 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.			

Table 1.6 – Pretest Configuration

Run	Combustion Air (in)	Fuel Added	Fuel Removed	Time (min)
1	Fully Closed	5.5 lbs at start; no addition; coal bed 2.2 lbs	0.0	60
3	Indexed with 0.188" Drill Bit	7.0 lbs at start; no addition; coal bed 2.2 lbs	0.0	60
4	Indexed with 0.141" Drill Bit	7.0 lbs at start; no addition; coal bed 2.1 lbs	0.0	60
5	Fully Open	12.7 lbs at start; no addition; coal bed 2.7 lbs	0.0	70

Table 1.7 – Run Data

Run	Average Dry Burn Rate (kg/hr)	Initial (Induced) Draft (H_2O)	Primary Air Setting (in)	Run Time (min)	Average Draft (H_2O)
1	0.95	0	Fully Closed	230	-0.063
3	1.37	0	Indexed with 0.188" Drill Bit	170	-0.073
4	1.19	0	Indexed with 0.141" Drill Bit	190	-0.071
5	2.52	0	Fully Open	100	-0.089

Table 1.8 – Test Configurations

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

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.