Stoll Trailers, Inc.

Model - High Valley 1300
Distributed by: Stoll Fireplace
EPA Certification Testing
Project # 014-S-001-1

Prepared by Dirigo Laboratories, Inc.
January 28, 2013

11785 SW Highway 212 – Suite 305
Clackamas, OR 97015-9050
(503) 650-0088
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CONFIDENTIAL BUSINESS INFORMATION - CBI

Table of Contents:

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Affidavit:

All testing and associated procedures were conducted at Dirigo Laboratories beginning 11/26/2012 and ending on 12/3/2012. Dirigo Laboratories is located at 11785 SE Highway 212 – Suite 305, Clackamas, OR 97015-9050. All EPA protocols from Methods 1, 2, 3, 4, 5 and 28 were followed in the testing, sampling, analysis, and calibrations for these tests and all results are based on these methods. Particulate sampling was performed per EPA Method 5G sampling option 3 and ASTM E2515 *Standard Test Method for Determination of Particulate Matter Emissions Collected in a Dilution Tunnel.* Efficiency was calculated using CAN/CSA-B415.1-10 *Performance Testing of Solid-Fuel Burning Heating Appliances*.

Dirigo Laboratories is accredited by the U.S. Environmental Protection Agency for the certification and auditing of wood heaters pursuant to subpart AAA of 40 CFR Part 60, New Source Performance Standards For Residential Wood Heaters- Methods 28, 28A, 28 OWHH, 5G, 5H. Certificate Numbers 9 and 9M (mobile). See Appendix H for Certification.

The following people were associated with the testing, analysis and report writing associated with this project.

John Steinert, President _____ **Signature** _____ **Date**

Gary Nelke CMfgE, Vice-President _____ **Signature** _____ **Date**

Ben Nelke, Technician _____ **Signature** _____ **Date**

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Introduction:

Stoll Fireplace, Inc.- located at 153 Highway 201, Abbeville, SC 29620 - contracted with Dirigo Laboratories, Inc. to perform EPA certification testing on their High Valley Model 1300 Free standing wood stove. Efficiency testing was also performed per CSA B-415.1-10 "Performance Testing of Solid-Fuel Burning Heating Appliances". All testing was performed at Dirigo Laboratories, 11785 SE Highway 212 – Suite 305, Clackamas, OR 97015

Wood heater Application Form:

Wood Heater Information Processing System Application Form		
	Application Type	
1.0	**Administrative Information**	
1.1	Wood Heater Model Name: **High Valley**	
1.1a	Wood Heater Model Number: **1300**	
1.1b	Wood Heater Certification Number (not applicable for initial certification)	
1.2	Wood Heater Type (catalytic, Non Catalytic, other): **Non Catalytic**	
1.3	Manufacturer Name: **Stoll Trailers, Inc.**	
1.3a	Manufacturer Street Address: **185 Highway 201,**	
1.3b	Manufacturer State and Zip Code: **Abbeville, SC 29620**	
1.3c	Manufacturer Telephone Number: **1-800-421-0771**	
1.3d	Manufacturer EIN **Brad Stoll Brad@stolltrailers.com**	
1.4	Owner, Corporate Office or authorized representative to whom correspondence should be addressed. **Brad Stoll**	
1.4a	Designated Representative Name: **Brad Stoll**	
1.4b	Designated Representative Title: **President**	
1.4c	Designated Representative Mailing Address: **185 Highway 201 Abbeville, SC 29620**	
1.4d	Designated Representative Telephone Number: **1-800-421-0771**	
1.5	Annual Production Volume for this model for the next two years: **Less than 2500 year**	
2.0	**Testing Information**	
2.1	Name of Laboratory: **Dirigo Laboratories, Inc.**	
2.2	Test Notification Date: **7/4/2012**	
2.3	Dates of Certification Tests: **9/26/2012 to 9/27/2012**	
2.4	Test Method used for certification: **Method 28 , Method 5G option 3**	
2.5	Test Result Summary: See Report	**Page 9**
2.5.1	Test Result Grams/Hour: See Report	**Page 9**
2.5.2	Emission Rate Plot: See Report	**Page 9**

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Wood Heater Information Processing System Application Form								
3.0	**Test Report**							
3.a1	Wood Heater Model Name:			Wood Heater Model Number:				**Cover**
3.a2	Testing Laboratory Name, Location and altitude							**Page 3,4**
	Laboratory Name	*Location*		*Altitude*				
	Dirigo Laboratories	Clackamas, OR		30 feet				
3.a3	Test Information date wood heater information received, data of tests, sampling method used, number of test runs							**Page 9**
	Date Received	*Date of Tests*		*Sampling Method*	*# Test Runs*			
	7/3/12	9/26/12 to 9/27/12		5g-3	4			
3.a4	Identify any variations in the certification test from the published test methods							**N/A**
3.b1	Table of Results (in order of increasing burn rate) test run number, burn rate, particulate emission rate, efficiency							**Page9**
	Run #	*Burn Rate*	*Emission Rate*	*Heat Output*	*Efficiency*			
3.b2	Summary of other data – Test facility conditions, surface temperature averages, catalyst temperature averages, pretest weights, test fuel charge weights, run times							**Page 11**
3.b3	Discussion – specific test run problems and solutions							**N/A**
3.c1	Wood Heater Firebox Dimensions – volume, height, width							**Page 11**
3.c2	Firebox Configuration – air supply locations and operation, air supply introduction location, refractory location, baffle and by-pass location, and operation (include line drawings and photographs							**Appendix D Page 12-15**
3.c3	Process Operation during test – air settings and adjustments, fuel bed adjustments, draft							**Page 15**
3.c4	Test Fuel – Test fuel properties (moisture and temperature), test fuel crib description (include line drawings or photograph), test fuel charge density.							**Page 16-17 Appendix F**
3.d1	Describe sampling location relative to wood heater (include drawing or photograph)							**Page 18**
3.e1	Sampling Methods							**Page 18**
3.e2	Analytical Methods							**Page 19**
3.f1	Calibration procedures and results, certification procedures, sampling and analysis procedures							**Appendix G**
3.f2	Test Method quality control procedures and results – leak checks, volume meter checks, stratification (velocity) checks, proportionality results.							**Appendix G**
3.g1	Results and Sample Calculations							**Appendix H**
3.g2	Raw Field Data							**Appendix F**
3.g3	Sampling and Analytical Procedures							**Appendix A**
3.g4	Analytical Data							**Appendix F**
3.g5	Participants							**Appendix B**
3.g6	Sampling and Operation Records							**Appendix A**
3.g7	Additional Information							**Appendix C**
4.0	**Wood Heater Description**							

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Wood Heater Information Processing System Application Form		
4.1	Attach two photographs	Page 12
4.2	Pursuant to Section 60.537c designate the permanent storage location of the tested wood heater, and the measures taken to seal the unit against tampering	Page 16
4.3	Describe any special operation instruction that were provided to the laboratory.	N/A
4.4	Attached engineering drawings showing dimensions and material specifications for the following wood heater components and systems	Appendix D
4.4a1	Firebox dimensions	Page 11
4.4a2	Air Introduction System: Cross sectional area of inlets, outlets, and location and method of control	Page 10
4.4a3	Baffles: dimension and location	Appendix D
4.4a4	Refractory , insulation, dimension, location, and materials	Appendix D
4.4a5	Catalyst: Dimensions and location	N/A
4.4a6	Catalyst bypass mechanism and catalyst bypass gap tolerances: dimensions, cross sectional area and location	N/A
4.4a7	Flue Gas Exit: : Location and Exit	Page 10
4.4a8	Door and catalyst bypass gaskets: dimensions, fit and materials	Appendix D
4.4a9	Outer shielding and coverings: dimensions and location.	Appendix D
4.4a10	Fuel feed system (if applicable): fuel feed rate, auger motor design and power rating, and the angle of the auger to firebox	N/A
4.4a11	Forced air combustion system (if applicable): location and horsepower of blower motors and fan blade size	N/A
4.5	For each of the components or system listed above, identify any dimensions that you expect to have tolerances greater than +/-.25” (or +/-5% for cross sectional areas) when all components are assembled and provide your manufacturing tolerances for these items. Attach documentation demonstrating that such tolerance variations do not adversely affect emissions.	N/A
4.6	If the tested wood heater has a firebox composed of material different from the material to be used in the manufacturer wood heaters (as provided for in Section 60.533(b)(3)(ii), describe these differences in the space below.	N/A
5.0	**Catalyst Information**	N/A
5.1	Catalyst Brand and model: Applied ceramics : Ceramic material	
5.2	Attach Catalyst Warranty: Within manual	N/A
5.3	Can the catalyst be visually inspected during normal heater operation or under typical installation conditions? Describe what the owner must do to make observation.	N/A
5.4	Describe catalyst installation and removal procedures (include descriptions, and illustrations prepared for use in owners manuals, if available.)	N/A
5.5	Describe location, size, and design of ports for monitoring catalyst temperature. Identify commercially available monitoring devices which are compatible.	N/A
5.6	If you want EPA to consider a proposed substitute for the catalyst identified in Section 5.1, please indicate below and submit evidence the you meet the tests described above.	N/A
6.0	**Affirmations**	

Wood Heater Information Processing System Application Form		
6.1	A representative wood heater for the model line in question has been tested in accordance with 40 CFR part 60, Section 60.534(a), and meets the applicable emission limits in 40 CFR Part 60, Section 60.532.	**Yes**
6.2	The results of all valid certification test runs are reported in this application and in the attached materials.	**Yes**
6.3	Wood Heaters manufactured under this certificate will be similar in all material and dimensional respects, within tolerances of 40 CFR Part 60, Section 60.533(k)(2) and (3), to that wood heater tested for certification purposes.	**Yes**
6.4	In-house parameter inspections and emission tests will be conducted and records will be maintained as described in 40 CFR Part 60, Section 60.533(o).	**Yes**
6.5	Labeling requirements described in 50 CFR Part 60, Section 60.536	**Yes**
6.6	For catalyst equipped wood heaters, warranty, inspection access and temperature port requirements as described in 40 CFR Part 60, Section 60.533 (c) , (d), and (m) will be adhered to.	**N/A**
6.7	I have read, understand and will comply with the requirements for reporting and record keeping set forth in 40 CFR Part 60, Section 60.537.	**Yes**
6.8	I have entered into a contract that satisfies the requirements of 40 CFR Part 60, Section 60.533(g) with the laboratory which conducted this certification	**Yes**
	The information contained in this application is true, complete, and correct to the best of my knowledge	**Yes**

Technician Notes:

Prior to start of testing, the dilution tunnel was cleaned with a 6" steel brush.

Per Method 28 Section 8.1.1.3.1 - The unit could not be operated below 0.80 kg/hr, therefore, two category 2 tests were performed. See Table 1.

Wood Heater Identification:

- Appliance Tested: *Stoll Fireplace –High Valley model 1300*
- Serial Number: *PROTOTYPE 1 1300*
- Manufacturer*: Stoll Fireplace, Inc.*
- Catalyst: *No*
- Heat exchange blower: *Integral*
- Type: *Wood Stove*
- Style: *Free Standing*
- Date Received: *Wednesday, July 04, 2012*
- Wood Heater Aging: *Thursday, July 05, 2012 – 10 hrs*
- Testing Period – Start: *Monday, November 26, 2012* Finish: *Monday, December 03, 2012*
- Test Location: *Dirigo Laboratories, Inc. 11785 SE HWY 212 Suite 305 Clackamas, OR 97015*
- Elevation: 30 *Feet above sea level*
- Test Technician(s): *Ben Nelke*

Results: Emissions

The overall weighted average emission rate based on the 4 certification runs is **3.1g/hr**. (See Table 1 & Figure 1)

Results							
3.1Category 2 0.8 to 1.0 Kg/hr		**Category 2 .80 to 1.25 kg/hr** *(1.76 to 2.76 lbs/hr)*		**Category 3 1.25 to 1.90 kg/hr** *(2.76 to 4.19 lbs/hr)*		**Category 4 Maximum Burn Rate**	
Date	9/26/2012	Date	9/26/2012	Date	9/27/2012	Date	9/27/2012
Run Number	1	Run Number	2	Run Number	3	Run Number	4
Emission Rate –g/Hr	**3.65**	Emission Rate g/Hr.	**3.98**	Emission Rate g/Hr.	**2.57**	Emission Rate g/Hr.	**2.41**
Burn Rate KG/hr	**0.92**	Burn Rate KG/hr	**1.0**	Burn Rate KG/hr	**1.4**	Burn Rate KG/hr	**2.38**
Overall Efficiency CSA B415	**72.2%**	Overall Efficiency CSA B415	**68.5%**	Overall Efficiency CSA B415	**71%**	Overall Efficiency CSA B415	**64.5%**
BTU (HHV)	**12,548**	BTU (HHV)	**12,833**	BTU (HHV)	**18,722**	BTU (HHV)	**28,846**

Table 1

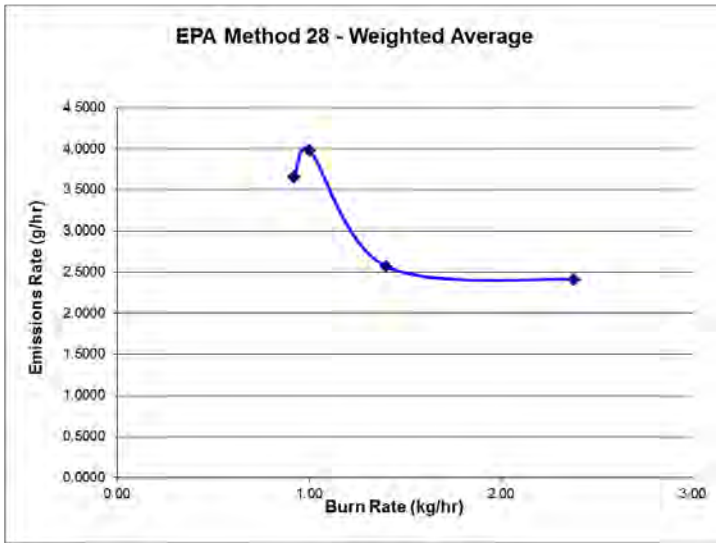

Table 2

Results: Efficiency

Overall Weighted Average Efficiency using the Higher Heating Value is **69.5%.**

EPA Method 28 - Weighted Average

DIRIGO LABORATORIES INC.

Overall HHV

Weighted Average: 69.5%

Client: Stoll
Model: High Valley 1300
Tracking No.: 10
Project No.: 014-S-001-1
Test Dates: 11/26/12 - 12/3/12
Signature/Date: 1/27/13

Burn Rate Category	2
Burn Rate (kg/hr-dry)	0.92
Emissions Rate (g/hr)	0.722
Emissions Rate Cap (g/hr)	15
Weighting Factor	23.13%
Run Number	1

Burn Rate Category	2
Burn Rate (kg/hr-dry)	1.00
Emissions Rate (g/hr)	0.685
Emissions Rate Cap (g/hr)	15
Weighting Factor	23.36%
Run Number	2

Burn Rate Category	3
Burn Rate (kg/hr-dry)	1.40
Emissions Rate (g/hr)	0.710
Emissions Rate Cap (g/hr)	15
Weighting Factor	34.94%
Run Number	3

Burn Rate Category	4
Burn Rate (kg/hr-dry)	2.38
Emissions Rate (g/hr)	0.645
Emissions Rate Cap (g/hr)	18
Weighting Factor	18.57%
Run Number	4

Figure 1: Overall Weighted Average Efficiency (HHV)

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Test Condition Summary:

All testing conditions for runs 1 through 5 fell within allowable specifications of Method - 28. A summary of facility conditions, surface temperature averages, temperature averages, pre-test fuel weights, test fuel charge weights and run times is listed below in Table 2.

Runs	Ambient (Deg. F)		Relative Humidity (%)		Avg. Stove Temp		Barometric Pressure (In. Hg.)	Pre-Test Fuel End Wt. (Lbs.)	Test Fuel Charge Wt. (Lbs.)	Test Fuel Moisture (Dry Basis)	Run Time (Min.)
	Pre	Post	Pre	Post	Start	End					
Run 1	75	72	67	67	285	211	29.88	2.0	9.4	20.3	230
Run 2	69	74	65	65	342	230	30.0	1.8	8.9	21.5	200
Run 3	81	78	65	65	367	300	30.0	2.1	8.7	20.5	140
Run 4	76	74	65	65	411	399	30.0	2.1	8.6	23	80

Table 3: Test Condition Summary

Description:

Dimensions, firebox configuration, air supply locations, air introduction locations, and baffle locations of the wood heater are referenced below in Table 4 and Figures 2 through 5.

Heater Dimensions				
Height	Width	Depth	Firebox Volume	Weight
30”	22”	23”	1.34 ft^3	314 Lbs.

Table 4: Heater Dimensions

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Figure 2: Front

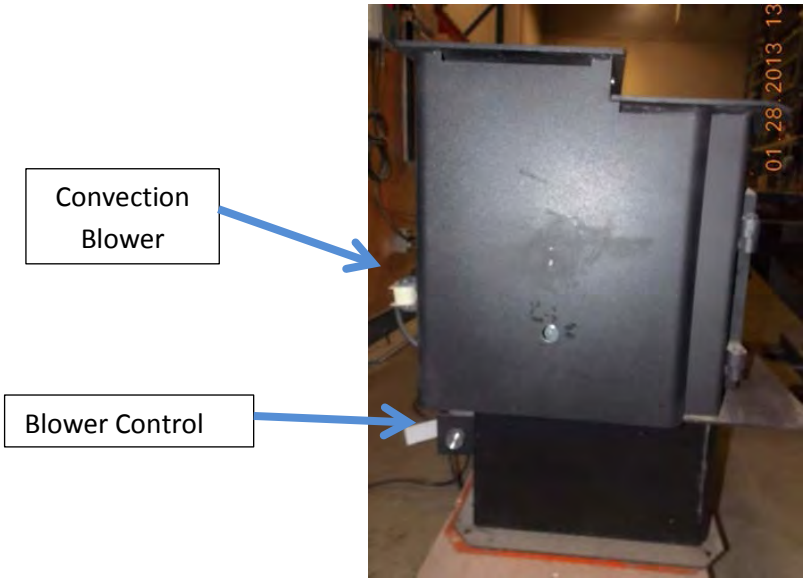

Figure 3: Side

Figure 4: Firebox

Process Operations:

The appliance was operated according to procedures as described in the Operations Manual – (see appendix I). Primary air supply settings, fuel bed adjustments, test fuel properties, test fuel configuration and loading density are as described below in Tables 4, and Figure 9. All draft measurements for all 5 runs were less than 1 ft^3 per minute. See Appendix F for detailed run information.

Table 5

	Burn Category	Primary Air Setting	Fuel Bed Adjustments	
		Inches	Pre-Burn	Test Run
Run 1	2	0.34”	Added 2.4 lbs @ 1hr	Door Open 1 minute, primary air open 3 min 10 Seconds. Fan On at 30 minutes.
Run 2	2	0.375”	None	Fan On at 30 minutes
Run 3	3	0.75”	None	Fan On at 30 minutes
Run 4	4	2.0”	None	Fan On at run start

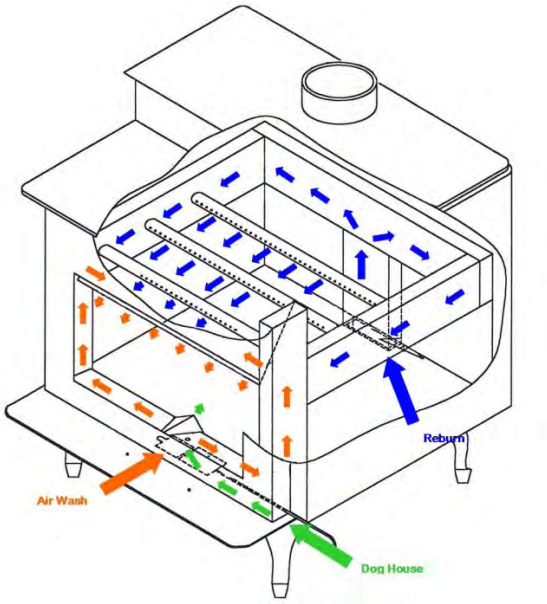

Figure 5: Air Flow Schematic

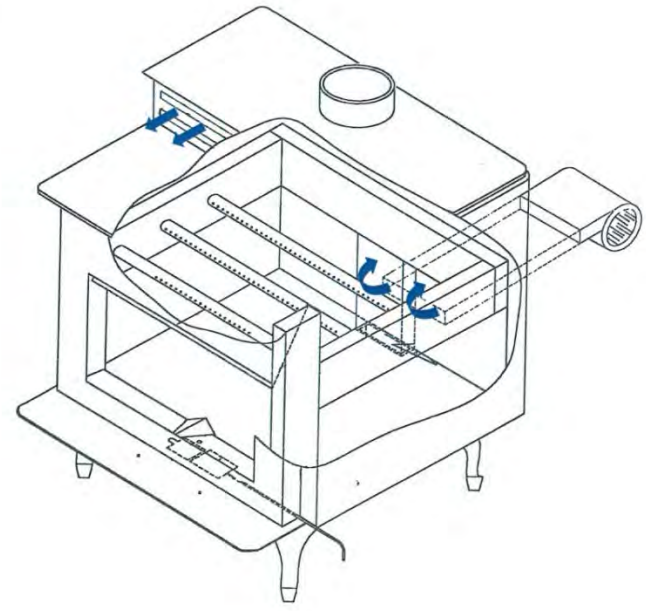

Figure 6: Convection Air Schematic

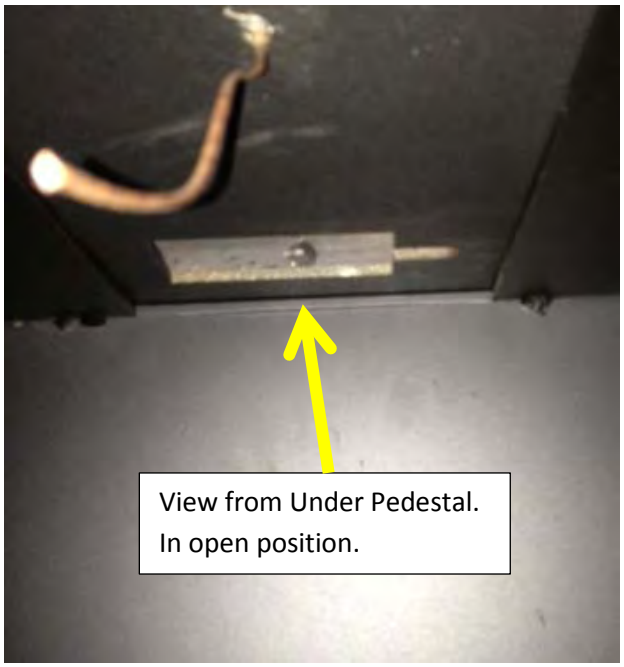

Figure 7: Primary Air

Figure 8: Primary Air Slide

Test Fuel Properties:

All test fuel charges consisted of 6 pieces of 2" x 4"x 13.5" douglas fir dimensional lumber and were assembled per Method 28 specifications. Figures 6 and 7 detail the fuel charges. All fuel crib moisture content and temperatures were within allowable limits.

Figure 9: Fuel Load –Side View

Figure 10: Fuel Load: Top/ front view

Figure 11: Fuel loaded

Figure 12: Door Shut

Sampling Locations:

Sample ports are located 16.5 feet downstream from any disturbances and 1.5 feet upstream from any disturbances. Flow rate traverse data was collected 12 feet downstream from any disturbances and 5.5 feet upstream from any disturbances. (See Figure 8 & 9)

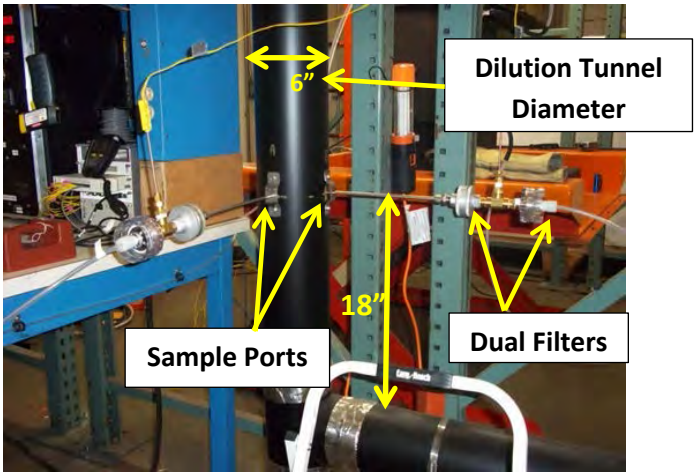

Figure 13: Sample Points

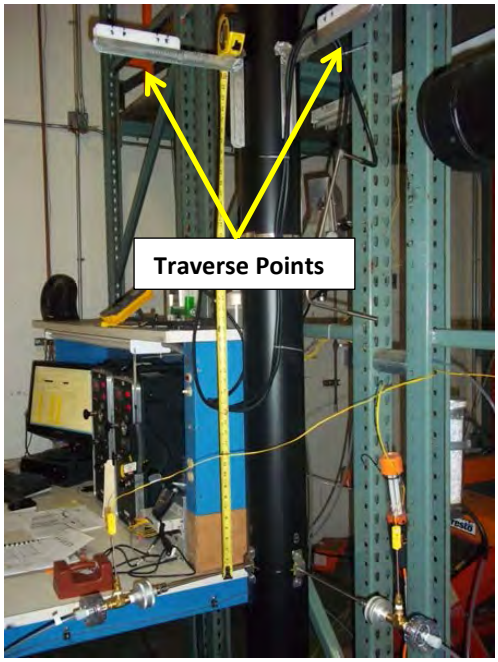

Figure 14: Traverse Points

Sampling Methods:

A dual filter dry sampling train system (5G sample option 3) was used in collecting particulate samples. The dilution tunnel is 6 inches in diameter. All sampling conditions per method 5G option 3 were followed. No alternate procedures were used.

Sampling and Analytical Procedures:

All sampling and analytical procedures used followed EPA Methods 1, 2, 3, 4, 5 and 28.

Analytical Methods Description:

All sample recovery and analysis procedures followed EPA Method 5 procedures. At the end of each test run, filters were removed from their housings, dessicated for 24 hours, and then weighed to a constant weight per Method 5 section 11.0.

Quality Control and Assurance Procedures and Results:

Calibration procedures and results were conducted per EPA Method 1 through 5 and Method 28. Calibration certificates and results can be found in Appendix F.

Test method quality control procedures (leak checks, volume meter checks, stratification checks, proportionality results) followed the procedures outlined in Method 5.

Upon completion of testing, the unit was sealed with metal strapping and labeled with the following seal:

ATTENTION:

THIS SEAL IS NOT TO BE BROKEN WITHOUT PRIOR AUTHORIZATION FROM THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.

THIS APPLIANCE HAS BEEN SEALED IN ACCORDANCE WITH REQUIREMENTS OF 40 CFR PART 60 SUBPART AAA §60.535(g)

REPORT #_____ DATE SEALED_____

MANUFACTURER_____ MODEL #_____

Figure 15: Sealed unit

Appendices:

Appendix A: Sampling and Analytical Procedures

All Sampling and Analytical Procedures were performed by Ben Nelke. All procedures used were directly from EPA Methods 1, 2, 3, 4, 5 and 28. No alternative procedures were used for this test series.

Appendix B: Participants

The following personnel were involved with the testing and producing of this report.

- John Steinert, President
- Gary Nelke CMfgE, Vice President
- Ben Nelke, Senior Technician

Appendix C: Updates

- There were no changes made to the High Valley 1300 once testing commenced.

Appendix D: Drawings

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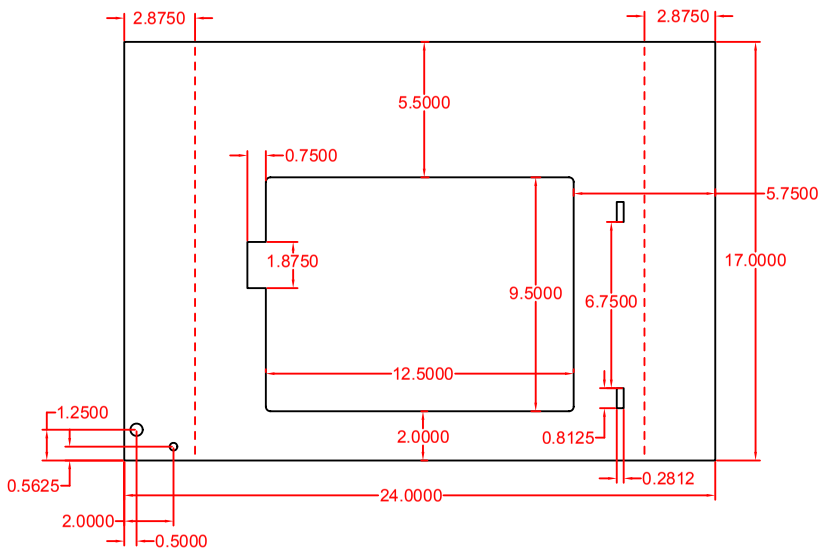
Part #1301
Size: $\frac{1}{4}$" x 24" x 17"
1 Required



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Part #1302L
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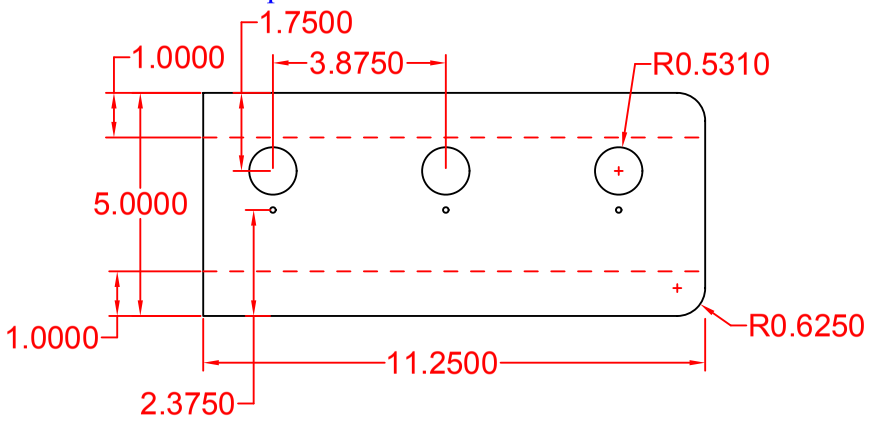

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Part #1302R
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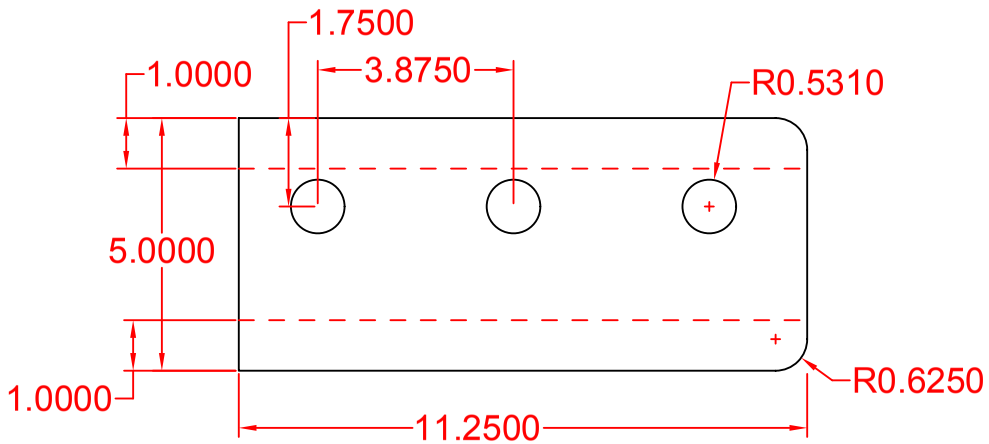

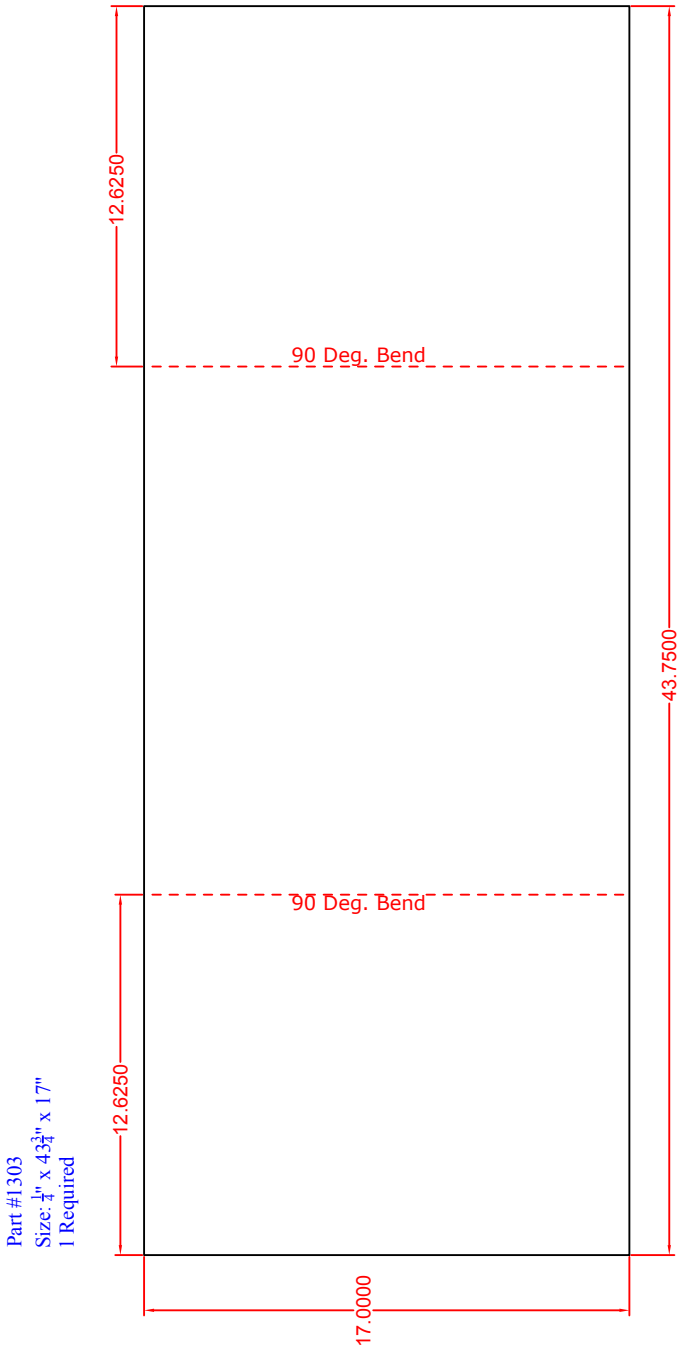

Part #1303
Size: $\frac{1}{4}$" x 43$\frac{3}{4}$" x 17"
1 Required

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Part #1304
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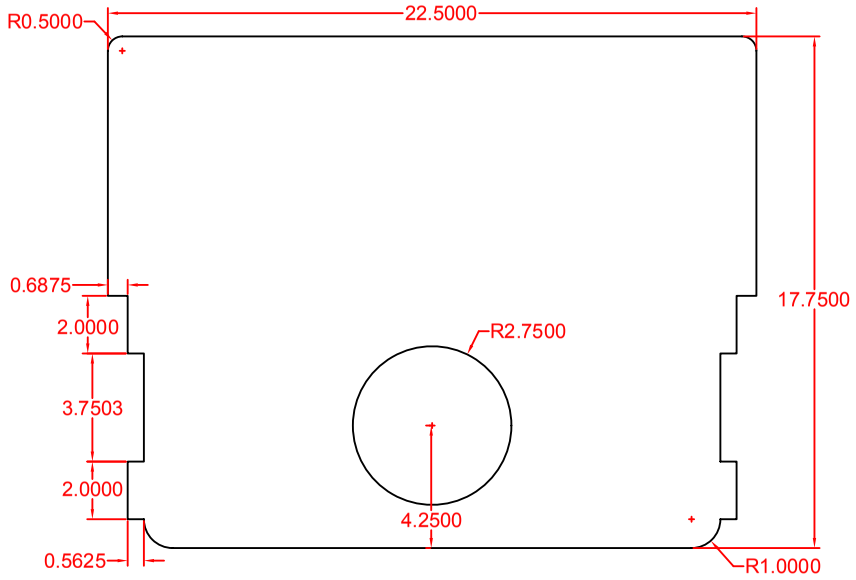

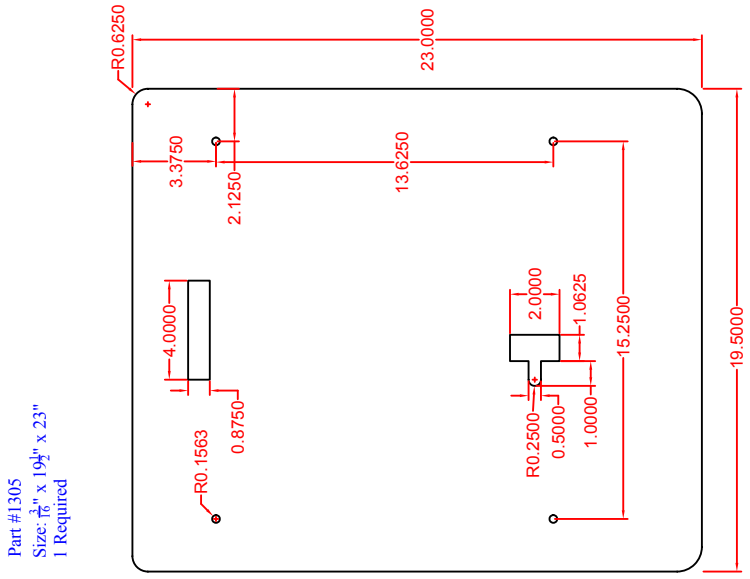

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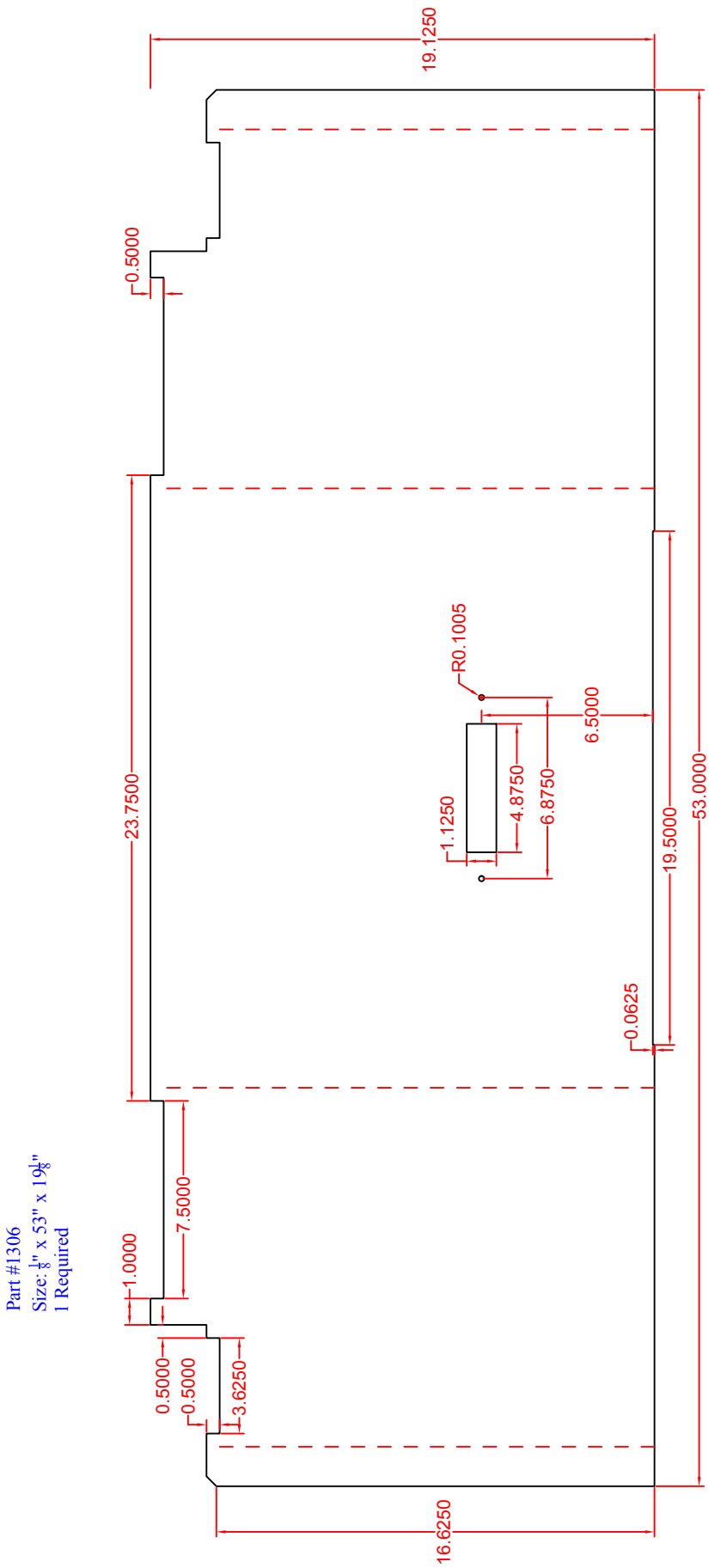

Part #1306
Size: $\frac{1}{8}$" x 53" x 19$\frac{1}{2}$"
1 Required

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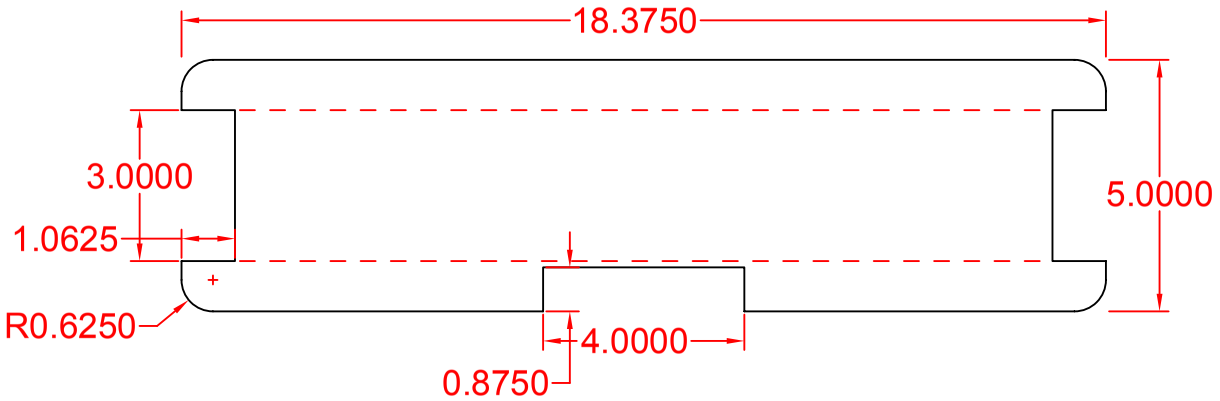
Part #1307
Size: $\frac{3}{16}$" x $18\frac{3}{8}$" x 5"
1 Required



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Part #1308
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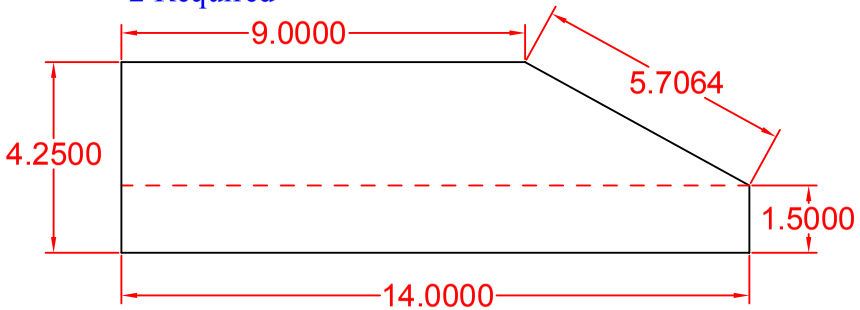
2 Required



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Part #1309
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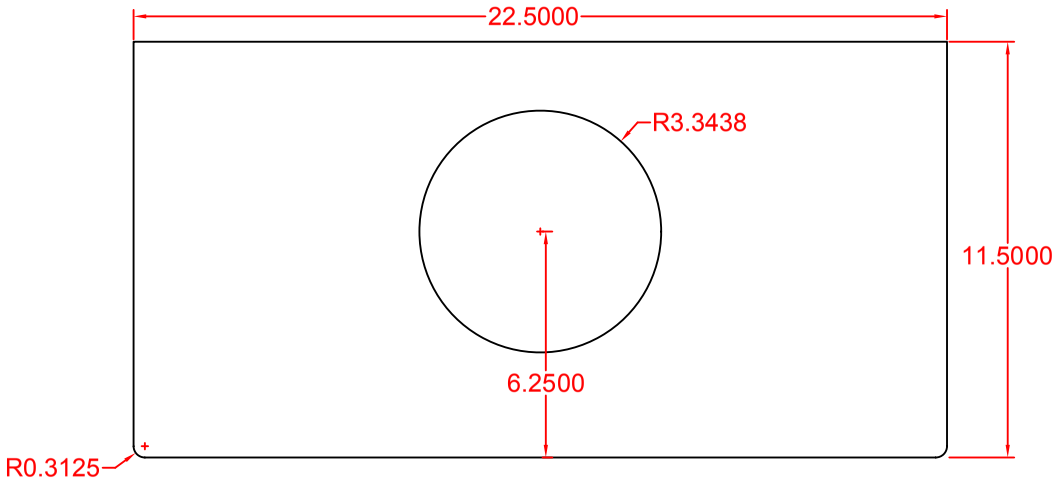

Part #1310
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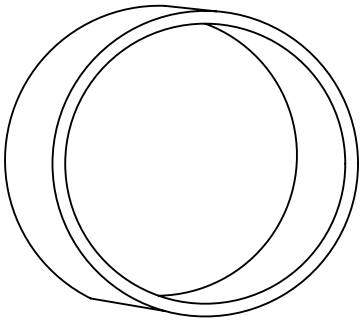
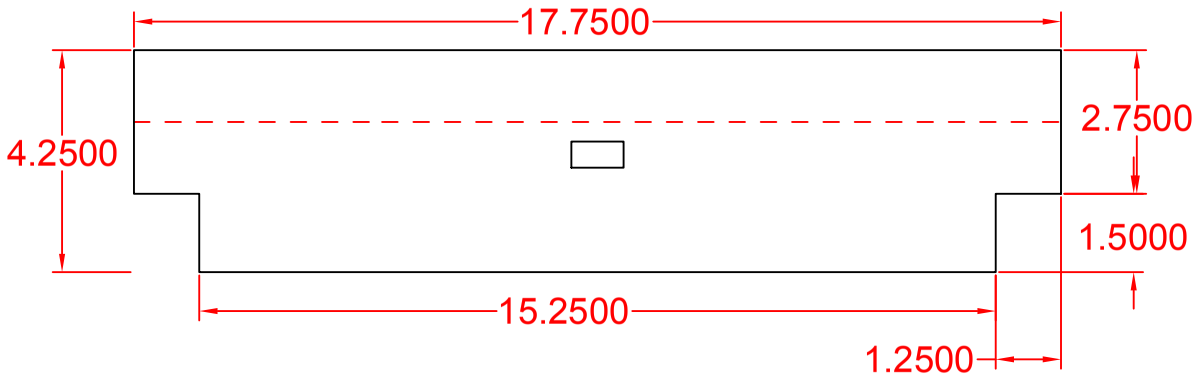
1 Required



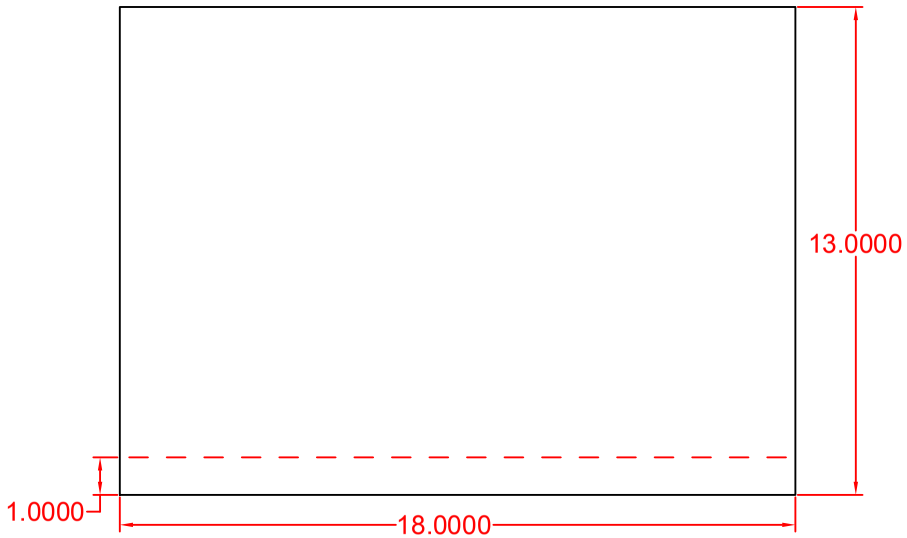
CBI

Part #1320
Size: $\frac{3}{16}$" x $17\frac{3}{4}$" x $4\frac{1}{4}$"
1 Required



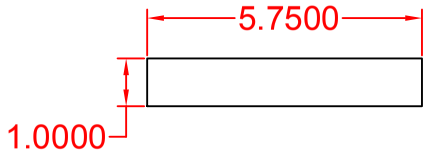
CBI

Part #1321
Size: $\frac{1}{4}$" x 18" x 13"
1 Required



CBI

Part #1322
Size: $\frac{1}{4}$" x $5\frac{3}{4}$" x 1"
1 Required

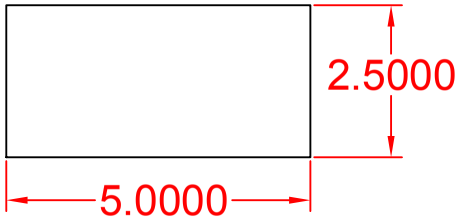


CBI

Part #1323

Size: $\frac{3}{8}$" x 5" x $2\frac{1}{2}$"

1 Required

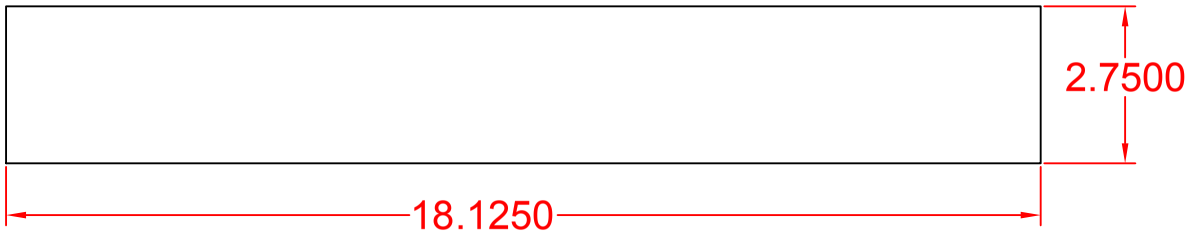


CBI

Part #1326

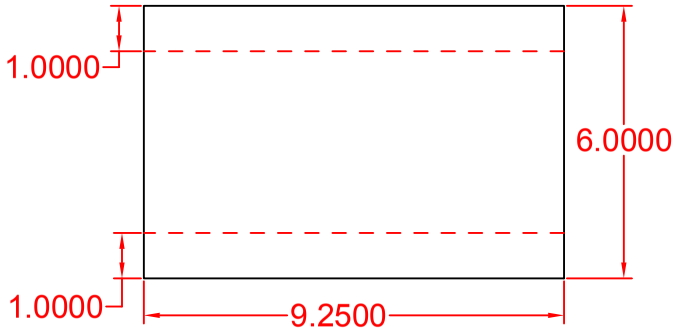
Size: $\frac{3}{16}$" x $18\frac{1}{8}$" x $2\frac{3}{4}$"

1 Required



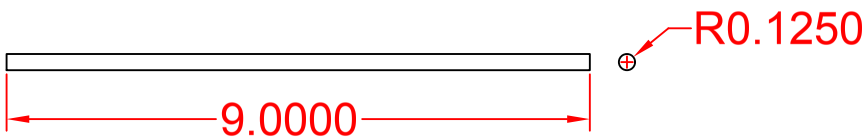
CBI

Part #1328
Size: $\frac{3}{16}$" x $9\frac{1}{4}$" x 6"
1 Required



CBI

Part #1329
¼" Rod
9" Long



CBI

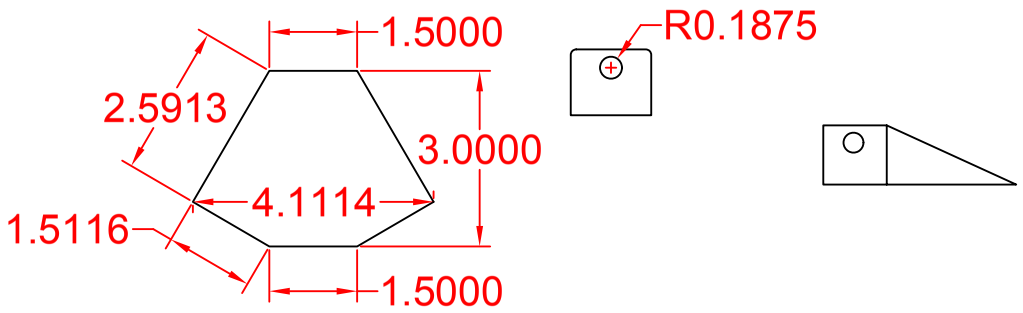
Part #1330
Size: $\frac{1}{8}$" x 17$\frac{3}{4}$" x $\frac{3}{4}$" x $\frac{3}{4}$"
1 Required

CBI

Part #1331

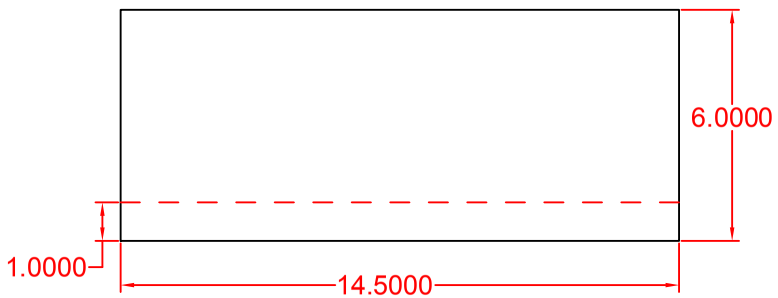
Size: $\frac{3}{16}$" x $4\frac{1}{8}$" x 3"

1 Required



CBI

Part #1332
Size: $\frac{3}{16}$" x 14$\frac{1}{2}$" x 6"
1 Required

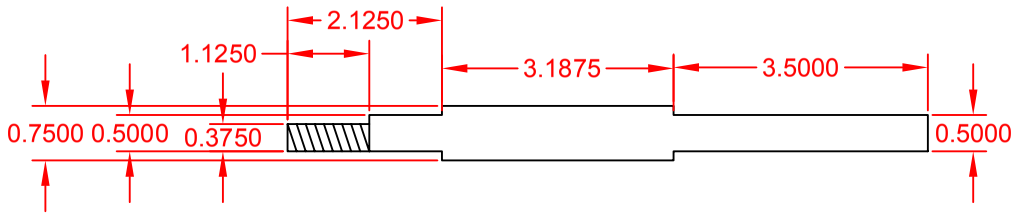


CBI

Part #1333

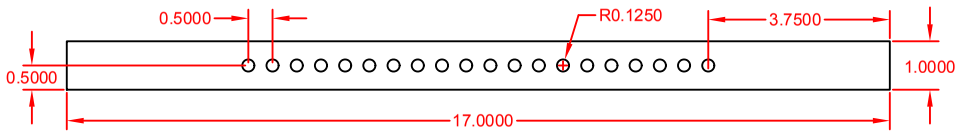
Size: $\frac{3}{4}$" CR rod x $9\frac{3}{4}$"

1 Required

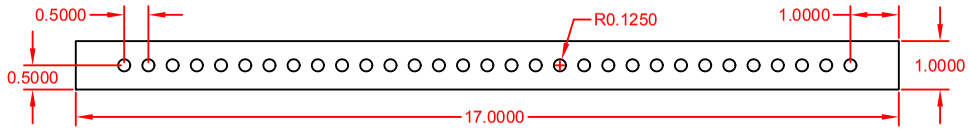


CBI

Part #1334
Size: 1" x 17" Tubing



Rear Tube

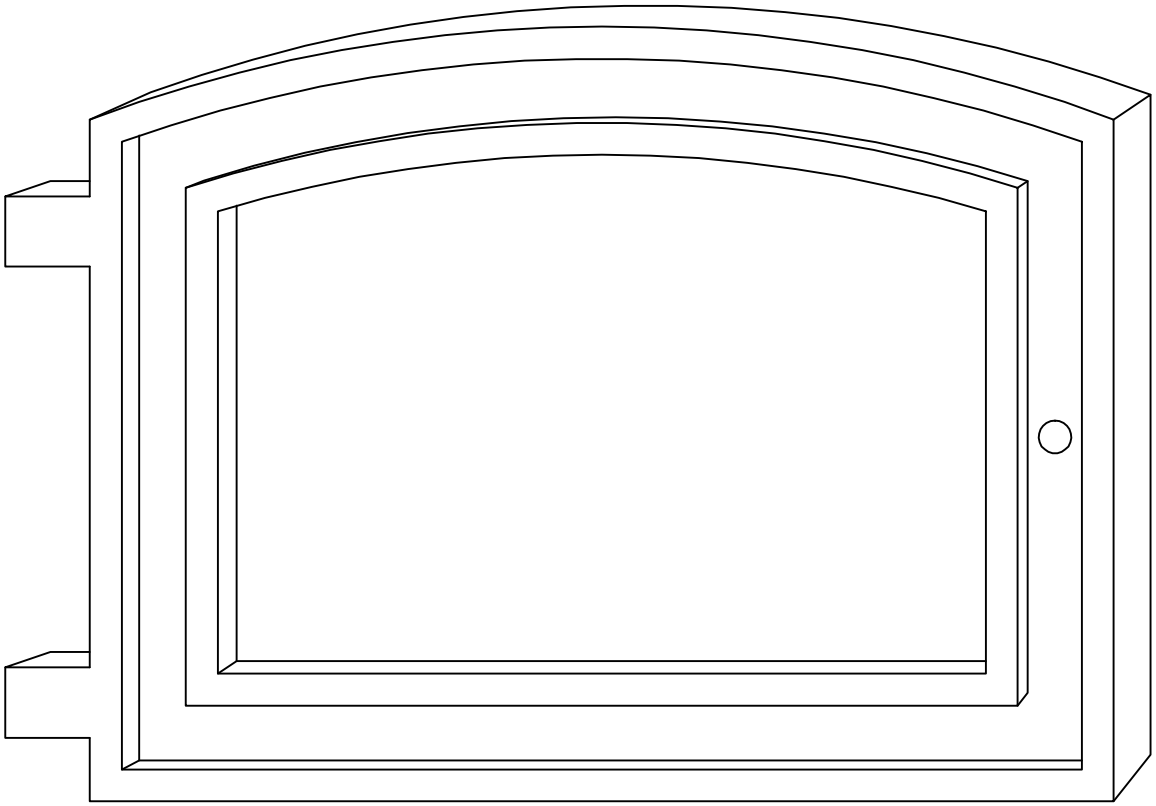


Front & Middle Tube

Stove Door

Size: $1\frac{1}{8}$" x $16\frac{1}{2}$" x 13"

1 Required



Appendix E: 10 Hour Break-in

CBI

PREBURN

JOB # 014_S_1_1
TECHNICIAN BTN
DATE: 7_9_12
RUN #: A1
READING INTERVAL: 10
.
Run Time: 120

Model Designation Stoll_HighValley

	Tunnel Traverse Information								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.032	0.043	0.040	0.034	0.034	0.042	0.043	0.035	0.038
Temperature	110	112	112	110	111	111	111	111	111.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	5.4	-0.062	298	307	324	600	482	402.2
10	4.5	-0.071	318	361	340	571	500	418
20	2.1	-0.071	347	401	368	666	521	460.6
30	2.5	-0.062	376	449	282	536	515	431.6
40	2.1	-0.051	382	449	263	441	511	409.2
50	5	-0.044	377	426	248	367	516	386.8
60	4.4	-0.049	360	395	221	362	501	367.8
70	3.6	-0.055	345	377	211	414	483	366
80	3.2	-0.048	331	373	202	381	465	350.4
90	2.6	-0.051	328	373	203	395	464	352.6
100	2.1	-0.048	340	370	215	407	466	359.6
110	1.8	-0.048	347	372	218	351	457	349
120	1.6	-0.037	345	369	219	317	444	338.8

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	13.22088	ft/sec.
Intial Tunnel Flow:	140.4526	scfm
Average Tunnel Flow:	143.6207	scfm

Notes:

CBI

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
			345.6923		254.9231			

Technician________________________

CBI

JOB #	014_S_1_1																	
TECHNICIA	BTN							ROOM TEMP (F)						BEG	MID	END	AVG	
DATE:	7_9_12								BAROMETRIC					30	30	30	30	
RUN #:	A1																	
READING INTERVAL:	10																	
SAMPLE BOX :	*A*	METER Y FACTOR:		1.014						PROBE MATERIAL:								
FRONT FILTER #:					REAR FILTER #	REAR FILTER #:												
FINAL LEAK RATE (CFM):		@		IN-HG		FINAL LEAK RATE (CFM)				@		IN-HG						
Run Time:	250	AMBIENT FILTER #:				VOLUME		LITERS	FUEL MOISTURE DB					21.9	%			
		FINAL LEAK RATE (CFM):				@		IN-HG										
TEST START TIME:								1	2	3	4	5	6					
								TEMPERATURES										

	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL	FLUE	FILTER	FB REAR	FB	METER	AMBIENT
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP	TEMP	TEMP	TEMP	INT	TEMP	TEMP
0	0.000	0.000	0.038	0.05	-0.05		NA	9	0	91	223	77	217	6031.01	79	75
10	1.393	0.139	0.038	1.99	-2.33	13.124	102	8.6	0.4	90	213	79	192	6031.21	80	75
20	2.795	0.140	0.038	1.99	-0.37	13.112	102	8.2	0.4	89	246	79	168	6031.36	83	75
30	4.197	0.140	0.038	2	-2.37	13.112	102	7.6	0.6	89	243	79	155	6031.6	87	75
40	5.599	0.140	0.038	1.98	-2.18	13.100	101	7.1	0.5	88	232	78	147	6031.62	90	75
50	7.012	0.141	0.038	1.97	-0.79	13.112	101	6.4	0.7	89	245	79	145	6031.95	93	76
60	8.419	0.141	0.038	1.97	-2.16	13.136	101	5.8	0.6	91	293	79	146	6032.06	95	76
70	9.829	0.141	0.038	1.96	-0.66	13.148	101	5.1	0.7	92	318	79	147	6032.21	97	76
80	11.244	0.142	0.038	1.94	-2.11	13.196	101	4.3	0.8	96	358	80	158	6032.41	99	76
90	12.653	0.141	0.038	1.96	0	13.196	100	3.4	0.9	96	372	80	173	6032.84	100	77
100	14.073	0.142	0.038	1.98	-1.89	13.160	101	3	0.4	93	308	81	179	6033.05	101	77
110	15.489	0.142	0.038	1.95	0	13.148	100	2.5	0.5	92	280	80	181	6033.24	102	77
120	16.911	0.142	0.038	1.95	0	13.148	101	2	0.5	92	302	80	189	6033.63	103	79
130	18.329	0.142	0.038	1.95	-2.26	13.136	100	1.7	0.3	91	269	81	199	6034.08	104	79
140	19.753	0.142	0.038	1.97	0	13.124	100	1.4	0.3	90	254	81	203	6034.33	104	79
150	21.176	0.142	0.038	1.98	0	13.124	100	1.2	0.2	90	242	81	206	6034.63	105	79
160	22.610	0.143	0.038	1.98	-0.37	13.124	101	1	0.2	90	231	81	212	6035.07	105	80
170	24.037	0.143	0.038	1.99	0	13.112	100	0.8	0.2	89	220	81	211	6035.35	106	80
180	25.470	0.143	0.038	1.97	0	13.088	100	0.7	0.1	87	206	81	210	6035.23	106	79
190	26.902	0.143	0.038	1.99	0	13.100	100	0.6	0.1	88	200	81	207	6035.53	107	80
200	28.333	0.143	0.038	1.97	0	13.088	100	0.4	0.2	87	194	81	207	6035.8	107	80
210	29.768	0.144	0.038	1.99	-0.5	13.088	100	0.3	0.1	87	187	81	203	6035.88	107	80
220	31.203	0.144	0.038	1.97	-1.43	13.077	100	0.3	0	86	180	81	198	6036.15	108	80
230	32.634	0.143	0.038	1.97	-2.09	13.088	100	0.2	0.1	87	168	82	191	6036.46	108	80
240	34.073	0.144	0.038	1.98	-2.49	13.065	100	0.1	0.1	85	160	82	190	6036.67	108	80
250	35.506	0.143	0.038	1.99	0	13.077	100	0	0.1	86	157	81	191	6036.58	108	80

CBI

TEST START TIME:										1	2	3	4	5	6			
										TEMPERATURES								
	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL	FLUE	FILTER	FB REAR	FB	METER	AMBIENT		
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP	TEMP	TEMP	TEMP	INT	TEMP	TEMP		
	35.506		0.038	1.97		13.120	100.6			90	242				100	78		

Appendix F: Run Information

Run 1:

VERSION: 2.4 4/15/2010

lanufacturer: Stoll
Model: High Valley
Date: 1/28/2013
Run: 1
Control #: 10
est Duration: 230
urn Category 2

Appliance Type: Non-Cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Wood Moisture (% DRY):	20.3
Wood Moisture (% wet):	16.87
Load Weight (lb wet):	9.40
Burn Rate (dry kg/h):	0.92
Total Particulate Emissions:	13.99 g

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.90	
%Ash	0.50	

Douglas Oak

	Averages	253.3	70.6	14.09	5.51	1.10
		Temp. (F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas	Room Temp	Flue Gas Composition (%) O2	CO2	CO
0	9.4	248.0	75.0	15.20	5.46	0.53
10	8.3	334.0	73.0	13.78	6.79	0.50
20	7.4	328.0	73.0	13.50	6.69	0.48
30	6.2	409.0	73.0	9.36	11.23	0.08
40	4.9	451.0	72.0	6.80	13.64	0.09
50	3.6	452.0	72.0	6.61	13.79	0.04
60	2.7	389.0	72.0	9.74	10.46	0.04
70	2.1	342.0	72.0	11.10	9.02	0.21
80	1.7	306.0	71.0	12.33	7.54	0.42
90	1.5	268.0	71.0	13.75	5.63	1.01
100	1.3	242.0	71.0	14.10	5.20	1.22
110	1.1	227.0	70.0	14.28	4.94	1.40
120	1.0	217.0	70.0	14.49	4.64	1.60
130	0.8	216.0	70.0	14.23	5.01	1.49
140	0.7	204.0	69.0	15.35	3.54	1.74
150	0.6	190.0	70.0	16.08	2.66	2.06
160	0.5	180.0	69.0	16.25	2.80	1.76
170	0.4	173.0	68.0	16.42	2.67	1.68
180	0.3	167.0	68.0	16.41	2.80	1.65
190	0.2	162.0	68.0	16.76	2.41	1.72
200	0.2	154.0	67.0	17.58	1.57	1.84
210	0.1	147.0	69.0	17.86	1.42	1.76
220	0.1	140.0	70.0	18.08	1.17	1.54
230	0.0	134.0	72.0	18.18	1.10	1.54

CBI

CBI

Manufacturer:	Stoll
Model	High Valley
Date:	1/28/2013
Run:	1
Control #:	10
Test Duration:	230 min

	HHV	LHV
Eff	72.2%	78.0%
Comb Eff	93.8%	93.8%
HT Eff	76.9%	83.1%
Output	13,227	kJ/h
Burn Rate	0.92	kg/h
Grams CO	314	g
Input	18,321	kJ/h
MC wet	16.87	

Overall Heating Efficiency: 72.2%
Combustion Efficiency: 93.8%
Heat Transfer Efficiency: 76.9%

Air Fuel Ratio (A/F)		
Dry Molecular Weight (Md)	29.46	
Dry Moles Exhaust Gas (Nr):	536.11	%HC
Air Fuel Ratio (A/F)	15.28	1.32

Heat Output: 12,548 Btu/h 13,227 kJ/h
Heat Input: 17,380 Btu/h 18,321 kJ/h

Ultimate CO2
CO2-ult 19.64
Fo 1.060

Burn Duration: 3.833333333 h
Burn Rate: 2.0 lb/h 0.9 kg/h
Stack Temp: 253.6 Deg. F 123.1 Deg. C

Combustion Efficiency 93.8%
Total Input (kJ): 70,232 66,612 (Btu)
Total Output (kJ) 50,705 48,091 (Btu)
Efficiency 72.2%
Total CO (g) 313.96

Moisture of Wood (wet basis):
Initial Dry Weight Wtdo (kg)
Moisture Content Dry

Load Weight (kg). 4.26
Fuel Heating HHV LHV
Value in kJ/kg - CV 19810.00 18328.69 Btu/lb

Averages		1.10	5.51	264.8%	20.50	14.45	123.0	21.5	80.8%	75.7%	61.5%	20.9	1.04	75.58	0.02	75.58	70606	4.06	6.87	2.74	19810.00	16.87	78.95	20.94	1.66	5.43	0.14	0.17
INPUT DATA				**Oxygen Calculation**			**Input Data**		**Combust**	**Heat**	**Net**	**Air**	**Wet Wt**	**% Wet**	**Dry Wt.**	**% Dry**	**Fuel Properties**						**Mass Balance**					**kg Wood per**
Elapsed	**Weight**	**%**	**%**	**Excess**	**Total**	**Calc. %**	**Flue**	**Room**	**Eff**	**Transfer**	**Eff**	**Fuel**	**Now**	**Consumed**	**Now**	**Consumed**	**Total**	**Carbon**	**Hydrogen**	**Oxygen**	**Calorific**	**Mw**	**(moles/100 mole dry flue gas)**					**100 mole dfp**
Time	**Remaining (kg)**	**CO [a]**	**CO2 [d]**	**Air EA**	**O2**	**O2 [g]**	**Gas (°C)**	**Temp (°C)**	**%**	**%**	**%**	**Ratio**	**Wt**	**x**	**Wtdn**	**y**	**Input**	**/12= [a]**	**/1= [b]**	**/16= [c]**	**Value**	**Fuel Burnt**	**[h]**	**[u]**	**[w]**	**[j]**	**[k]**	**Nk**
0	4.26	0.53	5.46	227.9%	20.54	14.82	120.0	23.9	93.3%	78.1%	72.8%	19.5	4.26	0.00	3.55	0.00	0	4.06	6.87	2.74	19810.00	16.87	79.19	21.01	1.49	5.01	0.05	0.15
10	3.77	0.50	6.79	169.5%	20.46	13.42	167.8	22.8	94.7%	75.4%	71.4%	16.1	3.77	11.70	3.13	11.70	11581	4.06	6.87	2.74	19810.00	16.87	79.29	21.03	1.81	6.11	0.05	0.18
20	3.36	0.48	6.69	174.0%	20.47	13.54	164.4	22.8	94.9%	75.5%	71.7%	16.4	3.36	21.28	2.79	21.28	7845	4.06	6.87	2.74	19810.00	16.87	79.29	21.03	1.78	6.01	0.05	0.18
30	2.81	0.08	11.23	73.7%	20.19	8.92	209.4	22.8	99.6%	77.9%	77.6%	10.5	2.81	34.04	2.34	34.04	9339	4.06	6.87	2.74	19810.00	16.87	79.77	21.16	2.78	9.57	0.00	0.28
40	2.22	0.09	13.64	43.1%	20.03	6.35	232.8	22.2	99.6%	78.3%	78.0%	8.7	2.22	47.87	1.85	47.87	9713	4.06	6.87	2.74	19810.00	16.87	79.92	21.20	3.38	11.61	0.00	0.34
50	1.63	0.04	13.79	42.0%	20.03	6.22	233.3	22.2	99.9%	78.4%	78.3%	8.6	1.63	61.70	1.36	61.70	8219	4.06	6.87	2.74	19810.00	16.87	79.95	21.21	3.40	11.70	0.00	0.34
60	1.23	0.04	10.46	87.1%	20.25	9.77	198.3	22.2	100.0%	77.9%	77.8%	11.3	1.23	71.28	1.02	71.28	5604	4.06	6.87	2.74	19810.00	16.87	79.73	21.15	2.58	8.89	-0.01	0.26
70	0.95	0.21	9.02	112.8%	20.33	11.21	172.2	22.2	98.4%	78.2%	77.0%	12.8	0.95	77.66	0.79	77.66	3736	4.06	6.87	2.74	19810.00	16.87	79.56	21.10	2.28	7.79	0.01	0.23
80	0.77	0.42	7.54	146.8%	20.41	12.66	152.2	21.7	96.0%	78.0%	74.8%	14.8	0.77	81.91	0.64	81.91	2241	4.06	6.87	2.74	19810.00	16.87	79.38	21.05	1.97	6.69	0.04	0.20
90	0.68	1.01	5.63	195.8%	20.50	14.37	131.1	21.7	87.9%	76.6%	67.4%	17.4	0.68	84.04	0.57	84.04	1494	4.06	6.87	2.74	19810.00	16.87	78.99	20.95	1.67	5.47	0.12	0.17
100	0.59	1.22	5.20	206.0%	20.52	14.71	116.7	21.7	84.9%	77.3%	65.6%	17.9	0.59	86.17	0.49	86.17	1494	4.06	6.87	2.74	19810.00	16.87	78.87	20.92	1.62	5.25	0.15	0.16
110	0.50	1.40	4.94	209.8%	20.52	14.88	108.3	21.1	82.4%	77.6%	64.0%	18.0	0.50	88.30	0.41	88.30	1121	4.06	6.87	2.74	19810.00	16.87	78.78	20.90	1.61	5.16	0.18	0.16
120	0.45	1.60	4.64	214.8%	20.53	15.09	102.8	21.1	79.6%	77.5%	61.7%	18.2	0.45	89.36	0.38	89.36	1121	4.06	6.87	2.74	19810.00	16.87	78.67	20.87	1.59	5.04	0.21	0.16
130	0.36	1.49	5.01	202.2%	20.51	14.76	102.2	21.1	81.7%	78.4%	64.1%	17.5	0.36	91.49	0.30	91.49	1121	4.06	6.87	2.74	19810.00	16.87	78.74	20.89	1.65	5.27	0.19	0.16
140	0.32	1.74	3.54	272.0%	20.59	16.18	95.6	20.6	74.0%	75.4%	55.8%	21.2	0.32	92.55	0.26	92.55	747	4.06	6.87	2.74	19810.00	16.87	78.54	20.83	1.36	4.20	0.23	0.13
150	0.27	2.06	2.66	316.2%	20.63	16.94	87.8	21.1	65.9%	73.2%	48.2%	23.4	0.27	93.62	0.23	93.62	747	4.06	6.87	2.74	19810.00	16.87	78.34	20.78	1.23	3.68	0.27	0.12
160	0.23	1.76	2.80	330.8%	20.64	16.96	82.2	20.6	69.8%	74.9%	52.3%	24.4	0.23	94.68	0.19	94.68	747	4.06	6.87	2.74	19810.00	16.87	78.48	20.82	1.18	3.59	0.23	0.12
170	0.18	1.68	2.67	351.6%	20.65	17.14	78.3	20.0	69.8%	75.1%	52.4%	25.6	0.18	95.74	0.15	95.74	747	4.06	6.87	2.74	19810.00	16.87	78.51	20.82	1.12	3.43	0.22	0.11
180	0.14	1.65	2.80	341.4%	20.65	17.02	75.0	20.0	71.0%	76.3%	54.2%	25.1	0.14	96.81	0.11	96.81	747	4.06	6.87	2.74	19810.00	16.87	78.53	20.83	1.15	3.52	0.21	0.11
190	0.09	1.72	2.41	375.6%	20.67	17.40	72.2	20.0	67.6%	75.1%	50.8%	26.8	0.09	97.87	0.08	97.87	374	4.06	6.87	2.74	19810.00	16.87	78.47	20.82	1.07	3.24	0.22	0.11
200	0.09	1.84	1.57	476.0%	20.71	18.22	67.8	19.4	58.6%	70.6%	41.3%	32.0	0.09	97.87	0.08	97.87	374	4.06	6.87	2.74	19810.00	16.87	78.37	20.79	0.90	2.61	0.24	0.09
210	0.05	1.76	1.42	517.7%	20.73	18.43	63.9	20.6	57.7%	70.8%	40.8%	34.3	0.05	98.94	0.04	98.94	374	4.06	6.87	2.74	19810.00	16.87	78.39	20.79	0.84	2.43	0.23	0.08
220	0.05	1.54	1.17	624.8%	20.76	18.82	60.0	21.1	56.8%	69.7%	39.6%	40.2	0.05	98.94	0.04	98.94	747	4.06	6.87	2.74	19810.00	16.87	78.47	20.81	0.72	2.07	0.19	0.07
230	0.00	1.54	1.10	644.1%	20.77	18.90	56.7	22.2	55.8%	70.6%	39.3%	41.2	0.00	100.00	0.00	100.00	374	4.06	6.87	2.74	19810.00	16.87	78.46	20.81	0.70	2.01	0.19	0.07
0															0.00													

Moisture Content MCwb 16.87

16.87 Dry kg 3.55
3.55 CA 48.73
20.30 HY 6.87
OX 43.90

CBI

HHV LHV
8522.48 7885.21

															SUMS							AVERAGE	SUMS						
30.00	114.94	9.60	1.21	573.05	32.09	11.28	396.11	4057.93	3047.30	2961.66	2929.17	3920.80	3543.58	294.61	3338.78	5998.78	65623.09	32342.04	26011.86	36678.97	12860.18	7618.90	19527	4320	15207.25	51079	4320	313.96	20.61
Moles per kg of Dry Wood								Heat Content Change - Ambient to Stack Temperature							Energy Losses (kJ/kg of Dry Fuel)														
								Flue Gas Constituent							Flue Gas Constituent														
CO2	O2	CO	HC	N2	H2O	Moisture Present	Stack Temp K	CO2	O2	CO	N2	CH4	H2O	Room Temp K	CO2	O2	CO	N2	CH4	H2O Comb	H2O Fuel MC	Total Loss Rate	Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
																													CO	HC
36.87	100.08	3.58	0.36	534.79	33.80	11.28	393.15	3800.98	2872.55	2796.31	2764.69	3632.64	3347.17	297.04	140.15	287.48	1022.78	1478.53	322.41	1599.34	533.63	5384.32	0	0	0.00	0	0	0.00	0.00
37.75	74.60	2.78	0.29	440.80	33.95	11.28	440.93	5832.54	4364.19	4237.65	4191.99	5669.93	5069.06	295.93	220.16	325.56	798.40	1847.84	255.46	1664.95	553.04	5665.43	3312	608	2703.73	8269	608	45.50	2.67
37.83	76.54	2.71	0.27	448.33	33.98	11.28	437.59	5691.61	4261.74	4138.91	4094.16	5526.36	4951.18	295.93	215.29	326.18	779.27	1835.55	244.05	1662.19	551.72	5614.24	2223	400	1828.12	5622	400	30.09	1.73
40.53	32.21	0.29	-0.01	287.91	34.54	11.28	482.59	7621.33	5653.27	5477.15	5420.69	7517.00	6547.85	295.93	308.92	182.08	83.30	1560.67	-8.73	1744.96	569.72	4440.90	2094	34	2059.21	7246	34	3.81	-0.07
40.54	18.87	0.27	0.01	237.52	34.51	11.28	505.93	8666.22	6398.33	6191.52	6129.28	8613.28	7399.49	295.37	351.30	120.72	77.35	1455.80	7.76	1772.49	579.33	4364.74	2140	41	2099.17	7573	41	3.67	0.07
40.71	18.35	0.12	-0.01	236.01	34.55	11.28	506.48	8690.79	6415.74	6208.19	6145.81	8639.29	7419.35	295.37	353.77	117.74	34.15	1450.49	-11.07	1775.33	579.55	4299.96	1784	9	1774.62	6435	9	1.37	-0.08
40.70	38.00	0.16	-0.04	310.21	34.60	11.28	471.48	7160.57	5324.34	5161.67	5107.79	7034.40	6171.73	295.37	291.40	202.31	44.84	1584.47	-34.50	1734.84	565.48	4388.86	1241	3	1238.69	4362	3	1.23	-0.17
39.83	49.48	0.93	0.06	351.33	34.41	11.28	445.37	6042.12	4517.30	4385.41	4338.35	5881.78	5245.52	295.37	240.65	223.52	266.48	1524.20	49.79	1693.54	555.03	4553.22	859	59	799.83	2877	59	4.90	0.17
38.46	64.60	2.14	0.21	404.90	34.11	11.28	425.37	5219.97	3919.65	3809.42	3767.65	5044.18	4557.90	294.82	200.77	253.21	614.45	1525.50	186.53	1655.05	547.28	4982.80	564	90	474.20	1678	90	6.79	0.38
33.97	86.68	6.09	0.75	476.62	33.02	11.28	404.26	4342.39	3275.44	3186.96	3151.25	4163.83	3814.29	294.82	147.51	283.92	1743.98	1501.95	669.71	1578.04	538.89	6464.01	488	180	307.22	1007	180	12.87	0.90
32.28	91.30	7.57	0.96	489.65	32.61	11.28	389.82	3749.38	2836.97	2762.50	2731.09	3575.87	3306.97	294.82	121.04	259.00	2164.24	1337.27	855.42	1541.59	533.17	6811.73	514	226	287.88	980	226	16.00	1.16
30.92	93.15	8.76	1.13	493.11	32.27	11.28	381.48	3431.17	2601.22	2534.16	2505.09	3261.40	3034.01	294.26	106.10	242.30	2502.14	1235.29	1007.36	1516.67	530.09	7139.95	404	197	206.85	717	197	13.88	1.02
29.36	95.48	10.13	1.32	497.88	31.88	11.28	375.93	3206.05	2433.49	2371.48	2344.13	3040.96	2839.47	294.26	94.14	232.36	2889.50	1167.09	1181.14	1492.15	527.90	7584.29	429	229	200.37	692	229	16.04	1.20
30.55	89.97	9.09	1.18	480.13	32.16	11.28	375.37	3183.59	2416.73	2355.22	2328.04	3019.02	2820.03	294.26	97.25	217.44	2592.41	1117.77	1053.56	1504.90	527.68	7111.00	402	205	197.44	718	205	14.39	1.07
26.23	119.91	12.89	1.69	581.99	31.15	11.28	368.71	2935.87	2232.21	2176.26	2150.96	2776.39	2606.02	293.71	77.01	267.66	3676.90	1251.83	1506.01	1450.79	525.27	8755.46	330	194	135.98	417	194	13.62	1.02
21.74	138.45	16.84	2.23	640.35	30.06	11.28	360.93	2602.68	1982.02	1933.10	1910.47	2454.42	2315.09	294.26	56.59	274.41	4797.64	1223.38	1992.06	1391.26	521.99	10257.33	387	255	132.22	360	255	17.78	1.35
23.86	144.52	15.00	1.95	668.79	30.62	11.28	355.37	2402.02	1831.68	1787.06	1766.02	2259.79	2140.38	293.71	57.31	264.71	4271.15	1181.09	1743.55	1411.64	520.02	9449.48	356	226	130.72	391	226	15.84	1.18
23.86	153.18	15.01	1.94	701.52	30.64	11.28	351.48	2268.42	1731.50	1689.74	1669.75	2130.38	2023.95	293.15	54.12	265.24	4273.68	1171.37	1732.67	1409.18	518.70	9424.96	355	225	130.05	392	225	15.85	1.17
24.51	148.97	14.44	1.87	687.30	30.79	11.28	348.15	2136.14	1631.73	1592.67	1573.77	2003.51	1907.77	293.15	52.35	243.08	4109.71	1081.65	1664.21	1412.63	517.39	9081.02	342	217	125.74	405	217	15.25	1.13
22.60	163.12	16.13	2.09	735.78	30.35	11.28	345.37	2026.15	1548.67	1511.83	1493.84	1898.26	1811.00	293.15	45.78	252.62	4588.26	1099.14	1862.96	1389.23	516.30	9754.30	184	121	62.82	190	121	8.52	0.63
17.56	203.84	20.58	2.67	876.50	29.18	11.28	340.93	1871.76	1432.25	1398.57	1381.85	1750.13	1675.45	292.59	32.87	291.95	5852.82	1211.19	2383.16	1331.84	514.77	11618.62	219	155	64.42	154	155	10.87	0.81
17.01	220.78	21.08	2.72	939.06	29.09	11.28	337.04	1676.38	1283.55	1253.55	1238.52	1565.71	1501.79	293.71	28.52	283.38	5992.95	1163.05	2423.81	1322.58	512.81	11727.10	221	158	63.00	152	158	11.13	0.82
16.44	264.49	21.64	2.73	1102.71	29.06	11.28	333.15	1502.57	1151.32	1124.62	1111.09	1401.50	1347.39	294.26	24.71	304.51	6148.71	1225.22	2433.16	1317.09	511.07	11964.47	451	323	128.64	296	323	22.85	1.65
15.84	272.11	22.18	2.79	1129.93	28.93	11.28	329.82	1329.74	1019.40	995.88	983.87	1239.18	1193.18	295.37	21.06	277.39	6297.98	1111.71	2491.36	1306.67	509.33	12015.51	227	165	61.32	147	165	11.71	0.84

Dirigo Laboratories, Inc.

Manufacturer:	**Stoll**
Model:	**High Valley**
Date:	**1/28/2013**
Run:	**1**
Control #:	**10**
Test Duration:	**230**
Output Category:	**2**

	HHV Basis	LHV Basis
Overall Efficiency	72.2%	78.0%
Combustion Efficiency	93.8%	93.8%
Heat Transfer Efficiency	76.9%	83.1%

HHV Output Rate (kJ/h)	13,227	12,548	**(Btu/h)**
Burn Rate (kg/h)	0.92	2.04	**(lb/h)**
Input (kJ/h)	18,321	17,380	**(Btu/h)**

Test Load Weight (dry kg)	3.5	7.8	**dry lb**
MC wet (%)	16.87		
MC dry (%)	20.30		
Particulate (g)	13.99		
CO (g)	314		
Test Duration (h)	3.833333333		

Emissions	Particulate	CO
g/MJ Output	0.28	6.19
g/kg Dry Fuel	3.95	88.56
g/h	3.65	81.90
lb/MM Btu Output	0.64	14.39

Air/Fuel Ratio (A/F)	15.28

Test Results in Accordance with CSA B415.1-10

Technician: 

CBI

Default Fuel Values		
	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

CBI

CBI

PREBURN

JOB # 014-S-1-1
TECHNICIAI
DATE: 9_26_12
RUN #: 1
READING INTERVAL: 10

Run Time: 110

Model Designation HIGH VALLEY

	Tunnel Traverse Information								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	5.4	-0.08	250	255	165	412	250	266.4
10	4.7	-0.063	275	298	179	398	305	291
20	4	-0.058	272	296	176	454	296	298.8
30	3.3	-0.06	278	299	179	470	280	301.2
40	2.7	-0.06	288	314	186	460	273	304.2
50	2.2	-0.054	301	331	195	413	297	307.4
60	1.7	-0.052	311	344	198	383	323	311.8
70	3.6	-0.052	319	354	201	331	325	306
80	3.3	-0.037	305	343	187	324	313	294.4
90	2.9	-0.053	291	323	178	319	302	282.6
100	2.4	-0.052	293	324	182	351	296	289.2
110	2	-0.044	299	330	189	335	297	290

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	13.17174 ft/sec.
Intial Tunnel Flow:	148.5201 scfm
Average Tunnel Flow:	147.9501 scfm

Notes:

CBI

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
			290.1667		184.5833			

CBI

Run #	1
Date:	9/26/12

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

Tunnel Velocity:	13.172	ft/sec.
Intial Tunnel Flow:	148.52	scfm
Average Tunnel Flow	147.95	scfm

JOB #: 014-5-1-1
TECHNICIAN: BTN
DATE: 9_26_12
RUN #: 1

CBI

READING INTERVAL: 10
SAMPLE BOX : A
METER Y FACTOR: 1.014
FRONT FILTER #: 1481 [redacted]
FINAL LEAK RATE (CFM): <0.01 @ 10 IN-HG
REAR FILTER #: 1482 [redacted]
FINAL LEAK RATE (CFM) <0.01 @ 10 IN-HG

ROOM TEMP (F) 68.0

BAROMETRIC	BEG	MID	END	AVG
	29.88	29.88	29.88	29.88

PROBE MATERIAL: SS

Run Time: 230
AMBIENT FILTER #:
FINAL LEAK RATE (CFM):
VOLUME LITERS
@ IN-HG
FUEL MOISTURE DB 20.3 %
TEST START TIME:

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	TEMPERATURES 1 TUNNEL TEMP	2 FLUE TEMP	3 FILTER TEMP	4 FB REAR TEMP	5 FB INT	6 METER TEMP	AMBIENT TEMP
0	0.000	0.000	0.039	0.06	-0.11		NA	9.4	0	73	248	74	192	6029.68	83	75
10	1.389	0.139	0.039	1.95	-1.18	13.103	102	8.3	1.1	72	334	78	227	6029.65	83	73
20	2.778	0.139	0.039	1.93	-0.52	13.090	101	7.4	0.9	71	328	78	238	6029.42	85	73
30	4.170	0.139	0.039	1.94	-1.87	13.090	101	6.2	1.2	71	409	78	249	6029.19	87	73
40	5.575	0.141	0.039	1.96	-0.13	13.103	101	4.9	1.3	72	451	79	196	6029.19	90	72
50	6.981	0.141	0.039	1.95	-1.69	13.103	101	3.6	1.3	72	452	79	202	6029.11	93	72
60	8.389	0.141	0.039	1.97	-0.24	13.103	101	2.7	0.9	72	389	79	217	6029.03	95	72
70	9.804	0.142	0.039	1.96	-1.95	13.090	101	2.1	0.6	71	342	78	226	6028.77	96	72
80	11.220	0.142	0.039	1.97	-0.94	13.078	101	1.7	0.4	70	306	77	229	6028.43	98	71
90	12.640	0.142	0.039	1.95	-0.59	13.078	101	1.5	0.2	70	268	76	231	6028.31	99	71
100	14.058	0.142	0.039	1.96	-1.4	13.066	100	1.3	0.2	69	242	75	230	6028.08	99	71
110	15.482	0.142	0.039	1.98	0	13.066	101	1.1	0.2	69	227	75	230	6027.82	100	70
120	16.902	0.142	0.039	1.97	-0.76	13.066	100	1	0.1	69	217	74	228	6027.43	100	70
130	18.326	0.142	0.039	1.99	-0.83	13.053	100	0.8	0.2	68	216	74	224	6027.07	101	70
140	19.748	0.142	0.039	2	0	13.053	100	0.7	0.1	68	204	73	207	6026.84	101	69
150	21.172	0.142	0.039	1.97	0	13.053	100	0.6	0.1	68	190	73	192	6026.38	101	70
160	22.597	0.143	0.039	1.97	-0.65	13.053	100	0.5	0.1	68	180	72	184	6026.01	101	69
170	24.021	0.142	0.039	1.98	-0.67	13.041	100	0.4	0.1	67	173	72	179	6025.58	101	68
180	25.447	0.143	0.039	1.98	-0.17	13.029	100	0.3	0.1	66	167	71	176	6025.15	101	68
190	26.869	0.142	0.039	1.99	-1.03	13.029	100	0.2	0.1	66	162	71	172	6024.88	100	68
200	28.297	0.143	0.039	1.98	-0.25	13.029	101	0.2	0	66	154	71	169	6024.39	100	67
210	29.718	0.142	0.039	1.98	-1.93	13.053	100	0.1	0.1	68	147	70	164	6024.28	100	69
220	31.146	0.143	0.039	1.99	-1.8	13.078	101	0.1	0	70	140	72	160	6025.44	100	70
230	32.566	0.142	0.039	1.98	0	13.090	101	0	0.1	71	134	73	154	6026.12	100	72

TEST START TIME:										1	2	3	4	5	6			
										TEMPERATURES								
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP		
	32.566		0.039	1.97		13.070	100.6			69	253				96	71		

CBI

JOB #	014-S-1-1
TECHNICIAN	BTN
DATE:	9_26_12
RUN #:	1

READING INTERVAL:	10								
SAMPLE BOX :	B	METER Y FACTOR:	0.982		PROBE MATERIAL:	SS			
FRONT FILTER #:	1483				REAR FILTER #:	1484			
FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG	FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG

Run Time: 230 Firebox Delta T 74.2

							1	2	3	4	5	6	
							TEMPERATURES						
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T
0	0	0	NA	0	0	-1	303	330	74	302	298	79	285
10	1.361	0.136	102	-0.06	2	-1.38	295	311	79	467	297	80	319
20	2.716	0.136	101	-0.06	1.98	-1.47	280	293	79	473	301	83	317
30	4.070	0.135	100	-0.08	1.97	-1.6	277	292	79	582	299	86	340
40	5.445	0.138	101	-0.08	2.03	-1.61	286	319	80	665	299	89	353
50	6.825	0.138	101	-0.08	2.02	-1.05	306	345	80	717	301	92	374
60	8.207	0.138	101	-0.07	2.02	-1.61	333	376	80	641	306	94	375
70	9.592	0.139	101	-0.06	2.01	-1.56	359	398	79	553	313	96	370
80	10.981	0.139	101	-0.06	2.01	-1.34	372	409	78	483	318	97	362
90	12.372	0.139	101	-0.04	2.01	-1.57	379	412	77	419	321	98	352
100	13.765	0.139	100	-0.04	2.02	-1.32	379	406	77	364	324	99	341
110	15.159	0.139	101	-0.04	2.02	-1.68	374	397	76	331	325	99	331
120	16.551	0.139	100	-0.04	2.02	-1.24	370	385	75	310	324	100	323
130	17.944	0.139	100	-0.04	2.02	-0.93	369	371	74	301	321	100	317
140	19.339	0.140	100	-0.04	2.04	-1.04	355	355	74	285	324	100	305
150	20.738	0.140	101	-0.04	2.02	-1.34	341	337	73	264	321	100	291
160	22.134	0.140	100	-0.04	2.02	-1.26	329	318	73	247	313	100	278
170	23.529	0.140	100	-0.03	2.05	-1.48	318	301	72	233	304	100	267
180	24.924	0.140	100	-0.03	2.03	-1.17	310	285	71	224	297	100	258
190	26.322	0.140	100	-0.03	2.04	-1.13	302	269	71	215	289	100	249
200	27.721	0.140	100	-0.03	2.02	-1.52	291	258	71	203	279	100	240
210	29.119	0.140	101	-0.03	2.04	-0.98	279	245	70	193	268	99	230
220	30.516	0.140	101	-0.02	2.05	-1.18	267	237	72	183	256	100	221
230	31.910	0.139	101	-0.02	2.04	-1.62	253	228	73	174	245	100	211

							1	2	3	4	5	6											
							TEMPERATURES																
E	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T										
CBI																							
	31.91	0.139	100.624	-0.044	2.02087	-1.336667	322	328	75	368	302	95	74										
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT										
													210.8										

CBI

JOB NUMBER: 014-S-1-1

RUN #: 1

DATE: 9_26_12

BURN RATE: 0.92 KG/HR DRY

FILTER A PARTICULATE: 8.3 mg

FILTER B PARTICULATE: 7.7 mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	32.57		31.91	
Average Gas Velocity in Dilution Tunnel - vs	13.17	feet/second	13.17	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8877.00	dscf/hour	8877.00	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	31.45	dscf	29.89	dscf
Average Tunnel Temperature	69.5	F	69.5	F
Average Delta p	0.039		0.039	
Average Gas Meter Temperature	96	F	95	F
Average Delta H	1.97	in-h20	2.02	in-h20
Total Time of Test	230	min	230	min
Total Particulates	8.3	mg	7.7	mg
Particulate Concentration (dry-standard)	0.00026	grams/dscf	0.00026	grams/dscf
Particulate Emission Rate	2.34	grams/hour	2.29	grams/hour
Adjusted Emissions	3.69	grams/hour	3.62	grams/hour
AVERAGE ADJUSTED EMISSIONS		3.65	grams/hour	
% OF AVERAGE	101.0		99.0	

Run 2:

VERSION: 2.4 4/15/2010

lanufacturer: Stoll
Model: High Valley
Date: 1/28/2013
Run: 2
Control #: 10
est Duration: 200
urn Category 2

Appliance Type: Non-Cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Wood Moisture (% DRY):	21.5
Wood Moisture (% wet):	17.70
Load Weight (lb wet):	8.90
Burn Rate (dry kg/h):	1.00
Total Particulate Emissions:	13.26 g

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.90	
%Ash	0.50	

Dougla
Oak

Averages		265.9	71.8	14.57	5.00	1.06
		Temp. (F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas	Room Temp	Flue Gas Composition (%) O2	CO2	CO
0	8.9	269.0	69.0	19.94	0.73	0.23
10	7.5	385.0	68.0	13.62	6.57	0.65
20	6.4	356.0	68.0	13.43	6.92	0.78
30	5.3	373.0	69.0	13.27	6.98	0.66
40	3.9	472.0	69.0	6.40	14.10	0.18
50	2.8	431.0	71.0	8.41	11.78	0.02
60	2.1	373.0	71.0	10.62	9.66	0.07
70	1.6	335.0	71.0	11.98	8.01	0.26
80	1.3	293.0	72.0	13.47	6.06	0.86
90	1.2	266.0	72.0	13.62	5.76	1.03
100	1.0	247.0	72.0	14.34	4.66	1.56
110	0.9	227.0	73.0	15.34	3.50	1.67
120	0.7	213.0	73.0	15.62	3.16	1.77
130	0.6	202.0	73.0	15.85	2.99	1.74
140	0.5	194.0	73.0	16.15	2.85	1.54
150	0.5	184.0	73.0	16.71	2.26	1.67
160	0.4	171.0	74.0	17.57	1.47	1.59
170	0.3	159.0	74.0	18.06	1.08	1.57
180	0.3	148.0	74.0	18.03	1.06	1.87
190	0.2	142.0	74.0	17.14	2.32	1.21
200	0.0	143.0	74.0	16.34	3.15	1.27

CBI

CBI

Manufacturer:	Stoll
Model:	High Valley
Date:	1/28/2013
Run:	2
Control #:	10
Test Duration	200 min

	HHV	LHV
Eff	68.5%	74.0%
Comb Eff	92.0%	92.0%
HT Eff	74.5%	80.5%
Output	13,528	kJ/h
Burn Rate	1.00	kg/h
Grams CO	381	g
Input	19,752	kJ/h
MC wet	17.70	

Overall Heating Efficiency:	68.5%	Air Fuel Ratio (A/F)	
Combustion Efficiency:	92.0%	Dry Molecular Weight (Md)	29.40
Heat Transfer Efficiency:	74.5%	Dry Moles Exhaust Gas (Nr):	575.84 %HC
		Air Fuel Ratio (A/F)	16.42 1.32

Heat Output:	12,833	Btu/h	13,528	kJ/h
Heat Input:	18.737	Btu/h	19,752	kJ/h
Burn Duration:	3.333333333	h		
Burn Rate:	2.2	lb/h	1.0	kg/h
Stack Temp:	265.7	Deg. F	129.8	Deg. C

Combustion Efficiency:	92.0%		
Total Input (kJ):	65,840	62,446	(Btu)
Total Output (kJ):	45,093	42,768	(Btu)
Efficiency:	68.5%		
Total CO (g):	381.49		

Moisture of Wood (wet basis):
Initial Dry Weight Wtdo (kg):
Moisture Content Dry

Load Weight (kg) 4.04
Fuel Heating: HHV LHV
Value in kJ/kg - CV: 19810.00 18328.69 Btu/lb

CO2-ult	Ultimate CO2	Fo
	19.64	1.059

Averages	1.06	5.00	359.9%	20.54	15.01	129.9	22.1	80.6%	70.8%	57.3%	26.6	1.00	75.17	0.02	75.17	66579	4.06	6.87	2.74	19810.00	17.70	78.93	20.94	1.52	4.98	0.13	0.15
INPUT DATA			**Oxygen Calculation**			**Input Data**		**Combust**	**Heat**	**Net**	**Air**	**Wet Wt**	**% Wet**	**Dry Wt.**	**% Dry**	**Fuel Properties**						**Mass Balance**					**kg Wood per**
Elapsed	**Weight**	**%**	**%**	**Excess**	**Total**	**Calc. %**	**Flue**	**Room**	**Eff**	**Transfer**	**Eff**	**Fuel**	**Now**	**Consumed**	**Now**	**Consumed**	**Total**	**Carbon**	**Hydrogen**	**Oxygen**	**Calorific**	**Mw**	**(moles/100 mole dry flue gas)**					**100 mole dfp**
Time	**Remaining (kg)**	**CO [e]**	**CO2 [d]**	**Air EA**	**O2**	**O2 [g]**	**Gas (°C)**	**Temp (°C)**	**%**	**%**	**%**	**Ratio**	**Wt**	**x**	**Wtdn**	**y**	**Input**	**/12= [a]**	**/1= [b]**	**/16= [c]**	**Value**	**Fuel Burnt**	**[h]**	**[u]**	**[w]**	**[j]**	**[k]**	**Nk**
0	4.04	0.23	0.73	1945.1%	20.88	20.03	131.7	20.6	85.8%	6.2%	5.3%	122.4	4.04	0.00	3.82	0.00	0	4.06	6.87	2.74	19810.00	17.70	79.01	20.96	0.24	0.81	0.00	0.02
10	3.40	0.65	6.57	172.1%	20.46	13.57	196.1	20.0	93.0%	71.5%	66.5%	16.2	3.40	15.73	2.80	15.73	14426	4.06	6.87	2.74	19810.00	17.70	79.21	21.01	1.80	6.02	0.07	0.18
20	2.90	0.78	6.92	155.1%	20.43	13.12	180.0	20.0	92.0%	73.9%	67.9%	15.1	2.90	28.09	2.39	28.09	8137	4.06	6.87	2.74	19810.00	17.70	79.18	21.00	1.92	6.41	0.09	0.19
30	2.40	0.66	6.98	157.1%	20.44	13.13	189.4	20.6	93.2%	73.2%	68.2%	15.3	2.40	40.45	1.98	40.45	9247	4.06	6.87	2.74	19810.00	17.70	79.23	21.02	1.90	6.38	0.08	0.19
40	1.77	0.18	14.10	37.6%	20.00	5.81	244.4	20.6	99.0%	77.7%	76.9%	8.3	1.77	56.18	1.46	56.18	9247	4.06	6.87	2.74	19810.00	17.70	79.91	21.20	3.52	12.06	0.02	0.35
50	1.27	0.02	11.78	66.5%	20.16	8.37	221.7	21.7	100.1%	77.3%	77.4%	10.1	1.27	68.54	1.05	68.54	6658	4.06	6.87	2.74	19810.00	17.70	79.83	21.17	2.90	9.99	-0.01	0.29
60	0.95	0.07	9.66	101.9%	20.30	10.60	189.4	21.7	99.7%	77.5%	77.3%	12.2	0.95	76.40	0.78	76.40	4439	4.06	6.87	2.74	19810.00	17.70	79.67	21.13	2.39	8.24	-0.01	0.24
70	0.73	0.26	8.01	137.5%	20.39	12.25	168.3	21.7	97.8%	77.1%	75.4%	14.3	0.73	82.02	0.60	82.02	2959	4.06	6.87	2.74	19810.00	17.70	79.48	21.08	2.04	6.97	0.02	0.20
80	0.59	0.86	6.06	183.9%	20.48	13.99	145.0	22.2	90.2%	75.9%	68.4%	16.8	0.59	85.39	0.49	85.39	1480	4.06	6.87	2.74	19810.00	17.70	79.09	20.98	1.73	5.73	0.10	0.17
90	0.54	1.03	5.76	189.3%	20.49	14.22	130.0	22.2	87.9%	76.9%	67.6%	17.0	0.54	86.52	0.45	86.52	1110	4.06	6.87	2.74	19810.00	17.70	78.99	20.95	1.70	5.60	0.13	0.17
100	0.45	1.56	4.66	215.8%	20.53	15.09	119.4	22.2	80.0%	75.4%	60.3%	18.2	0.45	88.76	0.37	88.76	1110	4.06	6.87	2.74	19810.00	17.70	78.69	20.87	1.58	5.03	0.20	0.16
110	0.41	1.67	3.50	279.9%	20.60	16.26	108.3	22.8	74.5%	73.4%	54.7%	21.7	0.41	89.89	0.34	89.89	1110	4.06	6.87	2.74	19810.00	17.70	78.57	20.84	1.33	4.12	0.22	0.13
120	0.32	1.77	3.16	298.4%	20.61	16.57	100.6	22.8	71.8%	73.3%	52.6%	22.6	0.32	92.13	0.26	92.13	1110	4.06	6.87	2.74	19810.00	17.70	78.50	20.82	1.27	3.90	0.23	0.13
130	0.27	1.74	2.99	315.3%	20.63	16.77	94.4	22.8	71.1%	73.7%	52.4%	23.6	0.27	93.26	0.22	93.26	740	4.06	6.87	2.74	19810.00	17.70	78.50	20.82	1.22	3.74	0.23	0.12
140	0.23	1.54	2.85	347.4%	20.65	17.03	90.0	22.8	72.5%	74.0%	53.7%	25.5	0.23	94.38	0.19	94.38	370	4.06	6.87	2.74	19810.00	17.70	78.58	20.84	1.13	3.49	0.20	0.11
150	0.23	1.67	2.26	399.8%	20.68	17.59	84.4	22.8	67.0%	72.0%	48.2%	28.2	0.23	94.38	0.19	94.38	370	4.06	6.87	2.74	19810.00	17.70	78.48	20.82	1.02	3.08	0.22	0.10
160	0.18	1.59	1.47	541.9%	20.74	18.47	77.2	23.3	60.2%	67.7%	40.8%	35.8	0.18	95.51	0.15	95.51	740	4.06	6.87	2.74	19810.00	17.70	78.47	20.81	0.80	2.36	0.20	0.08
170	0.14	1.57	1.08	641.2%	20.77	18.90	70.6	23.3	55.1%	65.0%	35.8%	41.0	0.14	96.63	0.11	96.63	370	4.06	6.87	2.74	19810.00	17.70	78.45	20.81	0.70	2.01	0.20	0.07
180	0.14	1.87	1.06	570.4%	20.75	18.75	64.4	23.3	51.6%	67.1%	34.7%	36.8	0.14	96.63	0.11	96.63	370	4.06	6.87	2.74	19810.00	17.70	78.32	20.77	0.78	2.20	0.24	0.08
190	0.09	1.21	2.32	456.5%	20.71	17.78	61.1	23.3	73.4%	78.2%	57.4%	31.9	0.09	97.75	0.07	97.75	1849	4.06	6.87	2.74	19810.00	17.70	78.69	20.87	0.91	2.82	0.15	0.09
200	0.00	1.27	3.15	344.4%	20.65	16.86	61.7	23.3	77.5%	80.6%	62.5%	25.6	0.00	100.00	0.00	100.00	740	4.06	6.87	2.74	19810.00	17.70	78.72	20.88	1.13	3.56	0.16	0.11
0															0.00													

CBI

Moisture Content MCwb		17.70
17.70	Dry kg	3.32
3.32	CA	48.73
21.50	HY	6.87
	OX	43.90

HHV	LHV
8522.48	7885.21

															SUMS							AVERAGE	SUMS						
29.80	156.37	9.83	1.18	729.04	32.16	11.94	403.07	4321.02	3240.38	3148.21	3113.91	4184.83	3766.43	295.24	3055.24	8513.72	58848.63	40635.68	22146.90	32307.51	11973.73	8451.50	20747	5285	15461.28	45833	5285	381.49	25.70
Moles per kg of Dry Wood						Moisture	Stack Temp	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp	Energy Losses (kJ/kg of Dry Fuel) Flue Gas Constituent							Total Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CO2	O2	CO	HC	N2	H2O	Present	K	CO2	O2	CO	N2	CH4	H2O	K	CO2	O2	CO	N2	CH4	H2O Comb	H2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
30.99	850.45	9.76	0.06	3354.34	34.41	11.94	404.82	4407.62	3325.04	3235.32	3199.05	4225.51	3872.20	293.71	136.60	2827.79	2794.60	10730.69	49.31	1646.33	571.44	18756.75	0	0	0.00	0	0	0.00	0.00
36.77	75.93	3.64	0.41	443.28	33.71	11.94	469.26	7149.22	5320.82	5159.48	5105.37	7012.48	6169.50	293.15	262.85	404.01	1048.16	2263.12	366.11	1689.99	598.88	6633.12	4830	1014	3816.09	9595	1014	74.17	4.75
36.24	68.72	4.09	0.48	414.68	33.55	11.94	453.15	6457.82	4822.46	4680.26	4630.32	6298.78	5597.75	293.15	234.05	331.41	1175.18	1920.12	434.71	1663.10	592.05	6350.62	2609	652	1956.49	5529	652	46.99	3.19
36.92	69.43	3.49	0.40	419.15	33.73	11.94	462.59	6841.07	5097.97	4945.01	4892.80	6696.01	5913.55	293.71	252.60	353.97	1005.30	2050.80	356.25	1682.45	595.82	6297.18	2939	626	2313.21	6308	626	45.63	2.97
40.25	16.58	0.51	0.05	228.12	34.43	11.94	517.59	9247.47	6813.58	6589.86	6524.35	9221.40	7874.44	293.71	372.21	112.95	148.80	1488.35	43.38	1784.77	619.25	4569.70	2133	88	2045.18	7114	88	6.72	0.36
40.78	28.98	0.07	-0.04	276.35	34.60	11.94	494.82	8197.94	6067.07	5874.59	5814.77	8116.15	7021.89	294.82	334.31	175.81	20.00	1606.91	-32.81	1764.06	609.06	4477.35	1505	-4	1509.13	5153	-4	0.65	-0.20
40.55	-41.50	0.29	-0.03	334.40	34.58	11.94	462.59	6798.77	5065.27	4912.99	4861.19	6657.17	5875.18	294.82	275.67	225.42	84.59	1625.58	-25.80	1723.62	595.37	4504.45	1009	13	996.37	3429	13	1.84	-0.10
39.44	60.34	1.28	0.09	391.35	34.34	11.94	441.48	5898.40	4413.98	4286.13	4239.92	5732.82	5127.09	294.82	232.65	266.34	367.80	1659.31	80.22	1686.13	586.43	4878.88	729	66	662.75	2230	66	5.35	0.21
35.22	81.32	5.00	0.60	459.60	33.33	11.94	418.15	4897.12	3682.46	3580.18	3540.66	4720.76	4284.03	295.37	172.46	299.45	1432.23	1627.30	534.86	1608.14	576.36	6250.80	467	145	321.48	1013	145	10.45	0.71
33.98	83.88	6.08	0.75	466.07	33.02	11.94	403.15	4275.39	3225.29	3138.26	3103.08	4098.75	3756.03	295.37	145.90	270.54	1738.84	1446.24	671.49	1575.92	570.05	6418.38	360	134	225.75	750	134	9.53	0.67
29.61	95.88	9.91	1.29	500.00	31.94	11.94	392.59	3841.79	2904.79	2828.03	2795.98	3668.59	3385.25	295.37	113.75	278.50	2833.12	1397.99	1153.60	1512.56	565.62	7855.15	440	221	218.53	670	221	15.55	1.16
26.51	123.21	12.65	1.65	595.20	31.23	11.94	381.48	3367.68	2552.15	2486.14	2457.67	3203.07	2976.45	295.93	89.29	314.45	3611.72	1462.79	1470.43	1466.14	560.74	8975.57	503	283	220.15	607	283	19.84	1.48
24.99	131.02	14.00	1.83	620.73	30.86	11.94	373.71	3052.75	2317.42	2258.43	2232.37	2894.95	2704.14	295.93	76.28	303.63	3992.36	1385.69	1633.72	1440.51	557.49	9389.69	526	313	212.89	584	313	21.95	1.64
24.62	138.06	14.33	1.87	646.38	30.79	11.94	367.59	2806.54	2133.36	2079.76	2055.61	2655.22	2490.42	295.93	69.09	294.54	4084.21	1328.70	1666.24	1430.49	554.94	9428.20	352	213	138.64	388	213	14.98	1.12
25.36	151.52	13.70	1.75	699.14	31.02	11.94	363.15	2628.16	1999.72	1949.94	1927.20	2482.19	2335.12	295.93	66.64	303.00	3904.22	1347.39	1565.25	1436.15	553.08	9175.73	171	102	69.78	199	102	7.16	0.52
22.25	173.14	16.44	2.12	772.75	30.29	11.94	357.59	2405.99	1832.91	1787.83	1766.87	2267.46	2141.16	295.93	53.54	317.36	4682.52	1365.34	1890.37	1396.50	550.76	10256.39	192	122	69.42	178	122	8.60	0.63
18.39	231.12	19.89	2.53	981.72	29.47	11.94	350.37	2097.32	1600.11	1561.33	1542.91	1971.41	1870.08	296.48	38.57	369.82	5660.61	1514.71	2255.23	1350.73	547.53	11737.20	438	294	144.05	301	294	20.80	1.51
15.47	270.80	22.49	2.84	1124.03	28.84	11.94	343.71	1833.30	1400.75	1367.30	1351.06	1718.71	1637.83	296.48	28.37	379.32	6396.64	1518.62	2535.93	1315.11	544.75	12718.75	237	166	71.36	132	166	11.76	0.85
13.64	241.23	24.06	3.12	1007.55	28.29	11.94	337.59	1592.40	1218.34	1189.65	1175.43	1489.26	1425.16	296.48	21.72	293.91	6836.61	1184.31	2780.73	1283.99	542.21	12943.47	242	179	62.73	128	179	12.58	0.93
25.75	197.33	13.43	1.64	873.21	31.24	11.94	334.26	1461.46	1118.99	1092.84	1079.74	1364.98	1309.25	296.48	37.63	220.81	3814.54	942.83	1461.94	1414.63	540.83	8433.20	787	491	296.29	1062	491	35.10	2.45
28.08	150.33	11.32	1.41	701.75	31.71	11.94	334.82	1483.26	1135.54	1108.97	1095.68	1385.65	1328.56	296.48	41.65	170.71	3216.58	768.90	1255.75	1436.19	541.06	7430.84	277	166	111.02	462	166	11.84	0.84

Dirigo Laboratories, Inc.

Manufacturer:	**Stoll**
Model:	**High Valley**
Date:	**1/28/2013**
Run:	**2**
Control #:	**10**
Test Duration:	**200**
Output Category:	**2**

	HHV Basis	LHV Basis
Overall Efficiency	68.5%	74.0%
Combustion Efficiency	92.0%	92.0%
Heat Transfer Efficiency	74.5%	80.5%

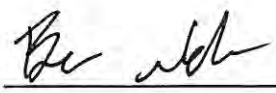
HHV Output Rate (kJ/h)	13,528	12,833	**(Btu/h)**
Burn Rate (kg/h)	1.00	2.20	**(lb/h)**
Input (kJ/h)	19,752	18,737	**(Btu/h)**

Test Load Weight (dry kg)	3.3	7.3	**dry lb**
MC wet (%)	17.70		
MC dry (%)	21.50		
Particulate (g)	13.26		
CO (g)	381		
Test Duration (h)	3.333333333		

Emissions	Particulate	CO
g/MJ Output	0.29	8.46
g/kg Dry Fuel	3.99	114.78
g/h	3.98	114.45
lb/MM Btu Output	0.68	19.66

Air/Fuel Ratio (A/F)	16.42

Test Results in Accordance with CSA B415.1-10

Technician: 

CBI

Default Fuel Values		
	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

CBI

CBI

PREBURN

JOB # 014-S-1-1
TECHNICIAI
DATE: 9_27_12
RUN #: 2
READING INTERVAL: 10
.
Run Time: 60

Model Designation HIGH VALLEY

	Tunnel Traverse Information								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	5.9	-0.086	203	163	264	558	300	297.6
10	4.9	-0.068	261	208	303	542	352	333.2
20	4.2	-0.063	297	244	315	538	346	348
30	3.3	-0.07	330	269	336	535	343	362.6
40	2.6	-0.061	370	312	365	526	349	384.4
50	2.2	-0.056	378	348	271	433	358	357.6
60	1.8	-0.05	385	353	241	385	382	349.2

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	13.15797 ft/sec.
Intial Tunnel Flow:	148.8183 scfm
Average Tunnel Flow:	148.1049 scfm

Notes:

CBI

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
			317.7143		299.2857			

CBI

Run #	2
Date:	9/27/12

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

Tunnel Velocity:	13.158	ft/sec.
Intial Tunnel Flow:	148.82	scfm
Average Tunnel Flow	148.1	scfm

SB1

JOB #	014-S-1-1																		
TECHNICIA	GEN							ROOM TEMP (F)											
DATE:	9_27_12							BAROMETRIC											
RUN #:	2																		
READING INTERVAL:	10																		
SAMPLE BOX :	A	METER Y FACTOR:		1.014								PROBE MATERIAL:							
FRONT FILTER #:	1485					REAR FILTER #:		REAR FILTER #:		1486									
FINAL LEAK RATE (CFM):	<0.01	@		10	IN-HG			FINAL LEAK RATE (CFM)		<0.01		@		10	IN-HG				

Run Time:	200			AMBIENT FILTER #:				VOLUME		LITERS		FUEL MOISTURE DB				21.5	%		
				FINAL LEAK RATE (CFM):				@		IN-HG									
TEST START TIME:										1		2		3		4		5	6
										TEMPERATURES									
	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL		FLUE		FILTER		FB REAR		FB	METER	AMBIENT
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP		TEMP		TEMP		TEMP		INT	TEMP	TEMP
0	0.000	0.000	0.039	0.06	-0.12		NA	8.9	0	68		269		72		238		6025.61	74	69
10	1.381	0.138	0.039	1.95	0	13.015	101	7.5	1.4	67		385		76		301		6025.06	76	68
20	2.766	0.139	0.039	1.96	-1.82	13.027	102	6.4	1.1	68		356		75		306		6024.83	78	68
30	4.149	0.138	0.039	1.95	-1.83	13.040	101	5.3	1.1	69		373		74		312		6024.76	81	69
40	5.536	0.139	0.039	1.94	0	13.040	101	3.9	1.4	69		472		76		228		6024.89	84	69
50	6.927	0.139	0.039	1.96	0	13.052	100	2.8	1.1	70		431		75		228		6025.09	87	71
60	8.324	0.140	0.039	1.94	0	13.052	100	2.1	0.7	70		373		75		231		6025.28	90	71
70	9.723	0.140	0.039	1.94	-1.93	13.052	100	1.6	0.5	70		335		75		234		6025.64	92	71
80	11.128	0.141	0.039	1.99	-1.83	13.052	100	1.3	0.3	70		293		75		235		6025.94	93	72
90	12.547	0.142	0.039	2	-2.01	13.064	101	1.2	0.1	71		266		74		235		6026.13	95	72
100	13.964	0.142	0.039	1.97	-0.18	13.064	101	1	0.2	71		247		74		228		6026.54	96	72
110	15.386	0.142	0.039	1.98	-2.14	13.064	101	0.9	0.1	71		227		74		218		6026.82	97	73
120	16.804	0.142	0.039	1.97	0	13.064	100	0.7	0.2	71		213		74		208		6027.21	98	73
130	18.227	0.142	0.039	1.97	-0.74	13.064	101	0.6	0.1	71		202		74		200		6027.45	99	73
140	19.646	0.142	0.039	2	0	13.077	100	0.5	0.1	72		194		74		194		6027.78	100	73
150	21.070	0.142	0.039	1.98	-1.78	13.077	100	0.5	0	72		184		75		194		6028.12	101	73
160	22.491	0.142	0.039	1.99	0	13.077	100	0.4	0.1	72		171		75		193		6028.45	101	74
170	23.918	0.143	0.039	1.96	-0.32	13.077	101	0.3	0.1	72		159		75		179		6028.79	101	74
180	25.340	0.142	0.039	1.97	-1.7	13.077	100	0.3	0	72		148		75		170		6029	102	74
190	26.768	0.143	0.039	1.96	-2	13.077	101	0.2	0.1	72		142		75		164		6029.22	102	74
200	28.190	0.142	0.039	1.96	-0.72	13.077	100	0	0.2	72		143		75		168		6029.41	102	74

TEST START TIME:										1	2	3	4	5	6	
										TEMPERATURES						
CBI FT	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP
	28.190		0.039	1.97		13.059	100.6			70	266				93	72

CBI

JOB #	014-S-1-1									
TECHNICIAN	GEN									
DATE:	9_27_12									
RUN #:	2									
READING INTERVAL:	10									
SAMPLE BOX :	B	METER Y FACTOR:		0.982		PROBE MATERIAL:		SS		
FRONT FILTER #:	1487				REAR FILTER #:	1488				
FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG	FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG	

Run Time: 200

Firebox Delta T 111.4

							1	2	3	4	5	6	
							TEMPERATURES						
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T
		0	NA	0	0	-1	386	354	73	344	387	75	342
10	1.363	0.136	102	-0.07	2.01	-1.07	372	331	76	535	375	76	383
20	2.724	0.136	102	-0.07	2.01	-1.26	356	314	75	507	367	79	370
30	4.085	0.136	101	-0.07	2	-1.18	351	306	74	551	357	82	375
40	5.447	0.136	101	-0.08	2	-1.31	348	327	76	690	347	85	388
50	6.806	0.136	100	-0.07	1.99	-1.58	363	351	76	671	346	88	392
60	8.169	0.136	100	-0.07	1.99	-1.68	382	380	75	576	351	90	384
70	9.533	0.136	100	-0.06	1.98	-1.21	399	401	76	514	357	92	381
80	10.912	0.138	100	-0.05	2.05	-1.19	408	408	75	447	363	94	372
90	12.307	0.140	101	-0.05	2.04	-1.12	407	402	75	396	369	96	362
100	13.700	0.139	101	-0.05	2.04	-1.7	401	392	75	355	377	97	351
110	15.093	0.139	101	-0.04	2.02	-1.34	389	376	75	322	377	97	336
120	16.486	0.139	100	-0.04	2.02	-1.17	373	361	75	296	368	99	321
130	17.882	0.140	101	-0.04	2.03	-1.27	355	344	74	276	360	99	307
140	19.279	0.140	101	-0.02	2.02	-1.32	341	326	75	260	351	100	294
150	20.676	0.140	101	-0.03	2.03	-1.62	330	311	75	246	344	100	285
160	22.073	0.140	100	-0.03	2.03	-1.73	319	299	75	233	334	101	276
170	23.469	0.140	100	-0.03	2.02	-1.11	301	285	75	215	318	101	260
180	24.867	0.140	100	-0.02	2.02	-1.33	283	272	75	196	301	102	244
190	26.266	0.140	100	-0.03	2.02	-1.43	270	267	75	186	282	102	234
200	27.664	0.140	100	-0.02	2	-1.07	257	276	75	187	264	102	230

							1	2	3	4	5	6											
							TEMPERATURES																
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T										
	27.664	0.138	100.619	-0.045	2.016	-1.318571	352	337	75	381	347	93	111										
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT										

230.4

CBI

JOB NUMBER 014-S-1-1

RUN # 2

DATE: 9_27_12

BURN RATE 1.00 KG/HR DRY

FILTER A PARTICULATE 7.7 mg

FILTER B PARTICULATE 7.8 mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	28.19		27.66	
Average Gas Velocity in Dilution Tunnel - vs	13.16	feet/second	13.16	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8886.29	dscf/hour	8886.29	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	27.51	dscf	26.13	dscf
Average Tunnel Temperature	70.5	F	70.5	F
Average Delta p	0.039		0.039	
Average Gas Meter Temperature	93	F	93	F
Average Delta H	1.97	in-h20	2.02	in-h20
Total Time of Test	200	min	200	min
Total Particulates	7.7	mg	7.8	mg
Particulate Concentration (dry-standard)	0.00028	grams/dscf	0.00030	grams/dscf
Particulate Emission Rate	2.49	grams/hour	2.65	grams/hour
Adjusted Emissions	3.88	grams/hour	4.09	grams/hour
AVERAGE ADJUSTED EMISSIONS		3.98	grams/hour	
% OF AVERAGE	97.3		102.7	

Run 3:

VERSION: 2.4 4/15/2010

lanufacturer: Stoll
Model: High Valley
Date: 1/28/2013
Run: 3
Control #: 10
est Duration: 140
urn Category 3

Appliance Type: Non-Cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Wood Moisture (% DRY):	20.5
Wood Moisture (% wet):	17.01
Load Weight (lb wet):	8.70
Burn Rate (dry kg/h):	1.40
Total Particulate Emissions:	5.99 g

Fuel Data

	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.90	
%Ash	0.50	

◉ Dougla
○ Oak

Averages		352.1	80.7	13.49	5.93	0.79
		Temp. (F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas	Room Temp	Flue Gas Composition (%) O2	CO2	CO
0	8.7	299.0	81.0	17.92	1.80	0.53
10	6.7	531.0	81.0	8.88	11.28	0.14
20	4.9	569.0	82.0	7.12	13.15	0.08
30	3.1	568.0	82.0	5.91	14.15	0.05
40	2.0	489.0	83.0	9.72	10.17	0.00
50	1.4	413.0	83.0	12.29	7.50	0.19
60	1.1	368.0	82.0	13.02	6.53	0.45
70	0.9	325.0	82.0	14.61	4.42	1.15
80	0.8	289.0	80.0	15.65	3.10	1.50
90	0.6	263.0	81.0	16.30	2.48	1.53
100	0.5	251.0	80.0	15.97	2.96	1.43
110	0.4	240.0	79.0	16.13	2.90	1.37
120	0.2	233.0	79.0	16.05	3.01	1.27
130	0.1	225.0	78.0	16.50	2.56	1.23
140	0.0	219.0	78.0	16.34	2.95	0.96

CBI

CBI

Manufacturer: Stoll
Model: High Valley
Date: 1/28/2013
Run: 3
Control #: 10
Test Duration: 140 min

	HHV	LHV
Eff	71.0%	76.7%
Comb Eff	96.5%	96.5%
HT Eff	73.5%	79.5%
Output	19,737	kJ/h
Burn Rate	1.40	kg/h
Grams CO	168	g
Input	27,812	kJ/h
MC wet	17.01	

Ultimate CO2
CO2-ult: 19.64
Fo
1.060

Overall Heating Efficiency: 71.0%
Combustion Efficiency: 96.5%
Heat Transfer Efficiency: 73.5%

Air Fuel Ratio (A/F)	
Dry Molecular Weight (Md)	29.52
Dry Moles Exhaust Gas (Nr):	528.43
Air Fuel Ratio (A/F)	15.09

%HC: 1.32

Heat Output: 18,722 Btu/h 19,737 kJ/h
Heat Input: 26,382 Btu/h 27,812 kJ/h
Burn Duration: 2.333333333 h
Burn Rate: 3.1 lb/h 1.4 kg/h
Stack Temp: 355.9 Deg. F 180.0 Deg. C

Combustion Efficiency: 96.5%
Total Input (kJ): 64,894 61,549 (Btu)
Total Output (kJ) 46,052 43,678 (Btu)
Efficiency: 71.0%
Total CO (g): 167.64

Moisture of Wood (wet basis)
Initial Dry Weight Wtdo (kg).
Moisture Content Dry

Load Weight (kg). 3.95
Fuel Heating: HHV LHV
Value in kJ/kg - CV 19810.00 18328.69 Btu/lb

Averages	0.79	5.93	279.2%	20.50	14.17	177.9	27.1	85.7%	69.9%	60.3%	22.1	0.95	75.94	0.01	75.94	65267	4.06	6.87	2.74	19810.00	17.01	79.11	20.98	1.68	5.58	0.09	0.17

INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry	Fuel Properties						Mass Balance (moles/100 mole dry flue gas)					kg Wood per
Elapsed Time	Weight Remaining (kg)	% CO [a]	% CO2 [d]	Excess Air EA	Total O2	Calc. % O2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x	Now Wtdn	Consumed y	Total Input	Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value	Moisture Fuel Burnt	[h]	[o]	[w]	[j]	[k]	100 mole dfp Nk
0	3.95	0.53	1.80	743.0%	20.79	18.72	148.3	27.2	83.4%	50.2%	41.8%	49.5	3.95	0.00	3.28	0.00	0	4.06	6.87	2.74	19810.00	17.01	78.95	20.94	0.59	1.92	0.05	0.06
10	3.04	0.14	11.28	72.0%	20.19	8.84	277.2	27.2	99.2%	73.7%	73.1%	10.4	3.04	22.99	2.52	22.99	21631	4.06	6.87	2.74	19810.00	17.01	79.74	21.13	2.81	9.65	0.01	0.28
20	2.22	0.08	13.15	48.5%	20.07	6.88	298.3	27.8	99.6%	74.4%	74.1%	9.0	2.22	43.68	1.85	43.68	13426	4.06	6.87	2.74	19810.00	17.01	79.89	21.19	3.26	11.19	0.00	0.32
30	1.41	0.05	14.15	38.3%	20.00	5.83	297.8	27.8	99.8%	75.3%	75.2%	8.4	1.41	64.37	1.17	64.37	10816	4.06	6.87	2.74	19810.00	17.01	79.97	21.21	3.50	12.01	0.00	0.35
40	0.91	0.00	10.17	93.1%	20.27	10.10	253.9	28.3	100.3%	74.0%	74.2%	11.7	0.91	77.01	0.75	77.01	6340	4.06	6.87	2.74	19810.00	17.01	79.73	21.15	2.50	8.62	-0.02	0.25
50	0.64	0.19	7.50	155.4%	20.43	12.84	211.7	28.3	98.4%	73.1%	72.0%	15.4	0.64	83.91	0.53	83.91	3357	4.06	6.87	2.74	19810.00	17.01	79.47	21.08	1.90	6.50	0.01	0.19
60	0.50	0.45	6.53	181.4%	20.48	13.72	186.7	27.8	95.1%	73.4%	69.8%	16.8	0.50	87.36	0.41	87.36	1865	4.06	6.87	2.74	19810.00	17.01	79.30	21.03	1.73	5.85	0.04	0.17
70	0.41	1.15	4.42	252.7%	20.57	15.58	162.8	27.8	83.7%	69.9%	58.5%	20.6	0.41	89.66	0.34	89.66	1119	4.06	6.87	2.74	19810.00	17.01	78.85	20.92	1.41	4.55	0.14	0.14
80	0.36	1.50	3.10	327.0%	20.64	16.79	142.8	26.7	74.4%	66.3%	49.4%	24.4	0.36	90.80	0.30	90.80	1119	4.06	6.87	2.74	19810.00	17.01	78.61	20.85	1.18	3.67	0.19	0.12
90	0.27	1.53	2.48	389.9%	20.68	17.43	128.3	27.2	70.3%	64.9%	45.6%	27.8	0.27	93.10	0.23	93.10	1119	4.06	6.87	2.74	19810.00	17.01	78.56	20.84	1.04	3.17	0.19	0.10
100	0.23	1.43	2.96	347.4%	20.65	16.98	121.7	26.7	74.5%	69.4%	51.7%	25.6	0.23	94.25	0.19	94.25	746	4.06	6.87	2.74	19810.00	17.01	78.63	20.86	1.13	3.50	0.18	0.11
110	0.18	1.37	2.90	360.0%	20.66	17.07	115.6	26.1	74.9%	70.2%	52.6%	26.4	0.18	95.40	0.15	95.40	1119	4.06	6.87	2.74	19810.00	17.01	78.66	20.86	1.09	3.41	0.17	0.11
120	0.09	1.27	3.01	358.9%	20.66	17.01	111.7	26.1	76.8%	71.6%	55.0%	26.4	0.09	97.70	0.08	97.70	1119	4.06	6.87	2.74	19810.00	17.01	78.71	20.88	1.09	3.44	0.16	0.11
130	0.05	1.23	2.56	418.3%	20.69	17.51	107.2	25.6	74.8%	69.8%	52.2%	29.7	0.05	98.85	0.04	98.85	1119	4.06	6.87	2.74	19810.00	17.01	78.70	20.87	0.97	3.03	0.15	0.10
140	0.00	0.96	2.95	402.4%	20.68	17.25	103.9	25.6	81.0%	72.8%	58.9%	29.2	0.00	100.00	0.00	100.00	373	4.06	6.87	2.74	19810.00	17.01	78.84	20.91	0.99	3.18	0.11	0.10
0															0.00													

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	Moisture Content MCwb	17.01	
17.01		Dry kg :	3.28
3.28		CA	48.73
20.50		HV	6.87
		OX	43.90

HHV	LHV
8522.48	7885.21

															SUMS							AVERAGE	SUMS						
32.68	121.61	7.26	0.86	605.21	32.80	11.39	451.00	6166.37	4569.56	4426.10	4380.71	6091.71	5290.98	300.22	3279.14	6328.88	31161.83	33008.01	11575.93	24280.13	8415.31	7869.95	18842	2255	16587.17	46425	2255	167.64	10.08
Moles per kg of Dry Wood						Moisture	Stack Temp	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp	Energy Losses (kJ/kg of Dry Fuel) Flue Gas Constituent							Total Loss	Total	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced	
CO2	O2	CO	HC	N2	H2O	Present	K	CO2	O2	CO	N2	CH4	H2O	K	CO2	O2	CO	N2	CH4	H2O Comb	H2O Fuel MC	Rate	Loss					CO	HC
30.90	321.42	9.10	0.81	1355.45	32.90	11.39	421.48	4845.28	3637.01	3534.41	3495.72	4684.94	4228.75	300.37	149.74	1169.00	2606.88	4738.28	724.19	1585.90	548.92	11522.90	0	0	0.00	0	0	0.00	0.00
40.29	31.56	0.50	0.02	284.83	34.48	11.39	550.37	10468.95	7652.59	7386.02	7315.83	10572.96	8820.91	300.37	421.80	241.52	145.21	2083.78	19.92	1820.11	601.22	5333.56	5824	176	5647.91	15807	176	15.29	0.39
40.56	21.21	0.25	0.00	246.45	34.52	11.39	571.48	11414.73	8308.18	8009.73	7935.52	11606.43	9562.89	300.93	463.02	176.23	71.81	1955.69	1.66	1847.86	609.67	5125.96	3474	48	3425.71	9952	48	4.68	0.02
40.67	16.75	0.14	-0.01	229.88	34.53	11.39	570.93	11389.11	8290.44	7992.86	7918.76	11578.40	9542.82	300.93	463.25	138.87	41.82	1820.40	-5.41	1848.01	609.45	4916.39	2684	19	2664.91	8131	19	2.20	-0.05
40.88	40.59	0.00	-0.07	320.48	34.65	11.39	527.04	9372.64	6881.78	6649.80	6584.96	9398.81	7944.13	301.48	383.13	279.33	0.00	2110.32	-58.74	1798.96	591.24	5104.24	1634	-19	1652.23	4707	-19	0.00	-0.33
39.77	68.07	1.01	0.04	421.39	34.45	11.39	484.82	7505.91	5558.73	5383.33	5328.31	7422.69	6434.99	301.48	298.49	378.37	290.52	2245.31	33.52	1736.31	574.05	5556.58	942	54	887.56	2415	54	4.78	0.10
37.94	79.75	2.61	0.25	460.77	34.02	11.39	459.82	6446.25	4799.29	4654.19	4605.28	6319.30	5565.42	300.93	244.60	382.74	752.16	2122.00	226.68	1685.01	564.15	5977.33	563	91	471.82	1302	91	6.89	0.38
31.58	111.29	8.22	1.02	563.35	32.49	11.39	435.93	5430.29	4063.21	3945.40	3902.88	5278.90	4719.47	300.93	171.48	452.19	2357.47	2198.69	912.07	1581.67	554.51	8228.08	465	183	282.19	654	183	12.99	0.92
26.40	142.98	12.78	1.63	669.59	31.26	11.39	415.93	4634.96	3483.66	3386.51	3349.20	4471.65	4052.15	299.82	122.38	498.08	3658.82	2242.58	1460.32	1501.04	546.91	10030.13	566	286	280.23	552	286	20.20	1.48
24.07	169.17	14.85	1.89	762.48	30.74	11.39	401.48	4015.82	3027.30	2945.08	2912.18	3854.65	3524.66	300.37	96.66	512.14	4246.11	2220.47	1691.87	1459.85	540.90	10768.01	608	332	275.68	511	332	23.48	1.71
26.43	151.56	12.77	1.62	702.07	31.29	11.39	394.82	3763.16	2841.25	2765.16	2734.04	3602.47	3309.68	299.82	99.45	430.62	3648.40	1919.50	1445.43	1479.26	538.46	9561.12	360	190	169.76	386	190	13.46	0.97
26.64	156.86	12.59	1.58	722.65	31.36	11.39	388.71	3534.44	2672.41	2601.79	2572.31	3375.10	3114.43	299.26	94.17	419.18	3594.69	1858.88	1413.91	1476.44	536.23	9393.49	531	281	249.81	588	281	19.90	1.43
27.68	156.46	11.68	1.45	723.84	31.62	11.39	384.82	3375.95	2554.72	2487.73	2459.43	3219.04	2978.07	299.26	93.45	399.70	3334.34	1780.25	1296.12	1484.51	534.68	8923.06	504	260	244.35	615	260	18.47	1.31
26.51	181.37	12.74	1.56	814.93	31.39	11.39	380.37	3216.57	2436.76	2373.51	2346.38	3061.29	2841.54	298.71	85.27	441.97	3634.80	1912.14	1397.79	1469.52	533.12	9474.61	535	282	252.86	584	282	20.14	1.41
29.93	175.05	9.74	1.14	799.96	32.25	11.39	377.04	3081.50	2336.12	2275.90	2249.80	2929.03	2724.81	298.71	92.24	408.94	2778.79	1799.74	1016.59	1505.69	531.79	8133.79	153	71	82.16	220	71	5.13	0.34

Dirigo Laboratories, Inc.

Manufacturer:	**Stoll**
Model:	**High Valley**
Date:	**1/28/2013**
Run:	**3**
Control #:	**10**
Test Duration:	**140**
Output Category:	**3**

	HHV Basis	LHV Basis
Overall Efficiency	71.0%	76.7%
Combustion Efficiency	96.5%	96.5%
Heat Transfer Efficiency	73.5%	79.5%

HHV Output Rate (kJ/h)	19,737	18,722	**(Btu/h)**
Burn Rate (kg/h)	1.40	3.09	**(lb/h)**
Input (kJ/h)	27,812	26,382	**(Btu/h)**

Test Load Weight (dry kg)	3.3	7.2	**dry lb**
MC wet (%)	17.01		
MC dry (%)	20.50		
Particulate (g)	5.99		
CO (g)	168		
Test Duration (h)	2.333333333		

Emissions	Particulate	CO
g/MJ Output	0.13	3.64
g/kg Dry Fuel	1.83	51.17
g/h	2.57	71.84
lb/MM Btu Output	0.30	8.46

Air/Fuel Ratio (A/F)	15.09

Test Results in Accordance with CSA B415.1-10

Technician: 

CBI

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

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PREBURN

JOB # 014-S-1-1
TECHNICIAI
DATE: 9_27_12
RUN #: 3
READING INTERVAL: 10
.
Run Time: 80

Model Designation HIGH VALLEY

	Tunnel Traverse Information								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	7.4	-0.076	245	298	185	579	403	342
10	6.3	-0.077	261	341	189	537	435	352.6
20	5.2	-0.066	277	373	197	565	424	367.2
30	4.4	-0.064	297	400	208	545	407	371.4
40	3.8	-0.06	322	417	220	490	403	370.4
50	3.2	-0.071	337	419	229	451	415	370.2
60	2.8	-0.051	361	423	238	430	431	376.6
70	2.4	-0.065	365	416	231	413	441	373.2
80	2.1	-0.052	370	403	230	380	456	367.8

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	13.24685 ft/sec.
Intial Tunnel Flow:	148.8183 scfm
Average Tunnel Flow:	147.1112 scfm

Notes:

CBI

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
			315		214.1111			

CBI

Run #	3
Date:	9/27/12

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

Tunnel Velocity:	13.247	ft/sec.
Intial Tunnel Flow:	148.82	scfm
Average Tunnel Flow	147.11	scfm

JOB #	014-S-1-1																	
TECHNICIA	BTN						ROOM TEMP (F)	78.0				BEG	MID	END	AVG			
DATE	9_27_12						BAROMETRIC					30	30	30	30			
RUN #:	3																	
READING INTERVAL:	10																	
SAMPLE BOX :	A	METER Y FACTOR:	1.014						PROBE MATERIAL:			SS						
FRONT FILTER #:	1489				REAR FILTER #	REAR FILTER #:	1490											
FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG		FINAL LEAK RATE (CFM)	<0.01	@	10	IN-HG								
Run Time:	140		AMBIENT FILTER #:			VOLUME		LITERS	FUEL MOISTURE DB			20.5	%					
			FINAL LEAK RATE (CFM).			@		IN-HG										
TEST START TIME:									1	2	3	4	5	6				
									TEMPERATURES									
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP		
0	0.000	0.000	0.039	0.06	-0.06		NA	8.7	0	76	299	76	252	6033.95	87	81		
10	1.399	0.140	0.039	1.95	-0.07	13.150	102	6.7	2	78	531	87	306	6034.44	87	81		
20	2.793	0.139	0.039	1.95	-2.23	13.150	101	4.9	1.8	78	569	88	333	6034.94	89	82		
30	4.183	0.139	0.039	2	-0.25	13.162	100	3.1	1.8	79	568	84	266	6035.33	92	82		
40	5.600	0.142	0.039	1.97	0	13.162	102	2	1.1	79	489	82	270	6036	95	83		
50	7.015	0.142	0.039	1.97	-1.01	13.162	101	1.4	0.6	79	413	81	278	6036.24	98	83		
60	8.439	0.142	0.039	1.97	-1.47	13.162	101	1.1	0.3	79	368	81	275	6036.62	100	82		
70	9.861	0.142	0.039	1.98	0	13.162	100	0.9	0.2	79	325	80	271	6036.87	103	82		
80	11.287	0.143	0.039	1.97	-0.78	13.150	100	0.8	0.1	78	289	80	255	6036.77	104	80		
90	12.714	0.143	0.039	1.96	-1.79	13.150	100	0.6	0.2	78	263	80	242	6036.64	105	81		
100	14.145	0.143	0.039	1.96	-0.77	13.126	100	0.5	0.1	76	251	80	228	6036.55	106	80		
110	15.577	0.143	0.039	1.99	-2.31	13.138	100	0.4	0.1	77	240	79	220	6036.36	107	79		
120	17.006	0.143	0.039	1.97	0	13.138	100	0.2	0.2	77	233	79	217	6036.2	108	79		
130	18.441	0.144	0.039	1.98	-0.23	13.126	100	0.1	0.1	76	225	79	213	6036.23	108	78		
140	19.876	0.144	0.039	1.97	-2.2	13.126	100	0	0.1	76	219	78	217	6035.83	108	78		

TEST START TIME:										1	2	3	4	5	6	
										TEMPERATURES						
CBI	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP
	19.876		0.039	1.97		13.147	100.6			78	352				100	81

JOB #	014-S-1-1
TECHNICIAN	BTN
DATE:	9_27_12
RUN #:	3

READING INTERVAL:	10								
SAMPLE BOX :	B	METER Y FACTOR:		0.982		PROBE MATERIAL:		SS	
FRONT FILTER #:	1491				REAR FILTER #:	1492			
FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG	FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG

Run Time: 140 Firebox Delta T 67.4

							1	2	3	4	5	6	
							TEMPERATURES						
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T
0	0	0	NA	0	0	-1	373	398	77	352	462	87	367
10	1.377	0.138	102	-0.08	2	-1.53	375	381	87	673	454	87	438
20	2.739	0.136	100	-0.09	1.96	-1.27	381	384	89	774	448	90	464
30	4.097	0.136	100	-0.09	2.01	-1.48	393	415	84	801	447	93	464
40	5.476	0.138	101	-0.08	1.97	-1.51	424	449	82	712	449	96	461
50	6.855	0.138	100	-0.07	1.99	-1.44	449	476	80	582	452	99	447
60	8.238	0.138	100	-0.06	1.98	-1.88	456	478	80	501	448	101	432
70	9.624	0.139	100	-0.05	1.98	-1.29	455	469	80	433	444	103	414
80	11.024	0.140	101	-0.05	2.03	-1.2	441	446	79	373	435	104	390
90	12.434	0.141	101	-0.05	2.03	-1.58	419	416	78	332	423	105	366
100	13.842	0.141	101	-0.05	2.02	-1.3	398	387	78	305	414	107	346
110	15.251	0.141	101	-0.04	2.03	-1.48	381	364	78	287	404	107	331
120	16.662	0.141	101	-0.04	2.05	-1.31	368	345	78	274	389	108	319
130	18.074	0.141	101	-0.04	2.02	-1.85	356	331	78	264	375	108	308
140	19.484	0.141	101	-0.04	2.04	-1.75	350	318	78	255	360	108	300

							1	2	3	4	5	6											
							TEMPERATURES																
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T										
	19.484	0.139	100.609	-0.055	2.007857	-1.458	401	404	80	461	427	100	67										
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT										

300

CBI

JOB NUMBER: 014-S-1-1

RUN #: 3

DATE: 9_27_12

BURN RATE: 1.40 KG/HR DRY

FILTER A PARTICULATE: 3.2 mg

FILTER B PARTICULATE: 3.2 mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	19.88		19.48	
Average Gas Velocity in Dilution Tunnel - vs	13.25	feet/second	13.25	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8826.67	dscf/hour	8826.67	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	19.15	dscf	18.17	dscf
Average Tunnel Temperature	77.7	F	77.7	F
Average Delta p	0.039		0.039	
Average Gas Meter Temperature	100	F	100	F
Average Delta H	1.97	in-h20	2.01	in-h20
Total Time of Test	140	min	140	min
Total Particulates	3.2	mg	3.2	mg
Particulate Concentration (dry-standard)	0.00017	grams/dscf	0.00018	grams/dscf
Particulate Emission Rate	1.47	grams/hour	1.55	grams/hour
Adjusted Emissions	2.51	grams/hour	2.62	grams/hour
AVERAGE ADJUSTED EMISSIONS		2.57	grams/hour	
% OF AVERAGE	97.8		102.2	

Run 4:

VERSION: 2.4 4/15/2010

lanufacturer: Stoll
Model: High Valley
Date: 1/28/2013
Run: 4
Control #: 10
est Duration: 80
urn Category 4

Appliance Type: Non-Cat (Cat, Non-Cat, Pellet)

Temp. Units F (F or C)
Weight Units lb (kg or lb)

Wood Moisture (% DRY):	23
Wood Moisture (% wet):	18.70
Load Weight (lb wet):	8.60
Burn Rate (dry kg/h):	2.38
Total Particulate Emissions:	3.21 g

Fuel Data	D. Fir	
HHV	19,810	kJ/kg
%C	48.73	
%H	6.87	
%O	43.90	
%Ash	0.50	

Dougla
Oak

Averages		531.1	75.2	13.04	6.83	0.34
		Temp. (F)				
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas	Room Temp	Flue Gas Composition (%) O2	CO2	CO
0	8.6	335.0	76.0	18.71	1.13	0.47
10	7.3	594.0	76.0	11.40	8.63	0.11
20	5.0	697.0	75.0	8.19	11.93	0.02
30	2.9	692.0	76.0	7.04	12.87	0.01
40	1.7	611.0	76.0	10.77	9.30	0.00
50	0.9	545.0	75.0	13.06	7.01	0.11
60	0.5	480.0	75.0	15.32	4.46	0.55
70	0.3	431.0	74.0	16.16	3.42	0.79
80	0.0	395.0	74.0	16.73	2.73	0.96

CBI

CBI

Manufacturer:	Stoll
Model:	High Valley
Date:	1/28/2013
Run:	4
Control #:	10
Test Duration:	80 min

	HHV	LHV
Eff	64.5%	69.7%
Comb Eff	98.5%	98.5%
HT Eff	65.5%	70.8%
Output	30,409	kJ/h
Burn Rate	2.38	kg/h
Grams CO	80	g
Input	47,133	kJ/h
MC wet	18.70	

Overall Heating Efficiency: 64.5%
Combustion Efficiency: 98.5%
Heat Transfer Efficiency: 65.5%

Air Fuel Ratio (A/F)	
Dry Molecular Weight (Md)	29.63
Dry Moles Exhaust Gas (Nr).	500.79
Air Fuel Ratio (A/F)	14.33

%HC 1.32

Heat Output: 28,846 Btu/h 30,409 kJ/h
Heat Input 44,711 Btu/h 47,133 kJ/h

CO2-ult: Ultimate CO2 19.64; Fo 1.060

Burn Duration: 1.333333333 h

Burn Rate: 5.2 lb/h 2.4 kg/h

Stack Temp: 555.6 Deg. F 290.9 Deg. C

Combustion Efficiency: 98.5%
Total Input (kJ): 62,844 59,605 (Btu)
Total Output (kJ): 40,546 38,456 (Btu)
Efficiency: 64.5%
Total CO (g): 79.70

Moisture of Wood (wet basis):
Initial Dry Weight Wtdo (kg)
Moisture Content Dry

Load Weight (kg): 3.90
Fuel Heating: HHV LHV
Value in kJ/kg - CV: 19810.00 18328.69 Btu/lb

	Averages	0.34	6.83	805.3%	20.47	13.47	277.3	24.0	92.8%	57.0%	54.0%	23.9	1.37	64.86	0.01	64.86	63940	4.06	6.87	2.74	19810.00	18.70	79.37	21.05	1.77	6.03	0.03	0.18

INPUT DATA				Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet	Dry Wt.	% Dry	Fuel Properties						Mw	Mass Balance (moles/100 mole dry flue gas)					kg Wood per
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO2 [d]	Excess Air EA	Total O2	Calc. % O2 [g]	Flue Gas (°C)	Room Temp (°C)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x	Now Wtdn	Consumed y	Total Input	Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value	Moisture Fuel Burnt	[h]	[u]	[w]	[j]	[k]	100 mole dfp Nk
0	3.90	0.47	1.13	1127.7%	20.83	19.47	188.3	24.4	79.1%	18.7%	14.8%	71.8	3.90	0.00	3.17	0.00	0	4.06	6.87	2.74	19810.00	18.70	78.93	20.94	0.40	1.31	0.04	0.04
10	3.31	0.11	8.63	124.7%	20.36	11.68	312.2	24.4	99.3%	66.0%	65.6%	13.6	3.31	15.12	2.69	15.12	17903	4.06	6.87	2.74	19810.00	18.70	79.58	21.11	2.15	7.40	0.00	0.21
20	2.27	0.02	11.93	64.4%	20.15	8.21	369.4	23.9	100.1%	67.9%	68.0%	10.0	2.27	41.86	1.84	41.86	16076	4.06	6.87	2.74	19810.00	18.70	79.84	21.18	2.94	10.12	-0.01	0.29
30	1.32	0.01	12.87	52.5%	20.09	7.21	366.7	24.4	100.1%	69.4%	69.5%	9.2	1.32	66.28	1.07	66.28	12057	4.06	6.87	2.74	19810.00	18.70	79.91	21.20	3.17	10.91	-0.01	0.32
40	0.77	0.00	9.30	111.2%	20.33	11.03	321.7	24.4	100.4%	66.8%	67.0%	12.8	0.77	80.23	0.63	80.23	7307	4.06	6.87	2.74	19810.00	18.70	79.67	21.13	2.29	7.89	-0.02	0.23
50	0.41	0.11	7.01	175.9%	20.47	13.40	285.0	23.9	99.2%	64.1%	63.6%	16.6	0.41	89.53	0.33	89.53	4384	4.06	6.87	2.74	19810.00	18.70	79.48	21.08	1.75	6.03	-0.01	0.17
60	0.23	0.55	4.46	292.1%	20.61	15.87	248.9	23.9	91.7%	56.9%	52.1%	23.3	0.23	94.19	0.18	94.19	2192	4.06	6.87	2.74	19810.00	18.70	79.12	20.99	1.25	4.17	0.05	0.12
70	0.14	0.79	3.42	366.6%	20.66	16.85	221.7	23.3	85.5%	53.2%	45.5%	27.4	0.14	96.51	0.11	96.51	2923	4.06	6.87	2.74	19810.00	18.70	78.94	20.94	1.06	3.46	0.09	0.11
80	0.00	0.96	2.73	432.3%	20.70	17.49	201.7	23.3	79.9%	49.9%	39.9%	30.9	0.00	100.00	0.00	100.00	1096	4.06	6.87	2.74	19810.00	18.70	78.82	20.91	0.94	2.99	0.11	0.09
0															0.00													

CBI

	Moisture Content MCwb:	18.70	
18.70	Dry kg	3.17	
3.17	CA:	48.73	
23.00	HY:	6.87	
	OX:	43.90	

HHV	LHV
8522.48	7885.21

															SUMS							AVERAGE	SUMS						
36.54	132.42	3.91	0.36	656.13	33.81	12.78	550.43	10660.80	7769.75	7493.27	7423.29	10817.23	8947.12	297.16	3633.64	7040.01	10147.47	36105.87	2882.72	16119.81	6085.40	9112.77	22299	933	21365.92	41642	933	79.70	2.29
Moles per kg of Dry Wood						Moisture	Stack Temp	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp	Energy Losses (kJ/kg of Dry Fuel) Flue Gas Constituent							Total Loss							
CO2	O2	CO	HC	N2	H2O	Present	K	CO2	O2	CO	N2	CH4	H2O	K	CO2	O2	CO	N2	CH4	H2O Comb	H2O Fuel MC	Rate	Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced CO	Grams Produced HC
28.17	485.34	11.72	0.93	1967.61	32.67	12.78	441.48	5792.48	4332.19	4206.08	4160.86	5635.43	5031.13	297.59	163.17	2102.58	3364.39	8188.95	830.42	1600.76	626.12	16874.38	0	0	0.00	0	0	0.00	0.00
40.31	54.55	0.51	-0.01	371.73	34.55	12.78	585.37	12185.38	8850.71	8528.09	8450.08	12430.29	10180.27	297.59	491.21	482.79	149.79	3141.18	-11.61	1870.77	691.91	6816.05	6160	121	6038.95	11743	121	13.00	-0.19
40.78	28.07	0.07	-0.04	272.91	34.59	12.78	642.59	14915.80	10715.80	10295.13	10207.32	15474.23	12279.99	297.04	608.25	300.76	20.05	2785.64	-31.87	1945.82	718.74	6347.40	5151	-10	5160.84	10925	-10	1.55	-0.46
40.81	22.88	0.03	-0.03	253.39	34.59	12.78	639.82	14760.89	10609.01	10193.69	10106.50	15303.67	12159.37	297.59	602.43	242.72	9.30	2560.92	-29.14	1941.31	717.20	6044.74	3679	-12	3691.10	8378	-12	0.54	-0.31
40.89	48.48	0.00	-0.08	350.31	34.88	12.78	594.82	12625.99	9153.81	8815.83	8736.10	12916.84	10522.37	297.59	516.28	443.77	0.00	3060.36	-70.44	1889.68	696.28	6535.94	2411	-26	2436.58	4897	-26	0.00	-0.46
40.21	76.90	0.63	-0.09	455.91	34.59	12.78	558.15	10951.06	7997.92	7717.54	7644.57	11075.36	9216.25	297.04	440.38	615.02	183.44	3485.25	-28.60	1839.47	679.59	7214.56	1597	33	1563.51	2788	33	3.91	-0.11
35.94	127.92	4.43	0.44	637.54	33.64	12.78	522.04	9318.74	6855.27	6627.47	6562.16	9316.17	7918.51	297.04	334.92	876.92	1283.62	4183.64	395.99	1745.61	663.01	9483.70	1050	182	867.33	1143	182	13.73	0.78
32.47	159.97	7.50	0.84	749.61	32.85	12.78	494.82	8134.41	6018.00	5826.57	5767.34	8057.77	6964.32	296.48	264.16	962.71	2166.58	4323.24	751.00	1673.18	650.82	10791.70	1592	423	1169.28	1331	423	30.99	1.97
29.31	187.72	10.31	1.20	846.17	32.12	12.78	474.82	7262.42	5395.09	5229.03	5174.70	7145.35	6251.87	296.48	212.84	1012.75	2970.30	4378.69	1076.96	1613.20	641.72	11906.46	659	220	438.32	437	220	15.97	1.06

Dirigo Laboratories, Inc.

Manufacturer:	Stoll
Model:	High Valley
Date:	1/28/2013
Run:	4
Control #:	10
Test Duration:	80
Output Category:	4

	HHV Basis	LHV Basis	
Overall Efficiency	64.5%	69.7%	
Combustion Efficiency	98.5%	98.5%	
Heat Transfer Efficiency	65.5%	70.8%	
HHV Output Rate (kJ/h)	30,409	28,846	(Btu/h)
Burn Rate (kg/h)	2.38	5.24	(lb/h)
Input (kJ/h)	47,133	44,711	(Btu/h)
Test Load Weight (dry kg)	3.2	7.0	dry lb
MC wet (%)	18.70		
MC dry (%)	23.00		
Particulate (g)	3.21		
CO (g)	80		
Test Duration (h)	1.333333333		

Emissions	Particulate	CO
g/MJ Output	0.08	1.97
g/kg Dry Fuel	1.01	25.12
g/h	2.41	59.77
lb/MM Btu Output	0.18	4.57

Air/Fuel Ratio (A/F)	14.33

Test Results in Accordance with CSA B415.1-10

Technician: _____

CBI

Default Fuel Values

	D. Fir	Oak
HHV (kJ/kg)	19,810	19,887
%C	48.73	50
%H	6.87	6.6
%O	43.9	42.9
%Ash	0.5	0.5

CBI

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PREBURN

JOB # 014-S-1-1
TECHNICIAI
DATE: 9_27_12
RUN #: 4
READING INTERVAL: 10

Model Designation HIGH VALLEY

	Tunnel Traverse Information								
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

Run Time: 80

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	10.5	-0.091	315	281	200	244	323	272.6
10	7.4	-0.101	300	286	195	753	368	380.4
20	4.8	-0.099	330	327	215	853	486	442.2
30	2.9	-0.09	390	400	245	781	546	472.4
40	6.5	-0.106	444	444	265	956	526	527
50	4.3	-0.095	502	462	290	920	524	539.6
60	2.9	-0.092	532	505	301	798	519	531
70	2.3	-0.07	542	519	324	578	498	492.2
80	2.1	-0.065	509	494	294	444	465	441.2

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Tunnel Velocity:	13.19199 ft/sec.
Intial Tunnel Flow:	148.8183 scfm
Average Tunnel Flow:	147.723 scfm

Notes:

CBI

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
			429.3333		258.7778			

CBI

Run #	4
Date:	9/27/12

Dilution Tunnel MW(dry):	29.00	lb/lb-mole
Dilution Tunnel MW(wet):	28.56	lb/lb-mole
Dilution Tunnel H2O:	4.00	%
Dilution Tunnel Static:	-0.400	In H20
Tunnel Area:	0.196	ft^2
Pitot Tube Cp:	0.99	

Dilution Tunnel Traverse Data									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.042	0.040	0.036	0.040	0.036	0.041	0.042	0.038	0.039
Temperature	70	70	70	70	70	70	70	70	70.000

Tunnel Velocity:	13.192	ft/sec.
Intial Tunnel Flow:	148.82	scfm
Average Tunnel Flow	147.72	scfm

JOB #:	014-S-1-1							ROOM TEMP (F)	74.0				BEG	MID	END	AVG		
TECHNICIA	BTN							BAROMETRIC					30	30	30	30		
DATE:	9_27_12																	
RUN #:	4																	
READING INTERVAL:	10																	
SAMPLE BOX :	A	METER Y FACTOR:		1.014						PROBE MATERIAL:			SS					
FRONT FILTER #:	1493				REAR FILTER #	REAR FILTER #:	1494											
FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG		FINAL LEAK RATE (CFM)	<0.01	@	10	IN-HG								
Run Time:	80		AMBIENT FILTER #:				VOLUME		LITERS	FUEL MOISTURE DB			23	%				
			FINAL LEAK RATE (CFM):				@		IN-HG									
TEST START TIME:										1	2	3	4	5	6			
										TEMPERATURES								
	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL	FLUE	FILTER	FB REAR	FB	METER	AMBIENT		
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP	TEMP	TEMP	TEMP	INT	TEMP	TEMP		
0	0.000	0.000	0.039	0.06	-0.04		NA	8.6	0	74	335	76	276	6034.17	91	76		
10	1.416	0.142	0.039	1.99	-1.1	13.101	102	7.3	1.3	74	594	82	233	6033.89	90	76		
20	2.828	0.141	0.039	1.98	-1.34	13.101	101	5	2.3	74	697	83	214	6033.68	91	75		
30	4.234	0.141	0.039	1.97	-2	13.101	100	2.9	2.1	74	692	83	226	6033.63	93	76		
40	5.646	0.141	0.039	2	-1.46	13.089	100	1.7	1.2	73	611	80	243	6033.46	96	76		
50	7.070	0.142	0.039	2	-1.8	13.089	101	0.9	0.8	73	545	79	258	6033.14	98	75		
60	8.498	0.143	0.039	2	-0.04	13.077	101	0.5	0.4	72	480	79	272	6032.95	99	75		
70	9.926	0.143	0.039	1.99	0	13.089	100	0.3	0.2	73	431	78	272	6032.7	101	74		
80	11.359	0.143	0.039	1.99	-0.88	13.077	100	0	0.3	72	395	78	267	6032.38	102	74		

TEST START TIME:										1	2	3	4	5	6		
										TEMPERATURES							
FT	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	TUNNEL TEMP	FLUE TEMP	FILTER TEMP	FB REAR TEMP	FB INT	METER TEMP	AMBIENT TEMP	
	11.359		0.039	1.99		13.090	100.7			73	531				96	75	

CBI

JOB #	014-S-1-1
TECHNICIAN	BTN
DATE	9_27_12
RUN #:	4

READING INTERVAL:	10								
SAMPLE BOX :	B	METER Y FACTOR:		0.982		PROBE MATERIAL:		SS	
FRONT FILTER #:	1495				REAR FILTER #:	1496			
FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG	FINAL LEAK RATE (CFM):	<0.01	@	10	IN-HG

Run Time: 80 Firebox Delta T 12.4

							1	2	3	4	5	6	
							TEMPERATURES						
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T
0	0	0	NA	0	0	-1	481	469	78	386	445	90	411
10	1.393	0.139	102	-0.09	2	-1.11	423	413	82	592	408	90	414
20	2.765	0.137	101	-0.1	1.99	-1.09	391	387	83	813	388	91	439
30	4.141	0.138	100	-0.1	2.03	-1.7	397	400	83	880	384	94	457
40	5.527	0.139	101	-0.08	2	-1.62	421	434	81	767	384	96	450
50	6.916	0.139	100	-0.09	2.02	-1.53	449	465	80	658	385	99	443
60	8.305	0.139	100	-0.08	1.99	-1.34	473	490	79	559	390	100	437
70	9.697	0.139	100	-0.07	2	-1.11	473	477	79	477	403	101	420
80	11.097	0.140	100	-0.07	2.02	-1.36	453	454	78	418	403	102	399

							1	2	3	4	5	6											
							TEMPERATURES																
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB REAR	FB BOT	METER	STOVE AVG T										
	11.097	0.139	100.628	-0.076	2.00625	-1.317778	440	443	80	617	399	96	12										
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT										

399

CBI

JOB NUMBER: 014-S-1-1

RUN #: 4

DATE: 9_27_12

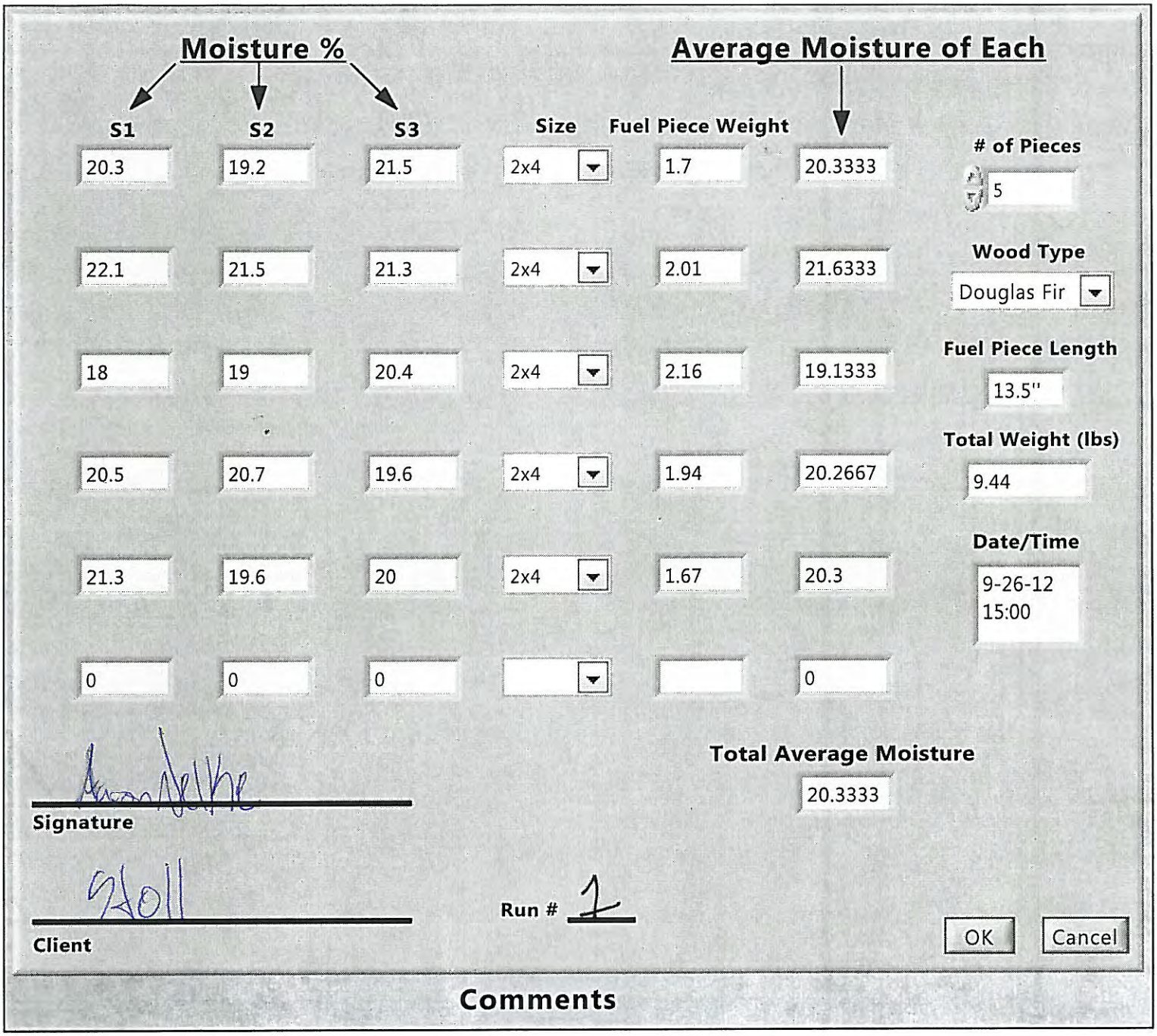
BURN RATE: 2.38 KG/HR DRY

FILTER A PARTICULATE: 1.7 mg

FILTER B PARTICULATE: 1.7 mg

	SAMPLE A INFORMATION		SAMPLE B INFORMATION	
Total Sample Volume - Vm	11.36		11.10	
Average Gas Velocity in Dilution Tunnel - vs	13.19	feet/second	13.19	feet/second
Average Gas Flow Rate in Dilution Tunnel - Qsd	8863.38	dscf/hour	8863.38	dscf/hour
Total Sample Volume (Standard Conditions) - Vmstd	11.03	dscf	10.43	dscf
Average Tunnel Temperature	73.2	F	73.2	F
Average Delta p	0.039		0.039	
Average Gas Meter Temperature	96	F	96	F
Average Delta H	1.99	in-h20	2.01	in-h20
Total Time of Test	80	min	80	min
Total Particulates	1.7	mg	1.7	mg
Particulate Concentration (dry-standard)	0.00015	grams/dscf	0.00016	grams/dscf
Particulate Emission Rate	1.37	grams/hour	1.44	grams/hour
Adjusted Emissions	2.36	grams/hour	2.47	grams/hour
AVERAGE ADJUSTED EMISSIONS		2.41	grams/hour	
% OF AVERAGE	97.7		102.3	

Supporting Data and Notes


Moisture %
Average Moisture of Each
S1
S2
S3
Size
Fuel Piece Weight
# of Pieces
20.3
19.2
21.5
2x4
1.7
20.3333
5
22.1
21.5
21.3
2x4
2.01
21.6333
Wood Type
Douglas Fir
18
19
20.4
2x4
2.16
19.1333
Fuel Piece Length
13.5"
20.5
20.7
19.6
2x4
1.94
20.2667
Total Weight (lbs)
9.44
21.3
19.6
20
2x4
1.67
20.3
Date/Time
9-26-12
15:00
0
0
0
0
Total Average Moisture
20.3333
Signature
Client
Run #
1
OK
Cancel
Comments

Run 1

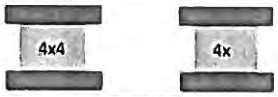
Fuel Load Information

Project Number	Client	Date
	Stolt	9/27/12

Firebox Volume (ft^3)		R & D	Y / N

Longest useable measurement parallel or perpendicular to front of unit.	

Test Fuel Charge Range	-
Coal bed range (lbs)	-

Vol ≤ 1.5 ft^3	Vol > 1.5 ≤ 3.0 ft^3	Vol > 3.0 ft^3
		

Fuel Piece Length	13.5 Inches

Run # 2

Test Run Fuel Moisture (db)

Weight (Lbs) With cleats

Piece	S1	S2	S3	S4	Hydronic Heater S5	S6	AVG (%)		Fuel	
1	22	21.7	21.5				21.7			
2	22.7	22.6	21.5				22.3			
3	21.4	21.6	20.7				21.1			
4	20.6	21.4	20.8				20.8			
5	21.9	22.1	21.4				21.8			
6										
7										
8										
9										
10										
Fuel Load Moisture AVG							21.5	#DIV/0!		

Total weight: 893 lbs

Signature

Date

Fuel Load Information

Project Number	Client	Date
	Stacc	9/27/12

Firebox Volume (ft^3)		R & D	Y / N

Longest useable measurement parallel or perpendicular to front of unit.	

Test Fuel Charge Range	-
Coal bed range (lbs)	-

Vol ≤ 1.5 ft^3	Vol > 1.5 ≤ 3.0 ft^3	Vol > 3.0 ft^3
		
Fuel Piece Length	13.5 Inches	

Run # 3

Test Run Fuel Moisture (db)

Weight (Lbs) With cleats

Piece	S1	S2	S3	S4	Hydronic Heater S5	S6	AVG (%)		Fuel	
1	20.6	20.6	21				20.7			
2	20.8	19.7	19				19.8			
3	19.9	19.9	20.1				20			
4	20.2	21.9	20.8				21			
5	20.9	22.3	20.3				21.2			
6										
7										
8										
9										
10										
Fuel Load Moisture AVG							20.5	#DIV/0!		

Total weight: 8.8lbs

Signature

Date

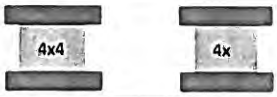
Fuel Load Information

Project Number	Client	Date
	STOLL	9/27/12

Firebox Volume (ft^3)		R & D	Y / N

Longest useable measurement parallel or perpendicular to front of unit.	

Test Fuel Charge Range	-
Coal bed range (lbs)	-

Vol ≤ 1.5 ft^3	Vol > 1.5 ≤ 3.0 ft^3	Vol > 3.0 ft^3
		
Fuel Piece Length	Inches	

Run # 4

Test Run Fuel Moisture (db)

Piece	S1	S2	S3	S4	Hydronic Heater S5	Hydronic Heater S6	AVG (%)		Weight (Lbs) With cleats Fuel	
1	22.6	23	22.2				22.6			
2	24.5	23.2	22.8				23.5			
3	24.6	23.8	22.5				23.6			
4	22	22.3	22.1				22.1			
5	22.7	23.2	23				23			
6										
7										
8										
9										
10										
Fuel Load Moisture AVG							23	#DIV/0!		

Total weight: 8.58

Signature _____ Date _____

Dirigo Laboratories, Inc.

Supplemental Data:

Client: Stoll

Date: 9/26/12

Model: 1300

Run No.: 1

Project No.: 014-S-001-1

Tracking No.: 010

Stack Diameter: 6 in

Induced draft determination: (< 0.005 in H_2O)
Unit Air Velocity: Pretest ✓ in H_2O Post Test ✓ in H_2O
Smoke Capture: 100 %

Room Air Velocity: (within 2 ft of unit & <50 ft/min without fire burning)
Roon Air Velocity: Pretest <5 ft/min Post Test <5 ft/min

Pitot Tube Leak Check: (> 3.0 in H2O for 15 sec)
Pretest: ✓ in H_2O for 20 sec. Post Test: ✓ in H2O for 20 sec.

10 lb. Scale Audit:
Pretest: 10 lbs Post Test: 10 lbs

Tunnel Cleaned: ✓ **Tunnel Velocity:** 13.192

Analyzer Calibrated: ✓

	Initial	Middle	End
P_{bar} (inHg)	30	30	30
Amb Temp. (°F)	75	79	80

Notes:

Technician Signature: Date: 1/30/13

CBI

Dirigo Laboratories, Inc.

Supplemental Data:

Client: Stoll

Date: 9/27/13

Model: 1300

Run No.: 2

Project No.: 014-S-001-1

Tracking No.: 010

Stack Diameter: 6 in

Induced draft determination: (< 0.005 in H_2O)

Unit Air Velocity: Pretest ✓ in H_2O Post Test ✓ in H_2O

Smoke Capture: 100 %

Room Air Velocity: (within 2 ft of unit & <50 ft/min without fire burning)

Roon Air Velocity: Pretest <5.0 ft/min Post Test <5.0 ft/min

Pitot Tube Leak Check: (> 3.0 in H2O for 15 sec)

Pretest: ✓ in H_2O for 20 sec. Post Test: ✓ in H2O for 20 sec.

10 lb. Scale Audit:

Pretest: 10 lbs Post Test: 10 lbs

Tunnel Cleaned: ✓ **Tunnel Velocity:** 13.158

Analyzer Calibrated: ✓

	Initial	Middle	End
P_{bar} (inHg)	30	30	30
Amb Temp. (°F)	69	72	74

Notes:

Technician Signature: Date: 1/30/13

CBI

Dirigo Laboratories, Inc.

Supplemental Data:

Client: Stoll

Date: 9/27/13

Model: 1300

Run No.: 3

Project No.: 014-S-001-1

Tracking No.: 010

Stack Diameter: 6 in

Induced draft determination: (< 0.005 in H_2O)
Unit Air Velocity: Pretest ✓ in H_2O Post Test ✓ in H_2O
Smoke Capture: 100 %

Room Air Velocity: (within 2 ft of unit & <50 ft/min without fire burning)
Roon Air Velocity: Pretest <5.0 ft/min Post Test <5.0 ft/min

Pitot Tube Leak Check: (> 3.0 in H2O for 15 sec)
Pretest: ✓ in H_2O for 20 sec. Post Test: ✓ in H2O for 20 sec.

10 lb. Scale Audit:
Pretest: 10 lbs Post Test: 10 lbs

Tunnel Cleaned: ✓ **Tunnel Velocity:** 13.247

Analyzer Calibrated: ✓

	Initial	Middle	End
P_{bar} (inHg)	30	30	30
Amb Temp. (°F)	81	82	78

Notes:

Technician Signature: Date: 1/30/13

CBI

Dirigo Laboratories, Inc.

Supplemental Data:

Client: Stoll

Date: 9/27/13

Model: 1300

Run No.: 4

Project No.: 014-S-001-1

Tracking No.: 010

Stack Diameter: 6 in

Induced draft determination: (< 0.005 in H_2O)

Unit Air Velocity: Pretest ✓ in H_2O Post Test ✓ in H_2O

Smoke Capture: 100 %

Room Air Velocity: (within 2 ft of unit & <50 ft/min without fire burning)

Roon Air Velocity: Pretest < 5.0 ft/min Post Test < 5.0 ft/min

Pitot Tube Leak Check: (> 3.0 in H2O for 15 sec)

Pretest: ✓ in H_2O for 20 sec. Post Test: ✓ in H2O for 20 sec.

10 lb. Scale Audit:

Pretest: 10 lbs Post Test: 10 lbs

Tunnel Cleaned: ✓ **Tunnel Velocity:** 13.192

Analyzer Calibrated: ✓

	Initial	Middle	End
P_{bar} (inHg)	30	30	30
Amb Temp. (°F)	81	82	78

Notes:

Technician Signature: [signature] Date: 1/30/13

CBI

Appendix G: Calibration and Q/A

AIR LIQUIDE | Air Liquide America Specialty Gases LLC | Scott

RATA CLASS

Dual-Analyzed Calibration Standard

500 WEAVER PARK RD, LONGMONT, CO 80501 Phone: 888-253-1635 Fax: 303-772-7673

CERTIFICATE OF ACCURACY: Interference Free™ Multi-Component EPA Protocol Gas

Assay Laboratory - PGVP Vendor ID: A42012

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
500 WEAVER PARK RD
LONGMONT, CO 80501

P.O. No.: 24
Document # : 45160164-001

Customer
DIRIGO LABORATORIES, INC

JOHN STEINERT
11785 SE HWY 212 SUITE 30
CLACKAMAS OR 97015
US

ANALYTICAL INFORMATION Gas Type : OCC

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: AAL021796 **Certification Date:** 05Mar2012 **Exp. Date:** 27Feb2015
Cylinder Pressure*:** 1143 PSIG **Batch No:** LGM0049653

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ACCURACY**	TRACEABILITY
CARBON MONOXIDE	4.27	%	+/- 1%	Direct NIST and VSL
CARBON DIOXIDE	17.2	%	+/- 1%	Direct NIST and VSL
OXYGEN	17.0	%	+/- 1%	Direct NIST and VSL
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2639	27Apr2017	KAL004146	0.974 %	CARBON MONOXIDE
NTRM 1800	01Mar2013	K015614	17.87 %	CARBON DIOXIDE
NTRM 2658	01Feb2016	K012175	10.03 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
HP/6890/US00034440	20Feb2012	TCD/FID
FTIR//0929062	10Feb2012	FTIR
OXYMAT/6E/W5-951	20Feb2012	PARAMAGNETIC

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

CARBON MONOXIDE
Date: 27Feb2012 Response Unit:AREA
Z1 = 0.00000 R1 = 1876082. T1 = 8259396.
R2 = 1867768. Z2 = 0.00000 T2 = 8217214.
Z3 = 0.00000 T3 = 8224550. R3 = 1862374.
Avg. Concentration: 4.262 %

CARBON DIOXIDE
Date: 28Feb2012 Response Unit:%
Z1 = 0.00483 R1 = 17.88295 T1 = 17.19822
R2 = 17.88429 Z2 = 0.00546 T2 = 17.20909
Z3 = 0.00649 T3 = 17.21928 R3 = 17.89547
Avg. Concentration: 17.19 %

OXYGEN
Date: 29Feb2012 Response Unit:VOLTS
Z1 = 0.00000 R1 = 10.04000 T1 = 17.04000
R2 = 10.05000 Z2 = 0.00000 T2 = 17.04000
Z3 = 0.00000 T3 = 17.04000 R3 = 10.06000
Avg. Concentration: 17.04 %

Second Triad Analysis

Date: 05Mar2012 Response Unit: AREA
Z1 = 0.00000 R1 = 1828660. T1 = 8068158.
R2 = 1824750. Z2 = 0.00000 T2 = 8068443.
Z3 = 0.00000 T3 = 8055063. R3 = 1820843.
Avg. Concentration: 4.274 %

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 1.000000
Constants: A = 0.00101487
B = 5.2891E-07 C = -5.157E-16
D = E =

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 9.99996E-1
Constants: A = 0.00000E + 0
B = 9.14230E-1 C = 1.04890E-2
D = 2.30000E-5 E = 0.00000E + 0

Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 1.000000
Constants: A = -0.00483773
B = 0.99911168 C =
D = E =

APPROVED BY: _____
JOHN ROZOF

CBI

CBI

Airgas

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Airgas Specialty Gases
11711 S. Alameda Street
Los Angeles, CA 90059-2130
(323) 357-6891 Fax: (323) 567-3686
http://www.airgas.com

Part Number:	E04NI77E15A0575	Reference Number:	48-124265336-1
Cylinder Number:	CC280566	Cylinder Volume:	151 Cu.Ft.
Laboratory:	ASG - Los Angeles - CA	Cylinder Pressure:	2015 PSIG
PGVP Number:	B32011	Valve Outlet:	590
Analysis Date:	May 25, 2011		

Expiration Date: May 25, 2014

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 150 psig.i.e. 1 Mega Pascal

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty
CARBON MONOXIDE	2.500 %	2.494 %	G1	+/- 1% NIST Traceable
CARBON DIOXIDE	10.00 %	10.47 %	G1	+/- 1% NIST Traceable
OXYGEN	10.50 %	10.11 %	G1	+/- 1% NIST Traceable
NITROGEN	Balance			

CALIBRATION STANDARDS

ype	Lot ID	Cylinder No	Concentration	Expiration Date
NTRM	060608	CC206095	22.51% OXYGEN/NITROGEN	May 01, 2016
NTRM	080614	CC267714	1.959% CARBON MONOXIDE/NITROGEN	Oct 15, 2012
NTRM	040604	XC034266B	19.84% CARBON DIOXIDE/NITROGEN	May 15, 2012

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
SIEMENS % CO2	NDIR	May 21, 2011
HORIBA % CO	NDIR	May 03, 2011
Siemens %O2	PARAMAGNETIC	May 20, 2011

Triad Data Available Upon Request

Notes:

Approved for Release

CBI

CBI

Airgas

CERTIFICATE OF BATCH ANALYSIS

NITROGEN - ULTRA HIGH PURITY-PURE

Airgas Nor Pac
11900 NE 95th St., Ste. 400
Vancouver, Washington 98682
(360) 944-4000 Fax: (360) 944-4100
www.airgas.com

Part Number:	NI UHP200BA	Reference Number:	16-101518687-3
Cylinder Analyzed:	6564&	Cylinder Volume:	230 Cubic Feet
Laboratory:	NOR - Portland - OR	Cylinder Pressure:	2200 PSIG
Analysis Date:	May 10, 2011	Valve Outlet:	580
Lot #:	16-101518687-3		

ANALYTICAL RESULTS

Component	Requested Purity	Certified Concentration
NitrogenUltraHighPurity	99.999%	99.999%
CO + CO2	< 1 PPM	< 1 PPM
Moisture	< 1 PPM	< 1 PPM
Oxygen	< 1 PPM	< 1 PPM
THC	< 0.5 PPM	< 0.5 PPM

Cylinders in Batch:

!175778Y, CG969822, N-459011

Notes:

Impurities verified against analytical standards traceable to NIST by weight and/or analysis.

Approved for Release

Page 1 of 16-101521404-1

CBI

CBI

CERTIFICATE OF CALIBRATION

Dwyer Instruments, Inc. P.O. Box 373 Michigan City, IN 46361
Fax: (219) 872-9057 Phone: (219) 879-8000

Customer: DIRIGO LABORATORIES
Address: 11785 SE HIGHWAY 212
SUITE 305 , CLACKAMAS, OR 97015

Accuracy: 0.5 % of Full Scale

Full Scale Range: 1 Units: IN.W.C.

Date February 23, 2012
Due February 23, 2013
PO #
Model # 475-000-FM-NIST
Sales
Order # S642420
RGA #
Certificate No.: 12DWY10-0112

This certifies that the instrument listed below has been calibrated using a standard having an accuracy as listed, and is traceable to the NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST).

Master Gage Accuracy: 0.06 % Full Scale

Calibration Standard Information

	Serial No.	Cert. Rpt. No.	Last Cal. Date
Base:	26915	26915-40696	06/01/11
Module 1:	N/A	N/A	N/A
Module 2:	N/A	N/A	N/A

Condition Of Meter	X New	After Repair	As Received

Instrument Information

I.D. No. of Instrument being Calibrated: NX0202013
Customer's I.D. No. (If Different):
Notes:

NEW / AS RECEIVED			AFTER REPAIR	
Customer Gage Setting	Dwyer Master Gage Reading	% Error Full Scale		
0.0000	0.0000	0.00%		
0.2000	0.2014	-0.14%		
0.4000	0.4007	-0.07%		
0.6000	0.6019	-0.19%		
0.8000	0.8010	-0.10%		
1.0000	0.9996	0.04%		
		0.00%		
		0.00%		
		0.00%		
		0.00%		

Signed: HUNG TON

Procedure No.: 658047-00

Customer Please Note: When requesting recalibration please mention the I.D. number of your instrument; when requesting other information on the calibrated instrument please mention the Certificate No.

Certificate of Calibration

Certificate Number: 469735

JJ Calibrations, Inc.
7007 SE Lake Rd
Portland, OR 97267-2105
Phone 503.786.3005
FAX 503.786.2994

Dirigo Laboratories, Inc.
11785 SE Hwy. 212
Suite 305
Clackamas, OR 97015

PO: 7
Order Date: 02/04/2011
Authorized By: N/A

Property #: 051
User: N/A
Department: N/A
Make: Unknown
Model: 10 LBS.
Serial #: 051
Description: Mass
Procedure: DCN 500901
Accuracy: NIST HB 105-1 (F CLASS)

Calibrated on: 02/08/2011
*Recommended Due: 02/08/2016
Environment: 18 °C 36 % RH
As Received: Within Tolerance
As Returned: Within Tolerance
Action Taken: Calibrated
Technician: 92

Remarks: * Any number of factors may cause the calibration item to drift out of calibration before the recommended interval has expired

Standards Used

Std ID	Manufacturer	Model	Nomenclature	Due Date	Trace ID
432A	Sartorius	C-44	Microbalance 5.1g	11/08/2011	461791
503A	Rice Lake	1mg-200g (Class O)	Mass Set	11/08/2011	460936
550A	And (A&D) Co.	HP-30K	Balance 30 Kg	02/02/2012	467177

Measurement Data

Parameter / Measurement Description	Range	Unit	Reference	UUT	Variance	Min	Max
Before/After							
Mass							
Class F - 10 lb		mg	4535924.0	4536081	-157.0	4535474.0	4536374.0

JJ Calibrations, Inc. certifies that this instrument has been calibrated in accordance with the JJ Calibrations Quality Assurance Manual with the stated procedure using standards that are traceable to the National Institute of Standards and Technology (NIST), or other National Measurement Institutes (NMI's), or by using natural physical constants, intrinsic standards or ratio calibration techniques. The quality system and this certificate are in compliance with ANSI/NCSL Z540-1-1994, ISO/IEC 17025-2005, ISO 10012-1, the ISO 9000 family and QS 9000. The expanded uncertainties of measurements for this calibration are based upon 95% (2 sigma) confidence limits. Unless otherwise stated, a test accuracy ratio (TAR) of 4:1, if achievable, is maintained. The results reported herein apply only to the calibration of the item described above. This report may not be reproduced, except in full, without prior written consent of JJ Calibrations, Inc.
JJ Calibrations, Inc. quality system has been assessed and accredited to ISO/IEC 17025:2005.

Reviewer

Issued 02/08/2011 Rev # 14

Inspector

CBI
Certificate: 469735
CBI

Manufacturer: Scientech **Type:** Digital Balance **Serial #:** 28095

FUNCTIONAL CHECKS					
OFF CENTER LOAD:		**HYSTERESIS: Load Increments**		**REPEATABILITY:**	
Loading	105.0000	Test Weight	Readings	Test	105.0000
Right	104.9957	0%	0.0000	1st	104.9980
Left	104.9993	(R1) 50%	104.9980	2nd	104.9980
Front	104.9985	100%	209.9983	3rd	104.9980
Back	104.9970	(R2)50%	104.9980	4th	104.9980
As Left	PASS	0%	0.0000	5th	104.9980
		As Left	PASS	As Left	PASS
Tolerance Deviation of lowest and highest reading within 0.1%		Tolerance The Difference of R1 and R2 must be within 0.1%		Tolerance Deviation of lowest and highest reading within 0.1%	

Remarks:

We sincerely thank you for your business.
Please call us at 1-800-356-4662 for all your calibration needs.
Cleaning and preventive maintenance were preformed before calibration of this equipment.

Calibrations are performed under ambient conditions using manufacturer's and customers specifications for the PASS/FAIL results Results may be influenced by the age of the instrument and environmental conditions. Calibration data should be reviewed to insure that the instrument is performing to its intended accuracy. Calibrations conforms to ANSI / NCSL Z540-1 specifications and CAL-CERT Procedure CP-002

Accredited by the International Accreditation Service, Inc. (IAS) under Calibration Laboratory Code CL-108.
This Laboratory meets the requirements of ISO/IEC 17025 AND ANSI/NCSL Z540-1

This Certificate is issued as a statement of the fact that on this date the above instrument(s) had an accuracy as indicated It should not be construed or regarded as a Guarantee or Warranty of any kind (in favor of the client, the client's customers, or the public at large) that the instrument(s) will continue to retain the same percentage (%) of accuracy or efficiency as determined on the date when the calibration, and adjustments if required, was performed and reported by "CAL-CERT", since the calibrator has absolutely no control over the future operation, damage, maintenance, repairs, and overall condition of the instrument(s) and hereby expressly disclaims any and all liability for damage or loss sustained by all parties arising or resulting from deterioration, obsolescence, malfunction, or substandard performance of said instrument(s); which shall be deemed to be and which shall remain the sole responsibility of the machines regular custodian, owner, and/or manufacturer

Service Engineer: GARRETT WALKER **Date:** July 19, 2012

Technical Manager: MARSHALL DOYLE **Signature:** MDoyle

REPORT#: 42426-D-01

Report and Certificate of Calibration

CAL-CERT CALIBRATION CERTIFICATION

by

Cal-Cert

6709 S.E Lake Road Milwaukie, OR 97222 (800)356-4662 Fax (503)654-9670

IAS ACCREDITED Laboratory Code CL-108

Report #:	42426-D-01
Customer Name:	Dirigo Laboratories
Customer Address:	11785 SE Highway 212, Suite 305
City:	Clackamas **State:** OR **Zip:** 97015
Contact:	John Steinert
Service Address:	11785 SE Highway 212, Suite 305, Clackamas, OR 97015

Calibration Standards

14-RH/00351 Comark Temp/Humidity Meter S/N. 06237360168 Cal Date: 9/14/11 Due Date: 9/14/12 Vendor CC NIST#: 39322-C-20
10-kg1/00209 Rice Lake Weight Set 5kg-1mg S/N. 43334/22696 Cal Date: 7/11/11 Due Date 7/11/13 Vendor QCS NIST#: 20111555

Instrument Data

Calibration Date:	July 19, 2012	**Reference:**	ASTM E-898
Calibration Due Date:	July 19, 2013	**Number of Ranges:**	One
Calibration Frequency:	12 Months	**Indicating System:**	Digital
Manufacturer:	Scientech	**Temperature:**	75 °F
Model Number:	ZSA 210	**Humidity:**	46% RH
Type:	Digital Balance	**Asset #:**	#048
Serial #:	28095	**Service Location:**	Service Address
Scale Capacity:	210 grams	**As Found:**	PASS
		As Left:	PASS

Scale Linear Test

Instrument Range: 210.0000 grams **Resolution:** 0.0001 grams

Calibration Standard grams	As Found UUT grams	As Found Error grams	As Left UUT grams	As Left Error grams	As Left % of Error grams	Tolerance (As Left) Allowable Error	
						Error	Condition
0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.0000	PASS
21.0000	20.9992	-0.0008	20.9992	-0.0008	-0.004	0.0210	PASS
42.0000	41.9981	-0.0019	41.9981	-0.0019	-0.005	0.0420	PASS
63.0000	62.9985	-0.0015	62.9985	-0.0015	-0.002	0.0630	PASS
84.0000	83.9984	-0.0016	83.9984	-0.0016	-0.002	0.0840	PASS
105.0000	104.9980	-0.0020	104.9980	-0.0020	-0.002	0.1050	PASS
126.0000	125.9964	-0.0036	125.9964	-0.0036	-0.003	0.1260	PASS
147.0000	146.9959	-0.0041	146.9959	-0.0041	-0.003	0.1470	PASS
168.0000	167.9958	-0.0042	167.9958	-0.0042	-0.002	0.1680	PASS
189.0000	188.9957	-0.0043	188.9957	-0.0043	-0.002	0.1890	PASS
210.0000	209.9983	-0.0017	209.9983	-0.0017	-0.001	0.2100	PASS
105.0000	104.9980	-0.0020	104.9980	-0.0020	-0.002	0.1050	PASS
0.0000	0.0000	0.0000	0.0000	0.0000	0.000	0.0000	PASS

Expanded Uncertainty± 0.000351 grams

Appendix H: Example Calculations

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Example Calculations for Run 1:

1. Sample Rate (ft^3/min) = $\frac{(Interval_2 \text{ gas meter volume} - Interval_1 \text{ gas meter volume})}{\text{Interval range (min)}}$ = **(2.828 ft^3 – 1.41616 ft^3) / 10 min = 0.141 ft^3/min**

2. Proportional Rate % = $\frac{(\text{Run time})(\text{Gas meter Volume})(\text{Initial Tunnel velocity})(\text{Average meter temp} + 460)(\text{Tunnel temp} + 460)}{(\text{Interval time})(\text{Total meter volume})(\text{Tunnel velocity})(\text{Average tunnel temp} + 460)(\text{Meter temp} + 460)}$ x (100) =

   = **$\frac{(80 \text{ min})(2.828 ft^3 - 1.4160 ft^3)(13.101 \text{ ft/sec})(90 °F + 460)(73 °F + 460)}{(10 \text{ min})(11.359 ft^3)(13.101 \text{ ft/sec})(96 °F + 460)(73 °F + 460)}$ x (100) = 99.7 %**

3. Initial Tunnel Flow (scfm) = $\left((5129.4) x (\text{Pitot tube Cp}) x (((\Delta P_1)^{0.5}(\Delta P_2)^{0.5}(\Delta P_3)^{0.5}(\Delta P_4)^{0.5}(\Delta P_5)^{0.5}(\Delta P_6)^{0.5}(\Delta P_7)^{0.5}(\Delta P_8)/8) x ((\text{Ave tunnel temp} + 460)/((\text{Ave } P_{bar} + (\text{static}/13.6))(MW_{wet})))^{0.5} x (528/(\text{Ave tunnel temp} + 460)) x ((\text{Ave } P_{bar} + (\text{static}/13.6))/29.92) x (\text{Tunnel area})\right)$ x (1-(%H2O/100)) =

   = **$\left((5129.4) x (0.99) x (((0.042)^{0.5}(0.040)^{0.5}(0.036)^{0.5}(0.040)^{0.5}(0.036)^{0.5}(0.041)^{0.5}(0.042)^{0.5}(0.038)^{0.5})/8) x ((70 + 460)/(30 + (- 0.4/13.6))(28.56)))^{0.5} x (528/(70 + 460)) x ((30.0 + (-0.4/13.6))/30)) x (0.196 ft^2)\right)$ x (1-(2.00/100)) = 148.82 scfm**

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4. Tunnel Velocity (Vs) =

Vs (ft/sec) = (85.49)(Pitot Tube Cp)(Ave. Tunnel $\Delta P)^{0.5}$ ((Ave. tunnel temp + 460)/(Ave. P_{bar} + (Tunnel static/13.6)) (Dilution tunnel MW))$^{0.5}$ =

= **(85.49)(0.99)(0.039 inH_2O)$^{0.5}$ ((70 °F + 460)/(30 inHg +(-0.400 inH2O/13.6))(28.78 lb/lb-mole))$^{0.5}$ = 13.192 ft/sec**

5. Average Gas Flow Rate in Dilution Tunnel – Qsd

Qsd (dscf/hr) = (3600)(1-(Dilution tunnel %H2O/100))(Tunnel area)(Vs)(528/29.92)((Ave.P_{bar} + (Dilution tunnel static/13.6))/(Ave. tunnel temp + 460))

= **(3600)(1-(4.00 % / 100))(0.196 ft^2)(13.192 ft/sec)(528/29.92)((30 inHg + (-0.400 inH_2O/13.6))/(73°F + 460))** = **8863.38 dscf/hr**

6. Total Sample Volume (Standard Condition) – Vmstd

Vm = Total sample volume

$$\text{Vmstd (dscf)} = \left(\frac{(\text{Vm})(\text{Meter y factor})(528 / 29.92\ \text{inHg})\ )(\text{Average } P_{bar}+(\text{Orifice } \Delta\ \text{H}/13.6))}{(\text{Average meter temp} + 460)} \right)$$

$$= \left(\frac{((11.36\ \text{cf})(1.014)(528 / 29.92\ \text{inHg}))\ ((30\ \text{inHg})+(2.0/13.6))}{(96\ °\text{F} + 460)} \right) = 11.03\ \text{dscf}$$

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7. Particulate Concentration (dry standard) – (grams/dscf) =

= [(Total particulate / 1000) / (vmstd)] = **(1.7 mg / 1000) / (11.03 dscf)** = **0.00015 g/dscf**

8. Particulate Emission Rate (grams / hour) =

= (Particulate concentration)(Qsd) = **0. 00015 g/dscf)(8863.38 dscf/hr)** = **1.33 g/hr**

9. Dry Wood Burn Rate (kg/hr) =

= ((1-(Average Fuel moisture / (100 + Average fuel moisture)))(60 min/hr)(Fuel weight / Run time)(0.453593 kg/lb))

= ((1-(23 % / (100 + 23 %))(60 min/hr)(8.6 lb / 80 min)(0.453593 kg/lb)) = **2.38 kg/hr**

Appendix I: Installation and Operations Manual

Installation, Operation, & Safety Handbook

Model 1300
Freestanding Stove

High Valley Stoves by Stoll
153 Hwy. 201
Abbeville, SC 29639
www.highvalleystoves.com
800.421.0771

Safety Notice: *If this wood stove is not properly installed, a house fire may result. For your safety, please follow the installation directions. Contact local building or fire officials about restrictions and installation inspection in your area.*

HIGH VALLEY STOVES BY STOLL
153 Hwy. 201
Abbeville, SC 29620
P: 800.421.0771
W: www.highvalleystoves.com
E: sales@highvalleystoves.com

Installation, Operation & Safety Handbook for Model 1300

Table Of Contents

Please read this entire manual before you install and use your new room heater. Failure to follow instructions may result in property damage, bodily injury, or even death.

CBI **SAVE THESE INSTRUCTIONS**

Section 1: General Safety Information

Proper installation of any wood burning stove is necessary for the safety and effectiveness of its operation. Check with your dealer regarding arrangements for installing your free standing model. Installation must meet strict specifications of the National Fire Protection Association and all local fire and building codes.
For additional information on using your heater (wood stove) safely, send for Using Coal and Wood Stoves Safely, NFPA No. 81974, from the National Protective Association, 470 Atlantic Avenue, Boston, MA 02210.
The High Valley 1300 has been tested by Omni Test Laboratories, Inc.

Safety Precautions

1. ASH DISPOSAL: Ashes should be placed in a metal container with a tight-fitting lid. The closed container of ashes should be placed on a non-combustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.
2. LIQUID FUELS: Never use gasoline type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or "freshen up" a fire in this stove. Keep all such liquids well away from the stove at all times.
3. FUEL STORAGE: Store wood in a dry environment. Do not place wood within stove clearances (see pg. 6) or within the space needed for loading stove or ash removal.
4. CREOSOTE FORMATION & REMOVAL: When wood is burned slowly, it produces tar and other organic vapors which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow burning fire. As a result, creosote accumulates on the flue lining. When ignited, this creosote makes an extremely hot fire. The chimney connector and chimney should be inspected at least once every two months during the heating season to determine if creosote build-up has occurred. If creosote has accumulated, it should be removed to reduce the risk of a chimney fire. Contact your local municipal or provincial fire authority for information on how to handle a chimney fire.
5. PRE-FABRICATED CHIMNEY: Not for use with a pre-fabricated chimney.
6. CHIMNEY & CONNECTOR: 6" MSG black steel connector pipe with UL 103 HT listed chimney suitable for solid fuels (*use supports and spark arrestors as required by NFPA 211*), or code-approved masonry chimney with a flue liner.
7. INSPECTION CODES: The installation of the stove must comply with state and local requirements and be inspected by the state or local building inspector, if required.
8. LOCATION: This stove is approved for use in mobile homes *(please read mobile home installation section in this manual)*. **WARNING: DO NOT INSTALL IN SLEEPING ROOM.** The stove should be placed centrally in relationship to the area to be heated. High traffic areas should be avoided, and the stove should be located in a relatively draft-free area. A 14" clearance to any furnishings must be maintained.
9. Inspect chimney connector and chimney twice monthly, and clean if necessary.
10. Keep stove away from combustibles. Follow suggested distances.
11. The use of aluminum type "B" gas vent is unsafe and prohibited by the National Fire Prevention Association Code.
12. The area through which the chimney pipe will travel should be inspected. If the installation requires cutting a hole in the ceiling, check the attic for wires, ducts, etc, that may interfere.

13. It is vitally important that single wall pipe is never closer than three times the diameter of the pipe from a combustible surface. Never use single wall pipe through a combustible surface.
14. Use only an insulated, all fuel chimney to vent the hot gases out of the house. It will reduce the amount of creosote buildup and improve the draft needed to vent hot gases from the stove.
15. Use a 6” diameter insulated thimble, or a 6” diameter insulated all-fuel chimney section when passing through a combustible wall or ceiling. See NFPA 211 for recommended type, clearances, and warnings.
16. Do not use more than one elbow in the stove pipe.
17. Ensure that the ventilating pipe does not extend so far into chimney flue that it blocks air flow.
18. Particular attention should be paid to the point where the flue passes through a wall or ceiling. This penetration should always be made with insulated pipe and the proper connector, thimble, and mounting accessories.
19. The longer the pipe and the greater amount of elbows, the greater the chance of dangerous creosote and ash buildup. Modern stoves are engineered to achieve maximum heat dispersal without lengthy vents eliminating a potentially hazardous situation.
20. Use heavy gauge stove pipe: at least 18 gauge with 6” diameter.
21. The top of the flue must be at least 3’ higher than the roof at the point of exit. In pitched roofs, the top of the stovepipe must be at least two feet to the highest point of the roof and at least ten feet away.
22. **DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.**

⚠ **CAUTION:** Do not operate in an extreme manner as to overfire the unit. If unit, chimney, or chimney connector glows, you are overfiring.

⚠ **SAFETY NOTICE:** If this wood stove is not properly installed, a house fire may result. For your safety, follow all installation directives, cautions, and safety notices. Contact local building officials about restrictions and installation inspection in your area.

⚠ **CAUTION:** Do not connect to or use in conjunction with any air distribution ductwork unless specifically approved for such installations.

⚠ **CAUTION:** Do not use chemicals or fluids to start the fire.

⚠ **CAUTION:** Do not burn garbage or flammable fluids such as gasoline, naphtha or engine oil.

⚠ **CAUTION:** Hot while in operation. Keep children, clothing and furniture away. Contact may cause skin burns.

Section 2: Clearances & Installations

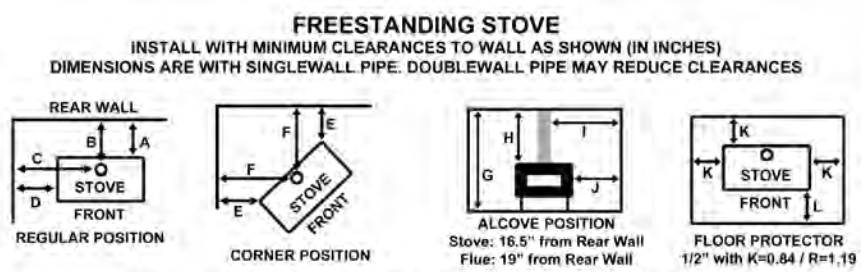


Figure 1.

Clearances

- **Normal:** **A**=12"*(305mm)* **B**=15.5"*(394mm)* **C**=22"*(560mm)* **D**=14"*(356mm)*
- **Corner:** **E**=8"*(203mm)* **F**=18"*(457mm)*
- **Alcove:** **G**=84"*(2134mm)* **H**=54"*(1372mm)* **I**=24"*(610mm)* **J**=16"*(406mm)*
  Unit must be 16.5" *(419mm)* and Flue must be 19" *(483mm)* from Rear Wall.
- **Floor Protector: K**=8"*(203mm)* **L**=18"*(457mm)* | Type II, UL 1618

⚠ **Note:** Clearances can only be reduced only by means approved by the applicable regulatory authority.

Floor Protector Installation

1. This Stove requires the use of a Type II, UL 1618 Approved, Floor Protector, with minimum rating of R = 0.84 / K = 1.19.
2. Floor protector must be placed under the stove; for USA it must extend 16 inches beyond the front and 8" beyond the sides of the stove and for Canada it must extend 18 inches beyond the front and 8" beyond the sides and back of the stove .
3. Floor protector must also extend under the chimney connector and at least 2" beyond each side.

Pedestal Installation

1. Place pedestal on floor protector where stove will be installed.
2. Carefully place the 1300 stove body on top of the pedestal. Center stove on pedestal, using caution to not damage floor or floor protector.
3. Align holes with threads in the stove with appropriate holes in pedestal.
4. Insert bolts through pedestal into stove and tighten securely.
5. If the unit is installed in a mobile home, see mobile home installation instructions.

Blower Installation

1. Blower assembly is shipped pre-installed, so no installation is necessary
2. Blower assembly is shipped pre-wired, so no wiring is necessary. However, if the wires become disconnected for any reason, please refer to Section 5: Wiring Diagram

Stove Pipe Installation

1. Minimum clearance to combustibles must be maintained as shown in figure 1.
2. Combustible wall and ceiling materials includes wood, cloth, vinyl, paper, etc. Wood covered with plastic is also considered combustible. The 10" clearance for the stove also applies for plain stovepipe used in constructing the chimney pipe. Clearance is applicable to the parallel wall or the ceiling either when the wall is unprotected or when Type 2 Floor Protector is affixed to the wall without spacing.
3. Select a spot for the stove. Inspect the area that the stovepipe will be running through to connect with the existing chimney. Use an insulated connector if a combustible wall is between the chimney and stove.
4. If the area the pipe runs through looks acceptable, move the stove into position. Be sure the stove has proper clearance from combustible areas.
5. If a new chimney is being installed, follow the instructions of the chimney pipe manufacturer or have it installed by a certified chimney installer.
6. Install the chimney connector/thimble. If it is passing through combustible walls, it must be insulated, such as triplewall pipe. Also, if it is possible to maintain 10" between your smoke pipe and a combustible wall, use an insulated chimney pipe. Consult your local building code and regulations.
7. Chimney connector shall not pass through an attic or roof space, closet or similar concealed space, or floor, or ceiling. Where passage through a wall or partition of combustible construction is desired, the installation must conform to *CAN/CSA-B365: Installation Code for Solid-Fuel Burning Appliances and Equipment.*
8. After the pipe connector is in place, run the stovepipe with the crimped edge down from the chimney connector to the stove. The crimped edges must be down so creosote accumulating on the walls of the stovepipe can run back into the stove and not out the joints of the pipe.
9. Any horizontal pipe should be pitched upward toward the chimney at least 1/4" for each horizontal foot.
10. Check the installation to determine the pipe is connected properly using three sheet metal screws per joint; that the proper distances have been maintained from combustible surfaces with the stove and the stovepipe; and the chimney is in good repair and is installed properly.

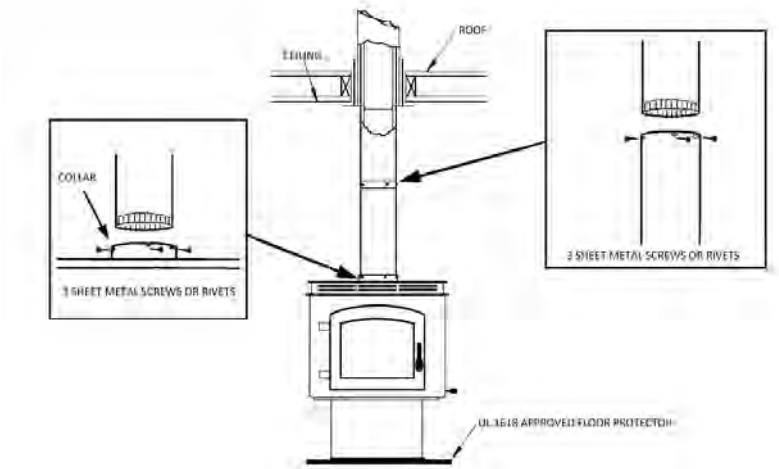


Figure 2.

Masonry Flue Installation *(Using Single Wall Pipe)*

1. Before connecting these units to a masonry chimney, determine that masonry flue pass-through connector thimble meets NFPA-211 Code and local building codes and is a minimum of 18" from ceiling. If connector thimble does not meet these codes, pass-through connector must be modified.
   NOTE: Floor protector must be under horizontal pipe exit
2. Connectors may pass through walls or partitions constructed of combustible material if connector is:
   (a) Either listed for wall pass-through or is routed through a device listed for wall pass-through and is installed in accordance with conditions of listing.
   (b) Selected or fabricated in accordance with conditions and clearances as stated in NFPA-211 Code. Any unexposed metal that is used as part of a wall pass-through system and is exposed to flue gases shall be constructed of stainless steel or other equivalent material that will resist corrosion, softening or cracking from flue gases at temperatures up to 1800°F. In addition, a connector to a masonry chimney shall extend through wall to the inner face or liner but not beyond, and shall be firmly cemented to masonry.
   EXCEPTION: A thimble may be used to facilitate removal of the chimney connector for cleaning, in which case the thimble shall be permanently cemented in place with high-temperature cement.
3. Once through-the-wall thimble codes are met, simply connect chimney collar to wall pass-through connector using #24 ga. minimum, blue or black steel connector pipe as follows:
   (a) Maintain 1/4" rise per foot (horizontal length) from appliance to chimney.
   (b) Connect each section so crimped end faces downward.
   (c) Secure each section to each other using at least three (3) sheet metal screws or rivets *(See Figure 2. Page 7)*.
   (d) Use three (3) sheet metal screws to fasten pipe to connector collar on heater. *(See Figure 2. Page 7)*.

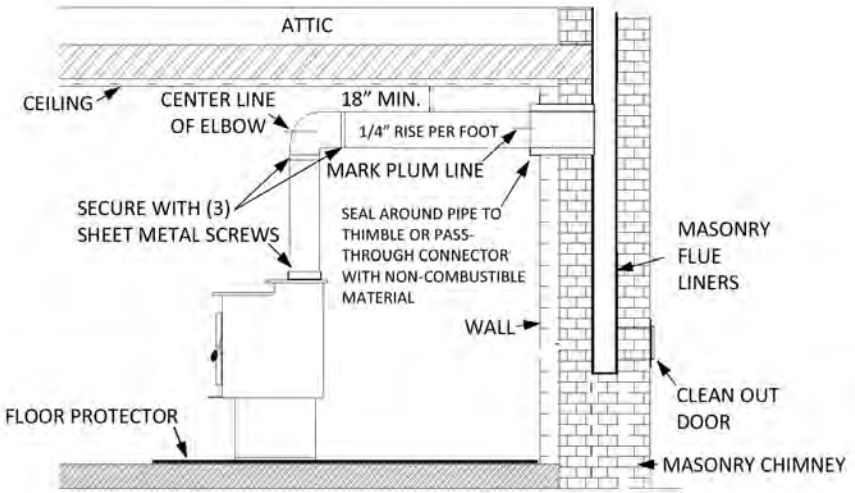


Figure 3.

Masonry Fireplace Installation

Connect to Masonry Fireplaces where the following conditions are met:

(1) There is a connector that extends from the appliance to the flue liner.

(2) The cross-sectional area of the flue is no smaller than the cross-sectional area of the flue collar of the appliance, unless otherwise specified by the appliance manufacturer.

(3) The cross-sectional area of the flue of a chimney with no walls exposed to the outside below the roofline is no more than three times the cross-sectional area of the appliance flue collar.

(4) The cross-sectional area of the flue of a chimney with one or more walls exposed to the outside below the roofline is no more than two times the cross-sectional area of the appliance flue collar.

(5) If the appliance vents directly through the chimney wall above the smoke chamber, there shall be a noncombustible seal below the entry point of the connector.

(6) The installation shall be such that the chimney system can be inspected and cleaned.

(7) Means shall be provided to prevent dilution of combustion products in the chimney flue with air from the habitable space.

Mobile Home Installation for USA ONLY! - *Optional Air Kit Required*

1. Position the stove onto the floor protector in its final location, making sure all minimum clearances are met. Anchor stove to floor with sufficient size and length bolts to go through the pedestal mount, floor protector, home floor and subfloor.
2. The stove should be grounded to chassis with a #8 AGW copper wire or equivalent.
3. Place the outside air kit on the rear of the unit with the elbow turned toward the bottom of the unit and fasten with 2 tec screws supplied. Connect a 4” flex pipe (not supplied) to the outside air kit, place a screen on the other end and insert through the wall of the home.
4. **CAUTION: THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.**

Chimney Connectors and Vent Connectors

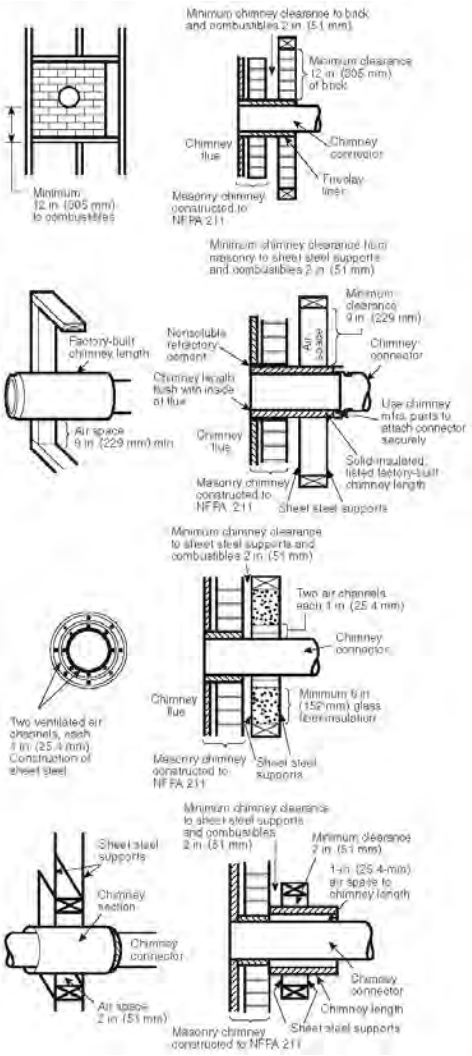


Figure 4.

Additional Requirements:

1. *Insulation material used as part of wall pass-through system shall be of noncombustible material and shall have a thermal condu ctivity of 1.0 Btu-in./hr-ft - °F (4.88 kg-cal/hr-m - °C) or less.*
2. *All clearances and thicknesses are minimums; larger clearances and thicknesses shall be permitted.*
3. *Any material used to close up an opening for the connector shall be of noncombustible material.*
4. *A connector to a masonry chimney, except for System B, shall extend in one continuous piece through the wall pass-through system and the chimney wall to the inner face of the flue liner, but not beyond.*

1. Minimum 3.5 in. (90 mm) thick brick masonry wall framed into combustible wall with a minimum of 12-in. (305-mm) brick separation from clay liner to combustibles. Fireclay liner (ASTM C 315, Standard Specification for Clay Fire Linings, or equivalent), minimum ⅝-in. (16-mm) wall thickness, shall run from outer surface of brick wall to, but not beyond, the inner surface of chimney flue liner and shall be firmly cemented in place.

2. Solid-insulated, listed factory-built chimney length of the same inside diameter as the chimney connector and having 1 in. (25.4 mm) or more of insulation with a minimum 9-in. (229-mm) air space between the outer wall of the chimney length and combustibles. The inner end of the chimney length shall be flush with the inside of the masonry chimney flue and shall be sealed to the flue and to the brick masonry penetration with non-water-soluble refractory cement. Supports shall be securely fastened to wall surfaces on all sides. Fasteners between supports and the chimney length shall not penetrate the chimney liner.

3. Sheet steel chimney connector, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness, with a ventilated thimble, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness, having two 1-in. (25.4-mm) air channels, separated from combustibles by a minimum of 6 in. (152 mm) of glass fiber insulation. Opening shall be covered, and thimble supported with a sheet steel support, minimum 24 gauge [0.024 in. (0.61 mm)] in thickness. Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

4. Solid-insulated, listed factory-built chimney length with an insidediameter 2 in. (51 mm) larger than the chimney connector and having 1 in. (25.4 mm) or more of insulation, serving as a passthrough for a single wall sheet steel chimney connector of minimum 24 gauge [0.024 in. (0.61 mm)] thickness, with a minimum 2-in. (51-mm) air space between the outer wall of chimney section and combustibles. Minimum length of chimney section shall be 12 in. (305 mm). Chimney section concentric with and spaced 1 in. (25.4 mm) away from connector by means of sheet steel support plates on both ends of chimney section. Opening shall be covered, and chimney section supported on both sides with sheet steel supports of minimum 24 gauge [0.024 in. (0.61 mm)] thickness. Supports shall be securely fastened to wall surfaces on all sides and shall be sized to fit and hold chimney section. Fasteners used to secure chimney section shall not penetrate chimney flue liner.

Section 3: Use, Care & Replacement of Glass

Although glass has excellent heat resistance and strength characteristics, it can crack through improper use. To achieve maximum utility and safety of glass in a wood burning stove, we advise the following:

1. Inspect the glass regularly. If you detect a crack or break, extinguish the fire immediately and replace the glass. Do not operate unit with broken glass.
2. Do not slam the door or otherwise impact the glass. When closing the door, logs or other objects should not protrude or impact the glass.
3. Do not clean when hot, allow unit to cool completely before cleaning. Do not clean the glass with abrasive materials which may scratch or damage the glass. Scratches on the glass can develop into cracks or breaks. Oven cleaner may be used, but do not get any on the paint as it will remove paint.
4. Never put substances which can ignite explosively in the stove since even small explosions in confined areas can blow out the glass.

Replacement Glass Installation

1. Replacement Glass must be 1/4" pyro-ceramic, "stove" glass. Do not use unsuitable substitute replacement glass.
2. Glass can be installed in the door with the door mounted on the stove.
3. Remove bracket bolts from the door and remove all pieces of broken glass if any.
4. Remove backing from the gasket. Center gasket on edge of replacement glass. Firmly press gasket onto glass edge of all sides. Cut excess gasket.
5. Place glass in opening. Position brackets in place, insert bolts and tighten carefully.

⚠ **CAUTION:** Glass should be snug but not excessively tight.

NOTICE

Gold plated surface must be cleaned with glass cleaner and a soft rag before firing the first time, or fingerprints will remain.

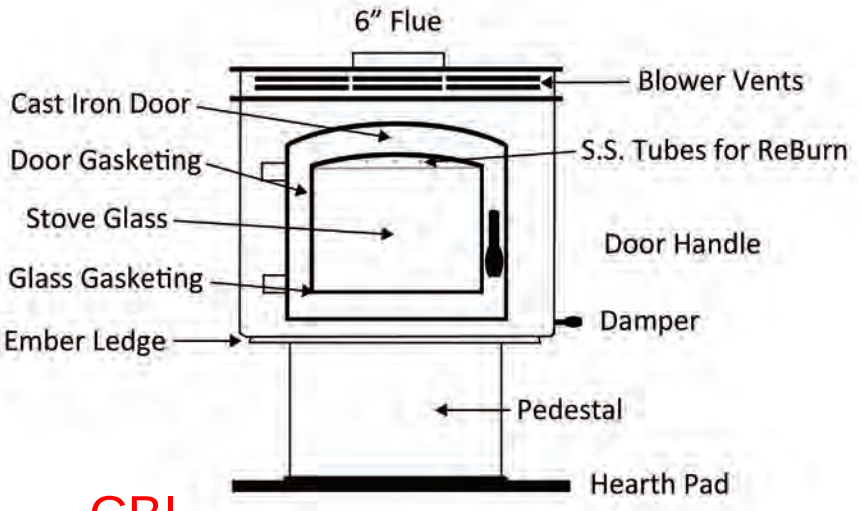
DO NOT CLEAN WHEN HOT!

Section 4: Operating Instructions

1. Pull the damper slide all the way open. *(slide is on lower right side of the unit)*
2. Always build fire directly on stove floor, do not raise with andirons or grates. Be careful to not build fire too close to the glass door. Roll up pieces of newspaper and place in the firebox towards back of stove. Place kindling on top of paper and light paper. After fire is burning, place larger pieces of wood on the fire.
3. This stove is designed to burn dry, seasoned hardwood. Use wood fuel only, no other solid or liquid fuels can be used.
4. Avoid coming in contact with the firebrick or air tubes when loading wood.
5. Once the fire is burning, you can control the fire by using the control on the right hand side of the unit. Pull to open and push to close. Do not alter damper for increased firing for any reason.
6. Keep door(s) closed when burning; inspect gasket monthly and replace if needed.
7. Due to the nature of a non-catalytic stove, there may be smoke spillage into the room from the combustion air chamber when starting the stove. After the stove has been burning for a time, this will cease.

⚠ **CAUTION:** When opening the door make sure the draft control is fully open *(pull to open)* to avoid smoke spillage into the room.

Section 5: Stove Overview



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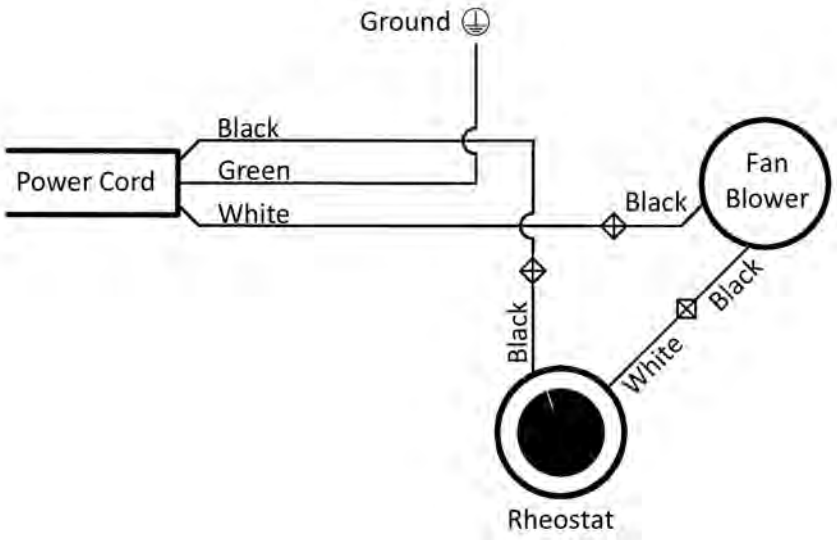
Section 6: Wiring Diagram



Section 7: Specifications

Stove Width: 22”
Stove Depth: 23”
Stove Height w/ pedestal: 30”
Weight: 315 lbs.

Firebox Size: 1.3 cu. ft.
Flue Size: 6”
Est. BTU Output: 28,846
Max. Wood Size: 16”
Est. Burn Time: 7 hrs.
Est. Heating Area: 1500 sq. ft.

Emissions: 3.1 g/Hr
Efficiency: 70%
Date of Certification: 01/28/2013

Floor Protector: 1/2” with R = 0.84 / K= 1.19 ratings

Safety Standard Compliance

USA UL: UL 1482-2011
Canadian UL: ULC-S627-00

Emissions and efficiency testing performed by Dirigo Laboratories, Inc.

Section 8: High Valley Stoves Limited Warranty

Products Guaranteed

This limited warranty covers all stoves manufactured by Stoll Fireplace Inc. and carrying the High Valley Stoves brand.

*The warranty will be void if coal is burned in any High Valley wood burning stove.

General Warranty Provisions

High Valley Stoves, warrants the model 1300 against defects in material and workmanship for 5 years as long as it is owned by the original purchaser, provided that **(1)** stove is installed by an authorized installer: **(2)** stove has not been repaired by an unauthorized person in any way, so as, in our judgment as manufacturer, performance or reliability is reduced: **(3)** stove has not been subject to unauthorized modification: **(4)** the right to repair or replace the stove is at the option and considered judgment of the manufacturer: **(5)** obligation under this warranty does not include or extend to paint on surface of stove, glass door, nor decor kit an optional attachment.

Specific Warranty Provisions & Time Periods

Period 1: Up to 30 days after purchase.

Stove should be used within 30 days by having a fire started, the blower and heat generated in the owner's home.

Period 2: Up to 90 days after purchase.

All electrical parts are warranted for 90 days from the date of purchase.

Period 3: Up to 5 years from date of purchase.

High Valley Stoves will replace or repair, at its option, any part defective in material or workmanship with the exception of electrical components (blower, thermostat, rheostat, etc ...), damper, damper handles and rod, fireclay castable lining, and all parts not permanently attached to the heating unit. Parts not permanently attached to the heating unit are defined as any part removable with common hand tools. The cost of parts only are included. The customer pays any labor or transportation charges required (owner is responsible for any costs involved with stove or part removal and reinstallation.)

Procedure to Obtain Warranty Repair

Should you feel that your stove is defective, you should contact your stove dealer for assistance and for the correct procedures to resolve the problem. If for any reason you are dissatisfied with the suggested procedure, you may contact us in writing.

Conditions & Exclusions

- There is no other express warranty. All implied warranties or merchantability and fitness are limited to the duration of the express warranty.
- High Valley Stoves is not liable for indirect, incidental, or consequential damages in connection with the use of the product including any cost or expense of providing substitute equipment or service during periods of malfunction or non-use. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.
- Warranty repairs for reimbursement must be performed by an authorized High Valley Dealer, manufacturer's representative, or by customer as directed by dealer or the manufacturer.
- Dealers will receive special instructions regarding minor repairs.
- Warranty void if serial plate has been removed or defaced.
- Warranty gives you specific legal rights and you may also have other rights which vary from state to state.

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Owner Registration Card

Name:_____

Address:_____

City:_____ **State:**_____ **ZIP:**_____

Phone:_____ **Email:**_____

Stove Was Purchased At:_____

Selling Price Less Tax:_____

Date Purchased:_____

Date Installed:_____

Model Purchased: 1300

Wood Stove Serial Number:_____ *(found on rear of unit)*

Cut Here

Remove page from book then fold in half and tape.

From:

Place
Stamp
Here

High Valley Stoves by Stoll
153 Hwy. 201
Abbeville, SC 29620

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