



TEST REPORT

TEST OF A HYBRID WOOD STOVE FOR EMISSIONS AND EFFICIENCY

PER EPA METHODS 28R AND ASTM E2515 and ASTM E2780, MAY 2015

Client:
Woodstock Soapstone
66 Airpark Road
West Lebanon NH

Model name: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

Attention: Rafael Sanchez

TESTED BY:
Services Polytests Inc.
695-B Gaudette
St-jean-sur-Richelieu, QC, J3B 7S7

TEST DATES: September 5th 2017 to September 21st 2017

REPORT DATE: October 16th 2017

Project number: PI-20154

All services undertaken are subject to the following general policy: Reports are submitted for exclusive use of the clients to whom they are addressed. Their significance is subject to the adequacy and representative character of the samples and to the comprehensiveness of the tests, examinations or surveys made. This document may not be reproduced except in its entirety without the written permission from Services Polytests. Services Polytests have not been involved in any R&D design consulting regarding this unit as requested by the NSPS..

Tested:
Maxime Martin

A handwritten signature in black ink, appearing to read "Maxime Martin", is written over a light grey rectangular background.

written by:
Danick Power, P. Eng

A handwritten signature in black ink, appearing to read "Danick Power", is written over a light grey rectangular background.

Verified by third party certifier (PFS):

SUMMARY

1	Introduction	5
1.1	General.....	5
1.2	Test unit information	5
1.3	Results.....	5
1.4	Pretest information.....	6
2	Summary of test results.....	7
2.1	Emissions.....	7
2.2	Average calculation.....	7
2.3	Test facility conditions	8
2.4	Fuel qualities	9
2.5	Dilution tunnel flow rate measurements and sampling data (ASTM E2515).....	10
2.6	Dilution tunnel dual train precision	10
2.7	General summary of results.....	11
3	Process description.....	12
3.1	Discussion	12
3.2	Unit dimensions	12
3.3	Air supply system	13
3.4	operation during test.....	15
3.5	Start-up operation	16
3.6	Sampling locations	16
3.7	Drawings	16
3.8	Emissions efficiency testing equipment list	16
4	Sampling methods	16
4.1	Particulate sampling	16
5	Quality assurance	17
5.1	Instrument calibration	17
5.1.1	Gas meters.....	17
5.1.2	SCALES	17
5.1.3	Gas analyzers	17
5.2	Test method procedures.....	17
5.2.1	Leak check procedures	17
5.2.2	Tunnel velocity flow measurement	17

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

5.2.3 Pm sampling proportionality (ASTM E2515) 17

List of appendix

APPENDIX 1: Raw data, forms and results

APPENDIX 2: Proportionality results

APPENDIX 3: Calibration data

APPENDIX 4: Unit pre burn

APPENDIX 5: Participants

APPENDIX 6: Drawings and specifications

APPENDIX 7: Operator's manual

APPENDIX 8: Photographs of test set up

APPENDIX 9: Test load photographs

APPENDIX 10: Laboratory Operating Procedures

APPENDIX 11: Sample calculations

APPENDIX 12: Volume calculations

APPENDIX 13: Operating instruction

APPENDIX 14: Drawing Air flow pattern

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

1 INTRODUCTION

1.1 GENERAL

Laboratory

- Location: Services Polytests Inc., 695-B Gaudette St-jean-sur-Richelieu QC, Canada J3B 7S7
- Elevation: 100 feet above sea level

Test program

- Purpose: unit qualification NSPS 2020
- Test dates: September 5th to 21st 2017
- Test methods used:
 - Particulate emissions: ASTM E2780-10 ; ASTM E2515-11 methods 28R as referred into 40 CFR Part 60 Subpart AAA
 - Efficiency: CSA B415.1-10

1.2 TEST UNIT INFORMATION

General

- Manufacturer: Woodstock Soapstone
- Product type: Hybrid wood or Coal stove
- Combustion system: Hybrid, secondary combustion and Catalytic
- Unit tested: 212N Navajo Hybrid Wood/Coal
- Option: Inclusion of a second Model 212S Survival Hybrid Wood/Coal, which is only Esthetic differences.

1.3 RESULTS

Emission results obtained with crib wood

- Average emission rate: 1.05 grams/hour
- Average Efficiency : 79.43 %
- Average Co (gr/min) : 0.15

Conformity: NSPS Phase 2020

Emission results obtained with Coal

- Average emission rate: 4.95 grams/hour
- Average Efficiency : 59.7 %
- Average Co (gr/min) : 1.37 gr/min

Client: Woodstock Soapstone

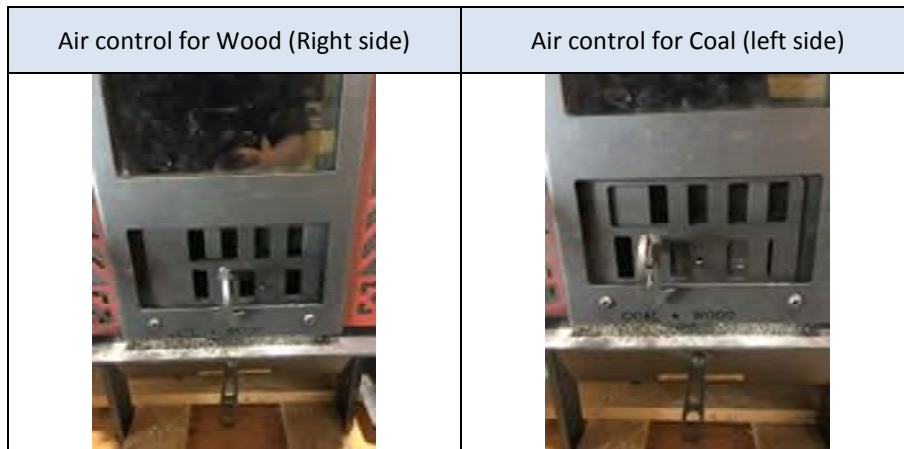
Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

1.4 PRETEST INFORMATION

Unit condition: The unit was received by carrier first week of September 2017. The 50hrs of aging is made by the manufacturer (all data in Appendix 4).

Set up

- Venting system type: 6 inch diameter insulated chimney
- System height from floor: 15 feet
- Particularities: This Stove can be operated with ether Wood or Coal. Sliding air damper control on the right side for wood burning combustion air adjustment. Sliding on the left side for Coal air burning adjustment.



Break in period

- Duration: the unit was pre burned by the manufacturer and run for at least 50 hours, adequate documentation of fuel additions; flue and unit temperatures recorded
- Fuel: BC FIR between 19% and 25%

2 SUMMARY OF TEST RESULTS

2.1 EMISSIONS

Run Number	Test Date (AAA-MM-DD)	Emission Rate (g/hr)	Burn Rate (kg/hr)	1st hour Emission Rate (g/hr)	CSA B415.1 CO emission Gr/hr	CSA B415.1 CO emission Gr/Kg dry	CSA B415.1 CO emission Gr/Mj
1	2017-09-05	0,93	2,004	1,048	9,185	4,786	0,319
2	2017-09-06	1,47	1,319	2,763	13,673	10,364	0,660
3	2017-09-07	6,61*	0,932	14,9	46,5	49,8	3,3
4	2017-09-11	2,34	1,295	4,96	17,46	13,73	0,87
5	2017-09-12	4,28**	1,549	5,36	26,09	17,16	1,17
6 Coal	2017-09-14	5,44	0,626	16,84	98,34	143,9	12,54
7	2017-09-18	0,83	1,178	1,465	2,813	2,387	0,150
8	2017-09-19	0,70	0,997	1,67	7,10	7,11	0,44
9 Coal	2017-09-20	5,65	0,776	14,81	82,11	108	7,65
10 Coal	2017-09-21	3,68	0,530	11,37	66,82	127,34	8,93

*test replaced by runs 7 and 8 see reference standard nps p13731 "additional test runs"

**Test fail ΔT° , see ref ASTM E2780 standard

2.2 AVERAGE CALCULATION

Test No.	Burn Rate (Kg/hr)	(E) Ave. Emission Rate g/hr	(OHE) %	Heat Output (BTU/HR)	CSA B415.1 CO emission g/min
8	0.997	0,698	81,80	15 332	0,12
7	1,18	0,830	80,32	17 790	0,05
4	1,29	2,340	79,40	18 965	0,29
2	1,32	1,500	79,22	19 638	0,23
1	2,00	0,930	75,68	27 294	0,15
Weighted particulate emission average of 4 test runs: 1.048 grams per hour.					
Weighted average HHV efficiency of 4 test runs: 79.43 %.					
Average Co 0.15 gr/min					

2.3 TEST FACILITY CONDITIONS

Run Number	Room Temperature		Barometric pressure		Relative humidity		Air Velocity	
	Before (F)	After (F)	Before (in.Hg)	After (in.Hg)	Before (%)	After (%)	Before (ft/min)	After (ft/min)
1	76	78	29,500	29,589	57	51	6	2
2	73	79	29,737	29,707	67	50	2	5
3	75	78	29,589	29,560	55,3	51	4	5
4	74	76	30,209	30,150	54,5	48,8	4	2
5	75	80	29,855	29,796	45,7	41,3	6	3
6 Coal	78	87	29,648	29,560	54	40,3	2	6
7	78	87	29,914	29,884	68	44	4	6
8	77	84	29,855	29,796	54	43,2	4	8
9 Coal	78	81	29,825	29,766	48,5	45	5	4
10 Coal	76	80	29,943	29,855	48	37	4	8

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

2.4 FUEL QUALITIES

Run Number	Pre-test Load			Test Load						
	Loading Weight Wet Basis (lbs)	Moisture Content Dry Basis (%)	Coal bed Weight (lbs)	Weight Wet Basis (lbs)	Density Wet Basis (lbs/cuft)	Moisture Content Dry Basis (%)	Piece Length (in.)	Number of 2X4's	Number of 4x4's	Number of Spacers
1	12,30	21,62	1,8	7,79	6,605	21,66	15,25	4	0	12
2	12,21	21,89	1,7	7,89	6,685	21,47	15,25	4	0	12
3	11,97	21,95	1,8	7,82	6,625	21,40	15,25	4	0	12
4	12,18	22,02	1,6	7,92	6,714	21,52	15,25	4	0	12
5	9,13	23,05	1,8	8,02	6,793	21,45	15,25	4	0	12
6 Coal	9,07	23,06	1,2	7,60	6,444	16,28	NA	NA	NA	NA
7	11,06	23,03	1,7	8,02	6,798	21,89	15,25	4	0	12
8	6,59	23,10	1,7	8,03	6,807	21,79	15,25	4	0	12
9 Coal	8,85	23,09	1,2	8,12	6,883	16,28	NA	NA	NA	NA
10 Coal	9,28	23,12	1,2	7,99	6,775	16,28	NA	NA	NA	NA

2.5 DILUTION TUNNEL FLOW RATE MEASUREMENTS AND SAMPLING DATA (ASTM E2515)

Average dilution tunnel measurements				Sample Data			
Run Number	Burn Rate (Min)	Volumetric Flow Rate (dscf/min)	Total Temperatures (°R)	Volume sampled (DSCF)		Particulate catch (mg)	
				1	2	1	2
1	87	157,62	576,97	15,704	15,668	1,60	1,50
2	134	162,95	560,24	23,706	23,553	3,80	3,40
3	188	173,29	550,97	33,093	33,149	21,20	21,00
4	137	177,94	558,09	24,560	24,581	5,70	5,20
5	116	169,28	565,24	20,898	20,811	9,80	7,90
6 Coal	290	169,30	573,26	51,881	51,243	29,00	26,40
7	152	175,51	564,00	27,318	26,934	2,30	2,10
8	180	173,18	555,13	31,782	31,282	2,20	2,00
9 Coal	250	162,20	573,51	43,811	43,428	26,10	24,70
10 Coal	360	165,85	563,01	61,456	60,940	23,20	22,10

2.6 DILUTION TUNNEL DUAL TRAIN PRECISION

Run Number	Sample Ratio		Total Emission (g)		
	Train 1	Train 2	Train 1	Train 2	% Deviation
1	873,23	875,19	1,40	1,31	3,11%
2	921,08	927,07	3,45	3,10	5,31%
3	984,44	982,80	20,81	20,58	0,56%
4	992,59	991,75	5,60	5,10	4,68%
5	939,61	943,52	9,15	7,40	10,60%
6 Coal	946,34	958,12	27,38	25,23	4,08%
7	976,59	990,52	2,18	2,02	3,92%
8	980,83	996,52	2,18	2,01	3,90%
9 Coal	925,56	933,72	24,10	23,00	2,32%
10 Coal	971,54	979,77	22,54	21,65	2,01%

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

2.7 GENERAL SUMMARY OF RESULTS

Run Number	Burn Rate (kg/hr)	Average Surface Temperature (F)	Change in surface Temperature (F)	Initial Draft (in. H ² O)	static pressure tunnel (in. H ² O)	Air Setting	Run Time (min)
1	2,004	626,31	48,4	0,003	0,227	Fully open	87
2	1,319	568,79	-12,9	0,052	0,231	0.78 in drill bit	134
3*	0,932	437,25	28,3	0,039	0,241	Minimum setting	188
4	1,295	551,54	24,8	0,053	0,245	Minimum setting	137
5	1,549	513,00	136,9**	0,049	0,238	Minimum setting	116
6 Coal	0,626	493,52	-166,8	0,059	0,242	Coal setting	290
7	1,178	539,81	15,2	0,050	0,246	Minimum setting	152
8	0,997	476,11	0,3	0,040	0,246	Minimum setting	180
9 Coal	0,776	586,97	-263,0	0,075	0,233	Coal setting	250
10 Coal	0,530	479,27	-317,7	0,078	0,237	Coal setting	360

*test replaced by runs 7 and 8 see reference standard nsps p13731 "additional test runs"

**Test fail ΔT° , see ref ASTM E2780 standard

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

3 PROCESS DESCRIPTION

3.1 DISCUSSION

The unit was delivered by the client and received in a good condition pre-burn of the stove was done by the manufacturer. Seven runs have been done, five of them taken for weighted average, Two runs were not taken, run 3 was replaced with run 7 & 8 under provision nsps (additional runs). Run 5 fail under ΔT° , refer to ASMTE2780. Three run done with coal and average number calculated for coal usage.

3.2 UNIT DESCRIPTION

Fireback

- Location: between top of combustion chamber and the heat exchange / catalyst area.
- Restriction: 4 $\frac{3}{4}$ hole to catalyst/ heat exchange chamber
- Dimensions: cover the hearth
- Material: Stainless Steel top of combustion chamber

Bricks

- Lining of firebox made from firebricks 1 $\frac{1}{4}$ thick

Flue gas exhaust

- Location: top flue
- Dimensions: 6 in. diameter
- Material: Steel

Gasket

- For all details refer to appendix 6

Overall unit dimension

- Overall dimensions : 19 $\frac{3}{4}$ inch wide x 25 $\frac{1}{4}$ inch deep x 34 $\frac{1}{4}$ inch high
- Usable volume : 1.15 cuft

Convection fan

- None

Catalyst (appendix 6 for details):

Clariant, 5.83" Round x 2"H x 49 cpsc stainless steel foil catalyst. Our Part #W-533(SS)

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

3.3 AIR SUPPLY SYSTEM

Description

- Primary air: Window wash design with steel channel and window incorporated into the door. Air intake is controlled on the door, below the window.
- Secondary air: secondary fireback design with intake coming from connection between door and secondary fireback. Additional tertiary air is fed through a steel riser tube in the rear of the stove to the secondary fireback.

Characterization

The following table shows the inlet and outlet sections of each system. The air introduction system number is referred to on a set of drawings in Appendix 6.

Wood Burning settings					
AIR INTRODUCTION SYSTEM		INLET (1) sq. in.			OUTLET (sq. in.)
Identification	Type	Imin	Imax	Controlled	
Appendix 6	Primary	0.028	2.188	Manual	2.406
Appendix 6	Secondary	1.50	3.00	Manual	8.168
Appendix 6	Under fire Air	0	0	Manual	13.231
Appendix 6	Tertiary	0	0.563	Automatic	Same outlet as Secondary fireback

* This section would be filled by measuring and comparing with the manufacturer's drawings included in the test report.

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

Coal Burning settings					
AIR INTRODUCTION SYSTEM		INLET (1) sq. in.			OUTLET (sq. in.)
Identification	Type	Imin	Imax	Controlled	
Appendix 6	Primary	0.078	0.156	Manual	2.406
Appendix 6	Secondary	1.50	3.00	Manual	8.168
Appendix 6	Under fire Air	0	1.35	Manual	13.231
Appendix 6	Tertiary	0	0.563	Automatic	Same outlet as Secondary fireback

* This section would be filled by measuring and comparing with the manufacturer's drawings included in the test report.

Legend

Identification: Tag name referred to on drawings in Appendix 14, section airflow pattern

Type: Characterization of air intake

Imin: Minimum air intake of a particular air channel

Imax: Maximum air intake of a particular air channel

Controlled: Determines if a provision for air control is present

Outlet: Total air outlet of a particular air channel

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

3.4 OPERATION DURING TEST

Run #1

This run was performed on September 5th 2017 burning crib wood. It lasted 87 minutes and a 2.0 kg/hr burn rate was obtained & emission at 0.93 gr/hr.

Run #2

This run was performed on September 6th 2017 burning crib wood. It lasted 134 minutes and a 1.32 kg/hr burn rate was obtained & emission at 1.5 gr/hr. air inlet was set with an 0.78 inches drill bit.

Run #3

This run was performed on September 7th 2017 burning crib wood. It lasted 188 minutes and a 0.93 kg/hr burn rate was obtained & emission at 6.6 gr/hr. This test will be eliminated from the weighted average by two subsequent tests (#7 & #8).

Run #4

This run was performed on September 11th 2017 burning crib wood. It lasted 116 minutes and a 1.54 kg/hr burn rate was obtained & emission at 4.3 gr/hr.

Run #5

This run was performed on September 12th 2017 burning crib wood. It lasted 137 minutes and a 1.3 kg/hr burn rate was obtained & emission at 2.3 gr/hr. This test failed on Delta T criteria with 136°F

Run #6

This run was performed on September 14th 2017 burning coal. It lasted 290 minutes and a 0.626 kg/hr burn rate was obtained & emission at 5.4 gr/hr.

Run #7

This run was performed on September 18th 2017 burning crib wood. It lasted 152 minutes and a 1.18 kg/hr burn rate was obtained & emission at 0.8 gr/hr. This run done to replace run #3

Run #8

This run was performed on September 19th 2017 burning crib wood. It lasted 180 minutes and a 0.997 kg/hr burn rate was obtained & emission at 0.7 gr/hr. This run is done as a confirmation of run 7 and to replace run #3

Run #9

This run was performed on September 20th 2017 burning Coal. It lasted 250 minutes and a 0.776 kg/hr burn rate was obtained & emission at 5.7 gr/hr.

Run #10

This run was performed on September 21th 2017 burning Coal. It lasted 360 minutes and a 0.53 kg/hr burn rate was obtained & emission at 3.7 gr/hr.

Client: Woodstock Soapstone

Model: 212N Navajo Hybrid Wood/Coal, Model 212S Survival Hybrid Wood/Coal

- Details: Refer to the front page of each test run data sheets found in appendix for the detailed test sequence showing air supply settings and adjustments, fuel bed adjustments and operational specifics of the test unit.

Test fuel cribs

- Type of wood: Douglas fir, grade c or better, 19 to 25% dry basis moisture content
- Type of Coal : Fruitland Coal, provided by EPA
- Description: for each test, description of the fuel crib is found on the front page of each test run data sheet together with photograph in appendix.

3.5 START-UP OPERATION

The complete manufacturer's firing procedure of each burn rate category is fully described in appendix 13.

3.6 SAMPLING LOCATIONS

Particulate samples are collected from the dilution tunnel at a point 15 feet from the tunnel entrance. The tunnel has two elbows and two mixing baffles in the system ahead of the sampling section. The sampling section is a continuous 15 foot section of 8 inch diameter pipe straight over its entire length. Tunnel velocity pressure is determined by a standard pitot tube located 48 inches from the beginning of the sampling section. Thermocouple is installed on the pitot tube to measure the dry bulb temperature. MC is assumed, as allowed, to be 4%. Tunnel samplers are located 56 inches downstream of the pitot tube and 16 inches upstream from the end of this section.

3.7 DRAWINGS

Various drawings of the stack gas sampling train and of dilution tunnel system are found in Appendix 1.

3.8 EMISSIONS EFFICIENCY TESTING EQUIPMENT LIST

The complete test equipment list together with all corresponding calibration data can be found in Appendix 3.

4 SAMPLING METHODS

4.1 PARTICULATE SAMPLING

Particulates were sampled in strict accordance with ASTM E2515. This method uses two identical sampling systems with Gelman A/E 61631 binder free (or equivalent), 47 mm diameter filters. The dryers used in the sample systems are filled with "Drierite" before each test run.

5 QUALITY ASSURANCE

5.1 INSTRUMENT CALIBRATION

5.1.1 GAS METERS

At the conclusion of each test program the gas meters are verified using the reference dry gas meter. This process involves sampling the train operation for 1 cubic foot of volume. With readings made to .01 fr', the resolution is 1 %, giving an accuracy higher than the 2% required by the standard.

5.1.2 SCALES

Before each test program, the different scales used are checked with traceable calibration weights to ensure their accuracy.

5.1.3 GAS ANALYZERS

The continuous analyzers are zeroed and spanned before each test with NBS traceable gases. A mid-scale multi-component calibration gas is then analyzed (values are recorded). At the conclusion of a test, the instruments are checked again with zero, span and calibration gases (values are recorded only). The drift in each meter is then calculated and must not exceed 5% of the scale used for the test.

5.2 TEST METHOD PROCEDURES

5.2.1 LEAK CHECK PROCEDURES

Before and after each test, each sample train is tested for leaks. Leakage rates are measured and must not exceed 0.02 CFM or 4% of the sampling rate. Leak checks are performed checking the entire sampling train. Pre-test and post-test leak checks are conducted with a vacuum of 5 inches of mercury. Vacuum is monitored during each test and the highest vacuum reached is then used for the post-test vacuum value. If leakage limits are not met, the test run is rejected. During these tests, the vacuum is typically less than 2 inches of mercury. Thus, leakage rates reported are expected to be much higher than actual leakage during the tests.

5.2.2 TUNNEL VELOCITY FLOW MEASUREMENT

The tunnel velocity is calculated from a center point pitot tube signal multiplied by an adjustment factor. This factor is determined by a traverse of the tunnel as prescribed in EPA Method 1. Final tunnel velocities and flow rates are calculated from EPA Method 2, Equation 6.9 and 6.10. (Tunnel cross sectional area is the average from both lines of traverse.)

Pitot tubes are cleaned before each test and leak checks are conducted after each test.

5.2.3 PM SAMPLING PROPORTIONALITY (ASTM E2515)

Proportionalities were calculated in accordance with ASTM E2515. The data and results are found in appendix.

APPENDIX 1: Raw data, forms and results

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	1
Date	05-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	wood and coal stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	N.A.	BTU/h Donnée fournie par le manufacturier
Targeted category	4	
Targeted output	N.A.	BTU/h
Cp steel	N.A.	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	05-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension
Fuel specie	D. Fir
HHV	19810,0 kJ/kg
%C	48,7
%H	6,9
%O	43,9
%Ash	0,5
HHV	8519,2 Btu/lb
LHV	7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	99,9	100,2
Barometer (in.Hg):	29,500459	29,58904886
Dry Bulb (F):	75,02	78,06
Humidity (%):	57	51
Air velocity (ft/min)	6	2

DGM #1	Final:	20016,265	cuft
	Initial:	19999,381	cuft
DGM #2	Final:	17014,430	cuft
	Initial:	16997,811	cuft
DGM room			

	Final:	566797,500	Liter
	Initial:	566319,400	Liter
	Final:	481794,980	Liter
	Initial:	481324,400	Liter
	Final:	622,680	cuft
	Initial:	612,340	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

327

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	05-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,33 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,953

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,051	70,81	0,2258
B center	0,050	70,19	0,2236
A1	0,048	70,89	0,2191
A2	0,054	70,78	0,2324
A3	0,044	70,34	0,2098
A4	0,040	70,32	0,2000
B1	0,040	70,340	0,2000
B2	0,049	70,020	0,2214
B3	0,043	70,010	0,2074
B4	0,041	70,000	0,2025
AVERAGE	0,0460	70,3700	0,2142

Project nu.	pi 21054
Date	05-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number															
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,0680	0,1266	0,1246	11,9023	109,2839	0,1277	0,1291	11,9869	107,6456	0,1263	0,1250	11,8930	0,1263	01/09/2017	17:00
Before (6)	61,0681	0,1265	0,1247	11,9024	109,2840	0,1276	0,1290	11,9868	107,6457	0,1262	0,1251	11,8931	0,1264	05/09/2017	09:00
After (1)	61,0686	0,1265	0,1248	11,9034	109,2840	0,1276	0,1290	11,9868	107,6463	0,1261	0,1250	11,8943	0,1265	05/09/2017	16:45
After (2)	61,0684	0,1264	0,1247	11,9035	109,2840	0,1274	0,1286	11,9879	107,6462	0,1260	0,1249	11,8944	0,1264	12/09/2017	08:00
After (3)	61,0684	0,1264	0,1247	11,9034	109,2840	0,1274	0,1286	11,9878	107,6462	0,1260	0,1249	11,8945	0,1264	13/09/2017	08:00
After (4)															
After (5)															
After (6)	61,0684	0,1264	0,1247	11,9034	109,2840	0,1274	0,1286	11,9878	107,6462	0,1260	0,1249	11,8945	0,1264	13/09/2017	08:00
Difference	0,0003	-0,0001	0,0000	0,0010	0,0000	-0,0002	-0,0004	0,0010	0,0005	-0,0002	-0,0002	0,0014	0,0000		
Total (mg)		1,2				1,6				1,5			0		
Total ajusté (mg)		1,20				1,60				1,50					

Project nu.	pi 21054
Date	05-09-2017
Technicien	

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,93 g/hr
 Burn Rate : 2,004 Dry kg/hr

Test Duration: 87 min

PRESSURE FACTOR: DGM 1 0,96150
 DGM 2 0,96635
 DGM 3 0,98746

BAROMETRIC PRESSURE
 Average: 29,544754 in Hg
 Start: 29,500459 in Hg
 End: 29,589049 in Hg

TEMPERATURE FACTORS DGM 1 0,98008
 DGM 2 0,97959
 DGM 3 0,98489

DGM CONTROLLER VALUES

DGM 1 Final: 20016,265 Cuft
 Initial: 19999,381 Cuft

VOLUMES SAMPLED DGM 1 15,704 SCft
 DGM 2 15,668 SCft
 DGM 3 9,734 SCft

DGM 2 Final: 17014,430 Cuft
 Initial: 16997,811 Cuft

DGM #3 Final: 622,680 Cuft
 Initial: 612,340 Cuft

TOTAL TUNNEL VOLUME : 13713

TEMPERATURES

SAMPLE RATIOS
 Sample Train 1: 873,232
 Sample Train 2: 875,192

DGM 1 538,734 °R
 DGM 2 538,999 °R

Paticulate concentration
 Sample Train 1 **0,000102** g/dscf
 Sample Train 2 **0,000096** g/dscf
 Room **0,000000** g/dscf

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

TUNNEL FLOW RATE: 157,620 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **1,40** g
 Sample Train 2 **1,31** g

PARTICULATE CATCH
 Total Sample Train 1: 1,60 mg
 Total Sample Train 2: 1,50 mg
 Total Sample Train 1 1st hour: 1,20 mg

EMISSION RATES
 Sample Train 1 **0,96** g/hr
 Sample Train 2 **0,91** g/hr

1st hour emission rate **1,05** g/hr

DEVIATION: 3,11%

Cs Train 1 Train 2
 0,0001019 9,57338E-05

Manufacturer: woodstock soapstone
 Model: navajo

Run: 1
 Project #: pi 21054
 Test Duration: 87 min

	HHV	LHV
Eff	75,68%	81,80%
Comb Eff	99,50%	99,50%
HT Eff	76,06%	82,21%
Output	28 772	kJ/h
Burn Rate	1,92	kg/h
Grams CO	13	g
Input	38 017	kJ/h
MC wet	17,81	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

Ultimate CO₂
 CO_{2-ult} 19,64
 F₀
 1,061

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency: 75,68%	Dry Molecular Weight (M _d)	29,83
Combustion Efficiency: 99,50%	Dry Moles Exhaust Gas (N _e):	454,40
Heat Transfer Efficiency: 76,06%	Air Fuel Ratio (A/F)	13,04

Heat Output:	27 294 Btu/h	28 772 kJ/h
Heat Input:	36 064 Btu/h	38 017 kJ/h
Burn Duration:	1,45 h	
Burn Rate:	4,23 lb/h	1,919 kg/h
Stack Temp:	400,5 Deg. F	204,7 Deg. C

Mr Woodstock

PRE / POST CHECKS

Date: 2017-09-05

Manufacturer: Woodstock Soapstone

Model: Navajo

Project #: PT 20154

Run: 1

Tech: MM

Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
E-M-191	7:00	ok	ok

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet

6 (max50 Fpm)	2 (max50 Fpm)
---------------	---------------

Smoke Capture Check.....

ok	ok
----	----

Picture.....

4 sides ok	ok
------------	----

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

2017-09-05

Date Dilution Tunnel Cleaned.....

2017-09-05

Induced Draft Check (max 0.005 H2O).....

ok

Traverse before ignition.....

ok

Flow Rate 140 cfm ±10%.....

ok

Temperature System:

Ambient (65°-90°F).....

ok °F

Wood Heater Surface (±125°F).....

ok °F

Proportional Checks:

Thermocouple check.....

ok

Pitot Clean.....

ok

Pitot verification.....

ok

Sampling Train ID Numbers:

Probe.....

Train 1 st hour	Train 1	Train 2
01	35	50
27	210	423
29	420	424
11	11	12
ok	ok	ok

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (<90°F).....



mm wood stock

SAMPLING EQUIPMENT CHECK OUT

Date: 2017 09-05 Manufacturer: WOODSTOVE Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 1 Tech: MM Reviewer: DP

Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	- 15	- 15	- 15	- 15	- 15	- 15
Final 1minute DGM (Liter)	566319.26	566798.42	566319.34	566798.51	481323.26	481795.91
Initial 1minute DGM (Liter)	566319.26	566798.42	566319.33	566798.50	481323.16	481795.89
Change © (Liter)	∅	∅	.01	.01	.01	.02
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	- 5	- 5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H ₂ O static	Pre Test 0.4-0.5 H ₂ O velocity	Post Test 3 H ₂ O Static	Post Test 0.4-0.5 H ₂ O velocity
Vacuum (inches Hg.)	3	.5	3	.4
Check OK (no change after 15 sec.)	ok	ok	ok	ok

PRE-TEST SCALE AUDIT

Date: 2017-09-08 Manufacturer: WOODSTOCK SCAPSTONE Model: NAVAJO
 Project #: PI 2154 Run: 1 Tech: MR Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2020-09-05 Manufacturer: WOODSTOCK SURVEILLANT Model: NAVAJO
 Project #: PT 20154 Run: 1 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 99.9 (KPa.) Static pressure (P_q) 0.33 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A - Centroid	3.00	3.50	4	0.051	70.81
B - Centroid	3.00	3.50	4	0.050	70.19
A-1	0.40	0.50	0.50	0.048	70.89
A-2	1.50	1.75	2	0.054	70.78
A-3	4.50	5.25	6	0.044	70.34
A-4	5.60	6.5	7.5	0.040	70.32
B-1	0.40	0.50	0.50	0.040	70.34
B-2	1.50	1.75	2	0.049	70.02
B-3	4.50	5.25	6	0.043	70.01
B-4	5.60	6.5	7.5	0.041	70.00
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

 C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.

 Δ_p = manometer reading (inches H₂O)

 T_s = average absolute dilution tunnel temperature (°F + 460)

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

 K_p = 85.49 pitot tube constant, (conversion factor for English units)

 Δ_p avg. = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

Date: 2017-09-05 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVAJO
 Project #: PT 20154 Run: 1 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2986	300	0996	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	1798	1800	972	1000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0006	2990	0999	0006	0.02	0004	0.15	0003	0.05	✓	
CO ₂	0005	1798	970	0	0.02	0005	0.5	002	0.5	✓	

Date: 2017-09-05 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 1 Tech: M.M. Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	566 797.50	481 794.98	622.68
Initial (Liter)	566 319.40	481 324.40	613.34

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	99.9	100.2
Dry Bulb (F):	75.02	78.06
Humidity (%):	57	51

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2017-09-05 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 10154 Run: 1 Tech: MR Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size			Weight	Meter Moisture Content (% dry)*				
2	x 4	x 5 in.	0 772 lbs.	223	229	216	216	216
2	x 4	x 5 in.	0 628 lbs.	220	220	213	219	216
2	x 4	x 5 in.	0 630 lbs.	213	219	220	226	223
2	x 4	x 5 in.	0 636 lbs.	223	229	223	223	228
2	x 4	x 5 in.	0 678 lbs.	216	218	221	213	218
2	x 4	x 5 in.	0 682 lbs.	228	219	216	218	219
2	x 4	x 5 in.	0 750 lbs.	229	223	209	228	219
2	x 4	x 5 in.	0 900 lbs.	216	213	219	208	209
2	x 4	x 5 in.	0 648 lbs.	203	209	216	218	219
2	x 4	x 5 in.	0 708 lbs.	223	226	213	224	226
2	x 4	x 5 in.	0 686 lbs.	213	219	219	217	216
2	x 4	x 5 in.	0 652 lbs.	216	213	216	219	210
2	x 4	x 5 in.	0 644 lbs.	209	203	210	209	206
2	x 4	x 5 in.	0 634 lbs.	216	211	210	212	214
2	x 4	x 5 in.	0 684 lbs.	220	213	208	218	213
2	x 4	x 5 in.	0 684 lbs.	220	223	213	216	214
2	x 4	x 5 in.	0 638 lbs.	213	216	209	214	216
2	x 4	x 5 in.	0 648 lbs.	203	206	209	201	203
	x	x in.						
	x	x in.						
	x	x in.						
	x	x in.						
	x	x in.						

TEST LOAD WEIGHT: 1230 lbs

FUEL DATA

Date: 2017-09-05 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PJ 20154 Run: 1 Tech: MM Reviewer: NP

FUEL DESCRIPTION:
 Type of wood :

TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*						
1 1/2 x 3 1/2 x 15 1/4 in.	1 526 lbs.	220	213	216	213	220		
1 1/2 x 3 1/2 x 15 1/4 in.	1 640 lbs.	219	209	216	218	213		
1 1/2 x 3 1/2 x 15 1/4 in.	1 756 lbs.	213	220	221	216	213		
1 1/2 x 3 1/2 x 15 1/4 in.	1 414 lbs.	219	216	218	213	214		
1 1/2 x 3/4 x 5 in.	0 120 lbs.			218				
1 1/2 x 3/4 x 5 in.	0 122 lbs.			210				
1 1/2 x 3/4 x 5 in.	0 124 lbs.			221				
1 1/2 x 3/4 x 5 in.	0 120 lbs.			226				
1 1/2 x 3/4 x 5 in.	0 120 lbs.			218				
1 1/2 x 3/4 x 5 in.	0 124 lbs.			219				
1 1/2 x 3/4 x 5 in.	0 120 lbs.			215				
1 1/2 x 3/4 x 5 in.	0 106 lbs.			219				
1 1/2 x 3/4 x 5 in.	0 122 lbs.			216				
1 1/2 x 3/4 x 5 in.	0 116 lbs.			220				
1 1/2 x 3/4 x 5 in.	0 132 lbs.			220				
1 1/2 x 3/4 x 5 in.	0 132 lbs.			221				
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							

TEST LOAD WEIGHT: 779 lbs Min 20%: 156 Max 25%: 195

Date: 2017-09-01 Manufacturer: Woodstock soapstone Model: MAVAJO
 Project #: PI 20154 Run: 1 Tech: MM Reviewer: NP

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Pre-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
			01	27	29	4	35	210	420	32	626
	2017-09-01	17:30	610686	01266	01246	119023	1092839	01277	01291	119869	01263
	2017-09-01	9:00	610681	01265	01247	119024	1092840	01276	01290	119868	01264

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Post-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
			01	27	29	4	35	210	420	32	626
	2017-09-01	16:45	610686	01265	01248	119049	1092840	01276	01287	119887	01265
	2017-09-12	8:00	610684	01264	01247	119035	1092840	01274	01286	119879	01264
	2017-09-13	8:00	610684	01264	01247	119034	1092840	01274	01286	119878	01264

Date: 2017-09-01 Project #: PT 20154 Run: 1 Manufacturer: woop stock Soapstone Model: MAVAJO
 Tech: M Reviewer: DR

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	50	423	424	54
2017-09-01	17:00	1076452	01263	01250	118930
2017-09-05	9100	1076457	01262	01251	118931

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	50	423	424	54
2017-09-05	16:45	1076463	01461	01250	118953
		1076462	01460	01249	118944

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	2
Date	06-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	06-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	100,7	100,6
Barometer (in.Hg):	29,736699	29,70716882
Dry Bulb (F):	68,18	78,8
Humidity (%):	67	50
Air velocity (ft/min)	2	5

DGM #1	Final:	20041,799	cuft
	Initial:	20016,472	cuft
DGM #2	Final:	17039,353	cuft
	Initial:	17014,533	cuft
DGM room			

	Final:	567520,550	Liter
	Initial:	566803,360	Liter
	Final:	482500,740	Liter
	Initial:	481797,900	Liter
	Final:	638,550	cuft
	Initial:	622,680	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

183

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	06-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,34 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,942

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,053	70,12	0,2302
B center	0,052	69,85	0,2280
A1	0,042	70,06	0,2049
A2	0,054	69,99	0,2324
A3	0,043	69,9	0,2074
A4	0,042	69,88	0,2049
B1	0,041	69,800	0,2025
B2	0,050	69,950	0,2236
B3	0,047	69,990	0,2168
B4	0,043	70,260	0,2074
AVERAGE	0,0467	69,9800	0,2158

Project nu.	pi 21054
Date	06-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	17	406	410	8	42	411	412	52	43	413	415	53	416		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	108,9496	0,1248	0,1255	11,9350	110,3080	0,1290	0,1250	11,8170	109,1630	0,1271	0,1299	11,7576	0,1249	05/09/2107	17:30
Before (6)	108,9497	0,1248	0,1256	11,9349	110,3079	0,1291	0,1249	11,8169	109,1629	0,1272	0,1298	11,7577	0,1249	06/09/2017	09:00
After (1)	108,9511	0,1264	0,1258	11,9373	110,3089	0,1285	0,1248	11,8196	109,1641	0,1290	0,1300	11,7600	0,1252	06/09/2017	14:00
After (2)	108,9505	0,1260	0,1257	11,9360	110,3083	0,1284	0,1248	11,8184	109,1635	0,1287	0,1300	11,7588	0,1250	12/09/2017	08:00
After (3)	108,9504	0,1260	0,1257	11,9359	110,3082	0,1284	0,1248	11,8183	109,1635	0,1288	0,1300	11,7588	0,1250	13/09/2017	08:00
After (4)															
After (5)															
After (6)	108,9504	0,1260	0,1257	11,9359	110,3082	0,1284	0,1248	11,8183	109,1635	0,1288	0,1300	11,7588	0,1250	13/09/2017	08:00
Difference	0,0007	0,0012	0,0001	0,0010	0,0003	-0,0007	-0,0001	0,0014	0,0006	0,0016	0,0002	0,0011	0,0001		
Total (mg)		3				3,9				3,5			0,1		
Total ajusté (mg)		2,90				3,80				3,40					

Project nu.	pi 21054
Date	06-09-2017
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 1,5 g/hr

Burn Rate : 1,319 Dry kg/hr

Test Duration: 134 min

PRESSURE FACTOR: DGM 1 0,96677
 DGM 2 0,97199
 DGM 3 0,99338

BAROMETRIC PRESSURE
 Average: 29,721934 in Hg
 Start: 29,736699 in Hg
 End: 29,707169 in Hg

TEMPERATURE FACTORS DGM 1 0,98090
 DGM 2 0,98019
 DGM 3 0,98714

DGM CONTROLLER VALUES

DGM 1 Final: 20041,799 Cuft
 Initial: 20016,472 Cuft

VOLUMES SAMPLED DGM 1 23,706 SCft
 DGM 2 23,553 SCft
 DGM 3 15,064 SCft

DGM 2 Final: 17039,353 Cuft
 Initial: 17014,533 Cuft

DGM #3 Final: 638,550 Cuft
 Initial: 622,680 Cuft

TOTAL TUNNEL VOLUME : 21835

TEMPERATURES

DGM 1 538,281 °R
 DGM 2 538,669 °R

SAMPLE RATIOS
 Sample Train 1: 921,083
 Sample Train 2: 927,066

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

Paticulate concentration
 Sample Train 1 **0,000165** g/dscf
 Sample Train 2 **0,000149** g/dscf
 Room **0,000007** g/dscf

TUNNEL FLOW RATE: 162,948 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **3,45** g
 Sample Train 2 **3,10** g

PARTICULATE CATCH
 Total Sample Train 1: 3,90 mg
 Total Sample Train 2: 3,50 mg
 Total Sample Train 1 1st hour: 3,00 mg

EMISSION RATES
 Sample Train 1 **1,54** g/hr
 Sample Train 2 **1,39** g/hr

1st hour emission rate **2,76** g/hr

DEVIATION: 5,31%

Cs Train 1 Train 2
 0,0001645 0,000148602

Manufacturer: odstock soapstone
 Model: navajo

Run: 2
 Project #: pi 21054
 Test Duration: 134 min

	HHV	LHV
Eff	79,22%	85,62%
Comb Eff	99,50%	99,50%
HT Eff	79,61%	86,05%
Output	20 702	kJ/h
Burn Rate	1,32	kg/h
Grams CO	31	g
Input	26 134	kJ/h
MC wet	17,68	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

Ultimate CO₂
 CO_{2-ut} 19,64
 F_o
 1,061

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	79,22%	Dry Molecular Weight (M _d) 29,80
Combustion Efficiency:	99,50%	Dry Moles Exhaust Gas (N _r): 461,44
Heat Transfer Efficiency:	79,61%	Air Fuel Ratio (A/F) 13,24

Heat Output:	19 638 Btu/h	20 702 kJ/h
Heat Input:	24 791 Btu/h	26 134 kJ/h
Burn Duration:	2,23 h	
Burn Rate:	2,91 lb/h	1,319 kg/h
Stack Temp:	304,7 Deg. F	151,5 Deg. C

Date: 2017-09-06 Manufacturer: Woodstock Soapstone Model: NAVAJO
Project #: PI 20154 Run: 2 Tech: MR Reviewer: DO

-	Kindling and 3 piece	400 LBS	Start Fire
-	At 34 LBS	close Door	and by pass
	At 200 LBS	adjust 4 LBS	pre load
	At 44 LBS	adjust 4.6 LBS	pre load
	At 500 LBS	close air inlet	(Drill bit 0.78 in)
	At 25 LBS	Brush ^{min.} feet	Remove fire
	At 17 LBS	in the	load
	open air	inlet	
	close Door	and by pass	immediately
	close air inlet	immediately	(Drill bit 0.78 in)
TEST LOAD CONFIGURATION			

PRE / POST CHECKS

Date: 2017.09.06 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PJ 20154 Run: 2 Tech: MM Reviewer: DD

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM 191	7:15	ok	ok

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet

2 (max50 Fpm)	5 (max50 Fpm)
ok	ok
4 sides	ok
ok	ok

Smoke Capture Check

Picture

Wood Heater Conditions:

Date Wood Heater Stack Cleaned

Date Dilution Tunnel Cleaned

Induced Draft Check (max 0.005 H2O)

Traverse before ignition

Flow Rate 140 cfm ±10%

2017-09-05 05 m.m.
2017-09-05
ok
ok

ok

Temperature System:

Ambient (65°-90°F)

ok	°F
ok	°F

Wood Heater Surface (±125°F)

Proportional Checks:

Thermocouple check

Pitot Clean

Pitot verification

ok
ok
ok

Sampling Train ID Numbers:

Probe

Filter Front

Filter Back

Filter Thermocouple

Filter (<90°F)

Train 1 st hour	Train 1	Train 2
17	42	43
406	411	413
410	412 412	415
11	h	12
ok	ok	ok



SAMPLING EQUIPMENT CHECK OUT

Date: 10/17/09 Manufacturer: WOOD STOCK Soap Stone Model: NAVAJO
 Project #: PT 20154 Run: 2 Tech: Mr Reviewer: DO

Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	566802.76	567521.58	566803.10	567521.68	481796.92	482501.75
Initial 1minute DGM (Liter)	566802.66	567521.52	566802.08	567521.65	481796.90	482503.74
Change © (Liter)	210.10	903	002	903	902	001
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H2o static	Pre Test 0.4-0.5 H2o velocity	Post Test 3 H2o Static	Post Test 0.4-0.5 H2o velocity
Vacuum (inches Hg.)	3	.4	3	.5
Check OK (no change after 15 sec.)	ok	ok	ok	ok

PRE-TEST SCALE AUDIT

Date: 2017-09-06 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 2 Tech: MM Reviewer: D

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	4.4 lbs, Class F	4.4 lbs
Wood	EM-090	4.4 lbs, Class F	4.4 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017-09-06 Manufacturer: WOODSLOCK SWAPSTONE Model: NAVAJO
 Project #: pl 20154 Run: 2 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 100.7 (KPa.) Static pressure (P_q) 0.34 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ _p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.053	70.12
B - Centroid	3.00	3.50	4	0.052	69.85
A-1	0.40	0.50	0.50	0.042	70.06
A-2	1.50	1.75	2	0.054	69.99
A-3	4.50	5.25	6	0.043	69.90
A-4	5.60	6.5	7.5	0.042	69.88
B-1	0.40	0.50	0.50	0.041	69.80
B-2	1.50	1.75	2	0.050	69.95
B-3	4.50	5.25	6	0.047	69.99
B-4	5.60	6.5	7.5	0.043	70.26
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

- Where,
- C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.
- Δ_p = manometer reading (inches H₂O)
- T_s = average absolute dilution tunnel temperature (°F + 460)
- P_s = absolute dilution tunnel gas pressure or P_{bar} + P_{qg}
- P_q = static pressure in. H₂O { 13.6 }
- M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)
- K_p = 85.49 pitot tube constant, (conversion factor for English units)

Δ_{p,avg}. = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

 Date: 2017-09-06 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVAJO
 Project #: PI 2154 Run: 2 Tech: MR Reviewer: [Signature]

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2981	300	0999	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	1803	1800	977	1000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0000	2961	1003	0.006	0.02	0.02	0.15	0.004	0.05	✓	
CO ₂	000	1788	974	0	0.02	0.15	0.5	0.03	0.5	✓	

TEST DATA LOG

Date: 20170906 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVDJ0
 Project #: PI 20154 Run: 2 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	567520.55	482500.74	638.55
Initial (Liter)	566803.36	481797.90	622.68

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100.7	100.6
Dry Bulb (F):	68.18	78.8
Humidity (%):	67.0	50

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2017-09-06 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PL 20154 Run: 2 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0.588 lbs.	226	21.9	221	21.9	216
2 x 4 x 5 in.	0.838 lbs.	209	213	223	226	221
2 x 4 x 5 in.	0.596 lbs.	223	221	220	219	218
2 x 4 x 5 in.	0.690 lbs.	224	226	221	220	223
2 x 4 x 5 in.	0.636 lbs.	219	216	218	213	218
2 x 4 x 5 in.	0.688 lbs.	223	226	229	228	219
2 x 4 x 5 in.	0.644 lbs.	221	220	219	216	213
2 x 4 x 5 in.	0.688 lbs.	226	221	223	224	223
2 x 4 x 5 in.	0.678 lbs.	221	219	216	211	218
2 x 4 x 5 in.	0.728 lbs.	213	218	219	215	214
2 x 4 x 5 in.	0.768 lbs.	218	218	210	219	213
2 x 4 x 5 in.	0.826 lbs.	223	226	221	223	222
2 x 4 x 5 in.	0.824 lbs.	216	219	217	218	219
2 x 4 x 5 in.	0.668 lbs.	219	216	219	213	216
2 x 4 x 5 in.	0.930 lbs.	223	226	226	221	223
2 x 4 x 5 in.	0.634 lbs.	221	226	221	213	216
2 x 4 x 5 in.	0.738 lbs.	213	212	210	199	196
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 1721 lbs

FUEL DATA

Date: 2017-09-06 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVAJO
 Project #: PJ 20154 Run: 2 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*						
1 1/4 x 3 1/2 x 15 1/4 in.	175 lbs.	22.3	22.6	21.1	21.9	21.8		
1 1/4 x 3 1/2 x 15 1/4 in.	146 lbs.	21.6	21.3	21.0	21.2	21.4		
1 1/4 x 3 1/2 x 15 1/4 in.	1706 lbs.	21.6	21.0	20.9	20.9	21.2		
1 1/4 x 3 1/2 x 15 1/4 in.	1488 lbs.	21.5	21.6	21.3	21.9	21.8		
1 1/4 x 3/4 x 5 in.	0122 lbs.			21.3				
1 1/4 x 3/4 x 5 in.	0120 lbs.			21.6				
1 1/4 x 3/4 x 5 in.	0122 lbs.			21.4				
1 1/4 x 3/4 x 5 in.	0122 lbs.			20.9				
1 1/4 x 3/4 x 5 in.	0120 lbs.			21.3				
1 1/4 x 3/4 x 5 in.	0126 lbs.			21.9				
1 1/4 x 3/4 x 5 in.	0130 lbs.			22.0				
1 1/4 x 3/4 x 5 in.	0120 lbs.			21.6				
1 1/4 x 3/4 x 5 in.	0118 lbs.			21.8				
1 1/4 x 3/4 x 5 in.	0132 lbs.			21.5				
1 1/4 x 3/4 x 5 in.	0116 lbs.			21.0				
1 1/4 x 3/4 x 5 in.	0124 lbs.			19.9				
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							
x x in.	lbs.							

TEST LOAD WEIGHT: 790 lbs Min 20%: 158 Max 25%: 198

Date: 2017-09-05 Manufacturer: Woodstock Soapstone Model: MAVA JB
 Project #: PJ 20154 Run: 2 Tech: Mr Reviewer: ND

Pre-test Weight Record		SYSTEM 1 - 1 st hour							SYSTEM 1			
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	gaskets	Blank
2017-09-05	17:30	108,9496	0,1248	0,1255	11,9350	110,3080	0,1290	0,1250	11,8170	0,1249	11,8170	0,1249
2017-09-06	9:00	108,9497	0,1248	0,1256	11,9349	110,3079	0,1291	0,1249	11,8169	0,1249	11,8169	0,1249

Post-test Weight Record		SYSTEM 1 - 1 st hour							SYSTEM 1			
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Back Filter Number	gaskets	Blank
2017-09-05	14:00	108,9511	0,1264	0,1258	11,9373	110,3089	0,1285	0,1248	11,8196	0,1252	11,8196	0,1252
2017-09-12	8:00	108,9505	0,1268	0,1257	11,9360	110,3083	0,1284	0,1248	11,8184	0,1250	11,8184	0,1250
2017-09-13	8:00	108,9504	0,1260	0,1257	11,9359	110,3082	0,1284	0,1248	11,8183	0,1250	11,8183	0,1250



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017.09.05 Project #: PI 20154 Run: 2
 Manufacturer: Woodstock soapstone Model: NAVAJO
 Tech: MM Reviewer: DP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2017.09.05	17:30	413	415	53	
2017.09.06	9:00	1091630	01271	01299	117576
		1091629	01272	01298	117577

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2017.09.05	14:00	43	413	415	53
2017.09.12	8:00	1091641	01290	01300	117600
2017.09.13	8:00	1091635	01287	01300	117588
		1091635	01288	01300	117588

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	3
Date	07-09-2017
Technicien	m.m
Project #	pi 20154

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood and coal stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20154
Date	07-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	100,2	100,1
Barometer (in.Hg):	29,589049	29,55951887
Dry Bulb (F):	74,84	77,89
Humidity (%):	55,3	51
Air velocity (ft/min)	4	5

DGM #1	Final:	20077,298	cuft
	Initial:	20041,851	cuft
DGM #2	Final:	17074,501	cuft
	Initial:	17039,413	cuft
DGM room			

	Final:	568525,750	Liter
	Initial:	567522,020	Liter
	Final:	483496,010	Liter
	Initial:	482502,440	Liter
	Final:	660,640	cuft
	Initial:	638,550	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

207

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 20154
Date	07-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: in. H2O
 Barometer: in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,951

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,058	73,35	0,2408
B center	0,057	73,29	0,2387
A1	0,051	73,31	0,2258
A2	0,059	73,36	0,2429
A3	0,050	73,34	0,2236
A4	0,047	73,4	0,2168
B1	0,046	73,330	0,2145
B2	0,056	73,310	0,2366
B3	0,048	73,290	0,2191
B4	0,049	73,410	0,2214
AVERAGE	0,0521	73,3390	0,2280

Project nu.	pi 20154
Date	07-09-2017
Technicien	<input type="text" value="m.m"/>

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	9	400	401	6	11	402	403	10	13	405	407	11	408		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4478	0,1239	0,1257	12,0550	93,7268	0,1259	0,1261	11,6463	95,1517	0,1261	0,1263	12,0464	0,1253	06/09/2017	17:00
Before (6)	61,4477	0,1238	0,1257	12,0551	93,7267	0,1258	0,1260	11,6464	95,1516	0,1262	0,1264	12,0465	0,1254	07/09/2017	09:00
After (1)	61,4485	0,1400	0,1259	12,0571	93,7280	0,1308	0,1257	11,6485	95,1532	0,1467	0,1259	12,0493	0,1255	07/09/2017	14:00
After (2)	61,4483	0,1372	0,1258	12,0561	93,7273	0,1303	0,1257	11,6478	95,1529	0,1451	0,1258	12,0480	0,1255	12/09/2017	08:00
After (3)	61,4483	0,1372	0,1258	12,0561	93,7273	0,1303	0,1257	11,6478	95,1529	0,1451	0,1258	12,0480	0,1255	13/09/2017	08:00
After (4)															
After (5)															
After (6)	61,4483	0,1372	0,1258	12,0561	93,7273	0,1303	0,1257	11,6478	95,1529	0,1451	0,1258	12,0480	0,1255	13/09/2017	08:00
Difference	0,0006	0,0134	0,0001	0,0010	0,0006	0,0045	-0,0003	0,0014	0,0013	0,0189	-0,0006	0,0015	0,0001		
Total (mg)		15,1				21,3				21,1			0,1		
Total ajusté (mg)		15,00				21,20				21,00					

Project nu.	pi 20154
Date	07-09-2017
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 6,6 g/hr

Burn Rate : 0,932 Dry kg/hr

Test Duration: 188 min

PRESSURE FACTOR: DGM 1 0,96279
 DGM 2 0,96597
 DGM 3 0,98845

BAROMETRIC PRESSURE
 Average: 29,574284 in Hg
 Start: 29,589049 in Hg
 End: 29,559519 in Hg

TEMPERATURE FACTORS DGM 1 0,98247
 DGM 2 0,98195
 DGM 3 0,98594

DGM CONTROLLER VALUES

DGM 1 Final: 20077,298 Cuft
 Initial: 20041,851 Cuft

VOLUMES SAMPLED DGM 1 33,093 SCft
 DGM 2 33,149 SCft
 DGM 3 20,839 SCft

DGM 2 Final: 17074,501 Cuft
 Initial: 17039,413 Cuft

DGM #3 Final: 660,640 Cuft
 Initial: 638,550 Cuft

TOTAL TUNNEL VOLUME : 32578

TEMPERATURES

DGM 1 537,419 °R
 DGM 2 537,704 °R

SAMPLE RATIOS
 Sample Train 1: 984,437
 Sample Train 2: 982,795

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

Paticulate concentration
 Sample Train 1 **0,000644** g/dscf
 Sample Train 2 **0,000637** g/dscf
 Room **0,000005** g/dscf

TUNNEL FLOW RATE: 173,289 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **20,81** g
 Sample Train 2 **20,58** g

PARTICULATE CATCH
 Total Sample Train 1: 21,30 mg
 Total Sample Train 2: 21,10 mg
 Total Sample Train 1 1st hour: 15,10 mg

EMISSION RATES
 Sample Train 1 **6,64** g/hr
 Sample Train 2 **6,57** g/hr

1st hour emission rate **14,87** g/hr

DEVIATION: 0,56%

Cs Train 1 Train 2
 0,0006436 0,000636527

102,0	309,0	2,4	0,2	10,1	0,0	282,0	75,5	94,1	814,5	292,7	384,0	390,0	530,8
103,0	310,0	2,3	0,2	10,2	0,0	283,6	75,7	94,1	818,0	293,9	385,3	391,1	532,2
104,0	311,0	2,3	0,2	10,2	0,0	284,5	75,8	94,3	820,7	295,1	386,9	392,2	533,5
105,0	312,0	2,2	0,2	10,1	0,0	286,7	75,7	94,4	822,1	296,3	388,4	393,2	535,1
106,0	313,0	2,1	0,2	10,0	0,0	287,2	75,8	94,6	823,1	297,5	390,1	394,2	536,9
107,0	314,0	2,0	0,2	9,9	0,0	289,1	75,7	94,6	823,8	298,8	391,6	395,2	538,1
108,0	315,0	2,0	0,2	9,8	0,0	289,8	75,7	94,6	823,5	300,1	393,1	396,2	539,2
109,0	316,0	1,9	0,2	9,7	0,0	291,6	75,9	95,0	821,1	301,3	394,8	397,4	540,1
110,0	317,0	1,9	0,2	9,6	0,0	292,2	75,8	95,2	819,7	302,7	396,4	398,5	541,0
111,0	318,0	1,9	0,2	9,5	0,0	293,6	75,9	95,3	816,3	304,1	397,9	399,6	541,7
112,0	319,0	1,8	0,2	9,3	0,0	295,2	75,7	95,2	811,1	305,4	399,5	400,5	542,8
113,0	320,0	1,7	0,2	9,1	0,0	296,4	75,8	95,5	806,7	307,0	401,1	401,7	544,4
114,0	321,0	1,7	0,2	8,9	0,0	297,4	75,9	95,6	800,7	308,5	402,6	402,7	546,2
115,0	322,0	1,6	0,2	8,6	0,0	297,6	75,8	95,9	793,2	310,0	404,0	403,8	547,6
116,0	323,0	1,6	0,2	8,4	0,0	298,8	75,9	96,0	785,4	311,4	405,7	404,9	549,0
117,0	324,0	1,6	0,2	8,3	0,0	299,4	76,0	96,2	776,9	313,0	407,1	406,0	550,3
118,0	325,0	1,5	0,2	8,1	0,0	299,4	75,8	96,3	769,7	314,6	408,7	407,2	551,3
119,0	326,0	1,4	0,2	8,0	0,0	299,8	75,7	96,6	760,8	316,2	410,1	408,2	552,1
120,0	327,0	1,4	0,2	7,8	0,0	300,3	75,8	96,5	752,4	317,8	411,5	409,4	552,9
121,0	328,0	1,4	0,2	7,7	0,0	300,6	75,9	96,4	743,9	319,5	412,9	410,5	553,8
122,0	329,0	1,3	0,2	7,7	0,0	299,8	76,0	96,2	736,7	321,1	414,1	411,6	554,7
123,0	330,0	1,3	0,2	7,7	0,0	299,1	76,0	96,5	729,0	322,7	415,6	412,6	555,7
124,0	331,0	1,2	0,2	7,5	0,0	298,9	75,8	96,6	720,3	324,4	416,8	413,5	556,6
125,0	332,0	1,2	0,2	7,3	0,0	299,3	76,0	96,5	710,7	326,2	418,0	414,7	557,8
126,0	333,0	1,2	0,1	7,1	0,0	298,9	76,0	96,4	700,7	327,9	419,1	415,8	558,8
127,0	334,0	1,1	0,1	7,0	0,0	298,1	76,0	96,6	690,8	329,5	420,1	416,8	559,8
128,0	335,0	1,1	0,1	6,9	0,0	297,2	75,8	96,3	681,4	331,2	421,1	417,8	561,0
129,0	336,0	1,1	0,1	6,7	0,0	296,5	75,8	96,5	671,8	332,9	422,0	418,8	562,3
130,0	337,0	1,1	0,1	6,6	0,0	295,3	75,9	96,4	662,1	334,6	422,9	419,8	563,5
131,0	338,0	1,0	0,1	6,5	0,0	294,4	75,9	96,4	652,5	336,2	423,6	420,7	564,7
132,0	339,0	1,0	0,1	6,4	0,0	293,6	76,0	96,4	643,6	337,8	424,4	421,6	566,0
133,0	340,0	0,9	0,1	6,3	0,0	292,4	76,0	96,3	635,3	339,4	425,0	422,5	567,2
134,0	341,0	1,0	0,1	6,2	0,0	291,2	76,0	95,9	627,9	341,1	425,4	423,4	568,5
135,0	342,0	1,0	0,1	6,1	0,0	289,5	75,9	96,2	620,0	342,8	426,0	424,2	569,5
136,0	343,0	0,9	0,1	6,1	0,0	288,6	76,0	96,1	613,6	344,2	426,5	424,9	570,9
137,0	344,0	0,9	0,1	6,0	0,0	286,8	75,9	96,2	607,2	345,8	426,8	425,7	572,3
138,0	345,0	0,9	0,1	6,0	0,0	285,4	75,9	96,0	600,3	347,3	427,3	426,4	573,7
139,0	346,0	0,8	0,1	5,7	0,0	284,1	76,0	95,9	593,4	348,7	427,7	427,1	574,6
140,0	347,0	0,8	0,1	5,7	0,0	284,4	75,9	96,0	581,1	350,0	428,0	427,8	577,3
141,0	348,0	0,8	0,1	5,7	0,0	282,4	76,2	95,9	558,3	351,2	428,2	428,3	580,5
142,0	349,0	0,8	0,0	5,7	0,0	280,0	76,0	95,9	539,7	352,7	428,5	428,7	585,7
143,0	350,0	0,7	0,0	5,8	0,0	277,9	76,0	95,7	525,1	354,2	428,9	429,0	590,3
144,0	351,0	0,7	0,0	5,7	0,0	275,5	76,2	95,7	513,4	355,7	429,9	429,5	593,5
145,0	352,0	0,7	0,0	5,7	0,0	273,6	76,0	95,2	503,0	357,1	430,3	429,9	596,0
146,0	353,0	0,7	0,0	5,6	0,0	271,1	76,2	95,1	494,3	358,7	431,5	430,5	598,2
147,0	354,0	0,7	0,0	5,6	0,0	268,9	76,1	95,4	486,7	360,3	432,6	431,2	600,1
148,0	355,0	0,7	0,0	5,6	0,0	267,0	76,1	95,3	480,5	361,9	433,8	432,1	602,9
149,0	356,0	0,6	0,0	5,5	0,0	265,7	75,9	94,8	474,4	363,1	434,9	432,9	604,8
150,0	357,0	0,6	0,0	5,5	0,0	263,0	75,7	94,9	469,1	364,8	436,1	433,6	606,6
151,0	358,0	0,6	0,1	5,4	0,0	261,9	76,0	94,6	462,8	366,1	437,2	434,5	609,1
152,0	359,0	0,6	0,0	5,3	0,0	259,5	76,3	94,5	454,5	367,6	438,1	435,1	611,5
153,0	360,0	0,6	0,0	5,2	0,0	257,3	76,5	93,8	447,5	368,8	438,6	435,7	613,2
154,0	361,0	0,5	0,0	5,2	0,0	255,3	76,3	93,2	441,5	370,0	439,2	436,5	614,7
155,0	362,0	0,5	0,0	5,1	0,0	253,4	76,4	92,5	435,7	371,1	439,5	436,9	616,1
156,0	363,0	0,5	0,0	5,0	0,0	251,1	76,1	93,5	429,9	372,2	439,9	437,8	617,5
157,0	364,0	0,4	0,0	5,0	0,0	249,5	76,1	92,9	425,4	373,2	439,7	438,2	617,9
158,0	365,0	0,4	0,0	5,0	0,0	247,3	76,6	92,6	421,4	374,2	439,6	438,9	619,3
159,0	366,0	0,4	0,0	5,0	0,0	245,6	76,5	92,9	418,3	375,0	439,3	439,5	620,7
160,0	367,0	0,4	0,0	5,1	0,0	244,3	76,1	92,9	415,2	375,9	438,7	440,1	622,3
161,0	368,0	0,4	0,0	5,1	0,0	242,7	76,0	92,7	412,6	376,7	438,5	440,7	624,3
162,0	369,0	0,4	0,0	5,1	0,0	241,8	76,2	91,7	410,2	377,2	437,9	441,0	626,3
163,0	370,0	0,4	0,0	5,1	0,0	240,5	76,6	92,5	408,1	377,8	437,5	441,5	628,5
164,0	371,0	0,3	0,0	5,1	0,0	239,3	76,5	92,1	406,2	378,4	437,0	441,8	629,9
165,0	372,0	0,3	0,0	5,1	0,0	238,3	76,5	92,4	404,5	378,9	436,6	442,1	629,7
166,0	373,0	0,3	0,0	5,1	0,0	237,3	76,1	92,4	402,4	379,7	436,3	442,7	630,7
167,0	374,0	0,3	0,1	5,1	0,0	236,4	76,5	92,3	400,6	380,3	436,0	443,1	632,2
168,0	375,0	0,3	0,1	5,1	0,0	235,1	76,3	91,9	399,1	380,8	435,5	443,5	633,9
169,0	376,0	0,3	0,1	5,0	0,0	234,2	76,2	91,5	397,5	381,0	435,2	443,6	634,1
170,0	377,0	0,3	0,1	5,0	0,0	233,1	76,2	91,6	396,1	381,4	434,7	443,8	634,2
171,0	378,0	0,3	0,1	5,0	0,0	232,3	76,0	91,6	394,9	381,7	434,1	444,1	634,6
172,0	379,0	0,2	0,1	5,0	0,0	231,4	76,2	91,4	393,9	382,2	433,9	444,3	635,7
173,0	380,0	0,2	0,1	5,0	0,0	230,4	76,3	91,0	392,8	382,4	433,7	444,7	637,4
174,0	381,0	0,2	0,1	5,1	0,0	229,8	76,1	91,2	392,0	382,9	433,2	444,9	639,4
175,0	382,0	0,2	0,1	5,0	0,0	229,1	76,1	90,1	391,2	383,0	432,9	445,2	641,5
176,0	383,0	0,1	0,1	5,0	0,0	227,7	76,3	90,7	389,8	383,0	432,5	445,2	643,1
177,0	384,0	0,2	0,1	5,1	0,0	226,9	76,0	91,1	388,8	383,2	432,0	445,5	644,2
178,0	385,0	0,1	0,1	5,0	0,0	225,8	76,2	90,9	387,8	383,6	431,6	445,5	645,3
179,0	386,0	0,1	0,1	5,0	0,0	224,9	76,0	91,0	387,0	383,7	431,2	445,8	646,1
180,0	387,0	0,1	0,1	5,0	0,0	224,7	75,9	90,7	386,4	384,0	430,9	445,8	646,6
181,0	388,0	0,1	0,1	4,9	0,0	224,4	76,0	90,9	385,7	384,2	430,5	445,8	647,2
182,0	389,0	0,1	0,1	5,0	0,0	223,8	76,1	91,0	385,2	384,3	430,2	445,6	647,9
183,0	390,0	0,1	0,1	4,9	0,0	223,3	76,2	89,8	384,6	384,5	429,9	445,3	649,0
184,0	391,0	0,1	0,1	4,8	0,0	222,3	76,4	89,8	382,6	384,4	429,5	445,3	651,4
185,0	392,0	0,1	0,1	4,8	0,0	222,0	76,5	89,3	381,0	384,4	428,9	444,9	652,3
186,0	393,0	0,1	0,1	4,7	0,0	220,9	76,7	89,3	379,4	384,3	428,3	444,1	651,9
187,0	394,0	0,1	0,1	4,7	0,0	220,1	76,3	89,9	378,5	384,1	427,8	443,4	651,6
188,0	395,0	0,0	0,1	4,6	0,0	219,5	76,0	89,8	377,3	384,1	427,3	442,3	651,0

Manufacturer: woodstock soapstone
 Model: navajo

Run: 3
 Project #: pi 20154
 Test Duration: 188 min

	HHV	LHV
Eff	77,21%	83,46%
Comb Eff	97,02%	97,02%
HT Eff	79,59%	86,02%
Output	14 264	kJ/h
Burn Rate	0,93	kg/h
Grams CO	146	g
Input	18 474	kJ/h
MC wet	17,63	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

Ultimate CO₂
 CO_{2-ult} 19,64
 F₀
 1,060

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency: 77,21%	Dry Molecular Weight (M _d)	29,58
Combustion Efficiency: 97,02%	Dry Moles Exhaust Gas (N _e):	569,80
Heat Transfer Efficiency: 79,59%	Air Fuel Ratio (A/F)	16,35

Heat Output:	13 531 Btu/h	14 264 kJ/h
Heat Input:	17 524 Btu/h	18 474 kJ/h
Burn Duration:	3,13 h	
Burn Rate:	2,06 lb/h	0,933 kg/h
Stack Temp:	241,9 Deg. F	116,6 Deg. C

Date: 2017-09-07 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVAJO
 Project #: PI 20154 Run: 3 Tech: MM Reviewer: DP

- kindling and 3 pieces pre load stone fire
 At 33 LBS close door and by pass
 At 18 LBS adjust 46 LBS pre load
 At 44 LBS adjust 48 LBS pre load
 At 400 LBS close air inlet (sun to diameter)
 At 21 LBS top cover
 At 18 LBS install load
~~open door~~ mm close door and by pass
 immediately

(S)

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 20170907 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 3 Tech: MM Reviewer: BP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM 191	7:00	ok	ok

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet

	4 (max50 Fpm)	5 (max50 Fpm)
Smoke Capture Check.....	ok	ok
Picture.....	ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

2017-09-05

Date Dilution Tunnel Cleaned.....

2017-09-05

Induced Draft Check (max 0.005 H2O).....

ok

Traverse before ignition.....

ok

Flow Rate 140 cfm ±10%.....

ok

Temperature System:

Ambient (65°-90°F).....

ok °F

Wood Heater Surface (±125°F).....

ok °F

Proportional Checks:

Thermocouple check.....

ok

Pitot Clean.....

ok

Pitot verification.....

ok

Sampling Train ID Numbers:

Probe.....

Train 1 st hour	Train 1	Train 2
9	11	13
400	402	405
401	403	407
11	11	12
ok	ok	ok

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (<90°F).....



SAMPLING EQUIPMENT CHECK OUT

Date: 2017-09-07 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: p1 20154 Run: 3 Tech: mm Reviewer: DP

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Unplugged Flow Rate = .25cfm						
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	56752.82	568526.70	56752.96	568526.81	482502.15	483496.92
Initial 1minute DGM (Liter)	56752.82	568526.70	56752.95	568526.80	482502.11	483496.95
Change © (Liter)	0	0.02	0.01	0.01	0.04	0.01
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H ₂ O static	Pre Test 0.4-0.5 H ₂ O velocity	Post Test 3 H ₂ O Static	Post Test 0.4-0.5 H ₂ O velocity
Vacuum (inches Hg.)	3	.4	3	.5
Check OK (no change after 15 sec.)	ok	ok	ok	ok

PRE-TEST SCALE AUDIT

Date: 2017-09-07 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: pl 2015 Run: 3 Tech: Mr Reviewer: DR

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	4.4 lbs, Class F	4.4 lbs
Wood	EM-090	4.4 lbs, Class F	4.4 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017-09-07 Manufacturer: WOODSTOCK SCAPSTONE Model: NAVAJO
 Project #: PI 20154 Run: 3 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 100.2 (KPa.) Static pressure (P_q) 0.36 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.058	73.35
B - Centroid	3.00	3.50	4	0.057	73.29
A-1	0.40	0.50	0.50	0.051	73.31
A-2	1.50	1.75	2	0.059	73.36
A-3	4.50	5.25	6	0.050	73.34
A-4	5.60	6.5	7.5	0.047	73.40
B-1	0.40	0.50	0.50	0.046	73.33
B-2	1.50	1.75	2	0.056	73.31
B-3	4.50	5.25	6	0.048	73.29
B-4	5.60	6.5	7.5	0.049	73.41
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

 C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.

 Δ_p = manometer reading (inches H₂O)

 T_s = average absolute dilution tunnel temperature (°F + 460)

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

 K_p = 85.49 pitot tube constant, (conversion factor for English units)

 Δ_p avg. = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

Date: 2017-09-07 Manufacturer: WOODSLOK Soapstone Model: MAVUJO
 Project #: PT 20154 Run: 3 Tech: MM Reviewer: DR

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2,970	3,000	1,001	1,000
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	17,911	18,000	9,733	10,000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.004	2,960	1,003	0.004	0.02	0.01	0.15	0.002	0.05	✓	
CO ₂	0	17,833	9,723	0	0.02	0.08	0.5	0.01	0.5	✓	

Date: 2.17.09.07 Manufacturer: WOODSLOK SOAPSTONE Model: NAVAJO
 Project #: p1 20154 Run: 3 Tech: M.M. Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	568525.75	483496.01	660.64
Initial (Liter)	567522.02	482502.44	638.55

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100.2	100.1
Dry Bulb (F):	74.84	77.89
Humidity (%):	55.3	51.0

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2017-09-07 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 2154 Run: 3 Tech: MM Reviewer: LD

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0692 lbs.	20.9	20.8	20.3	20.6	20.9
2 x 4 x 5 in.	0654 lbs.	20.9	21.6	21.1	22.1	21.8
2 x 4 x 5 in.	0586 lbs.	20.6	20.9	21.1	21.8	21.3
2 x 4 x 5 in.	0658 lbs.	20.8	21.9	20.9	21.6	21.8
2 x 4 x 5 in.	0644 lbs.	20.9	20.6	20.9	21.8	21.8
2 x 4 x 5 in.	0646 lbs.	22.1	22.6	22.3	22.6	22.8
2 x 4 x 5 in.	0652 lbs.	22.3	22.6	21.8	21.9	21.8
2 x 4 x 5 in.	0662 lbs.	23.0	22.8	22.6	22.8	22.9
2 x 4 x 5 in.	0652 lbs.	22.6	22.0	22.1	22.3	22.8
2 x 4 x 5 in.	0642 lbs.	21.6	21.3	21.9	22.3	22.6
2 x 4 x 5 in.	0718 lbs.	22.3	22.6	22.9	22.8	22.9
2 x 4 x 5 in.	0642 lbs.	21.6	21.3	21.9	21.6	21.9
2 x 4 x 5 in.	0802 lbs.	22.0	22.3	22.1	22.0	22.6
2 x 4 x 5 in.	0638 lbs.	21.6	21.3	21.6	21.9	21.3
2 x 4 x 5 in.	0672 lbs.	23.0	23.6	23.3	23.6	22.9
2 x 4 x 5 in.	0660 lbs.	21.6	21.3	21.9	21.6	21.8
2 x 4 x 5 in.	0660 lbs.	22.0	22.3	22.0	21.9	21.8
2 x 4 x 5 in.	0690 lbs.	21.6	21.8	22.0	22.8	22.6
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

 TEST LOAD WEIGHT: 11.97 lbs

FUEL DATA

Date: 2017-09-07 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVAJO
 Project #: PI 20154 Run: 3 Tech: MM Reviewer: DP

FUEL DESCRIPTION:
 Type of wood :

TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3/4 x 15 1/4 in.	1 484 lbs.	206	209	205	203	208
1 1/2 x 3/4 x 15 1/4 in.	1 676 lbs.	209	206	211	216	220
1 1/2 x 3/4 x 15 1/4 in.	1 390 lbs.	210	216	213	209	209
1 1/2 x 3/4 x 15 1/4 in.	1 762 lbs.	215	220	219	218	218
1 1/2 x 3/4 x 5 in.	0 126 lbs.			220		
1 1/2 x 3/4 x 5 in.	0 128 lbs.			226		
1 1/2 x 3/4 x 5 in.	0 128 lbs.			223		
1 1/2 x 3/4 x 5 in.	0 128 lbs.			219		
1 1/2 x 3/4 x 5 in.	0 124 lbs.			216		
1 1/2 x 3/4 x 5 in.	0 124 lbs.			219		
1 1/2 x 3/4 x 5 in.	0 124 lbs.			223		
1 1/2 x 3/4 x 5 in.	0 128 lbs.			221		
1 1/2 x 3/4 x 5 in.	0 122 lbs.			226		
1 1/2 x 3/4 x 5 in.	0 116 lbs.			223		
1 1/2 x 3/4 x 5 in.	0 120 lbs.			214		
1 1/2 x 3/4 x 5 in.	0 128 lbs.			218		
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 7,82 lbs Min 20%: 156 Max 25%: 196

Date: 2017-09-06 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 3 Tech: MM Reviewer: DO

Pre-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
		9	400	401	6	11	402	403	10					
2017-09-06	17:00	614478	01239	01257	120550	937268	01259	01261	116463					01253
2017-09-07	9:00	614477	01238	01257	120551	937267	01258	01260	116464					01254

Post-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blanck
		9	400	401	6	11	402	403	10					
2017-09-07	14:00	614485	01400	01259	120571	937280	01308	01257	116485					01255
2017-09-12	8:00	614483	01372	01258	120561	937273	01303	01257	116478					01255
2017-09-13	8:00	614483	01372	01258	120561	937273	01303	01257	116478					01255



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-06 Project #: PI 20154 Run: 3 Manufacturer: WOODstock soapstone Model: MSVAJ0
 Tech: MM Reviewer: AP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	13	405	407	11
2017-09-06	17:00	95.1517	01261	01263	12,0464
2017-09-07	9:00	95.1516	01262	01264	12,0465

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	13	405	407	11
2017-09-07	14:00	95.1532	01467	01259	12,0493
2017-09-12	8:00	95.1529	01451	01258	12,0480
2017-09-13	8:00	95.1529	01451	01258	12,0480

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	4
Date	11-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood and Coal stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	11-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	102,3	102,1
Barometer (in.Hg):	30,209179	30,15011865
Dry Bulb (F):	72,14	75,81
Humidity (%):	54,5	48,8
Air velocity (ft/min)	4	2

DGM #1	Final:	20103,152	cuft
	Initial:	20077,360	cuft
DGM #2	Final:	17100,066	cuft
	Initial:	17074,590	cuft
DGM room			

	Final:	569257,860	Liter
	Initial:	568527,510	Liter
	Final:	484219,940	Liter
	Initial:	483498,540	Liter
	Final:	676,790	cuft
	Initial:	660,640	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

174

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	11-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,37 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,965

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,057	68,09	0,2387
B center	0,056	68,02	0,2366
A1	0,053	68,16	0,2302
A2	0,060	68,16	0,2449
A3	0,051	67,18	0,2258
A4	0,046	67,01	0,2145
B1	0,047	68,140	0,2168
B2	0,058	68,140	0,2408
B3	0,052	68,000	0,2280
B4	0,047	68,040	0,2168
AVERAGE	0,0527	67,8940	0,2293

Project nu.	pi 21054
Date	11-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure	
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter			
Number	19	1000	1001	5	30	1002	1003	9	31	1007	1009	30	1024			
Before (1)																
Before (2)																
Before (3)																
Before (4)																
Before (5)	109,0923	0,1251	0,1274	12,1339	110,2390	0,1236	0,1278	11,8491	110,1279	0,1282	0,1263	11,8932	0,1263	07/09/2017	17:30	
Before (6)	109,0922	0,1252	0,1275	12,1338	110,2391	0,1237	0,1278	11,8492	110,1278	0,1281	0,1262	11,8933	0,1264	11/09/2017	13:00	
After (1)	109,0936	0,1292	0,1272	12,1372	110,2397	0,1232	0,1274	11,8522	110,1286	0,1317	0,1261	11,8963	0,1265	11/09/2017	19:00	
After (2)	109,0929	0,1284	0,1272	12,1354	110,2394	0,1231	0,1274	11,8508	110,1280	0,1313	0,1261	11,8950	0,1265	18/09/2017	08:00	
After (3)	109,0928	0,1284	0,1272	12,1353	110,2394	0,1231	0,1274	11,8507	110,1280	0,1314	0,1262	11,8951	0,1265	19/09/2017	08:00	
After (4)																
After (5)																
After (6)	109,0928	0,1284	0,1272	12,1353	110,2394	0,1231	0,1274	11,8507	110,1280	0,1314	0,1262	11,8951	0,1265	19/09/2017	08:00	
Difference	0,0006	0,0032	-0,0003	0,0015	0,0003	-0,0006	-0,0004	0,0015	0,0002	0,0033	0,0000	0,0018	0,0001			
Total (mg)		5				5,8				5,3				0,1		
Total ajusté (mg)		4,90				5,70				5,20						

Project nu.	pi 21054
Date	11-09-2017
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 2,3 g/hr

Burn Rate : 1,295 Dry kg/hr

Test Duration: 137 min

PRESSURE FACTOR: DGM 1 0,98295
 DGM 2 0,98750
 DGM 3 1,00868

BAROMETRIC PRESSURE
 Average: 30,179649 in Hg
 Start: 30,209179 in Hg
 End: 30,150119 in Hg

TEMPERATURE FACTORS DGM 1 0,98150
 DGM 2 0,98099
 DGM 3 0,98533

DGM CONTROLLER VALUES

DGM 1 Final: 20103,152 Cuft
 Initial: 20077,360 Cuft

VOLUMES SAMPLED DGM 1 24,560 Scft
 DGM 2 24,581 Scft
 DGM 3 15,538 Scft

DGM 2 Final: 17100,066 Cuft
 Initial: 17074,590 Cuft

DGM #3 Final: 676,790 Cuft
 Initial: 660,640 Cuft

TOTAL TUNNEL VOLUME : 24378

TEMPERATURES

DGM 1 537,950 °R
 DGM 2 538,231 °R

SAMPLE RATIOS
 Sample Train 1: 992,590
 Sample Train 2: 991,746

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

Paticulate concentration
 Sample Train 1 **0,000236** g/dscf
 Sample Train 2 **0,000216** g/dscf
 Room **0,000006** g/dscf

TUNNEL FLOW RATE: 177,941 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **5,60** g
 Sample Train 2 **5,10** g

PARTICULATE CATCH
 Total Sample Train 1: 5,80 mg
 Total Sample Train 2: 5,30 mg
 Total Sample Train 1 1st hour: 5,00 mg

EMISSION RATES
 Sample Train 1 **2,45** g/hr
 Sample Train 2 **2,23** g/hr

1st hour emission rate **4,96** g/hr

DEVIATION: 4,68%

Cs Train 1 Train 2
 0,0002362 0,000215616

* Elapsed	* Raw data row	* Weight Remaining	* CO	* CO ₂	* O ₂	*1 Flue Gas	*2 Room Temp	*3 Tunnel Dry Bulb	*4 Unit Top	*5 Unit Back	*6 Unit R.Side	*7 Unit L.Side	*8 Unit Bottom	*9 Catalyst Down	* Catalyst Center
Time min		lbs	%	%	%	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F
0,00	174,00	7,8	0,1	5,3	0,0	314,8	73,7	112,8	433,7	377,7	462,9	443,0	825,7	#####	592,0
1,0	175,0	7,7	0,2	3,5	0,0	310,2	73,9	104,5	440,6	382,1	462,2	443,3	836,7	#####	721,1
2,0	176,0	7,6	0,1	5,9	0,0	315,3	73,7	103,9	459,0	382,9	461,1	443,1	841,1	#####	805,2
3,0	177,0	7,5	0,1	7,5	0,0	314,6	73,8	102,8	478,7	382,4	459,6	442,7	843,3	#####	856,8
4,0	178,0	7,4	0,1	8,3	0,0	309,1	73,9	101,4	497,1	381,0	458,5	441,7	841,3	#####	887,6
5,0	179,0	7,3	0,1	8,4	0,0	294,6	74,1	98,4	513,9	378,5	457,8	440,7	838,5	#####	918,7
6,0	180,0	7,2	0,1	7,4	0,0	284,3	74,2	96,8	524,8	376,4	457,1	440,1	835,9	#####	913,9
7,0	181,0	7,2	0,1	6,4	0,0	279,1	74,3	96,3	527,0	374,2	456,7	439,0	834,3	#####	884,7
8,0	182,0	7,1	0,1	6,7	0,0	276,7	74,4	96,8	528,9	372,4	456,9	438,0	833,8	#####	884,3
9,0	183,0	7,0	0,1	7,4	0,0	276,2	74,4	96,2	536,5	370,5	456,5	437,1	834,2	#####	918,3
10,0	184,0	6,9	0,1	7,9	0,0	275,2	74,8	95,8	546,8	368,6	456,5	435,9	834,1	#####	944,9
11,0	185,0	6,8	0,1	8,2	0,0	275,7	74,5	95,6	556,5	366,9	455,9	434,5	834,0	#####	956,0
12,0	186,0	6,7	0,1	8,4	0,0	276,2	74,9	95,6	566,4	365,2	455,5	433,7	834,2	#####	979,0
13,0	187,0	6,6	0,1	8,1	0,0	277,2	74,7	96,2	576,0	363,6	455,7	433,3	834,7	#####	987,5
14,0	188,0	6,5	0,1	7,8	0,0	278,3	74,9	95,6	583,8	361,8	455,5	432,0	835,2	#####	989,6
15,0	189,0	6,4	0,2	7,9	0,0	279,1	74,7	96,1	590,6	360,7	455,4	431,3	836,0	#####	998,2
16,0	190,0	6,4	0,2	8,1	0,0	279,3	74,3	96,3	596,6	359,1	455,6	431,0	836,2	#####	997,3
17,0	191,0	6,3	0,2	8,0	0,0	280,5	75,0	95,8	601,1	357,7	455,4	430,2	836,9	#####	999,8
18,0	192,0	6,2	0,2	8,1	0,0	281,7	74,7	96,0	607,4	356,7	455,0	429,6	837,6	#####	1010,2
19,0	193,0	6,1	0,2	8,2	0,0	282,6	75,1	95,7	612,1	356,1	454,9	429,0	838,6	#####	1015,3
20,0	194,0	6,0	0,2	8,5	0,0	282,7	74,5	96,5	618,0	355,0	454,9	429,0	839,8	#####	1031,3
21,0	195,0	5,9	0,2	8,5	0,0	283,7	74,9	96,0	623,9	354,4	455,1	429,1	840,9	#####	1033,1
22,0	196,0	5,9	0,2	8,4	0,0	284,0	75,0	96,0	627,1	353,8	455,5	429,3	842,8	#####	1029,8
23,0	197,0	5,8	0,2	8,4	0,0	284,9	74,8	95,8	630,9	353,4	455,8	429,2	844,9	#####	1036,1
24,0	198,0	5,7	0,2	8,7	0,0	284,6	75,2	96,1	636,7	353,3	456,2	429,4	847,1	#####	1059,1
25,0	199,0	5,6	0,2	8,7	0,0	285,6	74,1	96,5	646,8	352,5	457,0	429,3	848,8	#####	1082,2
26,0	200,0	5,5	0,2	8,5	0,0	286,5	74,9	96,1	653,1	352,1	457,6	429,6	850,9	#####	1076,7
27,0	201,0	5,4	0,2	8,4	0,0	287,0	75,4	96,4	655,2	352,2	457,9	429,6	853,0	#####	1065,7
28,0	202,0	5,3	0,2	8,3	0,0	287,5	74,9	96,5	652,5	351,9	458,3	430,0	854,1	#####	1052,6
29,0	203,0	5,2	0,2	8,0	0,0	288,3	74,5	96,4	652,8	351,8	458,2	430,3	854,3	#####	1031,6
30,0	204,0	5,1	0,2	8,2	0,0	288,2	75,1	96,8	644,4	351,8	458,1	430,6	854,3	#####	1002,7
31,0	205,0	5,1	0,1	8,9	0,0	288,3	75,3	96,8	639,4	351,8	458,1	430,7	853,8	#####	1004,6
32,0	206,0	5,0	0,1	9,1	0,0	288,1	75,4	96,7	639,3	351,9	457,8	431,3	853,9	#####	1027,0
33,0	207,0	4,9	0,1	9,1	0,0	288,8	75,1	97,1	639,6	352,0	457,7	431,8	854,1	#####	1022,8
34,0	208,0	4,8	0,1	9,4	0,0	289,7	75,0	96,5	639,3	351,9	458,2	432,8	854,5	#####	1015,7
35,0	209,0	4,7	0,1	9,8	0,0	289,6	75,2	96,9	640,4	352,0	457,9	433,5	854,0	#####	1031,5
36,0	210,0	4,6	0,1	10,1	0,0	289,7	74,9	97,5	647,5	352,2	458,1	434,8	852,7	#####	1061,6
37,0	211,0	4,5	0,1	10,2	0,0	291,6	75,2	97,0	651,6	352,4	458,0	435,5	851,1	#####	1051,1
38,0	212,0	4,4	0,1	10,6	0,0	292,5	75,6	97,7	657,4	353,0	458,4	436,9	848,2	#####	1070,3
39,0	213,0	4,4	0,1	11,2	0,0	294,1	75,4	97,4	658,0	353,8	458,7	438,1	845,9	#####	1043,9
40,0	214,0	4,2	0,1	10,9	0,0	295,9	75,3	97,5	656,4	354,6	459,3	439,3	844,3	#####	1025,0
41,0	215,0	4,1	0,1	10,9	0,0	296,5	75,1	97,9	654,1	355,8	459,6	440,4	842,5	#####	1015,9
42,0	216,0	4,1	0,0	10,7	0,0	298,3	74,9	97,5	652,1	356,5	460,1	441,4	840,5	#####	1009,6
43,0	217,0	3,9	0,0	11,3	0,0	300,0	75,8	98,0	649,6	357,6	460,4	441,7	839,9	#####	1004,8
44,0	218,0	3,9	0,0	12,4	0,0	301,4	75,2	98,6	653,8	358,7	460,5	442,7	838,2	#####	1033,2
45,0	219,0	3,7	0,0	12,9	0,0	303,9	76,0	99,0	667,8	359,6	461,2	443,4	835,7	#####	1085,2
46,0	220,0	3,6	0,5	13,7	0,0	306,8	76,0	99,5	680,8	360,9	462,3	444,6	832,3	#####	1093,3
47,0	221,0	3,5	0,4	13,5	0,0	308,0	75,5	99,1	687,4	362,3	463,4	446,0	828,7	#####	1086,5
48,0	222,0	3,4	0,1	13,4	0,0	309,8	76,1	99,1	689,5	363,8	464,6	447,5	825,6	#####	1074,1
49,0	223,0	3,3	0,0	12,5	0,0	311,7	76,2	99,3	688,1	365,8	465,8	448,8	822,8	#####	1058,6
50,0	224,0	3,2	0,0	12,2	0,0	313,0	76,1	99,6	687,7	367,5	467,2	450,1	820,2	#####	1058,9
51,0	225,0	3,1	0,0	12,2	0,0	314,2	75,6	99,6	688,1	369,2	468,7	451,5	817,1	#####	1054,6
52,0	226,0	3,0	0,0	12,3	0,0	316,4	76,0	99,7	687,5	371,2	470,0	452,5	814,6	#####	1053,7
53,0	227,0	2,9	0,0	12,2	0,0	318,0	76,3	99,3	689,0	372,9	471,4	453,2	812,1	#####	1052,4
54,0	228,0	2,8	0,0	12,4	0,0	319,6	76,3	100,1	691,9	374,8	472,9	454,6	809,1	#####	1063,5
55,0	229,0	2,7	0,0	12,8	0,0	320,9	75,8	100,0	696,2	376,6	474,3	455,9	806,4	#####	1079,9
56,0	230,0	2,6	0,1	13,0	0,0	321,4	76,1	99,8	702,3	378,1	476,0	457,3	803,3	#####	1091,6
57,0	231,0	2,5	0,1	13,0	0,0	322,8	76,1	100,6	706,7	379,9	477,7	458,3	799,6	#####	1088,7
58,0	232,0	2,4	0,1	13,0	0,0	324,6	76,0	100,9	709,3	381,7	479,1	459,2	796,0	#####	1080,8
59,0	233,0	2,3	0,0	12,7	0,0	326,1	76,6	101,0	708,9	383,6	480,4	459,9	792,6	#####	1067,8
60,0	234,0	2,2	0,0	12,3	0,0	326,6	75,8	101,1	706,8	385,4	482,2	461,0	789,8	#####	1059,0
61,0	235,0	2,1	0,0	12,1	0,0	327,5	75,9	99,9	705,2	387,3	483,6	461,6	788,4	#####	1060,4
62,0	236,0	2,0	0,0	11,8	0,0	328,9	76,2	101,2	706,2	389,6	484,9	462,6	787,8	#####	1082,4
63,0	237,0	1,9	0,1	12,1	0,0	329,3	76,4	102,3	709,6	391,9	487,0	464,0	786,7	#####	1095,3
64,0	238,0	1,9	0,1	12,2	0,0	330,6	76,4	101,5	710,8	394,0	488,8	465,2	785,3	#####	1087,2
65,0	239,0	1,8	0,1	12,0	0,0	331,6	77,0	101,9	710,0	396,3	490,7	466,2	783,7	#####	1074,0
66,0	240,0	1,7	0,0	11,8	0,0	332,0	76,9	102,5	708,0	398,6	492,5	467,2	782,5	#####	1064,0
67,0	241,0	1,7	0,0	11,4	0,0	332,5	76,8	102,8	704,5	401,0	494,3	468,4	782,1	#####	1045,5
68,0	242,0	1,6	0,0	10,9	0,0	333,2	77,2	102,2	699,2	403,4	496,1	469,5	781,7	#####	1029,3
69,0	243,0	1,5	0,0	10,3	0,0	333,2	76,4	102,8	692,4	405,7	497,7	470,7	781,1	#####	1010,6
70,0	244,0	1,5	0,0	9,9	0,0	332,9	76,7	102,3	685,0	408,3	499,4	471,8	780,1	#####	991,0
71,0	245,0	1,4	0,0	9,4	0,0	332,1	76,7	102,4	678,6	410,7	500,8	472,8	779,4	#####	985,3
72,0	246,0	1,3	0,0	8,9	0,0	332,4	76,9	101,8	672,5	413,1	502,2	473,5	778,9	#####	976,2
73,0	247,0	1,3	0,0	8,3	0,0	331,5	76,7	102,1	663,5	415,3	503,3	474,4	783,1	#####	951,1
74,0	248,0	1,3	0,0	7,8	0,0	330,4	77,2	102,8	656,3	417,3	504,1	474,9	786,8	#####	949,5
75,0	249,0	1,2	0,0	7,5	0,0	328,5	76,9	102,9	647,3	419,2	504,9	476,0	791,1	#####	928,1
76,0	250,0	1,2	0,0	7,2	0,0	327,2	77,0	102,0	636,9	420,6	505,5	476,9	795,4	#####	904,0
77,0	251,0	1,2	0,0	7,1	0,0	325,5	76,4	102,3	626,7	422,0	505,8	477,7	799,6	#####	887,5
78,0	252,0	1,2	0,0	7,0	0,0	323,3	76,1	102,1	616,3	423,5	506,3	478,9	804,4	#####	872,4
79,0	253,0	1,1	0,0</												

119,0	293,0	0,3	0,1	6,1	0,0	250,5	76,2	95,2	439,2	439,7	509,8	516,2	857,3	#####	701,9
120,0	294,0	0,3	0,1	6,2	0,0	249,7	76,5	95,0	437,9	439,7	509,4	515,8	850,1	#####	700,2
121,0	295,0	0,3	0,1	6,2	0,0	249,1	76,1	94,9	436,9	439,7	509,4	515,6	845,9	#####	698,5
122,0	296,0	0,2	0,1	6,2	0,0	248,2	76,5	94,6	435,8	439,7	509,2	515,3	842,7	#####	697,7
123,0	297,0	0,2	0,1	6,2	0,0	247,6	76,4	94,2	434,3	439,6	508,8	515,1	840,5	#####	696,8
124,0	298,0	0,2	0,1	6,2	0,0	247,5	76,2	94,2	433,3	439,5	508,5	515,1	838,8	#####	696,1
125,0	299,0	0,2	0,1	6,1	0,0	246,6	76,4	94,0	431,9	439,4	507,8	515,2	835,2	#####	694,4
126,0	300,0	0,2	0,1	6,1	0,0	245,6	76,1	94,0	431,3	439,2	507,4	515,3	830,1	#####	695,5
127,0	301,0	0,2	0,1	6,1	0,0	244,7	76,3	94,2	431,4	439,0	506,8	515,2	823,1	#####	701,4
128,0	302,0	0,1	0,1	6,0	0,0	244,4	76,4	93,9	431,7	438,7	506,2	515,1	817,6	#####	705,3
129,0	303,0	0,2	0,1	5,9	0,0	243,5	76,1	93,8	432,3	438,0	505,1	514,6	813,0	#####	707,6
130,0	304,0	0,2	0,1	5,9	0,0	243,5	76,1	93,8	432,3	437,6	504,1	514,1	809,2	#####	708,6
131,0	305,0	0,1	0,1	5,9	0,0	241,9	76,0	94,3	432,3	437,4	503,2	513,7	806,3	#####	708,6
132,0	306,0	0,1	0,1	5,9	0,0	241,9	75,9	94,2	432,6	437,0	502,6	513,0	803,3	#####	707,4
133,0	307,0	0,1	0,1	5,9	0,0	242,3	75,8	92,6	432,5	436,5	501,3	511,6	801,1	#####	705,7
134,0	308,0	0,1	0,1	5,9	0,0	242,0	75,9	93,9	431,4	436,1	500,1	510,9	799,5	#####	701,1
135,0	309,0	0,1	0,1	5,9	0,0	241,2	75,8	93,5	430,4	436,0	499,3	510,0	799,1	#####	697,8
136,0	310,0	0,1	0,1	5,9	0,0	240,9	75,9	93,3	429,6	435,7	498,3	509,2	797,9	#####	695,4
137,0	311,0	0,0	0,1	5,9	0,0	240,7	75,8	93,6	428,6	435,4	497,3	508,3	797,3	#####	697,1

Manufacturer: odstock soapstone
 Model: navajo

Run: 4
 Project #: pi 21054
 Test Duration: 137 min

	HHV	LHV
Eff	79,40%	85,82%
Comb Eff	99,37%	99,37%
HT Eff	79,90%	86,36%
Output	19 992	kJ/h
Burn Rate	1,27	kg/h
Grams CO	40	g
Input	25 180	kJ/h
MC wet	17,71	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

Ultimate CO₂
 CO_{2-ut} 19,64
 F_o
 1,061

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	79,40%	Dry Molecular Weight (M _d) 29,79
Combustion Efficiency:	99,37%	Dry Moles Exhaust Gas (N _r): 465,55
Heat Transfer Efficiency:	79,90%	Air Fuel Ratio (A/F) 13,36

Heat Output:	18 965 Btu/h	19 992 kJ/h
Heat Input:	23 886 Btu/h	25 180 kJ/h
Burn Duration:	2,28 h	
Burn Rate:	2,80 lb/h	1,271 kg/h
Stack Temp:	288,9 Deg. F	142,7 Deg. C

Date: 201209-11 Manufacturer: WOODstock soapstone Model: NAVAJO
 Project #: PT 20154 Run: 4 Tech: MM Reviewer: DP

	kindling and 3 pieces	38 LBS	SLANT FIRE
A1	32 LBS	close door and	bypass
A1	19 LBS	instl 2 nd pre load	5,00 LBS
A1	5,00 LBS	instl 3 rd pre load	500, 6BS
A4	900 LBS	close air inlet	
A1	16 LBS	instl load	
	open air inlet		
	3 min	close air inlet	1/2
	4 min	close air inlet	3/4
	5 min	close air inlet	complement

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2017-09-06 Manufacturer: Woods Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 4 Tech: MR Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
<u>Em 191</u>	<u>7:00</u>	<u>ok</u>	<u>ok</u>

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet

<u>4</u> (max50 Fpm)	<u>2</u> (max50 Fpm)
----------------------	----------------------

Smoke Capture Check.....

<u>ok</u>	<u>ok</u>
-----------	-----------

Picture.....

4 sides <u>ok</u>	<u>ok</u>
-------------------	-----------

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

<u>2017.09.05</u>

Date Dilution Tunnel Cleaned.....

<u>2017.09.05</u>

Induced Draft Check (max 0.005 H2O).....

<u>ok</u>

Traverse before ignition.....

<u>ok</u>

Flow Rate 140 cfm ±10%.....

<u>ok</u>

Temperature System:

Ambient (65°-90°F).....

<u>ok</u> °F

Wood Heater Surface (±125°F).....

<u>ok</u> °F

Proportional Checks:

Thermocouple check.....

<u>ok</u>

Pitot Clean.....

<u>ok</u>

Pitot verification.....

<u>ok</u>

Sampling Train ID Numbers:

Probe.....

Train 1st hour Train 1 Train 2

Filter Front.....

<u>19</u>	<u>30</u>	<u>31</u>
<u>1060</u> 1000 MR	<u>1002</u>	<u>1007</u>

Filter Back.....

<u>1001</u>	<u>1003</u>	<u>1009</u>
-------------	-------------	-------------

Filter Thermocouple.....

<u>11</u>	<u>11</u>	<u>12</u>
-----------	-----------	-----------

Filter (<90°F).....

<u>ok</u>	<u>ok</u>	<u>ok</u>
-----------	-----------	-----------

SAMPLING EQUIPMENT CHECK OUT

Date: 2/20/11 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PT 20154 Run: 4 Tech: Mr Reviewer: [Signature]

Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	56852708	56925885	56852718	56925897	48349788	48422088
Initial 1minute DGM (Liter)	56852694	56925884	56852716	56925896	48349788	48422088
Change © (Liter)	009	001	002	001	∅	∅
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H ₂ O static	Pre Test 0.4-0.5 H ₂ O velocity	Post Test 3 H ₂ O Static	Post Test 0.4-0.5 H ₂ O velocity
Vacuum (inches Hg.)	3	.4	3	.4
Check OK (no change after 15 sec.)	ok	ok	ok	ok

PRE-TEST SCALE AUDIT

Date: 2017-09-11 Manufacturer: Woodstock Soap Stone Model: NAVAJO
 Project #: PT 2.154 Run: 4 Tech: _____ Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM 090	4.4 lbs, Class F	4.4 lbs
Wood	EM-090	4.4 lbs, Class F	4.4 lbs
Analytical	EM 128	100 mg, Class S	100 mg
Analytical	EM 127	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017-09-11 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: p1 20154 Run: 4 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 103.3 (KPa.) Static pressure (P_q) 0.37 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.057	68.09
B - Centroid	3.00	3.50	4	0.056	68.02
A-1	0.40	0.50	0.50	0.053	68.16
A-2	1.50	1.75	2	0.060	68.16
A-3	4.50	5.25	6	0.051	67.18
A-4	5.60	6.5	7.5	0.046	67.01
B-1	0.40	0.50	0.50	0.047	68.14
B-2	1.50	1.75	2	0.058	68.14
B-3	4.50	5.25	6	0.056	68.00
B-4	5.60	6.5	7.5	0.047	68.04
AVERAGE					

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

- Where,
- C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.
 - Δ_p = manometer reading (inches H₂O)
 - T_s = average absolute dilution tunnel temperature (°F + 460)
 - P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 - P_q = static pressure in. H₂O
 { 13.6 }
 - M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)
 - K_p = 85.49 pitot tube constant, (conversion factor for English units)

Δ_p avg. = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

 Date: 2017-09-11 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 4 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2965	3	0998	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	1790	18	978	1000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.006	2969	0999	0.006	0.02	0.004	0.15	0.001	0.05	✓	
CO ₂	0	0999	0999	0	0.02	0.06	0.5	0.02	0.5	✓	

17,96
MM
976
MM

Date: 2017-09-11 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVAJO
 Project #: PT 20154 Run: 4 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	569257.86	484219.94	626.79
Initial (Liter)	568527.51	483498.54	660.64

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	102.3	102.1
Dry Bulb (F):	72.14	75.81
Humidity (%):	54.5	48.8

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2013 07 11 Manufacturer: WOODS LOCK SOAPSTONE Model: NAVAJO
 Project #: PI 20154 Run: 4 Tech: MM Reviewer: [Signature]

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0.682 lbs.	219	219	213	220	221
2 x 4 x 5 in.	0.762 lbs.	219	218	220	219	223
2 x 4 x 5 in.	0.528 lbs.	220	223	218	218	216
2 x 4 x 5 in.	0.688 lbs.	220	223	218	228	216
2 x 4 x 5 in.	0.642 lbs.	218	213	219	223	220
2 x 4 x 5 in.	0.638 lbs.	223	221	223	230	226
2 x 4 x 5 in.	0.664 lbs.	216	213	226	218	220
2 x 4 x 5 in.	0.638 lbs.	220	218	215	216	213
2 x 4 x 5 in.	0.624 lbs.	219	216	213	212	213
2 x 4 x 5 in.	0.632 lbs.	216	219	220	213	214
2 x 4 x 5 in.	0.628 lbs.	220	218	216	219	213
2 x 4 x 5 in.	0.604 lbs.	216	219	213	219	213
2 x 4 x 5 in.	0.612 lbs.	220	221	226	223	224
2 x 4 x 5 in.	0.628 lbs.	223	221	216	229	226
2 x 4 x 5 in.	0.614 lbs.	221	226	219	228	229
2 x 4 x 5 in.	0.666 lbs.	218	216	218	219	217
2 x 4 x 5 in.	0.678 lbs.	229	223	224	223	228
2 x 4 x 5 in.	0.626 lbs.	230	226	225	229	220
2 x 4 x 5 in.	0.622 lbs.	221	223	216	226	221
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 12.18 lbs

FUEL DATA

Date: 2017-09-11 Manufacturer: WOOD STOCK SOAPSTONE Model: MAVAJO
 Project #: PT 20154 Run: 4 Tech: MR Reviewer: DO

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 1/4 in.	1394 lbs.	21.6	21.7	21.7	21.9	22
1 1/2 x 3 1/2 x 15 1/4 in.	1694 lbs.	21.5	21.4	21.4	21.3	21.5
1 1/2 x 3 1/2 x 15 1/4 in.	1584 lbs.	21.7	21.8	21.6	21.7	21.8
1 1/2 x 3 1/2 x 15 1/4 in.	1656 lbs.	21.6	21.3	21.8	21.3	21.6
1 1/2 x 3/4 x 5 in.	0 124 lbs.			22.0		
1 1/2 x 3/4 x 5 in.	0 134 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	0 134 lbs.			21.4		
1 1/2 x 3/4 x 5 in.	0 138 lbs.			22.0		
1 1/2 x 3/4 x 5 in.	0 132 lbs.			20.9		
1 1/2 x 3/4 x 5 in.	0 120 lbs.			20.8		
1 1/2 x 3/4 x 5 in.	0 136 lbs.			20.7		
1 1/2 x 3/4 x 5 in.	0 138 lbs.			20.9		
1 1/2 x 3/4 x 5 in.	0 124 lbs.			21.0		
1 1/2 x 3/4 x 5 in.	0 136 lbs.			21.0		
1 1/2 x 3/4 x 5 in.	0 132 lbs.			21.1		
1 1/2 x 3/4 x 5 in.	0 126 lbs.			21.3		
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 7924 lbs Min 20%: 158 Max 25%: 198

Date: 2017-09-07

Manufacturer: Woodsstock Soapstone

Model: NAVAJO

Project #: PI 20154 Run: 4

Tech: MM Reviewer: DDO

Pre-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-09-07	17:30	109,0923	0,1251	0,1274	12,1339	110,2390	0,1236	0,1278	11,8491	110,2391	0,1237	0,1278	11,8492	0,1263
2017-09-11	13:00	109,0924	0,1252	0,1275	12,1338	110,2391	0,1237	0,1278	11,8492	110,2391	0,1237	0,1278	11,8492	0,1264

Post-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-09-11	19:00	109,0926	0,1292	0,1272	12,1372	110,2397	0,1232	0,1274	11,8522	110,2397	0,1232	0,1274	11,8522	0,1265
2017-09-18	8:00	109,0929	0,1284	0,1272	12,1354	110,2394	0,1231	0,1274	11,8508	110,2394	0,1231	0,1274	11,8508	0,1265
2017-09-19	8:00	109,0928	0,1284	0,1272	12,1353	110,2394	0,1231	0,1274	11,8507	110,2394	0,1231	0,1274	11,8507	0,1265



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-07 Project #: PT 20154 Run: 4
 Manufacturer: Woodstock Soapstone Model: MAVAJ6
 Tech: MM Reviewer: BP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	31	1007	1009	30
2017-09-07	17:30	1101279	01282	01263	118932
2017-09-11	13:00	1101278	01281	01262	118933

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	31	1007	1009	30
2017-09-11	19:00	1101286	01317	01261	118963
2017-09-18	8:00	1101280	01313	01261	118950
2017-09-15	8:00	1101280	01314	01262	118951

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	5
Date	12-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood and coal Stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	12-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	101,1	100,9
Barometer (in.Hg):	29,854819	29,79575878
Dry Bulb (F):	74,12	80,06
Humidity (%):	45,7	41,3
Air velocity (ft/min)	6	3

DGM #1	Final:	20125,551	cuft
	Initial:	20103,249	cuft
DGM #2	Final:	17122,098	cuft
	Initial:	17100,182	cuft
DGM room			

	Final:	569892,120	Liter
	Initial:	569260,620	Liter
	Final:	484843,800	Liter
	Initial:	484223,220	Liter
	Final:	690,390	cuft
	Initial:	676,790	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

180

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	12-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,36 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,949

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,058	74,85	0,2408
B center	0,057	75,11	0,2387
A1	0,049	75,18	0,2214
A2	0,061	75,34	0,2470
A3	0,047	75,3	0,2168
A4	0,048	75,09	0,2191
B1	0,047	75,290	0,2168
B2	0,055	75,380	0,2345
B3	0,048	75,010	0,2191
B4	0,049	75,000	0,2214
AVERAGE	0,0519	75,1550	0,2276

Project nu.	pi 21054
Date	12-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	7	421	422	21	12	425	1004	22	21	1010	1020	51	1023		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4769	0,1250	0,1261	11,9420	94,5431	0,1280	0,1271	11,7225	108,7409	0,1306	0,1306	11,8721	0,1259	11/09/2017	17:00
Before (6)	61,4770	0,1251	0,1260	11,9420	94,5432	0,1279	0,1271	11,7226	108,7408	0,1307	0,1306	11,8722	0,1258	12/09/2017	10:00
After (1)	61,4778	0,1304	0,1259	11,9442	94,5441	0,1307	0,1271	11,7247	108,7420	0,1371	0,1299	11,8752	0,1260	12/09/2017	14:00
After (2)	61,4777	0,1292	0,1256	11,9433	94,5440	0,1302	0,1269	11,7239	108,7418	0,1364	0,1298	11,8743	0,1259	13/09/2017	08:00
After (3)															
After (4)															
After (5)															
After (6)	61,4777	0,1292	0,1256	11,9433	94,5440	0,1302	0,1269	11,7239	108,7418	0,1364	0,1298	11,8743	0,1259	13/09/2017	08:00
Difference	0,0007	0,0041	-0,0004	0,0013	0,0008	0,0023	-0,0002	0,0013	0,0010	0,0057	-0,0008	0,0021	0,0001		
Total (mg)		5,7				9,9				8			0,1		
Total ajusté (mg)		5,60				9,80				7,90					

Project nu.	pi 21054
Date	12-09-2017
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 4,3 g/hr

Burn Rate : 1,549 Dry kg/hr

Test Duration: 116 min

PRESSURE FACTOR: DGM 1 0,97113
 DGM 2 0,97596
 DGM 3 0,99683

BAROMETRIC PRESSURE
 Average: 29,825289 in Hg
 Start: 29,854819 in Hg
 End: 29,795759 in Hg

TEMPERATURE FACTORS DGM 1 0,97765
 DGM 2 0,97691
 DGM 3 0,98447

DGM CONTROLLER VALUES

DGM 1 Final: 20125,551 Cuft
 Initial: 20103,249 Cuft

VOLUMES SAMPLED DGM 1 20,898 SCft
 DGM 2 20,811 SCft
 DGM 3 12,919 SCft

DGM 2 Final: 17122,098 Cuft
 Initial: 17100,182 Cuft

DGM #3 Final: 690,390 Cuft
 Initial: 676,790 Cuft

TOTAL TUNNEL VOLUME : 19636

TEMPERATURES

DGM 1 540,069 °R
 DGM 2 540,477 °R

SAMPLE RATIOS
 Sample Train 1: 939,606
 Sample Train 2: 943,523

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

Paticulate concentration
 Sample Train 1 **0,000474** g/dscf
 Sample Train 2 **0,000384** g/dscf
 Room **0,000008** g/dscf

TUNNEL FLOW RATE: 169,276 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **9,15** g
 Sample Train 2 **7,40** g

PARTICULATE CATCH
 Total Sample Train 1: 9,90 mg
 Total Sample Train 2: 8,00 mg
 Total Sample Train 1 1st hour: 5,70 mg

EMISSION RATES
 Sample Train 1 **4,73** g/hr
 Sample Train 2 **3,83** g/hr

1st hour emission rate **5,36** g/hr

DEVIATION: 10,60%

Cs Train 1 Train 2
 0,0004737 0,000384404

Manufacturer: odstock soapstone
 Model: navajo

Run: 5
 Project #: pi 21054
 Test Duration: 116 min

	HHV	LHV
Eff	74,27%	80,27%
Comb Eff	99,41%	99,41%
HT Eff	74,71%	80,75%
Output	22 377	kJ/h
Burn Rate	1,52	kg/h
Grams CO	50	g
Input	30 129	kJ/h
MC wet	17,66	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

Ultimate CO₂
 CO_{2-ult} 19,64
 F_o
 1,060

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	74,27%	Dry Molecular Weight (M _d) 29,55
Combustion Efficiency:	99,41%	Dry Moles Exhaust Gas (N _g): 601,22
Heat Transfer Efficiency:	74,71%	Air Fuel Ratio (A/F) 17,26

Heat Output:	21 227 Btu/h	22 377 kJ/h
Heat Input:	28 580 Btu/h	30 129 kJ/h
Burn Duration:	1,93 h	
Burn Rate:	3,35 lb/h	1,521 kg/h
Stack Temp:	330,8 Deg. F	166,0 Deg. C

Date: 2012.09.12 Manufacturer: Woodstock Soap Stove Model: NAVAJO
 Project #: PT 20154 Run: S Tech: mm Reviewer: DP

- kindling and 3 pieces 400 LBS	SLDRI FIRE
- D1 36 LBS	close DOOR and by pass
D1 16 LBS	insert second piece 6.5 LBS 6.5 LBS
D1 5.20 LBS	close air inlet
D1 18 LBS	insert load
D1 3 mm	close air inlet 1/2
D1 4 mm	close air inlet complement

TEST LOAD CONFIGURATION
Dampen close

Pail Lt 136°F

PRE / POST CHECKS

Date: 2017-09-12 Manufacturer: WOODSTOCK SOAPSTONE Model: NAVAJO
 Project #: PT 20154 Run: 5 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM 191	7:00	OK	OK

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet

	6 (max50 Fpm)	3 (max50 Fpm)
	OK	OK
4 sides	OK	OK

Smoke Capture Check.....

Picture.....

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

2017-09-05
2017-09-05
OK
OK

Date Dilution Tunnel Cleaned.....

Induced Draft Check (max 0.005 H2O).....

Traverse before ignition.....

Flow Rate 140 cfm ±10%.....

OK

Temperature System:

Ambient (65°-90°F).....

OK	°F
----	----

Wood Heater Surface (±125°F).....

OK	°F
---------------	----

Paul MR

Proportional Checks:

Thermocouple check.....

OK
OK
OK

Pitot Clean.....

Pitot verification.....

Sampling Train ID Numbers:

Probe.....

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (<90°F).....

Train 1 st hour	Train 1	Train 2
07	12	21
421	70425	1010
422	1004	1010
11	11	12
OK	OK	OK



SAMPLING EQUIPMENT CHECK OUT

Date: 2017-09-12 Manufacturer: WOODS LOCK SOAPSTONE Model: NAVAJO
 Project #: PI-20154 Run: 5 Tech: MM Reviewer: DP

Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	569259.87	569893.13	569260.09	569893.31	484222.07	484844.90
Initial 1minute DGM (Liter)	569259.86	569893.09	569259.99	569893.28	484222.02	484844.85
Change © (Liter)	0.01	0.04	0.10	0.03	0.05	0.05
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H ₂ O static	Pre Test 0.4-0.5 H ₂ O velocity	Post Test 3 H ₂ O Static	Post Test 0.4-0.5 H ₂ O velocity
Vacuum (inches Hg.)	3	-5	3	.4
Check OK (no change after 15 sec.)	ok	ok	ok	ok

Date: 2017-09-12 Manufacturer: WOODstock supstock Model: NAVA J0
 Project #: PI 20154 Run: 5 Tech: MM Reviewer: DE

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017-09-12 Manufacturer: WOODSTOCK SOAPSTONE Model: NDAVJ6
 Project #: PI 10154 Run: 5 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 1011 (KPa.) Static pressure (P_q) 0.36 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0058	74.85
B - Centroid	3.00	3.50	4	0057	75.11
A-1	0.40	0.50	0.50	0049	75.18
A-2	1.50	1.75	2	0061	75.34
A-3	4.50	5.25	6	0047	75.30
A-4	5.60	6.5	7.5	0048	75.09
B-1	0.40	0.50	0.50	0047	75.29
B-2	1.50	1.75	2	0055	75.38
B-3	4.50	5.25	6	0048	75.01
B-4	5.60	6.5	7.5	0049	75.00 mm
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta_p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

- Where,
- C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.
 - Δ_p = manometer reading (inches H₂O)
 - T_s = average absolute dilution tunnel temperature (°F + 460)
 - P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 - P_q = static pressure in. H₂O
 { 13.6 }
 - M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)
 - K_p = 85.49 pitot tube constant, (conversion factor for English units)

Δ_p avg. = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

Date: 6/17-09-12 Manufacturer: WOODS/0266 SOAPSTONE Model: NAVAJO
 Project #: PT 26154 Run: 5 Tech: MM Reviewer: DR

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2968	300	1002	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	1788	1800	977	1000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	9006	2963	1004	9006	0.02	9005	0.15	0.002	0.05	✓	
CO ₂	0.00	1786	977	0	0.02	902	0.5	✓	0.5	✓	

TEST DATA LOG

Date: 2012-09-12 Manufacturer: WOODS LOCK SOAP STONE Model: NAVAJOS
 Project #: PT 20159 Run: 5 Tech: MJM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	569892, 12	484843, 80	690, 39
Initial (Liter)	569260, 62	484223, 22	676, 79

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101, 1	100, 9
Dry Bulb (F):	74, 12	80, 06
Humidity (%):	45, 7	41, 3

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2017.09.12 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 5 Tech: M.M. Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0.742 lbs.	221	232	230	229	226
2 x 4 x 5 in.	0.670 lbs.	222	226	229	231	232
2 x 4 x 5 in.	0.786 lbs.	230	233	226	233	231
2 x 4 x 5 in.	0.682 lbs.	228	228	229	219	227
2 x 4 x 5 in.	0.690 lbs.	229	236	233	221	236
2 x 4 x 5 in.	0.732 lbs.	230	233	236	233	232
2 x 4 x 5 in.	0.692 lbs.	220	226	228	229	227
2 x 4 x 5 in.	0.706 lbs.	230	226	238	237	236
2 x 4 x 5 in.	0.684 lbs.	227	226	228	226	229
2 x 4 x 5 in.	0.684 lbs.	230	236	239	236	237
2 x 4 x 5 in.	0.702 lbs.	233	229	226	230	233
2 x 4 x 5 in.	0.682 lbs.	231	226	229	220	229
2 x 4 x 5 in.	0.680 lbs.	228	231	229	236	235
2 x 4 x 5 in.	0.684 lbs.	239	233	236	229	233
2 x 4 x 5 in.	0.710 lbs.	226	229	226	221	223
2 x 4 x 5 in.	0.678 lbs.	229	223	219	224	228
2 x 4 x 5 in.	0.684 lbs.	226	228	223	223	227
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

M.M.
M.M.
M.M.
M.M.

TEST LOAD WEIGHT: 11.88 lbs
 9, 124

FUEL DATA

Date: 2017-09-12 Manufacturer: WOODS LOCK SOAPSTONE Model: NAVAJO
 Project #: PT 20154 Run: 5 Tech: MM Reviewer: DE

FUEL DESCRIPTION:

Type of wood :

TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
1 1/2 x 3 1/2 x 15 1/4 in.	1382 lbs.	21.9	21.8	21.6	21.9	21.7
1 1/2 x 3 1/2 x 15 1/4 in.	1340 lbs.	21.1	21.6	21.2	21.1	21.3
1 1/2 x 3 1/2 x 15 1/4 in.	1646 lbs.	21.0	21.3	21.8	21.0	21.1
1 1/2 x 3 1/2 x 15 1/4 in.	1648 lbs.	21.1	21.6	20.9	21.1	21.3
1 1/2 x 3/4 x 5 in.	0132 lbs.			21.6		
1 1/2 x 3/4 x 5 in.	0130 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	0134 lbs.			21.8		
1 1/2 x 3/4 x 5 in.	0118 lbs.			21.8		
1 1/2 x 3/4 x 5 in.	0148 lbs.			21.9		
1 1/2 x 3/4 x 5 in.	0136 lbs.			21.3		
1 1/2 x 3/4 x 5 in.	0130 lbs.			21.8		
1 1/2 x 3/4 x 5 in.	0126 lbs.			21.9		
1 1/2 x 3/4 x 5 in.	0132 lbs.			22.0		
1 1/2 x 3/4 x 5 in.	0134 lbs.			21.9		
1 1/2 x 3/4 x 5 in.	0138 lbs.			22.3		
1 1/2 x 3/4 x 5 in.	0132 lbs.			22.6		
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 802 lbs Min 20%: 160 Max 25%: 201

Date: 2017-09-11 Project #: PI 20154 Run: 5 Manufacturer: WOODS LOCK SAMPLES Model: NAVAJO
 Tech: MM Reviewer: BE

Pre-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-09-11	17:00	614769	01250	01261	119420	945431	01280	01271	117225	1004	1004	22	1023	
2017-09-12	16:00	614770	01251	01260	119420	945432	01279	01271	117225 117224				01259	
													01258	

Post-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-09-12	14:00	614778	01304	01259	119442	945441	01307	01271	117247	1004	1004	22	01260	
2017-09-13	8:00	614777	01292	01256	119433	945440	01302 01302	01269	117239				01259	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-11 Project #: PT 20154 Run: 5 Manufacturer: Woodstock Soapstone Model: NAVJO
 Tech: MM Reviewer: AP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	21	1010	1020	51
2017-09-11	17:00	1087409	01306	01306	118721
2017-09-12	10:00	1087408	01307	01306	118722

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	21	1010	1020	51
2017-09-12	14:00	1087420	01371	01299	118752
2017-09-13	8:00	1087418	01364	01298	118743

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	6
Date	14-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood or coal stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category		
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	14-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	Other	
HHV	23 183	kJ/kg
%C	56,36	
%H	4,05	
%O	10,29	
%Ash	27,07	
HHV		Btu/lb
LHV		Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	100,4	100,1
Barometer (in.Hg):	29,648109	29,55951887
Dry Bulb (F):	77,18	87,44
Humidity (%):	54	40,3
Air velocity (ft/min)	2	6

DGM #1	Final:	20182,460	cuft
	Initial:	20125,626	cuft
DGM #2	Final:	17177,638	cuft
	Initial:	17122,211	cuft
DGM room			

	Final:	571503,620	Liter
	Initial:	569894,250	Liter
	Final:	486416,540	Liter
	Initial:	484847,000	Liter
	Final:	723,820	cuft
	Initial:	690,380	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

167

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	14-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,35 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,952

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,058	73,77	0,2408
B center	0,057	73,88	0,2387
A1	0,052	73,61	0,2280
A2	0,061	73,78	0,2470
A3	0,047	73,8	0,2168
A4	0,048	73,83	0,2191
B1	0,048	73,910	0,2191
B2	0,055	73,920	0,2345
B3	0,049	73,950	0,2214
B4	0,047	73,780	0,2168
AVERAGE	0,0522	73,8230	0,2282

Project nu.	pi 21054
Date	14-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	4	404	414	2	20	409	1005	12	39	1006	1008	20	1011		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,3830	0,1250	0,1279	11,9568	108,8424	0,1272	0,1272	11,9666	110,2769	0,1242	0,1259	11,8182	0,1261	13/09/2017	17:00
Before (6)	61,3829	0,1251	0,1278	11,9567	108,8423	0,1273	0,1272	11,9666	110,2768	0,1243	0,1258	11,8182	0,1262	14/09/2017	09:00
After (1)	61,3842	0,1428	0,1275	11,9600	108,8430	0,1366	0,1271	11,9695	110,2779	0,1515	0,1256	11,8211	0,1263	14/09/2017	16:45
After (2)	61,3839	0,1405	0,1275	11,9584	108,8429	0,1363	0,1271	11,9684	110,2777	0,1484	0,1256	11,8199	0,1263	20/09/2017	08:00
After (3)	61,3839	0,1405	0,1275	11,9584	108,8429	0,1363	0,1271	11,9684	110,2777	0,1484	0,1256	11,8199	0,1263	21/09/2017	08:00
After (4)															
After (5)															
After (6)	61,3839	0,1405	0,1275	11,9584	108,8429	0,1363	0,1271	11,9684	110,2777	0,1484	0,1256	11,8199	0,1263	21/09/2017	08:00
Difference	0,0010	0,0154	-0,0003	0,0017	0,0006	0,0090	-0,0001	0,0018	0,0009	0,0241	-0,0002	0,0017	0,0001		
Total (mg)		17,8				29,1				26,5			0,1		
Total ajusté (mg)		17,70				29,00				26,40					

Project nu.	pi 21054
Date	14-09-2017
Technicien	mm

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 5,4 g/hr
 Burn Rate : 0,626 Dry kg/hr

Test Duration: 290 min

PRESSURE FACTOR: DGM 1 0,95719
 DGM 2 0,96107
 DGM 3 0,98943

BAROMETRIC PRESSURE
 Average: 29,603814 in Hg
 Start: 29,648109 in Hg
 End: 29,559519 in Hg

TEMPERATURE FACTORS DGM 1 0,96624
 DGM 2 0,96582
 DGM 3 0,97568

DGM CONTROLLER VALUES
 DGM 1 Final: 20182,460 Cuft
 Initial: 20125,626 Cuft

VOLUMES SAMPLED DGM 1 51,881 SCft
 DGM 2 51,243 SCft
 DGM 3 31,249 SCft

DGM 2 Final: 17177,638 Cuft
 Initial: 17122,211 Cuft

DGM #3 Final: 723,820 Cuft
 Initial: 690,380 Cuft

TOTAL TUNNEL VOLUME : 49097

TEMPERATURES
 DGM 1 546,450 °R
 DGM 2 546,688 °R

SAMPLE RATIOS
 Sample Train 1: 946,339
 Sample Train 2: 958,121

CALIBRATION FACTORS
 DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

Paticulate concentration
 Sample Train 1 **0,000561** g/dscf
 Sample Train 2 **0,000517** g/dscf
 Room **0,000003** g/dscf

TUNNEL FLOW RATE: 169,300 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **27,38** g
 Sample Train 2 **25,23** g

PARTICULATE CATCH
 Total Sample Train 1: 29,10 mg
 Total Sample Train 2: 26,50 mg
 Total Sample Train 1 1st hour: 17,80 mg

EMISSION RATES
 Sample Train 1 **5,67** g/hr
 Sample Train 2 **5,22** g/hr

1st hour emission rate **16,84** g/hr

DEVIATION: 4,08%

Cs Train 1 Train 2
 0,0005609 0,000517143

Elapsed Time min	Raw data row	Weight Remaining lbs	CO %	CO ₂ %	O ₂ %	Flue Gas F	Room Temp F	Tunnel Dry Bulb F	Unit Top F	Unit Back F	Unit R.Side F	Unit L.Side F	Unit Bottom F	Catalyst Down F	Catalyst Center F
0,0	167,00	7,5	0,3	2,7	0,0	401,6	78,3	139,5	338,6	354,3	453,9	370,9	895,8	#####	435,8
1,0	168,0	7,4	0,4	2,4	0,0	390,6	78,3	130,1	332,1	355,3	455,2	372,8	890,7	#####	433,6
2,0	169,0	7,3	0,4	2,1	0,0	433,8	78,5	143,7	324,8	356,5	455,9	374,1	933,9	#####	409,7
3,0	170,0	7,2	0,5	5,1	0,0	516,3	78,7	146,1	320,3	358,0	456,5	374,9	1007,2	#####	415,8
4,0	171,0	7,1	0,5	6,0	0,0	546,2	78,7	150,8	316,7	360,6	455,9	374,8	1003,0	#####	420,9
5,0	172,0	6,9	0,5	6,3	0,0	559,5	78,5	154,7	313,5	364,8	455,9	374,8	979,7	#####	421,3
6,0	173,0	6,8	0,4	6,0	0,0	489,0	78,5	145,2	316,7	370,0	456,5	374,8	955,8	#####	481,0
7,0	174,0	6,7	0,7	5,3	0,0	398,3	78,7	132,9	325,5	376,1	457,6	375,4	935,2	#####	518,0
8,0	175,0	6,7	0,6	5,2	0,0	364,5	78,4	127,8	332,2	382,3	459,7	376,5	920,4	#####	528,9
9,0	176,0	6,6	0,5	5,2	0,0	343,1	78,5	123,0	336,1	388,2	462,1	377,4	905,5	#####	521,8
10,0	177,0	6,5	0,6	4,5	0,0	328,2	78,4	119,5	337,2	393,8	464,7	379,0	892,1	#####	513,0
11,0	178,0	6,5	0,5	4,4	0,0	318,8	78,2	117,7	337,9	398,8	467,4	380,6	882,2	#####	508,3
12,0	179,0	6,4	0,5	4,4	0,0	312,1	78,6	113,7	338,6	403,4	469,7	382,0	875,4	#####	511,9
13,0	180,0	6,4	0,5	4,4	0,0	307,2	79,0	115,0	339,2	407,1	471,3	383,2	871,7	#####	514,9
14,0	181,0	6,3	0,5	4,4	0,0	303,7	78,6	114,2	340,9	410,7	472,9	384,7	867,3	#####	518,4
15,0	182,0	6,2	0,5	4,4	0,0	301,6	78,1	113,5	342,3	413,6	474,2	386,0	864,8	#####	525,1
16,0	183,0	6,2	0,5	4,4	0,0	299,7	78,6	113,4	344,1	416,5	475,6	387,4	863,5	#####	530,5
17,0	184,0	6,1	0,6	4,5	0,0	298,8	78,3	112,4	346,0	419,0	476,6	388,6	863,8	#####	537,2
18,0	185,0	6,1	0,5	4,5	0,0	298,4	78,7	112,2	347,9	421,1	477,5	390,2	866,8	#####	541,7
19,0	186,0	6,0	0,5	4,6	0,0	298,3	78,6	112,4	350,1	423,3	478,1	391,3	869,8	#####	547,7
20,0	187,0	6,0	0,5	4,7	0,0	298,4	78,7	112,2	352,4	425,5	478,7	392,6	865,6	#####	551,8
21,0	188,0	5,9	0,5	4,8	0,0	298,8	78,7	111,9	354,9	427,2	479,4	393,5	864,0	#####	553,3
22,0	189,0	5,9	0,5	4,8	0,0	299,3	78,6	112,0	357,4	429,1	480,2	395,1	869,4	#####	558,9
23,0	190,0	5,8	0,5	4,8	0,0	300,1	78,8	112,4	359,6	431,3	481,4	396,7	876,3	#####	563,2
24,0	191,0	5,7	0,5	4,8	0,0	301,2	78,6	112,6	362,3	433,0	482,6	398,5	884,3	#####	570,3
25,0	192,0	5,7	0,5	4,8	0,0	302,1	78,6	112,6	364,5	435,1	483,7	400,4	893,0	#####	571,1
26,0	193,0	5,7	0,5	4,8	0,0	303,0	78,6	112,2	367,0	436,6	484,8	402,1	907,6	#####	576,3
27,0	194,0	5,6	0,5	4,8	0,0	304,4	78,4	112,7	369,4	439,1	485,8	404,1	908,9	#####	581,2
28,0	195,0	5,6	0,5	5,0	0,0	305,3	78,8	112,7	372,7	440,6	486,8	405,7	905,6	#####	589,2
29,0	196,0	5,5	0,4	5,0	0,0	306,7	79,0	112,9	376,1	442,6	487,7	407,4	902,7	#####	592,8
30,0	197,0	5,5	0,4	5,0	0,0	307,8	78,9	112,9	378,7	444,7	488,4	409,1	897,9	#####	596,3
31,0	198,0	5,5	0,4	5,0	0,0	309,3	78,8	113,1	381,1	446,4	489,4	410,8	895,5	#####	592,9
32,0	199,0	5,4	0,4	5,0	0,0	310,8	79,0	112,8	383,9	448,4	490,0	412,5	898,3	#####	596,0
33,0	200,0	5,3	0,4	5,0	0,0	312,5	78,8	113,4	386,4	450,1	491,1	414,3	905,5	#####	599,8
34,0	201,0	5,3	0,4	5,1	0,0	313,8	79,1	113,1	389,9	451,7	491,8	415,9	911,9	#####	607,3
35,0	202,0	5,2	0,4	5,1	0,0	315,6	79,2	113,5	393,8	453,8	492,9	417,8	925,5	#####	620,5
36,0	203,0	5,1	0,4	5,0	0,0	318,3	79,2	113,7	398,2	455,5	494,1	419,6	934,5	#####	631,0
37,0	204,0	5,1	0,3	5,1	0,0	320,6	79,2	113,9	402,9	457,8	495,1	421,9	951,7	#####	638,8
38,0	205,0	5,0	0,3	5,1	0,0	323,4	79,2	114,2	407,1	459,6	496,1	424,1	986,3	#####	642,1
39,0	206,0	5,0	0,3	5,2	0,0	325,2	79,1	114,7	411,0	461,3	497,3	426,2	1046,4	#####	647,7
40,0	207,0	4,9	0,3	5,3	0,0	327,2	79,6	115,2	415,3	463,2	498,0	428,7	1047,6	#####	653,9
41,0	208,0	4,9	0,3	5,2	0,0	329,7	78,9	115,6	419,2	465,3	499,1	431,2	1047,5	#####	658,4
42,0	209,0	4,9	0,3	5,3	0,0	331,8	79,3	116,0	423,4	467,5	500,2	433,6	1047,5	#####	667,3
43,0	210,0	4,8	0,3	5,3	0,0	333,8	79,1	116,0	427,2	469,7	501,4	436,2	1046,2	#####	668,8
44,0	211,0	4,7	0,3	5,3	0,0	336,1	79,4	116,2	431,4	471,5	502,4	438,3	1041,3	#####	678,7
45,0	212,0	4,7	0,2	5,3	0,0	338,3	79,2	117,0	434,9	473,5	503,8	440,6	1044,5	#####	677,4
46,0	213,0	4,6	0,2	5,3	0,0	338,9	80,2	117,2	437,7	475,6	504,7	442,1	1044,4	#####	678,5
47,0	214,0	4,6	0,2	5,3	0,0	341,1	79,4	117,4	441,6	477,7	506,3	443,8	1043,1	#####	692,2
48,0	215,0	4,5	0,2	5,4	0,0	342,9	80,3	117,5	445,2	479,2	507,4	445,4	1044,9	#####	688,7
49,0	216,0	4,5	0,2	5,4	0,0	344,0	79,8	117,6	448,1	481,2	508,9	447,1	1048,7	#####	688,6
50,0	217,0	4,5	0,2	5,5	0,0	345,9	79,3	118,1	451,5	483,1	510,5	449,3	1050,3	#####	695,2
51,0	218,0	4,4	0,2	5,5	0,0	347,9	79,9	118,5	455,1	484,8	512,0	451,5	1049,1	#####	701,6
52,0	219,0	4,4	0,2	5,5	0,0	350,0	79,6	118,9	458,5	486,6	513,5	453,7	1048,7	#####	704,7
53,0	220,0	4,3	0,2	5,6	0,0	351,6	80,0	119,1	461,2	488,2	515,1	456,2	1047,8	#####	704,7
54,0	221,0	4,3	0,2	5,5	0,0	353,4	79,6	119,5	464,3	489,9	517,0	458,4	1045,9	#####	717,3
55,0	222,0	4,2	0,2	5,5	0,0	355,1	79,6	119,6	466,5	491,7	518,8	460,9	1045,2	#####	709,4
56,0	223,0	4,1	0,2	5,6	0,0	356,3	80,3	120,1	469,9	493,1	520,5	463,1	1045,1	#####	718,7
57,0	224,0	4,1	0,2	5,6	0,0	358,2	79,9	120,5	473,3	494,7	522,5	465,7	1038,5	#####	731,6
58,0	225,0	4,1	0,2	5,6	0,0	359,8	79,9	120,7	476,2	496,4	524,4	468,1	1038,7	#####	725,5
59,0	226,0	4,0	0,2	5,5	0,0	361,3	79,7	121,2	478,0	497,9	526,5	470,5	1057,7	#####	725,1
60,0	227,0	3,9	0,1	5,5	0,0	362,9	80,3	121,3	480,9	499,4	528,4	472,2	1058,1	#####	734,6
61,0	228,0	3,9	0,1	5,6	0,0	364,5	80,5	121,3	484,0	500,4	530,3	474,3	1048,7	#####	744,1
62,0	229,0	3,8	0,1	5,5	0,0	365,0	80,3	121,6	486,6	502,0	532,1	476,6	1034,0	#####	747,7
63,0	230,0	3,9	0,1	5,5	0,0	366,6	80,2	121,6	490,5	503,0	533,8	478,3	1053,1	#####	759,6
64,0	231,0	3,8	0,1	5,8	0,0	368,9	80,3	121,8	495,7	504,4	535,8	480,5	1072,7	#####	763,7
65,0	232,0	3,7	0,1	5,9	0,0	370,6	79,9	123,1	499,2	506,0	538,2	482,8	1080,8	#####	757,6
66,0	233,0	3,7	0,1	6,0	0,0	372,2	80,2	123,5	501,9	507,8	540,6	485,2	1074,9	#####	755,5
67,0	234,0	3,6	0,1	5,9	0,0	372,8	79,8	123,2	503,7	509,3	543,2	487,1	1074,5	#####	752,3
68,0	235,0	3,6	0,1	5,8	0,0	373,8	80,2	123,2	505,1	510,9	544,9	489,0	1072,0	#####	750,7
69,0	236,0	3,5	0,1	5,7	0,0	374,8	80,2	123,7	506,3	512,8	547,4	490,7	1066,7	#####	746,5
70,0	237,0	3,5	0,1	5,7	0,0	375,5	80,1	124,0	507,3	514,4	549,7	492,4	1074,2	#####	748,3
71,0	238,0	3,5	0,1	5,7	0,0	376,8	80,0	124,0	509,1	516,4	551,8	494,0	1066,4	#####	754,3
72,0	239,0	3,5	0,1	5,8	0,0	377,6	80,3	124,3	510,5	518,1	553,9	495,1	1042,6	#####	754,1
73,0	240,0	3,4	0,1	5,7	0,0	378,2	80,3	124,6	511,5	520,1	555,9	496,4	1001,1	#####	751,7
74,0	241,0	3,3	0,1	5,6	0,0	379,1	80,0	124,5	512,0	521,7	557,7	498,0	959,7	#####	749,4
75,0	242,0	3,3	0,1	5,5	0,0	379,2	80,0	124,6	511,3	523,3	559,1	499,2	923,2	#####	739,7
76,0	243,0	3,2	0,1	5,3	0,0	378,8	80,2	124,5	510,0	525,2	560,5	500,6	893,2	#####	735,3
77,0	244,0	3,2	0,1	5,3	0,0	378,1	80,2	124,4	509,3	527,1	561,9	501,7	868,4	#####	733,0
78,0	245,0	3,2	0,1	5,2	0,0	378,1	80,4	124,1	508,0	528,6	562,8	502,8	849,7	#####	727,6
79,0	246,0	3,2	0,1	5,1	0,0	377,6	80,3	124,6	506,1	530,4	563,8	504,1	838,3	#####	721,7

120,0	287,0	1,9	0,4	3,8	0,0	333,3	81,4	120,1	418,4	527,8	547,4	527,1	950,6	#####	590,8
121,0	288,0	2,0	0,4	3,8	0,0	331,8	81,5	120,0	416,2	527,0	546,5	527,2	944,7	#####	588,4
122,0	289,0	1,9	0,4	3,7	0,0	330,1	81,2	119,3	413,5	526,1	545,5	527,1	938,9	#####	583,6
123,0	290,0	1,9	0,4	3,6	0,0	328,6	81,7	119,3	411,5	524,9	544,4	526,6	931,6	#####	578,5
124,0	291,0	1,9	0,4	3,6	0,0	327,2	81,4	118,4	408,4	523,5	543,0	526,2	925,6	#####	574,3
125,0	292,0	1,8	0,4	3,6	0,0	325,3	81,5	118,5	405,9	522,3	541,8	525,7	922,7	#####	570,8
126,0	293,0	1,8	0,4	3,5	0,0	323,7	81,8	118,0	403,7	521,6	540,9	525,2	918,2	#####	567,7
127,0	294,0	1,8	0,4	3,5	0,0	322,6	81,6	117,9	400,7	520,2	539,6	524,4	914,6	#####	563,6
128,0	295,0	1,8	0,4	3,4	0,0	320,8	81,9	117,5	398,1	519,2	538,1	523,6	911,1	#####	559,4
129,0	296,0	1,8	0,4	3,4	0,0	319,0	81,4	117,6	395,7	517,9	536,8	523,2	908,3	#####	555,7
130,0	297,0	1,8	0,4	3,3	0,0	317,9	81,7	117,6	392,9	517,0	535,3	522,4	906,3	#####	551,9
131,0	298,0	1,8	0,4	3,2	0,0	316,4	81,2	117,5	390,2	515,5	534,2	521,9	901,1	#####	549,4
132,0	299,0	1,8	0,4	3,3	0,0	314,7	81,7	117,2	387,9	514,3	532,8	521,1	896,1	#####	546,5
133,0	300,0	1,7	0,4	3,2	0,0	313,6	81,4	117,4	385,6	513,0	531,0	520,9	890,0	#####	543,6
134,0	301,0	1,7	0,5	3,2	0,0	312,3	81,9	116,9	383,3	511,5	529,2	520,3	884,4	#####	540,5
135,0	302,0	1,7	0,4	3,2	0,0	310,7	81,4	116,6	381,4	510,1	527,6	519,3	879,2	#####	538,0
136,0	303,0	1,6	0,4	3,2	0,0	309,1	81,4	116,6	378,9	508,6	525,8	518,9	874,0	#####	535,2
137,0	304,0	1,6	0,4	3,2	0,0	307,7	81,5	116,2	376,9	507,1	524,2	518,6	867,5	#####	532,2
138,0	305,0	1,6	0,4	3,2	0,0	306,4	81,6	116,1	375,0	505,4	522,5	517,8	860,8	#####	529,9
139,0	306,0	1,6	0,4	3,2	0,0	305,1	81,6	115,9	372,6	503,9	520,7	517,4	853,4	#####	528,1
140,0	307,0	1,5	0,4	3,2	0,0	303,9	81,7	115,7	370,9	502,5	519,1	516,9	846,3	#####	526,9
141,0	308,0	1,5	0,4	3,2	0,0	302,9	81,4	115,6	369,5	500,5	517,3	516,2	839,5	#####	524,5
142,0	309,0	1,5	0,4	3,2	0,0	301,5	81,6	115,7	367,4	499,0	515,3	515,8	833,3	#####	522,4
143,0	310,0	1,5	0,4	3,1	0,0	300,4	81,6	115,4	365,8	497,6	513,6	515,3	828,2	#####	521,1
144,0	311,0	1,5	0,4	3,1	0,0	299,3	81,7	115,2	364,2	495,9	511,9	514,9	822,3	#####	518,4
145,0	312,0	1,5	0,4	3,0	0,0	298,0	81,7	115,3	362,2	494,3	510,3	514,3	816,0	#####	515,9
146,0	313,0	1,5	0,4	3,0	0,0	296,9	81,7	115,4	360,6	492,7	508,7	513,7	809,8	#####	513,8
147,0	314,0	1,4	0,4	3,0	0,0	295,7	81,4	114,8	359,3	491,1	507,0	513,1	803,9	#####	511,1
148,0	315,0	1,4	0,4	2,9	0,0	294,4	82,0	114,7	357,4	489,4	505,2	512,2	797,2	#####	508,1
149,0	316,0	1,4	0,4	2,9	0,0	293,0	81,5	114,6	355,7	487,9	503,6	511,7	790,6	#####	505,6
150,0	317,0	1,3	0,5	2,9	0,0	291,9	81,6	114,5	354,1	486,3	501,9	511,3	784,9	#####	503,5
151,0	318,0	1,4	0,5	2,8	0,0	290,6	81,9	114,4	352,3	484,7	500,3	510,9	779,2	#####	501,0
152,0	319,0	1,3	0,5	2,8	0,0	289,9	82,2	114,4	350,5	482,9	498,7	510,1	773,1	#####	498,8
153,0	320,0	1,3	0,5	2,7	0,0	288,9	81,8	114,4	348,6	481,2	497,0	509,4	767,3	#####	497,0
154,0	321,0	1,3	0,5	2,7	0,0	287,6	81,4	114,1	347,1	479,5	495,4	508,3	761,0	#####	495,0
155,0	322,0	1,3	0,5	2,7	0,0	286,7	82,1	114,0	345,3	477,9	493,6	507,6	754,8	#####	492,3
156,0	323,0	1,2	0,5	2,7	0,0	285,6	81,9	113,9	344,1	476,3	492,0	506,3	749,0	#####	492,1
157,0	324,0	1,2	0,5	2,7	0,0	284,2	82,1	114,1	342,4	474,5	490,3	505,4	744,0	#####	487,9
158,0	325,0	1,3	0,6	2,6	0,0	283,3	81,9	113,7	340,9	473,0	488,7	504,6	739,3	#####	485,0
159,0	326,0	1,2	0,6	2,6	0,0	281,6	82,2	113,2	338,8	471,3	486,9	503,4	738,0	#####	481,5
160,0	327,0	1,2	0,5	2,6	0,0	280,5	81,9	112,9	337,0	469,7	485,2	502,2	740,5	#####	478,2
161,0	328,0	1,2	0,5	2,5	0,0	279,0	81,9	112,8	335,2	468,0	483,7	501,2	741,1	#####	476,1
162,0	329,0	1,2	0,5	2,5	0,0	277,8	81,7	112,7	333,4	466,4	482,0	499,9	740,7	#####	472,9
163,0	330,0	1,2	0,5	2,5	0,0	276,7	82,0	112,7	331,8	464,7	480,3	498,5	739,4	#####	470,2
164,0	331,0	1,2	0,5	2,4	0,0	275,5	82,1	112,1	330,0	463,3	478,7	497,5	738,4	#####	467,2
165,0	332,0	1,1	0,5	2,4	0,0	274,4	81,9	112,3	328,3	461,8	476,9	496,2	737,1	#####	464,8
166,0	333,0	1,1	0,5	2,4	0,0	273,0	82,1	112,1	326,9	459,9	475,3	495,1	735,3	#####	462,8
167,0	334,0	1,1	0,5	2,4	0,0	272,2	82,0	111,7	325,1	458,4	473,4	493,3	733,9	#####	460,2
168,0	335,0	1,1	0,5	2,4	0,0	271,2	81,9	111,4	323,4	456,6	471,7	491,6	734,2	#####	457,8
169,0	336,0	1,1	0,5	2,4	0,0	269,7	81,9	111,1	321,8	455,1	469,8	489,7	732,5	#####	455,8
170,0	337,0	1,0	0,5	2,3	0,0	268,3	82,1	110,5	320,0	453,4	468,0	487,7	729,6	#####	453,0
171,0	338,0	1,1	0,5	2,2	0,0	267,3	82,3	110,0	318,6	451,7	466,2	485,3	727,9	#####	450,9
172,0	339,0	1,1	0,5	2,2	0,0	265,8	81,9	110,3	316,8	450,0	464,5	483,3	724,8	#####	448,0
173,0	340,0	1,0	0,4	2,2	0,0	264,6	82,1	110,2	315,3	448,2	462,7	481,5	721,1	#####	446,2
174,0	341,0	1,0	0,4	2,2	0,0	263,7	82,1	109,6	313,7	446,5	460,8	479,8	717,4	#####	443,7
175,0	342,0	1,0	0,4	2,2	0,0	262,2	82,0	109,6	312,3	444,6	458,8	477,8	719,0	#####	440,3
176,0	343,0	1,0	0,4	2,1	0,0	261,0	82,2	109,3	310,4	442,7	456,8	475,7	724,3	#####	436,4
177,0	344,0	1,0	0,4	2,0	0,0	259,7	82,0	109,3	308,4	440,9	455,1	473,6	725,3	#####	433,5
178,0	345,0	1,0	0,4	2,0	0,0	258,3	82,1	109,1	307,0	439,2	453,2	471,9	724,8	#####	431,0
179,0	346,0	0,9	0,4	2,0	0,0	257,2	81,9	108,8	304,9	437,3	451,3	469,9	722,7	#####	429,0
180,0	347,0	0,9	0,4	2,0	0,0	255,9	82,1	108,9	303,5	435,7	449,4	467,7	720,5	#####	427,1
181,0	348,0	0,9	0,4	2,0	0,0	254,8	82,1	108,7	302,0	433,7	447,5	466,1	717,8	#####	424,6
182,0	349,0	0,9	0,4	2,0	0,0	253,6	82,1	108,7	300,4	432,0	445,7	464,2	715,1	#####	422,3
183,0	350,0	0,9	0,4	2,0	0,0	252,7	82,0	108,5	298,6	430,0	443,5	462,3	712,4	#####	421,9
184,0	351,0	0,8	0,4	2,0	0,0	251,8	82,1	108,3	297,3	428,1	441,5	460,6	709,7	#####	419,0
185,0	352,0	0,8	0,4	2,0	0,0	250,5	82,2	107,3	295,7	426,3	439,3	458,4	707,2	#####	416,1
186,0	353,0	0,8	0,4	2,0	0,0	249,4	82,1	107,3	294,1	424,2	437,4	456,3	703,9	#####	414,1
187,0	354,0	0,9	0,4	2,0	0,0	248,2	82,2	106,8	292,5	422,5	435,7	454,3	700,9	#####	412,0
188,0	355,0	0,8	0,4	2,0	0,0	247,1	82,3	106,7	291,0	420,6	433,5	452,7	698,2	#####	409,5
189,0	356,0	0,8	0,4	1,9	0,0	245,9	81,9	106,5	289,6	419,0	431,7	450,4	695,2	#####	407,9
190,0	357,0	0,8	0,4	1,9	0,0	244,5	82,1	106,6	288,1	417,2	430,1	449,0	692,1	#####	405,7
191,0	358,0	0,8	0,4	1,9	0,0	243,2	82,1	106,5	286,7	415,6	428,1	447,2	689,5	#####	403,9
192,0	359,0	0,8	0,4	1,9	0,0	242,4	82,1	106,8	285,5	413,9	426,2	445,8	685,7	#####	401,8
193,0	360,0	0,7	0,4	1,9	0,0	241,3	82,2	106,5	284,2	412,2	424,6	444,1	682,6	#####	401,9
194,0	361,0	0,8	0,4	1,9	0,0	240,5	81,8	106,4	282,7	410,6	422,8	442,2	679,4	#####	399,2
195,0	362,0	0,7	0,4	1,9	0,0	239,2	82,0	106,4	281,4	408,9	420,9	440,6	676,1	#####	399,0
196,0	363,0	0,7	0,4	1,9	0,0	238,4	82,0	106,1	280,2	407,5	419,3	438,8	673,1	#####	395,7
197,0	364,0	0,7	0,4	1,9	0,0	237,7	82,0	106,0	279,0	405,6	417,3	437,4	670,2	#####	393,1
198,0	365,0	0,7	0,4	1,9	0,0	236,7	82,3	105,9	277,4	404,1	415,7	435,7	667,9	#####	391,6
199,0	366,0	0,7	0,4	1,9	0,0	235,8	81,9	105,2	276,2	402,7	414,1	433,9	663,8	#####	389,9
200,0	367,0	0,7	0,4	1,9	0,0	234,8	82,1	105,2	274,9	401,0	412,3	432,			

243,0	410,0	0,3	0,3	1,5	0,0	204,5	82,5	99,7	234,9	349,0	352,6	374,4	559,2	#####	332,2
244,0	411,0	0,3	0,3	1,5	0,0	203,8	82,6	99,6	233,9	347,8	351,2	372,5	557,4	#####	330,5
245,0	412,0	0,3	0,3	1,5	0,0	203,1	82,8	99,4	233,2	346,6	349,8	370,9	556,8	#####	329,7
246,0	413,0	0,3	0,3	1,4	0,0	202,5	82,5	99,3	232,6	345,6	348,7	368,8	556,6	#####	328,9
247,0	414,0	0,2	0,3	1,4	0,0	201,9	82,5	99,1	231,7	344,6	347,4	366,9	555,3	#####	327,8
248,0	415,0	0,2	0,3	1,4	0,0	201,0	82,5	99,2	231,0	343,4	346,0	365,0	553,2	#####	326,5
249,0	416,0	0,3	0,3	1,4	0,0	200,5	82,3	99,0	230,1	342,2	344,7	362,8	550,2	#####	325,2
250,0	417,0	0,2	0,3	1,4	0,0	200,0	82,3	99,1	229,3	341,0	343,5	360,8	549,5	#####	323,9
251,0	418,0	0,2	0,3	1,4	0,0	199,2	82,0	99,1	228,5	340,1	342,2	359,0	547,3	#####	322,7
252,0	419,0	0,2	0,3	1,4	0,0	198,7	82,3	98,8	227,9	339,0	340,8	357,1	545,2	#####	321,5
253,0	420,0	0,3	0,3	1,4	0,0	198,1	82,1	98,7	227,0	337,8	339,4	355,5	543,7	#####	321,9
254,0	421,0	0,2	0,3	1,4	0,0	197,6	82,4	98,5	226,4	336,7	338,2	353,4	541,8	#####	320,8
255,0	422,0	0,2	0,2	1,4	0,0	196,9	81,9	98,8	225,6	335,4	336,9	351,4	539,6	#####	318,9
256,0	423,0	0,2	0,2	1,4	0,0	196,3	82,2	98,7	224,7	334,3	335,7	349,9	537,5	#####	317,8
257,0	424,0	0,2	0,2	1,4	0,0	195,8	82,3	98,7	224,1	333,2	334,6	348,0	535,5	#####	317,3
258,0	425,0	0,2	0,2	1,4	0,0	195,2	82,4	98,5	223,2	332,1	333,3	346,3	534,1	#####	314,8
259,0	426,0	0,2	0,2	1,4	0,0	194,5	82,0	98,6	222,5	331,0	332,2	344,7	532,2	#####	313,6
260,0	427,0	0,2	0,2	1,3	0,0	193,9	82,5	98,5	221,8	329,9	331,0	342,8	530,4	#####	313,2
261,0	428,0	0,2	0,2	1,3	0,0	193,3	82,2	98,5	221,1	328,8	329,8	341,4	528,1	#####	311,7
262,0	429,0	0,2	0,2	1,3	0,0	193,0	82,4	98,4	220,4	327,8	328,6	340,0	526,0	#####	310,1
263,0	430,0	0,2	0,2	1,3	0,0	192,2	82,5	98,1	219,6	326,7	327,3	338,3	523,4	#####	309,3
264,0	431,0	0,2	0,2	1,3	0,0	191,6	82,4	98,0	219,1	325,6	326,3	336,7	521,3	#####	308,0
265,0	432,0	0,2	0,2	1,3	0,0	190,9	82,4	98,1	218,4	324,5	325,2	335,3	519,0	#####	307,9
266,0	433,0	0,1	0,2	1,3	0,0	190,3	82,4	98,0	217,6	323,3	324,0	333,5	516,9	#####	305,8
267,0	434,0	0,1	0,2	1,3	0,0	189,6	82,5	97,9	216,9	322,5	322,8	331,9	514,5	#####	305,5
268,0	435,0	0,1	0,2	1,3	0,0	189,0	82,0	97,9	216,4	321,2	321,6	330,3	512,5	#####	303,6
269,0	436,0	0,1	0,2	1,3	0,0	188,8	82,9	97,7	215,3	320,3	320,4	328,8	510,9	#####	302,3
270,0	437,0	0,1	0,2	1,2	0,0	187,8	82,5	97,6	214,7	319,2	319,2	327,3	509,2	#####	301,0
271,0	438,0	0,1	0,2	1,2	0,0	187,0	82,4	97,4	214,0	318,1	318,2	325,5	507,2	#####	299,4
272,0	439,0	0,1	0,2	1,2	0,0	186,3	82,6	97,3	213,3	317,1	316,8	324,1	505,5	#####	298,2
273,0	440,0	0,1	0,2	1,2	0,0	185,8	82,4	97,3	212,6	316,1	315,9	322,5	503,6	#####	297,7
274,0	441,0	0,1	0,2	1,2	0,0	185,4	82,5	97,1	211,8	315,0	314,5	320,9	501,3	#####	296,6
275,0	442,0	0,1	0,2	1,2	0,0	184,8	82,6	97,3	211,2	313,8	313,4	319,5	499,1	#####	295,6
276,0	443,0	0,1	0,2	1,2	0,0	184,2	82,6	97,1	210,5	312,7	312,2	318,0	497,1	#####	293,8
277,0	444,0	0,1	0,2	1,2	0,0	183,7	82,6	96,9	209,6	311,7	311,3	316,7	495,1	#####	293,6
278,0	445,0	0,1	0,2	1,3	0,0	183,1	82,7	96,8	209,2	310,7	310,2	315,3	493,3	#####	294,3
279,0	446,0	0,1	0,2	1,3	0,0	182,6	82,7	96,7	208,5	309,7	309,1	313,9	491,7	#####	293,1
280,0	447,0	0,1	0,2	1,3	0,0	182,0	82,5	96,6	208,2	308,9	308,0	312,5	490,5	#####	292,2
281,0	448,0	0,1	0,2	1,3	0,0	181,4	82,8	96,7	207,5	307,9	306,9	311,3	489,0	#####	291,9
282,0	449,0	0,1	0,2	1,2	0,0	180,9	82,8	96,7	207,0	307,2	306,0	310,0	488,0	#####	291,0
283,0	450,0	0,1	0,2	1,2	0,0	180,3	82,5	96,7	206,4	306,3	305,0	308,6	486,8	#####	289,8
284,0	451,0	0,1	0,2	1,2	0,0	179,8	82,7	96,5	205,7	305,5	304,0	307,1	485,3	#####	289,2
285,0	452,0	0,1	0,2	1,2	0,0	179,4	82,4	96,7	205,0	304,6	303,0	305,8	484,2	#####	287,5
286,0	453,0	0,1	0,2	1,2	0,0	179,0	82,5	96,7	204,5	304,1	302,0	304,8	483,1	#####	285,7
287,0	454,0	0,1	0,2	1,2	0,0	178,5	82,3	96,7	203,9	303,3	301,2	303,7	481,9	#####	285,7
288,0	455,0	0,1	0,2	1,2	0,0	178,2	82,7	96,5	203,3	302,6	300,1	302,4	480,6	#####	284,8
289,0	456,0	0,1	0,2	1,2	0,0	177,5	82,2	96,4	202,7	301,7	299,1	301,3	479,3	#####	283,0
290,0	457,0	0,0	0,2	1,2	0,0	177,2	82,3	96,2	202,2	300,9	298,1	300,2	478,0	#####	282,8

Manufacturer: podstock Soapstone

Model: Navajo

Date: 09/14/17

Run: 6

Control #: Fruitland

Test Duration: 290 min

	HHV	LHV
Eff	56,07%	58,26%
Comb Eff	91,37%	91,37%
HT Eff	61,36%	63,76%
Output	7 833	kJ/h
Burn Rate	0,60	kg/h
Grams CO	475	g
Input	13 970	kJ/h
MC wet	14,00	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
 CO_{2-ult} 18,78
 F₀
 1,104

		Air Fuel Ratio (A/F)
Overall Heating Efficiency:	56,07%	Dry Molecular Weight (M _d)
Combustion Efficiency:	91,37%	Dry Moles Exhaust Gas (N _e):
Heat Transfer Efficiency:	61,36%	Air Fuel Ratio (A/F)
Heat Output:	7 431 Btu/h	7 833 kJ/h
Heat Input:	13 252 Btu/h	13 970 kJ/h
Burn Duration:	4,83	h
Burn Rate:	1,33	lb/h 0,603 kg/h
Stack Temp:	286,4 Deg. F	141,3 Deg. C

Date: 2017 07 14 Manufacturer: WOODSTOCK SOAPSTONE Model: MNAJG
 Project #: PI 2154 Run: 6 Tech: MM Reviewer: DP

Coal test

kindling and 3 pieces START FIRE (WOOD)

At 3.5 LBS CBSE DOOR and by pass

At 200 LBS INSTANT 300 LBS PRECISE

and setting at coal (COAL)

At 12 LBS INSTANT bad COAL ↑

Dégager million end. instab coal on side side

laissé port craquer and by pass open

At by At 2:30 a lost by pass and DOOR

At 10 m w open an ribe enthe L ↑ ◊

le L et le ◊

TEST LOAD CONFIGURATION

catalyst Fernth
 Demper open

PRE / POST CHECKS

Date: 2017-09-14 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PJ 20154 Run: 6 Tech: MM Reviewer: DP

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM 191	7:30	OK	OK

Pre-Test

Post-Test

Facility Conditions:

Air Velocity from less than 2 feet

	Pre-Test	Post-Test
2 (max50 Fpm)	OK	OK (max50 Fpm)
Smoke Capture Check.....	OK	OK
Picture.....	OK	OK
4 sides	OK	OK

Smoke Capture Check.....

Picture.....

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....

2017-09-05
2017-09-05
OK
OK

Date Dilution Tunnel Cleaned.....

Induced Draft Check (max 0.005 H2O).....

Traverse before ignition.....

Flow Rate 140 cfm ±10%.....

OK

Temperature System:

Ambient (65°-90°F).....

OK	°F
OK	°F

Wood Heater Surface (±125°F).....

Proportional Checks:

Thermocouple check.....

OK
OK
OK

Pitot Clean.....

Pitot verification.....

Sampling Train ID Numbers:

Probe.....

Filter Front.....

Filter Back.....

Filter Thermocouple.....

Filter (<90°F).....

Train 1 st hour	Train 1	Train 2
04	20	39
404	409	1006
414	1005	1008
11	11	12
OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

Date: 2017-09-14 Manufacturer: WOODSlock Soapstone Model: NAVAJO
 Project #: p7 10154 Run: 6 Tech: MM Reviewer: DP

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	569893.68	571504.58	569893.74	571504.65	484845.90	486417.48
Initial 1minute DGM (Liter)	569893.68	571504.56	569893.74	571504.64	484845.89	486417.48
Change © (Liter)	Ø	0.02	Ø	0.01	0.01	Ø
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok		ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H ₂ O static	Pre Test 0.4-0.5 H ₂ O velocity	Post Test 3 H ₂ O Static	Post Test 0.4-0.5 H ₂ O velocity
Vacuum (inches Hg.)	3	5	3	4
Check OK (no change after 15 sec.)	ok	ok	ok	ok

Date: 2017-07-14 Manufacturer: WOODSTOCK SOAPSTONE Model: MAVAJO
 Project #: PT 154 Run: 6 Tech: MM Reviewer: NO

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-118	100 mg, Class S	MM 100 200 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017 09. 14 Manufacturer: WOOD stock Soapstone Model: NAVA jo
 Project #: PI 20154 Run: 6 Tech: M.M. Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2981	300	1,002	1,00
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	1294	1800	977	10,00
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.002	3.002	0.999	0.007	0.02	0.024	0.15	0.003	0.05	✓	
CO ₂	0	1292	973	0	0.02	0.02	0.5	0.001	0.5	✓	

Date: 2017-09-14 Manufacturer: WOODSTOCK Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 6 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	571503, 62	486416, 54	723, 82
Initial (Liter)	569894, 25	484847, 00	690, 38

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	100, 4	100, 1
Dry Bulb (F):	77, 18	87, 44
Humidity (%):	54	40, 3

Flow Meter

	Start	End
Flow meter reading	N.D	N.D

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.D	N.D
Scale Weight (Kg)	N.D	N.D

FUEL DATA

Date: 2017.07.14 ^{14 m.m.} Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 6 Tech: M.M. Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0.590 lbs.	231	233	236	228	229
2 x 4 x 5 in.	0.584 lbs.	233	228	231	238	239
2 x 4 x 5 in.	0.674 lbs.	231	234	234	233	232
2 x 4 x 5 in.	0.586 lbs.	228	226	229	231	233
2 x 4 x 5 in.	0.598 lbs.	233	236	229	228	228
2 x 4 x 5 in.	0.586 lbs.	238	236	234	238	239 ^{23.9 m.m.}
2 x 4 x 5 in.	0.682 lbs.	226	229	223	228	228
2 x 4 x 5 in.	0.594 lbs.	226	225	229	228	228
2 x 4 x 5 in.	0.590 lbs.	226	225	225	223	221
2 x 4 x 5 in.	0.654 lbs.	237	238	234	238	234
2 x 4 x 5 in.	0.574 lbs.	228	229	229	226	227
2 x 4 x 5 in.	0.586 lbs.	229	226	228	226	225
2 x 4 x 5 in.	0.598 lbs.	231	234	234	233	236
2 x 4 x 5 in.	0.594 lbs.	228	226	229	230	230
2 x 4 x 5 in.	0.578 lbs.	233	228	231	234	231
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 9.07 lbs



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-14 Manufacturer: Woodstock soap stone Model: MAVAJO
 Project #: pj20154 Run: 6 Tech: MM Reviewer: NO

Pre-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1			
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank	
2017-09-13	17:00	613830	01250	01279	119568	1088424	01272	01272	119666	01261	
2017-09-14	9:00	613829	01251	01278	119567	1088423	01273	01272	119666	01262	

Post-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1			
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank	
2017-09-14	16:45	613842	01428	01275	119600	1088430	01366	01271	119695	01263	
2017-09-20	8:00	613839	01405	01275	119587 119584	1088429	01363	01271	119684	01263	
2017-09-21	8:00	613839	01405	01275	119584	1088429	01363	01271	119684	01263	



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-14 Project #: PT 10154 Run: 6
 Manufacturer: Woodstock Soap Shovel Model: MDV-AJ6
 Tech: MM Reviewer: RP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2017-09-13	17:00	110, 2769	0, 1242	0, 1259	11, 8182
2017-09-14	9:00	110, 2768	0, 1243	0, 1258	11, 8182

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2017-09-14	16:45	110, 2779	0, 1515 0, 1425	0, 1256	11, 8211
2017-09-20	8:00	110, 2777	0, 1484	0, 1256	11, 8199
2017-09-21	8:00	110, 2777	0, 1484	0, 1256	11, 8199

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	7
Date	18-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	hybrid wood stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	18-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	101,3	101,2
Barometer (in.Hg):	29,913879	29,88434875
Dry Bulb (F):	75,2	86,9
Humidity (%):	68	44
Air velocity (ft/min)	4	6

DGM #1	Final:	20211,774	cuft
	Initial:	20182,550	cuft
DGM #2	Final:	17206,210	cuft
	Initial:	17177,705	cuft
DGM room			

	Final:	572333,680	Liter
	Initial:	571506,160	Liter
	Final:	487225,610	Liter
	Initial:	486418,440	Liter
	Final:	741,560	cuft
	Initial:	723,820	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

260

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	18-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,39 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,948

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,060	75,64	0,2449
B center	0,059	76,09	0,2429
A1	0,053	75,65	0,2302
A2	0,063	75,75	0,2510
A3	0,049	75,72	0,2214
A4	0,048	75,53	0,2191
B1	0,048	76,010	0,2191
B2	0,057	76,070	0,2387
B3	0,051	76,060	0,2258
B4	0,048	76,000	0,2191
AVERAGE	0,0536	75,8520	0,2312

Project nu.	pi 21054
Date	18-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	16	2101	2106	31	18	2107	2108	55	38	2207	2208	103	2210		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	108,7539	0,1247	0,1281	11,9364	108,9481	0,1266	0,1249	11,8917	110,4343	0,1256	0,1251	10,2454	0,1270	14/09/2017	17:00
Before (6)	108,7540	0,1248	0,1282	11,9363	108,9480	0,1267	0,1249	11,8916	110,4343	0,1257	0,1252	10,2455	0,1271	18/09/2017	09:00
After (1)	108,7545	0,1256	0,1279	11,9390	108,9486	0,1261	0,1246	11,8940	110,4345	0,1261	0,1248	10,2496	0,1273	18/09/2017	16:00
After (2)	108,7544	0,1254	0,1278	11,9380	108,9483	0,1260	0,1246	11,8932	110,4343	0,1261	0,1248	10,2474	0,1272	21/09/2017	08:00
After (3)	108,7544	0,1254	0,1278	11,9372	108,9483	0,1260	0,1246	11,8932	110,4344	0,1263	0,1248	10,2474	0,1272	25/09/2017	08:00
After (4)	108,7544	0,1254	0,1278	11,9372	108,9483	0,1260	0,1246	11,8932	110,4344	0,1263	0,1248	10,2474	0,1272	26/09/2017	08:00
After (5)															
After (6)	108,7544	0,1254	0,1278	11,9372	108,9483	0,1260	0,1246	11,8932	110,4344	0,1263	0,1248	10,2474	0,1272	26/09/2017	08:00
Difference	0,0004	0,0006	-0,0004	0,0009	0,0003	-0,0007	-0,0003	0,0016	0,0001	0,0006	-0,0004	0,0019	0,0001		
Total (mg)		1,5				2,4				2,2			0,1		
Total ajusté (mg)		1,40				2,30				2,10					

Project nu.	pi 21054
Date	18-09-2017
Technicien	

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,8 g/hr

Burn Rate : 1,178 Dry kg/hr

Test Duration: 152 min

PRESSURE FACTOR: DGM 1 0,97728
 DGM 2 0,97945
 DGM 3 0,99930

BAROMETRIC PRESSURE
 Average: 29,899114 in Hg
 Start: 29,913879 in Hg
 End: 29,884349 in Hg

TEMPERATURE FACTORS DGM 1 0,96911
 DGM 2 0,96857
 DGM 3 0,97469

DGM CONTROLLER VALUES

DGM 1 Final: 20211,774 Cuft
 Initial: 20182,550 Cuft

VOLUMES SAMPLED DGM 1 27,318 SCft
 DGM 2 26,934 SCft
 DGM 3 16,726 SCft

DGM 2 Final: 17206,210 Cuft
 Initial: 17177,705 Cuft

DGM #3 Final: 741,560 Cuft
 Initial: 723,820 Cuft

TOTAL TUNNEL VOLUME : 26678

TEMPERATURES

SAMPLE RATIOS
 Sample Train 1: 976,589
 Sample Train 2: 990,516

DGM 1 544,828 °R
 DGM 2 545,131 °R

Paticulate concentration
 Sample Train 1 **0,000088** g/dscf
 Sample Train 2 **0,000082** g/dscf
 Room **0,000006** g/dscf

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

TUNNEL FLOW RATE: 175,514 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **2,18** g
 Sample Train 2 **2,02** g

PARTICULATE CATCH
 Total Sample Train 1: 2,40 mg
 Total Sample Train 2: 2,20 mg
 Total Sample Train 1 1st hour: 1,50 mg

EMISSION RATES
 Sample Train 1 **0,86** g/hr
 Sample Train 2 **0,80** g/hr

1st hour emission rate **1,46** g/hr

DEVIATION: 3,92%

Cs Train 1 Train 2
 8,786E-05 8,16825E-05

* Time min	Elapsed Raw data row	* Weight Remaining lbs	* CO %	* CO ₂ %	* O ₂ %	*1 Flue Gas °F	*2 Room Temp °F	*3 Tunnel Dry Bulb °F	*4 Unit Top °F	*5 Unit Back °F	*6 Unit R.Side °F	*7 Unit L.Side °F	*8 Unit Bottom °F	*9 Catalyst Down °F	* Catalyst Center °F
0,00	260,00	8,0	0,2	4,3	0,0	309,9	78,5	113,0	452,7	379,4	425,1	432,4	853,5	#####	663,2
1,0	261,0	7,8	0,0	5,5	0,0	297,3	78,5	105,1	467,6	379,3	425,2	432,7	855,5	#####	808,7
2,0	262,0	7,7	0,0	5,2	0,0	296,2	78,6	103,9	482,0	379,0	424,2	432,5	852,1	#####	825,4
3,0	263,0	7,6	0,0	5,3	0,0	287,0	78,6	101,9	489,2	378,3	422,8	431,9	849,3	#####	829,9
4,0	264,0	7,6	0,0	4,8	0,0	276,9	78,5	100,5	493,6	376,5	421,0	431,1	849,4	#####	822,7
5,0	265,0	7,6	0,0	4,5	0,0	272,1	78,6	100,4	492,5	374,8	418,6	429,8	850,7	#####	794,7
6,0	266,0	7,5	0,0	4,5	0,0	269,2	78,6	100,4	489,9	373,0	416,1	428,5	851,8	#####	780,7
7,0	267,0	7,5	0,0	4,9	0,0	267,7	78,8	100,3	489,3	370,6	413,3	427,0	853,0	#####	792,3
8,0	268,0	7,4	0,0	5,5	0,0	267,4	78,9	100,3	492,2	368,5	410,5	425,5	852,7	#####	812,5
9,0	269,0	7,4	0,0	5,5	0,0	266,9	79,0	99,7	495,6	366,0	407,8	423,6	851,8	#####	829,3
10,0	270,0	7,3	0,0	5,7	0,0	266,3	79,2	99,9	499,8	363,6	404,8	421,7	849,7	#####	836,8
11,0	271,0	7,3	0,0	5,9	0,0	265,7	79,2	99,7	504,6	361,1	401,9	420,2	847,0	#####	855,7
12,0	272,0	7,2	0,0	6,7	0,0	265,6	79,1	99,7	514,6	358,7	399,2	418,9	843,6	#####	901,4
13,0	273,0	7,1	0,0	7,3	0,0	265,8	79,5	98,6	531,8	356,5	396,6	417,5	840,2	#####	959,2
14,0	274,0	7,1	0,0	7,3	0,0	266,9	79,9	99,2	545,3	354,3	394,3	416,6	835,9	#####	967,8
15,0	275,0	7,0	0,0	9,3	0,0	267,6	79,9	100,2	562,2	352,0	392,5	416,0	831,4	#####	1022,8
16,0	276,0	5,7	0,0	9,7	0,0	269,4	80,0	100,1	579,6	350,0	391,0	415,8	825,4	#####	1044,8
17,0	277,0	6,8	0,0	10,1	0,0	271,2	79,7	100,2	592,6	348,2	389,3	415,2	819,9	#####	1038,5
18,0	278,0	6,7	0,0	10,3	0,0	273,6	79,9	100,6	597,4	346,4	388,0	415,5	816,6	#####	1005,9
19,0	279,0	6,6	0,0	10,2	0,0	274,9	79,9	100,7	596,2	344,9	386,9	415,7	814,5	#####	982,2
20,0	280,0	6,5	0,0	10,0	0,0	276,3	80,1	101,2	596,9	343,6	386,2	415,9	813,3	#####	989,7
21,0	281,0	6,4	0,0	9,9	0,0	277,3	80,1	100,9	600,0	342,3	385,6	416,8	811,6	#####	998,2
22,0	282,0	6,3	0,0	9,9	0,0	278,5	79,8	101,0	602,6	341,4	385,5	417,8	808,2	#####	994,2
23,0	283,0	6,2	0,0	10,0	0,0	280,5	79,9	101,1	603,3	340,7	385,4	419,1	805,6	#####	993,9
24,0	284,0	6,1	0,0	10,2	0,0	281,2	80,4	101,2	602,7	339,9	385,5	420,5	803,0	#####	983,8
25,0	285,0	6,1	0,0	10,0	0,0	281,8	80,4	101,8	603,9	339,4	385,7	421,9	799,9	#####	993,9
26,0	286,0	5,9	0,0	9,5	0,0	283,3	80,0	101,6	609,8	339,1	386,3	423,4	796,9	#####	1015,1
27,0	287,0	5,8	0,0	9,0	0,0	283,9	80,2	101,9	613,6	338,9	387,1	425,2	795,3	#####	1008,4
28,0	288,0	5,8	0,0	8,8	0,0	284,2	80,2	102,1	615,3	338,7	387,5	426,8	794,3	#####	1004,1
29,0	289,0	5,7	0,0	8,7	0,0	285,3	80,5	102,5	617,9	338,8	388,4	427,7	793,9	#####	999,6
30,0	290,0	5,6	0,0	8,6	0,0	285,7	80,2	101,9	616,8	338,9	389,1	430,4	794,5	#####	995,0
31,0	291,0	5,5	0,0	8,6	0,0	286,6	80,4	102,2	616,7	339,2	389,9	432,2	795,6	#####	996,9
32,0	292,0	5,5	0,0	8,7	0,0	287,1	80,6	102,2	617,8	339,3	390,8	434,0	795,9	#####	995,3
33,0	293,0	5,4	0,0	9,0	0,0	287,4	80,5	102,4	619,0	339,5	391,7	435,7	798,0	#####	999,9
34,0	294,0	5,3	0,0	9,4	0,0	287,4	80,8	102,5	621,4	339,9	392,8	437,0	801,8	#####	1010,4
35,0	295,0	5,2	0,0	9,7	0,0	288,2	80,4	102,8	627,9	340,4	394,1	438,5	805,1	#####	1038,5
36,0	296,0	5,1	0,0	10,1	0,0	288,4	80,2	102,9	632,2	340,8	395,0	439,8	808,1	#####	1040,2
37,0	297,0	5,0	0,0	10,7	0,0	288,7	80,6	103,1	638,3	341,2	396,1	441,4	810,8	#####	1058,9
38,0	298,0	4,9	0,0	11,0	0,0	289,9	80,7	102,9	646,5	341,7	397,4	442,7	812,5	#####	1075,4
39,0	299,0	4,8	0,0	11,5	0,0	290,4	80,8	102,9	653,8	342,3	399,0	444,0	813,2	#####	1086,0
40,0	300,0	4,7	0,0	11,6	0,0	290,8	80,8	103,2	665,9	343,1	400,2	445,5	813,7	#####	1118,3
41,0	301,0	4,6	0,0	11,8	0,0	292,4	80,8	103,3	674,5	344,0	402,0	446,9	814,0	#####	1131,5
42,0	302,0	4,5	0,0	12,0	0,0	294,1	80,9	103,5	679,9	345,0	403,9	448,2	814,4	#####	1086,0
43,0	303,0	4,4	0,0	11,9	0,0	295,1	80,9	103,7	673,6	346,0	405,7	449,5	813,7	#####	1085,8
44,0	304,0	4,3	0,0	12,2	0,0	296,6	80,8	103,8	675,5	347,1	407,4	451,1	812,7	#####	1089,8
45,0	305,0	4,2	0,0	13,1	0,0	297,5	81,0	103,5	677,7	348,4	409,2	452,7	812,1	#####	1086,3
46,0	306,0	4,0	0,0	13,6	0,0	299,1	80,9	104,1	678,0	349,6	411,0	454,2	811,0	#####	1079,5
47,0	307,0	3,9	0,0	13,6	0,0	299,4	81,1	103,9	682,4	350,8	413,1	455,8	808,5	#####	1095,1
48,0	308,0	3,9	0,0	13,1	0,0	301,0	80,8	104,2	683,5	352,2	415,3	457,3	807,2	#####	1080,6
49,0	309,0	3,8	0,0	13,4	0,0	302,0	81,3	104,8	686,3	353,6	417,6	458,8	806,7	#####	1088,1
50,0	310,0	3,7	0,0	14,4	0,0	303,5	81,2	104,8	692,4	355,1	419,9	460,2	805,8	#####	1116,6
51,0	311,0	3,5	0,1	14,7	0,0	305,3	81,3	105,0	700,8	356,9	422,2	461,3	801,8	#####	1127,0
52,0	312,0	3,4	0,2	14,8	0,0	306,7	81,1	105,5	710,6	358,8	425,1	462,6	797,4	#####	1149,5
53,0	313,0	3,3	0,1	14,6	0,0	307,9	81,1	105,4	717,1	360,8	427,9	463,9	792,3	#####	1137,3
54,0	314,0	3,2	0,0	13,4	0,0	311,4	81,6	105,6	715,6	362,7	428,8	465,0	786,2	#####	1094,9
55,0	315,0	3,1	0,0	12,8	0,0	316,6	81,7	105,7	705,7	364,8	433,7	465,7	785,2	#####	1071,6
56,0	316,0	3,1	0,0	12,1	0,0	314,0	81,7	106,0	698,5	367,0	436,0	466,8	776,6	#####	1053,3
57,0	317,0	2,9	0,0	11,7	0,0	314,7	81,7	106,4	691,4	369,6	438,3	467,7	772,1	#####	1039,3
58,0	318,0	2,9	0,0	11,3	0,0	315,7	81,7	106,7	685,2	372,0	440,3	468,3	768,1	#####	1031,0
59,0	319,0	2,8	0,0	11,1	0,0	315,6	81,7	106,7	680,7	374,7	442,0	469,0	764,6	#####	1028,9
60,0	320,0	2,7	0,0	11,0	0,0	316,5	82,0	106,1	675,8	377,2	443,6	469,1	761,3	#####	1018,6
61,0	321,0	2,6	0,0	10,8	0,0	316,4	82,3	106,8	671,2	379,3	445,2	469,7	758,7	#####	1007,1
62,0	322,0	2,6	0,0	10,8	0,0	316,7	82,0	107,0	667,3	381,6	446,3	470,0	756,2	#####	1005,5
63,0	323,0	2,5	0,0	11,0	0,0	316,7	81,7	107,1	665,0	383,7	447,7	470,5	754,5	#####	1006,6
64,0	324,0	2,4	0,0	10,9	0,0	316,4	82,0	106,8	662,2	385,9	448,5	470,8	753,8	#####	1005,9
65,0	325,0	2,3	0,0	11,4	0,0	316,8	82,1	107,4	663,8	388,0	449,9	471,0	752,6	#####	1022,7
66,0	326,0	2,2	0,0	12,0	0,0	316,7	81,7	107,5	668,5	389,8	451,0	471,5	753,4	#####	1046,5
67,0	327,0	2,1	0,0	13,5	0,0	317,3	82,0	107,7	679,1	391,9	451,9	471,6	756,2	#####	1087,9
68,0	328,0	2,1	0,0	13,9	0,0	317,8	82,1	107,6	690,8	393,9	453,1	472,0	759,1	#####	1112,0
69,0	329,0	2,0	0,0	14,1	0,0	318,2	81,9	107,6	700,7	395,8	454,8	472,7	762,2	#####	1117,4
70,0	330,0	1,9	0,1	14,2	0,0	318,1	82,3	108,0	706,6	398,2	456,5	473,4	765,2	#####	1117,2
71,0	331,0	1,8	0,1	13,9	0,0	319,2	82,5	108,2	709,8	400,6	458,3	474,0	767,0	#####	1116,5
72,0	332,0	1,7	0,1	13,8	0,0	319,8	82,6	108,1	711,6	402,7	460,3	474,7	768,0	#####	1112,1
73,0	333,0	1,7	0,0	13,5	0,0	319,6	82,5	108,2	710,7	405,0	462,4	475,6	768,3	#####	1088,2
74,0	334,0	1,6	0,0	12,7	0,0	320,9	82,9	108,1	705,8	407,4	464,4	476,4	769,3	#####	1066,6
75,0	335,0	1,5	0,0	12,1	0,0	320,6	82,4	108,2	699,8	409,3	466,6	477,6	770,0	#####	1048,5
76,0	336,0	1,5	0,0	11,5	0,0	320,2	82,4	108,4	694,2	411,4	468,6	478,9	771,9	#####	1032,7
77,0	337,0	1,4	0,0	10,8	0,0	319,5	82,5	108,3	685,8	413,9	470,7	480,1	774,4	#####	1010,6
78,0	338,0	1,4	0,0	10,0	0,0	319,4	82,9	108,8	677,5	416,1	472,9	481,5	776,6		

119,0	379,0	0,5	0,0	6,6	0,0	255,2	82,5	103,2	452,2	450,4	504,3	493,3	849,0	#####	717,9
120,0	380,0	0,5	0,0	6,6	0,0	254,0	82,5	103,0	450,8	450,4	504,6	492,7	849,1	#####	714,3
121,0	381,0	0,5	0,0	6,6	0,0	253,3	82,7	102,9	449,4	450,1	504,9	492,1	849,2	#####	713,3
122,0	382,0	0,5	0,0	6,6	0,0	251,8	82,6	103,1	448,3	450,2	504,9	491,7	849,0	#####	715,2
123,0	383,0	0,4	0,0	6,7	0,0	251,0	82,6	102,7	447,0	449,9	504,8	491,2	848,9	#####	715,0
124,0	384,0	0,4	0,0	6,6	0,0	250,1	82,6	102,9	446,1	449,8	505,0	490,5	848,7	#####	714,8
125,0	385,0	0,4	0,0	6,6	0,0	249,7	82,8	102,8	444,7	449,6	505,3	490,0	845,4	#####	713,4
126,0	386,0	0,4	0,0	6,6	0,0	249,4	82,6	102,6	443,1	449,5	505,3	489,3	844,1	#####	711,4
127,0	387,0	0,4	0,0	6,6	0,0	248,8	82,7	102,6	441,6	448,9	505,1	488,9	843,2	#####	709,3
128,0	388,0	0,4	0,0	6,4	0,0	248,0	83,3	102,4	440,5	448,5	505,1	488,3	841,9	#####	708,9
129,0	389,0	0,4	0,0	6,4	0,0	246,8	83,0	101,8	439,3	448,5	504,9	487,3	841,4	#####	708,6
130,0	390,0	0,3	0,0	6,4	0,0	246,3	83,3	102,0	438,1	447,8	505,1	486,8	841,3	#####	707,1
131,0	391,0	0,3	0,0	6,3	0,0	245,6	82,8	101,6	436,9	447,8	505,1	486,0	840,6	#####	706,1
132,0	392,0	0,3	0,0	6,2	0,0	244,5	83,1	101,7	435,5	447,4	504,7	485,4	839,6	#####	706,0
133,0	393,0	0,3	0,0	6,2	0,0	244,2	82,8	101,7	434,6	447,0	504,7	485,0	838,1	#####	705,8
134,0	394,0	0,3	0,0	6,2	0,0	243,4	82,9	101,7	434,4	446,8	504,5	484,3	835,2	#####	710,9
135,0	395,0	0,2	0,0	6,1	0,0	242,4	83,2	101,6	434,0	446,3	504,2	483,7	830,9	#####	711,3
136,0	396,0	0,2	0,0	6,4	0,0	241,0	82,9	101,9	433,1	445,7	504,4	483,1	826,7	#####	707,7
137,0	397,0	0,2	0,0	6,3	0,0	240,8	82,8	101,8	432,2	445,3	504,4	482,4	823,5	#####	704,2
138,0	398,0	0,2	0,0	6,3	0,0	240,7	82,9	101,7	431,1	444,8	504,3	481,6	820,0	#####	703,8
139,0	399,0	0,2	0,0	6,3	0,0	240,3	83,2	101,5	430,5	444,2	504,0	480,5	817,2	#####	702,4
140,0	400,0	0,2	0,0	6,3	0,0	239,5	83,0	101,6	429,4	443,9	503,8	479,9	813,9	#####	701,5
141,0	401,0	0,1	0,0	6,2	0,0	239,1	82,6	101,7	428,5	443,1	503,2	479,3	812,0	#####	703,3
142,0	402,0	0,1	0,0	6,2	0,0	238,8	83,0	101,8	428,1	442,5	502,9	478,6	810,8	#####	702,5
143,0	403,0	0,1	0,0	6,2	0,0	237,9	82,9	101,8	427,6	442,3	502,8	478,0	808,5	#####	703,8
144,0	404,0	0,1	0,0	6,2	0,0	237,7	82,6	101,9	427,3	441,4	502,0	477,6	807,0	#####	701,9
145,0	405,0	0,1	0,0	6,3	0,0	237,1	82,9	102,0	426,2	440,8	501,5	476,8	805,5	#####	700,4
146,0	406,0	0,1	0,0	6,3	0,0	237,0	82,9	101,7	425,8	440,6	500,9	476,1	803,6	#####	703,9
147,0	407,0	0,1	0,0	6,2	0,0	236,6	82,9	101,8	425,1	440,0	500,4	475,3	802,0	#####	701,2
148,0	408,0	0,1	0,0	6,1	0,0	236,3	82,6	101,8	424,5	439,5	500,0	474,6	799,6	#####	698,6
149,0	409,0	0,1	0,0	6,0	0,0	235,7	83,1	101,9	423,5	439,1	499,2	474,0	797,3	#####	698,0
150,0	410,0	0,1	0,0	6,0	0,0	235,6	82,8	102,0	422,9	438,5	498,7	473,4	795,0	#####	696,7
151,0	411,0	0,1	0,0	6,0	0,0	234,8	83,5	101,7	421,9	438,3	498,2	472,9	792,2	#####	696,0
152,0	412,0	0,0	0,0	5,9	0,0	234,2	83,1	101,7	421,3	437,6	497,1	472,3	790,8	#####	695,9

Manufacturer: odstock soapstone
 Model: navajo

Run: 7
 Project #: pi 21054
 Test Duration: 152 min

	HHV	LHV
Eff	80,32%	86,81%
Comb Eff	99,50%	99,50%
HT Eff	80,72%	87,24%
Output	18 754	kJ/h
Burn Rate	1,18	kg/h
Grams CO	7	g
Input	23 350	kJ/h
MC wet	17,96	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

Ultimate CO₂
 CO_{2-ut} 19,64
 F_o
 1,061

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	80,32%	Dry Molecular Weight (M _d) 29,84
Combustion Efficiency:	99,50%	Dry Moles Exhaust Gas (N _r): 450,04
Heat Transfer Efficiency:	80,72%	Air Fuel Ratio (A/F) 12,92

Heat Output:	17 790 Btu/h	18 754 kJ/h
Heat Input:	22 150 Btu/h	23 350 kJ/h
Burn Duration:	2,53 h	
Burn Rate:	2,60 lb/h	1,179 kg/h
Stack Temp:	281,6 Deg. F	138,7 Deg. C

Date: 2012.09.18 Manufacturer: WOOD stock scapston Model: MADJO
 Project #: PI 20154 Run: 7 Tech: MM Reviewer: DP

	handling and 3 pieces	START FINE
At	35 LBS cbs	hook and by pass
At	19 LBS inst	2 ^{cm} pre load 78 LBS
At	53 LBS	cbs a.n. incl 18 min
At	24 LBS	growth 3 pieces 2,1 LBS
At	28 LBS	U tapocher
At	17 LBS	inst load
	a.n. incl 1/2	open
	afer 35 min	cbs a.n. incl

TEST LOAD CONFIGURATION
dampen open

PRE / POST CHECKS

Date: 2017-09-18 Manufacturer: Woodstock soapstone Model: NARAJO
 Project #: PT 2/54 Run: 2 Tech: 7 Reviewer: D

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM 191	7:15	ok	ok

Pre-Test Post-Test

Facility Conditions:

Air Velocity from less than 2 feet
 Smoke Capture Check.....
 Picture.....

	Pre-Test	Post-Test
(max50 Fpm)	4	6
	ok	ok
4 sides	ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....
 Date Dilution Tunnel Cleaned.....
 Induced Draft Check (max 0.005 H2O).....
 Traverse before ignition.....
 Flow Rate 140 cfm ±10%.....

2017-09-05
2017-09-05
ok
ok

ok

Temperature System:

Ambient (65°-90°F).....
 Wood Heater Surface (±125°F).....

ok	°F
ok	°F

Proportional Checks:

Thermocouple check.....
 Pitot Clean.....
 Pitot verification.....

ok
ok
ok

Sampling Train ID Numbers:

Probe.....
 Filter Front.....
 Filter Back.....
 Filter Thermocouple.....
 Filter (<90°F).....

Train 1 st hour	Train 1	Train 2
16	18	38
2101	2107	2207
2106	2108	2209
h	h	12
ok	ok	ok

SAMPLING EQUIPMENT CHECK OUT.

Date: 2017-09-18 Manufacturer: WOODSTOCK SOAPSTONE Model: MAVJG
 Project #: PT 20154 Run: 7 Tech: MM Reviewer: DO

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Unplugged Flow Rate = .25cfm						
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	571505.51	572334.64	501505.61	572334.72	486417.84	487226.51
Initial 1minute DGM (Liter)	571505.49	572334.02	501505.60	572334.71	486417.84	487226.5
Change © (Liter)	0.02	$\frac{0.02 \text{ MM}}{0.01}$	0.01	0.01	0	0
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok		ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H2o static	Pre Test 0.4-0.5 H2o velocity	Post Test 3 H2o Static	Post Test 0.4-0.5 H2o velocity
Vacuum (inches Hg.)	3	0.4	3	0.4
Check OK (no change after 15 sec.)	ok	ok	ok	ok

PRE-TEST SCALE AUDIT

Date: 2017-09-18 Manufacturer: Woodstock Soapstone Model: NDAJG
 Project #: PI 2154 Run: J Tech: MM Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017-09-18 Manufacturer: WOODSTOCK SOAPSTONE Model: MAVJ5
 Project #: PI 20154 Run: 7 Tech: MM Reviewer: DO

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 101.3 (KPa.) Static pressure (P_q) 0.39 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0060	75.64
B - Centroid	3.00	3.50	4	0059	76.09
A-1	0.40	0.50	0.50	0053	75.65
A-2	1.50	1.75	2	0063	75.75
A-3	4.50	5.25	6	0049	75.72
A-4	5.60	6.5	7.5	0048	75.53
B-1	0.40	0.50	0.50	0048	76.01
B-2	1.50	1.75	2	0057	76.07
B-3	4.50	5.25	6	0051	76.06
B-4	5.60	6.5	7.5	0048	76.00
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.

Δ_p = manometer reading (inches H₂O)

T_s = average absolute dilution tunnel temperature (°F + 460)

P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$

P_q = static pressure in. H₂O
 { 13.6 }

M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

K_p = 85.49 pitot tube constant, (conversion factor for English units)

$\Delta_{p,avg}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

Date: 2017-09-18 Manufacturer: Woodstock Soapstone Model: MDVAJ0
 Project #: PT 20154 Run: 7 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2974	300	0.988	1.00
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	1780	1800	973	1000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.002	2963	0.996	0.002	0.02	0.11	0.15	0.008	0.05	✓	
CO ₂	0	1775	9.68	0	0.02	0.05	0.5	9.05	0.5	✓	

Date: 2017.09-18 Manufacturer: WOODSTOCK soapstone Model: NAVAJO
 Project #: PT 20154 Run: 7 Tech: MM Reviewer: [Signature]

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	572333.68	487225.61	741.56
Initial (Liter)	571506.16	486418.44	723.82

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101.3	101.2
Dry Bulb (F):	75.2	86.96
Humidity (%):	68	44

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2017-09-18 Manufacturer: Woodstock Soapstone Model: MAJANA
 Project #: PT 2.158 Run: 7 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0.624 lbs.	223	228	229	230	231
2 x 4 x 5 in.	0.596 lbs.	228	226	229	232	233
2 x 4 x 5 in.	0.622 lbs.	230	226	230	233	234
2 x 4 x 5 in.	0.584 lbs.	228	226	229	223	228
2 x 4 x 5 in.	0.654 lbs.	230	226	225	229	233
2 x 4 x 5 in.	0.590 lbs.	228	229	229	226	230
2 x 4 x 5 in.	0.648 lbs.	233	239	238	227	227
2 x 4 x 5 in.	0.642 lbs.	228	229	228	224	226
2 x 4 x 5 in.	0.660 lbs.	229	228	233	232	232
2 x 4 x 5 in.	0.786 lbs.	230	236	234	227	228
2 x 4 x 5 in.	0.644 lbs.	226	228	229	230	233
2 x 4 x 5 in.	0.680 lbs.	228	234	236	233	238
2 x 4 x 5 in.	0.650 lbs.	229	230	233	232	224
2 x 4 x 5 in.	0.672 lbs.	228	224	224	226	224
2 x 4 x 5 in.	0.720 lbs.	226	223	229	223	229
2 x 4 x 5 in.	0.650 lbs.	230	236	220	222	230
2 x 4 x 5 in.	0.638 lbs.	229	222	236	229	231
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 905 lbs

FUEL DATA

Date: 2012-09-18 Manufacturer: WOODSlock Soapstone Model: NAVAJO
 Project #: PT 20154 Run: 2 Tech: MM Reviewer: AP

FUEL DESCRIPTION:
Type of wood :

TEST LOAD

Piece Size			Weight	Meter Moisture Content (% dry)*				
1 1/2	x 3 1/2	x 15 1/2 in.	1 932 lbs.	224	226	221	222	224
1 1/2	x 3 1/2	x 14 1/2 in.	1 458 lbs.	226	223	224	225	225
1 1/2	x 3 1/2	x 14 1/4 in.	1 628 lbs.	216	213	218	215	213
1 1/2	x 3 1/2	x 14 1/4 in.	1 684 lbs.	211	216	213	214	213
1 1/2	x 3/4	x 5 in.	0 116 lbs.			221		
1 1/2	x 3/4	x 5 in.	0 116 lbs.			223		
1 1/2	x 3/4	x 5 in.	0 108 lbs.			224		
1 1/2	x 3/4	x 5 in.	0 110 lbs.			224		
1 1/2	x 1/4	x 5 in.	0 100 lbs.			228		
1 1/2	x 3/4	x 5 in.	0 112 lbs.			214		
1 1/2	x 3/4	x 5 in.	0 110 lbs.			206		
1 1/2	x 3/4	x 5 in.	0 104 lbs.			204		
1 1/2	x 3/4	x 5 in.	0 108 lbs.			213		
1 1/2	x 3/4	x 5 in.	0 116 lbs.			218		
1 1/2	x 3/4	x 5 in.	0 110 lbs.			214		
1 1/2	x 3/4	x 5 in.	0 116 lbs.			220		
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					
x	x	in.	lbs.					

TEST LOAD WEIGHT: 802 lbs Min 20%: 160 Max 25%: 200

Date: 2017-09-18 Manufacturer: Woodstock Suspst one Model: MAVA J
 Project #: PT 20154 Run: 7 Tech: MM Reviewer: DP

Pre-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-09-14	17:00	108, 7539	0, 1247	0, 1281	11, 9364	108, 9481	0, 1266	0, 1249	11, 8917	108, 9480	0, 1267	0, 1249	11, 8916	0, 1270
2017-09-18	9:00	108, 7540	0, 1248	0, 1282	11, 9363	108, 9480	0, 1267	0, 1249	11, 8916					

Post-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-09-18	16:00	108, 7545	0, 1256	0, 1279	11, 9390	108, 9486	0, 1261	0, 1246	11, 8940	108, 9483	0, 1260	0, 1246	11, 8932	0, 1273
2017-09-21	8:00	108, 7544	0, 1254	0, 1278	11, 9380	108, 9483	0, 1260	0, 1246	11, 8932	108, 9483	0, 1260	0, 1246	11, 8932	0, 1272
2017-09-25	8:00	108, 7544	0, 1254	0, 1278	11, 9372	108, 9483	0, 1260	0, 1246	11, 8932	108, 9483	0, 1260	0, 1246	11, 8932	0, 1272
2017-09-26	8:00	108, 7544	0, 1254	0, 1278	11, 9372	108, 9483	0, 1260	0, 1246	11, 8932	108, 9483	0, 1260	0, 1246	11, 8932	0, 1272



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-18 Project #: PJ 10154 Run: 3 Manufacturer: WOODstock Soapstone Model: MVAJS
 Tech: MR Reviewer: SD

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	38	2207	2209	103
2017-09-14	17:00	110, 4343	0, 1256	0, 1251	10, 2454
2017-09-14	9:00	110, 4343	0, 1257	0, 1252	10, 2455

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	38	2207	2209	103
2017-09-18	16:00	110, 4343 110, 4345	0, 1261	0, 1248	10, 2496
2017-09-21	8:00	110, 4343	0, 1261	0, 1248	10, 2474
2017-09-25	8:00	110, 4344	0, 1263	0, 1248	10, 2474
2017-09-26	8:00	110, 4344	0, 1263	0, 1248	10, 2474

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	8
Date	19-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood and Coal stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category	1	
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	19-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	D. Fir	
HHV		19810,0 kJ/kg
%C		48,7
%H		6,9
%O		43,9
%Ash		0,5
HHV		8519,2 Btu/lb
LHV		7451,0 Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	101,1	100,9
Barometer (in.Hg):	29,854819	29,79575878
Dry Bulb (F):	77,36	84,2
Humidity (%):	54	43,2
Air velocity (ft/min)	4	8

DGM #1	Final:	20245,959	cuft
	Initial:	20211,980	cuft
DGM #2	Final:	17239,284	cuft
	Initial:	17206,279	cuft
DGM room			

	Final:	573301,690	Liter
	Initial:	572339,520	Liter
	Final:	488162,160	Liter
	Initial:	487227,540	Liter
	Final:	782,340	cuft
	Initial:	741,570	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

180

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	19-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,39 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,942

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,060	75,48	0,2449
B center	0,059	75,47	0,2429
A1	0,049	75,36	0,2214
A2	0,061	75,18	0,2470
A3	0,049	75,21	0,2214
A4	0,048	75,24	0,2191
B1	0,048	75,400	0,2191
B2	0,058	75,420	0,2408
B3	0,048	75,400	0,2191
B4	0,049	75,290	0,2214
AVERAGE	0,0529	75,3450	0,2297

Project nu.	pi 21054
Date	19-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	3	2100	2103	50	34	2104	2109	102	37	2110	2112	104	2113		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,4572	0,1253	0,1273	11,8702	110,1023	0,1261	0,1218	10,2208	107,9733	0,1307	0,1270	10,1508	0,1261	18/09/2017	17:00
Before (6)	61,4573	0,1254	0,1274	11,8703	110,1024	0,1262	0,1281	10,2209	107,9734	0,1308	0,1271	10,1509	0,1262	19/09/2017	09:00
After (1)	61,4574	0,1270	0,1276	11,8721	110,1026	0,1263	0,1283	10,2234	107,9735	0,1311	0,1269	10,1554	0,1264	19/09/2017	15:00
After (2)	61,4573	0,1266	0,1274	11,8710	110,1024	0,1260	0,1281	10,2218	107,9734	0,1308	0,1269	10,1530	0,1263	25/09/2017	08:00
After (3)	61,4573	0,1265	0,1274	11,8709	110,1024	0,1260	0,1281	10,2217	107,9734	0,1309	0,1270	10,1530	0,1263	26/09/2017	08:00
After (4)															
After (5)															
After (6)	61,4573	0,1265	0,1274	11,8709	110,1024	0,1260	0,1281	10,2217	107,9734	0,1309	0,1270	10,1530	0,1263	26/09/2017	08:00
Difference	0,0000	0,0011	0,0000	0,0006	0,0000	-0,0002	0,0000	0,0008	0,0000	0,0001	-0,0001	0,0021	0,0001		
Total (mg)		1,7				2,3				2,1			0,1		
Total ajusté (mg)		1,60				2,20				2,00					

Project nu.	pi 21054
Date	19-09-2017
Technicien	mm

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 0,7 g/hr

Burn Rate : 0,997 Dry kg/hr

Test Duration: 180 min

PRESSURE FACTOR: DGM 1 0,97232
 DGM 2 0,97686
 DGM 3 0,99683

BAROMETRIC PRESSURE
 Average: 29,825289 in Hg
 Start: 29,854819 in Hg
 End: 29,795759 in Hg

TEMPERATURE FACTORS DGM 1 0,97466
 DGM 2 0,97412
 DGM 3 0,97945

DGM CONTROLLER VALUES

DGM 1 Final: 20245,959 Cuft
 Initial: 20211,980 Cuft

VOLUMES SAMPLED DGM 1 31,782 SCft
 DGM 2 31,282 SCft
 DGM 3 38,532 SCft

DGM 2 Final: 17239,284 Cuft
 Initial: 17206,279 Cuft

DGM #3 Final: 782,340 Cuft
 Initial: 741,570 Cuft

TOTAL TUNNEL VOLUME : 31173

TEMPERATURES

DGM 1 541,726 °R
 DGM 2 542,025 °R

SAMPLE RATIOS
 Sample Train 1: 980,828
 Sample Train 2: 996,519

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

Patriculate concentration
 Sample Train 1 **0,000072** g/dscf
 Sample Train 2 **0,000067** g/dscf
 Room **0,000003** g/dscf

TUNNEL FLOW RATE: 173,184 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **2,18** g
 Sample Train 2 **2,01** g

PARTICULATE CATCH
 Total Sample Train 1: 2,30 mg
 Total Sample Train 2: 2,10 mg
 Total Sample Train 1 1st hour: 1,70 mg

EMISSION RATES
 Sample Train 1 **0,73** g/hr
 Sample Train 2 **0,67** g/hr

1st hour emission rate **1,67** g/hr

DEVIATION: 3,90%

Cs Train 1 Train 2
 7,237E-05 6,71312E-05

* Elapsed		* Weight		* CO		* CO ₂		* O ₂		*1 Flue	*2 Room	*3 Tunnel	*4 Unit	*5 Unit	*6 Unit	*7 Unit	*8 Unit	*9 Catalyst	* Catalyst
Time	Raw data row	Remaining	CO	CO ₂	O ₂	Gas	Temp	Dry Bulb	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Unit	Down	Center
min		lbs	%	%	%	%F	%F	%F	%F	%F	%F	%F	%F	%F	%F	%F	%F	%F	%F
0,00	180,00	8,0	0,1	4,4	0,0	254,5	77,4	103,3	396,4	327,4	378,3	372,5	777,9	#####	550,2				
1,0	181,0	7,8	0,5	4,1	0,0	238,8	77,6	92,9	392,2	327,4	378,9	371,3	776,3	#####	596,5				
2,0	182,0	7,8	0,0	6,6	0,0	230,7	77,5	91,0	407,2	326,6	378,7	370,0	769,0	#####	736,9				
3,0	183,0	7,7	0,0	6,9	0,0	225,6	77,4	90,3	422,8	325,2	378,5	368,4	759,5	#####	794,5				
4,0	184,0	7,7	0,0	6,8	0,0	223,0	77,4	89,7	434,6	323,2	378,2	366,5	751,7	#####	806,1				
5,0	185,0	7,6	0,0	6,5	0,0	221,3	77,4	89,8	441,6	321,2	378,1	364,2	743,5	#####	794,8				
6,0	186,0	7,6	0,0	6,8	0,0	220,6	77,5	90,1	445,6	319,0	378,1	362,0	736,4	#####	787,4				
7,0	187,0	7,5	0,0	6,6	0,0	219,5	77,4	89,1	447,6	317,1	377,8	359,7	730,5	#####	777,3				
8,0	188,0	7,4	0,0	6,5	0,0	219,2	77,4	89,3	448,9	315,0	378,0	357,4	725,6	#####	770,7				
9,0	189,0	7,4	0,0	6,3	0,0	218,6	77,6	89,3	449,1	312,9	377,8	355,1	722,6	#####	762,8				
10,0	190,0	7,4	0,0	6,5	0,0	218,7	77,4	89,2	450,0	311,0	377,6	352,4	718,5	#####	767,2				
11,0	191,0	7,3	0,0	6,9	0,0	218,7	77,5	89,1	452,9	309,0	377,2	350,4	714,8	#####	778,2				
12,0	192,0	7,2	0,0	7,0	0,0	218,8	77,4	89,9	454,9	307,0	377,1	348,8	711,7	#####	784,6				
13,0	193,0	7,2	0,0	7,4	0,0	218,9	77,4	89,8	460,1	305,5	377,2	346,8	708,0	#####	813,2				
14,0	194,0	7,1	0,0	6,7	0,0	219,3	77,6	90,0	464,9	303,8	377,3	345,2	705,9	#####	813,9				
15,0	195,0	7,0	0,0	6,4	0,0	219,7	77,7	89,0	466,9	302,3	377,6	343,6	704,3	#####	801,5				
16,0	196,0	7,0	0,0	6,4	0,0	219,6	77,6	90,2	468,3	300,8	377,7	342,2	703,0	#####	802,6				
17,0	197,0	7,0	0,0	6,4	0,0	219,6	77,5	89,3	470,6	299,5	378,0	340,9	704,5	#####	809,0				
18,0	198,0	6,9	0,0	6,8	0,0	220,6	77,5	90,0	475,4	298,3	378,5	339,8	706,3	#####	833,1				
19,0	199,0	6,8	0,0	6,9	0,0	221,0	77,5	90,2	479,9	297,1	378,7	338,8	707,2	#####	837,1				
20,0	200,0	6,8	0,0	6,8	0,0	221,5	77,5	90,1	482,9	295,9	378,9	337,6	709,2	#####	833,5				
21,0	201,0	6,7	0,0	6,9	0,0	221,8	77,6	90,3	486,2	295,0	379,3	336,5	711,3	#####	842,1				
22,0	202,0	6,7	0,0	6,9	0,0	222,0	77,8	90,1	489,1	293,9	379,3	335,5	711,5	#####	845,5				
23,0	203,0	6,6	0,0	6,8	0,0	222,5	77,6	91,1	492,8	292,9	379,5	334,7	711,4	#####	848,5				
24,0	204,0	6,5	0,0	6,9	0,0	222,7	77,7	90,3	495,4	292,1	379,9	334,0	711,2	#####	854,4				
25,0	205,0	6,5	0,0	6,9	0,0	223,4	77,5	90,9	498,1	291,3	380,1	333,5	712,2	#####	862,1				
26,0	206,0	6,4	0,0	7,1	0,0	223,6	77,7	91,1	501,1	290,4	380,4	333,0	712,2	#####	861,7				
27,0	207,0	6,3	0,0	7,2	0,0	223,5	77,8	90,7	506,9	289,8	380,7	332,8	711,8	#####	890,7				
28,0	208,0	6,2	0,0	7,2	0,0	224,1	77,7	91,4	515,4	289,9	381,0	332,5	710,1	#####	920,9				
29,0	209,0	6,2	0,0	7,8	0,0	224,8	77,9	90,9	523,6	288,3	381,5	332,4	708,5	#####	931,5				
30,0	210,0	6,1	0,0	7,9	0,0	225,7	77,9	91,4	528,9	287,7	381,8	332,3	706,8	#####	925,0				
31,0	211,0	6,0	0,0	7,9	0,0	227,1	77,8	91,4	531,7	287,0	382,3	332,6	705,2	#####	924,8				
32,0	212,0	6,0	0,0	7,9	0,0	226,3	78,0	91,4	534,8	286,6	382,8	332,9	702,8	#####	922,5				
33,0	213,0	5,9	0,0	7,6	0,0	226,5	77,9	91,2	535,6	286,0	383,2	333,5	698,8	#####	913,6				
34,0	214,0	5,8	0,0	7,5	0,0	226,5	77,8	91,5	534,7	285,5	383,8	334,2	695,4	#####	900,0				
35,0	215,0	5,8	0,0	7,4	0,0	227,0	77,8	91,6	534,2	285,2	384,3	335,1	692,1	#####	900,9				
36,0	216,0	5,7	0,0	7,5	0,0	227,6	77,9	91,5	534,2	284,8	385,0	336,0	689,9	#####	903,2				
37,0	217,0	5,6	0,0	7,7	0,0	227,8	78,1	91,3	535,1	284,6	385,4	337,2	687,5	#####	908,4				
38,0	218,0	5,6	0,0	7,8	0,0	227,8	78,4	89,7	535,8	284,3	385,6	337,3	685,4	#####	908,6				
39,0	219,0	5,5	0,0	7,7	0,0	227,7	78,2	90,7	535,7	283,7	385,5	338,8	682,9	#####	900,0				
40,0	220,0	5,4	0,0	7,7	0,0	227,1	78,1	91,5	534,7	283,5	385,9	340,1	680,0	#####	899,3				
41,0	221,0	5,4	0,0	7,7	0,0	227,9	78,2	91,4	535,5	283,3	386,3	341,5	677,5	#####	907,3				
42,0	222,0	5,3	0,0	8,0	0,0	228,1	78,2	91,9	536,5	283,3	386,7	342,5	674,4	#####	911,5				
43,0	223,0	5,3	0,0	8,2	0,0	227,8	78,2	92,0	538,8	283,1	387,1	343,9	672,6	#####	923,3				
44,0	224,0	5,2	0,0	8,4	0,0	227,6	78,2	91,8	544,3	283,1	387,6	345,5	671,4	#####	946,4				
45,0	225,0	5,1	0,0	8,8	0,0	228,5	78,3	92,3	545,9	283,0	388,0	347,0	670,3	#####	930,3				
46,0	226,0	5,1	0,0	9,1	0,0	228,6	78,3	92,3	549,3	282,9	388,5	348,2	669,0	#####	948,2				
47,0	227,0	5,0	0,0	9,7	0,0	229,1	78,2	92,6	549,9	283,0	389,2	349,8	667,1	#####	936,4				
48,0	228,0	4,9	0,0	10,2	0,0	229,1	78,3	92,4	548,4	283,1	390,0	351,2	664,9	#####	918,4				
49,0	229,0	4,8	0,0	10,7	0,0	229,3	78,3	92,4	562,2	283,3	390,7	352,8	662,7	#####	1015,9				
50,0	230,0	4,8	0,0	10,9	0,0	230,9	78,3	92,9	567,9	283,6	391,9	354,4	659,7	#####	967,6				
51,0	231,0	4,7	0,0	11,3	0,0	229,4	78,3	92,6	585,3	284,0	392,8	356,0	658,3	#####	1081,4				
52,0	232,0	4,6	0,0	11,5	0,0	229,2	78,3	92,3	609,7	284,4	394,1	357,6	656,7	#####	1122,9				
53,0	233,0	4,5	0,0	10,8	0,0	230,1	78,3	92,5	626,0	285,0	395,2	359,1	655,9	#####	1118,2				
54,0	234,0	4,5	0,0	10,7	0,0	231,6	78,6	92,4	629,4	285,4	395,9	360,7	653,4	#####	1073,2				
55,0	235,0	4,5	0,0	10,2	0,0	232,2	78,5	92,9	624,8	286,0	396,8	362,0	650,0	#####	1031,7				
56,0	236,0	4,4	0,0	10,1	0,0	234,2	78,4	93,1	619,1	286,6	397,7	363,3	646,9	#####	1007,4				
57,0	237,0	4,4	0,0	10,2	0,0	234,7	78,5	93,2	617,7	287,4	398,2	364,5	644,2	#####	1023,5				
58,0	238,0	4,2	0,0	10,4	0,0	236,2	78,4	94,1	621,3	288,0	398,9	365,9	641,6	#####	1045,0				
59,0	239,0	4,2	0,0	10,9	0,0	236,8	78,4	93,8	629,3	288,8	399,5	367,3	638,4	#####	1076,1				
60,0	240,0	4,1	0,0	10,9	0,0	236,6	78,5	94,0	643,3	289,6	400,2	368,2	636,4	#####	1130,2				
61,0	241,0	4,1	0,0	11,5	0,0	237,0	78,7	93,3	660,2	290,1	400,6	369,5	635,3	#####	1163,6				
62,0	242,0	4,0	0,0	11,7	0,0	235,8	78,7	93,7	694,2	290,9	401,2	371,0	638,1	#####	1262,3				
63,0	243,0	3,9	0,0	12,2	0,0	235,5	78,7	93,7	719,3	291,5	401,9	372,3	638,5	#####	1268,0				
64,0	244,0	3,8	0,0	11,7	0,0	236,4	78,6	93,6	734,5	292,0	402,5	373,4	637,9	#####	1261,8				
65,0	245,0	3,8	0,0	11,4	0,0	237,3	78,9	92,8	745,2	292,1	402,9	374,2	638,0	#####	1260,3				
66,0	246,0	3,7	0,0	11,2	0,0	238,4	78,9	93,6	753,0	292,4	403,1	374,9	637,5	#####	1254,9				
67,0	247,0	3,7	0,0	11,0	0,0	239,4	78,7	94,1	757,7	292,6	403,6	375,8	637,4	#####	1251,8				
68,0	248,0	3,6	0,0	11,0	0,0	240,6	78,8	94,4	761,8	292,8	404,2	376,5	638,5	#####	1253,2				
69,0	249,0	3,5	0,0	11,1	0,0	241,8	78,9	93,9	766,6	292,9	404,4	377,1	639,8	#####	1258,5				
70,0	250,0	3,4	0,0	11,1	0,0	242,9	79,0	94,0	771,0	293,1	404,7	377,7	641,2	#####	1263,1				
71,0	251,0	3,4	0,0	11,3	0,0	243,3	79,0	94,5	775,5	293,4	405,4	378,3	642,3	#####	1265,9				
72,0	252,0	3,3	0,0	11,2	0,0	244,7	79,0	94,7	778,2	293,8	405,9	379,0	642,3	#####	1263,1				
73,0	253,0	3,3	0,0	11,0	0,0	246,0	78,7	94,8	780,7	294,1	406,6	379,7	641,9	#####	1261,3				
74,0	254,0	3,2	0,0	11,0	0,0	247,3	78,9	95,2	782,9	294,3	407,2	380,5	641,8	#####	1265,0				
75,0	255,0	3,1	0,0	11,1	0,0	248,7	78,9	94,9	785,5	294,8	407,8	381,2	642,3	#####	1270,8				
76,0	256,0	3,1	0,0	11,2	0,0	250,1	78,8	95,1	788,6	295,2	408,5	381,9	642,6	#####	1270,7				
77,0	257,0	3,0	0,0	10,9	0,0	251,7	78,9	95,1	790,0	295,6	409,2	382,6	643,1	#####	1266,1				
78,0	258,0	2,9	0,0	10,8	0,0	252,2													

119,0	299,0	1,0	0,0	7,1	0,0	264,1	79,9	98,6	661,4	334,3	438,1	415,0	660,2	#####	1007,0
120,0	300,0	1,0	0,0	7,0	0,0	262,9	79,9	98,6	652,3	335,5	438,6	414,9	660,2	#####	996,9
121,0	301,0	0,9	0,0	7,0	0,0	261,8	79,9	98,7	643,3	336,6	439,2	414,8	660,6	#####	982,7
122,0	302,0	0,9	0,0	6,9	0,0	259,8	79,8	98,5	635,5	337,7	439,6	414,9	660,8	#####	972,4
123,0	303,0	0,9	0,0	6,8	0,0	258,9	80,0	98,6	627,7	338,8	440,3	415,0	660,8	#####	963,9
124,0	304,0	0,8	0,0	6,8	0,0	257,5	79,9	98,8	621,3	340,1	440,6	415,2	660,7	#####	959,4
125,0	305,0	0,8	0,0	6,7	0,0	256,5	79,8	98,5	615,0	341,1	440,9	415,4	660,0	#####	950,4
126,0	306,0	0,8	0,0	6,7	0,0	255,8	79,9	98,4	609,0	342,2	441,5	415,3	659,7	#####	944,2
127,0	307,0	0,8	0,0	6,7	0,0	254,7	79,8	98,5	602,8	343,4	441,8	415,4	658,9	#####	938,2
128,0	308,0	0,8	0,0	6,7	0,0	253,7	79,7	98,4	597,4	344,4	442,1	415,5	658,7	#####	931,6
129,0	309,0	0,8	0,0	6,6	0,0	252,8	79,8	98,5	592,3	345,5	442,7	415,4	658,3	#####	926,8
130,0	310,0	0,7	0,0	6,6	0,0	251,3	79,9	98,6	587,3	346,5	443,1	415,4	657,2	#####	920,0
131,0	311,0	0,7	0,0	6,5	0,0	250,4	79,7	98,1	582,2	347,4	443,4	415,3	655,2	#####	912,0
132,0	312,0	0,7	0,0	6,4	0,0	249,1	79,8	98,3	577,5	348,4	443,5	415,2	653,5	#####	906,9
133,0	313,0	0,7	0,0	6,4	0,0	247,8	79,8	98,3	572,8	349,3	443,7	415,2	651,6	#####	902,1
134,0	314,0	0,7	0,0	6,4	0,0	247,0	80,0	98,2	568,4	350,2	443,9	415,3	649,8	#####	897,3
135,0	315,0	0,7	0,0	6,3	0,0	245,6	80,3	98,1	563,9	351,2	444,2	414,9	647,7	#####	892,4
136,0	316,0	0,7	0,0	6,3	0,0	244,8	79,8	97,7	559,9	351,8	444,2	414,9	646,4	#####	887,8
137,0	317,0	0,6	0,0	6,3	0,0	243,7	80,0	97,6	556,3	352,8	444,2	414,7	644,8	#####	886,1
138,0	318,0	0,6	0,0	6,3	0,0	242,4	79,9	97,6	552,9	353,6	444,3	414,7	643,6	#####	881,1
139,0	319,0	0,6	0,0	6,4	0,0	241,0	79,9	98,0	549,5	354,2	444,5	414,7	641,4	#####	879,8
140,0	320,0	0,6	0,0	6,3	0,0	240,0	79,7	97,6	547,3	355,1	444,4	414,5	639,7	#####	880,4
141,0	321,0	0,6	0,0	6,3	0,0	239,4	79,8	97,6	544,7	355,8	444,3	414,4	637,9	#####	879,7
142,0	322,0	0,5	0,0	6,3	0,0	238,6	79,9	98,0	541,8	356,5	444,4	414,3	636,0	#####	878,2
143,0	323,0	0,6	0,0	6,3	0,0	237,6	80,0	97,7	538,6	357,5	444,3	414,0	633,8	#####	871,1
144,0	324,0	0,5	0,0	6,2	0,0	236,8	79,9	97,9	535,7	358,0	444,4	413,9	631,7	#####	865,0
145,0	325,0	0,5	0,0	6,2	0,0	235,9	79,9	97,6	533,3	358,7	444,3	413,7	629,8	#####	863,7
146,0	326,0	0,5	0,0	6,2	0,0	234,6	79,9	97,7	530,5	359,3	444,3	413,5	627,9	#####	860,2
147,0	327,0	0,5	0,0	6,2	0,0	234,3	80,0	97,6	528,0	359,9	444,0	413,3	626,2	#####	860,1
148,0	328,0	0,5	0,0	6,2	0,0	233,4	79,9	97,7	525,8	360,7	443,8	413,0	624,8	#####	858,4
149,0	329,0	0,4	0,0	6,2	0,0	232,4	80,4	97,6	523,8	361,5	443,6	412,8	623,0	#####	854,9
150,0	330,0	0,4	0,0	6,1	0,0	231,3	80,0	97,6	522,1	362,1	443,3	412,4	621,1	#####	856,6
151,0	331,0	0,4	0,0	6,2	0,0	230,3	80,2	97,3	520,0	362,7	443,2	412,3	619,4	#####	857,1
152,0	332,0	0,4	0,0	6,2	0,0	230,1	80,2	97,2	517,5	363,4	442,9	412,1	617,8	#####	857,7
153,0	333,0	0,3	0,0	6,2	0,0	229,2	80,3	97,2	516,3	363,8	442,5	411,7	615,9	#####	856,3
154,0	334,0	0,3	0,0	6,1	0,0	228,6	80,5	97,3	514,1	364,5	442,3	411,4	614,6	#####	855,2
155,0	335,0	0,3	0,0	6,1	0,0	228,1	80,1	96,9	512,3	365,0	441,8	411,2	612,8	#####	849,2
156,0	336,0	0,3	0,0	6,2	0,0	227,5	80,5	97,2	511,4	365,5	441,5	410,9	611,1	#####	852,3
157,0	337,0	0,3	0,0	6,2	0,0	226,4	80,1	97,0	510,5	366,0	441,1	410,4	609,6	#####	853,6
158,0	338,0	0,2	0,0	6,2	0,0	225,5	80,1	97,1	509,1	366,5	440,8	410,3	608,4	#####	853,2
159,0	339,0	0,3	0,0	6,2	0,0	224,8	80,1	96,8	507,6	367,1	440,4	410,0	606,7	#####	852,7
160,0	340,0	0,2	0,0	6,2	0,0	224,5	80,4	96,9	506,5	367,6	440,1	409,6	605,6	#####	850,8
161,0	341,0	0,2	0,0	6,1	0,0	224,2	80,1	96,8	505,1	368,1	439,5	409,2	603,8	#####	844,7
162,0	342,0	0,1	0,0	6,0	0,0	223,8	80,1	96,8	503,0	368,5	439,2	408,9	602,3	#####	840,8
163,0	343,0	0,2	0,0	6,0	0,0	222,7	80,2	96,8	500,7	368,8	438,7	408,6	601,4	#####	839,0
164,0	344,0	0,2	0,0	6,1	0,0	222,2	80,2	96,7	499,4	369,1	438,3	408,3	600,0	#####	838,1
165,0	345,0	0,1	0,0	6,1	0,0	221,8	80,1	96,6	497,7	369,5	437,8	408,0	598,8	#####	836,8
166,0	346,0	0,1	0,0	6,0	0,0	221,0	80,2	96,8	496,4	369,8	437,2	407,8	597,8	#####	833,4
167,0	347,0	0,1	0,0	6,0	0,0	220,9	80,7	97,0	494,3	370,1	436,8	407,7	596,3	#####	830,9
168,0	348,0	0,1	0,0	5,9	0,0	220,2	80,4	96,5	492,8	370,2	436,2	407,3	594,8	#####	828,6
169,0	349,0	0,1	0,0	5,9	0,0	220,1	80,4	96,8	491,0	370,5	435,6	406,9	593,5	#####	825,8
170,0	350,0	0,1	0,0	5,9	0,0	219,1	80,7	96,5	489,3	370,4	434,8	406,6	592,0	#####	822,8
171,0	351,0	0,1	0,0	5,9	0,0	218,8	80,6	96,5	487,3	370,6	434,2	406,4	590,7	#####	820,9
172,0	352,0	0,1	0,0	5,8	0,0	218,6	80,5	96,7	486,4	370,7	433,5	406,1	589,2	#####	818,7
173,0	353,0	0,1	0,0	5,8	0,0	218,0	80,3	96,5	484,9	370,9	432,7	405,6	588,0	#####	818,2
174,0	354,0	0,1	0,0	5,8	0,0	217,5	80,4	96,9	482,7	370,9	432,2	405,3	587,1	#####	816,4
175,0	355,0	0,1	0,0	5,8	0,0	217,2	80,4	96,6	482,2	370,9	431,5	404,9	584,9	#####	814,6
176,0	356,0	0,1	0,0	5,8	0,0	216,3	80,9	96,3	480,2	370,8	430,9	404,5	583,4	#####	812,1
177,0	357,0	0,1	0,0	5,8	0,0	216,1	80,7	96,2	479,1	370,7	430,0	404,3	582,2	#####	808,5
178,0	358,0	0,1	0,0	5,7	0,0	215,7	80,5	96,3	477,0	370,8	429,3	403,9	581,1	#####	805,4
179,0	359,0	0,1	0,0	5,7	0,0	215,3	80,4	96,5	475,3	370,9	428,6	403,4	579,8	#####	803,6
180,0	360,0	0,0	0,0	5,7	0,0	214,8	80,4	96,3	473,8	370,6	427,8	403,2	578,5	#####	801,6

Manufacturer: odstock soapstone
 Model: navajo

Run: 8
 Project #: pi 21054
 Test Duration: 180 min

	HHV	LHV
Eff	81,80%	88,41%
Comb Eff	99,50%	99,50%
HT Eff	82,21%	88,86%
Output	16 163	kJ/h
Burn Rate	1,00	kg/h
Grams CO	21	g
Input	19 759	kJ/h
MC wet	17,89	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3

Ultimate CO₂
 CO_{2-ut} 19,64
 F_o
 1,061

	Air Fuel Ratio (A/F)	
Overall Heating Efficiency:	81,80%	Dry Molecular Weight (M _d) 29,79
Combustion Efficiency:	99,50%	Dry Moles Exhaust Gas (N _r): 471,84
Heat Transfer Efficiency:	82,21%	Air Fuel Ratio (A/F) 13,54

Heat Output:	15 332 Btu/h	16 163 kJ/h
Heat Input:	18 743 Btu/h	19 759 kJ/h
Burn Duration:	3,00 h	
Burn Rate:	2,20 lb/h	0,997 kg/h
Stack Temp:	238,9 Deg. F	114,9 Deg. C

Date: 2-12-09 Manufacturer: WOOD stock Soapstone Model: NAVAJO
 Project #: PT 2015^u Run: 8 Tech: M m Reviewer: DP

kindling and 3 pieces solid F.A.E	
At 35 LBS close Door and Bypass	
At 22 LBS hold 44 LBS pressure and	
close air inlet 1/2 and close damper	
At 46 LBS close air inlet	△
At 22 LBS Brassh Fev	
At 13 LBS hold load	
air inlet open 1/8	
after 4 min close air inlet	△ (Full close)

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2017-09-19 Manufacturer: Woodstock Soap Works Model: MAV3jo
 Project #: PI 2154 Run: 8 Tech: MM Reviewer: DD

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM-19	7:00	ok	ok
Pre-Test		Post-Test	

Facility Conditions:

Air Velocity from less than 2 feet
 Smoke Capture Check.....
 Picture.....

	4 (max50 Fpm)	8 (max50 Fpm)
	ok	ok
4 sides	ok	ok

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....
 Date Dilution Tunnel Cleaned.....
 Induced Draft Check (max 0.005 H2O).....
 Traverse before ignition.....
 Flow Rate 140 cfm ±10%.....

2017-09-05	
2017-09-05	
ok	
ok	
	ok

Temperature System:

Ambient (65°-90°F).....
 Wood Heater Surface (±125°F).....

ok	°F
ok	°F

Proportional Checks:

Thermocouple check.....
 Pitot Clean.....
 Pitot verification.....

ok
ok
ok

Sampling Train ID Numbers:

Probe.....
 Filter Front.....
 Filter Back.....
 Filter Thermocouple.....
 Filter (<90°F).....

Train 1 st hour	Train 1	Train 2
03	34	37
2106	2104	2110
2103	2109	2112
11	11	12
ok	ok	ok

SAMPLING EQUIPMENT CHECK OUT

 Date: 2/17-09-19 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 8 Tech: MM Reviewer: DO
Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	572338.92	573303.65	572338.96	573303.74	487226.84	488163.08
Initial 1minute DGM (Liter)	572338.82	573303.64	572339.03	573302.73	487226.84	488163.08
Change © (Liter)	MM 0.10	0.01	MM-0.07 572339.07	0.01	Ø	Ø
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	0.050 ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H2o static	Pre Test 0.4-0.5 H2o velocity	Post Test 3 H2o Static	Post Test 0.4-0.5 H2o velocity
Vacuum (inches Hg.)	3	.4	3	Ø .5 mm
Check OK (no change after 15 sec.)	ok	ok	ok	ok

Date: 20170919 Manufacturer: Woodstock Sampston Model: NAVAJO
 Project #: PT 20154 Run: 8 Tech: M.M. Reviewer: DP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	44 lbs, Class F	44 lbs
Wood	EM-090	44 lbs, Class F	44 lbs
Analytical	EM-128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017-09-19 Manufacturer: WOOD STOCK SCRAPSTOCK Model: NAVAJO
 Project #: PT 20154 Run: 8 Tech: mm Reviewer: DP

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 1011 (KPa.) Static pressure (P_q) 0.39 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0060	75.48
B - Centroid	3.00	3.50	4	0059	75.47
A-1	0.40	0.50	0.50	0049	75.36
A-2	1.50	1.75	2	0061	75.14
A-3	4.50	5.25	6	0049	75.21
A-4	5.60	6.5	7.5	0048	75.24
B-1	0.40	0.50	0.50	0048	75.40
B-2	1.50	1.75	2	0058	75.42
B-3	4.50	5.25	6	0048	75.40
B-4	5.60	6.5	7.5	0049	75.29
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

 C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.

 Δ_p = manometer reading (inches H₂O)

 T_s = average absolute dilution tunnel temperature (°F + 460)

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

 K_p = 85.49 pitot tube constant, (conversion factor for English units)

 $(\Delta_p)_{avg}$ = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

 Date: 2017-09-19 Manufacturer: Woodstock Soapstone Model: NADAJO
 Project #: PT 20154 Run: 8 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2980	300	1002	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	6	0	1794	1800	975	1000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.005	2973	1007	0.005	0.02	0.007	0.15	0.005	0.05	✓	
CO ₂	0	1789	975	0	0.02	0.11	0.5	0	0.5	✓	

TEST DATA LOG

Date: 2017-09-19 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PI 20154 Run: 8 Tech: MM Reviewer: DP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	573301.69	488162.16	784.34
Initial (Liter)	572339.52	487227.54	741.57

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101.1	100.9
Dry Bulb (F):	77.36	84.2
Humidity (%):	54	47.2

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2017.09.12 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: pl 20154 Run: 8 Tech: MM Reviewer: DD

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0616 lbs.	230	231	233	233	234
2 x 4 x 5 in.	0770 lbs.	229	230	228	226	234
2 x 4 x 5 in.	0724 lbs.	226	228	224	225	225
2 x 4 x 5 in.	0654 lbs.	231	231	231	238	238
2 x 4 x 5 in.	0632 lbs.	229	231	233	234	235
2 x 4 x 5 in.	0626 lbs.	236	231	228	227	229
2 x 4 x 5 in.	0640 lbs.	233	231	230	228	227
2 x 4 x 5 in.	0654 lbs.	236	231	228	229	226
2 x 4 x 5 in.	0628 lbs.	238	237	237	235	236
2 x 4 x 5 in.	0644 lbs.	229	228	225	226	229
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 659 lbs

Date: 2017-07-18 Run: 8 Manufacturer: Woodstock Swaps, Inc Model: NADAJO
 Project #: PJ 20153 Tech: MM Reviewer: BO

Pre-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-07-18	17:00	614572	01253	01273	118702	1101023	01261	01281	102208	1101024	01262	01281	102209	01262
2017-07-19	9:00	614573	01254	01274	118703	1101024	01262	01281	102209					

Post-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-07-19	15:00	614574	01270	01276	118721	1101026	01263	01283	102234	1101027	01260	01281	102218	01263
2017-07-25	8:00	614573	01246	01274	118710	1101024	01260	01281	102217	1101024	01260	01281	102217	01263
2017-07-26	8:00	614573	01265	01274	118709	1101024	01260	01281	102217	1101024	01260	01281	102217	01263



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-18 Project #: PJ 20154 Run: 8 Manufacturer: WOOD Slob Sumpston Model: NVAJO
 Tech: MM Reviewer: DP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	37	2110	104	
2017-09-18	17:00	1079733	01307	01270	101508
2017-09-19	09:00	1079734	01308	01271	101509

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	37	2110	104	
2017-09-19	15:00	1079735	01311	01269	101554
2017-09-25	8:00	1079734	01308	01269	101530
2017-09-26	8:00	1079734	01309	01270	101530

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	9
Date	20-09-2017
Technicien	m.m
Project #	pi 20154

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood or coal stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category		
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 20154
Date	20-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	Other	
HHV	23 183	kJ/kg
%C	56,36	
%H	4,05	
%O	10,29	
%Ash	27,07	
HHV		Btu/lb
LHV		Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	101	100,8
Barometer (in.Hg):	29,825289	29,7662288
Dry Bulb (F):	78,8	80,6
Humidity (%):	48,5	45
Air velocity (ft/min)	5	4

DGM #1	Final:	20293,611	cuft
	Initial:	20246,033	cuft
DGM #2	Final:	17285,971	cuft
	Initial:	17239,362	cuft
DGM room			

	Final:	574651,050	Liter
	Initial:	573303,810	Liter
	Final:	489484,190	Liter
	Initial:	488164,350	Liter
	Final:	790,760	cuft
	Initial:	762,340	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

127

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 20154
Date	20-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,38 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,944

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,061	73,93	0,2470
B center	0,060	73,91	0,2449
A1	0,050	74,01	0,2236
A2	0,064	73,92	0,2530
A3	0,049	73,88	0,2214
A4	0,050	73,91	0,2236
B1	0,050	73,850	0,2236
B2	0,058	73,740	0,2408
B3	0,050	73,830	0,2236
B4	0,049	73,790	0,2214
AVERAGE	0,0541	73,8770	0,2323

Project nu.	pi 20154
Date	20-09-2017
Technicien	m.m

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 5,7 g/hr

Burn Rate : 0,776 Dry kg/hr

Test Duration: 250 min

PRESSURE FACTOR: DGM 1 0,95754
 DGM 2 0,96084
 DGM 3 0,99585

BAROMETRIC PRESSURE
 Average: 29,795759 in Hg
 Start: 29,825289 in Hg
 End: 29,766229 in Hg

TEMPERATURE FACTORS DGM 1 0,97433
 DGM 2 0,97361
 DGM 3 0,97881

DGM CONTROLLER VALUES

DGM 1 Final: 20293,611 Cuft
 Initial: 20246,033 Cuft

VOLUMES SAMPLED DGM 1 43,811 SCft
 DGM 2 43,428 SCft
 DGM 3 26,816 SCft

DGM 2 Final: 17285,971 Cuft
 Initial: 17239,362 Cuft

DGM #3 Final: 790,760 Cuft
 Initial: 762,340 Cuft

TOTAL TUNNEL VOLUME : 40550

TEMPERATURES

DGM 1 541,913 °R
 DGM 2 542,312 °R

SAMPLE RATIOS
 Sample Train 1: 925,561
 Sample Train 2: 933,716

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

Paticulate concentration
 Sample Train 1 **0,000598** g/dscf
 Sample Train 2 **0,000571** g/dscf
 Room **0,000004** g/dscf

TUNNEL FLOW RATE: 162,198 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **24,10** g
 Sample Train 2 **23,00** g

PARTICULATE CATCH
 Total Sample Train 1: 26,20 mg
 Total Sample Train 2: 24,80 mg
 Total Sample Train 1 1st hour: 16,00 mg

EMISSION RATES
 Sample Train 1 **5,78** g/hr
 Sample Train 2 **5,52** g/hr

1st hour emission rate **14,81** g/hr

DEVIATION: 2,32%

Cs Train 1 Train 2
 0,000598 0,000571059

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	5	2201	2202	7	32	2203	2205	100	33	2206	2211	101	2212		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,5061	0,1267	0,1290	11,9696	110,1781	0,1235	0,1236	11,0474	109,3618	0,1251	0,1262	10,0631	0,1273	19/09/2017	17:00
Before (6)	61,5062	0,1268	0,1291	11,9697	110,1782	0,1235	0,1237	11,0475	109,3619	0,1252	0,1263	10,0632	0,1274	20/09/2017	09:00
After (1)	61,5076	0,1420	0,1287	11,9726	110,1787	0,1328	0,1240	11,0501	109,3636	0,1489	0,1262	10,0678	0,1277	20/09/2017	15:00
After (2)	61,5073	0,1408	0,1286	11,9711	110,1783	0,1326	0,1237	11,0485	109,3632	0,1471	0,1261	10,0650	0,1275	25/09/2017	08:00
After (3)	61,5073	0,1408	0,1286	11,9711	110,1783	0,1326	0,1237	11,0485	109,3632	0,1471	0,1261	10,0650	0,1275	26/09/2017	08:00
After (4)															
After (5)															
After (6)	61,5073	0,1408	0,1286	11,9711	110,1783	0,1326	0,1237	11,0485	109,3632	0,1471	0,1261	10,0650	0,1275	26/09/2017	08:00
Difference	0,0011	0,0140	-0,0005	0,0014	0,0001	0,0091	0,0000	0,0010	0,0013	0,0219	-0,0002	0,0018	0,0001		
Total (mg)		16			26,2				24,8				0,1		
Total ajusté (mg)		15,90			26,10				24,70						

Project nu.	pi 20154
Date	20-09-2017
Technicien	M.M

* Elapsed Time min	Raw data row	* Weight		* CO		* CO ₂		* O ₂		*1 Flue	*2 Room	*3 Tunnel	*4 Unit	*5 Unit	*6 Unit	*7 Unit	*8 Unit	*9 Catalyst	* Catalyst
		Remaining	CO	CO ₂	O ₂	Gas	Temp	Dry Bulb	Top	Back	R.Side	L.Side	Bottom	Down	Center				
		lbs	%	%	%	%	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F
0,00	127,00	8,1	0,1	5,5	0,0	450,5	78,3	186,8	570,2	450,8	566,3	533,2	1174,9	#####	649,0				
1,0	128,0	7,9	0,4	3,3	0,0	492,8	78,0	149,6	552,9	454,6	571,4	534,3	1190,3	#####	679,0				
2,0	129,0	7,8	0,8	5,0	0,0	533,8	78,1	152,0	538,3	456,1	571,3	534,9	1217,7	#####	673,8				
3,0	130,0	7,6	0,7	6,4	0,0	584,5	78,4	159,0	523,5	456,9	572,8	534,3	1237,9	#####	667,0				
4,0	131,0	7,5	0,6	7,3	0,0	617,1	78,4	166,4	514,9	458,2	571,7	533,7	1249,7	#####	661,2				
5,0	132,0	7,4	0,6	7,7	0,0	634,6	78,4	170,8	504,9	459,9	569,8	533,0	1258,6	#####	655,1				
6,0	133,0	7,2	0,5	7,9	0,0	645,3	78,4	174,7	496,2	462,5	567,8	532,2	1269,6	#####	651,3				
7,0	134,0	7,1	0,6	8,0	0,0	684,5	78,3	159,5	499,3	466,1	566,7	531,5	1283,8	#####	748,9				
8,0	135,0	7,0	0,6	6,8	0,0	503,7	78,2	143,8	504,3	470,1	565,7	531,4	1273,2	#####	731,6				
9,0	136,0	7,0	0,4	5,6	0,0	464,6	78,4	138,2	504,8	474,3	565,6	531,5	1258,6	#####	715,6				
10,0	137,0	6,9	0,4	5,3	0,0	441,1	78,3	134,2	503,7	477,8	565,8	531,6	1241,7	#####	708,8				
11,0	138,0	6,8	0,3	5,3	0,0	423,8	78,1	131,5	501,8	480,5	565,7	531,6	1224,1	#####	704,4				
12,0	139,0	6,8	0,3	5,2	0,0	412,3	78,2	128,8	499,6	482,5	565,7	531,0	1209,7	#####	701,9				
13,0	140,0	6,7	0,3	5,2	0,0	402,7	78,3	127,6	497,7	484,1	565,0	530,9	1196,9	#####	703,0				
14,0	141,0	6,6	0,3	5,3	0,0	395,4	78,1	126,6	496,0	485,1	564,0	528,1	1184,2	#####	704,0				
15,0	142,0	6,6	0,3	5,3	0,0	389,7	78,2	125,3	494,4	485,4	563,3	526,7	1173,5	#####	706,1				
16,0	143,0	6,5	0,3	5,4	0,0	385,3	78,2	124,8	493,6	485,9	562,3	524,9	1164,8	#####	707,3				
17,0	144,0	6,4	0,3	5,4	0,0	381,4	78,6	122,6	492,4	485,9	560,7	523,0	1155,0	#####	708,2				
18,0	145,0	6,4	0,3	5,4	0,0	378,5	78,5	121,2	491,9	485,7	559,7	520,1	1147,0	#####	712,6				
19,0	146,0	6,3	0,3	5,5	0,0	376,6	78,4	120,8	492,6	485,7	558,4	518,5	1138,3	#####	716,0				
20,0	147,0	6,3	0,3	5,5	0,0	374,4	78,4	121,3	492,9	485,4	557,8	517,4	1129,6	#####	721,9				
21,0	148,0	6,2	0,3	5,6	0,0	373,0	78,3	121,0	493,7	485,1	557,4	516,1	1122,6	#####	729,6				
22,0	149,0	6,2	0,3	5,7	0,0	372,2	78,4	121,1	495,3	484,9	556,8	515,0	1118,4	#####	739,8				
23,0	150,0	6,1	0,2	5,8	0,0	371,2	78,4	120,7	497,0	484,8	556,5	514,0	1111,0	#####	743,1				
24,0	151,0	6,1	0,2	5,8	0,0	370,7	78,8	120,2	498,7	484,2	556,4	513,0	1102,0	#####	746,5				
25,0	152,0	6,0	0,2	5,9	0,0	370,5	79,1	119,8	500,9	483,6	556,3	512,1	1100,0	#####	751,5				
26,0	153,0	6,0	0,2	5,9	0,0	369,5	78,6	119,7	502,4	483,2	556,1	511,1	1107,5	#####	752,4				
27,0	154,0	5,9	0,2	5,9	0,0	369,4	78,6	120,0	503,2	482,9	556,2	510,7	1104,8	#####	752,3				
28,0	155,0	5,8	0,2	5,9	0,0	369,7	78,7	119,0	504,7	482,4	556,7	510,0	1101,5	#####	757,4				
29,0	156,0	5,8	0,2	6,0	0,0	369,5	78,9	119,4	506,4	481,8	557,6	510,0	1097,0	#####	759,7				
30,0	157,0	5,8	0,2	6,0	0,0	369,7	78,9	119,0	507,8	481,5	558,5	510,0	1097,4	#####	756,4				
31,0	158,0	5,7	0,2	5,8	0,0	369,3	78,9	119,2	509,8	481,3	559,2	510,1	1097,3	#####	767,7				
32,0	159,0	5,6	0,2	6,1	0,0	369,5	78,6	119,2	511,7	481,1	559,8	510,0	1095,3	#####	767,9				
33,0	160,0	5,6	0,2	6,0	0,0	371,0	78,8	119,7	516,9	480,8	560,3	510,3	1098,4	#####	797,0				
34,0	161,0	5,5	0,2	6,5	0,0	372,9	78,8	119,3	522,6	480,9	561,0	510,5	1103,2	#####	809,3				
35,0	162,0	5,5	0,2	6,8	0,0	375,2	79,1	119,6	529,3	480,9	561,5	510,9	1107,5	#####	820,7				
36,0	163,0	5,4	0,3	6,8	0,0	378,1	79,1	120,4	539,9	481,2	562,7	510,9	1117,7	#####	856,9				
37,0	164,0	5,4	0,3	7,8	0,0	379,9	78,9	120,5	546,7	481,6	563,7	511,3	1125,7	#####	845,9				
38,0	165,0	5,3	0,3	7,6	0,0	381,3	78,8	120,8	551,4	481,9	565,2	512,2	1131,4	#####	844,6				
39,0	166,0	5,3	0,3	7,5	0,0	383,2	79,0	120,5	556,1	482,5	566,5	513,2	1135,7	#####	846,7				
40,0	167,0	5,2	0,3	7,5	0,0	384,9	79,1	120,8	559,7	483,2	567,9	515,0	1140,5	#####	852,0				
41,0	168,0	5,1	0,2	7,6	0,0	386,1	79,0	121,5	564,4	484,5	569,3	517,1	1143,3	#####	861,2				
42,0	169,0	5,0	0,2	7,7	0,0	389,6	79,2	121,7	573,4	486,1	570,9	519,3	1144,8	#####	892,7				
43,0	170,0	5,0	0,2	8,1	0,0	391,4	79,4	121,8	578,8	487,4	572,1	521,6	1144,5	#####	885,0				
44,0	171,0	4,9	0,1	7,9	0,0	392,6	79,4	121,9	582,4	488,7	573,4	524,2	1143,2	#####	877,5				
45,0	172,0	4,9	0,1	7,7	0,0	393,9	79,1	121,9	584,3	490,5	574,3	526,9	1142,7	#####	872,1				
46,0	173,0	4,8	0,1	7,5	0,0	394,9	79,1	122,4	585,5	492,3	575,2	529,6	1143,5	#####	872,1				
47,0	174,0	4,7	0,1	7,6	0,0	395,4	79,1	122,8	586,2	493,9	575,9	532,3	1146,3	#####	868,2				
48,0	175,0	4,7	0,1	7,5	0,0	396,0	79,0	122,2	585,4	496,1	576,3	535,0	1149,8	#####	858,5				
49,0	176,0	4,7	0,1	7,3	0,0	398,9	79,1	123,1	590,5	498,1	577,0	537,6	1158,7	#####	901,2				
50,0	177,0	4,6	0,1	7,8	0,0	400,9	79,1	123,2	595,5	500,1	577,7	540,2	1167,9	#####	898,4				
51,0	178,0	4,5	0,2	7,8	0,0	402,7	79,3	123,5	599,5	502,0	578,1	542,8	1174,2	#####	901,8				
52,0	179,0	4,5	0,1	7,8	0,0	405,1	79,2	123,7	604,8	504,1	578,6	545,2	1178,7	#####	918,0				
53,0	180,0	4,4	0,2	8,0	0,0	406,5	79,2	123,9	608,7	506,1	579,2	547,5	1182,0	#####	912,1				
54,0	181,0	4,4	0,2	7,9	0,0	407,3	79,3	124,1	611,4	508,1	579,7	549,8	1186,7	#####	910,2				
55,0	182,0	4,4	0,2	7,8	0,0	408,0	79,6	124,7	624,0	510,0	580,4	552,2	1188,9	#####	901,6				
56,0	183,0	4,3	0,2	7,7	0,0	408,9	79,3	124,1	612,7	512,2	581,4	554,4	1189,9	#####	898,0				
57,0	184,0	4,2	0,2	7,7	0,0	409,6	79,2	124,1	613,4	514,0	582,0	556,3	1191,2	#####	909,9				
58,0	185,0	4,2	0,1	7,9	0,0	410,2	79,3	124,0	615,0	516,2	582,8	558,1	1196,9	#####	908,3				
59,0	186,0	4,1	0,1	7,9	0,0	409,7	79,7	124,4	614,7	517,7	583,7	559,8	1199,9	#####	903,5				
60,0	187,0	4,1	0,1	7,8	0,0	409,5	79,7	124,3	613,8	519,3	584,5	561,8	1200,0	#####	896,3				
61,0	188,0	4,0	0,1	7,7	0,0	409,4	79,8	123,6	613,2	521,4	585,2	563,1	1199,5	#####	893,3				
62,0	189,0	3,9	0,1	7,7	0,0	408,7	79,4	124,0	612,2	523,3	586,0	564,7	1199,9	#####	892,7				
63,0	190,0	3,9	0,1	7,7	0,0	409,1	79,4	124,2	611,6	525,0	587,4	566,3	1200,1	#####	894,6				
64,0	191,0	3,9	0,1	7,7	0,0	409,7	79,4	124,4	613,1	526,6	588,3	567,9	1200,1	#####	907,2				
65,0	192,0	3,7	0,1	8,1	0,0	410,5	79,3	124,2	615,2	528,0	589,9	569,5	1199,3	#####	909,9				
66,0	193,0	3,7	0,1	7,9	0,0	411,4	79,4	124,2	617,9	529,6	590,9	571,0	1200,4	#####	923,0				
67,0	194,0	3,7	0,1	8,1	0,0	412,5	79,3	124,7	620,7	531,1	592,3	572,9	1202,9	#####	921,0				
68,0	195,0	3,6	0,1	8,0	0,0	413,3	79,4	124,7	622,0	532,4	593,8	574,4	1204,5	#####	917,9				
69,0	196,0	3,6	0,1	7,9	0,0	413,9	79,6	124,6	623,2	533,5	594,8	576,0	1205,3	#####	916,9				
70,0	197,0	3,5	0,1	7,8	0,0	414,3	79,8	124,2	623,7	534,8	596,1	577,3	1205,7	#####	918,4				
71,0	198,0	3,5	0,1	7,8	0,0	413,9	79,7	124,5	623,7	535,8	597,1	579,1	1205,7	#####	911,1				
72,0	199,0	3,5	0,1	7,6	0,0	413,3	79,9	124,1	622,8	536,9	598,1	580,5	1203,1	#####	902,0				
73,0	200,0	3,4	0,1	7,5	0,0	412,2	79,6	124,4	620,8	538,3	599,0	581,6	1199,5	#####	896,7				
74,0	201,0	3,4	0,1	7,3	0,0	411,6	79,6	124,0	618,6	539,4	599,9	582,8	1195,1	#####	888,2				
75,0	202,0	3,3	0,1	7,2	0,0	410,2	79,5	124,3	614,0	540,3	600,7	583,7	1190,2	#####	867,2				
76,0	203,0	3,2	0,1	6,9	0,0	408,7	80,2	123,2	608,3	541,4	601,3	584,6	1185,6	#####	853,2				
77,0	204,0	3,2	0,1	6,8	0,0	407,6	79,8	122,9	602,8	542,6									

119,0	246,0	2,0	0,2	4,7	0,0	337,2	79,7	112,4	445,5	537,7	582,3	564,7	1051,0	#####	639,8
120,0	247,0	1,9	0,2	4,7	0,0	335,4	79,9	110,6	442,6	536,1	581,0	562,8	1046,2	#####	636,5
121,0	248,0	1,9	0,2	4,6	0,0	333,9	79,8	110,6	440,1	534,9	579,2	561,1	1039,9	#####	633,9
122,0	249,0	1,9	0,3	4,6	0,0	332,1	80,1	110,9	437,6	533,4	577,2	560,0	1033,8	#####	631,5
123,0	250,0	1,9	0,3	4,6	0,0	330,8	80,0	110,4	435,0	532,4	575,0	558,5	1027,8	#####	628,8
124,0	251,0	1,8	0,3	4,6	0,0	329,5	80,1	110,3	432,9	531,2	575,4	556,9	1024,4	#####	626,1
125,0	252,0	1,9	0,3	4,6	0,0	328,0	79,7	109,9	430,5	530,0	573,5	555,3	1020,7	#####	623,1
126,0	253,0	1,9	0,3	4,6	0,0	326,6	79,9	109,8	428,1	528,5	572,3	553,9	1014,9	#####	620,9
127,0	254,0	1,9	0,3	4,6	0,0	325,4	79,8	108,6	425,7	526,5	570,6	552,4	1008,1	#####	618,3
128,0	255,0	1,8	0,3	4,6	0,0	324,0	79,8	108,4	423,7	525,5	569,1	550,9	1001,8	#####	615,9
129,0	256,0	1,7	0,3	4,5	0,0	322,7	79,8	108,5	421,5	524,0	567,4	549,3	995,5	#####	613,3
130,0	257,0	1,7	0,3	4,5	0,0	321,4	79,7	108,7	419,3	522,9	566,4	548,2	990,0	#####	610,4
131,0	258,0	1,7	0,3	4,5	0,0	320,3	79,8	108,5	417,2	521,7	565,2	547,3	985,2	#####	607,4
132,0	259,0	1,8	0,3	4,5	0,0	319,0	79,7	108,6	415,6	520,7	563,7	546,1	981,1	#####	607,2
133,0	260,0	1,7	0,3	4,5	0,0	317,4	79,9	107,8	413,6	519,5	562,2	543,9	977,1	#####	605,1
134,0	261,0	1,7	0,3	4,4	0,0	316,6	79,8	108,2	411,8	518,0	560,4	542,8	973,3	#####	602,1
135,0	262,0	1,7	0,3	4,4	0,0	315,1	79,8	108,4	409,6	516,7	558,7	541,5	973,7	#####	599,1
136,0	263,0	1,7	0,2	4,4	0,0	313,9	80,1	108,2	407,8	515,7	557,4	540,3	973,9	#####	598,8
137,0	264,0	1,6	0,2	4,7	0,0	313,3	79,8	108,3	406,2	514,8	556,3	539,4	972,9	#####	597,4
138,0	265,0	1,6	0,2	4,6	0,0	312,4	79,7	108,2	404,9	514,4	554,9	538,3	971,1	#####	594,7
139,0	266,0	1,6	0,2	4,6	0,0	311,7	79,7	107,9	403,4	514,1	553,8	537,5	968,8	#####	594,1
140,0	267,0	1,6	0,2	4,6	0,0	310,7	79,6	107,5	401,8	513,1	552,6	536,5	965,7	#####	592,9
141,0	268,0	1,5	0,2	4,6	0,0	309,7	79,8	107,1	400,3	512,8	551,3	535,4	962,9	#####	590,6
142,0	269,0	1,5	0,2	4,5	0,0	309,0	79,7	107,2	398,6	512,1	550,2	534,4	960,1	#####	588,6
143,0	270,0	1,5	0,2	4,5	0,0	308,0	79,8	107,4	397,4	511,5	549,0	533,1	956,7	#####	587,1
144,0	271,0	1,5	0,2	4,5	0,0	307,2	79,6	107,1	396,1	510,8	547,4	532,1	953,0	#####	584,6
145,0	272,0	1,5	0,3	4,4	0,0	306,3	79,6	107,0	394,2	510,2	546,7	531,1	949,4	#####	582,7
146,0	273,0	1,5	0,2	4,4	0,0	305,6	79,9	106,2	392,6	509,4	545,7	530,0	945,9	#####	580,3
147,0	274,0	1,4	0,3	4,3	0,0	304,1	79,5	106,5	390,8	509,0	545,0	529,4	942,5	#####	576,9
148,0	275,0	1,4	0,3	4,3	0,0	303,2	79,5	107,1	389,5	508,1	544,3	528,5	939,0	#####	575,8
149,0	276,0	1,4	0,3	4,3	0,0	302,4	79,4	107,1	387,7	507,4	543,4	527,7	935,5	#####	573,8
150,0	277,0	1,4	0,3	4,2	0,0	301,7	79,4	107,4	386,2	506,4	542,4	526,7	932,2	#####	572,2
151,0	278,0	1,3	0,3	4,2	0,0	300,9	79,4	106,8	385,0	505,3	541,3	525,8	928,4	#####	569,7
152,0	279,0	1,3	0,3	4,1	0,0	299,7	79,5	107,0	383,5	504,0	540,3	524,9	924,8	#####	568,0
153,0	280,0	1,3	0,3	4,1	0,0	299,1	79,4	107,7	382,1	502,7	539,3	523,9	921,3	#####	566,9
154,0	281,0	1,2	0,3	4,1	0,0	298,3	79,4	107,5	380,8	501,4	538,3	522,8	916,7	#####	565,3
155,0	282,0	1,2	0,3	4,1	0,0	297,7	79,3	107,1	379,2	500,2	537,2	521,8	911,5	#####	563,0
156,0	283,0	1,2	0,3	4,0	0,0	296,6	79,4	106,9	378,0	498,9	536,2	521,0	906,9	#####	560,4
157,0	284,0	1,2	0,3	4,1	0,0	295,8	79,3	107,2	376,4	497,8	535,2	519,9	902,6	#####	559,2
158,0	285,0	1,2	0,3	4,1	0,0	295,1	79,5	107,5	375,0	496,6	534,1	518,8	898,6	#####	556,5
159,0	286,0	1,2	0,3	4,0	0,0	294,1	79,3	107,2	373,2	495,2	533,3	517,5	894,3	#####	553,4
160,0	287,0	1,1	0,3	4,0	0,0	293,5	79,3	107,1	372,1	494,0	532,2	516,5	890,5	#####	551,7
161,0	288,0	1,1	0,4	3,9	0,0	292,5	79,4	107,0	370,6	492,5	531,2	515,5	886,5	#####	549,4
162,0	289,0	1,1	0,4	3,8	0,0	291,7	79,4	106,9	369,2	491,2	530,4	514,4	882,2	#####	547,3
163,0	290,0	1,1	0,4	3,8	0,0	290,9	79,4	106,5	367,7	489,8	529,6	513,2	877,6	#####	544,9
164,0	291,0	1,1	0,4	3,7	0,0	289,9	79,5	106,5	366,0	488,4	528,5	512,0	876,4	#####	542,0
165,0	292,0	1,1	0,4	3,7	0,0	288,6	79,6	106,7	364,3	487,2	527,4	510,9	874,1	#####	539,5
166,0	293,0	1,0	0,4	3,7	0,0	287,8	79,5	106,6	362,7	485,9	526,6	509,2	870,6	#####	537,1
167,0	294,0	1,1	0,4	3,7	0,0	286,9	79,4	106,3	361,1	484,6	525,4	507,9	866,7	#####	534,1
168,0	295,0	1,0	0,4	3,6	0,0	285,5	79,5	106,2	359,7	483,2	524,2	506,6	862,9	#####	531,6
169,0	296,0	1,0	0,4	3,6	0,0	284,9	79,4	106,1	358,1	481,8	523,1	505,3	859,0	#####	528,8
170,0	297,0	1,0	0,4	3,5	0,0	283,9	79,4	106,1	356,1	480,7	522,0	503,9	855,0	#####	527,4
171,0	298,0	1,0	0,5	3,5	0,0	283,0	79,4	106,2	354,4	479,3	520,8	502,4	851,2	#####	523,2
172,0	299,0	0,9	0,5	3,4	0,0	282,0	79,5	106,0	352,7	477,9	519,8	501,2	847,3	#####	520,3
173,0	300,0	0,9	0,5	3,3	0,0	280,9	79,3	105,8	351,3	476,4	518,7	499,6	843,9	#####	518,1
174,0	301,0	0,9	0,5	3,3	0,0	279,9	79,4	105,2	349,8	475,1	517,4	498,1	840,3	#####	515,7
175,0	302,0	0,9	0,5	3,3	0,0	279,2	79,4	105,3	348,1	473,6	516,4	496,7	836,1	#####	514,4
176,0	303,0	0,9	0,4	3,4	0,0	277,9	79,4	105,1	346,9	472,3	514,8	495,2	833,2	#####	511,8
177,0	304,0	0,9	0,5	3,3	0,0	276,9	79,4	105,0	345,2	470,8	513,5	493,6	829,9	#####	509,8
178,0	305,0	0,9	0,5	3,2	0,0	276,0	79,3	104,9	343,9	469,3	512,1	492,1	826,1	#####	506,9
179,0	306,0	0,8	0,5	3,2	0,0	274,6	79,3	104,9	342,0	467,6	510,6	490,4	822,2	#####	504,3
180,0	307,0	0,8	0,5	3,1	0,0	273,5	79,4	104,8	340,4	465,9	509,1	488,9	818,4	#####	501,6
181,0	308,0	0,8	0,5	3,1	0,0	272,6	79,3	104,1	339,0	464,1	507,7	487,4	815,1	#####	498,1
182,0	309,0	0,8	0,5	3,0	0,0	271,4	79,4	104,1	337,3	462,7	506,2	485,7	810,7	#####	495,5
183,0	310,0	0,7	0,5	3,0	0,0	270,1	79,4	104,0	335,8	461,2	504,3	484,1	806,5	#####	492,6
184,0	311,0	0,8	0,5	3,0	0,0	269,0	79,4	103,8	334,0	459,4	502,8	482,5	801,8	#####	489,9
185,0	312,0	0,7	0,5	2,9	0,0	267,7	79,3	103,7	332,3	457,6	501,2	480,6	797,6	#####	486,7
186,0	313,0	0,7	0,5	2,9	0,0	266,7	79,3	103,5	330,5	455,8	499,6	478,8	793,3	#####	484,2
187,0	314,0	0,7	0,5	2,9	0,0	265,5	79,5	103,2	328,9	453,9	498,1	477,1	789,5	#####	481,0
188,0	315,0	0,7	0,5	2,8	0,0	264,6	79,4	103,1	327,5	452,3	496,5	475,3	785,8	#####	478,7
189,0	316,0	0,7	0,5	2,8	0,0	263,6	79,2	102,9	325,8	450,3	494,7	473,6	781,8	#####	476,7
190,0	317,0	0,7	0,5	2,8	0,0	262,4	79,4	103,0	324,1	448,2	492,9	471,9	777,9	#####	474,2
191,0	318,0	0,7	0,5	2,7	0,0	261,2	79,4	102,7	322,5	446,5	491,1	470,0	773,9	#####	472,0
192,0	319,0	0,6	0,5	2,7	0,0	260,0	79,3	102,5	321,1	444,6	489,3	468,2	770,0	#####	469,8
193,0	320,0	0,6	0,4	2,7	0,0	258,8	79,4	102,0	319,5	442,6	487,5	466,5	766,0	#####	467,8
194,0	321,0	0,6	0,5	2,7	0,0	257,8	79,5	102,0	318,0	440,8	485,6	464,6	762,4	#####	464,4
195,0	322,0	0,6	0,5	2,7	0,0	256,6	79,5	101,7	316,6	438,8	483,9	462,8	758,7	#####	461,1
196,0	323,0	0,6	0,4	2,7	0,0	255,6	79,5	101,9	315,2	437,1	481,9	461,0	755,0	#####	461,9
197,0	324,0	0,5	0,4	2,7	0,0	254,6	79,3	101,9	313,6	435,3	480,2	459,3	751,5	#####	459,9
198,0	325,0	0,6	0,4	2,7	0,0	253,6	79,4	101,6	312,2	433,5	478,3	457,6	748,2	#####	458,0
199,0	326,0	0,6	0,4	2,7	0,0	252,8	79,5	101,3	310,3	431,6	476,				

242,0	369,0	0,1	0,4	2,0	0,0	215,7	80,0	98,3	259,2	361,5	405,8	388,4	625,9	#####	377,8
243,0	370,0	0,1	0,4	2,0	0,0	215,1	80,1	98,0	257,8	359,9	404,3	387,1	624,6	#####	376,1
244,0	371,0	0,1	0,4	2,0	0,0	214,3	80,1	98,0	256,8	358,4	402,7	385,6	622,3	#####	374,8
245,0	372,0	0,1	0,4	2,0	0,0	213,3	80,0	98,2	256,0	357,1	401,4	384,3	619,9	#####	373,6
246,0	373,0	0,1	0,4	2,0	0,0	212,9	80,3	97,9	254,9	355,7	399,9	383,0	617,3	#####	372,4
247,0	374,0	0,1	0,4	2,0	0,0	212,1	80,3	97,9	254,1	354,2	398,4	381,6	614,8	#####	370,7
248,0	375,0	0,1	0,3	2,0	0,0	211,4	80,1	97,9	253,2	352,9	396,7	380,1	612,4	#####	368,9
249,0	376,0	0,1	0,3	2,0	0,0	210,5	80,1	97,9	252,2	351,6	395,5	378,9	610,0	#####	367,7
250,0	377,0	0,0	0,3	2,0	0,0	210,0	80,3	97,5	251,2	350,1	394,0	377,5	607,8	#####	366,3

Manufacturer: podstock Soapstone

Model: Navajo

Date: 09/20/17

Run: 9

Control #: Fruitland

Test Duration: 250

	min	
	HHV	LHV
Eff	60,91%	63,30%
Comb Eff	94,31%	94,31%
HT Eff	64,59%	67,11%
Output	10 741	kJ/h
Burn Rate	0,76	kg/h
Grams CO	342	g
Input	17 633	kJ/h
MC wet	14,00	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
 CO_{2-ult} 18,78
 F₀
 1,107

		Air Fuel Ratio (A/F)
Overall Heating Efficiency:	60,91%	Dry Molecular Weight (M _d)
Combustion Efficiency:	94,31%	Dry Moles Exhaust Gas (N _r):
Heat Transfer Efficiency:	64,59%	Air Fuel Ratio (A/F)
Heat Output:	10 189 Btu/h	10 741 kJ/h
Heat Input:	16 727 Btu/h	17 633 kJ/h
Burn Duration:	4,17	h
Burn Rate:	1,68	lb/h 0,761 kg/h
Stack Temp:	330,7 Deg. F	165,9 Deg. C

Date: 2017-07-20 Manufacturer: WOODstock Soapstone Model: NAVAJO
 Project #: PT 20154 Run: 9 Tech: MN Reviewer: DP

- kindling and 3 pieces stone fire
- Damper open and catalyst X close
- air inlet full open
- At 36 LBS close Dook and by pass
- At 200 inst second pre load and sitting at coal (coal)
- At 12 LBS inst load
- Degager grille inst load
- close Dook and by pass open
- for ~~inst~~ (sitting coal)



after 7 min close air inlet and by pass (L A D)

TEST LOAD CONFIGURATION

coal test

SAMPLING EQUIPMENT CHECK OUT

Date: 2017-09-20 Manufacturer: woodstock saps s/nk Model: NAVAJO
 Project #: pt 20154 Run: 9 Tech: MR Reviewer: DP

Leakage Checks Tunnel Samplers

Unplugged Flow Rate = .25cfm	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Vacuum (inches Hg.)	-15	-15	-15	-15	-15	-15
Final 1minute DGM (Liter)	57330315	57465538	57330323	57465558	48816370	48948906
Initial 1minute DGM (Liter)	57330300	57465535	57330321	57465552	48816370	48948903
Change © (Liter)	015	003	002	006	∅	003
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	-5	-5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H ₂ o static	Pre Test 0.4-0.5 H ₂ o velocity	Post Test 3 H ₂ o Static	Post Test 0.4-0.5 H ₂ o velocity
Vacuum (inches Hg.)	3	4	3	4
Check OK (no change after 15 sec.)	ok	ok	ok	ok

Date: 2012-09-10 Manufacturer: woodstock soap stone Model: NBVAJO
 Project #: pl 20154 Run: 9 Tech: MM Reviewer: BP

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM-090	4.4 lbs, Class F	4.4 lbs
Wood	EM-096	4.4 lbs, Class F	4.4 lbs
Analytical	EM 128	100 mg, Class S	100 mg
Analytical	EM-129	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2017-09-28 Manufacturer: WOODSLOCH SOAPSTONE Model: NVA/BJU
 Project #: PT 20154 Run: 9 Tech: MM Reviewer: SO

FOR TUNNELS < 12 in

 Barometric pressure (P_{bar}) 101 (KPa.) Static pressure (P_q) 0.38 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.061	73.93
B - Centroid	3.00	3.50	4	0.060 ^{mm} 0.050	74.01 73.91 ^{mm}
A-1	0.40	0.50	0.50	0.050	74.01
A-2	1.50	1.75	2	0.064	73.92
A-3	4.50	5.25	6	0.049	73.88
A-4	5.60	6.5	7.5	0.050	73.91
B-1	0.40	0.50	0.50	0.050	73.85
B-2	1.50	1.75	2	0.058	73.74
B-3	4.50	5.25	6	0.050	73.83
B-4	5.60	6.5	7.5	0.049	73.79
				AVERAGE	

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

 C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.

 Δ_p = manometer reading (inches H₂O)

 T_s = average absolute dilution tunnel temperature (°F + 460)

 P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$
 P_q = static pressure in. H₂O
 { 13.6 }

 M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

 K_p = 85.49 pitot tube constant, (conversion factor for English units)

 Δ_p avg. = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

Date: 2017.09.20 Manufacturer: WOODstock soapstone Model: MAVAJO
 Project #: PT 20154 Run: 9 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2,981	3 00	0,995	1,00
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	17,91	18 00	9,77	10,00
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0.006	2,973	1000	0.006	0.02	0.008	0.15	0.005	0.05	✓	
CO ₂	0	17,81	9,70	0	0.02	0.10	0.5	0.07	0.5	✓	

TEST DATA LOG

Date: 2017-09-20 Manufacturer: Woodstock Soapst Model: MAVA J0
 Project #: PI 20154 Run: 9 Tech: mm Reviewer: DP

RAW DRY GAS METER READINGS

	System 1 <i>mm</i>	System 2	Blank
Final (Liter)	57465.05 57464.67	489 489.19 489.76 <i>mm</i>	790.76
Initial (Liter)	573303.81	488164.35	762.34

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101	100.8
Dry Bulb (F):	78.8	80.60
Humidity (%):	48.5	45

Flow Meter

	Start	End
Flow meter reading	N.A	N.A

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.A	N.A
Scale Weight (Kg)	N.A	N.A

FUEL DATA

Date: 2013-07-20 Manufacturer: Woodstock Soapstone Model: NOVAJO
 Project #: PT 20154 Run: 9 Tech: Mr Reviewer: DP

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	0 738 lbs.	209	216	223	223	231
2 x 4 x 5 in.	0 792 lbs.	236	231	234	234	238
2 x 4 x 5 in.	6 730 lbs.	236	231	228	229	229
2 x 4 x 5 in.	0 738 lbs.	238	239	236	238	237
2 x 4 x 5 in.	6 742 lbs.	233	231	233	231	236
2 x 4 x 5 in.	0 724 lbs.	236	231	230	231	232
2 x 4 x 5 in.	0 728 lbs.	234	233	236	231	231
2 x 4 x 5 in.	0 760 lbs.	238	234	233	236	228
2 x 4 x 5 in.	0 718 lbs.	229	229	230	234	233
2 x 4 x 5 in.	0 738 lbs.	231	236	234	235	231
2 x 4 x 5 in.	0 686 lbs.	228	226	228	229	226
2 x 4 x 5 in.	0 758 lbs.	229	226	228	229	230
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 885 lbs

FUEL DATA

Date: 2017-09-20 Manufacturer: Woodstock Soapstone Model: MAV5J0
 Project #: pt 20154 Run: 9 Tech: MM Reviewer: DP

FUEL DESCRIPTION:

Type of wood : Coal

TEST LOAD

Piece Size			Weight	Meter Moisture Content (% dry)*			
x	x	in.	1,432 lbs.	14			
x	x	in.	1,772 lbs.	14			
x	x	in.	3,164 lbs.	14			
x	x	in.	1,754 lbs.	14			
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				
x	x	in.	lbs.				

TEST LOAD WEIGHT: 8,122 lbs Min 20%: 162 Max 25%: 304

Date: 2017-07-19 Manufacturer: Woodstock Soapstone Model: MAV030
 Project #: PJ 20154 Run: 9 Tech: MM Reviewer: DP

Pre-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-07-19	17:00	05	2201	2202	7	32	2203	2205	100	32	2203	2205	100	2212
2017-07-20	9:00	615061	01267	01290	119696	1101781	01235	01236	110474	1101781	01235	01236	110474	01273
2017-07-20	9:00	615062	01268	01291	119697	1101782	01235	01237	110475	1101782	01235	01237	110475	01274

Post-test Weight Record		SYSTEM 1 - 1 st hour						SYSTEM 1						
Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
2017-07-20	9:00	05	2201	2202	7	32	2203	2205	100	32	2203	2205	100	2212
2017-07-20	8:00	615076	01420	01287	119726	1101787	01328	01240	110501	1101787	01328	01240	110501	01277
2017-07-20	8:00	615073	01408	01286	119711	1101783	01326	01237 01237	110485	1101783	01326	01237 01237	110485	01275
2017-07-20	8:00	615072	01408	01286	119711	1101783	01326	01237	110485	1101783	01326	01237	110485	01275



DILUTION TUNNEL PARTICULATE SAMPLER DATA

Date: 2017-09-19 Run: 9 Manufacturer: Woo D. Stock Soapstone Model: NAVDJO
 Project #: PJ 20154 Tech: M M Reviewer: [Signature]

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	33	2206	2211	101
2017-09-19	17:00	1093618	01251	01262	100631
2017-09-20	9:00	1093619	01252	01263	100632

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time	33	2206	2211	101
2017-09-20	15:00	1093636	01489	01262	100678
2017-09-25	8:00	1093632	01471	01261	100650
2017-09-26	8:01	1093632	01471	01261	100650

Paramètres

Tous les facteurs de corrections et autres paramètres qui peuvent être modifiés par l'utilisateur du fichier sont regroupés ici.

Code verrouillage:

Description du test

Test standard	EPA
Run #	10
Date	21-09-2017
Technicien	m.m
Project #	pi 21054

Description de l'unité

Manufacturier	woodstock soapstone	
Modèle	navajo	
Combustion system	Cat	
Appliance type	Wood or Coal Stove	
Firebox volume	1,18	cu ft.
Appliance weight empty	n.a	lbs
Appliance weight full	n.a	lbs

Paramètres du test

Logging time	1	min
Manufacturer's rated heat output	n.a	BTU/h Donnée fournie par le manufacturier
Targeted category		
Targeted output	n.a	BTU/h
Cp steel	n.a	BTU/lb-°F

Échantillonnage

Blank sampling rate	0,20	cuft/min
Internal probe diameter	0,18	in.
Calibration Factor (DGM #1):	0,987	Dimensionless
Equipment number (DGM #1):	EM-178	
Calibration Factor (DGM #2):	0,996	Dimensionless
Equipment number (DGM #2):	EM-179	
Calibration Factor (DGM #3):	0,968	Dimensionless
Equipment number (DGM #3):	EM-070	Dimensionless

Tunnel

Targeted tunnel flow rate	140	scfm
Tunnel diameter	6	in.
Molecular weight	28,78	May be assumed to be 28,78 (EPA) Si B-415 = 29
Pitot tube type	Standard	
Pitot tube coefficient	0,99	Dimensionless

Project nu.	pi 21054
Date	21-09-2017
Technicien	<input type="text" value="m.m"/>

Fuel data

Fuel type	Dimension	
Fuel specie	Other	
HHV	23 183	kJ/kg
%C	56,36	
%H	4,05	
%O	10,29	
%Ash	27,07	
HHV		Btu/lb
LHV		Btu/lb

Default Fuel Values		
	D. Fir	Oak/Maple
HHV	19 810	19 887
%C	48,73	50
%H	6,87	6,6
%O	43,9	42,9
%Ash	0,5	0,5
HHV (Btu/lb)	8519	8552
LHV (Btu/lb)	7451	7480

	Start	End
Barometer (kPa):	101,4	101,1
Barometer (in.Hg):	29,943409	29,85481876
Dry Bulb (F):	72,14	80,06
Humidity (%):	48	37
Air velocity (ft/min)	4	8

DGM #1	Final:	20360,498	cuft
	Initial:	20293,794	cuft
DGM #2	Final:	17351,534	cuft
	Initial:	17286,206	cuft
DGM room			

	Final:	576545,100	Liter
	Initial:	574656,240	Liter
	Final:	491340,720	Liter
	Initial:	489490,820	Liter
	Final:	831,950	cuft
	Initial:	790,750	cuft

Numéro de la ligne dans "Raw data" à partir duquel les données du VRAI test commencent

134

Autres données à rentrer: dans preload data, load data, traverse et filter set weight

Project nu.	pi 21054
Date	21-09-2017
Technicien	m.m

Tunnel Traverse Worksheet (for velocity calculations)

Static Pressure: 0,38 in. H2O
 Barometer: 29,900 in. Hg

Pour un tunnel de 12" et plus, prendre 6 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center			0,0000
B center			0,0000
A1			0,0000
A2			0,0000
A3			0,0000
A4			0,0000
A5			0,0000
A6			0,0000
B1			0,0000
B2			0,0000
B3			0,0000
B4			0,0000
B5			0,0000
B6			0,0000
AVERAGE	#DIV/0!	#DIV/0!	0,0000

PITOT CONSTANT=
0,939

Pour un tunnel moins de 12", prendre 4 lectures

	TUNNEL VELOCITY	TUNNEL TEMP	SQUARE ROOT
	In. wc	°F	
A center	0,058	73,09	0,2408
B center	0,057	73	0,2387
A1	0,048	73,18	0,2191
A2	0,061	73,35	0,2470
A3	0,047	73,2	0,2168
A4	0,046	73,02	0,2145
B1	0,047	73,150	0,2168
B2	0,051	73,060	0,2258
B3	0,046	73,040	0,2145
B4	0,047	73,090	0,2168
AVERAGE	0,0508	73,1180	0,2251

Project nu.	pi 21054
Date	21-09-2017
Technicien	m.m

Filter set weight

	System 1 (g) 1st hour				System 1 (g)				System 2 (g)				Ambient blank (g)	Date	Heure
	probe	front	back	gasket	probe	front	back	gasket	probe	front	back	gasket	Filter		
Number	2	22	60	1	6	280	427	3	10	622	2200	150	2204		
Before (1)															
Before (2)															
Before (3)															
Before (4)															
Before (5)	61,1014	0,1289	0,1239	11,9920	61,3764	0,1286	0,1236	11,8633	94,6423	0,1265	0,1270	11,7572	0,1269	20/09/2017	17:00
Before (6)	61,1015	0,1290	0,1240	11,9921	61,3765	0,1287	0,1237	11,8634	94,6424	0,1266	0,1271	11,7572	0,1270	21/09/2017	09:00
After (1)	61,1023	0,1404	0,1234	11,9957	61,3771	0,1397	0,1237	11,8658	94,6439	0,1475	0,1271	11,7600	0,1273	21/09/2017	16:45
After (2)	61,1020	0,1392	0,1230	11,9941	61,3767	0,1387	0,1237	11,8647	94,6431	0,1464	0,1270	11,7589	0,1270	25/09/2017	08:00
After (3)	61,1020	0,1392	0,1230	11,9941	61,3767	0,1387	0,1237	11,8647	94,6431	0,1464	0,1270	11,7589	0,1270	26/09/2017	08:00
After (4)															
After (5)															
After (6)	61,1020	0,1392	0,1230	11,9941	61,3767	0,1387	0,1237	11,8647	94,6431	0,1464	0,1270	11,7589	0,1270	26/09/2017	08:00
Difference	0,0005	0,0102	-0,0010	0,0020	0,0002	0,0100	0,0000	0,0013	0,0007	0,0198	-0,0001	0,0017	0,0000		
Total (mg)		11,7				23,2				22,1			0		
Total ajusté (mg)		11,70				23,20				22,10					

Project nu.	pi 21054
Date	21-09-2017
Technicien	M.M

SFBA EPA EMISSION RESULTS

RESULTS

Average emission rate: 3,7 g/hr

Burn Rate : 0,530 Dry kg/hr

Test Duration: 360 min

PRESSURE FACTOR: DGM 1 0,95388
 DGM 2 0,95744
 DGM 3 0,99930

BAROMETRIC PRESSURE
 Average: 29,899114 in Hg
 Start: 29,943409 in Hg
 End: 29,854819 in Hg

TEMPERATURE FACTORS DGM 1 0,97859
 DGM 2 0,97820
 DGM 3 0,98119

DGM CONTROLLER VALUES

DGM 1 Final: 20360,498 Cuft
 Initial: 20293,794 Cuft

VOLUMES SAMPLED DGM 1 61,456 SCft
 DGM 2 60,940 SCft
 DGM 3 39,104 SCft

DGM 2 Final: 17351,534 Cuft
 Initial: 17286,206 Cuft

DGM #3 Final: 831,950 Cuft
 Initial: 790,750 Cuft

TOTAL TUNNEL VOLUME : 59707

TEMPERATURES

SAMPLE RATIOS
 Sample Train 1: 971,536
 Sample Train 2: 979,766

DGM 1 539,554 °R
 DGM 2 539,766 °R

Paticulate concentration
 Sample Train 1 **0,000378** g/dscf
 Sample Train 2 **0,000363** g/dscf
 Room **0,000000** g/dscf

CALIBRATION FACTORS

DGM 1 0,9870
 DGM 2 0,9960
 DGM #3 0,9680

TUNNEL FLOW RATE: 165,852 Dscfm

TOTAL EMISSIONS
 Sample Train 1 **22,54** g
 Sample Train 2 **21,65** g

PARTICULATE CATCH
 Total Sample Train 1: 23,20 mg
 Total Sample Train 2: 22,10 mg
 Total Sample Train 1 1st hour: 11,70 mg

EMISSION RATES
 Sample Train 1 **3,76** g/hr
 Sample Train 2 **3,61** g/hr

1st hour emission rate **11,37** g/hr

DEVIATION: 2,01%

Cs Train 1 Train 2
 0,0003775 0,000362652

* Elapsed Time min	* Raw data row	* Weight			* CO ₂			* O ₂			*1	*2	*3	*4	*5	*6	*7	*8	*9	*					
		* Remaining lbs	* CO %	* CO ₂ %	* O ₂ %	* Flue Gas		* Room Temp		* Tunnel Dry Bulb		* Unit Top		* Unit Back		* Unit R.Side		* Unit L.Side		* Unit Bottom		* Catalyst Down		* Catalyst Center	
						°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F	°F
0,00	134,00	8,1	0,4	4,5	0,0	409,7	76,3	171,2	506,1	519,9	572,3	508,3	851,6	#####	597,4										
1,0	135,0	7,9	0,4	3,0	0,0	468,7	76,1	141,4	497,3	521,0	573,3	509,3	960,7	#####	646,2										
2,0	136,0	7,8	0,6	6,7	0,0	540,1	76,4	147,5	486,5	518,9	572,6	510,2	1047,3	#####	638,3										
3,0	137,0	7,7	0,5	7,6	0,0	555,4	76,2	151,1	477,8	517,2	571,3	510,5	1102,9	#####	634,4										
4,0	138,0	7,5	0,5	7,7	0,0	579,1	76,4	154,4	470,4	516,9	570,1	511,2	1140,2	#####	631,3										
5,0	139,0	7,4	0,5	8,0	0,0	590,5	76,5	156,8	464,3	518,3	570,0	511,6	1163,8	#####	631,3										
6,0	140,0	7,3	0,5	8,0	0,0	512,8	76,2	140,2	479,1	520,9	570,5	512,5	1180,7	#####	760,3										
7,0	141,0	7,2	0,5	7,4	0,0	468,3	76,3	131,7	491,8	524,5	572,2	513,3	1193,0	#####	775,8										
8,0	142,0	7,1	0,4	6,8	0,0	436,9	76,5	124,9	494,0	528,2	573,8	514,2	1189,6	#####	729,0										
9,0	143,0	7,1	0,4	5,5	0,0	416,5	76,3	121,2	491,3	532,2	575,8	515,5	1178,9	#####	704,7										
10,0	144,0	7,0	0,4	5,1	0,0	403,5	76,4	118,8	489,3	535,5	577,3	516,0	1172,8	#####	708,2										
11,0	145,0	7,0	0,4	5,2	0,0	393,8	76,5	117,3	487,6	537,4	577,4	516,3	1166,1	#####	709,0										
12,0	146,0	6,8	0,4	5,3	0,0	387,6	76,5	116,2	487,9	538,9	577,1	516,7	1158,2	#####	722,0										
13,0	147,0	6,8	0,4	5,5	0,0	382,4	76,5	115,1	488,7	539,6	576,2	516,8	1152,6	#####	727,8										
14,0	148,0	6,8	0,4	5,5	0,0	378,1	76,2	114,7	489,5	540,1	574,4	516,6	1149,2	#####	733,8										
15,0	149,0	6,7	0,4	5,6	0,0	375,6	76,5	113,8	491,4	539,7	572,5	515,9	1143,2	#####	741,9										
16,0	150,0	6,7	0,3	5,8	0,0	374,4	76,6	113,2	494,7	538,8	570,6	515,4	1137,5	#####	758,8										
17,0	151,0	6,6	0,3	5,9	0,0	373,2	76,6	112,9	497,7	538,2	568,6	515,0	1130,4	#####	763,9										
18,0	152,0	6,5	0,3	6,1	0,0	372,4	76,6	112,0	500,6	537,2	566,7	514,3	1126,1	#####	766,6										
19,0	153,0	6,5	0,2	6,2	0,0	371,6	76,7	112,2	503,5	536,4	564,4	513,5	1121,6	#####	773,0										
20,0	154,0	6,4	0,2	6,3	0,0	371,0	76,6	111,7	505,4	535,2	562,2	513,0	1117,0	#####	771,3										
21,0	155,0	6,4	0,2	6,3	0,0	370,4	76,8	111,9	507,0	534,7	560,2	512,2	1110,4	#####	767,4										
22,0	156,0	6,3	0,2	6,3	0,0	369,7	76,8	111,6	508,1	534,0	558,2	512,0	1105,1	#####	772,0										
23,0	157,0	6,3	0,2	6,3	0,0	370,2	76,8	111,2	511,5	533,3	556,6	511,5	1103,6	#####	787,3										
24,0	158,0	6,2	0,2	6,3	0,0	370,2	76,9	111,6	513,4	532,5	554,8	511,3	1100,9	#####	779,4										
25,0	159,0	6,2	0,2	6,2	0,0	369,7	76,8	111,6	514,9	531,8	553,9	511,1	1098,8	#####	780,5										
26,0	160,0	6,1	0,2	6,4	0,0	370,4	76,9	111,6	517,8	531,3	552,9	511,0	1098,6	#####	793,2										
27,0	161,0	6,0	0,2	6,5	0,0	370,1	76,9	111,7	519,4	530,9	551,9	511,1	1098,2	#####	786,4										
28,0	162,0	6,0	0,2	6,5	0,0	369,8	77,0	111,1	519,9	530,6	551,0	510,9	1097,5	#####	780,1										
29,0	163,0	5,9	0,2	6,2	0,0	369,9	77,0	111,3	520,0	529,9	550,7	511,1	1094,0	#####	779,3										
30,0	164,0	5,9	0,1	6,2	0,0	369,6	77,0	110,7	520,5	529,8	550,6	511,2	1098,8	#####	778,8										
31,0	165,0	5,9	0,1	6,2	0,0	369,6	77,1	111,0	521,1	529,4	550,6	511,7	1099,0	#####	782,2										
32,0	166,0	5,8	0,1	6,2	0,0	369,8	77,1	110,7	521,6	528,9	550,8	512,1	1097,2	#####	783,5										
33,0	167,0	5,8	0,1	6,3	0,0	370,4	77,1	110,9	523,1	528,6	551,1	512,7	1095,5	#####	797,5										
34,0	168,0	5,7	0,1	6,9	0,0	371,8	77,2	111,3	527,3	528,4	551,5	513,2	1099,6	#####	808,9										
35,0	169,0	5,6	0,1	6,8	0,0	372,1	77,2	111,4	528,8	528,5	551,9	514,1	1099,7	#####	796,1										
36,0	170,0	5,6	0,1	6,5	0,0	371,7	77,1	111,3	528,2	528,6	552,1	515,0	1101,3	#####	788,4										
37,0	171,0	5,5	0,1	6,5	0,0	371,6	77,2	111,0	527,8	528,9	552,6	515,8	1103,2	#####	786,7										
38,0	172,0	5,5	0,1	6,5	0,0	370,9	77,2	110,7	526,9	529,3	553,1	516,5	1104,0	#####	783,9										
39,0	173,0	5,4	0,1	6,5	0,0	371,5	77,4	110,9	528,3	530,0	553,1	517,4	1112,3	#####	800,0										
40,0	174,0	5,4	0,2	7,0	0,0	373,7	77,4	110,8	532,1	530,2	553,5	518,5	1122,9	#####	815,2										
41,0	175,0	5,3	0,1	7,3	0,0	374,9	77,4	110,8	536,3	531,0	554,0	519,4	1130,8	#####	822,0										
42,0	176,0	5,2	0,1	7,3	0,0	376,2	77,3	111,6	539,5	531,7	554,8	520,6	1136,4	#####	826,0										
43,0	177,0	5,1	0,1	7,4	0,0	376,9	77,4	111,4	542,2	532,6	556,1	521,9	1138,8	#####	824,0										
44,0	178,0	5,1	0,1	7,2	0,0	377,6	77,4	111,7	544,0	533,5	557,2	523,4	1137,8	#####	824,3										
45,0	179,0	5,1	0,1	7,3	0,0	378,0	77,4	111,9	545,5	534,8	558,3	524,9	1137,3	#####	825,0										
46,0	180,0	5,0	0,1	7,3	0,0	378,4	77,6	111,9	546,8	536,1	559,9	526,6	1136,5	#####	826,3										
47,0	181,0	5,0	0,1	7,2	0,0	379,1	77,6	111,7	547,8	537,5	561,3	528,3	1134,9	#####	827,6										
48,0	182,0	4,9	0,1	7,3	0,0	379,7	77,6	112,1	549,1	538,9	562,9	529,9	1135,1	#####	827,0										
49,0	183,0	4,9	0,1	7,3	0,0	379,9	77,5	112,2	550,3	540,0	564,5	531,5	1134,4	#####	827,3										
50,0	184,0	4,8	0,1	7,2	0,0	381,4	77,6	112,7	552,4	541,5	566,2	533,1	1136,5	#####	839,1										
51,0	185,0	4,8	0,1	7,5	0,0	382,3	77,6	113,7	555,0	542,8	568,2	534,8	1136,7	#####	844,3										
52,0	186,0	4,7	0,1	7,6	0,0	383,2	77,7	113,3	557,2	544,0	570,2	536,5	1136,8	#####	845,3										
53,0	187,0	4,6	0,1	7,6	0,0	384,7	77,7	113,7	561,1	545,3	572,3	538,1	1138,7	#####	863,1										
54,0	188,0	4,6	0,1	7,8	0,0	386,9	77,6	113,8	567,0	546,5	574,2	539,8	1142,3	#####	872,3										
55,0	189,0	4,6	0,1	7,8	0,0	388,0	77,7	114,3	571,4	548,4	576,0	541,9	1142,5	#####	871,8										
56,0	190,0	4,5	0,1	7,7	0,0	390,3	77,8	114,5	576,4	550,0	577,8	543,5	1143,2	#####	897,0										
57,0	191,0	4,4	0,3	8,2	0,0	391,9	77,8	114,9	581,4	551,8	579,8	545,3	1144,6	#####	897,8										
58,0	192,0	4,3	0,3	8,1	0,0	393,0	77,8	114,9	584,6	553,6	581,7	547,1	1146,5	#####	887,8										
59,0	193,0	4,3	0,3	7,8	0,0	393,0	77,8	114,5	584,2	555,5	583,9	548,9	1148,2	#####	873,9										
60,0	194,0	4,2	0,2	7,8	0,0	393,5	77,9	114,8	583,9	557,3	586,1	550,8	1151,4	#####	868,4										
61,0	195,0	4,2	0,1	7,7	0,0	393,5	78,0	114,8	582,8	559,1	588,3	552,4	1152,8	#####	863,7										
62,0	196,0	4,2	0,1	7,6	0,0	393,7	78,0	115,5	581,7	560,8	590,8	554,1	1153,9	#####	858,4										
63,0	197,0	4,1	0,1	7,3	0,0	393,5	78,0	115,1	579,5	562,4	592,8	555,8	1152,7	#####	846,4										
64,0	198,0	4,1	0,1	7,0	0,0	393,4	78,1	115,1	576,7	564,2	595,1	557,5	1148,0	#####	837,4										
65,0	199,0	4,0	0,1	6,8	0,0	392,9	78,1	115,2	572,9	565,8	597,2	559,2	1142,8	#####	827,7										
66,0	200,0	4,0	0,1	6,7	0,0	391,5	78,0	115,2	569,9	567,6	598,9	560,8	1136,8	#####	827,2										
67,0	201,0	3,9	0,1	6,8	0,0	391,0	78,4	114,8	567,5	569,5	600,8	562,0	1130,8	#####	823,5										
68,0	202,0	3,9	0,1	6,7	0,0	389,7	78,1	115,0	564,0	571,4	601,8	561,9	1126,4	#####	815,9										
69,0	203,0	3,9	0,1	6,6	0,0	388,8	78,2	115,0	560,6	572,8	603,0	564,1	1122,5	#####	808,3										
70,0	204,0	3,8	0,1	6,3	0,0	387,6	78,2	114,1	556,9	574,3	603,9	564,9	1118,0	#####	800,6										
71,0	205,0	3,7	0,1	6,2	0,0	386,1	78,2	114,5	552,8	575,3	604,7	565,8	1113,6	#####	792,2										
72,0	206,0	3,7	0,1	6,0	0,0	384,6	78,3	114,6	548,6	576,6	605,0	566,4	1108,6	#####	785,7										
73,0	207,0	3,7	0,1	5,9	0,0	383,1	78,4	114,6	544,3	577,4	605,0	567,3	1103,5	#####	777,8										
74,0	208,0	3,6	0,1	5,8	0,0	381,4	78,0	114,6	540,3	578,0	604,7	567,9	1098,0	#####	773,4										
75,0	209,0	3,7	0,1	5,8	0,0	379,9	78,7	114,1	536,2	578,4	604,5	567,9	1091,7	#####	766,7										
76,0	210,0	3,6	0,1	5,7	0,0	378,4	78,2	114,1	532,5	578,6	604,														

119,0	253,0	2,7	0,3	4,0	0,0	309,7	78,3	102,7	399,8	523,5	548,5	517,5	926,2	#####	586,6
120,0	254,0	2,7	0,3	3,9	0,0	308,2	78,1	102,6	397,5	521,6	547,1	516,2	921,8	#####	584,8
121,0	255,0	2,6	0,3	3,9	0,0	307,0	78,3	102,9	395,5	519,5	545,9	515,1	916,9	#####	583,1
122,0	256,0	2,6	0,3	3,9	0,0	305,5	78,3	102,5	393,6	517,8	544,7	513,5	910,9	#####	579,3
123,0	257,0	2,6	0,3	3,9	0,0	304,3	78,2	102,3	391,6	515,8	543,2	512,2	904,0	#####	576,3
124,0	258,0	2,6	0,3	3,8	0,0	303,0	78,3	102,5	389,3	513,8	542,1	511,0	896,8	#####	574,8
125,0	259,0	2,6	0,3	3,9	0,0	301,4	78,3	102,0	387,4	511,8	540,9	509,7	891,1	#####	572,3
126,0	260,0	2,5	0,3	3,9	0,0	300,4	78,3	102,0	385,5	510,3	539,5	508,4	886,3	#####	569,4
127,0	261,0	2,5	0,3	3,8	0,0	299,5	78,3	101,7	384,1	508,5	538,1	507,0	881,5	#####	569,4
128,0	262,0	2,5	0,3	3,9	0,0	298,6	78,3	101,7	382,1	506,6	536,9	505,5	877,6	#####	567,0
129,0	263,0	2,5	0,3	3,8	0,0	296,5	78,2	101,1	379,3	504,6	535,5	504,0	873,7	#####	562,3
130,0	264,0	2,5	0,4	3,5	0,0	294,3	78,3	100,6	376,2	502,8	534,3	502,7	870,3	#####	546,4
131,0	265,0	2,5	0,4	3,5	0,0	292,5	78,3	101,0	373,3	500,9	533,3	501,4	867,0	#####	543,3
132,0	266,0	2,5	0,4	3,6	0,0	291,2	78,2	100,6	371,3	499,2	531,6	499,7	863,8	#####	541,9
133,0	267,0	2,5	0,4	3,5	0,0	290,0	78,5	100,4	368,8	497,2	530,1	498,1	860,1	#####	539,6
134,0	268,0	2,4	0,4	3,5	0,0	288,5	78,3	100,0	366,7	495,3	528,6	496,7	857,9	#####	536,4
135,0	269,0	2,4	0,4	3,5	0,0	287,0	78,1	99,9	364,4	493,4	527,0	495,2	855,4	#####	533,7
136,0	270,0	2,4	0,4	3,5	0,0	285,5	78,3	99,8	362,3	491,7	525,4	493,7	852,1	#####	530,0
137,0	271,0	2,4	0,4	3,4	0,0	283,9	78,3	99,6	360,1	489,8	523,6	491,9	848,6	#####	526,5
138,0	272,0	2,4	0,4	3,4	0,0	282,8	78,1	99,7	357,9	487,9	521,9	490,3	844,3	#####	523,2
139,0	273,0	2,3	0,4	3,4	0,0	281,4	78,2	99,4	355,9	486,2	520,2	488,7	840,2	#####	520,4
140,0	274,0	2,3	0,4	3,3	0,0	280,6	78,0	99,3	354,0	484,3	518,7	487,2	835,7	#####	521,0
141,0	275,0	2,3	0,4	3,3	0,0	279,1	78,1	99,2	352,0	482,6	517,0	485,4	832,7	#####	516,1
142,0	276,0	2,3	0,4	3,3	0,0	278,2	78,3	98,8	349,9	480,8	515,1	483,6	828,6	#####	513,0
143,0	277,0	2,3	0,4	3,3	0,0	276,6	78,2	98,7	347,7	479,1	513,6	482,2	824,2	#####	511,1
144,0	278,0	2,3	0,4	3,4	0,0	276,0	78,0	98,3	346,3	477,3	511,8	480,3	819,7	#####	512,3
145,0	279,0	2,2	0,4	3,4	0,0	274,8	78,1	98,3	344,8	475,6	509,9	478,5	815,0	#####	510,3
146,0	280,0	2,2	0,4	3,4	0,0	273,4	78,1	97,9	343,3	473,9	508,4	477,1	811,4	#####	507,8
147,0	281,0	2,2	0,4	3,3	0,0	272,4	78,1	98,3	341,3	472,2	506,9	475,6	807,9	#####	503,6
148,0	282,0	2,2	0,4	3,3	0,0	271,2	78,1	97,9	339,5	470,9	505,5	474,0	804,2	#####	500,7
149,0	283,0	2,2	0,4	3,3	0,0	270,1	78,1	98,1	337,8	469,2	504,1	472,3	800,9	#####	499,4
150,0	284,0	2,2	0,4	3,3	0,0	268,8	78,5	97,5	336,1	467,7	502,7	470,6	797,2	#####	495,6
151,0	285,0	2,1	0,4	3,2	0,0	267,7	78,1	97,4	334,3	465,9	501,4	469,2	793,2	#####	492,8
152,0	286,0	2,1	0,4	3,2	0,0	266,7	78,3	97,4	332,6	464,6	500,1	467,6	789,3	#####	490,6
153,0	287,0	2,1	0,4	3,2	0,0	265,8	78,2	97,0	330,9	462,5	498,6	466,1	785,3	#####	489,3
154,0	288,0	2,1	0,4	3,2	0,0	265,9	78,1	97,6	331,2	460,7	497,0	464,5	781,8	#####	505,5
155,0	289,0	2,1	0,3	3,4	0,0	265,5	78,0	97,2	331,1	458,8	495,8	462,9	781,6	#####	505,1
156,0	290,0	2,0	0,3	3,4	0,0	265,0	78,0	97,2	330,4	457,2	494,4	461,3	778,8	#####	502,2
157,0	291,0	2,0	0,3	3,3	0,0	264,3	78,2	96,9	329,8	455,7	493,1	459,8	775,7	#####	500,1
158,0	292,0	2,0	0,3	3,3	0,0	263,7	78,2	96,8	328,8	454,0	491,8	458,4	772,4	#####	495,9
159,0	293,0	2,0	0,3	3,2	0,0	262,8	78,0	97,1	327,6	452,4	490,8	457,1	769,1	#####	494,9
160,0	294,0	2,0	0,3	3,3	0,0	262,8	78,2	96,7	327,0	450,9	489,7	455,6	765,5	#####	490,7
161,0	295,0	2,0	0,3	3,3	0,0	262,2	78,2	96,9	326,4	449,3	488,5	454,3	761,9	#####	495,2
162,0	296,0	1,9	0,3	3,3	0,0	261,3	78,4	96,4	325,3	447,6	487,7	452,6	758,3	#####	493,5
163,0	297,0	1,9	0,3	3,2	0,0	260,6	78,2	96,0	324,4	445,9	485,4	451,2	754,7	#####	491,0
164,0	298,0	1,9	0,3	3,2	0,0	260,0	78,2	96,0	323,4	444,4	483,5	449,4	750,8	#####	488,6
165,0	299,0	1,9	0,3	3,2	0,0	259,1	78,3	95,7	322,2	442,5	482,1	448,2	746,8	#####	486,0
166,0	300,0	1,8	0,3	3,2	0,0	258,2	78,4	95,6	320,8	441,2	480,7	446,7	743,0	#####	482,8
167,0	301,0	1,8	0,3	3,1	0,0	257,1	78,1	95,5	319,4	439,6	479,8	445,6	739,5	#####	478,6
168,0	302,0	1,8	0,3	3,1	0,0	256,3	78,0	95,8	318,2	438,2	478,5	444,3	736,1	#####	476,8
169,0	303,0	1,8	0,4	3,1	0,0	255,2	77,9	95,8	316,7	437,0	477,1	443,1	732,9	#####	473,4
170,0	304,0	1,8	0,4	3,1	0,0	254,1	78,0	95,7	315,3	435,5	475,8	441,7	729,8	#####	470,5
171,0	305,0	1,8	0,4	3,1	0,0	253,7	78,3	95,6	314,4	434,2	474,3	440,2	726,7	#####	472,3
172,0	306,0	1,8	0,3	3,0	0,0	252,4	78,0	95,8	312,9	432,7	473,0	439,2	724,3	#####	468,6
173,0	307,0	1,7	0,3	3,0	0,0	251,3	78,1	95,6	311,4	431,4	471,7	437,9	721,7	#####	464,2
174,0	308,0	1,8	0,4	2,9	0,0	250,3	78,2	95,6	309,8	430,1	470,6	436,7	718,9	#####	460,5
175,0	309,0	1,7	0,4	3,0	0,0	249,3	78,4	95,2	308,3	428,8	469,3	435,3	716,1	#####	456,8
176,0	310,0	1,7	0,4	2,9	0,0	248,3	78,3	94,6	306,6	427,5	468,0	433,8	713,1	#####	454,5
177,0	311,0	1,7	0,4	2,9	0,0	247,3	78,4	94,7	305,1	426,3	466,7	432,4	710,2	#####	452,2
178,0	312,0	1,6	0,4	2,9	0,0	246,3	78,0	94,9	303,8	424,9	465,5	431,2	707,2	#####	451,3
179,0	313,0	1,7	0,4	2,9	0,0	245,4	78,3	95,3	302,5	423,5	464,1	430,1	704,7	#####	449,3
180,0	314,0	1,7	0,4	2,9	0,0	244,6	78,1	94,3	301,3	422,3	462,8	428,7	702,3	#####	447,5
181,0	315,0	1,6	0,4	2,9	0,0	243,3	78,3	94,5	299,8	421,3	461,6	427,2	699,9	#####	445,7
182,0	316,0	1,6	0,4	2,8	0,0	242,6	78,2	94,6	298,5	420,0	460,5	425,9	697,5	#####	443,8
183,0	317,0	1,6	0,4	2,8	0,0	241,9	78,3	94,1	297,3	418,7	459,0	424,6	695,1	#####	441,7
184,0	318,0	1,6	0,4	2,8	0,0	241,2	78,3	94,3	295,9	417,4	457,7	423,4	692,5	#####	440,0
185,0	319,0	1,6	0,4	2,8	0,0	240,3	78,1	94,0	294,6	416,3	456,7	421,8	689,9	#####	438,4
186,0	320,0	1,6	0,4	2,7	0,0	239,4	78,2	93,8	293,4	415,0	455,4	420,5	687,4	#####	436,6
187,0	321,0	1,7	0,4	2,8	0,0	238,5	78,3	93,9	292,2	413,8	454,1	419,2	684,4	#####	434,7
188,0	322,0	1,5	0,4	2,8	0,0	237,8	78,3	93,9	290,8	412,5	452,9	418,0	682,0	#####	432,9
189,0	323,0	1,5	0,4	2,7	0,0	236,9	78,3	93,7	289,4	411,2	451,6	416,5	679,1	#####	431,2
190,0	324,0	1,5	0,4	2,7	0,0	236,2	78,1	93,7	288,7	410,1	450,4	415,4	676,0	#####	429,7
191,0	325,0	1,5	0,4	2,7	0,0	235,5	78,3	93,7	287,3	408,8	449,0	414,1	672,9	#####	427,8
192,0	326,0	1,5	0,4	2,7	0,0	234,5	78,3	93,4	286,2	407,6	447,8	413,0	669,8	#####	426,0
193,0	327,0	1,5	0,4	2,7	0,0	233,7	78,2	93,4	285,1	406,4	446,4	411,8	667,0	#####	424,4
194,0	328,0	1,4	0,4	2,7	0,0	232,7	78,2	93,5	283,9	405,1	445,2	410,4	664,2	#####	422,5
195,0	329,0	1,5	0,4	2,7	0,0	232,1	78,4	93,3	282,7	404,2	443,9	409,1	661,3	#####	421,1
196,0	330,0	1,4	0,4	2,7	0,0	231,5	78,5	93,3	281,6	402,8	442,7	407,8	658,2	#####	419,6
197,0	331,0	1,4	0,4	2,7	0,0	230,5	78,3	93,1	280,7	401,8	441,4	406,6	655,1	#####	417,7
198,0	332,0	1,4	0,4	2,6	0,0	229,7	78,2	93,1	279,6	400,7	440,1	405,4	652,1	#####	416,0
199,0	333,0	1,4	0,4	2,6	0,0	229,0	78,0	92,9	278,4	399,7	438,9	404,0	649,3	#####	414,8
200,0	334,0	1,4													

242,0	376,0	0,9	0,3	2,2	0,0	202,3	78,3	90,4	240,9	352,3	387,8	353,7	549,3	#####	359,7
243,0	377,0	0,9	0,3	2,2	0,0	201,6	78,4	90,2	240,0	351,2	386,6	352,6	547,5	#####	359,0
244,0	378,0	0,9	0,3	2,2	0,0	201,1	78,4	90,1	239,2	350,1	385,5	351,3	545,6	#####	357,5
245,0	379,0	0,9	0,3	2,1	0,0	200,6	78,5	90,0	238,6	349,1	384,4	350,3	543,7	#####	356,4
246,0	380,0	0,9	0,3	2,1	0,0	200,0	78,3	90,0	237,8	348,2	383,5	349,4	541,9	#####	355,5
247,0	381,0	0,8	0,3	2,1	0,0	199,4	78,6	90,1	237,2	347,1	382,3	348,2	540,1	#####	354,3
248,0	382,0	0,8	0,3	2,1	0,0	198,7	78,8	90,5	236,5	345,9	381,3	347,1	538,4	#####	353,3
249,0	383,0	0,9	0,3	2,1	0,0	198,4	78,4	90,0	235,8	344,8	380,3	346,2	536,4	#####	352,0
250,0	384,0	0,9	0,3	2,1	0,0	198,0	78,4	89,8	235,1	343,7	379,2	345,2	534,7	#####	351,0
251,0	385,0	0,9	0,3	2,1	0,0	197,4	78,3	89,8	234,4	342,6	378,0	344,0	533,0	#####	349,9
252,0	386,0	0,8	0,3	2,1	0,0	196,9	78,4	89,9	233,7	341,6	377,0	342,9	531,1	#####	348,9
253,0	387,0	0,8	0,3	2,1	0,0	196,3	78,3	90,0	232,9	340,6	376,1	341,9	529,4	#####	347,8
254,0	388,0	0,8	0,3	2,1	0,0	195,8	78,3	90,0	232,3	339,5	375,1	340,9	527,8	#####	346,6
255,0	389,0	0,8	0,3	2,1	0,0	195,3	78,3	90,0	231,5	338,4	374,2	340,0	526,1	#####	345,5
256,0	390,0	0,7	0,3	2,0	0,0	194,8	78,2	89,5	230,8	337,4	373,0	339,0	524,5	#####	344,2
257,0	391,0	0,8	0,3	2,0	0,0	194,1	78,4	89,1	230,0	336,4	372,1	337,9	522,9	#####	343,1
258,0	392,0	0,7	0,3	2,0	0,0	193,6	78,5	89,2	229,4	335,6	371,1	336,8	521,3	#####	341,9
259,0	393,0	0,7	0,3	2,0	0,0	193,1	78,4	89,4	228,7	334,4	369,9	335,8	519,8	#####	340,7
260,0	394,0	0,7	0,3	2,0	0,0	192,5	78,2	89,3	227,9	333,5	368,9	334,9	518,3	#####	339,7
261,0	395,0	0,7	0,3	2,0	0,0	192,0	78,4	89,3	227,1	332,5	367,7	333,6	516,9	#####	338,6
262,0	396,0	0,7	0,3	2,0	0,0	191,5	78,5	89,0	226,5	331,4	366,7	332,5	515,4	#####	337,5
263,0	397,0	0,7	0,3	2,0	0,0	190,9	78,3	89,2	225,9	330,5	365,7	331,6	514,0	#####	336,7
264,0	398,0	0,7	0,3	2,0	0,0	190,3	78,5	89,2	225,4	329,5	365,0	330,8	512,7	#####	335,7
265,0	399,0	0,6	0,3	2,0	0,0	189,7	78,6	89,2	224,7	328,5	364,0	329,8	511,4	#####	334,7
266,0	400,0	0,6	0,3	2,0	0,0	189,0	78,4	89,2	223,9	327,5	363,1	328,7	510,0	#####	333,5
267,0	401,0	0,6	0,3	2,0	0,0	188,6	78,5	88,6	223,4	326,6	362,2	327,9	508,5	#####	332,7
268,0	402,0	0,7	0,3	2,0	0,0	188,0	78,4	88,7	222,8	325,8	361,3	326,9	507,2	#####	331,8
269,0	403,0	0,7	0,3	2,0	0,0	187,5	78,3	89,0	222,2	324,9	360,5	326,1	505,7	#####	330,8
270,0	404,0	0,6	0,3	2,0	0,0	187,1	78,6	88,7	221,6	323,9	359,6	325,1	504,5	#####	330,1
271,0	405,0	0,6	0,3	2,0	0,0	186,6	78,4	88,9	221,1	323,0	358,8	324,1	503,1	#####	329,3
272,0	406,0	0,6	0,3	2,0	0,0	186,2	78,5	88,7	220,4	322,2	358,0	323,2	501,7	#####	328,2
273,0	407,0	0,6	0,3	1,9	0,0	185,6	78,5	88,7	220,0	321,2	357,1	322,3	500,5	#####	327,4
274,0	408,0	0,6	0,3	1,9	0,0	185,1	78,5	88,5	219,2	320,3	356,2	321,3	499,1	#####	326,5
275,0	409,0	0,6	0,3	1,9	0,0	184,7	78,5	88,2	218,6	319,4	355,3	320,3	497,7	#####	325,5
276,0	410,0	0,6	0,3	1,9	0,0	184,0	78,4	88,0	218,2	318,6	354,3	319,2	496,3	#####	324,5
277,0	411,0	0,6	0,3	1,9	0,0	183,4	78,7	88,0	217,7	317,7	353,4	318,3	495,1	#####	323,8
278,0	412,0	0,6	0,3	1,9	0,0	183,0	78,6	87,9	217,1	316,8	352,3	317,1	493,7	#####	322,9
279,0	413,0	0,6	0,3	1,9	0,0	182,6	78,4	87,9	216,6	315,9	351,5	316,2	492,4	#####	322,1
280,0	414,0	0,5	0,3	1,9	0,0	182,2	78,5	87,9	216,1	314,9	350,7	315,3	491,1	#####	321,2
281,0	415,0	0,5	0,3	1,9	0,0	181,6	78,5	87,9	215,5	314,0	349,8	314,3	489,7	#####	320,3
282,0	416,0	0,6	0,3	1,9	0,0	181,0	78,6	88,1	215,0	313,1	349,0	313,5	488,5	#####	319,4
283,0	417,0	0,5	0,3	1,9	0,0	180,5	78,6	87,7	214,4	312,3	347,9	312,4	487,2	#####	318,4
284,0	418,0	0,5	0,3	1,9	0,0	179,9	78,4	87,9	213,8	311,2	347,0	311,6	485,9	#####	317,3
285,0	419,0	0,5	0,3	1,9	0,0	179,3	78,7	88,0	213,0	310,4	346,2	310,7	484,6	#####	316,4
286,0	420,0	0,5	0,3	1,9	0,0	179,0	78,5	87,9	212,4	309,5	345,4	309,9	483,4	#####	315,5
287,0	421,0	0,5	0,3	1,9	0,0	178,7	78,4	87,6	212,0	308,6	344,5	309,0	482,1	#####	314,9
288,0	422,0	0,5	0,3	1,9	0,0	178,1	78,5	87,8	211,5	307,9	343,6	308,1	480,8	#####	313,8
289,0	423,0	0,5	0,3	1,9	0,0	177,5	78,6	87,6	210,8	307,1	342,9	307,2	479,5	#####	313,2
290,0	424,0	0,5	0,3	1,9	0,0	177,0	78,5	87,5	210,3	306,1	341,9	306,2	478,3	#####	312,2
291,0	425,0	0,5	0,3	1,9	0,0	176,5	78,6	87,4	209,7	305,2	341,1	305,2	477,1	#####	311,6
292,0	426,0	0,5	0,3	1,9	0,0	176,1	78,5	87,5	209,2	304,4	340,4	304,3	475,7	#####	310,9
293,0	427,0	0,5	0,3	1,9	0,0	175,7	78,4	87,3	208,7	303,3	339,4	303,3	474,5	#####	310,0
294,0	428,0	0,4	0,3	1,9	0,0	175,4	78,5	87,3	208,1	302,4	338,6	302,4	473,3	#####	309,2
295,0	429,0	0,4	0,3	1,9	0,0	174,8	78,5	87,0	207,7	301,7	337,9	301,5	471,9	#####	308,3
296,0	430,0	0,5	0,3	1,9	0,0	174,2	78,5	87,2	207,1	300,9	337,1	300,5	470,8	#####	307,6
297,0	431,0	0,5	0,3	1,8	0,0	173,7	78,5	87,2	206,6	300,0	336,2	299,9	469,6	#####	306,8
298,0	432,0	0,4	0,3	1,8	0,0	173,5	78,7	87,5	206,1	299,3	335,4	298,9	468,2	#####	306,1
299,0	433,0	0,4	0,3	1,8	0,0	173,1	78,7	87,1	205,5	298,4	334,6	298,1	467,0	#####	305,3
300,0	434,0	0,4	0,3	1,8	0,0	172,7	78,7	86,8	204,9	297,6	333,9	297,3	465,7	#####	304,4
301,0	435,0	0,4	0,3	1,8	0,0	172,3	78,7	86,9	204,5	296,8	333,0	296,4	464,4	#####	303,5
302,0	436,0	0,4	0,3	1,8	0,0	171,8	78,4	86,6	204,0	296,0	332,1	295,3	463,1	#####	302,6
303,0	437,0	0,4	0,3	1,8	0,0	171,2	78,4	86,4	203,6	295,2	331,3	294,4	461,8	#####	302,0
304,0	438,0	0,4	0,3	1,8	0,0	170,6	78,3	86,5	203,2	294,4	330,5	293,5	460,4	#####	301,1
305,0	439,0	0,4	0,3	1,8	0,0	170,3	78,3	86,2	202,7	293,5	329,7	292,7	459,0	#####	300,4
306,0	440,0	0,4	0,3	1,8	0,0	169,8	78,5	86,5	202,2	292,6	329,0	291,9	457,7	#####	299,6
307,0	441,0	0,4	0,3	1,8	0,0	169,3	78,4	86,5	201,7	291,8	328,3	291,2	456,4	#####	298,7
308,0	442,0	0,4	0,3	1,8	0,0	169,0	78,6	86,6	201,2	291,1	327,6	290,4	455,1	#####	297,8
309,0	443,0	0,3	0,3	1,8	0,0	168,5	78,4	86,6	200,8	290,5	327,0	289,7	453,8	#####	297,1
310,0	444,0	0,3	0,3	1,8	0,0	168,1	78,5	86,7	200,3	289,6	326,4	288,9	452,4	#####	296,4
311,0	445,0	0,3	0,3	1,8	0,0	167,8	78,6	86,2	199,9	288,9	325,7	288,2	451,1	#####	295,0
312,0	446,0	0,3	0,3	1,8	0,0	167,5	78,5	86,2	199,4	288,1	325,0	287,3	449,8	#####	294,0
313,0	447,0	0,3	0,3	1,8	0,0	167,1	78,6	86,4	199,0	287,3	324,4	286,4	448,4	#####	294,3
314,0	448,0	0,3	0,3	1,8	0,0	166,5	78,3	86,3	198,5	286,6	323,8	285,8	447,0	#####	293,6
315,0	449,0	0,3	0,3	1,8	0,0	166,1	78,5	86,5	198,1	285,8	323,0	284,9	445,7	#####	293,0
316,0	450,0	0,4	0,3	1,8	0,0	165,8	78,5	86,3	197,6	285,0	322,4	284,1	444,4	#####	292,2
317,0	451,0	0,3	0,3	1,8	0,0	165,3	78,4	86,3	197,2	284,3	321,9	283,3	443,2	#####	291,5
318,0	452,0	0,2	0,3	1,8	0,0	165,0	78,5	86,1	196,7	283,5	321,3	282,5	441,8	#####	290,7
319,0	453,0	0,3	0,3	1,7	0,0	164,6	78,4	86,4	196,3	282,7	320,8	281,9	440,6	#####	289,9
320,0	454,0	0,3	0,3	1,7	0,0	164,1	78,4	86,4	195,8	282,0	320,2	281,2	439,3	#####	289,4
321,0	455,0	0,3	0,3	1,7	0,0	164,0	78,5	86,2	195,5	281,3	319,6	280,4	438,0	#####	288,5
322,0	456,0	0,3	0,3	1,7	0,0	163,6	78,3	86,1	194,9	280,5	319,0	279,5	436,6	#####	287,9
323,0	457,0	0,3	0,3	1,7	0,0										

Manufacturer: podstock Soapstone

Model: Navajo

Date: 09/21/17

Run: 10

Control #: Fruitland

Test Duration: 360

	min	
	HHV	LHV
Eff	61,48%	63,89%
Comb Eff	93,44%	93,44%
HT Eff	65,80%	68,37%
Output	7 479	kJ/h
Burn Rate	0,52	kg/h
Grams CO	401	g
Input	12 165	kJ/h
MC wet	14,00	

Note: In the "Input data", "Calc. % O₂", "Fuel Properties", and "Mass Balance" columns, [e], [d], [g], [a], [b], [c], [h], [u], [w], [j], and [k] refer to their respective variables in Clauses 13.7.3 to 13.7.5.

Ultimate CO₂
CO_{2-ult} 18,78
F₀
1,105

		Air Fuel Ratio (A/F)
Overall Heating Efficiency:	61,48%	Dry Molecular Weight (M _d)
Combustion Efficiency:	93,44%	Dry Moles Exhaust Gas (N _r):
Heat Transfer Efficiency:	65,80%	Air Fuel Ratio (A/F)
Heat Output:	7 095 Btu/h	7 479 kJ/h
Heat Input:	11 540 Btu/h	12 165 kJ/h
Burn Duration:	6,00	h
Burn Rate:	1,16	lb/h 0,525 kg/h
Stack Temp:	265,5 Deg. F	129,7 Deg. C

Date: 2017-09-21 Manufacturer: Woodstock Soapstone Model: NAVAJO
 Project #: PT 20154 Run: 10 Tech: MM Reviewer: DO

kindling and 3 pieces START FIRE
 Dampen open and catalyst close
 air n/w Full open
 DJ 39 LBS close Door and by pass
 DJ 200 LBS n/w 2nd load
 and setting a coal (Coal)
 DJ 10 LBS n/w load
 Degager grille
 close Door and by pass open (Setting Coal)
 DJ 7 min close by pass
 DJ 7:30 close n/w setting L, ~~1~~

TEST LOAD CONFIGURATION

PRE / POST CHECKS

Date: 2017-09-21 Manufacturer: Woodstock Soap Stone Model: NAVAJO
 Project #: PT 20154 Run: 10 Tech: MM Reviewer: [Signature]

Moisture Meter Calibration Check:

Equipment #	Time	12%	22%
EM 191	7:00	OK	OK

Pre-Test Post-Test

Facility Conditions:

Air Velocity from less than 2 feet
 Smoke Capture Check.....
 Picture.....

Pre-Test	Post-Test
4 (max50 Fpm)	8 (max50 Fpm)
OK	OK
4 sides OK	OK

Wood Heater Conditions:

Date Wood Heater Stack Cleaned.....
 Date Dilution Tunnel Cleaned.....
 Induced Draft Check (max 0.005 H2O).....
 Traverse before ignition.....
 Flow Rate 140 cfm ±10%.....

2017-09-05
2017-09-05
OK
OK

OK

Temperature System:

Ambient (65°-90°F).....
 Wood Heater Surface (±125°F).....

OK	°F
OK	°F

Proportional Checks:

Thermocouple check.....
 Pitot Clean.....
 Pitot verification.....

OK
OK
OK

Sampling Train ID Numbers:

Probe.....
 Filter Front.....
 Filter Back.....
 Filter Thermocouple.....
 Filter (<90°F).....

Train 1 st hour	Train 1	Train 2
02	06	10
22	280	622
60	427	2200
11	11	12
OK	OK	OK

SAMPLING EQUIPMENT CHECK OUT

Date: 2017-09-21 Manufacturer: WOOD SLAKE SOAP STONE Model: NAVAJO
 Project #: PI 20154 Run: 10 Tech: MM Reviewer: DO

Leakage Checks Tunnel Samplers

	System 1 st hour		System 1		System 2	
	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)	Pre-Test ASTM (-15) CSA B415 (-5)	Post-Test (Max test)
Unplugged Flow Rate = .25cfm						
Vacuum (inches Hg.)	- 15	- 15	- 15	- 15	- 15	- 15
Final 1minute DGM (Liter)	574655.76	576546.03	574655.81	576546.16	489490.34	491342.13
Initial 1minute DGM (Liter)	574655.76	576546.02	574655.81	576546.08	489490.31	491342.08
Change © (Liter)	∅	0.01	∅	0.02	0.03	0.05
Allowable leakage .04 x Sample rate or 0.28Lpm CSA B415 (0.56)						
Check OK	ok	ok	ok	ok	ok	ok

Leakage Checks Flue Gas Sampler

Plugged Probe	Pre Test	Post Test
Vacuum (inches Hg.)	- 5	- 5
Rotometer Reading (mml/min.)	0	0
Flow Rate (lpm)	1.5	1.5
Allowable (.02 x Sample Rate)	30	30
Check OK	ok	ok

Leakage Checks Pitot

Plugged Probe	Pre Test 3 H ₂ O static	Pre Test 0.4-0.5 H ₂ O velocity	Post Test 3 H ₂ O Static	Post Test 0.4-0.5 H ₂ O velocity
Vacuum (inches Hg.)	3	.4	3	.5
Check OK (no change after 15 sec.)	ok	ok	ok	ok

PRE-TEST SCALE AUDIT

Date: 2017-09-21 Manufacturer: Woodstock Soapstone Model: NANAJO
 Project #: PT 20154 Run: 10 Tech: MM Reviewer: DO

Scale Type	Audit		Measured Weight
	Equipment #	Weight	
Platform	EM 090	4.4 lbs, Class F	4.4 lbs
Wood	EM 090	4.4 lbs, Class F	4.4 lbs
Analytical	EM 124	100 mg, Class S	100 mg
Analytical	EM 124	200 g, Class S	200 g

LIMITS OF WEIGHT RANGES

ANALYTICAL SCALE: 50%-150% of dry filter weight, ± 0.1 mg
PLATFORM SCALE: 20%-80% of ideal test load weight, ± 0.1 lbs or 1%
WOOD SCALE: 20%-80% of ideal test load weight, ± 0.01 lbs or 1%

Date: 2013-09-21 Manufacturer: WOODSTOCK SCAPSTONE Model: MAVAJO
 Project #: PT 20154 Run: 10 Tech: MM Reviewer: DP

FOR TUNNELS < 12 in

Barometric pressure (P_{bar}) 1014 (KPa.) Static pressure (P_q) 0.38 (inches w.c.)
 Inside diameter: Port A _____ Port B _____
 Tunnel cross sectional area: .1963Ft²
 Pitot tube type: Standard

Traverse Point	Position (inches)			Velocity Head Δ_p (inches H ₂ O)	Tunnel Temperature (°F)
	6 po	7 po	8 po		
A- Centroid	3.00	3.50	4	0.058	73.09
B - Centroid	3.00	3.50	4	0.057	73.00
A-1	0.40	0.50	0.50	0.048	73.18
A-2	1.50	1.75	2	0.061	73.35
A-3	4.50	5.25	6	0.047	73.20
A-4	5.60	6.5	7.5	0.046	73.02
B-1	0.40	0.50	0.50	0.047	73.15
B-2	1.50	1.75	2	0.051	73.06
B-3	4.50	5.25	6	0.046	73.04
B-4	5.60	6.5	7.5	0.047	73.09
AVERAGE					

$$v_s = K_p C_p (\sqrt{\Delta p})_{avg} \sqrt{\frac{(T_s)_{avg}}{P_s M_s}}$$

Where,

C_p = pitot tube coefficient, dimension less = 0.99 for standard pitot.

Δ_p = manometer reading (inches H₂O)

T_s = average absolute dilution tunnel temperature (°F + 460)

P_s = absolute dilution tunnel gas pressure or $P_{bar} + P_{qg}$

P_q = static pressure in. H₂O
 { 13.6 }

M_s = 28.56, wet molecular weight of stack gas (alternatively, it may be measured)

K_p = 85.49 pitot tube constant, (conversion factor for English units)

Δ_p avg. = average of the square roots of the velocity heads (Δ_p) measured at each traverse point.

CONTINUOUS ANALYZERS

Date: 6/7/07 Manufacturer: WOODSLOK Soapstone Model: NAVAJO
 Project #: PI 6154 Run: 10 Tech: MM Reviewer: DP

Pre-Test (Adjust and Record)

	ZERO		SPAN		CAL. (Record Only)	
	Actual	Should Be	Actual	Should Be	Actual	Should Be
CO	0	0	2975	300	1005	100
Tolerance CO		+/- 0.02		+/- 0.15		+/- 0.05
CO ₂	0	0	1792	1800	974	1000
Tolerance CO ₂		+/- 0.02		+/- 0.5		+/- 0.5
O ₂ informative CSA B415 calculated value	na	na	na	na	na	na
	Actual	Should Be	Actual	Should Be	Actual	Should Be

Post Test (Record Only)

	Zero	Span	Cal.	Zero Drift	Limit	Span Drift	Limit	Cal. Drift	Limit	OK?	Not OK*
CO	0005	2980	1001	0005	0.02	005	0.15	004	0.05	✓	
CO ₂	0	1790	977	0	0.02	602	0.5	603	0.5	✓	

Date: 2017-09-21 Manufacturer: Woodslock Soapstone^E Model: NAVAJO
 Project #: PJ 20154 Run: 10 Tech: MM Reviewer: JP

RAW DRY GAS METER READINGS

	System 1	System 2	Blank
Final (Liter)	576545, 10	491340, 72	831, 95
Initial (Liter)	574656, 24	489490, 82	790, 75

AMBIENT CONDITIONS

	Before	After
Barometer (kPa):	101.4	101.1
Dry Bulb (F):	72.14	80.06
Humidity (%):	48 10.4 mm	37

Flow Meter

	Start	End
Flow meter reading	N.D	N.D

Flow Meter Verification

	Before	After
Flow meter Check (liters)	N.D	N.D
Scale Weight (Kg)	N.D	N.D

FUEL DATA

Date: 2017.09.21 Manufacturer: Woodstock Soapstone Model: NNAJ0
 Project #: PT 6154 Run: 10 Tech: MM Reviewer: DO

FUEL DESCRIPTION:

Type of wood:

PRE-TEST LOAD

Piece Size	Weight	Meter Moisture Content (% dry)*				
2 x 4 x 5 in.	6688 lbs.	231	233	236	234	234
2 x 4 x 5 in.	0926 lbs.	232	229	231	230	236
2 x 4 x 5 in.	0628 lbs.	231	239	236	239	238
2 x 4 x 5 in.	0666 lbs.	229	226	229	227	228
2 x 4 x 5 in.	0634 lbs.	231	234	236	233	236
2 x 4 x 5 in.	0728 lbs.	228	229	229	226	227
2 x 4 x 5 in.	0636 lbs.	231	231	233	234	230
2 x 4 x 5 in.	0736 lbs.	239	238	238	234	235
2 x 4 x 5 in.	0712 lbs.	229	228	233	236	234
2 x 4 x 5 in.	0730 lbs.	231	236	233	236	234
2 x 4 x 5 in.	0722 lbs.	228	229	226	229	232
2 x 4 x 5 in.	0714 lbs.	221	225	221	223	222
2 x 4 x 5 in.	0762 lbs.	229	226	230	233	234
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					
x x in.	lbs.					

TEST LOAD WEIGHT: 9282 lbs

Date: 2017-09-20 Manufacturer: Woodstock swap store Model: MVAJ0
 Project #: PT 20154 Run: 10 Tech: MM Reviewer: RP

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Pre-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
			02	22	60	1	06	280	427	3	2204
	2017-09-20	17:00	611014	01289	01239	119920	613764	01286	01236	118633	01269
	2017-09-21	9:30	611015	01290	01240	119921	613765	01287	01237	118634	01270

		SYSTEM 1 - 1 st hour					SYSTEM 1				
Post-test Weight Record	Date	Time	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	Blank
			02	23	60	1	06	280	427	3	2204
	2017-09-21	16:45	611023	01404	01234	119957	613771	01393 01393 ^{MM}	01237	118658	01273
	2017-09-25	8:00	611020	01392	01230	119941	613767	01387	01237	118647	01270
	2017-09-26	8:00	611020	01392	01230	119941	613767	01387	01237	118647	01270

Date: 2017-09-20 Project #: PI 20154 Run: 10 Manufacturer: WOODSBOK samplers Model: MVA Djo
 Tech: MR Reviewer: DP

SYSTEM 2					
Pre-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2017-09-20	17:00	946423	01265	01270	117572
2017-09-21	09:00	946424	01266	01271	117572

SYSTEM 2					
Post-test Weight Record	Probe & Housing Number	Front Filter Number	Back Filter Number	gaskets	
Date	Time				
2017-09-21	16:45	946439	01475 01376	01271	117600
2017-09-25	8:00	946431	01464	01270	117589
2017-09-26	8:00	946431	01464	01270	117589

APPENDIX 2: Proportionality results

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,54	98,66	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,121	537,3	537,5			0,173	0,171	0	0,2274043
15,063	537,4	537,6	101,04	99,12	0,174	0,172	1	0,2267333
15,000	537,4	537,6	101,33	99,66	0,174	0,172	2	0,2258366
14,875	537,5	537,7	102,22	100,33	0,174	0,172	3	0,2240453
15,044	537,5	537,7	100,79	99,01	0,174	0,172	4	0,2267338
15,164	537,5	537,8	100,07	98,35	0,174	0,172	5	0,2285173
15,014	537,5	537,8	100,96	99,18	0,174	0,172	6	0,2262857
15,162	537,5	537,8	99,99	98,05	0,174	0,172	7	0,2285175
15,224	537,6	537,9	99,68	97,82	0,174	0,172	8	0,2294039
15,016	537,6	537,9	101,02	99,13	0,174	0,172	9	0,2262857
15,096	537,6	537,9	100,52	98,63	0,174	0,172	10	0,2274043
14,995	537,6	537,9	101,18	99,15	0,174	0,171	11	0,2258371
14,994	537,6	537,9	101,15	99,51	0,174	0,172	12	0,2258375
15,029	537,7	538,0	101,05	99,17	0,174	0,172	13	0,2262857
15,060	537,7	538,0	100,85	98,93	0,174	0,171	14	0,2267341
15,175	537,7	538,0	99,96	97,97	0,174	0,171	15	0,2285183
14,991	537,8	538,1	101,15	99,36	0,174	0,171	16	0,2258376
15,023	537,8	538,1	101,13	99,25	0,174	0,172	17	0,2262858
15,064	537,8	538,1	100,79	98,90	0,174	0,172	18	0,226735
15,212	537,8	538,1	99,80	97,98	0,173	0,171	19	0,2289614
15,037	537,9	538,2	101,16	98,97	0,174	0,171	20	0,2262853
15,074	537,9	538,2	100,78	99,05	0,174	0,171	21	0,2267349
15,225	538,0	538,2	99,84	98,27	0,173	0,172	22	0,2289618
15,193	538,1	538,3	99,97	98,17	0,173	0,172	23	0,2285192
15,150	538,1	538,3	100,46	98,47	0,173	0,171	24	0,2278512
15,072	538,1	538,4	100,72	98,94	0,173	0,171	25	0,2267352
15,015	538,2	538,4	101,25	99,16	0,173	0,171	26	0,2258386
15,119	538,2	538,4	100,37	98,79	0,173	0,171	27	0,2274054
15,147	538,3	538,5	100,19	98,40	0,173	0,171	28	0,2278508
15,125	538,3	538,6	100,57	98,64	0,173	0,171	29	0,2274058
15,047	538,4	538,6	100,93	99,05	0,173	0,171	30	0,2262865
14,947	538,4	538,6	101,61	100,05	0,173	0,171	31	0,2247124
15,023	538,5	538,7	101,28	99,34	0,173	0,171	32	0,2258382
15,129	538,6	538,7	100,43	98,72	0,173	0,171	33	0,2274053
15,071	538,6	538,8	100,75	98,96	0,173	0,171	34	0,2265436
15,059	538,7	538,9	100,96	99,35	0,173	0,171	35	0,2262873
15,081	538,8	538,9	100,61	98,96	0,173	0,171	36	0,2267353
15,093	538,8	538,9	100,92	98,95	0,173	0,171	37	0,2267356
15,172	538,8	539,0	100,49	98,37	0,173	0,171	38	0,2278513
15,096	539,0	539,2	100,83	99,03	0,173	0,171	39	0,2267358
15,103	539,1	539,3	101,00	98,97	0,173	0,171	40	0,2267355
15,116	539,1	539,3	100,91	98,99	0,173	0,171	41	0,2267859
15,044	539,1	539,3	101,24	99,33	0,173	0,171	42	0,2258389
15,043	539,1	539,3	101,16	99,41	0,173	0,171	43	0,225839
15,225	539,1	539,4	100,05	98,17	0,173	0,171	44	0,2285201
15,258	539,2	539,4	99,82	98,15	0,173	0,171	45	0,228963
15,155	539,2	539,4	100,80	98,91	0,173	0,171	46	0,2274056
15,230	539,2	539,4	100,15	98,05	0,173	0,171	47	0,2285267
15,234	539,2	539,5	100,17	98,22	0,173	0,171	48	0,2285194
15,118	539,3	539,5	100,97	99,08	0,173	0,171	49	0,2267362
15,113	539,3	539,5	100,90	99,15	0,173	0,171	50	0,226736
15,116	539,3	539,5	101,14	99,08	0,173	0,171	51	0,2267362
15,191	539,4	539,6	100,55	98,67	0,173	0,171	52	0,227852
15,193	539,3	539,6	100,55	98,85	0,173	0,171	53	0,2278518
15,265	539,4	539,6	99,89	98,08	0,173	0,171	54	0,2289629
15,161	539,4	539,6	100,66	98,71	0,173	0,171	55	0,2274071

15,116	539,4	539,6	100,98	99,18	0,173	0,171	56	0,2267363
15,186	539,5	539,7	100,27	98,73	0,173	0,171	57	0,2278522
14,933	539,5	539,7	102,16	100,16	0,173	0,171	58	0,2240355
15,181	539,5	539,7	100,31	98,26	0,173	0,171	59	0,2278526
15,104	539,4	539,7	100,68	98,82	0,173	0,171	60	0,2267369
15,103	539,5	539,7	100,72	98,66	0,173	0,171	61	0,2267871
15,068	539,5	539,7	101,01	99,09	0,173	0,171	62	0,2262878
15,088	539,4	539,7	100,76	98,83	0,173	0,171	63	0,2267366
15,157	539,4	539,7	100,06	98,26	0,173	0,171	64	0,2278525
15,120	539,4	539,7	100,29	98,33	0,173	0,171	65	0,2274073
15,004	539,4	539,7	101,11	98,92	0,173	0,171	66	0,2258392
15,251	539,3	539,7	99,58	97,49	0,173	0,171	67	0,2294068
15,065	539,3	539,7	100,50	98,80	0,173	0,171	68	0,2267467
15,183	539,4	539,7	99,87	97,84	0,173	0,171	69	0,2285195
15,007	539,4	539,7	100,92	99,05	0,173	0,171	70	0,2258395
15,107	539,4	539,7	100,32	98,22	0,173	0,171	71	0,2274068
15,057	539,4	539,7	100,41	98,44	0,173	0,171	72	0,226736
15,091	539,4	539,7	100,10	98,22	0,173	0,171	73	0,227407
15,096	539,4	539,7	99,97	98,29	0,173	0,171	74	0,2274072
15,092	539,4	539,7	100,01	97,95	0,173	0,171	75	0,2274248
15,017	539,4	539,7	100,56	98,62	0,173	0,171	76	0,2262871
15,117	539,5	539,8	99,82	97,88	0,173	0,171	77	0,2278515
15,062	539,4	539,8	99,92	98,20	0,173	0,171	78	0,2272099
15,072	539,4	539,8	99,69	97,92	0,173	0,171	79	0,2274069
15,183	539,4	539,8	99,37	97,23	0,173	0,170	80	0,2289628
15,075	539,4	539,8	99,77	97,85	0,173	0,170	81	0,2274066
15,174	539,4	539,7	99,35	97,34	0,173	0,171	82	0,2289633
14,967	539,4	539,8	100,61	98,65	0,173	0,171	83	0,2258397
14,964	539,5	539,8	100,52	98,58	0,173	0,171	84	0,2258362
15,093	539,4	539,8	99,54	97,90	0,173	0,171	85	0,2278526
15,138	539,4	539,8	99,37	97,59	0,173	0,171	86	0,22852
15,120	539,5	539,8	99,31	97,48	0,173	0,171	87	0,2285197

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	101,50	100,01	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,326	535,7	536,2			0,173	0,171	0	0,230501
15,052	536,0	536,3	102,97	101,30	0,173	0,171	1	0,2320382
15,231	536,1	536,4	101,09	99,48	0,173	0,171	2	0,2357268
15,018	536,1	536,4	102,03	100,85	0,173	0,171	3	0,2326934
15,010	536,1	536,5	102,02	100,49	0,173	0,171	4	0,2326935
15,106	536,2	536,5	101,33	99,83	0,173	0,171	5	0,2342152
15,002	536,2	536,5	102,16	100,63	0,173	0,171	6	0,2326942
15,002	536,2	536,5	101,97	100,68	0,173	0,171	7	0,2326936
15,030	536,3	536,6	101,87	100,32	0,173	0,171	8	0,2331291
15,027	536,3	536,6	101,81	100,61	0,173	0,171	9	0,233129
15,164	536,3	536,6	100,73	99,31	0,173	0,171	10	0,235297
15,093	536,4	536,7	101,28	99,77	0,173	0,171	11	0,2342154
14,954	536,4	536,7	102,20	100,84	0,173	0,171	12	0,232039
15,018	536,4	536,7	101,75	100,14	0,173	0,171	13	0,2331294
15,155	536,4	536,8	100,87	99,48	0,173	0,171	14	0,2352618
14,951	536,4	536,8	102,25	100,74	0,173	0,171	15	0,2320403
15,025	536,4	536,8	101,73	100,27	0,173	0,171	16	0,2331297
15,099	536,5	536,9	101,39	99,78	0,173	0,171	17	0,2342225
15,081	536,5	536,9	101,51	100,02	0,173	0,171	18	0,2339496
14,984	536,6	536,9	102,11	100,79	0,173	0,171	19	0,2324632
15,196	536,6	537,0	100,62	98,97	0,173	0,171	20	0,2357278
15,002	536,6	537,0	102,07	100,57	0,173	0,171	21	0,2326949
14,958	536,7	537,1	102,35	100,61	0,173	0,171	22	0,2320398
15,095	536,7	537,1	101,31	99,73	0,173	0,171	23	0,2342166
15,066	536,7	537,1	101,41	99,92	0,173	0,171	24	0,2337837
15,022	536,8	537,2	101,71	100,09	0,173	0,171	25	0,2331305
14,992	536,8	537,2	101,86	100,24	0,173	0,171	26	0,2326952
15,030	536,9	537,2	101,77	100,42	0,173	0,171	27	0,2331306
15,244	536,9	537,3	100,48	98,92	0,173	0,171	28	0,2363742
14,956	536,9	537,3	102,25	100,67	0,173	0,171	29	0,2320398
15,029	537,0	537,4	101,75	100,18	0,173	0,171	30	0,2331305
15,033	537,0	537,4	101,84	100,25	0,173	0,171	31	0,2331311
15,178	537,1	537,4	100,90	99,40	0,173	0,171	32	0,235299
15,011	537,1	537,5	102,05	100,37	0,173	0,171	33	0,2326953
15,076	537,2	537,5	101,44	100,01	0,173	0,171	34	0,233784
15,013	537,2	537,6	102,11	100,59	0,173	0,171	35	0,2326956
15,044	537,3	537,6	101,81	100,37	0,173	0,171	36	0,2331315
15,177	537,3	537,7	100,93	99,26	0,173	0,171	37	0,2352986
15,180	537,3	537,7	100,89	99,34	0,173	0,171	38	0,2352985
15,090	537,4	537,8	101,51	100,01	0,173	0,171	39	0,2337835
15,054	537,5	537,8	101,95	100,39	0,173	0,171	40	0,2331313
14,931	537,6	537,9	102,80	101,04	0,173	0,171	41	0,2311644
15,057	537,6	538,0	101,88	100,38	0,173	0,171	42	0,2331313
14,994	537,6	538,0	102,39	100,90	0,173	0,171	43	0,232041
15,063	537,7	538,1	101,80	100,31	0,173	0,171	44	0,2331317
15,037	537,7	538,1	101,93	100,30	0,173	0,170	45	0,2326966
15,071	537,8	538,1	101,88	100,45	0,173	0,170	46	0,233132
14,995	537,8	538,1	102,52	100,81	0,173	0,171	47	0,2320412
15,043	537,9	538,2	102,07	100,61	0,173	0,171	48	0,2326971
14,950	537,9	538,3	102,71	101,50	0,173	0,171	49	0,2311649
15,124	538,0	538,3	101,69	100,18	0,173	0,171	50	0,2337845
15,013	538,0	538,4	102,26	100,71	0,173	0,170	51	0,232023
15,086	538,1	538,4	101,72	100,45	0,172	0,170	52	0,2331315
15,017	538,1	538,5	102,40	100,68	0,172	0,170	53	0,2320409
15,064	538,2	538,5	102,01	100,64	0,173	0,170	54	0,2326968
15,019	538,2	538,5	102,28	100,88	0,172	0,170	55	0,2320418

15,026	538,3	538,6	102,38	101,07	0,172	0,170	56	0,2320413
15,147	538,4	538,7	101,54	100,27	0,172	0,171	57	0,2337998
15,095	538,4	538,7	101,80	100,38	0,172	0,170	58	0,2331324
15,067	538,4	538,7	102,20	100,62	0,173	0,170	59	0,2326966
15,068	538,5	538,8	102,12	100,59	0,173	0,170	60	0,232697
15,071	538,5	538,8	102,02	100,72	0,172	0,170	61	0,2326967
15,076	538,5	538,9	101,95	100,69	0,172	0,170	62	0,2326972
15,075	538,6	538,9	102,17	100,62	0,172	0,170	63	0,2326971
15,081	538,7	539,0	102,18	100,66	0,173	0,170	64	0,2326967
15,105	538,7	539,0	101,85	100,46	0,172	0,170	65	0,2331326
15,042	538,8	539,1	102,23	100,63	0,172	0,170	66	0,2322364
15,176	538,8	539,1	101,40	99,94	0,172	0,170	67	0,2342183
15,078	538,9	539,1	102,10	100,52	0,172	0,170	68	0,2326893
15,077	538,9	539,2	102,11	100,50	0,172	0,170	69	0,2326965
15,070	538,9	539,2	101,97	100,71	0,172	0,170	70	0,2326978
15,170	539,0	539,3	101,39	99,97	0,172	0,170	71	0,2342181
15,141	539,0	539,4	101,60	100,04	0,172	0,170	72	0,2337855
15,069	539,1	539,4	102,09	100,47	0,172	0,170	73	0,2326976
15,024	539,1	539,4	102,34	100,61	0,172	0,170	74	0,2320426
15,065	539,2	539,5	102,08	100,67	0,172	0,170	75	0,2326976
15,125	539,2	539,5	101,48	100,10	0,172	0,170	76	0,2337855
15,256	539,2	539,5	100,69	99,24	0,172	0,170	77	0,2357311
15,051	539,2	539,5	101,82	100,52	0,172	0,170	78	0,2326987
15,008	539,2	539,6	102,20	100,66	0,172	0,170	79	0,232043
15,080	539,2	539,6	101,79	100,37	0,173	0,170	80	0,2332367
15,115	539,2	539,6	101,59	100,19	0,173	0,171	81	0,2337853
15,114	539,2	539,6	101,40	100,00	0,173	0,171	82	0,2337863
15,040	539,2	539,6	101,87	100,57	0,172	0,170	83	0,2326985
15,204	539,2	539,6	100,73	99,29	0,172	0,170	84	0,2353007
15,039	539,2	539,6	101,82	100,34	0,172	0,170	85	0,2326984
15,082	539,2	539,6	101,34	99,84	0,172	0,170	86	0,2335034
14,990	539,2	539,6	102,19	100,68	0,172	0,170	87	0,232043
15,100	539,2	539,7	101,37	99,90	0,173	0,170	88	0,2337865
15,194	539,2	539,7	100,63	99,37	0,172	0,170	89	0,2353015
15,025	539,3	539,7	101,93	100,20	0,173	0,170	90	0,2326984
15,116	539,2	539,7	101,19	99,68	0,173	0,170	91	0,2342199
15,115	539,2	539,7	101,22	99,60	0,173	0,170	92	0,2342199
15,062	539,2	539,7	101,53	99,98	0,173	0,170	93	0,233429
15,042	539,3	539,7	101,71	100,24	0,173	0,171	94	0,2331341
15,009	539,3	539,7	101,60	100,13	0,173	0,170	95	0,232699
15,078	539,3	539,7	101,18	99,71	0,172	0,170	96	0,2337866
15,077	539,3	539,7	101,18	99,73	0,172	0,170	97	0,2337864
15,169	539,3	539,7	100,39	98,93	0,172	0,170	98	0,2353012
15,070	539,3	539,7	101,24	99,71	0,172	0,170	99	0,2337864
15,068	539,3	539,7	101,18	99,70	0,173	0,170	100	0,233786
15,189	539,3	539,7	100,21	98,66	0,172	0,170	101	0,2357319
15,095	539,3	539,8	100,73	99,44	0,172	0,170	102	0,2342199
14,949	539,4	539,8	101,77	100,19	0,172	0,170	103	0,2320517
15,152	539,3	539,8	100,15	98,96	0,172	0,170	104	0,2353013
15,058	539,3	539,8	100,92	99,38	0,172	0,170	105	0,233787
15,081	539,4	539,8	100,88	99,36	0,172	0,170	106	0,2342207
15,014	539,4	539,9	101,26	99,65	0,172	0,170	107	0,2331343
14,950	539,4	539,8	101,66	100,11	0,172	0,170	108	0,23227
15,048	539,4	539,8	100,93	99,38	0,172	0,170	109	0,2337881
15,072	539,4	539,9	100,68	99,22	0,172	0,170	110	0,2341791
15,048	539,4	539,9	101,00	99,51	0,172	0,170	111	0,2337863
14,976	539,4	539,9	101,48	99,95	0,173	0,170	112	0,2326993
14,935	539,4	539,9	101,72	100,31	0,172	0,170	113	0,2320442
15,001	539,4	539,9	101,34	99,92	0,173	0,170	114	0,2331348
15,139	539,5	540,0	100,40	99,06	0,173	0,171	115	0,2353024
15,038	539,5	540,0	100,98	99,63	0,173	0,171	116	0,2337876

14,991	539,5	540,0	101,34	99,82	0,173	0,170	117	0,2330771
14,994	539,5	540,0	101,23	99,68	0,173	0,170	118	0,2331342
15,063	539,4	539,9	100,66	99,12	0,172	0,170	119	0,2342211
15,035	539,4	539,9	100,93	99,46	0,172	0,170	120	0,2337873
15,136	539,4	540,0	100,18	98,88	0,172	0,170	121	0,2353021
14,990	539,5	540,0	101,13	99,41	0,172	0,170	122	0,2331349
15,130	539,5	540,0	100,16	98,88	0,172	0,170	123	0,2353016
15,054	539,5	540,0	100,73	98,99	0,172	0,170	124	0,2342212
15,029	539,5	540,0	100,75	99,09	0,172	0,170	125	0,2337871
15,265	539,5	540,0	99,23	97,91	0,172	0,170	126	0,2374484
15,145	539,5	540,0	99,83	98,44	0,172	0,170	127	0,2357325
14,954	539,5	540,0	101,34	100,06	0,172	0,170	128	0,2326999
15,022	539,5	540,0	100,86	99,40	0,173	0,171	129	0,2337875
15,024	539,5	540,0	100,80	99,27	0,172	0,170	130	0,2337876
15,056	539,6	540,1	100,66	99,19	0,172	0,170	131	0,2342204
15,121	539,6	540,1	100,11	98,64	0,172	0,170	132	0,2353019
15,050	539,6	540,1	100,48	99,22	0,172	0,170	133	0,2342204
15,014	539,6	540,1	100,83	99,27	0,172	0,170	134	0,233606

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	101,70	99,40	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,838	536,5	536,9			0,172	0,170	0	0,24147
15,822	536,6	536,9	102,19	99,81	0,172	0,170	1	0,2439087
15,676	536,6	536,9	103,03	100,83	0,172	0,170	2	0,2418899
15,727	536,6	537,0	102,44	100,27	0,172	0,170	3	0,2429366
15,725	536,6	537,0	102,53	99,97	0,172	0,170	4	0,242947
15,867	536,6	536,9	102,10	99,93	0,172	0,170	5	0,2443809
15,718	536,6	536,9	102,32	100,13	0,172	0,170	6	0,2429371
15,713	536,6	537,0	102,44	100,10	0,172	0,170	7	0,2429372
15,602	536,6	537,0	103,12	100,60	0,172	0,170	8	0,2414701
15,765	536,6	537,0	101,92	99,44	0,172	0,170	9	0,2439798
15,623	536,6	537,0	102,76	100,52	0,172	0,170	10	0,24189
15,827	536,6	537,0	101,34	98,83	0,172	0,170	11	0,2450172
15,789	536,6	537,0	101,77	99,32	0,172	0,169	12	0,2443947
15,621	536,6	537,0	102,55	100,30	0,172	0,170	13	0,2418898
15,779	536,6	536,9	101,51	99,19	0,172	0,170	14	0,2443987
15,819	536,6	537,0	101,33	98,90	0,172	0,170	15	0,2450178
15,684	536,6	536,9	102,06	99,88	0,172	0,170	16	0,2429372
15,765	536,6	536,9	101,35	99,43	0,172	0,170	17	0,2443947
15,563	536,5	536,9	102,62	100,29	0,172	0,170	18	0,2414709
15,766	536,5	536,9	101,55	99,27	0,172	0,170	19	0,2443947
15,829	536,5	536,9	100,98	98,71	0,172	0,170	20	0,2454319
15,754	536,5	536,9	101,47	99,35	0,172	0,170	21	0,2443304
15,756	536,5	536,9	101,34	99,23	0,172	0,170	22	0,2443952
15,525	536,5	536,9	103,02	100,67	0,172	0,170	23	0,2408392
15,803	536,5	536,9	101,26	98,95	0,172	0,170	24	0,245022
15,852	536,5	536,9	100,92	98,65	0,172	0,170	25	0,245845
15,666	536,5	536,8	101,79	99,47	0,172	0,170	26	0,2431934
15,817	536,5	536,8	101,03	98,76	0,172	0,170	27	0,2454326
15,742	536,5	536,8	101,37	98,95	0,172	0,170	28	0,2443955
15,803	536,5	536,8	100,80	98,64	0,172	0,170	29	0,2454321
15,735	536,5	536,8	101,17	98,91	0,172	0,170	30	0,2443952
15,747	536,5	536,8	101,53	99,08	0,172	0,170	31	0,2443962
15,655	536,5	536,9	102,04	99,63	0,172	0,170	32	0,242938
15,808	536,6	536,9	100,83	98,53	0,172	0,170	33	0,2454322
15,636	536,6	536,9	102,17	99,89	0,172	0,170	34	0,2426941
15,654	536,6	536,9	102,04	99,68	0,172	0,170	35	0,2429372
15,755	536,6	536,9	101,36	98,95	0,172	0,170	36	0,2443954
15,759	536,6	536,9	101,46	98,98	0,172	0,169	37	0,2443952
15,796	536,6	537,0	101,29	98,88	0,172	0,170	38	0,2450173
15,759	536,7	537,0	101,34	99,06	0,172	0,170	39	0,2443954
15,762	536,7	537,0	101,43	98,96	0,172	0,169	40	0,2443953
15,740	536,7	537,0	101,59	99,43	0,172	0,170	41	0,2439802
15,860	536,7	537,0	100,85	98,53	0,172	0,170	42	0,2458502
15,603	536,7	537,0	102,42	100,13	0,172	0,170	43	0,2418898
15,829	536,8	537,0	101,03	98,99	0,172	0,170	44	0,2454198
15,746	536,8	537,0	101,72	99,32	0,172	0,170	45	0,2439805
15,832	536,8	537,0	101,11	98,79	0,172	0,170	46	0,2453057
15,831	536,8	537,1	100,97	98,72	0,172	0,170	47	0,2454328
15,841	536,8	537,1	101,01	98,76	0,172	0,170	48	0,2454329
15,928	536,8	537,1	100,42	97,97	0,172	0,169	49	0,2468756
15,801	536,8	537,1	101,08	98,77	0,172	0,169	50	0,2450183
15,857	536,7	537,1	100,82	98,41	0,172	0,169	51	0,245845
15,860	536,7	537,0	100,76	98,56	0,172	0,169	52	0,2458452
15,843	536,7	537,0	101,09	98,78	0,172	0,170	53	0,2454282
15,868	536,7	537,0	100,90	98,63	0,172	0,170	54	0,2458453
15,847	536,7	537,0	101,11	98,81	0,172	0,170	55	0,2454326

15,784	536,8	537,0	101,51	99,22	0,172	0,170	56	0,2443961
15,687	536,8	537,1	102,15	99,64	0,172	0,169	57	0,2429381
15,585	536,8	537,0	102,70	100,53	0,172	0,170	58	0,2414708
15,852	536,8	537,1	101,22	98,80	0,172	0,170	59	0,2454325
15,765	536,8	537,1	101,48	99,18	0,172	0,170	60	0,2443962
15,819	536,8	537,1	101,22	99,00	0,172	0,170	61	0,2450183
15,687	536,9	537,1	101,99	99,65	0,172	0,169	62	0,2429381
15,855	536,9	537,1	101,18	98,95	0,172	0,170	63	0,245433
15,881	536,9	537,2	101,13	98,69	0,172	0,170	64	0,2457402
15,776	536,9	537,2	101,48	99,17	0,172	0,170	65	0,2443961
15,830	537,0	537,2	101,17	98,91	0,172	0,169	66	0,2450178
15,764	536,9	537,2	101,78	99,38	0,172	0,169	67	0,2439803
15,700	537,0	537,2	102,12	99,89	0,172	0,170	68	0,2429379
15,702	537,0	537,2	102,16	99,84	0,172	0,170	69	0,2429386
15,868	537,0	537,2	101,27	98,88	0,172	0,169	70	0,2454326
15,781	537,0	537,2	101,96	99,48	0,172	0,169	71	0,2439938
15,894	537,0	537,3	101,00	98,49	0,172	0,169	72	0,2458452
15,705	537,0	537,3	102,19	99,83	0,172	0,169	73	0,2429379
15,615	537,0	537,3	102,82	100,73	0,172	0,170	74	0,2414709
15,809	537,1	537,3	101,79	99,36	0,172	0,170	75	0,2443959
15,839	537,1	537,3	101,42	98,91	0,172	0,169	76	0,245018
15,699	537,1	537,3	102,17	99,83	0,172	0,169	77	0,2429387
15,851	537,1	537,4	101,58	99,11	0,172	0,169	78	0,2450179
15,790	537,1	537,4	101,94	99,61	0,172	0,170	79	0,2439802
15,805	537,1	537,4	102,03	99,70	0,172	0,170	80	0,2439802
15,819	537,1	537,4	102,13	99,79	0,172	0,170	81	0,2439802
15,819	537,1	537,4	102,13	99,79	0,172	0,170	82	0,2439802
15,819	537,1	537,4	102,13	99,79	0,172	0,170	83	0,2439802
15,819	537,1	537,4	102,13	99,79	0,172	0,170	84	0,2439802
15,675	537,3	537,5	102,91	100,69	0,172	0,170	85	0,2418913
15,902	537,3	537,5	101,38	99,03	0,172	0,170	86	0,2454089
15,743	537,3	537,5	102,34	100,12	0,172	0,169	87	0,2429382
15,843	537,3	537,5	101,91	99,50	0,172	0,169	88	0,2443957
15,833	537,3	537,5	101,82	99,39	0,172	0,169	89	0,244396
15,871	537,3	537,6	101,40	99,17	0,172	0,169	90	0,2450183
15,909	537,3	537,6	101,44	99,03	0,172	0,169	91	0,2454325
15,660	537,3	537,6	103,06	100,92	0,172	0,169	92	0,2414715
15,891	537,4	537,6	101,53	99,34	0,171	0,170	93	0,2450181
16,013	537,4	537,7	100,77	98,72	0,171	0,170	94	0,2468747
15,925	537,4	537,7	101,42	99,14	0,171	0,170	95	0,2454328
15,920	537,4	537,7	101,30	99,19	0,171	0,169	96	0,2454323
15,931	537,4	537,7	101,49	99,20	0,171	0,169	97	0,2454331
15,864	537,5	537,7	101,89	99,64	0,171	0,169	98	0,2443962
15,771	537,5	537,8	102,47	100,41	0,171	0,170	99	0,2429383
15,942	537,5	537,8	101,51	99,40	0,171	0,170	100	0,2454326
15,873	537,6	537,8	101,89	99,72	0,171	0,170	101	0,2443955
15,946	537,6	537,8	101,52	99,13	0,171	0,169	102	0,2454331
15,715	537,6	537,8	103,00	100,74	0,171	0,169	103	0,2418908
15,853	537,6	537,9	102,26	99,77	0,172	0,169	104	0,2439808
15,923	537,6	537,9	101,83	99,32	0,172	0,169	105	0,2450179
15,979	537,7	537,9	101,45	99,03	0,172	0,169	106	0,2458455
15,654	537,7	537,9	103,32	101,29	0,171	0,169	107	0,2408408
15,926	537,7	538,0	101,71	99,41	0,171	0,169	108	0,2450181
15,728	537,8	538,0	103,07	101,01	0,171	0,169	109	0,2418946
15,893	537,8	538,0	102,01	99,81	0,171	0,170	110	0,2443959
15,933	537,8	538,0	101,93	99,49	0,171	0,169	111	0,2449971
16,054	537,8	538,1	101,09	98,76	0,172	0,169	112	0,2468759
15,938	537,9	538,1	101,75	99,55	0,171	0,169	113	0,2450182
15,872	537,9	538,1	102,23	100,03	0,171	0,169	114	0,243976
15,904	537,9	538,1	102,10	99,94	0,171	0,169	115	0,2443963
15,877	537,9	538,1	102,39	99,93	0,171	0,169	116	0,2439805

15,814	537,9	538,1	102,67	100,33	0,171	0,169	117	0,2429395
15,950	537,9	538,2	101,94	99,46	0,171	0,169	118	0,2450183
15,682	538,0	538,2	103,58	101,28	0,171	0,169	119	0,2408394
15,911	538,0	538,2	102,10	99,89	0,171	0,169	120	0,2443966
15,816	538,0	538,2	102,77	100,51	0,171	0,169	121	0,2429389
15,975	538,1	538,2	101,54	99,51	0,171	0,169	122	0,2454332
15,980	538,1	538,3	101,77	99,45	0,171	0,169	123	0,2454333
15,818	538,1	538,3	102,90	100,43	0,172	0,169	124	0,2429386
15,912	538,1	538,3	102,18	99,87	0,172	0,169	125	0,2443964
15,978	538,1	538,3	101,73	99,37	0,171	0,169	126	0,2454331
15,981	538,1	538,3	101,72	99,41	0,171	0,169	127	0,2454337
15,987	538,1	538,4	101,62	99,19	0,171	0,169	128	0,2455771
15,979	538,1	538,4	101,63	99,30	0,171	0,169	129	0,2454335
15,978	538,1	538,4	101,66	99,42	0,171	0,169	130	0,2454332
15,952	538,2	538,4	101,68	99,59	0,171	0,169	131	0,2450186
15,979	538,2	538,4	101,74	99,31	0,171	0,169	132	0,2454331
15,882	538,2	538,4	102,16	99,88	0,171	0,169	133	0,2439809
15,998	538,2	538,4	101,31	99,04	0,171	0,169	134	0,2458462
15,881	538,2	538,4	102,12	99,83	0,171	0,169	135	0,2439812
15,974	538,2	538,4	101,62	99,32	0,171	0,169	136	0,2454333
15,812	538,2	538,4	102,58	100,44	0,171	0,169	137	0,2429396
16,001	538,2	538,5	101,38	99,11	0,171	0,169	138	0,2458701
15,971	538,2	538,5	101,57	99,41	0,171	0,169	139	0,2454339
15,973	538,2	538,5	101,59	99,50	0,171	0,169	140	0,2454337
15,877	538,2	538,5	102,23	99,88	0,171	0,169	141	0,2439813
16,038	538,2	538,5	101,10	98,65	0,171	0,169	142	0,2464655
15,806	538,2	538,5	102,59	100,13	0,171	0,169	143	0,2429396
15,995	538,2	538,5	101,26	98,93	0,171	0,169	144	0,2458461
15,712	538,2	538,5	103,01	100,70	0,171	0,169	145	0,2416172
15,865	538,2	538,5	102,10	99,67	0,171	0,169	146	0,2439813
15,937	538,2	538,5	101,61	99,47	0,171	0,169	147	0,2450195
15,894	538,3	538,5	101,82	99,63	0,171	0,169	148	0,2443969
15,888	538,3	538,5	101,93	99,59	0,171	0,169	149	0,2443971
16,044	538,3	538,5	100,92	98,74	0,171	0,169	150	0,2467766
15,925	538,3	538,5	101,47	99,26	0,171	0,169	151	0,2450173
15,978	538,2	538,5	101,24	98,90	0,171	0,169	152	0,2458517
15,847	538,2	538,5	101,94	99,63	0,171	0,169	153	0,243982
15,959	538,2	538,5	101,16	98,85	0,171	0,169	154	0,2458468
15,922	538,1	538,5	101,33	99,10	0,171	0,169	155	0,2454388
15,842	538,1	538,4	101,89	99,65	0,171	0,169	156	0,2439823
15,954	538,1	538,5	101,15	99,06	0,171	0,169	157	0,245847
15,923	538,1	538,4	101,22	99,11	0,171	0,169	158	0,2454339
15,766	538,1	538,4	102,33	99,97	0,171	0,169	159	0,2429395
15,925	538,1	538,5	101,36	99,29	0,171	0,169	160	0,245393
16,059	538,1	538,5	100,50	98,21	0,171	0,169	161	0,2474931
15,817	538,1	538,5	101,65	99,63	0,171	0,169	162	0,2439823
15,896	538,1	538,5	101,53	99,13	0,171	0,169	163	0,2450196
15,850	538,1	538,5	101,77	99,31	0,171	0,169	164	0,244397
15,853	538,1	538,5	101,80	99,40	0,171	0,169	165	0,2443971
15,853	538,1	538,5	101,77	99,30	0,171	0,169	166	0,2443976
15,946	538,1	538,5	101,10	98,75	0,171	0,169	167	0,245847
15,846	538,1	538,5	101,58	99,23	0,171	0,169	168	0,2443975
15,934	538,1	538,5	101,04	98,76	0,171	0,169	169	0,2458468
15,976	538,1	538,5	100,94	98,37	0,171	0,169	170	0,2464659
15,816	538,2	538,5	101,86	99,76	0,171	0,169	171	0,2439815
15,812	538,1	538,5	101,64	99,65	0,171	0,169	172	0,2439815
15,807	538,1	538,5	101,73	99,47	0,171	0,169	173	0,243982
15,904	538,2	538,5	101,13	98,92	0,171	0,169	174	0,2454337
15,887	538,2	538,5	101,09	98,64	0,171	0,169	175	0,2454273
15,896	538,2	538,5	101,11	98,79	0,171	0,169	176	0,2454341
15,874	538,1	538,5	101,32	98,96	0,171	0,169	177	0,2450198

15,738	538,1	538,5	102,12	99,89	0,171	0,169	178	0,2429401
15,900	538,2	538,5	101,15	98,82	0,171	0,169	179	0,2454342
15,897	538,2	538,5	101,06	98,74	0,171	0,169	180	0,245434
15,900	538,2	538,5	101,06	98,87	0,171	0,169	181	0,2454341
15,967	538,2	538,6	100,71	98,57	0,171	0,169	182	0,2464662
15,884	538,2	538,5	100,98	98,87	0,171	0,169	183	0,2454343
15,884	538,2	538,5	101,03	98,66	0,171	0,169	184	0,2454339
15,969	538,2	538,5	100,39	98,12	0,171	0,169	185	0,2468781
15,809	538,2	538,5	101,48	99,29	0,171	0,169	186	0,2443979
15,885	538,2	538,6	100,96	98,82	0,171	0,169	187	0,2454346
15,856	538,3	538,6	101,37	98,79	0,171	0,169	188	0,24502

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,21	98,05	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
16,282	536,1	536,5			0,175	0,173	0	0,2454253
16,095	536,2	536,5	101,66	99,28	0,175	0,173	1	0,2443888
16,057	536,2	536,5	101,63	99,47	0,175	0,173	2	0,2439512
16,003	536,2	536,6	101,69	99,50	0,175	0,173	3	0,243348
16,051	536,3	536,6	101,39	99,02	0,175	0,173	4	0,2443888
16,238	536,3	536,6	99,56	97,16	0,175	0,173	5	0,2478954
15,985	536,4	536,7	100,96	98,53	0,175	0,173	6	0,2443896
16,114	536,4	536,7	99,94	97,73	0,175	0,173	7	0,2464577
16,120	536,4	536,7	99,93	97,84	0,175	0,173	8	0,2464581
15,950	536,4	536,7	100,90	98,86	0,175	0,173	9	0,2439735
16,106	536,4	536,7	100,00	97,83	0,175	0,173	10	0,2464577
16,103	536,4	536,7	99,87	97,94	0,175	0,173	11	0,2464581
16,103	536,4	536,8	99,86	97,72	0,175	0,173	12	0,246458
16,111	536,5	536,8	100,16	97,89	0,175	0,173	13	0,2464583
16,190	536,5	536,8	99,48	97,34	0,176	0,173	14	0,247771
16,069	536,5	536,8	100,31	98,33	0,175	0,173	15	0,2458389
16,072	536,5	536,8	100,46	98,06	0,176	0,173	16	0,2458388
15,903	536,6	536,9	101,32	99,05	0,176	0,173	17	0,2433485
16,042	536,6	536,9	100,32	98,17	0,175	0,173	18	0,2454266
16,114	536,5	536,9	100,01	97,74	0,175	0,173	19	0,2465956
16,049	536,6	536,9	100,42	98,25	0,175	0,173	20	0,2454259
16,109	536,7	536,9	100,15	97,65	0,175	0,173	21	0,2464583
16,204	536,7	537,0	99,30	97,18	0,175	0,173	22	0,2478958
16,066	536,8	537,0	100,25	98,13	0,175	0,173	23	0,2458392
16,042	536,8	537,1	100,48	98,29	0,175	0,173	24	0,2454268
15,981	536,8	537,1	100,90	98,77	0,175	0,173	25	0,2443899
16,177	536,8	537,1	99,68	97,36	0,176	0,173	26	0,2474856
16,047	536,9	537,1	100,61	98,33	0,176	0,173	27	0,2454252
16,049	536,9	537,2	100,30	98,20	0,175	0,173	28	0,245427
15,953	536,9	537,2	100,96	99,11	0,175	0,173	29	0,2439744
15,918	536,9	537,2	101,16	99,21	0,175	0,173	30	0,2433596
15,918	536,9	537,2	101,32	99,06	0,175	0,173	31	0,243349
15,958	537,0	537,3	100,96	98,94	0,175	0,173	32	0,2440084
16,124	537,0	537,3	99,97	97,77	0,175	0,173	33	0,246458
15,912	537,1	537,4	101,27	99,13	0,175	0,173	34	0,2433492
16,218	537,1	537,4	99,37	97,24	0,175	0,173	35	0,2479121
16,225	537,1	537,4	99,27	97,48	0,175	0,173	36	0,2478959
16,202	537,1	537,4	99,48	97,31	0,175	0,173	37	0,2476557
16,066	537,2	537,5	100,55	98,50	0,175	0,173	38	0,2454266
16,264	537,2	537,5	99,20	97,29	0,175	0,173	39	0,2485097
16,063	537,3	537,5	100,44	98,38	0,175	0,173	40	0,2454268
16,204	537,3	537,6	99,80	97,51	0,175	0,173	41	0,2474859
16,265	537,3	537,6	99,24	97,06	0,175	0,173	42	0,2485097
15,975	537,3	537,6	101,15	98,96	0,175	0,173	43	0,2439744
16,078	537,3	537,6	100,52	98,68	0,175	0,173	44	0,2454256
16,219	537,4	537,7	99,79	97,62	0,175	0,173	45	0,2474857
16,186	537,4	537,7	100,20	97,89	0,175	0,173	46	0,2468701
16,248	537,5	537,7	99,76	97,46	0,176	0,173	47	0,2478969
16,154	537,5	537,8	100,50	98,11	0,176	0,173	48	0,2464591
16,116	537,5	537,8	100,56	98,39	0,176	0,173	49	0,2458398
16,188	537,6	537,8	100,20	98,04	0,175	0,173	50	0,2468698
16,188	537,6	537,9	100,11	98,04	0,175	0,173	51	0,2468704
15,958	537,6	537,9	101,72	99,54	0,175	0,173	52	0,243349
16,183	537,6	537,9	100,20	97,78	0,176	0,173	53	0,2468704
16,128	537,7	537,9	100,66	98,55	0,176	0,173	54	0,24584
16,004	537,7	538,0	101,36	99,26	0,175	0,173	55	0,243975

16,192	537,8	538,0	100,27	98,22	0,175	0,173	56	0,2468702
16,203	537,8	538,1	100,19	98,05	0,175	0,173	57	0,2468705
16,045	537,9	538,1	101,52	99,33	0,176	0,173	58	0,2443905
16,114	537,9	538,2	101,12	98,73	0,176	0,173	59	0,2454268
16,182	537,9	538,2	100,38	98,36	0,176	0,173	60	0,2464593
16,192	537,9	538,2	100,18	98,30	0,175	0,174	61	0,2468706
16,117	538,0	538,2	100,97	98,77	0,175	0,174	62	0,2454276
16,295	538,0	538,3	100,07	97,89	0,176	0,173	63	0,2478973
16,214	538,0	538,3	100,22	98,05	0,175	0,173	64	0,2468585
16,221	538,1	538,3	100,25	98,23	0,175	0,173	65	0,2468707
16,135	538,1	538,3	101,04	98,80	0,175	0,173	66	0,2454279
16,274	538,2	538,4	100,08	97,91	0,175	0,173	67	0,2474861
16,159	538,2	538,4	100,89	98,51	0,175	0,173	68	0,2458401
16,071	538,3	538,5	101,38	99,17	0,175	0,173	69	0,2443914
16,295	538,3	538,5	99,90	97,82	0,175	0,173	70	0,2478972
16,160	538,4	538,6	100,90	98,63	0,175	0,173	71	0,2458399
16,288	538,4	538,6	99,90	97,67	0,175	0,173	72	0,2478971
16,157	538,5	538,7	100,77	98,56	0,175	0,173	73	0,2458407
16,072	538,5	538,7	101,54	99,27	0,175	0,173	74	0,2443913
16,235	538,5	538,7	100,40	98,10	0,175	0,173	75	0,246871
16,197	538,6	538,8	100,60	98,29	0,175	0,173	76	0,2464599
16,267	538,6	538,8	100,43	97,95	0,176	0,173	77	0,247488
16,130	538,6	538,8	101,11	98,77	0,176	0,173	78	0,2454295
16,118	538,6	538,8	101,02	98,71	0,176	0,173	79	0,2454281
16,259	538,6	538,8	100,25	98,04	0,176	0,173	80	0,2474871
16,123	538,6	538,9	100,87	98,84	0,176	0,173	81	0,2454278
16,183	538,7	538,9	100,66	98,28	0,176	0,173	82	0,2464603
16,141	538,7	538,9	100,69	98,73	0,176	0,173	83	0,245841
16,137	538,7	538,9	100,77	98,72	0,175	0,174	84	0,2458411
16,175	538,7	538,9	100,51	98,04	0,176	0,173	85	0,2464603
16,197	538,7	538,9	100,22	98,16	0,176	0,173	86	0,2468713
16,237	538,7	539,0	100,03	97,88	0,175	0,173	87	0,2474876
16,166	538,8	539,0	100,27	98,20	0,175	0,173	88	0,2464606
15,953	538,7	539,0	101,57	99,20	0,175	0,173	89	0,243351
16,252	538,8	539,0	99,59	97,65	0,175	0,173	90	0,2478981
16,286	538,8	539,0	99,52	97,50	0,175	0,174	91	0,248511
16,245	538,8	539,1	99,65	97,80	0,175	0,174	92	0,2478978
16,113	538,9	539,0	100,65	98,39	0,175	0,174	93	0,2458408
16,083	538,9	539,1	100,59	98,59	0,175	0,173	94	0,2454272
16,311	538,9	539,1	99,31	97,23	0,175	0,173	95	0,2489194
16,235	538,9	539,1	99,68	97,53	0,176	0,173	96	0,2478986
16,203	538,9	539,1	99,69	97,59	0,175	0,173	97	0,2474878
16,234	538,9	539,1	99,80	97,66	0,176	0,173	98	0,2478984
16,139	538,9	539,1	100,38	98,23	0,176	0,174	99	0,2464605
16,133	538,9	539,1	100,32	98,13	0,176	0,174	100	0,2464606
16,130	538,9	539,1	100,36	98,25	0,176	0,174	101	0,2464607
16,061	538,9	539,2	100,64	98,49	0,176	0,174	102	0,2454282
16,058	538,9	539,2	100,63	98,53	0,176	0,174	103	0,2454282
16,210	538,9	539,2	99,58	97,49	0,176	0,174	104	0,2478969
16,279	538,9	539,2	99,25	97,28	0,176	0,174	105	0,2489203
16,251	538,9	539,2	99,46	97,17	0,176	0,174	106	0,2485112
16,184	538,9	539,2	99,89	97,77	0,176	0,174	107	0,2474885
16,185	538,9	539,2	99,80	97,50	0,176	0,174	108	0,2474878
16,212	538,9	539,3	99,56	97,78	0,176	0,174	109	0,2478983
16,252	538,9	539,3	99,34	97,19	0,176	0,174	110	0,2485111
16,269	538,9	539,2	99,10	96,85	0,176	0,173	111	0,2489204
16,199	538,9	539,2	99,45	97,33	0,176	0,173	112	0,2478984
16,103	539,0	539,2	100,18	97,77	0,176	0,173	113	0,2464614
16,237	539,0	539,2	99,23	97,27	0,176	0,173	114	0,2485118
16,193	539,0	539,2	99,62	97,34	0,176	0,174	115	0,2478988
16,168	539,0	539,3	99,80	97,54	0,176	0,174	116	0,2474882

16,098	539,0	539,3	100,06	98,04	0,176	0,174	117	0,2464611
15,895	538,9	539,2	101,28	99,08	0,176	0,174	118	0,2433516
16,124	538,9	539,3	99,90	97,80	0,176	0,173	119	0,2468724
16,228	538,9	539,3	99,10	97,14	0,176	0,174	120	0,2485118
16,281	538,9	539,3	98,82	96,77	0,175	0,174	121	0,2493274
16,115	538,9	539,3	99,83	97,87	0,176	0,174	122	0,2468716
16,083	538,9	539,3	100,06	97,88	0,176	0,174	123	0,2464609
16,111	538,9	539,3	99,80	97,44	0,176	0,173	124	0,2468718
16,241	539,0	539,3	98,88	96,93	0,176	0,173	125	0,2489214
16,013	539,0	539,3	100,37	98,36	0,176	0,174	126	0,2454276
16,109	539,0	539,3	99,70	97,76	0,176	0,174	127	0,2468722
16,173	539,0	539,3	99,32	97,13	0,176	0,174	128	0,2478986
16,077	538,9	539,3	99,96	97,61	0,176	0,173	129	0,2464611
16,043	538,9	539,3	100,24	97,78	0,176	0,173	130	0,2459201
16,219	538,9	539,3	99,21	96,89	0,176	0,173	131	0,2485117
16,217	538,9	539,3	99,09	97,11	0,176	0,173	132	0,248512
16,126	538,9	539,3	99,34	97,22	0,176	0,174	133	0,2474878
16,266	538,9	539,3	98,92	96,79	0,176	0,174	134	0,2493277
16,140	538,9	539,3	99,61	97,26	0,176	0,174	135	0,2474883
16,138	538,9	539,3	99,60	97,44	0,176	0,173	136	0,2474883
16,261	539,0	539,3	98,88	96,55	0,176	0,174	137	0,2493281

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,98	98,30	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,587	538,4	538,7			0,173	0,171	0	0,2382904
15,544	538,4	538,8	101,37	99,73	0,173	0,171	1	0,2382901
15,491	538,5	538,8	101,79	100,07	0,173	0,171	2	0,237437
15,474	538,6	538,9	101,43	100,13	0,173	0,171	3	0,2374371
15,618	538,6	538,9	100,02	98,52	0,173	0,171	4	0,240412
15,543	538,6	539,0	100,39	98,76	0,173	0,171	5	0,2393538
15,701	538,7	539,0	99,51	97,68	0,173	0,171	6	0,241885
15,704	538,7	539,1	99,44	97,61	0,173	0,171	7	0,2418851
15,772	538,8	539,1	99,06	97,35	0,173	0,171	8	0,2429324
15,632	538,8	539,2	99,83	98,27	0,173	0,171	9	0,2408342
15,700	538,8	539,2	99,21	97,64	0,173	0,171	10	0,2418851
15,628	538,9	539,2	99,63	98,18	0,173	0,171	11	0,2408335
15,411	538,9	539,3	101,21	99,52	0,173	0,171	12	0,2374385
15,676	538,9	539,3	99,56	97,79	0,173	0,171	13	0,2414662
15,798	539,0	539,4	98,66	97,02	0,173	0,171	14	0,2433497
15,789	539,0	539,4	98,59	97,18	0,173	0,171	15	0,2433497
15,640	539,0	539,4	99,78	98,05	0,173	0,171	16	0,2408344
15,778	539,0	539,4	98,97	97,28	0,173	0,171	17	0,2429329
15,770	539,0	539,5	98,88	97,10	0,173	0,171	18	0,2429329
15,607	539,1	539,5	99,90	98,17	0,173	0,171	19	0,2404128
15,583	539,1	539,5	100,08	98,28	0,173	0,171	20	0,2399898
15,687	539,1	539,5	99,66	97,82	0,173	0,171	21	0,2414659
15,710	539,2	539,6	99,46	97,68	0,173	0,171	22	0,2418859
15,805	539,2	539,6	98,94	96,99	0,173	0,171	23	0,2433503
15,643	539,3	539,7	99,66	98,10	0,173	0,171	24	0,2408343
15,781	539,4	539,7	98,96	97,34	0,173	0,171	25	0,2429334
15,622	539,4	539,8	99,94	98,31	0,173	0,171	26	0,2404137
15,782	539,4	539,8	98,86	97,26	0,173	0,171	27	0,2429342
15,814	539,4	539,8	98,87	97,20	0,173	0,171	28	0,2433511
15,688	539,5	539,8	99,47	98,02	0,173	0,171	29	0,241467
15,688	539,5	539,9	99,53	97,97	0,173	0,171	30	0,2414664
15,699	539,5	539,9	99,57	97,92	0,173	0,171	31	0,2414674
15,718	539,5	539,9	99,37	97,77	0,173	0,171	32	0,2418868
15,628	539,4	539,9	100,01	98,34	0,173	0,171	33	0,2404138
15,789	539,4	539,9	99,13	97,28	0,173	0,171	34	0,2429344
15,788	539,4	539,9	99,02	97,47	0,173	0,171	35	0,2429342
15,657	539,4	539,9	99,88	98,21	0,173	0,171	36	0,2408348
15,657	539,4	539,9	99,98	98,38	0,173	0,171	37	0,2408354
15,630	539,4	539,9	100,17	98,38	0,173	0,171	38	0,2404137
15,803	539,5	539,9	99,22	97,48	0,173	0,171	39	0,242934
15,567	539,5	540,0	100,56	98,80	0,173	0,171	40	0,2393472
15,659	539,6	540,0	99,94	98,18	0,173	0,171	41	0,2408349
15,699	539,6	540,0	99,50	97,94	0,173	0,171	42	0,2414669
15,608	539,6	540,1	100,24	98,68	0,173	0,171	43	0,2399903
15,804	539,7	540,1	99,04	97,46	0,173	0,171	44	0,2429338
15,814	539,7	540,1	99,19	97,51	0,173	0,171	45	0,2429335
15,753	539,8	540,2	99,69	97,93	0,173	0,171	46	0,2418865
15,816	539,8	540,2	99,07	97,46	0,173	0,171	47	0,2429334
15,720	539,9	540,3	99,68	97,95	0,173	0,171	48	0,2414668
15,686	539,9	540,3	100,04	98,25	0,173	0,171	49	0,2408346
15,665	539,9	540,3	100,23	98,51	0,173	0,171	50	0,2404134
15,763	540,0	540,4	99,62	97,96	0,173	0,171	51	0,2418869
15,697	540,1	540,4	100,24	98,39	0,173	0,171	52	0,240835
15,840	540,1	540,4	99,35	97,61	0,173	0,171	53	0,2429327
15,749	540,1	540,5	100,02	98,26	0,173	0,171	54	0,2413869
15,689	540,2	540,5	100,40	98,80	0,173	0,171	55	0,2404179

15,717	540,2	540,6	100,37	98,49	0,173	0,171	56	0,2408352
15,756	540,2	540,6	100,03	98,17	0,173	0,171	57	0,2414675
15,722	540,2	540,6	100,25	98,71	0,173	0,171	58	0,2408349
15,797	540,3	540,6	100,10	98,20	0,173	0,171	59	0,2418868
15,671	540,3	540,7	100,77	98,91	0,173	0,171	60	0,2399931
15,772	540,3	540,7	100,18	98,47	0,173	0,171	61	0,2414674
15,611	540,3	540,7	101,18	99,59	0,173	0,171	62	0,2389306
15,775	540,4	540,8	100,22	98,34	0,173	0,171	63	0,2414672
15,740	540,4	540,8	100,38	98,83	0,173	0,171	64	0,2408762
15,779	540,4	540,8	100,23	98,71	0,173	0,171	65	0,2414674
15,716	540,4	540,8	100,64	98,94	0,173	0,171	66	0,2404144
15,747	540,5	540,9	100,56	98,88	0,173	0,171	67	0,2408354
15,723	540,5	540,9	100,75	99,02	0,173	0,171	68	0,240414
15,818	540,6	540,9	100,04	98,21	0,173	0,171	69	0,2418868
15,749	540,6	540,9	100,53	98,77	0,173	0,171	70	0,2408362
15,888	540,6	541,0	99,65	98,00	0,173	0,171	71	0,2429348
15,819	540,6	541,0	100,05	98,35	0,173	0,171	72	0,2418786
15,655	540,6	541,0	101,21	99,45	0,173	0,171	73	0,2393562
15,754	540,6	541,0	100,42	98,74	0,173	0,171	74	0,2408358
15,730	540,6	541,0	100,78	99,01	0,173	0,171	75	0,2404141
15,825	540,7	541,1	99,92	98,59	0,173	0,171	76	0,241887
15,728	540,7	541,1	100,66	98,96	0,173	0,171	77	0,2404141
15,761	540,7	541,1	100,77	98,85	0,173	0,171	78	0,2408357
15,735	540,8	541,1	100,87	99,12	0,173	0,171	79	0,2404139
15,802	540,8	541,2	100,36	98,61	0,173	0,171	80	0,2414674
15,800	540,8	541,2	100,36	98,62	0,173	0,171	81	0,2413791
15,767	540,8	541,2	100,63	98,76	0,173	0,171	82	0,2408358
15,684	540,9	541,3	101,24	99,49	0,173	0,171	83	0,2395474
15,767	540,9	541,3	100,73	98,85	0,173	0,171	84	0,2408359
15,739	540,9	541,3	100,78	99,13	0,173	0,171	85	0,2404143
15,712	540,9	541,3	100,97	99,37	0,173	0,171	86	0,2399913
15,769	540,9	541,4	100,70	98,90	0,173	0,171	87	0,2408355
15,907	541,0	541,4	99,87	97,94	0,173	0,171	88	0,2429188
15,841	541,0	541,4	100,12	98,64	0,173	0,171	89	0,2418875
15,814	541,0	541,4	100,35	98,57	0,173	0,171	90	0,2414676
15,688	541,0	541,4	101,27	99,94	0,173	0,171	91	0,2393563
15,854	541,0	541,4	100,27	98,46	0,173	0,171	92	0,2418872
15,775	541,0	541,4	100,62	99,16	0,173	0,171	93	0,2408354
15,912	541,0	541,4	99,80	98,21	0,173	0,171	94	0,2429346
15,744	541,0	541,4	100,78	99,16	0,173	0,171	95	0,2404143
15,808	541,0	541,5	100,41	98,57	0,173	0,171	96	0,2414678
15,898	541,0	541,5	99,71	98,08	0,173	0,171	97	0,2429344
15,900	541,0	541,5	99,74	98,00	0,173	0,171	98	0,2429343
15,796	541,0	541,5	100,23	98,52	0,173	0,171	99	0,2414671
15,815	541,0	541,5	99,96	98,38	0,173	0,171	100	0,241887
15,688	541,0	541,5	100,70	99,26	0,173	0,171	101	0,2399906
15,901	541,0	541,5	99,27	97,88	0,173	0,171	102	0,2433516
15,687	541,0	541,5	100,85	99,05	0,173	0,171	103	0,2399914
15,781	541,0	541,5	100,13	98,55	0,173	0,171	104	0,241468
15,868	541,0	541,5	99,44	97,80	0,173	0,171	105	0,2429349
15,727	541,0	541,5	100,44	98,41	0,173	0,171	106	0,2408355
15,882	541,0	541,5	99,30	97,54	0,173	0,171	107	0,2433517
15,781	541,0	541,5	99,77	98,05	0,173	0,171	108	0,2418871
15,914	541,0	541,5	99,02	97,30	0,173	0,171	109	0,2439768
15,748	541,0	541,5	99,94	98,17	0,173	0,171	110	0,241461
15,838	541,0	541,5	99,31	97,78	0,173	0,171	111	0,242935
15,695	541,0	541,5	100,10	98,50	0,173	0,171	112	0,2408352
15,646	541,0	541,5	100,24	98,72	0,173	0,171	113	0,2401468
15,847	541,0	541,5	99,09	97,31	0,173	0,171	114	0,2433518
15,823	541,0	541,5	99,18	97,55	0,173	0,171	115	0,2429352
15,983	540,9	541,4	98,19	96,59	0,173	0,171	116	0,2454296

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,92	99,07	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
16,351	541,4	541,4			0,170	0,168	0	0,2418869
16,433	541,5	541,5	101,31	100,49	0,170	0,168	1	0,245015
16,579	541,5	541,6	102,83	102,02	0,170	0,168	2	0,2443923
16,370	541,6	541,6	104,67	103,76	0,170	0,168	3	0,2408354
16,376	541,6	541,7	105,32	104,30	0,170	0,168	4	0,2399912
16,311	541,7	541,8	106,53	105,36	0,170	0,168	5	0,2382926
16,185	541,8	541,9	105,62	104,94	0,170	0,168	6	0,2382926
16,162	541,8	542,0	103,57	102,54	0,170	0,168	7	0,2404145
16,092	541,9	542,0	103,02	102,10	0,170	0,168	8	0,2404142
16,265	541,9	542,1	101,12	100,10	0,170	0,167	9	0,2439772
16,146	542,0	542,2	101,20	100,31	0,170	0,167	10	0,2429349
16,190	542,0	542,2	100,58	99,85	0,170	0,168	11	0,2439779
16,102	542,1	542,2	100,95	100,01	0,170	0,168	12	0,2429354
16,179	542,1	542,3	100,22	99,33	0,170	0,167	13	0,2443932
16,265	542,1	542,3	99,56	98,59	0,170	0,167	14	0,2458602
16,159	542,1	542,3	100,07	99,06	0,170	0,167	15	0,2443931
15,964	542,2	542,4	101,33	100,34	0,170	0,167	16	0,2414685
16,144	542,2	542,4	99,99	99,02	0,170	0,167	17	0,2443932
16,181	542,3	542,5	99,62	98,83	0,170	0,167	18	0,2450156
16,239	542,3	542,5	99,35	98,47	0,169	0,167	19	0,2458436
16,182	542,4	542,6	99,77	98,67	0,170	0,167	20	0,245016
16,178	542,4	542,6	99,55	98,49	0,170	0,167	21	0,2450168
16,137	542,5	542,7	99,96	99,05	0,169	0,167	22	0,2443935
16,116	542,5	542,8	99,90	99,17	0,169	0,167	23	0,2439788
16,145	542,6	542,8	99,73	99,11	0,169	0,167	24	0,2443797
16,187	542,7	542,9	99,66	99,10	0,169	0,168	25	0,2450167
16,372	542,8	543,0	98,40	97,61	0,169	0,168	26	0,2479011
16,284	542,9	543,0	98,92	97,76	0,169	0,167	27	0,2464639
16,306	543,0	543,2	98,93	97,94	0,169	0,167	28	0,2467943
16,123	543,0	543,2	100,03	99,16	0,169	0,167	29	0,2439808
16,150	543,1	543,2	99,76	99,13	0,169	0,167	30	0,2443949
16,317	543,1	543,3	98,81	98,06	0,169	0,167	31	0,2468746
16,286	543,1	543,3	99,13	97,86	0,169	0,167	32	0,2464636
16,247	543,2	543,4	99,30	98,29	0,169	0,167	33	0,2457616
16,290	543,3	543,5	99,03	98,16	0,169	0,167	34	0,2464639
16,148	543,3	543,5	99,98	99,07	0,169	0,167	35	0,2442379
16,162	543,4	543,6	99,79	98,99	0,169	0,167	36	0,2443964
16,329	543,4	543,6	98,68	97,97	0,169	0,167	37	0,2468752
16,100	543,5	543,7	100,38	99,26	0,169	0,167	38	0,2433544
16,271	543,6	543,8	99,10	98,49	0,169	0,167	39	0,2458451
16,087	543,6	543,8	100,41	99,55	0,169	0,167	40	0,2429383
16,230	543,7	543,9	99,70	98,94	0,169	0,167	41	0,2450178
16,195	543,7	543,9	99,99	99,10	0,169	0,167	42	0,2443961
16,195	543,8	544,0	99,96	99,08	0,169	0,167	43	0,2443959
16,198	543,8	544,0	99,92	99,16	0,169	0,167	44	0,2443964
16,414	543,9	544,1	98,68	97,87	0,169	0,167	45	0,2474921
16,141	543,9	544,1	100,45	99,67	0,169	0,167	46	0,2433551
16,213	544,0	544,2	99,97	99,06	0,169	0,167	47	0,2443963
16,379	544,0	544,2	99,05	98,19	0,169	0,167	48	0,2468768
16,190	544,1	544,3	100,32	99,41	0,169	0,167	49	0,2439813
16,196	544,1	544,3	100,31	99,57	0,169	0,167	50	0,2439817
16,366	544,2	544,4	99,26	98,79	0,169	0,167	51	0,2464654
16,277	544,2	544,4	100,00	99,11	0,169	0,167	52	0,2450191
16,238	544,3	544,5	100,26	99,30	0,169	0,167	53	0,244397
16,284	544,4	544,6	100,09	98,95	0,169	0,167	54	0,2450191
16,080	544,5	544,6	101,22	100,38	0,169	0,167	55	0,2418919

16,252	544,5	544,7	100,29	99,43	0,169	0,167	56	0,2443972
16,188	544,6	544,8	100,50	99,74	0,169	0,167	57	0,2433564
16,024	544,7	544,9	101,69	100,71	0,169	0,167	58	0,2408405
16,268	544,7	544,9	100,34	99,40	0,169	0,167	59	0,2443972
16,074	544,8	545,0	101,48	100,62	0,169	0,167	60	0,2414725
16,074	544,9	545,0	101,32	100,62	0,169	0,167	61	0,2414729
16,106	544,9	545,1	101,12	100,36	0,168	0,167	62	0,2418927
16,036	545,0	545,2	101,87	100,96	0,169	0,167	63	0,2408404
16,109	545,0	545,2	101,20	100,51	0,169	0,167	64	0,2418928
16,099	545,1	545,3	101,58	100,79	0,169	0,167	65	0,2414731
16,104	545,2	545,4	101,73	100,77	0,169	0,167	66	0,2414729
16,100	545,3	545,4	101,59	100,83	0,169	0,167	67	0,2414733
16,059	545,3	545,5	101,94	101,18	0,169	0,167	68	0,2408413
16,205	545,3	545,5	101,06	100,22	0,169	0,167	69	0,2429402
16,111	545,4	545,6	101,74	100,89	0,169	0,167	70	0,2414736
16,111	545,4	545,6	101,61	100,93	0,169	0,167	71	0,2414738
16,073	545,4	545,6	102,05	101,07	0,169	0,167	72	0,2408374
16,217	545,4	545,6	101,13	100,36	0,169	0,167	73	0,2429402
15,977	545,4	545,7	102,83	101,63	0,169	0,167	74	0,2393614
16,049	545,4	545,7	102,21	101,25	0,169	0,167	75	0,2404202
16,076	545,5	545,7	101,94	101,20	0,169	0,167	76	0,2408419
16,019	545,5	545,8	102,19	101,46	0,169	0,167	77	0,2399977
16,042	545,6	545,8	102,18	101,29	0,169	0,167	78	0,2404209
15,978	545,6	545,8	102,60	101,97	0,169	0,167	79	0,239362
16,078	545,6	545,9	102,01	101,25	0,169	0,167	80	0,2408422
16,051	545,6	545,9	102,11	101,30	0,169	0,167	81	0,2404211
16,024	545,6	545,9	102,35	101,56	0,169	0,167	82	0,2399977
16,148	545,7	546,0	101,53	100,67	0,169	0,167	83	0,2418936
16,142	545,8	546,0	101,63	100,57	0,169	0,167	84	0,2418936
15,877	545,9	546,1	103,22	102,28	0,169	0,167	85	0,2378743
16,076	545,9	546,1	101,99	101,24	0,169	0,167	86	0,2408426
15,910	545,9	546,2	103,10	101,98	0,169	0,167	87	0,2383005
16,040	546,0	546,2	102,16	101,39	0,169	0,167	88	0,2404211
16,064	546,0	546,2	101,97	101,11	0,169	0,167	89	0,2408428
16,033	545,9	546,2	102,04	101,12	0,169	0,167	90	0,240421
16,005	546,0	546,2	102,13	101,40	0,169	0,167	91	0,2399982
16,064	546,0	546,2	101,83	100,94	0,169	0,167	92	0,2408429
16,026	546,0	546,3	101,89	100,95	0,169	0,166	93	0,2404197
16,024	546,0	546,3	102,02	100,98	0,169	0,166	94	0,2404215
16,053	546,0	546,3	101,77	101,04	0,169	0,167	95	0,2408424
16,049	546,0	546,3	101,89	100,91	0,169	0,167	96	0,2408424
15,881	546,1	546,3	102,89	102,07	0,169	0,167	97	0,2383002
16,193	546,1	546,3	101,06	100,06	0,169	0,167	98	0,2429422
15,886	546,2	546,4	102,82	102,20	0,169	0,167	99	0,2383006
16,092	546,2	546,4	101,57	100,84	0,169	0,167	100	0,2414748
16,120	546,2	546,4	101,44	100,53	0,169	0,167	101	0,2418946
15,989	546,2	546,4	102,02	101,17	0,169	0,167	102	0,2399979
16,189	546,3	546,5	100,73	100,16	0,168	0,167	103	0,2429414
16,116	546,3	546,5	101,33	100,29	0,169	0,167	104	0,2418945
15,820	546,3	546,5	103,19	102,46	0,169	0,167	105	0,2374339
16,087	546,3	546,5	101,39	100,92	0,169	0,167	106	0,2414756
16,203	546,4	546,6	100,63	99,67	0,169	0,167	107	0,2433596
16,079	546,4	546,6	101,45	100,69	0,169	0,167	108	0,2414757
16,008	546,5	546,7	101,95	100,71	0,169	0,166	109	0,2404219
16,008	546,6	546,7	101,64	101,19	0,169	0,167	110	0,2404225
16,072	546,6	546,8	101,48	100,37	0,169	0,167	111	0,2414758
16,080	546,7	546,9	101,48	100,65	0,169	0,167	112	0,241476
16,007	546,7	546,9	101,80	101,11	0,169	0,167	113	0,2404225
16,200	546,8	546,9	100,43	99,77	0,168	0,167	114	0,2433607
15,993	546,9	547,0	101,63	100,71	0,168	0,166	115	0,2404223
16,095	546,9	547,1	101,02	100,18	0,168	0,166	116	0,2418956

16,191	547,0	547,1	100,55	99,61	0,169	0,166	117	0,2433601
16,064	547,0	547,2	101,26	100,34	0,169	0,166	118	0,2414762
16,085	547,1	547,2	101,08	100,23	0,169	0,166	119	0,241896
16,127	547,1	547,2	100,90	100,03	0,169	0,167	120	0,2425369
15,916	547,1	547,2	101,96	101,44	0,169	0,167	121	0,2393642
16,074	547,1	547,3	100,97	99,99	0,168	0,167	122	0,2418961
15,983	547,2	547,3	101,39	100,82	0,168	0,166	123	0,240521
16,061	547,2	547,3	101,03	100,04	0,169	0,167	124	0,2418901
16,132	547,1	547,3	100,57	99,92	0,169	0,167	125	0,2429438
16,035	547,1	547,3	101,11	100,05	0,169	0,167	126	0,2414765
16,028	547,1	547,3	101,08	100,35	0,169	0,166	127	0,2414779
16,049	547,1	547,3	100,92	100,29	0,169	0,167	128	0,2418967
16,148	547,1	547,3	100,22	99,40	0,169	0,167	129	0,243361
16,258	547,1	547,3	99,69	98,81	0,169	0,167	130	0,2450239
16,147	547,1	547,4	100,22	99,41	0,169	0,167	131	0,2433607
16,115	547,1	547,4	100,41	99,58	0,169	0,167	132	0,242944
16,145	547,1	547,4	100,30	99,33	0,169	0,167	133	0,2433608
16,137	547,1	547,4	100,29	99,37	0,169	0,167	134	0,2433603
16,175	547,1	547,4	99,83	99,11	0,169	0,167	135	0,2439858
16,036	547,1	547,4	100,83	99,96	0,169	0,167	136	0,2418962
16,101	547,2	547,4	100,30	99,61	0,169	0,167	137	0,2429438
15,932	547,2	547,5	101,35	100,46	0,169	0,167	138	0,2404233
16,166	547,2	547,5	99,88	98,91	0,169	0,166	139	0,2439863
16,025	547,2	547,5	100,71	99,82	0,169	0,166	140	0,2418965
16,093	547,3	547,5	100,36	99,47	0,169	0,167	141	0,2429441
16,025	547,3	547,6	100,76	99,94	0,169	0,167	142	0,2418965
15,922	547,4	547,6	101,28	100,59	0,169	0,167	143	0,2404239
16,087	547,4	547,7	100,30	99,17	0,169	0,167	144	0,242948
16,019	547,4	547,7	100,79	99,96	0,169	0,166	145	0,2418971
16,158	547,5	547,7	99,88	98,92	0,169	0,167	146	0,2439867
16,012	547,5	547,8	100,61	99,56	0,169	0,166	147	0,2418965
16,107	547,5	547,8	100,01	99,09	0,169	0,166	148	0,243362
15,981	547,5	547,8	100,80	99,90	0,169	0,166	149	0,2414773
16,146	547,6	547,8	99,72	98,95	0,169	0,167	150	0,2439867
15,937	547,6	547,9	100,99	100,08	0,169	0,167	151	0,2408457
16,007	547,6	547,9	100,63	99,87	0,169	0,167	152	0,2418974
16,103	547,6	547,9	100,17	99,12	0,169	0,167	153	0,2433615
16,002	547,7	547,9	100,59	99,79	0,169	0,167	154	0,2418974
15,931	547,7	548,0	100,99	100,22	0,169	0,167	155	0,2408459
15,930	547,8	548,0	100,91	100,11	0,169	0,167	156	0,2408454
15,933	547,8	548,1	101,02	100,12	0,169	0,167	157	0,2408471
15,969	547,9	548,1	100,75	99,79	0,169	0,166	158	0,2414776
15,990	547,9	548,2	100,43	99,48	0,169	0,166	159	0,2418971
16,082	548,0	548,2	99,85	99,12	0,169	0,167	160	0,2433619
16,081	548,1	548,3	99,73	98,96	0,169	0,167	161	0,2433637
16,145	548,1	548,3	99,60	98,51	0,169	0,166	162	0,2443491
16,071	548,2	548,4	99,72	98,92	0,169	0,166	163	0,2433624
15,946	548,2	548,4	100,55	99,86	0,169	0,167	164	0,2414783
16,143	548,2	548,5	99,36	98,52	0,169	0,167	165	0,2444146
15,974	548,2	548,5	100,54	99,56	0,169	0,167	166	0,2418977
16,057	548,3	548,5	99,83	99,00	0,169	0,167	167	0,243234
15,937	548,3	548,6	100,58	99,62	0,169	0,167	168	0,2414785
16,167	548,3	548,6	99,09	98,19	0,169	0,167	169	0,2450252
16,048	548,4	548,6	99,93	98,79	0,169	0,167	170	0,2433621
16,110	548,3	548,6	99,46	98,35	0,169	0,167	171	0,2444032
16,114	548,3	548,6	99,12	98,36	0,169	0,167	172	0,2444036
15,781	548,3	548,6	101,44	100,46	0,169	0,167	173	0,2393671
16,146	548,4	548,6	98,97	98,33	0,169	0,167	174	0,2450258
16,148	548,3	548,6	99,09	98,23	0,169	0,167	175	0,2450263
16,004	548,3	548,6	99,76	99,18	0,169	0,167	176	0,2429456
16,005	548,3	548,7	99,89	99,08	0,169	0,167	177	0,2429453

16,001	548,4	548,7	99,88	99,03	0,169	0,167	178	0,2429459
16,025	548,4	548,7	99,73	98,79	0,169	0,167	179	0,2433614
15,860	548,4	548,7	100,71	99,97	0,169	0,167	180	0,2408459
16,132	548,4	548,7	98,93	98,24	0,169	0,167	181	0,245025
16,064	548,4	548,7	99,44	98,66	0,169	0,167	182	0,2439875
16,020	548,4	548,7	99,67	98,74	0,169	0,167	183	0,2433626
16,017	548,5	548,8	99,66	98,89	0,169	0,167	184	0,2433624
15,976	548,4	548,8	99,55	98,64	0,169	0,167	185	0,2429456
16,112	548,4	548,7	98,90	98,04	0,169	0,167	186	0,2450251
16,065	548,4	548,7	99,07	98,12	0,169	0,167	187	0,2444039
16,104	548,4	548,7	98,80	97,96	0,169	0,167	188	0,2450255
15,896	548,4	548,7	99,89	99,07	0,169	0,167	189	0,2418989
15,966	548,4	548,7	99,67	98,64	0,169	0,167	190	0,2429455
16,034	548,4	548,7	99,11	98,45	0,169	0,167	191	0,2439879
16,065	548,4	548,7	99,08	98,46	0,169	0,167	192	0,2444027
15,828	548,5	548,8	100,32	99,54	0,169	0,167	193	0,2408707
15,963	548,5	548,8	99,51	98,61	0,169	0,167	194	0,2429455
16,154	548,6	548,9	98,38	97,45	0,169	0,167	195	0,2458526
16,096	548,6	548,9	98,68	97,85	0,169	0,167	196	0,2450259
16,053	548,7	548,9	98,91	98,14	0,169	0,167	197	0,2444034
16,051	548,8	549,0	98,89	98,09	0,169	0,167	198	0,2444034
16,157	548,8	549,0	98,24	97,20	0,169	0,167	199	0,2461554
16,042	548,8	549,0	98,82	98,10	0,169	0,167	200	0,2444034
16,038	548,8	549,0	98,91	98,00	0,169	0,167	201	0,2444032
16,072	548,8	549,0	98,51	97,80	0,169	0,167	202	0,2450253
16,070	548,8	549,0	98,68	97,80	0,169	0,167	203	0,2450252
16,125	548,8	549,0	98,24	97,45	0,169	0,167	204	0,2458526
16,026	548,7	549,0	98,90	98,24	0,169	0,167	205	0,2444032
16,157	548,6	548,9	97,97	97,02	0,169	0,167	206	0,2464721
16,020	548,6	548,9	98,77	98,03	0,169	0,167	207	0,2444029
16,152	548,5	548,8	98,13	97,09	0,169	0,167	208	0,2464601
16,013	548,4	548,7	98,86	97,79	0,169	0,167	209	0,244403
16,049	548,3	548,7	98,71	97,84	0,169	0,167	210	0,2450249
16,106	548,3	548,7	98,07	97,54	0,169	0,167	211	0,2458524
16,006	548,2	548,6	98,94	98,00	0,169	0,167	212	0,2444023
16,009	548,2	548,6	98,91	98,06	0,169	0,167	213	0,2444028
16,145	548,2	548,6	98,02	97,10	0,169	0,167	214	0,2464709
16,007	548,2	548,6	98,90	97,98	0,169	0,167	215	0,2444027
16,047	548,2	548,5	98,62	97,65	0,169	0,167	216	0,2450252
15,932	548,2	548,5	99,41	98,31	0,169	0,167	217	0,2433611
16,045	548,2	548,5	98,40	97,79	0,169	0,167	218	0,245025
16,046	548,2	548,5	98,78	97,57	0,169	0,167	219	0,2450246
16,042	548,2	548,5	98,52	97,67	0,169	0,167	220	0,2450255
15,966	548,2	548,5	98,97	98,19	0,169	0,167	221	0,2439873
15,903	548,2	548,5	99,44	98,55	0,169	0,167	222	0,2429452
15,972	548,2	548,5	98,87	98,01	0,169	0,167	223	0,2439876
16,035	548,2	548,5	98,50	97,78	0,169	0,167	224	0,2450254
15,798	548,2	548,5	99,90	99,03	0,169	0,167	225	0,2414784
16,124	548,2	548,5	97,90	97,12	0,169	0,167	226	0,2464714
16,080	548,2	548,5	98,13	97,26	0,169	0,167	227	0,2458524
15,956	548,1	548,4	98,78	97,90	0,169	0,167	228	0,2439873
16,114	548,1	548,4	97,89	96,84	0,169	0,167	229	0,246472
15,981	548,1	548,4	98,74	97,73	0,169	0,167	230	0,2444027
15,981	548,1	548,4	98,69	97,67	0,169	0,167	231	0,2444027
16,022	548,1	548,4	98,49	97,49	0,169	0,167	232	0,2450286
16,072	548,1	548,4	98,19	97,32	0,169	0,167	233	0,2458525
16,140	548,1	548,4	97,74	96,85	0,169	0,167	234	0,2468829
15,907	548,1	548,4	99,14	98,22	0,169	0,167	235	0,2433616
15,978	548,1	548,4	98,67	97,68	0,169	0,167	236	0,2444028
16,110	548,1	548,4	97,87	97,03	0,169	0,167	237	0,2464716
15,903	548,1	548,4	99,12	98,15	0,169	0,167	238	0,243362

16,133	548,1	548,4	97,60	97,09	0,169	0,167	239	0,2468824
16,103	548,1	548,4	97,83	96,74	0,169	0,167	240	0,2464721
16,064	548,1	548,4	97,94	97,20	0,169	0,167	241	0,2458526
15,938	548,0	548,4	98,68	98,04	0,169	0,167	242	0,2439876
16,163	548,0	548,3	97,29	96,63	0,169	0,167	243	0,2474581
16,165	548,0	548,3	97,29	96,55	0,169	0,167	244	0,2474992
16,053	548,0	548,3	98,07	97,12	0,169	0,167	245	0,2458449
15,930	548,1	548,3	98,73	97,90	0,169	0,167	246	0,2439879
16,100	548,1	548,3	97,76	96,96	0,169	0,167	247	0,2466213
16,092	548,1	548,3	97,84	96,81	0,169	0,167	248	0,2464722
16,157	548,1	548,3	97,19	96,47	0,169	0,167	249	0,2474988
16,050	548,1	548,4	97,96	97,30	0,169	0,167	250	0,2458522
16,090	548,1	548,4	97,63	96,84	0,169	0,167	251	0,2464717
16,045	548,1	548,4	98,04	97,15	0,169	0,167	252	0,2458526
15,923	548,1	548,4	98,67	97,75	0,169	0,167	253	0,2439956
16,109	548,1	548,4	97,50	96,86	0,169	0,167	254	0,2468828
16,152	548,1	548,4	97,32	96,47	0,169	0,167	255	0,2474983
16,044	548,1	548,4	97,86	97,05	0,169	0,167	256	0,2458523
16,112	548,2	548,4	97,47	96,74	0,169	0,167	257	0,2468827
15,668	548,2	548,4	100,27	99,39	0,169	0,167	258	0,2401202
15,948	548,2	548,4	98,34	97,81	0,169	0,167	259	0,2444026
16,108	548,2	548,4	97,66	96,57	0,169	0,167	260	0,2468824
16,082	548,2	548,4	97,66	96,75	0,169	0,167	261	0,2464715
15,985	548,2	548,4	98,24	97,35	0,169	0,167	262	0,2450247
16,076	548,1	548,4	97,67	96,93	0,169	0,167	263	0,2464707
16,034	548,1	548,4	97,94	97,07	0,169	0,167	264	0,2458517
15,914	548,2	548,4	98,50	97,83	0,169	0,167	265	0,2439869
16,101	548,2	548,4	97,41	96,70	0,169	0,167	266	0,2468826
15,979	548,2	548,4	98,40	97,51	0,169	0,167	267	0,2450242
16,073	548,2	548,4	97,66	96,74	0,169	0,167	268	0,246471
16,030	548,2	548,4	97,81	96,91	0,169	0,167	269	0,2458518
16,096	548,2	548,4	97,52	96,70	0,169	0,167	270	0,2468824
16,047	548,2	548,4	97,72	96,86	0,169	0,167	271	0,246192
16,064	548,2	548,4	97,60	96,71	0,169	0,167	272	0,2464712
16,091	548,3	548,4	97,28	96,60	0,169	0,167	273	0,2468822
16,062	548,3	548,4	97,73	96,69	0,169	0,167	274	0,2464715
15,834	548,3	548,4	98,87	98,12	0,169	0,167	275	0,242944
16,061	548,3	548,5	97,52	96,76	0,169	0,167	276	0,2464709
16,018	548,3	548,5	97,79	97,09	0,169	0,167	277	0,2458515
15,731	548,3	548,5	99,70	98,94	0,169	0,167	278	0,2414764
16,016	548,3	548,5	97,79	96,93	0,169	0,167	279	0,2458516
15,894	548,3	548,5	98,47	97,69	0,169	0,167	280	0,2440093
15,962	548,4	548,5	98,02	97,20	0,169	0,167	281	0,2450238
16,081	548,4	548,6	97,36	96,53	0,169	0,167	282	0,2468534
15,825	548,4	548,6	99,16	98,18	0,169	0,167	283	0,2429436
16,052	548,4	548,6	97,63	96,77	0,169	0,167	284	0,2464489
16,056	548,5	548,6	97,52	96,72	0,169	0,167	285	0,2464711
16,055	548,5	548,6	97,62	96,63	0,169	0,167	286	0,2464706
15,962	548,5	548,6	98,10	97,12	0,169	0,167	287	0,2450236
16,079	548,4	548,6	97,29	96,54	0,169	0,167	288	0,2468816
16,051	548,4	548,6	97,46	96,67	0,169	0,167	289	0,2464719
16,098	548,5	548,6	97,07	96,32	0,169	0,167	290	0,2472364

16,24	Inlet +	Inlet +						0,250
	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	99,57	98,88	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
16,143	541,7	541,9			0,172	0,170	0	0,2464621
16,125	541,8	542,0	101,22	100,57	0,172	0,170	1	0,2479028
16,108	541,8	542,0	101,06	100,18	0,172	0,170	2	0,2479004
16,277	541,8	542,0	99,56	98,79	0,172	0,170	3	0,2509475
16,060	541,8	542,0	100,76	99,77	0,172	0,170	4	0,2479006
16,059	541,8	542,1	100,61	99,98	0,172	0,170	5	0,2479004
16,058	541,8	542,1	100,76	99,91	0,172	0,170	6	0,2479006
16,123	541,8	542,1	100,29	99,61	0,172	0,170	7	0,2489227
16,096	541,9	542,1	100,55	99,70	0,172	0,170	8	0,248514
16,140	541,8	542,1	100,02	99,37	0,172	0,170	9	0,2493299
16,117	541,8	542,1	100,38	99,39	0,172	0,170	10	0,2489225
16,246	541,9	542,2	99,43	98,71	0,172	0,170	11	0,2509539
16,246	541,9	542,2	99,51	98,73	0,172	0,170	12	0,2509537
15,966	542,0	542,3	100,96	100,54	0,172	0,170	13	0,2468745
16,133	542,0	542,3	100,12	99,36	0,172	0,170	14	0,2493307
16,188	542,0	542,4	99,88	99,25	0,172	0,170	15	0,2499401
16,147	542,1	542,4	100,11	99,35	0,172	0,170	16	0,2493299
16,253	542,1	542,4	99,46	98,93	0,172	0,170	17	0,2509541
16,285	542,2	542,5	99,30	98,72	0,172	0,170	18	0,2513584
16,286	542,2	542,5	99,41	98,51	0,172	0,170	19	0,2513587
16,293	542,3	542,6	99,27	98,46	0,172	0,170	20	0,2513591
16,197	542,3	542,6	100,06	99,19	0,172	0,170	21	0,2499408
16,200	542,4	542,7	100,04	99,11	0,172	0,170	22	0,2499408
16,293	542,4	542,7	99,29	98,63	0,172	0,170	23	0,251359
16,108	542,5	542,8	100,54	99,75	0,172	0,170	24	0,2485149
16,276	542,5	542,8	99,48	99,08	0,172	0,170	25	0,2509556
16,273	542,6	542,9	99,42	98,82	0,172	0,170	26	0,2509546
16,013	542,7	543,0	101,16	100,46	0,172	0,170	27	0,2468757
16,214	542,7	543,0	99,87	99,05	0,172	0,170	28	0,249941
16,280	542,8	543,1	99,51	98,67	0,172	0,169	29	0,250955
16,172	542,8	543,1	100,30	99,30	0,172	0,169	30	0,2493313
16,083	542,9	543,2	100,69	100,19	0,172	0,170	31	0,247902
16,334	543,0	543,3	99,07	98,30	0,172	0,170	32	0,2517618
16,337	543,0	543,3	99,16	98,61	0,172	0,170	33	0,2517628
16,180	543,1	543,4	100,13	99,61	0,172	0,170	34	0,2493315
16,159	543,2	543,4	100,42	99,58	0,172	0,170	35	0,2489305
16,227	543,3	543,5	99,73	99,25	0,172	0,170	36	0,2499416
16,163	543,3	543,6	100,39	99,62	0,172	0,170	37	0,2489244
16,160	543,3	543,6	100,34	99,72	0,172	0,170	38	0,2489248
16,227	543,4	543,6	99,83	99,33	0,172	0,170	39	0,2499421
16,192	543,4	543,7	100,13	99,37	0,172	0,170	40	0,2493405
16,140	543,5	543,7	100,52	99,83	0,172	0,170	41	0,2485164
16,169	543,5	543,8	100,34	99,64	0,172	0,170	42	0,2489252
16,238	543,6	543,9	99,92	99,10	0,172	0,169	43	0,249943
16,147	543,6	543,9	100,45	99,92	0,172	0,169	44	0,2485168
16,301	543,7	544,0	99,42	98,86	0,172	0,170	45	0,2509563
16,309	543,8	544,1	99,50	98,88	0,172	0,170	46	0,2509565
16,241	543,9	544,1	99,77	99,32	0,171	0,170	47	0,2499422
16,311	543,9	544,2	99,55	99,06	0,171	0,170	48	0,2509564
16,254	544,0	544,2	99,92	99,23	0,172	0,170	49	0,2499426
16,254	544,0	544,3	99,94	99,12	0,171	0,169	50	0,2499429
16,217	544,0	544,3	100,03	99,50	0,171	0,169	51	0,2493328
16,265	544,1	544,4	99,89	99,19	0,171	0,169	52	0,249943
16,104	544,2	544,4	100,79	100,24	0,171	0,169	53	0,2474934
16,199	544,2	544,5	100,28	99,73	0,171	0,169	54	0,2489262

16,180	544,2	544,5	100,45	99,92	0,171	0,169	55	0,2485169
16,205	544,3	544,5	100,43	99,58	0,171	0,169	56	0,2489255
16,143	544,4	544,6	100,77	100,02	0,171	0,169	57	0,2479038
16,281	544,5	544,7	99,85	99,44	0,171	0,169	58	0,2499435
16,347	544,5	544,8	99,44	98,78	0,171	0,169	59	0,2509568
16,273	544,5	544,8	99,78	99,30	0,171	0,169	60	0,2499435
16,283	544,6	544,8	99,89	99,09	0,171	0,169	61	0,2499435
16,246	544,6	544,9	100,07	99,47	0,171	0,169	62	0,249334
16,194	544,7	544,9	100,45	99,66	0,171	0,169	63	0,2485177
16,190	544,7	545,0	100,48	99,86	0,171	0,169	64	0,2485181
16,131	544,8	545,1	100,83	100,14	0,171	0,169	65	0,2474943
16,252	544,9	545,1	99,97	99,42	0,171	0,169	66	0,2493335
16,395	544,9	545,1	99,33	98,72	0,171	0,169	67	0,251458
16,201	545,0	545,2	100,29	99,67	0,171	0,169	68	0,248518
16,295	545,0	545,2	99,87	99,16	0,171	0,169	69	0,2499443
16,298	545,1	545,3	99,80	99,09	0,171	0,169	70	0,2499011
16,396	545,1	545,4	99,35	98,66	0,171	0,169	71	0,2513627
16,262	545,2	545,4	100,21	99,30	0,171	0,169	72	0,2493343
16,237	545,3	545,5	100,30	99,67	0,171	0,169	73	0,2489278
16,367	545,3	545,5	99,42	98,82	0,171	0,169	74	0,2509585
16,369	545,3	545,6	99,44	98,68	0,171	0,169	75	0,2509586
16,306	545,4	545,6	99,78	99,39	0,171	0,169	76	0,2499452
16,105	545,4	545,7	100,99	100,30	0,171	0,169	77	0,2468795
16,311	545,5	545,7	99,79	99,35	0,171	0,169	78	0,249945
16,402	545,5	545,7	99,29	98,73	0,171	0,169	79	0,2513632
16,370	545,6	545,8	99,40	98,80	0,171	0,169	80	0,2509586
16,368	545,6	545,8	99,41	98,56	0,171	0,169	81	0,2509591
16,235	545,7	545,9	100,11	99,77	0,171	0,169	82	0,2489291
16,208	545,8	546,0	100,35	99,69	0,171	0,169	83	0,2485197
16,264	545,8	546,0	99,83	99,29	0,171	0,169	84	0,2493352
16,260	545,9	546,1	99,97	99,16	0,171	0,168	85	0,2493354
16,366	545,8	546,1	99,28	98,44	0,171	0,168	86	0,2509595
16,364	545,9	546,1	99,25	98,45	0,171	0,168	87	0,2509595
16,297	545,9	546,2	99,71	99,02	0,171	0,168	88	0,2499456
16,251	545,9	546,2	99,80	99,15	0,171	0,168	89	0,2493356
16,157	545,9	546,2	100,39	99,58	0,170	0,168	90	0,2479066
16,404	546,0	546,2	98,86	98,02	0,171	0,168	91	0,2517675
16,218	546,0	546,2	99,99	99,32	0,171	0,168	92	0,2489289
16,185	546,0	546,3	100,07	99,46	0,171	0,169	93	0,2485267
16,396	546,0	546,3	98,78	98,15	0,171	0,168	94	0,2517676
16,373	546,1	546,4	99,06	98,22	0,171	0,168	95	0,251364
16,234	546,1	546,4	99,64	99,28	0,171	0,169	96	0,2493358
16,073	546,1	546,4	100,56	99,92	0,170	0,169	97	0,2468806
16,226	546,1	546,5	99,59	99,14	0,170	0,168	98	0,2493361
16,231	546,1	546,4	99,73	98,94	0,170	0,168	99	0,2493356
16,266	546,1	546,4	99,33	98,90	0,170	0,168	100	0,2499464
16,211	546,2	546,5	99,74	98,93	0,170	0,168	101	0,2491345
16,221	546,2	546,5	99,62	99,08	0,170	0,168	102	0,249337
16,353	546,2	546,5	98,85	98,05	0,171	0,168	103	0,2513649
16,376	546,2	546,5	98,56	97,96	0,170	0,168	104	0,2517677
16,249	546,2	546,5	99,29	98,37	0,170	0,168	105	0,2499458
16,342	546,2	546,6	98,75	98,19	0,170	0,168	106	0,2513653
16,345	546,2	546,6	98,73	98,14	0,170	0,169	107	0,2513653
16,248	546,3	546,6	99,18	98,59	0,170	0,168	108	0,2499461
16,334	546,3	546,6	98,56	98,11	0,170	0,168	109	0,2513651
16,312	546,3	546,6	98,70	98,32	0,170	0,169	110	0,2509603
16,176	546,3	546,7	99,63	98,74	0,170	0,168	111	0,2489299
16,399	546,3	546,7	98,23	97,61	0,170	0,168	112	0,2523731
16,333	546,3	546,7	98,71	97,96	0,170	0,168	113	0,2513625
16,330	546,3	546,7	98,67	98,10	0,170	0,168	114	0,2513656
16,137	546,3	546,7	99,69	99,19	0,170	0,169	115	0,2485313

16,301	546,3	546,7	98,75	98,05	0,170	0,168	116	0,2509608
16,419	546,3	546,7	98,03	97,57	0,170	0,168	117	0,2527748
16,232	546,3	546,7	99,30	98,50	0,170	0,168	118	0,2499467
16,323	546,4	546,8	98,61	97,78	0,171	0,168	119	0,2513651
16,099	546,4	546,8	99,99	99,11	0,170	0,168	120	0,2479542
16,186	546,5	546,8	99,21	98,67	0,170	0,168	121	0,2493366
16,348	546,5	546,8	98,38	97,86	0,170	0,168	122	0,2517683
16,223	546,5	546,9	99,07	98,09	0,170	0,168	123	0,2499472
16,293	546,5	546,9	98,65	97,78	0,170	0,168	124	0,2509599
16,226	546,5	546,9	98,95	98,23	0,170	0,168	125	0,2499579
16,183	546,5	546,9	99,22	98,49	0,170	0,168	126	0,2493367
16,156	546,5	546,9	99,36	98,66	0,170	0,168	127	0,2489299
16,338	546,5	546,9	98,24	97,74	0,170	0,168	128	0,2517685
16,211	546,5	546,9	98,96	98,09	0,170	0,168	129	0,2499468
16,331	546,5	546,9	98,46	97,47	0,170	0,168	130	0,2517688
16,075	546,5	546,9	99,68	98,94	0,170	0,168	131	0,2479087
16,301	546,6	546,9	98,34	97,22	0,170	0,168	132	0,2513658
16,120	546,6	547,0	99,62	98,75	0,170	0,168	133	0,2485722
16,302	546,6	547,0	98,28	97,81	0,170	0,168	134	0,2513658
16,274	546,6	547,0	98,49	97,60	0,170	0,168	135	0,2509612
16,173	546,6	547,0	99,26	98,50	0,170	0,168	136	0,249337
16,277	546,6	547,1	98,56	97,93	0,170	0,168	137	0,2509607
16,301	546,7	547,1	98,29	97,75	0,170	0,168	138	0,2513657
16,206	546,7	547,1	98,97	98,30	0,170	0,168	139	0,2499475
16,116	546,7	547,1	99,51	98,63	0,170	0,168	140	0,2485216
16,393	546,7	547,1	97,76	96,65	0,170	0,168	141	0,2527759
16,171	546,7	547,1	98,97	98,52	0,170	0,168	142	0,2493372
16,277	546,8	547,1	98,52	97,86	0,170	0,168	143	0,2509613
16,279	546,8	547,2	98,44	97,81	0,170	0,168	144	0,2509617
16,371	546,8	547,2	97,92	97,27	0,170	0,168	145	0,2523732
16,169	546,9	547,2	99,06	98,41	0,170	0,168	146	0,2493377
16,394	546,9	547,3	97,73	97,17	0,170	0,168	147	0,252776
16,395	547,0	547,3	97,72	97,14	0,170	0,168	148	0,2527757
16,120	547,0	547,3	99,36	98,59	0,170	0,168	149	0,2485221
16,214	547,1	547,4	98,87	98,21	0,170	0,168	150	0,249948
16,393	547,1	547,4	97,60	97,06	0,170	0,168	151	0,2527756
16,171	547,1	547,5	99,05	98,37	0,170	0,168	152	0,249338

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,62	100,09	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
15,880	538,1	538,5			0,172	0,169	0	0,2458368
15,732	538,2	538,5	101,63	100,88	0,172	0,169	1	0,245837
15,653	538,3	538,5	101,68	100,83	0,172	0,169	2	0,2450103
15,761	538,3	538,6	100,80	100,39	0,172	0,169	3	0,2468675
15,771	538,4	538,6	100,69	100,14	0,172	0,170	4	0,2471698
15,662	538,4	538,7	101,36	100,90	0,172	0,170	5	0,245424
15,666	538,4	538,7	101,31	101,11	0,172	0,170	6	0,2454245
15,626	538,4	538,7	101,53	100,85	0,172	0,170	7	0,24501
15,721	538,4	538,7	100,95	100,28	0,172	0,169	8	0,2464567
15,655	538,4	538,7	101,44	100,53	0,172	0,169	9	0,2454246
15,654	538,5	538,7	101,22	100,76	0,172	0,169	10	0,2454245
15,718	538,5	538,8	100,73	100,28	0,171	0,169	11	0,2464569
15,570	538,5	538,8	102,04	101,51	0,172	0,169	12	0,2439725
15,688	538,6	538,8	101,07	100,73	0,172	0,170	13	0,2458378
15,665	538,6	538,9	101,33	100,69	0,171	0,169	14	0,2454248
15,650	538,6	538,9	101,24	100,69	0,172	0,169	15	0,2454252
15,785	538,6	538,9	100,31	99,66	0,171	0,169	16	0,2474842
15,786	538,7	538,9	100,34	100,01	0,171	0,169	17	0,2474839
15,730	538,7	539,0	100,81	100,31	0,171	0,169	18	0,2464566
15,695	538,8	539,0	101,25	100,57	0,171	0,169	19	0,2458378
15,733	538,8	539,1	100,87	100,38	0,172	0,169	20	0,2464578
15,695	538,9	539,1	101,13	100,53	0,171	0,169	21	0,2458387
15,824	539,0	539,2	100,43	99,78	0,172	0,169	22	0,2478947
15,772	539,1	539,3	100,69	100,36	0,171	0,169	23	0,2468686
15,800	539,1	539,3	100,42	99,81	0,171	0,169	24	0,2474846
15,585	539,2	539,4	101,98	101,50	0,171	0,169	25	0,2439739
15,773	539,2	539,4	100,71	100,59	0,171	0,170	26	0,2468685
15,740	539,3	539,4	100,81	100,11	0,171	0,169	27	0,246458
15,658	539,3	539,5	101,47	101,02	0,171	0,169	28	0,2450113
15,770	539,3	539,5	100,76	100,09	0,171	0,169	29	0,2468687
15,777	539,3	539,5	100,78	100,16	0,171	0,169	30	0,2468684
15,751	539,4	539,6	100,82	100,64	0,171	0,169	31	0,2464583
15,777	539,5	539,6	100,66	100,23	0,171	0,169	32	0,2468695
15,748	539,6	539,7	100,77	100,42	0,171	0,169	33	0,2464581
15,713	539,6	539,8	101,02	100,69	0,171	0,169	34	0,2458393
15,846	539,7	539,8	100,29	99,71	0,171	0,169	35	0,2478965
15,687	539,7	539,8	101,32	100,81	0,171	0,169	36	0,2454267
15,551	539,7	539,9	102,13	101,59	0,171	0,169	37	0,2433491
15,818	539,7	539,9	100,08	99,64	0,171	0,169	38	0,2478964
15,768	539,7	539,9	100,47	100,06	0,171	0,169	39	0,2468698
15,713	539,7	539,9	101,09	100,53	0,171	0,169	40	0,2458398
15,659	539,8	540,0	101,34	100,96	0,171	0,169	41	0,2450122
15,889	539,9	540,0	100,08	99,40	0,171	0,169	42	0,2485098
15,785	540,0	540,1	100,83	100,24	0,171	0,169	43	0,2468705
15,718	540,0	540,2	101,31	100,50	0,171	0,169	44	0,24584
15,698	540,0	540,2	101,35	100,70	0,171	0,169	45	0,2454275
15,764	540,1	540,2	100,90	100,35	0,171	0,169	46	0,2464596
15,768	540,2	540,3	100,74	100,41	0,171	0,169	47	0,2464594
15,830	540,2	540,3	100,49	99,89	0,171	0,169	48	0,2474866
15,725	540,3	540,4	100,96	100,59	0,171	0,169	49	0,24584
15,798	540,3	540,4	100,67	100,31	0,171	0,169	50	0,2468702
15,794	540,3	540,5	100,59	100,15	0,171	0,169	51	0,2468709
15,790	540,3	540,5	100,69	100,24	0,171	0,169	52	0,2468705
15,727	540,4	540,5	100,94	100,47	0,171	0,169	53	0,2458404
15,836	540,4	540,6	100,42	99,98	0,171	0,169	54	0,2474867
15,864	540,5	540,6	100,28	99,85	0,171	0,169	55	0,2478973

15,802	540,5	540,6	100,51	100,11	0,171	0,169	56	0,2468708
15,843	540,6	540,7	100,66	99,78	0,171	0,169	57	0,2474872
15,816	540,6	540,8	100,77	100,18	0,171	0,169	58	0,2468706
15,786	540,7	540,8	100,92	100,27	0,171	0,169	59	0,2464597
15,880	540,7	540,9	101,76	99,62	0,172	0,169	60	0,2478975
15,805	540,7	540,9	100,55	99,84	0,172	0,168	61	0,2468703
15,810	540,8	540,9	100,68	99,96	0,171	0,168	62	0,2468712
15,810	540,8	541,0	100,60	100,18	0,171	0,169	63	0,2468712
15,848	540,9	541,0	100,34	99,97	0,171	0,169	64	0,2474872
15,705	540,9	541,0	100,91	100,75	0,171	0,169	65	0,245428
15,743	540,9	541,1	100,87	100,28	0,170	0,169	66	0,2458408
15,816	541,0	541,1	100,82	100,05	0,171	0,168	67	0,2468715
15,820	541,0	541,2	100,55	100,15	0,171	0,169	68	0,2468714
15,813	541,0	541,2	100,59	99,85	0,171	0,168	69	0,2468713
15,789	541,1	541,2	100,57	100,29	0,170	0,168	70	0,2464604
15,729	541,1	541,3	101,13	100,58	0,170	0,168	71	0,2454282
15,797	541,1	541,3	100,88	100,16	0,171	0,168	72	0,246455
15,760	541,2	541,4	101,12	100,52	0,171	0,168	73	0,245841
15,737	541,2	541,4	101,27	100,93	0,171	0,169	74	0,2453973
15,894	541,3	541,5	100,16	99,62	0,171	0,169	75	0,2478982
15,511	541,3	541,5	102,59	102,22	0,170	0,168	76	0,2418866
15,738	541,4	541,6	101,04	100,80	0,170	0,169	77	0,2454287
15,832	541,4	541,6	100,61	99,93	0,170	0,168	78	0,2468718
15,900	541,5	541,6	100,11	99,60	0,170	0,168	79	0,2478983
15,809	541,5	541,7	100,75	100,26	0,170	0,168	80	0,2464611
15,815	541,5	541,7	100,83	100,30	0,170	0,168	81	0,2464609
15,815	541,6	541,8	100,82	100,30	0,170	0,168	82	0,2464608
15,911	541,6	541,8	100,21	99,62	0,170	0,168	83	0,2478986
15,852	541,7	541,9	100,63	100,13	0,170	0,168	84	0,2468722
15,826	541,7	542,0	100,79	100,26	0,170	0,168	85	0,2464612
15,667	541,8	542,0	101,84	101,16	0,170	0,168	86	0,2439768
15,786	541,8	542,1	100,98	100,48	0,170	0,168	87	0,2458423
15,823	541,8	542,1	100,70	100,35	0,170	0,168	88	0,2464611
15,755	541,9	542,1	101,10	100,47	0,170	0,168	89	0,2454291
15,829	541,9	542,2	100,70	100,07	0,170	0,168	90	0,246461
15,859	542,0	542,2	100,56	100,18	0,170	0,168	91	0,2468721
15,792	542,0	542,3	101,15	100,65	0,170	0,168	92	0,2458423
15,798	542,1	542,3	101,07	100,55	0,170	0,168	93	0,245842
15,837	542,1	542,4	100,76	100,21	0,170	0,168	94	0,2464614
15,773	542,2	542,4	101,42	100,89	0,170	0,168	95	0,2454291
15,868	542,2	542,5	100,61	100,14	0,170	0,168	96	0,2468727
15,778	542,2	542,5	101,35	100,64	0,170	0,168	97	0,2454296
15,867	542,3	542,5	100,60	100,13	0,170	0,168	98	0,2468729
15,751	542,3	542,6	101,35	100,81	0,170	0,168	99	0,2450149
15,979	542,4	542,7	99,83	99,46	0,170	0,168	100	0,2485117
15,871	542,5	542,7	100,56	100,06	0,170	0,168	101	0,2468723
15,874	542,5	542,8	100,70	100,05	0,170	0,168	102	0,246868
15,879	542,6	542,9	100,61	100,01	0,170	0,168	103	0,2468732
15,876	542,6	542,9	100,51	99,87	0,170	0,168	104	0,246887
15,916	542,6	543,0	100,28	99,84	0,170	0,168	105	0,2474889
15,781	542,7	543,0	101,14	100,68	0,170	0,168	106	0,2454302
15,852	542,7	543,0	100,47	100,39	0,170	0,168	107	0,246462
15,852	542,7	543,1	100,69	100,29	0,170	0,168	108	0,2464623
15,789	542,8	543,1	101,14	100,85	0,170	0,168	109	0,2454309
15,951	542,8	543,2	100,21	99,64	0,170	0,168	110	0,2479007
15,946	542,9	543,2	100,11	99,52	0,170	0,168	111	0,2478986
15,943	543,0	543,3	99,95	99,69	0,170	0,168	112	0,2479002
15,856	543,0	543,3	100,57	100,24	0,170	0,168	113	0,2464625
15,885	543,1	543,4	100,48	99,96	0,170	0,168	114	0,2468737
15,863	543,1	543,4	100,74	100,13	0,170	0,168	115	0,2464941
15,947	543,1	543,5	100,07	99,60	0,170	0,168	116	0,2479006

15,857	543,1	543,5	100,56	100,38	0,170	0,168	117	0,2464632
15,922	543,1	543,5	100,20	99,58	0,170	0,168	118	0,2474908
15,853	543,2	543,6	100,61	100,06	0,170	0,167	119	0,2464628
15,986	543,2	543,6	99,69	99,18	0,170	0,167	120	0,2485135
15,948	543,3	543,6	100,16	99,47	0,170	0,167	121	0,2479003
15,852	543,3	543,6	100,72	100,23	0,170	0,168	122	0,246463
15,880	543,3	543,7	100,38	99,74	0,170	0,168	123	0,2468741
15,790	543,3	543,7	101,08	100,43	0,170	0,167	124	0,2454313
15,812	543,3	543,7	100,85	100,30	0,170	0,167	125	0,2458444
15,916	543,3	543,7	100,06	99,45	0,170	0,167	126	0,2474903
15,813	543,3	543,8	100,70	100,18	0,169	0,167	127	0,2458442
15,812	543,3	543,8	100,76	100,21	0,169	0,167	128	0,2458444
15,852	543,4	543,8	100,62	100,00	0,170	0,167	129	0,246463
15,920	543,4	543,9	100,04	99,70	0,170	0,168	130	0,247491
15,912	543,4	543,9	100,13	99,36	0,170	0,167	131	0,2474815
15,915	543,5	543,9	100,06	99,47	0,170	0,167	132	0,2474909
15,915	543,5	543,9	100,14	99,51	0,170	0,167	133	0,2474908
15,848	543,5	544,0	100,34	100,00	0,169	0,167	134	0,246464
15,913	543,5	543,9	100,05	99,49	0,169	0,167	135	0,2474924
15,907	543,5	543,9	100,06	99,62	0,170	0,167	136	0,2474892
15,932	543,5	544,0	99,73	99,26	0,169	0,167	137	0,2479013
15,972	543,6	544,0	99,58	98,97	0,169	0,167	138	0,2485145
15,805	543,6	544,1	100,77	100,09	0,170	0,167	139	0,2458442
15,866	543,6	544,1	100,12	99,52	0,169	0,167	140	0,2468708
15,866	543,7	544,1	100,11	99,57	0,169	0,167	141	0,2468753
15,937	543,7	544,1	99,91	99,54	0,169	0,167	142	0,2479012
15,801	543,8	544,2	100,48	100,10	0,169	0,168	143	0,245845
15,844	543,8	544,2	100,27	99,82	0,169	0,167	144	0,2464636
15,747	543,8	544,2	100,97	100,31	0,169	0,167	145	0,245018
15,907	543,8	544,3	100,07	99,55	0,170	0,167	146	0,2474913
15,906	543,9	544,3	100,04	99,57	0,170	0,168	147	0,2474917
15,748	543,9	544,3	100,95	100,27	0,169	0,167	148	0,2450181
15,866	543,9	544,3	100,22	99,58	0,169	0,167	149	0,2468759
15,839	543,9	544,4	100,47	99,86	0,170	0,167	150	0,2464649
15,864	543,9	544,4	100,15	99,60	0,170	0,167	151	0,2469229
15,768	543,9	544,4	100,86	100,24	0,170	0,167	152	0,2454329
15,833	543,9	544,4	100,44	99,86	0,170	0,167	153	0,2464642
15,796	543,9	544,4	100,74	99,94	0,170	0,167	154	0,2458456
15,896	544,0	544,4	99,75	99,24	0,169	0,167	155	0,247492
15,900	544,0	544,4	99,99	99,41	0,169	0,167	156	0,2474919
15,898	544,0	544,5	99,99	99,36	0,170	0,167	157	0,2474923
15,859	544,0	544,5	100,08	99,64	0,169	0,167	158	0,2468762
15,894	544,1	544,5	99,94	99,12	0,169	0,167	159	0,2474925
15,857	544,0	544,5	100,10	99,44	0,169	0,167	160	0,2468762
15,762	544,0	544,5	100,66	100,05	0,169	0,167	161	0,2454331
15,789	544,1	544,6	100,47	100,01	0,169	0,167	162	0,2458458
15,895	544,1	544,6	99,80	99,55	0,169	0,167	163	0,2474922
15,920	544,1	544,6	99,62	98,99	0,169	0,167	164	0,247903
15,851	544,2	544,6	100,06	99,71	0,169	0,167	165	0,2468761
15,788	544,2	544,7	100,57	99,84	0,169	0,167	166	0,2458464
15,791	544,2	544,7	100,54	99,88	0,169	0,167	167	0,2458461
15,917	544,2	544,7	99,72	99,21	0,169	0,167	168	0,2479024
15,960	544,2	544,7	99,32	98,89	0,169	0,167	169	0,2485162
15,851	544,3	544,8	100,04	99,49	0,169	0,167	170	0,2468764
15,785	544,3	544,8	100,49	99,97	0,169	0,167	171	0,245853
15,893	544,3	544,8	99,90	99,27	0,169	0,167	172	0,2474928
15,851	544,3	544,8	100,00	99,70	0,169	0,167	173	0,2468767
15,896	544,3	544,8	99,80	99,33	0,169	0,167	174	0,2474931
15,733	544,4	544,9	100,79	100,24	0,169	0,167	175	0,2450187
15,887	544,4	544,9	99,89	99,07	0,169	0,167	176	0,2474932
15,847	544,4	544,9	100,19	99,44	0,170	0,167	177	0,2468767

15,848	544,4	544,9	100,02	99,54	0,169	0,167	178	0,246877
15,956	544,4	544,9	99,29	98,99	0,169	0,167	179	0,2485167
15,953	544,4	545,0	99,70	99,14	0,170	0,168	180	0,2485165

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	101,14	99,86	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
16,190	539,2	539,5			0,171	0,168	0	0,2331182
16,137	539,4	539,6	102,43	101,33	0,171	0,168	1	0,2393486
15,821	539,5	539,7	104,93	103,70	0,170	0,168	2	0,2342058
15,705	539,6	539,8	106,85	105,72	0,170	0,168	3	0,2311523
15,647	539,7	539,8	108,53	107,40	0,170	0,168	4	0,2289462
15,672	539,7	539,9	109,32	107,94	0,170	0,168	5	0,2285029
15,674	539,8	540,0	109,88	108,52	0,171	0,168	6	0,2278351
15,636	539,9	540,1	107,36	106,37	0,170	0,168	7	0,2300519
15,510	540,0	540,2	105,74	104,08	0,170	0,168	8	0,2311523
15,468	540,0	540,3	104,87	103,51	0,170	0,168	9	0,2315911
15,416	540,1	540,3	104,50	103,34	0,170	0,168	10	0,231591
15,554	540,1	540,4	103,02	102,01	0,170	0,168	11	0,2342059
15,491	540,2	540,5	102,97	101,93	0,170	0,168	12	0,2337725
15,475	540,2	540,5	103,05	101,65	0,170	0,168	13	0,2337725
15,172	540,2	540,5	104,79	103,00	0,170	0,168	14	0,2293902
15,516	540,3	540,5	102,04	91,40	0,170	0,160	15	0,2348547
15,466	540,3	540,6	102,34	101,19	0,170	0,160	16	0,2342058
15,480	540,3	540,6	101,85	100,84	0,170	0,168	17	0,2348551
15,518	540,3	540,7	101,45	100,19	0,170	0,168	18	0,235718
15,484	540,3	540,7	101,61	100,50	0,170	0,168	19	0,2352878
15,520	540,4	540,7	101,44	100,18	0,170	0,168	20	0,2357181
15,416	540,4	540,7	102,19	100,97	0,170	0,168	21	0,2342064
15,488	540,5	540,8	101,57	100,44	0,170	0,168	22	0,2352878
15,412	540,5	540,8	102,00	100,92	0,170	0,168	23	0,2342065
15,449	540,5	540,9	101,73	100,42	0,170	0,168	24	0,2348556
15,371	540,6	540,9	102,09	100,89	0,170	0,168	25	0,2337734
15,442	540,6	540,9	101,58	100,46	0,170	0,168	26	0,2348559
15,403	540,7	541,0	102,02	100,88	0,170	0,168	27	0,2342066
15,432	540,7	541,0	101,55	100,17	0,170	0,168	28	0,2348558
15,324	540,8	541,1	102,46	101,02	0,170	0,168	29	0,2331204
15,461	540,8	541,1	101,31	100,06	0,170	0,168	30	0,2352885
15,249	540,9	541,2	102,81	101,53	0,170	0,168	31	0,2320298
15,392	540,9	541,2	101,88	100,48	0,170	0,168	32	0,2342066
15,154	540,9	541,3	103,50	102,26	0,170	0,168	33	0,230495
15,251	540,9	541,3	102,86	101,59	0,170	0,168	34	0,2320334
15,196	541,0	541,3	103,29	102,07	0,170	0,168	35	0,2311544
15,336	541,0	541,4	102,48	101,14	0,170	0,168	36	0,2331217
15,237	541,1	541,4	103,08	101,94	0,170	0,168	37	0,2315925
15,140	541,2	541,5	103,82	102,59	0,170	0,168	38	0,2300546
15,165	541,3	541,6	103,52	102,43	0,170	0,168	39	0,2304938
15,170	541,3	541,6	103,59	102,43	0,170	0,168	40	0,230495
15,221	541,4	541,7	103,32	101,93	0,170	0,168	41	0,2311549
15,181	541,5	541,8	103,55	102,15	0,170	0,167	42	0,2304949
15,283	541,6	541,9	102,97	101,63	0,170	0,168	43	0,2320312
15,183	541,7	542,0	103,50	102,49	0,170	0,168	44	0,2304952
15,284	541,7	542,0	102,73	101,50	0,170	0,168	45	0,2320314
15,478	541,7	542,0	101,80	100,51	0,170	0,168	46	0,2348574
15,440	541,8	542,0	102,00	100,79	0,170	0,168	47	0,2342082
15,259	541,8	542,1	103,26	102,10	0,170	0,168	48	0,2315936
15,271	541,9	542,2	103,17	101,81	0,170	0,168	49	0,2315933
15,244	541,9	542,2	103,52	102,18	0,170	0,168	50	0,2311558
15,305	542,0	542,3	102,94	101,88	0,170	0,168	51	0,2320318
15,279	542,0	542,3	103,27	102,11	0,170	0,168	52	0,2315935
15,283	542,1	542,3	103,30	101,98	0,170	0,168	53	0,231594
15,386	542,1	542,4	102,68	101,41	0,170	0,168	54	0,233122
15,255	542,1	542,4	103,56	102,31	0,170	0,168	55	0,2311557

15,285	542,2	542,5	103,33	102,04	0,170	0,168	56	0,2315936
15,314	542,2	542,5	102,99	101,73	0,170	0,168	57	0,2320326
15,312	542,2	542,5	103,22	101,87	0,170	0,168	58	0,2320249
15,217	542,2	542,6	103,68	102,33	0,170	0,168	59	0,2304959
15,288	542,2	542,6	103,21	102,15	0,170	0,168	60	0,2315936
15,205	542,2	542,6	103,83	102,62	0,170	0,168	61	0,2304955
15,283	542,3	542,6	103,31	101,96	0,170	0,168	62	0,231594
15,248	542,3	542,7	103,43	102,29	0,170	0,168	63	0,2310215
15,288	542,3	542,7	103,32	101,96	0,170	0,168	64	0,2315937
15,315	542,4	542,7	102,95	101,79	0,170	0,168	65	0,2320324
15,316	542,4	542,8	102,94	101,57	0,170	0,167	66	0,232033
15,321	542,4	542,8	103,03	101,88	0,170	0,167	67	0,2320324
15,321	542,4	542,8	102,95	101,67	0,170	0,167	68	0,2320329
15,146	542,4	542,8	104,06	102,81	0,169	0,167	69	0,2293935
15,286	542,4	542,8	103,23	102,11	0,170	0,168	70	0,2315949
15,391	542,4	542,8	102,52	101,26	0,170	0,168	71	0,233123
15,429	542,4	542,8	102,33	101,27	0,170	0,168	72	0,2337758
15,390	542,4	542,8	102,66	101,22	0,170	0,168	73	0,2331234
15,138	542,4	542,8	104,12	102,88	0,170	0,167	74	0,2293941
15,237	542,4	542,8	103,61	102,24	0,170	0,167	75	0,2308283
15,374	542,4	542,8	102,53	101,09	0,170	0,167	76	0,2331239
15,270	542,5	542,8	102,98	101,73	0,170	0,167	77	0,2315954
15,419	542,5	542,9	102,13	101,07	0,170	0,168	78	0,2337761
15,383	542,5	542,9	102,39	101,17	0,170	0,168	79	0,2331248
15,238	542,5	542,9	103,32	102,10	0,170	0,168	80	0,2311563
15,369	542,5	542,9	102,20	101,05	0,170	0,167	81	0,2331234
15,294	542,5	542,9	102,81	101,43	0,169	0,167	82	0,2320334
15,356	542,5	542,9	102,33	100,81	0,170	0,167	83	0,2331236
15,426	542,4	542,9	101,86	100,63	0,170	0,167	84	0,2342092
15,283	542,4	542,9	102,85	101,60	0,170	0,168	85	0,2320334
15,357	542,4	542,8	102,26	100,95	0,170	0,167	86	0,2331233
15,354	542,4	542,8	102,31	101,12	0,170	0,167	87	0,2331237
15,417	542,4	542,8	101,87	100,45	0,170	0,167	88	0,2342091
15,390	542,3	542,8	102,04	100,72	0,170	0,167	89	0,2337753
15,413	542,3	542,8	101,63	100,52	0,170	0,168	90	0,2342091
15,265	542,4	542,8	102,76	101,34	0,170	0,167	91	0,2320334
15,375	542,4	542,9	101,94	100,71	0,170	0,168	92	0,2337832
15,259	542,4	542,9	102,60	101,34	0,170	0,168	93	0,2320324
15,259	542,4	542,9	102,60	101,46	0,170	0,168	94	0,2320324
15,438	542,5	542,9	101,43	100,02	0,170	0,167	95	0,234855
15,428	542,5	542,9	101,25	99,85	0,170	0,167	96	0,234856
15,383	542,5	542,9	101,55	100,09	0,170	0,167	97	0,2342092
15,424	542,4	542,9	101,09	99,82	0,170	0,167	98	0,2348583
15,228	542,4	542,8	102,34	101,00	0,169	0,167	99	0,2320326
15,404	542,3	542,8	101,32	99,87	0,170	0,167	100	0,2348588
15,340	542,3	542,8	101,69	100,37	0,170	0,167	101	0,2337758
15,225	542,3	542,8	102,56	101,22	0,170	0,168	102	0,2320326
15,366	542,3	542,8	101,43	100,09	0,170	0,167	103	0,2342092
15,288	542,2	542,7	102,00	100,52	0,170	0,167	104	0,2331229
15,425	542,2	542,7	100,79	99,54	0,170	0,167	105	0,2352905
15,280	542,2	542,7	101,74	100,41	0,170	0,167	106	0,2331235
15,383	542,1	542,7	101,20	99,77	0,170	0,167	107	0,2347093
15,383	542,1	542,7	101,01	99,75	0,170	0,167	108	0,2348581
15,384	542,1	542,6	100,95	99,82	0,170	0,168	109	0,2348587
15,336	542,2	542,6	101,23	99,96	0,170	0,168	110	0,2342096
15,405	542,2	542,6	100,74	99,39	0,170	0,167	111	0,2352902
15,426	542,2	542,6	100,58	99,17	0,170	0,167	112	0,2357206
15,184	542,2	542,6	102,23	100,95	0,170	0,167	113	0,2320325
15,327	542,2	542,6	101,14	99,81	0,170	0,167	114	0,2342093
15,246	542,1	542,6	101,72	100,36	0,170	0,167	115	0,2331224
15,356	542,1	542,6	100,82	99,44	0,170	0,167	116	0,2348579

15,304	542,1	542,5	101,13	99,79	0,170	0,167	117	0,2342084
15,306	542,0	542,5	101,05	99,69	0,170	0,167	118	0,2342087
15,401	542,0	542,5	100,51	99,13	0,170	0,167	119	0,2357205
15,320	542,0	542,5	100,56	99,22	0,170	0,167	120	0,2348584
15,347	542,0	542,5	100,34	98,93	0,170	0,167	121	0,2352638
15,352	542,1	542,5	100,42	99,25	0,170	0,167	122	0,2352904
15,345	542,1	542,5	100,37	99,14	0,170	0,168	123	0,2352904
15,132	542,1	542,6	101,84	100,43	0,170	0,167	124	0,2320329
15,240	542,2	542,6	101,17	99,55	0,170	0,167	125	0,2337755
15,365	542,2	542,6	100,30	98,73	0,170	0,167	126	0,2357211
15,294	542,1	542,6	100,33	99,12	0,170	0,167	127	0,2348584
15,249	542,1	542,6	100,60	99,40	0,170	0,167	128	0,2342091
15,320	542,1	542,6	100,18	99,25	0,170	0,168	129	0,235291
15,350	542,1	542,6	99,95	98,57	0,170	0,168	130	0,2357213
15,179	542,1	542,5	101,12	99,92	0,170	0,167	131	0,2331231
15,321	542,0	542,5	100,19	99,05	0,170	0,168	132	0,2352907
15,310	542,0	542,5	100,17	98,71	0,170	0,167	133	0,23529
15,076	542,0	542,5	101,79	100,42	0,170	0,167	134	0,2315943
15,347	542,0	542,5	100,04	98,80	0,170	0,167	135	0,2357207
15,104	542,0	542,5	101,49	100,35	0,170	0,168	136	0,2320319
15,317	542,0	542,4	100,15	98,82	0,170	0,167	137	0,2352907
15,218	542,0	542,4	100,78	99,83	0,170	0,168	138	0,2337756
15,312	542,0	542,4	100,31	99,09	0,170	0,168	139	0,2352903
15,334	541,9	542,4	100,03	98,81	0,170	0,168	140	0,2357208
15,329	541,9	542,4	99,99	98,58	0,170	0,168	141	0,2357206
15,330	541,9	542,3	99,91	98,76	0,170	0,167	142	0,23572
15,239	541,9	542,3	100,50	99,36	0,170	0,168	143	0,2342863
15,329	541,8	542,3	99,99	98,77	0,170	0,168	144	0,2357204
15,272	541,8	542,3	100,33	98,97	0,170	0,168	145	0,2348578
15,190	541,8	542,3	100,74	99,61	0,170	0,168	146	0,2337748
15,293	541,8	542,3	100,22	98,73	0,170	0,168	147	0,2352894
15,329	541,8	542,3	99,97	98,89	0,170	0,168	148	0,2357204
15,203	541,8	542,3	100,86	99,89	0,170	0,168	149	0,233775
15,332	541,8	542,2	100,00	98,79	0,170	0,168	150	0,23572
15,198	541,8	542,3	100,82	99,45	0,170	0,168	151	0,2337693
15,328	541,8	542,3	100,04	98,60	0,170	0,167	152	0,23572
15,281	541,8	542,3	100,37	99,25	0,170	0,168	153	0,234858
15,279	541,8	542,3	100,45	99,00	0,170	0,168	154	0,2348579
15,301	541,9	542,3	100,13	98,81	0,170	0,167	155	0,2352896
15,326	541,9	542,3	99,94	98,79	0,170	0,168	156	0,2357202
15,275	541,9	542,3	100,33	98,98	0,170	0,168	157	0,2348578
15,165	541,9	542,3	101,15	99,82	0,170	0,167	158	0,2331224
15,274	541,9	542,4	100,37	98,99	0,170	0,167	159	0,2348575
15,301	541,9	542,4	100,05	98,76	0,170	0,167	160	0,2352903
15,327	541,9	542,4	99,94	98,88	0,170	0,168	161	0,2357205
15,293	542,0	542,4	100,11	98,60	0,170	0,167	162	0,2352903
15,293	542,0	542,4	99,93	98,86	0,170	0,167	163	0,2352903
15,233	542,0	542,4	100,39	99,07	0,170	0,167	164	0,2343713
15,267	542,0	542,4	100,50	99,12	0,170	0,167	165	0,2348578
15,322	542,0	542,5	99,94	98,54	0,170	0,168	166	0,2357202
15,291	542,0	542,5	100,12	98,75	0,170	0,167	167	0,2352986
15,261	542,0	542,5	100,15	98,83	0,170	0,167	168	0,2348578
15,316	542,1	542,5	99,77	98,63	0,170	0,167	169	0,2357204
15,260	542,1	542,5	100,20	98,98	0,170	0,168	170	0,2348578
15,261	542,1	542,5	100,10	99,03	0,170	0,168	171	0,2348577
15,286	542,1	542,5	99,95	98,70	0,170	0,168	172	0,2352902
15,311	542,1	542,5	99,75	98,66	0,170	0,168	173	0,2357201
15,250	542,1	542,5	100,13	98,97	0,170	0,168	174	0,2348583
15,346	542,1	542,5	99,34	98,44	0,170	0,168	175	0,2363663
15,302	542,1	542,5	99,68	98,73	0,169	0,168	176	0,2357208
15,272	542,1	542,5	99,99	98,76	0,170	0,168	177	0,2352902

15,299	542,1	542,5	99,62	98,32	0,170	0,167	178	0,2357209
15,272	542,1	542,6	99,85	98,66	0,170	0,167	179	0,2352904
15,270	542,1	542,6	99,99	98,68	0,170	0,168	180	0,235287
15,289	542,1	542,6	99,54	98,44	0,170	0,168	181	0,2357209
15,261	542,1	542,6	99,61	98,63	0,169	0,168	182	0,2352903
15,259	542,1	542,6	99,95	98,66	0,170	0,168	183	0,2352904
15,228	542,1	542,6	99,97	98,73	0,170	0,168	184	0,2348583
15,284	542,1	542,6	99,56	98,13	0,170	0,167	185	0,2357208
15,280	542,1	542,6	99,51	98,42	0,170	0,167	186	0,2357207
15,277	542,1	542,6	99,56	98,26	0,170	0,167	187	0,2357209
15,275	542,1	542,6	99,55	98,54	0,170	0,168	188	0,2357208
15,245	542,1	542,6	99,68	98,46	0,170	0,168	189	0,2352907
15,385	542,1	542,5	98,93	97,59	0,170	0,167	190	0,2374367
15,242	542,0	542,6	99,59	98,26	0,170	0,167	191	0,2352904
15,337	542,1	542,5	99,11	97,96	0,170	0,167	192	0,2367949
15,330	542,0	542,5	98,92	97,72	0,170	0,168	193	0,2367955
15,260	542,0	542,5	99,47	98,24	0,170	0,167	194	0,2357206
15,233	542,0	542,5	99,50	98,47	0,170	0,168	195	0,2353555
15,230	542,0	542,5	99,59	98,67	0,170	0,168	196	0,2352922
15,259	542,0	542,5	99,46	98,12	0,170	0,168	197	0,2357214
15,366	542,0	542,5	98,76	97,52	0,170	0,167	198	0,2374374
15,251	542,0	542,5	99,33	98,01	0,170	0,167	199	0,2357211
15,248	542,0	542,5	99,32	98,16	0,170	0,167	200	0,2357207
15,149	542,0	542,5	99,93	98,76	0,170	0,167	201	0,2342142
15,151	542,1	542,5	100,11	98,86	0,170	0,168	202	0,234209
15,250	542,1	542,5	99,32	98,27	0,170	0,168	203	0,2357208
15,290	542,2	542,6	99,25	97,76	0,170	0,167	204	0,2363662
15,315	542,2	542,6	98,80	97,73	0,170	0,167	205	0,236795
15,314	542,2	542,6	98,90	97,75	0,170	0,168	206	0,2367951
15,241	542,3	542,7	99,38	98,16	0,170	0,168	207	0,2357212
15,284	542,3	542,7	98,98	98,06	0,170	0,168	208	0,2363663
15,241	542,2	542,7	99,20	98,25	0,169	0,168	209	0,2357208
15,209	542,3	542,7	99,31	98,45	0,169	0,168	210	0,2352902
15,210	542,3	542,7	99,38	98,21	0,169	0,168	211	0,2352908
15,310	542,3	542,7	98,80	97,59	0,169	0,167	212	0,2367951
15,233	542,3	542,7	99,28	98,00	0,170	0,167	213	0,2357214
15,274	542,3	542,7	98,86	97,62	0,170	0,167	214	0,2363666
15,236	542,3	542,7	99,30	98,22	0,170	0,167	215	0,2357212
15,234	542,3	542,7	99,29	98,04	0,170	0,168	216	0,2357221
15,232	542,3	542,7	99,23	97,93	0,170	0,167	217	0,2357214
15,236	542,3	542,7	99,26	98,16	0,170	0,167	218	0,2357215
15,297	542,3	542,8	98,77	97,55	0,170	0,168	219	0,2367948
15,202	542,4	542,8	99,33	98,20	0,170	0,167	220	0,2352924
15,226	542,4	542,8	99,18	97,85	0,170	0,167	221	0,2357208
15,199	542,4	542,8	99,34	98,31	0,170	0,167	222	0,2352908
15,228	542,4	542,8	99,21	97,88	0,170	0,167	223	0,2357211
15,297	542,4	542,8	98,65	97,65	0,169	0,167	224	0,2367949
15,224	542,4	542,8	99,19	97,76	0,170	0,167	225	0,235721
15,222	542,4	542,8	99,20	98,15	0,170	0,167	226	0,2357213
15,222	542,4	542,8	99,15	97,90	0,170	0,168	227	0,2357217
15,266	542,4	542,9	98,87	97,77	0,170	0,167	228	0,2363672
15,220	542,5	542,9	98,98	97,91	0,169	0,167	229	0,2357217
15,194	542,6	542,9	99,35	98,27	0,169	0,168	230	0,2352911
15,332	542,6	543,0	98,42	97,08	0,170	0,167	231	0,2374384
15,090	542,6	543,0	99,89	98,70	0,170	0,167	232	0,2337766
15,327	542,6	543,0	98,36	97,18	0,169	0,167	233	0,2374379
15,286	542,6	543,0	98,62	97,37	0,169	0,167	234	0,236796
15,219	542,7	543,1	98,95	97,82	0,169	0,167	235	0,2357218
15,211	542,7	543,1	99,00	97,69	0,169	0,167	236	0,235722
15,279	542,8	543,1	98,66	97,33	0,170	0,167	237	0,2367956
15,320	542,8	543,2	98,24	96,99	0,169	0,167	238	0,2374382

15,183	542,9	543,2	99,19	97,93	0,169	0,167	239	0,2352915
15,280	542,9	543,2	98,47	97,36	0,169	0,167	240	0,2367961
15,263	542,9	543,3	98,58	97,61	0,169	0,167	241	0,2365782
15,210	542,9	543,3	98,86	97,72	0,169	0,167	242	0,2357222
15,150	542,9	543,3	99,16	97,93	0,169	0,167	243	0,2348592
15,275	542,9	543,3	98,52	97,29	0,169	0,167	244	0,2367966
15,208	542,9	543,3	99,01	97,63	0,169	0,167	245	0,2357221
15,176	543,0	543,3	99,17	98,01	0,169	0,167	246	0,2352917
15,204	543,0	543,4	98,86	97,64	0,169	0,167	247	0,2357222
15,204	543,1	543,4	99,01	97,79	0,169	0,167	248	0,2357229
15,246	543,0	543,3	98,75	97,54	0,170	0,167	249	0,2363679
15,310	543,1	543,5	98,09	96,84	0,169	0,167	250	0,2374496

	Outlet	Outlet	Average	Average	#1	#2		
Tunnel	Temp.	Temp.	100,53	99,58	System 1	System 2		SQRT
Velocity	Meter 1	Meter 2	Proportional Rates		Vol.Std.	Vol.Std.		Delta-P
			PR1	PR2			Time	
Ft/Sec	Deg. R	Deg. R	%	%	(ft3)	(ft3)	min	(in H2O)2
16,163	536,4	536,9			0,087	0,064	0	0,2374276
15,946	536,9	537,1	107,07	105,63	0,130	0,117	1	0,2399793
15,640	537,0	537,1	110,14	108,78	0,172	0,170	2	0,2342007
15,687	537,0	537,2	110,54	109,07	0,172	0,170	3	0,2341998
15,656	537,1	537,2	111,22	109,95	0,172	0,170	4	0,2331146
15,406	537,1	537,3	113,61	112,30	0,172	0,170	5	0,2289419
15,474	537,2	537,4	110,05	108,80	0,172	0,170	6	0,233114
15,407	537,2	537,4	108,95	107,70	0,172	0,170	7	0,2337671
15,275	537,2	537,4	108,63	107,18	0,172	0,170	8	0,2331145
15,369	537,3	537,5	107,29	105,88	0,172	0,169	9	0,2352815
15,435	537,3	537,5	106,37	105,20	0,172	0,170	10	0,2367859
15,219	537,3	537,5	107,56	106,21	0,172	0,170	11	0,2337674
15,373	537,3	537,6	106,39	105,01	0,172	0,170	12	0,2363574
15,455	537,4	537,6	105,60	104,25	0,172	0,170	13	0,2378551
15,282	537,4	537,6	106,67	105,22	0,172	0,170	14	0,235282
15,410	537,4	537,7	105,69	104,05	0,172	0,169	15	0,2374286
15,262	537,4	537,7	106,74	105,27	0,172	0,169	16	0,235282
15,329	537,4	537,7	106,01	104,70	0,172	0,170	17	0,2363583
15,219	537,5	537,7	106,76	105,15	0,172	0,170	18	0,234862
15,179	537,5	537,7	107,06	105,64	0,172	0,170	19	0,2342008
15,173	537,5	537,8	106,96	105,56	0,172	0,170	20	0,2342008
15,105	537,6	537,8	107,37	106,21	0,172	0,170	21	0,233115
15,171	537,7	537,9	106,85	105,47	0,172	0,170	22	0,2342006
15,166	537,7	538,0	106,89	105,39	0,172	0,169	23	0,2342009
15,214	537,8	538,0	106,47	105,23	0,172	0,169	24	0,2348503
15,311	537,8	538,1	105,88	104,66	0,172	0,170	25	0,236359
15,171	537,9	538,1	106,67	105,56	0,172	0,170	26	0,234201
15,173	537,9	538,1	106,97	105,46	0,172	0,170	27	0,2342013
15,207	538,0	538,2	106,41	104,94	0,172	0,169	28	0,2348506
15,235	538,0	538,2	106,22	104,86	0,172	0,169	29	0,2352827
15,327	538,0	538,3	105,46	104,10	0,171	0,169	30	0,2367873
15,233	538,1	538,3	106,23	105,01	0,171	0,169	31	0,2352829
15,299	538,1	538,3	105,75	104,48	0,172	0,170	32	0,2363584
15,302	538,2	538,4	105,63	104,48	0,171	0,170	33	0,2363589
15,209	538,2	538,4	106,35	105,09	0,171	0,169	34	0,2348504
15,141	538,3	538,5	106,96	105,66	0,171	0,169	35	0,2337689
15,376	538,3	538,5	105,16	104,09	0,171	0,170	36	0,2374298
15,302	538,4	538,5	105,54	104,45	0,171	0,170	37	0,2363591
15,127	538,4	538,6	106,93	105,48	0,171	0,169	38	0,2336964
15,161	538,4	538,6	106,69	105,27	0,172	0,169	39	0,2341928
15,301	538,4	538,7	105,62	104,22	0,171	0,169	40	0,2363588
15,300	538,5	538,7	105,59	104,10	0,171	0,169	41	0,2363595
15,339	538,5	538,8	105,62	104,33	0,171	0,169	42	0,2367878
15,377	538,6	538,8	105,19	103,93	0,171	0,169	43	0,2374297
15,233	538,6	538,8	106,33	105,14	0,171	0,169	44	0,2351285
15,315	538,7	538,9	105,77	104,37	0,171	0,169	45	0,23636
15,343	538,8	538,9	105,55	104,10	0,171	0,169	46	0,2367882
15,340	538,8	539,0	105,49	104,19	0,171	0,169	47	0,2367884
15,443	538,9	539,0	104,77	103,56	0,171	0,169	48	0,2382837
15,346	538,9	539,1	105,32	104,25	0,171	0,169	49	0,2367888
15,354	539,0	539,1	105,48	103,98	0,171	0,169	50	0,2367885
15,340	539,0	539,1	105,87	104,41	0,171	0,169	51	0,2363603
15,124	539,1	539,2	107,15	105,89	0,171	0,169	52	0,2331173
15,368	539,1	539,2	105,54	104,15	0,171	0,169	53	0,2367886
15,243	539,1	539,3	106,45	104,93	0,171	0,169	54	0,2348524
15,347	539,1	539,3	105,79	104,61	0,171	0,169	55	0,2363606

15,447	539,2	539,3	105,14	103,95	0,171	0,169	56	0,2378586
15,257	539,2	539,3	106,56	105,01	0,171	0,169	57	0,2348524
15,285	539,3	539,3	106,28	105,16	0,171	0,169	58	0,2352842
15,378	539,3	539,4	105,56	104,18	0,171	0,169	59	0,2367892
15,382	539,3	539,4	105,56	104,56	0,171	0,169	60	0,2367891
15,284	539,3	539,5	106,32	105,08	0,171	0,169	61	0,2352844
15,297	539,4	539,5	106,23	105,05	0,171	0,169	62	0,2353446
15,189	539,4	539,5	107,01	105,69	0,171	0,169	63	0,2337697
15,358	539,4	539,6	105,83	104,46	0,171	0,169	64	0,2363602
15,262	539,4	539,6	106,37	105,02	0,171	0,169	65	0,2348521
15,359	539,5	539,6	105,90	104,68	0,171	0,169	66	0,2363607
15,354	539,5	539,6	106,01	104,51	0,171	0,169	67	0,2363603
15,385	539,5	539,7	105,73	104,28	0,171	0,169	68	0,236789
15,258	539,6	539,7	106,36	104,90	0,171	0,169	69	0,2348524
15,442	539,6	539,7	105,04	103,62	0,171	0,169	70	0,237859
15,280	539,6	539,7	106,28	104,92	0,171	0,169	71	0,235285
15,253	539,7	539,8	106,37	105,15	0,171	0,169	72	0,2348523
15,282	539,7	539,8	106,10	104,68	0,171	0,169	73	0,2352847
15,446	539,7	539,8	105,01	103,83	0,171	0,169	74	0,2378152
15,345	539,8	539,9	105,71	104,34	0,171	0,169	75	0,2363609
15,344	539,8	539,9	105,78	104,39	0,171	0,169	76	0,2363605
15,412	539,8	540,0	105,13	103,73	0,171	0,169	77	0,2374318
15,337	539,9	540,0	105,73	104,24	0,171	0,169	78	0,2363612
15,366	539,9	540,0	105,50	104,05	0,171	0,169	79	0,2367885
15,407	539,9	540,0	105,18	103,68	0,171	0,169	80	0,2374315
15,337	539,9	540,0	105,60	104,07	0,171	0,169	81	0,2363613
15,403	539,9	540,0	105,08	103,75	0,171	0,169	82	0,2374309
15,333	540,0	540,1	105,46	104,14	0,171	0,169	83	0,2363601
15,347	540,0	540,1	105,24	104,02	0,171	0,169	84	0,2367894
15,176	540,0	540,1	106,44	104,95	0,171	0,169	85	0,2342042
15,408	540,0	540,1	104,66	103,36	0,171	0,169	86	0,2378594
15,438	540,0	540,1	104,37	103,02	0,171	0,169	87	0,2382848
15,328	540,0	540,1	104,96	103,56	0,171	0,168	88	0,2367893
15,376	540,0	540,1	104,79	103,49	0,171	0,169	89	0,2374314
15,496	540,0	540,2	104,01	102,71	0,171	0,169	90	0,2393477
15,326	540,1	540,2	105,06	103,73	0,171	0,169	91	0,2367901
15,396	540,1	540,2	104,68	103,17	0,171	0,169	92	0,2378592
15,198	540,1	540,2	106,01	104,70	0,171	0,169	93	0,2348531
15,298	540,1	540,2	105,21	103,99	0,171	0,169	94	0,2363614
15,417	540,1	540,2	104,35	103,07	0,171	0,169	95	0,2368251
15,196	540,2	540,2	105,82	104,59	0,171	0,169	96	0,2348535
15,289	540,2	540,3	105,06	103,72	0,171	0,169	97	0,2363613
15,379	540,2	540,3	104,42	103,24	0,171	0,169	98	0,2378598
15,407	540,2	540,3	104,05	102,76	0,171	0,169	99	0,2382858
15,446	540,2	540,3	103,79	102,59	0,170	0,168	100	0,2389244
15,306	540,2	540,3	104,84	103,42	0,171	0,168	101	0,23679
15,204	540,2	540,3	105,37	104,17	0,171	0,168	102	0,2352856
15,341	540,2	540,3	104,55	103,33	0,171	0,169	103	0,2374323
15,264	540,2	540,3	104,96	103,57	0,171	0,169	104	0,2363615
15,383	540,2	540,3	103,97	102,55	0,171	0,168	105	0,2382859
15,384	540,2	540,4	103,96	102,77	0,171	0,168	106	0,2382857
15,419	540,2	540,4	103,72	102,50	0,171	0,169	107	0,2389243
15,267	540,2	540,4	104,42	103,27	0,171	0,169	108	0,23679
15,422	540,2	540,4	103,23	102,04	0,170	0,169	109	0,239349
15,349	540,2	540,4	103,81	102,29	0,171	0,168	110	0,2382774
15,324	540,2	540,4	104,21	102,63	0,171	0,168	111	0,2378605
15,344	540,2	540,3	103,75	102,38	0,171	0,168	112	0,2382857
15,382	540,2	540,3	103,60	102,19	0,171	0,168	113	0,2389249
15,408	540,2	540,3	103,28	102,08	0,171	0,169	114	0,2393486
15,334	540,1	540,3	103,71	102,50	0,171	0,169	115	0,2382539
15,369	540,1	540,3	103,34	102,18	0,171	0,169	116	0,2389248

15,395	540,1	540,3	103,16	101,97	0,171	0,169	117	0,2393489
15,391	540,1	540,3	103,19	101,90	0,171	0,169	118	0,2393489
15,424	540,1	540,3	103,00	101,56	0,171	0,169	119	0,2399844
15,355	540,1	540,2	103,28	101,98	0,171	0,169	120	0,238925
15,318	540,1	540,2	103,53	102,36	0,171	0,169	121	0,2382859
15,449	540,1	540,2	102,58	101,13	0,171	0,168	122	0,2404069
15,256	540,1	540,2	103,86	102,53	0,171	0,168	123	0,2374329
15,312	540,1	540,2	103,63	102,27	0,171	0,168	124	0,2382862
15,374	540,0	540,2	103,09	101,89	0,171	0,169	125	0,2393488
15,364	540,0	540,2	103,03	101,72	0,171	0,169	126	0,2391954
15,369	540,1	540,2	102,97	102,05	0,171	0,169	127	0,2393487
15,369	540,1	540,2	103,07	101,91	0,171	0,169	128	0,2393488
15,335	540,1	540,2	103,17	101,98	0,171	0,169	129	0,2389249
15,490	540,0	540,2	102,06	100,66	0,171	0,169	130	0,24146
15,401	540,0	540,2	102,58	101,22	0,171	0,168	131	0,2399843
15,286	540,0	540,2	103,47	101,92	0,171	0,168	132	0,2382859
15,284	540,0	540,2	103,26	102,07	0,171	0,168	133	0,238286
15,442	540,0	540,2	102,24	101,01	0,171	0,169	134	0,2408282
15,481	540,0	540,2	101,96	100,78	0,171	0,169	135	0,2414605
15,385	540,0	540,2	102,48	101,31	0,171	0,169	136	0,2399833
15,381	540,0	540,1	102,49	101,16	0,171	0,168	137	0,2399835
15,343	540,0	540,1	102,93	101,75	0,171	0,169	138	0,2393492
15,311	540,0	540,1	102,94	101,57	0,171	0,169	139	0,2389243
15,378	540,0	540,1	102,46	100,73	0,171	0,168	140	0,2399838
15,240	539,9	540,1	102,11	101,47	0,169	0,168	141	0,2378603
15,323	539,9	540,1	89,44	92,25	0,158	0,160	142	0,2392412
15,397	539,9	540,1	81,12	84,18	0,142	0,147	143	0,2404066
15,390	540,0	540,0	76,33	80,37	0,131	0,137	144	0,2404066
15,296	540,0	540,1	73,62	77,93	0,125	0,132	145	0,2389238
15,250	539,9	540,1	70,51	76,16	0,119	0,128	146	0,2382854
15,364	539,9	540,1	66,86	73,20	0,114	0,124	147	0,2399836
15,291	539,9	540,1	64,35	71,35	0,109	0,120	148	0,2389244
15,320	540,0	540,0	62,68	69,53	0,105	0,117	149	0,2393482
15,313	540,0	540,1	60,60	67,05	0,102	0,114	150	0,2393485
15,284	540,0	540,1	58,13	66,22	0,099	0,111	151	0,2389242
15,243	540,0	540,1	57,38	65,13	0,096	0,109	152	0,2382862
15,373	539,9	540,1	55,56	63,60	0,094	0,107	153	0,2404053
15,313	540,0	540,1	52,09	60,38	0,090	0,103	154	0,239349
15,241	540,0	540,1	50,32	59,53	0,085	0,099	155	0,2382863
15,281	540,0	540,1	48,57	58,66	0,082	0,098	156	0,2389248
15,372	540,0	540,0	46,99	57,51	0,080	0,097	157	0,2404068
15,234	540,0	540,1	46,89	57,79	0,078	0,096	158	0,2382858
15,374	540,0	540,1	44,92	56,57	0,076	0,095	159	0,2404079
15,342	540,0	540,1	45,14	56,34	0,075	0,094	160	0,2399836
15,209	540,0	540,1	45,54	56,94	0,075	0,094	161	0,2378602
15,338	540,1	540,1	102,25	53,47	0,123	0,092	162	0,2399839
15,264	540,0	540,2	102,73	101,27	0,171	0,129	163	0,2389247
15,333	540,0	540,1	102,22	100,91	0,171	0,168	164	0,2399842
15,423	540,0	540,1	101,51	100,30	0,171	0,169	165	0,2414602
15,123	539,9	540,1	103,52	102,34	0,171	0,169	166	0,2367908
15,377	539,9	540,1	101,86	100,69	0,171	0,169	167	0,24079
15,195	539,9	540,1	103,20	101,82	0,171	0,169	168	0,2378712
15,424	539,9	540,1	101,60	100,32	0,171	0,169	169	0,2414606
15,422	539,9	540,1	101,66	100,31	0,171	0,169	170	0,24146
15,354	539,9	540,1	102,22	100,62	0,171	0,168	171	0,2404075
15,289	539,9	540,2	102,47	101,26	0,171	0,168	172	0,2393482
15,326	539,9	540,1	102,31	101,05	0,171	0,169	173	0,2399837
15,379	539,9	540,2	101,85	100,79	0,171	0,169	174	0,2408289
15,253	539,9	540,2	102,59	101,50	0,171	0,169	175	0,2389247
15,340	539,9	540,2	101,92	100,78	0,171	0,169	176	0,2404058
15,341	539,9	540,2	102,03	100,58	0,171	0,169	177	0,2404074

15,277	539,9	540,2	102,48	101,21	0,171	0,169	178	0,2393487
15,350	539,9	540,2	101,95	100,81	0,171	0,169	179	0,2404073
15,336	539,9	540,2	102,02	100,57	0,171	0,169	180	0,2404071
15,366	539,9	540,2	101,73	100,43	0,171	0,168	181	0,2408287
15,367	539,9	540,2	101,73	100,38	0,171	0,168	182	0,2408279
15,334	539,9	540,2	101,90	100,50	0,171	0,168	183	0,2404071
15,349	539,9	540,2	101,77	100,52	0,171	0,168	184	0,2406163
15,314	539,9	540,2	101,93	100,69	0,171	0,169	185	0,240126
15,356	539,9	540,2	101,78	100,35	0,171	0,168	186	0,2408281
15,236	539,9	540,2	102,42	101,14	0,171	0,168	187	0,2389248
15,263	539,9	540,2	102,31	101,05	0,171	0,169	188	0,2393486
15,234	539,9	540,2	102,42	101,16	0,171	0,169	189	0,2389247
15,260	539,9	540,2	102,35	101,23	0,171	0,169	190	0,2393509
15,354	539,9	540,2	101,71	100,49	0,171	0,169	191	0,2408286
15,296	539,9	540,2	102,14	100,64	0,171	0,169	192	0,2399845
15,296	539,9	540,2	102,11	100,71	0,171	0,168	193	0,239982
15,351	539,9	540,2	101,68	100,53	0,171	0,169	194	0,2408288
15,349	539,9	540,2	101,45	100,21	0,171	0,169	195	0,2408285
15,228	539,9	540,2	102,48	101,06	0,171	0,168	196	0,2389252
15,479	539,9	540,2	100,69	99,53	0,171	0,169	197	0,2429275
15,225	539,9	540,2	102,41	101,00	0,171	0,168	198	0,2389247
15,343	539,9	540,2	101,51	100,08	0,171	0,168	199	0,2408282
15,194	539,9	540,2	102,47	101,17	0,170	0,168	200	0,2385007
15,342	540,0	540,3	101,54	100,29	0,171	0,168	201	0,2408289
15,287	540,0	540,3	101,84	100,41	0,171	0,168	202	0,2399842
15,287	540,0	540,2	101,86	100,58	0,171	0,168	203	0,2399843
15,244	539,9	540,2	102,02	100,63	0,170	0,168	204	0,2393488
15,246	539,9	540,2	102,00	100,97	0,170	0,168	205	0,239349
15,336	539,9	540,2	101,38	100,25	0,170	0,169	206	0,2408285
15,279	539,9	540,2	101,93	100,32	0,171	0,168	207	0,2399843
15,301	539,9	540,3	101,61	100,21	0,171	0,168	208	0,2404074
15,277	539,9	540,3	101,82	100,67	0,171	0,168	209	0,2399844
15,306	540,0	540,3	101,62	100,17	0,171	0,168	210	0,2404076
15,169	540,0	540,3	102,54	101,05	0,171	0,168	211	0,2382863
15,276	540,0	540,3	101,78	100,44	0,171	0,168	212	0,2399847
15,490	540,0	540,3	100,30	99,09	0,170	0,168	213	0,2433444
15,305	540,0	540,3	101,56	100,42	0,170	0,168	214	0,2404076
15,304	540,0	540,3	101,62	100,34	0,170	0,168	215	0,2404075
15,301	540,0	540,3	101,67	100,41	0,171	0,169	216	0,2404075
15,270	540,0	540,3	101,84	100,71	0,171	0,169	217	0,2399848
15,364	540,0	540,3	101,14	99,92	0,171	0,169	218	0,241461
15,294	540,0	540,3	101,54	100,27	0,171	0,168	219	0,2404075
15,325	540,0	540,3	101,50	100,30	0,171	0,169	220	0,2408287
15,318	540,0	540,3	101,42	100,15	0,171	0,169	221	0,2408291
15,270	540,0	540,3	101,76	100,40	0,171	0,168	222	0,2399842
15,369	540,0	540,3	101,22	99,86	0,171	0,168	223	0,2414609
15,205	540,0	540,3	102,30	100,86	0,171	0,168	224	0,2389252
15,457	540,0	540,3	100,79	99,18	0,171	0,168	225	0,2429279
15,365	540,1	540,3	101,28	99,88	0,171	0,168	226	0,2414499
15,196	540,1	540,4	102,23	100,71	0,171	0,168	227	0,2389253
15,270	540,0	540,3	101,83	100,36	0,171	0,168	228	0,2399844
15,157	540,0	540,4	102,51	101,03	0,171	0,168	229	0,2382862
15,452	540,0	540,4	100,53	99,32	0,171	0,168	230	0,2429275
15,261	540,0	540,4	101,86	100,49	0,171	0,169	231	0,2399845
15,263	540,0	540,4	101,77	100,32	0,171	0,168	232	0,2399843
15,219	540,0	540,4	101,91	100,63	0,171	0,168	233	0,2393494
15,283	540,0	540,4	101,51	100,11	0,171	0,168	234	0,2404073
15,217	540,0	540,4	101,98	100,44	0,171	0,168	235	0,2393494
15,219	540,0	540,4	102,05	100,63	0,171	0,168	236	0,2393495
15,285	540,0	540,4	101,46	100,24	0,171	0,168	237	0,2404071
15,313	540,0	540,4	101,38	100,21	0,171	0,169	238	0,2408294

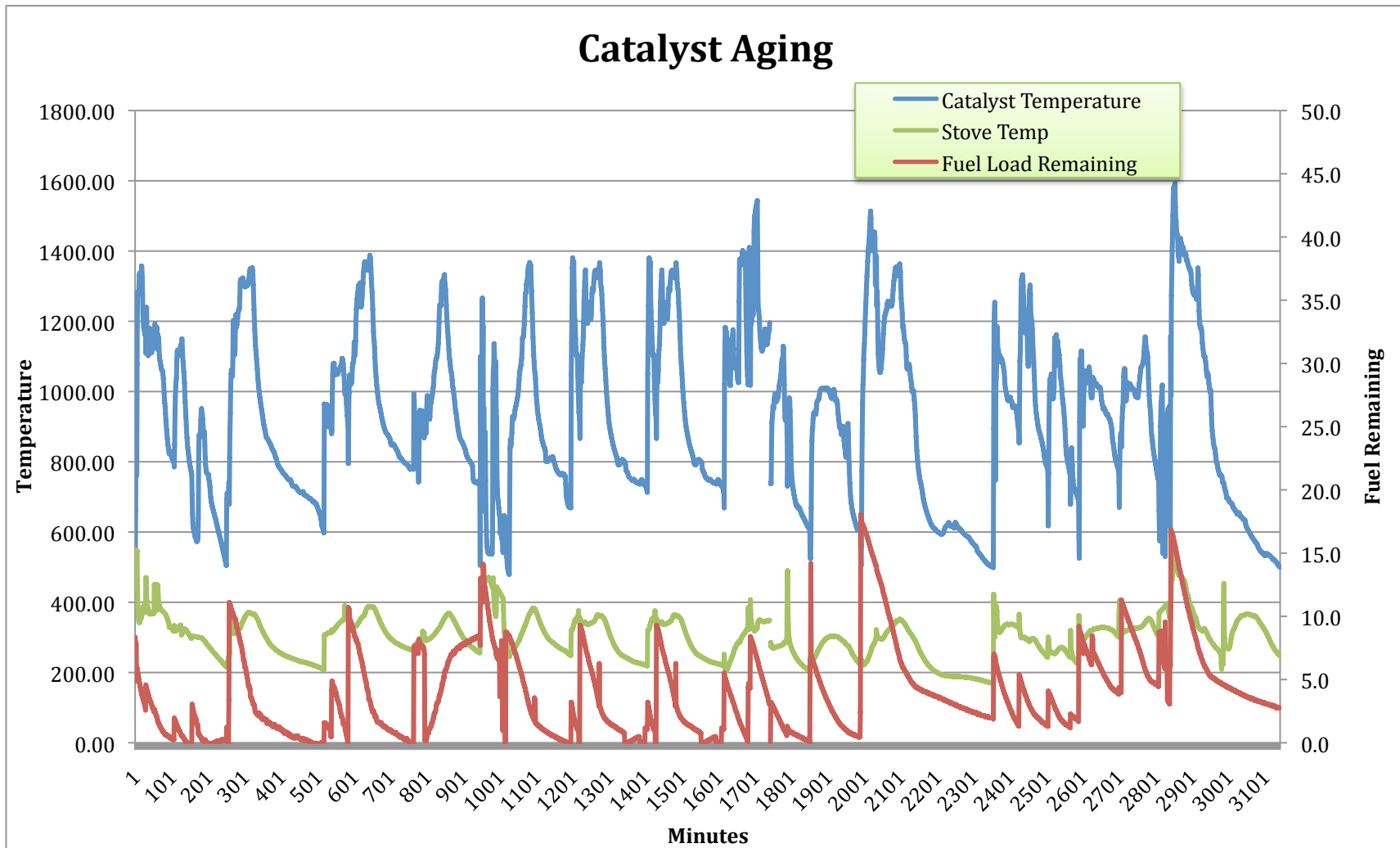
15,349	540,0	540,4	101,05	99,95	0,171	0,169	239	0,241461
15,348	540,1	540,4	101,13	99,81	0,171	0,169	240	0,2414612
15,187	540,1	540,4	102,03	100,73	0,171	0,168	241	0,2389253
15,214	540,1	540,4	101,93	100,65	0,170	0,168	242	0,23935
15,279	540,1	540,4	101,32	100,03	0,170	0,168	243	0,2404078
15,345	540,1	540,4	101,08	99,74	0,170	0,168	244	0,2414606
15,303	540,0	540,4	101,31	99,89	0,171	0,168	245	0,2408293
15,503	540,1	540,4	99,88	98,79	0,171	0,168	246	0,2439705
15,210	540,1	540,4	101,81	100,64	0,170	0,169	247	0,2393494
15,310	540,1	540,4	101,28	99,98	0,170	0,168	248	0,2408293
15,250	540,1	540,4	101,62	100,28	0,171	0,168	249	0,239984
15,300	540,1	540,4	101,21	99,84	0,171	0,168	250	0,2408288
15,300	540,1	540,4	101,18	100,06	0,170	0,168	251	0,2408292
15,342	540,1	540,4	100,96	99,69	0,170	0,168	252	0,241461
15,436	540,1	540,5	100,36	99,14	0,170	0,168	253	0,2429276
15,343	540,2	540,5	101,09	99,52	0,171	0,168	254	0,2414604
15,343	540,2	540,5	101,02	99,65	0,171	0,168	255	0,2414606
15,297	540,2	540,5	101,17	100,02	0,171	0,168	256	0,2408292
15,331	540,1	540,5	100,93	99,72	0,171	0,169	257	0,2414596
15,451	540,1	540,5	100,07	98,73	0,171	0,168	258	0,2433448
15,241	540,2	540,5	101,65	100,19	0,171	0,168	259	0,2399845
15,241	540,2	540,5	101,47	100,00	0,171	0,168	260	0,2400009
15,239	540,1	540,5	101,52	100,22	0,170	0,168	261	0,2399844
15,422	540,1	540,5	100,36	98,87	0,171	0,168	262	0,2429281
15,198	540,1	540,5	101,94	100,72	0,171	0,168	263	0,2393491
15,293	540,2	540,5	101,08	99,97	0,171	0,169	264	0,2408291
15,332	540,2	540,5	100,95	99,49	0,170	0,168	265	0,241461
15,288	540,1	540,5	101,19	100,08	0,171	0,168	266	0,2408294
15,028	540,2	540,5	102,92	101,52	0,171	0,169	267	0,2368004
15,286	540,2	540,5	101,26	99,82	0,171	0,168	268	0,2408292
15,235	540,2	540,5	101,72	100,10	0,171	0,168	269	0,2399846
15,414	540,2	540,5	100,37	99,21	0,171	0,168	270	0,2428665
15,234	540,2	540,5	101,38	100,29	0,170	0,169	271	0,2399847
15,285	540,2	540,5	101,27	100,06	0,171	0,169	272	0,2408291
15,444	540,2	540,5	100,07	99,01	0,171	0,169	273	0,2433451
15,229	540,1	540,5	101,46	100,11	0,171	0,169	274	0,2399847
15,318	540,1	540,5	100,90	99,51	0,171	0,168	275	0,2414612
15,276	540,1	540,5	101,23	99,87	0,171	0,168	276	0,2408289
15,316	540,1	540,5	100,93	99,48	0,171	0,168	277	0,2414613
15,315	540,1	540,5	100,86	99,74	0,171	0,169	278	0,2414613
15,315	540,1	540,5	100,88	99,63	0,171	0,169	279	0,241461
15,251	540,1	540,5	101,28	99,89	0,171	0,168	280	0,2404728
15,274	540,1	540,5	101,17	99,87	0,171	0,168	281	0,2408295
15,250	540,1	540,5	101,35	99,93	0,171	0,168	282	0,2404079
15,311	540,2	540,5	100,86	99,50	0,171	0,168	283	0,2414612
15,247	540,2	540,6	101,34	99,83	0,171	0,168	284	0,2404082
15,249	540,2	540,6	101,38	100,14	0,171	0,168	285	0,2404076
15,273	540,3	540,6	101,17	99,62	0,171	0,168	286	0,2408299
15,177	540,3	540,6	101,71	100,37	0,171	0,168	287	0,2393497
15,313	540,3	540,6	100,82	99,36	0,171	0,168	288	0,2414605
15,175	540,3	540,6	101,68	100,29	0,171	0,168	289	0,2393494
15,309	540,4	540,6	100,79	99,26	0,171	0,168	290	0,2414609
15,427	540,4	540,7	99,84	98,81	0,170	0,168	291	0,2433454
15,148	540,4	540,7	101,78	100,54	0,170	0,169	292	0,2389259
15,265	540,4	540,6	101,00	99,55	0,170	0,168	293	0,2408297
15,305	540,4	540,7	100,62	99,16	0,170	0,168	294	0,2414608
15,261	540,4	540,7	100,84	99,59	0,170	0,168	295	0,2408293
15,304	540,4	540,7	100,75	99,21	0,170	0,168	296	0,2414633
15,237	540,4	540,7	101,07	99,87	0,170	0,168	297	0,2404081
15,421	540,4	540,7	99,76	98,51	0,170	0,168	298	0,2433455
15,262	540,4	540,7	100,84	99,61	0,170	0,168	299	0,2408292

15,299	540,4	540,7	100,63	99,58	0,170	0,168	300	0,2414612
15,300	540,4	540,7	100,63	99,33	0,170	0,168	301	0,2414602
15,389	540,4	540,7	100,10	98,74	0,171	0,168	302	0,2429283
15,412	540,4	540,7	99,84	98,62	0,171	0,168	303	0,2433451
15,414	540,4	540,7	99,95	98,43	0,171	0,168	304	0,2433452
15,409	540,4	540,7	99,90	98,72	0,171	0,168	305	0,2433453
15,387	540,5	540,7	100,04	98,59	0,171	0,168	306	0,2429288
15,227	540,5	540,7	100,90	99,91	0,170	0,168	307	0,2404077
15,415	540,5	540,7	99,90	98,56	0,170	0,168	308	0,2433454
15,296	540,5	540,7	100,52	99,25	0,170	0,168	309	0,2414612
15,258	540,5	540,7	100,99	99,72	0,170	0,168	310	0,2408291
15,383	540,5	540,7	100,01	98,91	0,171	0,169	311	0,242921
15,449	540,5	540,7	99,48	98,15	0,170	0,168	312	0,2439707
15,216	540,5	540,8	101,18	99,76	0,170	0,168	313	0,2402419
15,252	540,6	540,8	100,86	99,67	0,170	0,168	314	0,2408287
15,254	540,6	540,8	100,88	99,58	0,170	0,168	315	0,2408294
15,198	540,6	540,8	101,18	100,19	0,170	0,169	316	0,2399848
15,410	540,5	540,8	99,75	98,45	0,170	0,168	317	0,2433452
15,196	540,5	540,8	101,30	100,14	0,170	0,168	318	0,2399851
15,412	540,5	540,8	99,88	98,56	0,171	0,169	319	0,2433451
15,227	540,6	540,8	100,96	99,60	0,170	0,168	320	0,2404079
15,291	540,6	540,8	100,69	99,13	0,170	0,168	321	0,2414608
15,222	540,6	540,8	101,09	99,73	0,171	0,168	322	0,2404265
15,385	540,5	540,8	100,02	98,82	0,171	0,168	323	0,2429283
15,195	540,5	540,8	101,06	99,79	0,170	0,168	324	0,2399855
15,287	540,5	540,8	100,65	99,42	0,170	0,168	325	0,2414615
15,406	540,6	540,9	99,83	98,61	0,171	0,169	326	0,2433454
15,286	540,5	540,9	100,60	99,34	0,171	0,168	327	0,2414613
15,286	540,6	540,8	100,56	99,04	0,170	0,168	328	0,2414617
15,448	540,5	540,9	99,54	98,38	0,170	0,168	329	0,2439713
15,221	540,5	540,9	101,06	99,84	0,170	0,168	330	0,2404082
15,444	540,6	540,9	99,55	97,86	0,171	0,168	331	0,2439707
15,243	540,6	540,9	100,98	99,67	0,171	0,168	332	0,2408303
15,195	540,6	540,9	101,02	99,88	0,170	0,168	333	0,2399852
15,404	540,6	540,9	99,85	98,35	0,170	0,168	334	0,2433456
15,246	540,6	540,9	100,86	99,51	0,171	0,168	335	0,2408301
15,219	540,6	540,9	101,06	99,72	0,171	0,168	336	0,2404081
15,376	540,6	540,9	99,93	98,62	0,170	0,168	337	0,2429281
15,151	540,7	541,0	101,49	100,21	0,170	0,168	338	0,2393495
15,377	540,7	541,0	99,98	98,66	0,171	0,168	339	0,2429286
15,282	540,7	541,0	100,62	99,44	0,171	0,168	340	0,2414617
15,281	540,7	541,0	100,45	99,18	0,170	0,168	341	0,2414614
15,191	540,7	541,0	101,23	99,94	0,170	0,168	342	0,2399849
15,377	540,7	541,0	99,95	98,76	0,170	0,168	343	0,2429282
15,188	540,7	541,0	101,17	99,87	0,170	0,168	344	0,2399851
15,284	540,8	541,0	100,64	99,23	0,171	0,168	345	0,2414613
15,402	540,8	541,0	99,68	98,65	0,170	0,168	346	0,2433458
15,466	540,8	541,1	99,28	98,09	0,170	0,168	347	0,2443862
15,189	540,8	541,1	101,15	99,85	0,170	0,168	348	0,2400517
15,436	540,8	541,1	99,47	98,34	0,170	0,168	349	0,243971
15,442	540,8	541,1	99,49	98,27	0,170	0,168	350	0,2439708
15,125	540,8	541,1	101,66	100,22	0,170	0,168	351	0,2389259
15,282	540,8	541,1	100,59	99,37	0,171	0,168	352	0,2414615
15,376	540,8	541,1	99,86	98,52	0,170	0,168	353	0,2429287
15,375	540,9	541,1	99,85	98,47	0,170	0,168	354	0,2429289
15,465	540,8	541,1	99,29	98,35	0,170	0,168	355	0,2443862
15,188	540,9	541,1	101,09	99,88	0,170	0,169	356	0,239985
15,372	540,9	541,1	99,88	98,59	0,170	0,168	357	0,2429281
15,371	540,9	541,1	99,90	98,58	0,170	0,168	358	0,2429287
15,233	540,9	541,2	100,78	99,49	0,170	0,168	359	0,2408299
15,222	540,9	541,2	100,75	99,52	0,170	0,168	360	0,2406795

APPENDIX 4: Unit pre burn

Model 212 Catalyst Aging:

Catalyst was aged 3144 minutes (52.4 hours) between 8/4/17 and 8/31/17. Catalyst Temperatures for the 3144 minutes are indicated below.



APPENDIX 5: Participants

Danick Power ing.
v-p operation
Services Polytests inc.
450.741.3636
www.polytests.com

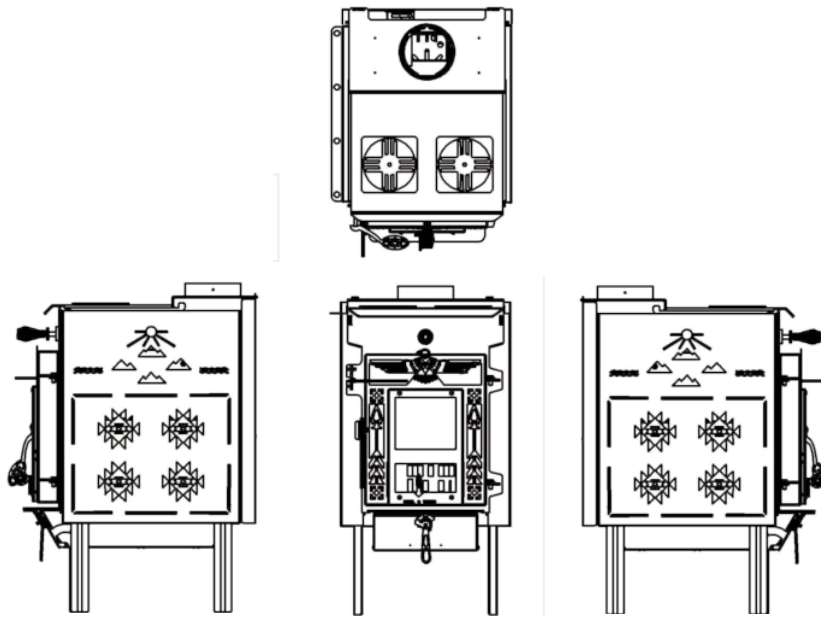
Maxime Martin
Technicien
Services Polytests inc.
450.741.3636
www.polytests.com

Tom Morrissey
Pres.
Woodstock Soapstone

APPENDIX 6: Drawings and specifications

APPENDIX 7: Operator's manual

NAVAJO HYBRID COMBINATION WOOD/COAL STOVE MODEL 212



GEAR HEAD STOVES
BY WOODSTOCK SOAPSTONE COMPANY

OWNER'S MANUAL



Tested To UL 1482-2011(R2015)
Tested & Listed By PFS Corporation
Report #NAV171012v1

Woodstock Soapstone Company, Inc.
66 Airpark Road, West Lebanon, NH 03784
Toll Free 1-800-866-4344 • www.woodstove.com

Tested and Listed by



Report #NAV171012v1

Rev 1708

OUR PROMISE

We are sure you will enjoy your new stove. During the first six months that you own it, test its performance and experience the comfortable warmth of soapstone. If you are not completely delighted with the beauty, quality, and energy efficiency of your stove, you may return it for a full refund, including the cost of return freight. This is the best consumer protection plan in the industry.

EPA APPROVAL

This Manual describes the installation and operation of: the **Model 212 Navajo Hybrid Combination Wood/Coal Stove**

The Model 212 Navajo Hybrid Combination Wood/Coal Stove meets the 2020 Standard U.S. Environmental Protection Agency's crib wood emission limits for wood heaters sold after May 15, 2020. Under specific test conditions, this stove has been shown to deliver wood heat at rates ranging from 15,332 to 27,294 BTU/hr., and average emissions of 1.048 grams/hr. Heat output using coal ranges from 7,095 to 10,189 BTU/hr, and average emissions of 4.93 grams/hr.

The Navajo Hybrid has a manufacturer-set minimum low burn rate that must not be altered. It is against federal regulations to alter this setting or otherwise operate this wood heater in a manner inconsistent with operating instructions in this manual.

The Navajo Hybrid contains a catalytic combustor, which needs periodic inspection and replacement for proper operation. It is against federal regulations to operate this wood heater in a manner inconsistent with the operating instructions in this manual, or if the catalytic element is deactivated or removed.



Tested and Listed by



Report #NAV171012v1

LISTING TO UL #1482-2011

Model 212 Navajo Hybrid Combination Wood/Coal Stove has been tested to UL Standard #1482-2011 for safety, and is listed by PFS Corporation. UL Standard #1482 is the standard for testing solid fuel heating appliances which is universally recognized by all national building regulatory agencies (SBCC, BOCA, ICBO) and individual states.

Please Note: Tested and Listed for US installations only

LIMITED WARRANTY

Your Woodstock Soapstone Stove will be carefully inspected before shipment. We will replace any part which is defective in material or workmanship, free of cost, for a period of one year from the date of purchase. If a defect is discovered, please contact Woodstock Soapstone Company, Inc. for instructions regarding return or replacement of the defective part.

CATALYTIC COMBUSTOR WARRANTY

The catalytic combustor supplied with your Navajo Hybrid Combination Wood/Coal Stove is a Clariant Corporation high performance durafoil catalyst. The catalyst is fully warranted for three years from the date of purchase against any defect in workmanship or materials that prevent the combustor from functioning when installed and operated properly. The catalytic combustor is additionally warranted for three years from the date of purchase for any deterioration in the stainless steel substrate material. Operating the Navajo Hybrid in a manner inconsistent with the owner's manual will void the catalytic combustor warranty.

For instructions regarding return or replacement of the catalytic combustor, please contact:

Woodstock Soapstone Company, Inc.

66 Airpark Road

West Lebanon, NH 03768

Phone: 1-800-866-4344 • Web: www.woodstove.com

GEAR HEAD STOVES

Gear Head Stoves is a division of Woodstock Soapstone Co., which is specifically 'geared' to designing and building affordable stoves with high efficiency and low emissions. The first Gear Head Stove, The Ideal Steel Hybrid, was the grand prize winner of the 2013 Wood Stove Design Challenge competition, which judged efficiency, emissions, affordability, innovation, and user friendliness. The Absolute Steel Hybrid was our R2Z (Race to Zero) stove, our internal challenge to design and build a stove that reaches zero wood stove emissions. The Navajo Hybrid Combination Wood/Coal Stove was designed to burn both wood *and* coal cleanly and efficiently.

MODEL 212

NAVAJO HYBRID COMBINATION WOOD/COAL

TABLE OF CONTENTS

WARRANTY INFORMATION/CERTIFICATIONS..... Inside Cover
EPA Certification, UL Listing, Warranty, Catalytic Combustor Warranty

INTRODUCTION & EFFICIENCY/EMISSIONS.....ii-iii
Navajo Hybrid Wood Stove Explained

INSTALLATION..... 1-7
Installation, Location, Chimneys, Clearance Table, Wall Protection,
Floor Protection, Mobile Home Installation, Install Shields First

OPERATION.....8-14
Seasoning your Stove, Getting to Know the Controls, Wood Burning
Operation, Coal Burning Operation, Reloading & Overnight Burning, Ash
Removal, Probe Thermometer, Overfiring, Daily Use, The Fall-Away Tool,
Firewood

CATALYTIC COMBUSTOR..... 15-18
How your Combustor Works, Inspection & Cleaning,
Replacement, Catalytic Probe Thermometer, Frequently
Asked Questions, Catalytic Combustor Warranty Information

MAINTENANCE..... 19-20
Stove & Glass Cleaning, Gasket Replacement, Routine Checks,
End-Of-Season Maintenance, Creosote

TROUBLESHOOTING..... 21-22

SAFETY..... 23-24
Overview, Installation, Smoke & The Chimney, Heat, Ash Removal,
Precautions, Emergency Procedures

PARTS LIST & DIAGRAMS..... 25-28

MAINTENANCE LOG & NOTE SHEET.....29

DIMENSION & SPECIFICATIONS..... Back Cover

Woodstock Soapstone Company, Inc.
66 Airpark Road, West Lebanon, NH 03784
Toll Free 1-800-866-4344 • www.woodstove.com

INTRODUCTION

Thank you for using one of our Navajo Stoves! The Navajo Stove is designed to heat a small house. Here are some important things to know before using your stove for the first time.

THERE SHOULD BE NO SMOKE INSIDE

With a good stove and chimney system, there should be no smoke or odor inside your house, and very little smoke outside the house. If you have smoke or odors inside the house, please let us know right away so we can help you!

THE STOVE IS ONE PART OF A SYSTEM

The stove is part of a system. All parts of that system need to work together to ensure your wood stove is a safe and efficient heat source that you and your family will enjoy for years to come.

The system includes (1) the chimney, (2) the stove, (3) the hearth, (4) tools and ash bucket, (5) a safe installation, and (6) a trained operator (you!)

1) The Chimney: The chimney serves a critical function. It is the “engine” that drives the stove. As hot air rises in the chimney, “draft” is created which pulls combustion air into the stove. It is essential to have a good draft in your chimney system for optimum stove performance.

A good draft in your chimney provides the oxygen needed for the fire to burn. A stove with a strong draft creates more heat. A sluggish or weak chimney draft will cause your stove to smolder, produce less heat, and potentially spill smoke and/or odors inside the home. These are all indications of a stove that isn’t burning as it should.

Draft can be adversely affected by a chimney that is too short, or too tall, high winds, and flue size.

High efficiency stoves make the best use of your wood and send cleaner smoke into the air. This is because they are burning the gas vapors in the smoke, keeping extra heat inside your stove and therefore inside your home. The smoke going up your chimney is cooler and cleaner. This makes a highly efficient stove more draft sensitive. A chimney that meets all requirements for your stove will ensure peak performance.

2) The Stove: The new Navajo Hybrid is designed to burn either coal or wood efficiently. It will produce more heat with less wood, and burn either wood or coal with clean air both inside and outside of the home. With basic maintenance and proper operation, this stove will keep you and your family warm for years to come. Plus, the Navajo stove has an added bonus of a cook surface on the top for skillets, saucepans or kettles (perfect for frybread!).

3) The Hearth: The stove is the heart of the home, and the hearth that the stove sits on creates a focal point that

serves two important functions. The stove must be placed on a non-combustible surface so that the floor is protected from falling embers or ashes. The dimensions required for the hearth area are based on providing this protection, particularly from the loading door and ash pan.

Not having enough thermal protection to any combustible flooring under the stove (wood, carpet, vinyl, laminate, etc) can cause hidden scorching and can be a fire hazard. If the thermal protection is adequate but the size of the pad is not, there is danger of heat, ashes, or embers causing a fire hazard on the combustible floor surface.

The manual has specific minimum dimensions for a hearth pad for your stove. We actually prefer larger hearth areas to allow plenty of room, if possible, for storing wood, hearth tools, or drying boots. A larger hearth also provides a visual cue so children, elders, and other members of the household give it a wide berth when passing by.

4) Tools: Having the right tool for the right job is a key to success. Your stove and your safety will benefit from the proper use of tools such as – an ash rake, an ash shovel, poker, stove top thermometer, and ash bucket. All of these except the ash bucket are included with the stove.

Ash rake - Use the rake to help move ash down to the ash pan below. Also use the rake before loading coal (see instructions).

Ash shovel - Handy to remove coal “klinkers” and ash from the firebox. Be sure to use an appropriate ash bucket.

Poker - Use this to reposition wood inside the stove. You will also find the poker handy to adjust the air damper - just “poke” it to adjust the heat output. A very small adjustment can make a big difference.

Probe Thermometer - One is provided with your stove to help you monitor the firebox and stove top temperatures and catalyst operation.

Ash bucket- The safe removal and disposal of ashes is of utmost importance. An ash removal container should be metal, have legs that lift it off the floor, and have a top that closes securely and will not fall or blow off.

Ashes should NEVER be dumped into a combustible container, such as a cardboard box. An ash container should never be set on a combustible floor. Hot embers in the ashes can often stay viable for 36 hours or longer after removal from your stove. A galvanized ash can, set away from the home, on a non-combustible surface or up on bricks or cinder blocks is advisable.

5) Stove Installation: A wood stove by itself is not a hazard, but an unsafe installation is. Following the specific

guidelines for clearances and venting materials is critical. Your stove installation needs to conform to certain clearances for safety, not just around it, but under it as well.

Clearance is the open space between your stove, or stovepipe, and a combustible surface. A combustible surface is a surface that burns (like wood, sheetrock, fabric, etc.). Framed or sheet rock walls simply covered by brick or stone are still considered combustible because heat will transfer through those materials and dry out the combustible wall behind.

Both your stove and your chimney pipe need to conform to the required distances to combustible materials for the safety of your home and your family. Clearance specifications and information is in your manual. Read it carefully and make sure your installation meets all requirements.

Please note that installation of any wood stove in a mobile home has some additional special requirements that must be met. Because mobile homes can be airtight, an outside air adapter connection from the stove down and out to an outside air source is necessary for good air supply to your stove. This manual has additional information on connecting an outside air adapter. A pipe shield is necessary for the connection from the stove to the stainless chimney and there must be a spark guard screen on the chimney cap. Wood stoves cannot be installed in bedroom areas of a mobile home.

6) Stove Operator - The last part of a happy relationship with your stove is in the day-to-day use. Learning to use a catalytic stove means a little more participation on the owners end, but the result is rewarding. Like learning to drive a car, or ride a bicycle, it becomes second nature.

The catalyst will work when the firebox is at 500 degrees- this translates into roughly 250 degrees on the top of the stove. After you have burned dry kindling for about 10 minutes, engage the catalyst. Smoke will then filter through the honeycomb of the stainless catalytic combustor. The catalyst will activate and cause the gas vapors in the smoke to burn, creating more heat inside your stove and eliminating smoke.

EFFICIENCY & EMISSIONS

EPA TEST DATA

Your Navajo Hybrid Combination Stove is

- One of the cleanest woodburning stoves approved by EPA;
- One of the most efficient wood stoves approved by EPA;
- The first wood/coal stove approved by EPA;
- A very clean coal-burning stove

AVERAGE WOOD EMISSIONS: 1.13 g/hr
AVERAGE WOOD EFFICIENCY: 79.5%
HEAT OUTPUT WOOD 15,332-27,294 BTU/hr

AVERAGE COAL EMISSIONS: 4.93 g/hr
AVERAGE COAL EFFICIENCY: 60%
HEAT OUTPUT COAL: 7,095-10,189 BTU/hr

FACTORS EFFECTING EFFICIENCY & EMISSIONS

1. Burn Rate: The Navajo Steel Hybrid is able to attain its highest efficiency and lowest emissions burning wood at a low-medium burn rate. A lower burn rate gives the combustor more time to effectively burn the volatile gases as they enter into the catalytic combustor (see discussion in the Catalytic Combustor Section of the Manual). When operating your stove at a lower burn rate you will achieve a cleaner burn over a longer period of time. Low burn rates are also how you achieve desirable long burn times of 6-8+ hours.

2. Wood Quality: Cord wood with a moisture content between 15-22% is ideal for burning. The Navajo Hybrid will still burn wood with a higher moisture content with great effectiveness, however, the energy loss at start up and reloading is significant. During the first stage of wood burning the moisture content within the wood is expelled creating steam. The higher the moisture content the lesser the available heat value.

Kiln Dried Wood:

**Approximately 8600 BTU Available/per pound
20% Moisture Content:
Approximately 6,200 BTU Available/per pound
50% Moisture Content:
Approximately 4,000 BTU Available/per pound**

3. Effective Wood Fire Starting: The most effective method for an emissions free start is a top down fire. A top down fire is built with the larger splits on the bottom of the firebox, the second layer should be medium sized splits, and if possible running perpendicular to the large splits on the bottom, and the third layer should be small splits. On top of the small splits a generous amount of small very dry kindling and newspaper will be placed at the top. The newspaper and kindling will produce enough heat very quickly allow in the secondary air and catalytic combustor to ignite within minutes. You may need to leave the loading door cracked open to allow enough oxygen in for a quick start. Within a few minutes you should be able to engage the combustor and start the clean burn cycle.

4. Effective Coal Fire Starting: A successful clean burn with coal begins with the starting conditions. Since coal requires more air and heat to ignite cleanly, it is crucial that the firebox conditions prior to loading coal include a hot coal bed, with flames that are high enough to reach the ceiling of the firebox. Be sure to maintain a flame in the firebox at all times after loading coal.

INSTALLATION

Woodstock Soapstone Co. has been designing, building, and innovating since 1978. A properly installed and operated Woodstock Soapstone Stove will warm your home and delight your eye for a lifetime.

Read this entire manual carefully. It explains how to install your Woodstock Soapstone Navajo Steel Hybrid Wood Stove safely and how to operate it correctly and efficiently. The clearances and procedures recommended in this guide are in compliance with the recommendations of the National Fire Protection Association (NFPA), the Underwriters Laboratories (UL), and the U. S. Environmental Protection Agency (EPA). You may feel some of them are very stringent, but they should be followed. They were designed to protect you, your home, and the environment.

Improper installations are a major cause of serious fires. Failure to follow instructions may result in property damage, bodily injury, or death.

Before installing a wood stove, check your local building codes and any requirements established by your insurance company.

You may need a local building permit to install your stove. Any changes in your home must comply with building codes. If the codes have not been fully updated, you may want to check with the Building Inspection Department or your local Fire Department.

LOCATION

A stove which is centrally located will heat the greatest area of your home. Heat should be able to circulate easily into nearby rooms. Placing your stove near an open stairway or register in the floor will help transfer heat to other rooms.

Other installation considerations are:

- Clearance to Combustibles
- Adequate Space for Wood Loading and Ash Removal
- Room Traffic Patterns

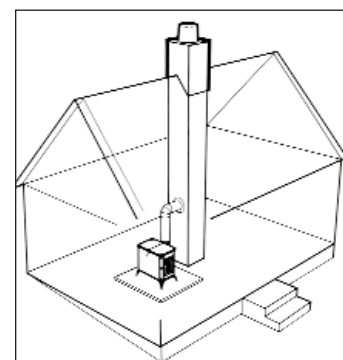
Most people install their stove in a room they use frequently where they can enjoy the beauty and comfort of the stove. This also helps in the monitoring and reloading the stove as needed. A well-planned placement will enhance your enjoyment of your stove and may save installation costs.

A qualified stove installer should be aware of any changes and updates to local and state codes and may be best suited to handle your installation work.

Many chimney sweeps are qualified installers. If you are unfamiliar with sweeps or need to locate a certified sweep in your area, you can check listings at www.csia.org (Chimney Safety Institute of America). Builders and contractors are another option. In some cases, homeowners install their own stoves. Before installing your stove, please review carefully the stove installation, clearance, and safety information in this manual. Woodstock Soapstone has NFI (National Fireplace Institute) certified woodburning specialists on staff and available to answer any questions you may have about your installation. If you have questions, please call us toll free at 1-800-866-4344.

You should notify your insurance company that you are using a woodstove. Before you light your first fire, have a local building inspector and your insurance representative inspect and approve your installation in writing.

When this room heater is not properly installed, a house fire may result. To reduce the risk of fire, follow the installation instructions. Contact local building or fire officials about restrictions and installation inspection requirements in your area.



The best location for a chimney and woodstove is in the center of the house. The chimney will be warmer, draft will be better, and radiant heat will be distributed more evenly.

ALCOVE INSTALLATIONS

THE MODEL 212 NAVAJO STEEL HYBRID WOODSTOVE IS NOT APPROVED FOR AN ALCOVE INSTALLATION. AN ALCOVE IS DESCRIBED AS AN AREA LESS THAN 512 CUBIC FEET, WHICH IS EQUIVALENT TO AN 8'X8'X8' SPACE.

STOVEPIPE AND CHIMNEYS

Stovepipe (Connector Pipe):

Connector pipe is either single wall (sheet metal) or double wall (sheet metal outer pipe with a stainless steel inner pipe). Connector pipe is designed to connect your stove to your approved prefabricated chimney system. The connector pipe should be 6 inch diameter to match the flue collar of the stove. If you use single wall pipe, we strongly recommend 22 gauge pipe (26 or 28 gauge is too thin for use with a woodstove). Attach the 3 foot pipe shield to the first three feet of stovepipe. Use three sheet metal screws to secure each pipe joint, including the pipe to stove connection.



UNPROTECTED SINGLE OR DOUBLE WALL STOVE PIPE MUST NOT BE USED TO PASS THROUGH A COMBUSTIBLE WALL, WINDOW, OR CEILING TO CONNECT TO THE CHIMNEY. YOU MUST USE AN APPROVED METHOD WHICH PROVIDES GREATER PROTECTION THAN SINGLE OR DOUBLE WALL PIPE.

It is important to know that connector pipe (either single wall or double wall) CANNOT be used to pass through a combustibile surface like a ceiling or wall, or to pass through a window. Single wall pipe can be used inside the home, but must connect to insulated chimney pipe to pass through a ceiling, roof or wall.



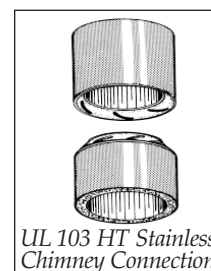
DO NOT USE GALVANIZED SINGLE WALL PIPE AS CONNECTOR PIPE.

Stovepipe Shields:

The Navajo Hybrid includes a three foot pipe shield that must be attached to the back of the pipe, and a round ceiling shield/trim collar that must be attached where the connector pipe attaches to the chimney pipe. These shields are considered part of the stove and must be attached to the pipe and ceiling.

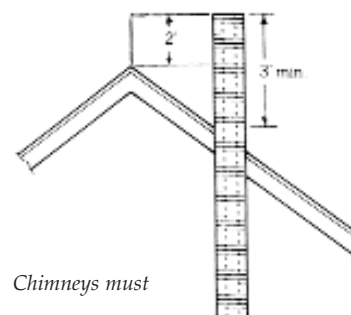
Approved Chimney Type: "UL 103 Type HT Class A":

For high efficiency, freestanding woodstoves, like the Navajo Hybrid stove, a Prefabricated Metal Chimney must be listed as Class A and carry a UL Listing of 103 HT (high temperature). The "UL 103 Type HT Class A" prefabricated chimney will have a temperature rating of 2,100° F. There are prefabricated chimney systems that are approved only to 1,700° F and are suitable only for fireplace inserts or factory built fireplaces. **DO NOT** use these with your Navajo Hybrid stove.



UL 103 HT Stainless Chimney Connection

At the point of the first penetration of a combustibile surface (i.e., wall or ceiling) all subsequent venting components need to be prefabricated "UL Type HT Class A". If your prefabricated chimney goes through a living space like an attic or second storey, it must be enclosed, and that enclosure must conform to clearance standards for the prefabricated chimney. Your chimney must pass through your roof and extend above the roof line in accordance with the height requirements above.



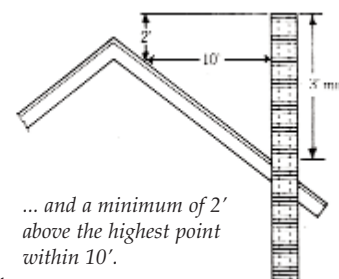
Chimneys must

Chimney Flue Sizing: 6" Round ID

The Navajo Hybrid has been designed for use with a 6" (28 sq.in.) chimney system, which is the same diameter as the stove's flue collar.

Chimney Height Requirements:

The chimney must extend 3 ft. above the point where it passes through the roof and must also be 2 ft. higher than any roof surface or obstruction within 10 feet (measured horizontally) of the chimney. You should check your local building codes for any other requirements.



... and a minimum of 2' above the highest point within 10'.

The recommended minimum chimney height for the Navajo Steel Hybrid is 10 feet from the flue collar of the stove to the top of the chimney. Provided the pipe extends 3' above the roof and 2'

above and obstruction in a 10 foot radius. There may be other factors, like local building codes, high wind, high altitude, etc., that may make the *minimum* height undesirable or a violation of building codes.

If a chimney is too short, or the flue too large, the hot exhaust can cool and slow down. This can lead to poor stove performance, smoke spillage, or back puffing. Generally if the Navajo Hybrid is installed with a 10-12 foot chimney and there is smoke spillage or backpuffing, the height of the chimney may have to be increased by adding another section of pipe on the outside of the home, to create better flow through the stove and up the chimney.

	DO NOT CONNECT THIS UNIT TO A CHIMNEY FLUE SERVING ANOTHER APPLIANCE.
---	--

Approved Chimney Configurations:

The diagrams below represent the most common and acceptable installations using prefabricated chimney pipe. The necessary components are listed and shown in their appropriate locations. These components are Class A listed to UL 103HT (tested to 2100 degrees F.) Only components listed to UL 103HT can be used to install your wood stove. Installation instructions are described below **as examples only**. More detailed instructions are available through Woodstock Soapstone or the pipe manufacturer. **ALWAYS FOLLOW THE SPECIFIC MANUFACTURER'S INSTALLATION INSTRUCTIONS.**

Installation 1- Through ceiling, attic or second floor, and roof

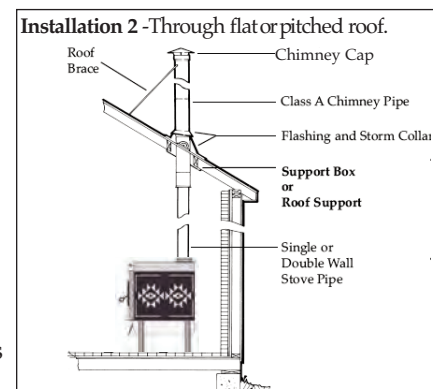
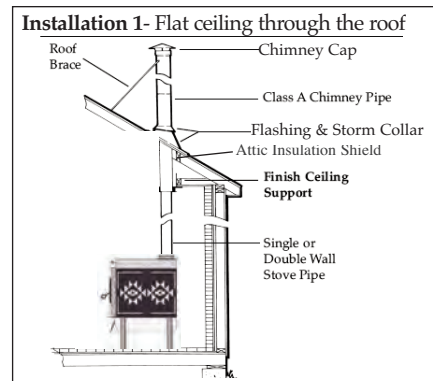
Installation 2- Through flat or pitched roof

Determine where the stove will be placed. Pay close attention to all required clearances for the stove **and** connector pipe. Next, use a plumb line to locate the support in the ceiling/roof above. Cut the appropriate sized hole in the ceiling and frame in the necessary supports to secure the chimney support.

Install the pipe adapter onto the first section of chimney pipe, and lower the pipe into the appropriate support. *If the chimney passes through an attic, use an insulation shield in the attic to keep any insulation away from the pipe. If it passes through a second story living space, the chimney will need to be enclosed.*

As the pipe extends through the roof, install the appropriate flashing and storm collar to keep the weather out. If the height of the chimney above the roof is 5 feet or greater, a roof brace will be used. All chimneys should have the appropriate cap installed at the top to reduce wind and weather related downdrafts, as well as deter any animals from building nests.

The connector pipe should extend from the flue collar of the stove to the pipe adapter at the chimney support. The male (crimped) end should always point down toward the stove. Be sure that each joint has enough overlap for a secure connection. All connections should be fastened with screws, including at the flue collar and pipe adapter. (Please refer to the manufacturers full set of installation instructions).



FLOOR PROTECTION REQUIREMENTS

Your Navajo Hybrid stove comes with an approved hearth pad. The hearth protects your floor from two hazards:

- Heat Transfer: Heat radiation from the bottom, front, and sides of the woodstove
- Ember Protection: Sparks and hot coals that may fall out during ash removal and reloading of firewood. Even if you have a stone or tile overlay on wood, it is still considered combustible since the surface materials will not provide adequate heat transfer protection.



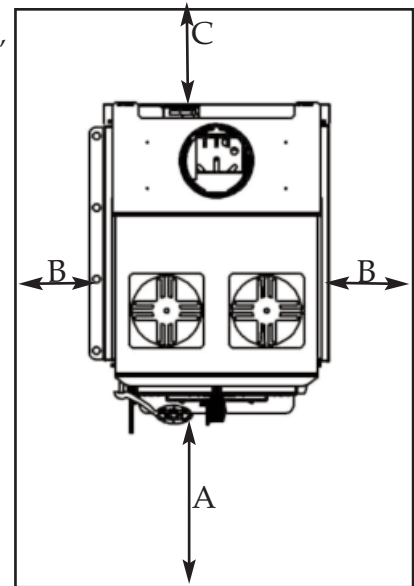
DO NOT INSTALL YOUR NAVAJO HYBRID STOVE ON A COMBUSTIBLE SURFACE (WOOD, CARPET, LAMINATE, OR VINYL, FOR EXAMPLE).

Your stove **MUST** sit on one of the following: (1) the Hearth pad provided with the stove; (2) a floor of solid non-combustible material (masonry, brick or tile on concrete and mortared in place), (3) a prefabricated hearth pad listed to UL1618 approved standards (these pads are made to be placed on an existing floor), or (4) a custom designed pad constructed of approved non-combustible materials which will protect the floor from sparks, hot coals, and ashes; and prevents heat from being transferred onto the floor beneath.

The Navajo Hearth Pad

The Navajo Hearth Pad is a sturdy pad made with a steel frame, 1/2 inch plywood on the bottom, 1/2" of cementboard on top of the plywood, and six pieces of tile on top of the cementboard. The tiles are "loose fit," but can be mortared in place by an owner if desired.

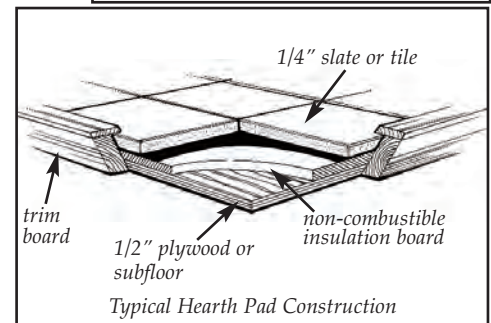
The Navajo Hearth pad is 30" x 48", and provides 6" of protection to the sides of the stove (B), 4" in the back of the stove (C), and 16" in the front of the stove (A) where wood is loaded and ashes are removed (see diagram at right)



To Build Your Own Hearth Pad

- 1) Start with a plywood base or subfloor.
Over this apply:
- 2) A layer of cement board.
Over this apply:
- 3) Cover with a non-combustible material such as steel, tile, slate, stone, or brick. Use mortar or grout to set the material in place, then grout the seams.

Hearth Rugs also **ARE NOT** meant to be used as primary hearth protection. These are made to be used in addition to an approved hearth, and are an auxiliary decorative protection. They are not a substitute for an approved hearth pad.



REQUIRED CLEARANCES

The Model 211 Navajo Hybrid stove has been tested to UL standards for clearances to combustible walls. The stove comes with two side shields, a back shield, and a shield for under the ash pan. There is also a pipe shield and a ceiling shield. All of these shields are considered part of the stove and must be installed before the stove is operated.

These shields enable the stove to be installed in small areas where space is limited and the stove must be placed near a combustible wall. The two side shields are decorative as well as protective.

Stove Shields and Pipe Shields:

Clearances for the Navajo Hybrid were determined by testing with heat shields designed specifically for this stove. When using these shields, **clearance is measured from the back of the stove to the combustible wall** (the shield is not included in the clearance calculation). In addition, there is a three foot pipe shield that must be attached to the back of the pipe, and a round ceiling shield/trim collar that must be attached where the connector pipe attaches to the chimney pipe.

Be sure that all joints in the connector pipe are secure and fastened with screws, including at the flue collar and chimney pipe adapter. (Please refer to the manufacturers full set of installation instructions).

Clearance Table:

The Navajo Steel Hybrid can be installed at a 9" clearance with no additional protection, provided that all of the stove and pipe shields are installed.

Clearance Table For Model 211 Navajo Hybrid			
Type of Installation ►	<i>Back clearances, installed parallel to walls, top vent, & stove pipe which goes straight up</i>	<i>Side clearances, installed parallel to walls, top vent, & stove pipe which goes straight up</i>	<i>Corner installation clearances, when stove is installed in corner at 45 degrees to 2 walls</i>
Type of protection ▼			
Top Vent, Straight Up, With all Shields (sides, back, 36" pipe shield, and ceiling shield)	9" stove back 14" stove pipe	9" stove sides 14" stove pipe	9" stove corners 14" stove pipe
No Protection	36"	36"	36"* stove corners
3 1/2" thick Masonry Against Combustible Wall*	24"	24" stove sides 30" stove pipe	24" stove sides 28" stove pipe
3 1/2" thick Masonry with 1" ventilated airspace*	12"	12" stove sides 18" stove pipe	12" stove sides 18" stove pipe
24 ga. sheet metal with 1" ventilated airspace*	12"	12" stove sides 18" stove pipe	12" stove sides 18" stove pipe
1/2" thick non-combustible insulation board with 1" airspace*	12"	12" stove sides 18" stove pipe	12" stove sides 18" stove pipe

*These clearance reductions meet or exceed requirements of NFPA 211, Standard for Chimneys, Fireplaces, Vents, and Solid Fuel Burning Appliances. Approved NFPA 211 clearance reduction methods **DO NOT** allow stove clearances to be reduced below 12". **NFPA WALL SHIELDS MUST BE SIZED TO NFPA 211 SPECIFICATIONS. CONSULT NFPA 211 AND A QUALIFIED EXPERT BEFORE IMPLEMENTING THESE REDUCTIONS.**

- These clearances apply to walls, ceilings, furniture and other combustibles.
- The 36" Vertical Stack Shield attaches to the back of the stove pipe and prevents excess heat from being radiated from the pipe. Heat shield protection is only required for the first 24" of vertical connector pipe.
- At least 30" is required from the front of the stove to combustibles (such as curtains, wall hangings, and furniture).

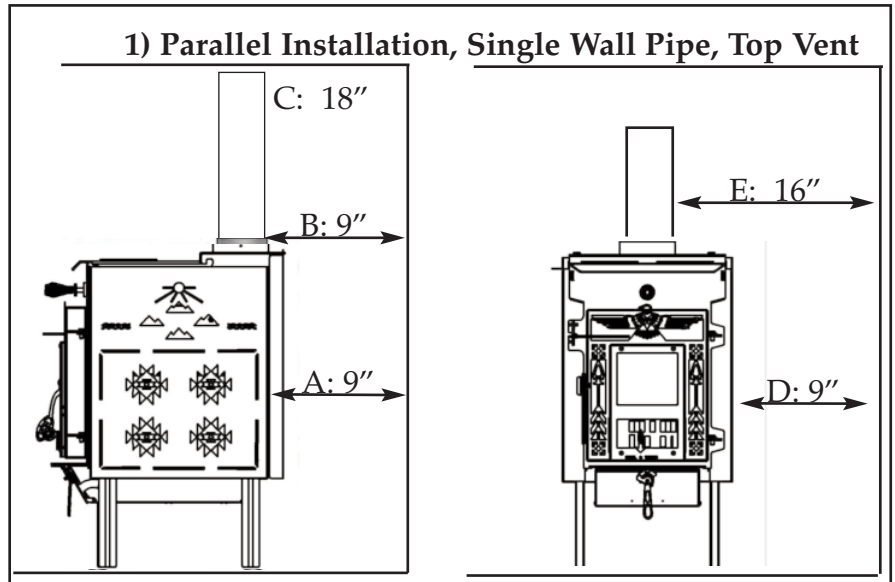
Note: The only approved method allowing for a rear stove clearance less than 12" is the Approved Rear Heat Shield (#N-997) provided by Woodstock Soapstone Co.

CLEARANCE INSTALLATION DIAGRAMS

The Navajo Hybrid Combination stove is a top vent stove designed to be installed along a side or back wall, or at a 45 degree angle to a corner wall. Straight up venting will provide the best draft and easiest operation.

PARALLEL INSTALLATION WITH STOVE SHIELDS, PIPE/CEILING SHIELDS

- A. Back of stove to wall = 9"
- B. Back of pipe shield to wall = 9"
- C. Above pipe to ceiling = 18"
- D. Side of stove to wall = 9"
- E. Side of pipe to wall = 16"

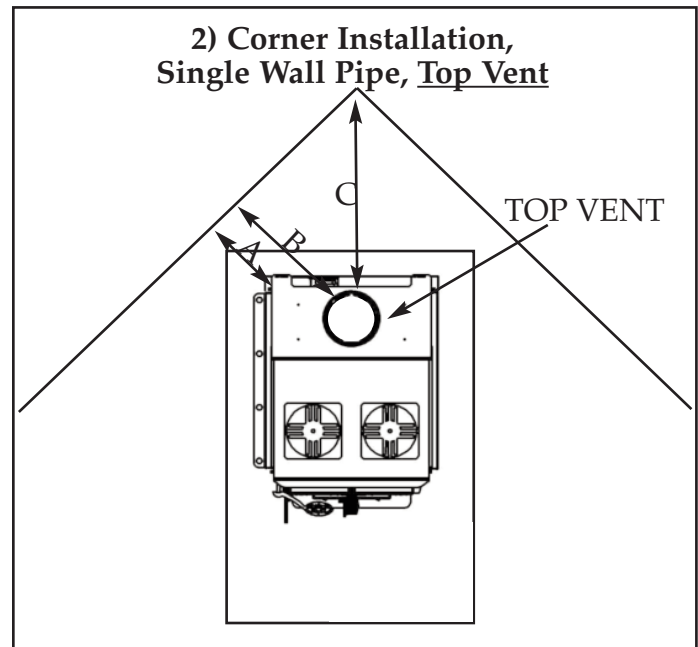


CLEARANCE INSTALLATION DIAGRAMS, Continued

In a corner installation, the distance from the stove corners to the side walls dictates where the stove can, and cannot, be placed. The minimum distance from the back corners to the side walls is 9"

CORNER INSTALLATION WITH STOVE SHIELDS, PIPE/CEILING SHIELDS

- A. Stove corners to side walls = 9"
(determines placement)
- B. Pipe to side walls = 16"
- C. Pipe to corner = 16"



MOBILE HOME INSTALLATION

CAUTION: THE STRUCTURAL INTEGRITY OF THE MOBILE HOME FLOOR, WALL, AND CEILING/ROOF MUST BE MAINTAINED.

Because mobile homes are also referred to by HUD as "manufactured" homes, regulations present a gray area. Many "mobile" homes are set on a permanent foundation and connected to public utilities. If you are installing a stove in a mobile or manufactured home, read the requirements below and check with your local code officials. More questions? Give us a call Monday through Saturday from 9 to 5 Eastern time at 1-800-866-4344.

While all stove installations have to meet National Fire Safety codes, mobile homes are given special consideration when it comes to installing a wood burning stove. These additional regulations were established by the Department of Housing and Urban Development (HUD), and result in the following additional requirements:

1. Outside Air for Combustion
3. Tie Downs for the Stove
4. Spark Arrestor on the Chimney Cap
5. Stove Grounded to Chassis
6. Stoves May Not Be Installed in Mobile Home Bedrooms

Mobile Home Prohibition:
WARNING: DO NOT INSTALL IN SLEEPING ROOM

1. Outside Air must be used for combustion. Many mobile homes have very tight construction, so wood stoves need a way to get adequate combustion air from *outside the home* to avoid the risk of depleting oxygen in the living space and to reduce the likelihood of smoldering and spilling smoke because there is a lack of combustion air. Having outside air for combustion is a requirement for all woodburning stoves in the state of Washington and is recommended for woodstoves in "super tight" new construction.

The outside air adapter has a four-inch collar on the back of the stove. Use 26 gage pipe to make a duct from this collar, through the floor, and then horizontally to the outside of the foundation or skirting. The ter-

mination of the outside air adapter should be covered with wire mesh with openings no larger than 1/4 inch by 1/4 inch.

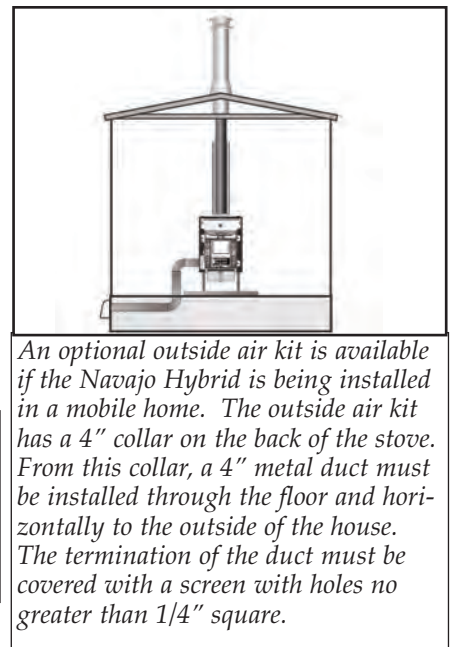
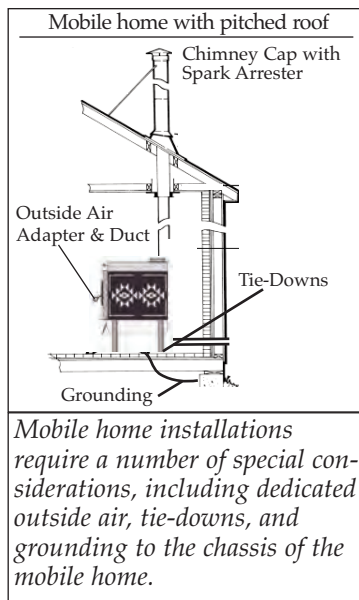
2. Tie Downs: HUD requires that the stove must be attached to the floor. This is to prevent tipping in the event the home is moved. It also provides some protection if the mobile home is installed in an earthquake zone. Two legs of the Navajo Stove have a plate at the bottom to enable bolting opposite corners to the floor.

3. Spark Arrestor: The chimney cap must have a spark arrestor screen for fire-protection. These are available with most prefabricated chimney systems.

4. Grounding: The stove should be grounded to the home chassis.

5. Not allowed in mobile home bedrooms: Wood stoves are not permitted for installation in sleeping rooms.

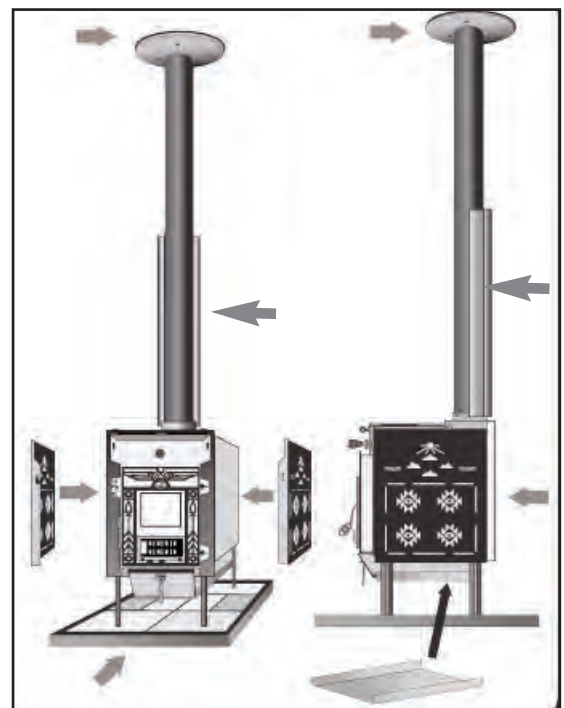
Note: A heat shield is provided for the stovepipe to prevent excessive heat from being radiated to nearby walls. The heat shield should be attached to the back of the stovepipe with screws provided. Double wall pipe is often used in mobile homes to connect the stove to the chimney, but when the Navajo Hybrid was tested to UL Standards the heat shield provided better protection than double wall pipe.



INSTALL SHIELDS BEFORE YOU LIGHT YOUR STOVE

Your Model 211 Navajo Hybrid Stove has been shipped assembled except for heat shields. You must install all required shields before lighting your stove. Each shield comes with instructions and hardware (if needed) attached to the shield. These shields are considered parts of the stove, and must be installed before lighting the first fire. The shields that you need to install are diagrammed below.

- Bottom Heat Shield (protects the floor)
- Side Heat Shields (2) (protects walls)
- Back Heat Shield (protects walls)
- Pipe Shield (protects walls from heat from pipe)
- Ceiling Shield (protects ceiling)



Woodstock Soapstone Company
 66 Airpark Road, West Lebanon, NH 03784
 800-866-4344 • www.woodstove.com

OPERATION

The Navajo Wood/Coal Hybrid Stove is uniquely designed to burn clean when burning either wood or coal. It is important to note that there are separate operating techniques when burning these two fuels. The directions below will direct you how to best burn each fuel type in a clean and efficient manner.

Seasoning Your Stove

The seasoning can be accomplished through a series of small to moderate wood fires. *Don't place anything on the top surface of the stove until the paint has finished curing. There are two things you will notice during the first fire:*

First, there will be a hot, acrid smell as the stove heats up. This smell is a result of the paint on the stove and pipe curing. You will want to have your first fire on a day when you can open the windows in the house to provide adequate ventilation. The odor is non-toxic and will only be present for the first few fires.

Second, there will be some condensation on the glass. This condensation is a result of any moisture being driven out of the stove and condensing on the inner surface of the glass. It takes a couple of small fires to season the stove and remove this excess moisture.

Getting to Know the Navajo Stove Controls

Fuel Choice Lever

The Fuel Choice Lever is operated with a coil spring handle above the door. This control engages a catalytic combustor when burning wood, and disengages it when burning coal.

To burn wood, use the coil spring to straighten the lever, then push it in as far as it will go and leave it there. The coil spring handle is centered over the door.

To burn coal, pull the rod out completely to disengage the catalyst. Move the handle to the left before loading coal.

Bypass Damper

Opening the Bypass Damper prevents smoke from coming out the loading door when you are kindling a fire or loading fuel. The Bypass Damper Handle is in front of the loading door, so the door cannot be opened unless the bypass is opened first.

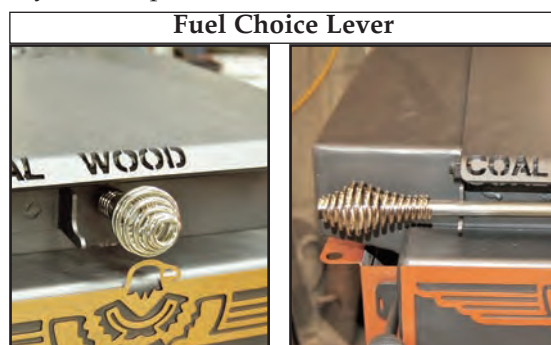
When the bypass is open, smoke goes directly up the chimney

When the bypass is closed, the stove produces more heat, and less smoke. Close the bypass as soon as the stove begins to warm up.

Air Control

The air damper on the bottom of the Load Door controls the rate the fuel is burned and the amount of heat that the stove produces.

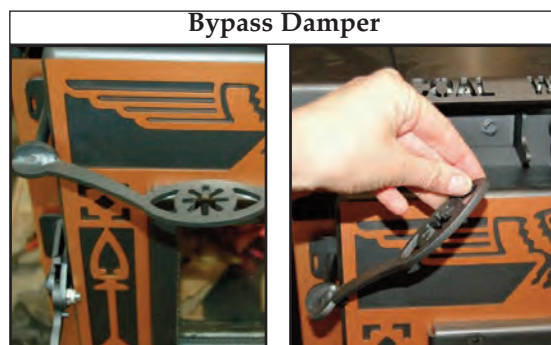
Move the air damper to the right of the diamond mark to burn wood. Move it all the way to the right to kindle a fire or maximum heat.



Wood Position

Coal Position

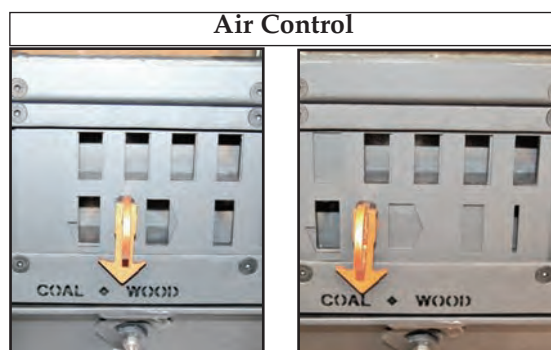
When burning wood and coal at the same time, leave Fuel Selection Rod in "COAL" position.



Bypass Closed

Bypass Opening

The Bypass Handle must be opened to kindle a fire or reload the stove. Close this handle when the stove is in operation. The stove will produce more heat and less smoke with the handle closed.



Push RIGHT To Burn WOOD

Push LEFT To Burn COAL

When burning coal, move the air damper all the way to the left. Adjust the damper slightly toward the middle to extend coal burn times.

Door Latch Detente

There is a small notch in the door handle. If you close the door just to this notch, it will let air in at the edge of the door. This will provide a small boost when kindling a fire. Use the detente to add a little air when starting a wood fire, or just after reloading.

Wood Burning ONLY Operation

1. Move the coil-handled FUEL CHOICE LEVER to "WOOD" position (Figure 1)
2. Open the combustion air control, located on the loading door, to "WOOD" by sliding the air control to the RIGHT (upper slots fully open). (Figure 2)
3. Open the Bypass Damper (Figure 3). The Bypass Damper must be open to open the loading door. Keep the Bypass Damper open to prevent smoke from spilling into the room when kindling the fire.
4. **Always confirm there is adequate draft before lighting the fire.** Hold a lit match or light a small piece of newspaper in the top/back of the firebox, where smoke exits. If the flame is drawn out of the firebox, toward the flue, proceed with lighting the fire. If the flame stands still or is pushed away from the flue exit, you must establish a good draft before lighting a fire. A hair dryer or heat gun pointed at the flue exit is a good way to establish draft without creating a lot of smoke. After you think you have draft, retest with a match.
5. Once good draft has been established, build a fire on the floor of the firebox.
DO NOT USE ADDITIONAL GRATES, ANDIRONS OR ANY OTHER METHODS TO SUPPORT THE FUEL IN THE FIREBOX. Start with crumpled newspaper and dry kindling (Figure 4).
6. Add small splits of firewood once the kindling has ignited to establish a bed of hot coals.
7. Add small to medium splits onto the hot coals (Figure 5).
8. After the single wall pipe temperature reaches 250°-300°F, close the Bypass Damper by lowering the handle down to the closed position (Figure 6). All of the smoke from the firebox will now pass through the catalytic combustor. The combustor will generate a substantial amount of heat as it "burns" the smoke passing through it.
9. Adjust the Combustion Air Control to a lower setting, by sliding the Air Control towards the center diamond.
Do Not slide the air control past the center diamond, keep the Air Control on the "Wood" side of the diamond. The closer the lever is to the center diamond (without going past) the longer the wood will burn (Figure 7).



Figure 1



Figure 2

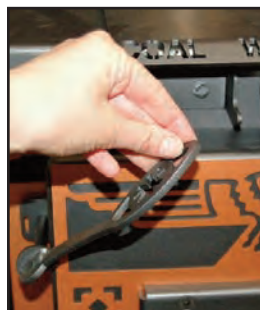


Figure 3



Figure 4



Figure 5



Figure 6



Figure 7



CAUTION

NEVER USE GASOLINE, 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 WHILE IT IS IN USE.

Coal Burning or Coal-Wood Combination Operation

The stove should be started using wood. Once a wood fire has been established, coal may be added as an alternative fuel. Establish a good, hot coal bed before adding coal.

1. Move the coil-handled FUEL CHOICE LEVER to "COAL" position (Figure 8)
2. Open the combustion air control, located on the loading door, to "COAL, by sliding the air control to the LEFT. (Figure 9)
3. Open the Bypass Damper (Figure) and the Loading Door.
4. Rake down the center of the grate, to move ashes into the ash pan and increase airflow through the grate and into the firebox. If the ash pan is full, make sure to safely empty into an ash bucket with a tightly sealed lid. A full ash pan will prevent the required "under-fire" air from reaching the coal bed.
5. Put in several large pieces of coal. Leave space between pieces of coal so air can flow up through the middle of the grate. Add small coal pieces outside big pieces. (Figure 10) Always keep a flame in the coalbed. Make sure there is some flame before you close the door.
6. Close the Load Door but leave the Bypass Damper open for about 10 minutes after loading coal.
7. Leaving the bypass damper open will help to create a strong draft and ignite the coal.
8. When the bypass damper is open, all of the exiting smoke will go directly up the chimney, creating additional draft. The additional draft pulls more air through the coal bed, heating up the coal. You should notice secondary flame activity around the exit at the back of the stove.
9. After about 10 minutes, close the bypass damper (Figures 11 and 12). Flames will now come toward the front of the stove, across the perforated fireback at the top of the firebox. Oxygen is introduced through the holes in the fireback, and the flames will create enough heat that exhaust will ignite at the top of the firebox.



Figure 8



Figure 9



Figure 10



Figure 11

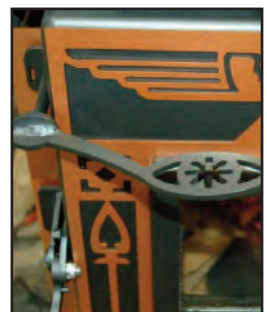


Figure 12



AFTER LOADING COAL, CHECK TO BE SURE THERE ARE VISIBLE FLAMES IN THE COALBED. IF THERE ARE NO FLAMES, OPEN THE BYPASS DAMPER FOR SEVERAL MINUTES UNTIL FLAMES ARE CLEARLY VISIBLE.

Low & Overnight Burning

These instructions are intended as a guide to operating your wood stove. Your timing and final damper settings will vary depending on chimney draft, type of wood, moisture content of the wood and size of the splits. The Navajo Steel Hybrid is simply designed and intended to be user friendly, but it will take some practice to understand how the stove works best for you.

1. Before you open the loading door, you must fully open the catalytic bypass and the air damper. Wait a minute or so, before opening the loading door slowly, for a strong draft to be established to prevent smoke from spilling back into the room.
2. Wearing stove gloves, open the loading door and stir up the hot coals. If necessary, excess ash should be removed before reloading the firebox. If your stove has the optional ash pan, simply rake the hot coals back and forth in the firebox to allow the loose ash to fall through the center grate into the ash pan. If your stove does not have an ash pan, push the hot coals to one side and shovel the loose ash into a non-combustible ash container with a tight fitting lid. Dispose of the ash properly.
NEVER PUT AN ASH CONTAINER ON A COMBUSTIBLE SURFACE, LIKE A WOOD FLOOR.
3. Place several small splits on top of the hot coals and allow them to ignite.
4. Load the firebox to capacity leaving roughly 2" of space for secondary combustion, with a mix of larger and smaller split pieces of wood. If burning coal, add about 10-12 pounds of coal for an overnight burn. Close the loading door.
5. Allow the temperature on the exterior of single wall pipe to come back up to 250°, this may only take 5-15 minutes depending on the dryness of the wood and draft conditions.
6. Adjust the air damper to a low setting, close to the diamond setting on the wood/coal indicator.
7. Close the Bypass Damper by lowering the lever until it stops.
8. Try to always maintain a flame in the stove, especially when burning coal. If no flame is present, open the bypass damper.

NEVER BURN THE STOVE WITH THE AIR DAMPER FULLY OPEN EXCEPT WHEN KINDLING A FIRE OR RELOADING THE FIREBOX. NEVER BUILD A ROARING FIRE IN A COLD STOVE. IT TAKES AT LEAST 30 MINUTES TO HEAT THE INNER FIREBRICK WALLS OF THE NAVAJO HYBRID. ATTEMPTS TO REACH HIGH TEMPERATURES VERY QUICKLY COULD RESULT IN DAMAGE TO THE STEEL PARTS.

Burning for Higher Heat Output

These instructions are intended as a guide to operating your wood stove. Your timing and final damper settings will vary depending on chimney draft, type of wood, moisture content of the wood, and size of the splits. The Navajo Steel Hybrid is simply designed and intended to be user friendly, but it will take some practice to understand how the stove works best for you.

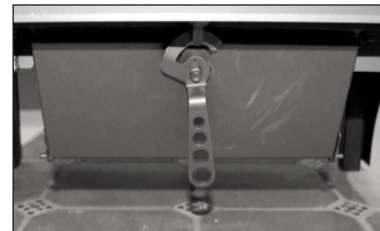
1. Before you open the loading door, you must fully open the catalytic bypass and the air damper. Wait a minute or so to establish a strong draft. This will help to keep smoke from spilling into the room.
2. Open the load door and stir up the coals and remove excess ash as needed.
3. Place several small splits on top of the hot coals and allow them to ignite.
4. Load the firebox to capacity leaving about a 2" space for secondary combustion at the top, with a mix of larger and smaller splits. Close the loading door.
5. Allow the fresh wood to become involved in the fire. With dry wood this may take 5-15 minutes, or until the exterior of single wall pipe reaches 250°. Lower air damper handle down to the 3 position.
6. Close the Bypass Damper by lowering the lever until it stops.
7. You should see the flames from secondary combustion at the top of the firebox becoming more active.

Ash Removal

NEVER BURN THE STOVE WITH THE ASH DOOR OPEN!

If your Navajo Steel Hybrid is in continuous operation and you are burning both wood and coal, it is recommended to empty the ash pan daily. Daily ash removal will keep the underfire air flow from becoming blocked when burning coal. You do not have to let the fire die out completely, but make sure that it is reduced to hot coals. Open bypass damper, and open the air control damper. Remember to wear stove gloves - the ash pan will be hot! Open the ash pan door located below the loading door. Carefully slide the lid into place on the top of the ash pan and remove the ash pan from the base of the stove. The lid slides over the long top edges of the ash pan. Close the ash pan door before emptying the ashes into an appropriate container.

Do not open the ash removal door while the stove is in the middle of a long burn, because the additional draft created under the fire could cause the stove to burn excessively hot and the ash pan itself will be very hot, and full of live coals. If you are burning your stove 24 hours/day, it is often easiest to empty the ashes first thing in the morning, after an overnight burn.



The ash pan door is located below the front loading door.



The ash pan door drops down and the ash pan slides out from under the stove for easy ash removal.

ASHES SHOULD BE EMPTIED INTO A METAL CONTAINER WITH A TIGHT FITTING LID. THE CLOSED CONTAINER OF ASHES SHOULD BE PLACED ON A NONCOMBUSTIBLE 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. LIVE CINDERS CAN TAKE

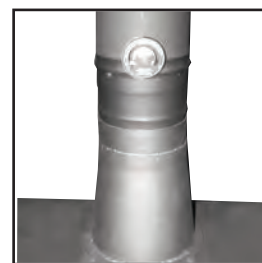
NEVER SHOVEL ASHES INTO A COMBUSTIBLE CONTAINER LIKE A CARDBOARD BOX OR A PLASTIC BUCKET. DO NOT USE A VACUUM CLEANER TO REMOVE ASHES UNLESS IT IS SPECIFICALLY DESIGNED FOR WOODSTOVE ASH REMOVAL. NEVER LEAVE A CONTAINER OF HOT ASHES ON A WOOD FLOOR, PORCH, OR ANY COMBUSTIBLE SURFACE.

Magnetic & Probe Thermometer

We recommend placing the magnetic thermometer 8"-10" above the flue collar on single wall stove pipe.

If you are reading the single wall stove pipe temperature, the interior flue exhaust temperature is about twice as hot as the reading on the magnetic thermometer. We recommend engaging your catalytic combustor once the pipe thermometer reaches 250° F.

To install the probe thermometer, remove the screw toward the rear of the lift top, and insert the probe in the hole. The end of the probe is about 1 inch away from the catalyst, when the catalyst is engaged. This thermometer will tell you the exhaust gas temperature as it exits the catalyst. Over time you will become used to monitoring the exhaust gas temperatures. If these temperatures decline over time, then it is usually an indication that the catalyst needs to be cleaned. See directions for cleaning in the next section.



Place the surface thermometer 8" above the stove top for top vent, or on the cover plate for rear vent.

DO NOT OVERFIRE THIS WOOD STOVE!



ATTEMPTS TO ACHIEVE HEAT OUTPUT RATES THAT EXCEED STOVE DESIGN SPECIFICATIONS CAN RESULT IN PERMANENT DAMAGE TO THE STOVE AND TO THE CATALYTIC COMBUSTOR.

Overfiring

Burning a stove frequently at excessive temperatures is known as overfiring. When the surface temperature is consistently over 700° F, the stove has reached 1400° F inside. Operation with temperatures in

this range can lead to metal warping, becoming brittle, and eventually deteriorating completely. It can shorten the useful life of the catalytic combustor.

Avoid overfiring by letting the combustor and secondaries do most of the work in the stove. Your stove is operating at peak efficiency when the combustor is “engaged” and the secondaries are ignited, with the damper lever set to a low to moderate setting, and the logs are glowing with secondary flames apparent. You will get the greatest amount of heat per pound of wood when the stove is operated in this manner.

Daily Use

Your Navajo Steel Hybrid stove is well suited for continuous firing on a 24 hour a day basis. It will burn for hours on one load of wood, and will provide steady, even, heat for hours after the fire dies down. You need only disengage the catalytic combustor when you kindle a fire, or reload the stove. Once the catalyst is ignited, it will continue to function as long as there is smoke to burn.

Your connector pipe and chimney, or chimney pipe, should be inspected at regular intervals (not less than once every two months). Examine the connector pipe for creosote, corrosion, loose seams, or excessive soot. Clean and replace as necessary. The chimney or chimney pipe should be cleaned and checked by a certified specialist once a year. A small mirror held at the cleanout door of a masonry chimney will be helpful. For a Class A prefabricated metal pipe, some disassembly is usually required.



Dry Firewood will show “checking” or cracks at the end of the split

The Stove Top

The top lid of the Navajo Hybrid makes for a perfect cook surface. The cook surface can be used to make soups, stews, sauces, and even traditional Navajo Fry Bread. The steel cook top is not designed as a cooking surface and food should always be placed in a heavy duty Dutch oven or skillet, not directly onto the steel surface.

The Fall-Away Tool

The “fall-away tool”, which comes with your stove, can be used to operate the door latch and the bypass lever. Simply insert the tool into the door handle circle to use to safely open/close the loading door. The loading door and the door handle are very hot, so use the tool provided. The “fall-away tool” conforms to UL requirements and is made so that if you let go of it, it will “fall-away” from the stove and not become too hot to handle.

Firewood

Your Woodstock Soapstone Navajo Steel Hybrid Wood Stove is designed to burn dry, natural cordwood. Higher efficiency and lower emissions generally result when burning air dried hardwoods, as compared to green, freshly cut hardwoods. It is perfectly fine to burn soft woods in your stove as long as they are properly dried. Hardwoods are preferable because they are typically denser than soft woods which gives them a higher fuel value per volume.

The moisture content of some trees may range as high as 50% – i.e., there is as much moisture in the tree as there is wood. After wood has been cut to length, split and stacked for a year, the moisture content will usually range from 15-25%. Splitting wood before it is stored will reduce drying time. Properly dried wood will produce more heat, reduce the likelihood of water vapor condensing in the chimney, forming creosote, and result in less pollution entering the air. It is safer and more efficient to burn dry hardwood than green or wet wood that smolders.

The advantages of burning dry wood are many. Dry wood is lighter, easier to split, and easier to carry. It is easier to light, produces more heat, and generates less pollution. If you burn wet wood much of the energy generated by the fire is used to drive moisture out of the wood, rather than producing heat for you. Dry wood will maintain the highest combustor temperatures and burn the most efficiently. Creosote is much less likely to form if you burn dry wood.

There are several ways to determine if wood is properly dried. Visual “checking” on the end of the wood splits, dry wood will feel lighter, if you bang two pieces of dry wood together it will sound hollow (wet wood will sound solid & dull), and no bubbling or sizzling from the wood as it burns. Moisture meters are a great way to determine the percentage of moisture content in wood. Moisture meters utilize two pin probes that insert into the wood and read the percentage of moisture. Moisture meters can be purchased online.

Common symptoms of burning wet wood include: Difficulty getting the fire started, smokey fire, dirty glass, creosote buildup within the stove pipe and/or chimney, low heat output, short burn times, and excessive wood use.

DO NOT BURN pressure treated or painted wood, unseasoned wood, garbage, solvents, lawn clippings or yard waste, materials containing rubber; including tires, plastics, petroleum products, paints, paint thinners, asphalt products, materials containing asbestos, construction debris, railroad ties, manure or animal remains, salt water driftwood or other salt treated saturated materials, or paper products, cardboard, plywood, or particle board in your Woodstock Soapstone Navajo Steel Hybrid Wood Stove.

The prohibition against burning these materials does not prohibit the use of fire starters made from paper, cardboard, saw dust, wax and similar substances for the purpose of starting a fire in the Navajo Steel Hybrid.

Burning treated wood, garbage, solvents, colored paper or trash may result in the release of toxic fumes and may poison or otherwise render the catalytic combustor ineffective and cause smoke.

Burning cardboard, loose paper, and trash will add significantly to ash and soot buildup, and it will not produce much heat. Fly ash from improper fuel can also coat or plug the combustor, causing smoke spillage into the room. Under normal operating conditions, the Woodstock Soapstone Stove is designed to last for generations. It is not, however, designed for continuous over-firing or the burning of trash.

 DO NOT BURN!	
<ul style="list-style-type: none">• UNSEASONED WOOD• TREATED/PAINTED WOOD• GARBAGE• CARDBOARD• SOLVENTS• COLORED PAPER• TRASH• LAWN CLIPPING• RUBBER PRODUCTS	<ul style="list-style-type: none">• PLASTICS• PETROLEUM PRODUCTS• PAINT/PAIN THINNER• MATERIALS CONTAINING ASBESTOS• DRIFTWOOD• ASPHALT PRODUCTS• RAILROAD TIES• MANURE/ANIMAL REMAINS• PLYWOOD/PARTICLE BOARD

Coal Fuel

The Navajo stove has been designed and developed for burning sub-bituminous coal, like Fruitland Coal and Black Mesa Coal. We recommend small piece sizes, in the 1 pound to 7 pound range. Remember when loading the stove to always leave a gap between pieces down the center of the grate. This will allow air to flow freely between pieces. We do not recommend the use of other fuels, other than wood and coal.

Coal should be stored outside in a box, container, or shed with a roof to keep the coal dry. Excessive moisture will result in loss of heat and generation of excessive smoke.

THE CATALYTIC COMBUSTOR



The catalytic combustor is **ONLY** used while burning wood. **DO NOT** activate the catalytic combustor while coal is burning in the Navajo Stove. Coal exhaust will reduce the efficiency of the catalyst.

Here is how your catalytic combustor works.

The catalytic combustor in your stove is very similar to the one in the exhaust system of your car and works to achieve the same results - high efficiency and clean air! The catalytic combustor is a round stainless steel honeycomb with thousands of cells. The inside of the cells has a coating that ignites exhaust gases as they pass through the catalyst - helping the stove to create more heat and reduce smoke and emissions. The dense cell structure is used to create a large surface area so all of the exhaust is exposed to hot surfaces inside the catalyst.

When you first start a fire, you should bypass your catalytic combustor and let the smoke go directly up the chimney. Once wood smoke reaches 500° F internally (about 10-15 minutes after reestablishing a strong fire), it is hot enough to ignite the catalytic combustor. As the wood smoke passes through the cells in the combustor, the smoke reacts with coating which lines the inside of the catalyst and both gases and particles in the smoke ignite and burn. This “catalytic burn” reduces emissions and increases the stove’s heat output.

Without a catalytic combustor, between 5% - 40% of the chemical energy contained in wood simply escapes up the chimney when wood is burned. The catalyst takes smoke in a slow-burning fire and turns it into heat, and eliminates pollution at the same time.

Most of the chemical compounds in wood smoke are combustible. The catalyst produces high temperatures, which loosen the bonds of these chemical compounds and “burns” wood smoke. A stove that “burns” these compounds and uses smoke as additional fuel will burn more efficiently and produce more heat, while reducing creosote and air pollution at the same time.

With proper care, a new catalytic combustor will give years of fuel savings, increased heat and lowered emissions. By following some simple

guidelines you can ensure maximum combustor performance and longevity. Your catalytic combustor is designed to last for 10,000 -12,000 hours of use. You can ensure yourself of getting the maximum life from your combustor by following these simple guidelines:

- 1) Burn only natural, dry wood.
- 2) Wait until the internal exhaust gases reach about 500 degrees F (250° F on the pipe or stovetop) before closing the Bypass Damper and engaging the catalytic combustor.
- 3) Open the Bypass Damper before reloading, and leave the bypass open for a few minutes after reloading, to raise the exhaust temperature to 500 degrees F (250° F on the pipe or stovetop).
- 4) Don’t overfire the stove.
- 5) Clean the combustor regularly. See instructions below.

You can also



Bypass lever should be up when starting or reloading the Navajo Steel, allowing the smoke to heat up to 500° internally.



The bypass lever interlocks with the door when the combustor is engaged (bypass closed). This safety feature makes it impossible to open the loading door without opening the bypass.

obtain a lot of useful information by visiting our website (www.woodstove.com). Other very useful web sites on all aspects of wood burning are (www.woodheat.org) and (www.csia.org). CSIA is the Chimney Safety Institute of America

Inspection & Cleaning

Your stove comes with a new stainless steel combustor already installed. The stainless combustor is a round stainless steel honeycomb located under the top lid of the Navajo Steel. Typical lifespan for a well maintained catalytic combustor is 4-6 years. There are a few ways to determine if your combustor needs to be cleaned. If you notice that the smoke exiting your chimney is thicker and darker in color, the combustor may need cleaning. Additionally, if you notice reduced draft or backpuffing, or performance and heat output has diminished, then the combustor may not be working as efficiently as designed or may need to be cleaned.

Plan to clean and visually inspect your catalytic combustor about every 4-6 weeks, or at least 3 times during the heating season. Any fly ash deposits on the combustor will need to be brushed or vacuumed off. An accumulation of fly ash can reduce the draft, causing backpuffing or sluggish burning, and inefficient heating performance. You should clean and check your combustor before the heating season begins, as well as on a regular 4-6 week basis.

CLEANING A COMBUSTOR WITH BRUSH OR VACUUM:

Materials needed: (1) work gloves and safety glasses; (2) soft bristled paint brush or vacuum cleaner (preferably one designed for ash removal).

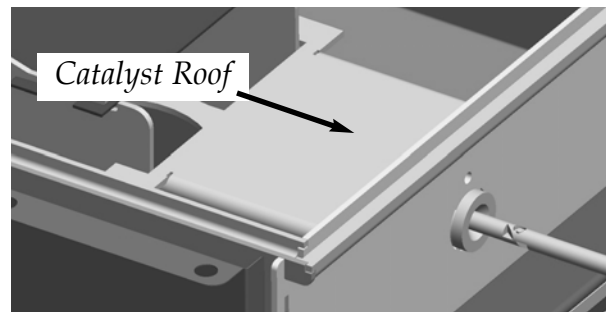
1. Be sure the fire is out and the stove is cold. If you are using a regular home vacuum, it is extremely important that no hot ashes or embers be sucked into it as this could result in damage to the vacuum or cause a serious fire. Open the top lid. The combustor can be removed as illustrated at the right.
2. Lift the combustor out of the stove. Brush or vacuum the combustor sure to remove all fly ash from the combustor.
3. Return the combustor to the stove. Be sure that it is seated flat on the catalytic sled. Close the top lid.

CLEANING A COMBUSTOR WITH WHITE VINEGAR & WARM WATER:

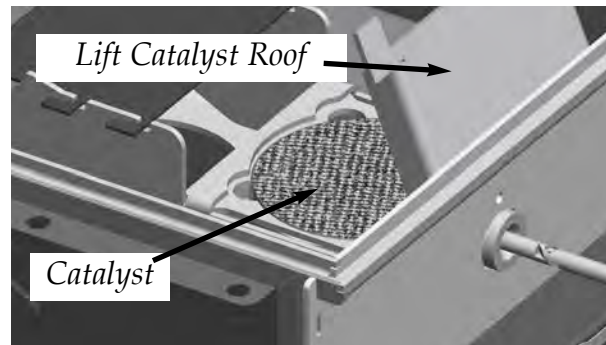
A cleaning with a 50/50 mixture of white vinegar & distilled water is recommended at least once each year. The acidity of common white vinegar (diluted 50%) is just enough to remove any fly ash within the catalytic cells that may be masking the catalytic coating.

Materials needed: (1) work gloves and safety glasses; (2) spray bottle; (3) white vinegar; (4) distilled water.

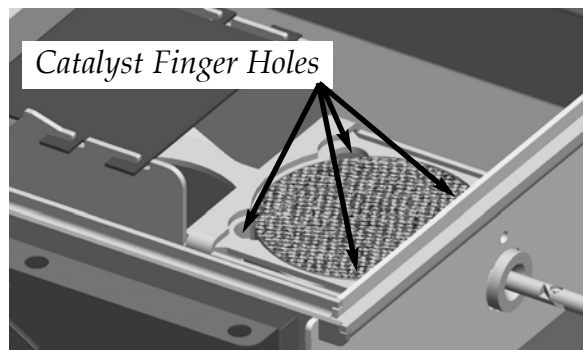
1. Be sure the fire is out and the stove is cold. Open the top lid.
2. Lift the combustor out of the stove. Place the combustor on a newspaper or an old towel. In a spray bottle prepare a 50/50 white vinegar & distilled water mixture.
3. Spray the 50/50 mixture through one side of the combustor and allow it to drain onto the newspaper. Flip the combustor over and spray through the other side and allow it to drain.
4. Rinse the combustor with 100% distilled water to remove any remaining vinegar, allow the combustor to dry before returning the combustor to the stove.
5. Return the combustor to the stove. Be sure that it is seated properly. Close the top lid.



To remove the catalytic combustor, first lift the top lid



Next, lift the catalyst roof.



There are finger holes around the combustor. The catalyst will lift right out for cleaning.

Catalytic Combustor Replacement

If you feel that your catalytic combustor is not working properly, please contact Woodstock Soapstone Company at 1-800-866-4344 for instructions regarding return and replacement.

Accessing the catalyst in your new Navajo Steel Hybrid Woodstove is simple. 1) Lift the top stove lid, 2) Remove the roof installed over the catalyst, 3) Lift the catalyst from the stove, 4) Install the new combustor, 5) Reinstall the roof, 6) Close the top lid.

Frequently Asked Questions

Q. Why use a catalytic combustor for burning wood?

A. There are three advantages to burning the smoke created by burning wood. *First*, the smoke becomes another source of fuel, giving you more heat from the same amount of wood. *Second*, creosote causing materials will be burned up instead of being deposited in your chimney, reducing the risk of a chimney fire. *Third*, air pollution will be drastically reduced. A stove with a catalytic combustor will generate up to 25% more heat from each piece of wood, thus reducing the amount of fuel used during the year.

Q. How can I tell if the catalytic combustor is working or "worn out"?

A. *First* - The best way to tell if the catalytic combustor is working is by observing the smoke coming out of your chimney. If there is only a small amount of smoke, and/or it's white in color, the catalytic combustor is working. You will see significantly more smoke when the Bypass Damper is open and smoke is going straight up the flue, as opposed to then the Bypass Damper is closed and the smoke is being burned by the combustor.

Second - One very noticeable effect of a well functioning combustor is the high efficiency of your stove. Catalytic combustors produce lots of heat, which the stove radiates into your home. If you notice that the stove is producing less heat, or that a load of wood doesn't provide as much warmth, under similar circumstances, as it did before, it's time to check the combustor. If and when the catalyst ceases to function properly, the stove will produce noticeably less heat.

Third - Regular inspection of the connector pipe and chimney flue should show very little accumulation of soot and creosote. Soot is

typically brown and powdery when the combustor is working properly. Heavy buildup of black sticky creosote may indicate the combustor is not functioning or needs cleaning.

Q. How do I maintain my catalytic combustor?

A. Combustors should be inspected and cleaned if necessary **every 4-6 weeks, or a minimum of 3 times** during the heating season. When the stove is cool, the combustor can be cleaned by thoroughly vacuuming or brushing both sides.

If the stove does not draft well when the catalytic combustor is engaged then the combustor cells themselves might be partially plugged with fly ash. If this is the case, follow the cleaning procedure using white vinegar and warm water described on the previous page

Q. Is it all right to burn my stove hot daily to clean any build up in my chimney system?

A. It is not necessary to burn your stove hot daily to burn off any creosote build up in the chimney. This function is performed by the catalytic combustor. It is there to reduce the emissions from the stove that contribute to deposits in the connector pipe and chimney flue.

View more frequently asked questions and articles at our web site www.woodstove.com. Other very useful websites on all aspects of wood burning are www.woodheat.org, and www.csia.org. CSIA is the Chimney Safety Institute of America.

TWO OTHER IMPORTANT POINTS REGARDING CATALYTIC COMBUSTORS:

- 1) The combustor uses wood smoke as fuel. Most smoke is created in the early stages of the burn cycle. When a bed of coals is all that remains of your wood, there is little smoke left to fuel the combustor, and it will no longer create substantial amounts of heat. Hence, the temperatures on the surface thermometer tend to fall toward the end of the burn, even though the firebox is full of hot coals. This does not mean that you have to reload the stove or open the bypass. Let the hot coals burn down to ashes.
- 2) Since the combustor blocks the path of exiting smoke, it can reduce the draft in your stove. When draft is reduced by warm or rainy weather, open the bypass damper longer when starting the stove to create more draft.

CATALYTIC COMBUSTOR WARRANTY

The catalytic combustor in your Navajo Steel Hybrid Woodstove is fully warranted for three years from the date of purchase against any defect in workmanship or materials that prevent the combustor from functioning when installed and operated properly. The catalytic combustor is additionally warranted for three years from the date of purchase for any deterioration in the stainless steel substrate material. For instructions regarding return or replacement of the catalytic combustor, please contact:

Woodstock Soapstone Company, Inc.

66 Airpark Road

West Lebanon, NH 03784

Phone: 1-800-866-4344 • Web:

www.woodstove.com

MAINTENANCE

Stove Cleaning

The steel body of your Navajo Steel Hybrid stove is painted with high temperature stove paint. Under normal operating conditions, this paint will not peel or blister. We suggest cleaning by dusting with a soft brush or cloth, or vacuuming with a brush attachment when the stove is cold. If the steel is exposed to moisture for a long period of time it may develop surface rust. If this happens, brush the affected area until clean with either a short wire brush or medium steel wool and then touch-up with high temperature stove paint, which is available from Woodstock Soapstone Company.

The firebrick that lines the firebox interior is rugged and well suited to the harsh environment of the firebox. It should last for years under normal use. Should you need a replacement firebrick part, contact Woodstock Soapstone Company directly.

Glass Cleaning

We use ceramic glass in our stoves because it is resistant to both impact and thermal shock. The ceramic glass installed in the loading door is fully gasketed around the perimeter so there is no contact between the glass and the steel frame.

The glass may soot up the *first* time you use the stove (from condensation already inside the stove). *Don't be alarmed!* Usually, as soon as you build up adequate temperature with a hot fire, the glass will clean itself. The residue will burn off, and it will stay clean. Soot accumulation on the inside of the glass is more likely in the spring and fall, when temperatures are very mild and you are less likely to maintain a hot fire.

To clean the inside of the glass or wipe off fly ash, we recommend that you use a brush with soft bristles (like a paintbrush). A white vinegar and water solution works well to remove most ash or soot accumulation. You may clean heavy soot from the glass with very fine steel wool (0000 grade), but first, be sure the fire is out; and second, be sure that the glass has cooled to room temperature before you clean it. **DO NOT ATTEMPT TO CLEAN HOT GLASS.**

Gasket Replacement

There are 3 places on your stove where you should check the gasket routinely: (1) on the loading door, (2) under the steel lid/cooktop, (3) the ashpan door (models purchased with the ashpan). These gaskets are most important for maintaining high efficiency and clean burning. Close a slip of paper in these gasketed areas. There should be resistance as you pull the paper out. If there is any evidence of deterioration and/or leaking in any of these areas or if any of the gasket material in the stove becomes worn or frayed, it should be replaced. Please contact Woodstock Soapstone Company for replacement gasket and instructions. The sizes of all the gaskets on your Navajo Steel Hybrid woodstove are included in the parts list at the end of this manual.

Routine Checks And End of Season Maintenance

Every few weeks of operation we recommend checking the chimney connector (stovepipe) and combustor (see combustor section) and cleaning, if necessary. The connector pipe and chimney should be inspected every two months at a minimum and cleaned if necessary.

When the weather warms up and the burning season is over, it is a good idea to do a thorough spring cleaning and inspection of your stove and chimney system. We recommend an annual inspection and cleaning by a certified chimney sweep who has the tools and knowledge to inspect the whole system, from top to bottom. Chimney safety is an important part of responsible wood burning. The best way to gain confidence in the safety of your Navajo Steel Hybrid woodstove is to have it serviced and inspected once a year by a professional chimney sweep. The Chimney Safety Institute of America maintains a database of certified sweeps nationwide. Visit their website www.csia.org to find a professional in your area.

If you live in a climate with warm, humid summer weather, your stove may collect moisture from warm, moist, chimney downdrafts during the summer. If this happens, you may get smoky smells in your home. One way to reduce the likelihood of this happening is to block the flue exit in the stove with fiberglass insulation at the end of the heating season. This will help prevent downdrafts and humidity from entering the stove. (You'll have to be careful to remember to remove the insulation before

you light the stove again in the fall!). Some prefer to place a tray of kitty litter or baking soda in the firebox to reduce moisture and odors.

Creosote Formation and Need for Removal

When wood is burned too 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 residue accumulates on the flue lining. When ignited, this creosote makes an extremely hot and dangerous fire.

The chimney connector and chimney should be inspected at least once every two months during the heating season to determine if creosote buildup has occurred. If creosote has accumulated it should be removed to reduce the risk of a chimney fire. Cleaning the combustor regularly will also greatly reduce creosote buildup. Under certain conditions, creosote can form rapidly.

The most likely conditions for creosote to occur are: (1) when filling the firebox with a hot bed of coals and the damper is then completely closed; (2) extremely long, smoldering fires, and; (3) burning wet or green wood.

Lack of combustion air and smoldering fires usually result in dense smoke and low stack temperatures in the chimney connector and the chimney. Wet or green wood can also produce dense smoke and excessive water vapor, which can quickly lead to creosote buildup.

Creosote will accumulate faster in exterior chimneys than interior chimneys because of colder outside temperatures.

There are three stages of creosote build-up. The first is a flaky, crystal like accumulation which can be removed with a brush. The second is a tar like coating. The third is a hard, glossy enamel like coating that is difficult to penetrate. If your chimney is heavily coated with tar or enamel like creosote, we recommend that you consult with an experienced chimney sweep about removal and prevention.

CREOSOTE PREVENTION: Without question, the best way to treat creosote is to prevent its accumulation. In order to reduce the danger of accumulation, we recommend the following:

1. Only burn properly dried firewood. Dry wood

burns hotter, cleaner, and expels less moisture to condense.

2. Use the catalytic combustor properly. It can reduce possible creosote accumulation by as much as 90% and improve stove efficiency at the same time. Be sure to read the section on catalytic combustors on pages 15-18.
3. Never operate your stove for extended periods of time with the draft control completely closed. Both the wood fire and the catalytic combustor need oxygen to burn efficiently.
4. Re-establish a hot fire, and reignite the combustor after every reloading by opening the primary air control for about 10 minutes.
5. Check the catalytic combustor output. Use the thermometer provided with the stove to be sure that the catalytic combustor is igniting properly when you kindle a fire or reload the stove. The temperatures on the stove top should rise noticeably when the catalytic combustor is engaged.
6. Avoid long, smoldering fires. Again, the catalytic combustor is critical here. Hot firebox temperatures (with the stove top thermometer in the 400-600°F range) will produce more complete combustion and maintain proper catalytic activity.

Coal Soot Removal

Soot - Formation and Need for Removal

When coal is burned, the products of combustion combine with moisture to form a soot residue which accumulates on the flue lining. When ignited, this soot 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 a soot buildup has occurred.

If soot has collected, it should be removed to reduce the risk of a chimney fire.

TROUBLESHOOTING GUIDE

<u>Problem</u>	<u>Possible Cause</u>	<u>Solutions</u>
Stove smokes	Operating technique	Open bypass and air damper prior to reloading stove
	Blocked Chimney	Examine chimney and stovepipe for blockage and creosote accumulations. Check spark arrestor screen on your cap, if you have one.
	Blocked outside airduct	Check the outside inlet for blockage caused by snow, debris, or insects.
	Oversized chimney	Reline chimney to appropriate size.
	Chimney too short	Add height (industry standard is 15ft or more).
	More than one appliance vented into flue	Disconnect other appliances, seal openings appropriately.
Back Puffing or sudden internal ignitions	Operating technique	Open bypass and air dampers before opening to reload and keep it open a few minutes after reloading.
	Burn rate too low	Open air damper to allow for hotter burn.
	Chimney down draft	In high wind areas, a specially designed wind cap may be necessary.
	Combustor plugged	Clean combustor of accumulated fly ash.
	Tight house	Dedicated air supply with outside air adaptor attachment to stove.
Combustor not glowing	Late stage of burn	Combustor does not need to be glowing to be working. Check smoke exiting chimney to help determine if combustor is working properly.
Stove burning too hot or fast	Ashpan Door is Open	Close ash door securely, check ash door gasket, check clean out door or cap secure.
	Excessive draft	Adjust air damper to lower setting.
	Extra tall chimney	Consider installing pipe damper
	High wind or hilltop location	Install wind cap on top of chimney

Insufficient Heat	Poor quality or green wood	Use only dry wood (dried at least one year depending on wood species) Test with kiln dried wood.
	Blocked outside air duct	Check outside air duct for blockage
	Heat going up chimney	Test with thermometer on 1st section of stovepipe– temps should drop below 300 degrees F when combustor is engaged.
Acrid odor during initial burn	Paint and/or window gasket curing	Open windows until paint or gasket is cured.
Window Dirty	First start up fire	This is sometimes the result of condensation in a new stove, and should disappear after several short fires.
	Airflow too restricted	Open air damper in small increments until some slow flames appear. Run hot fire to burn smoke off the glass, or remove build up with glass cleaner when stove is cold.
	Smoldering fire	Green or wet wood. Burn dry wood, or open air damper slightly for a hotter burn. (see above)

Is my Combustor still working?

Your catalytic combustor is viable for 12,000 to 14,000 burn hours. This translates, roughly, into a life span of 4 -6 years. If the catalytic coating is not working as it should, it is not burning the gas vapors in the smoke and therefore, the smoke exiting your chimney will be darker in color. If your draft is sluggish and you have ruled out any draft related issues in the venting or in the wood supply, your combustor may not be burning the smoke vapors and too much volume is trying to pass through the honey-comb at one time. If heat output is diminished, and any other factors are ruled out, that may also be a sign that the catalytic combustor is not burning the smoke vapors, therefore not extracting maximum heat from available btu's in the wood you are burning.

SAFETY

Overview

To gain maximum enjoyment and benefit from your stove, you must have a safe installation. Adhere to all guidelines found in this manual. All local and national building codes need to be followed. Having a certified installer perform all connections to an inspected chimney system is strongly advised. If you choose to perform any or all of this work yourself, it must be inspected by either a Certified Wood Stove Specialist or a Certified Chimney Specialist.

You will often find the local Fire Department to be very knowledgeable. They may inspect your house for proper warning devices, fire extinguishers, and evacuation routes. Keep their phone number handy. Although many communities utilize Fire Department personnel for woodstove installation inspections, they are not usually trained as combustion venting specialists. Generally, you are best advised to use a certified specialist. The sense of security that comes with a properly installed and maintained system is worth far more than its cost.

Installation

Your Woodstock Soapstone Co. Stove has been thoroughly tested and listed to UL #1482 by an independent testing laboratory. UL #1482 is the standard for testing solid fuel appliances and is universally recognized by all national building regulatory agencies, (SBCC, BOCA, ICBO) and individual states. Your woodstove is a safe product, but it must be installed in accordance with the instructions in this manual. Woodstoves themselves rarely cause fires, but improper installation or careless operation are often to blame.

Follow the guidelines in the Installation chapter of this manual with regard to:

- Proper chimney and connector pipe
- Clearances to combustible surfaces and objects
- Floor protection

Smoke and the Chimney

According to www.woodheat.org, "The chimney is the engine that drives a wood heat system". To have a safe system you must have:

- The correct type of chimney
- The correct size of chimney
- Correct location inside the house
- A properly installed system

Smoke spilling into the living space when starting a fire is an inconvenience. Smoke spilling into the house when you are away or asleep can be a major problem. In order to have all the smoke go up the chimney all the time, the chimney must have positive draft. Ideally, this draft is

between 10-18 pascals, or .04-.07 inches water column, a pressure measurement, when there is no fire in the stove. A certified installer can perform a simple draft test for this.

Hot Surfaces

Your stove is HOT to the touch! Utilizing the fall-away tool and use of heat resistant or insulated stove gloves can prevent serious burns when opening or closing the door, ash pan, or lid of your stove.

Ash removal

Convenient and safe ash removal is a necessity for trouble free wood burning. An ash removal container should have:

- A comfortably large capacity
- Good stability
- A top that closes securely and will not fall off
- Legs or other means of preventing downward heat flow
- A design that prevents spilling when loading

Ashes should never be dumped into a combustible container, such as a cardboard box, and an ash container should never be set on a combustible surface. Hot embers in the ashes can often stay viable for 36 hours or longer after removal from your stove.

Precautions

• **Smoke detectors:** A smoke detector is inexpensive insurance and is required by most localities. They can either work on batteries, or can be hardwired into your electrical system. If you have battery operated detectors, it is a good idea to replace batteries on an annual basis (i.e.: every New Year's day, or 4th of July, etc). They will sound an audible alarm in the event of the presence of smoke. Smoke will almost always precede a wood fueled fire.

• **Fire Extinguisher:** If you burn wood, you should have at least one ABC dry chemical extinguisher. The chemical extinguisher is preferable to water because the application of cold water to hot metal stove pipes can cause metal parts to buckle or crack, thereby releasing more fuel to the fire.

• **Carbon Monoxide Detector:** These operate in a manner similar to smoke detectors but are usually user calibrated and record minute quantities on a digital readout before sounding an audible alarm. The chances of carbon monoxide being created and escaping from your properly installed and operated stove are miniscule. You may have other vented appliances in your home that could be potential problems. The investment in a high quality carbon monoxide detector is well worth its cost in the peace of mind it affords.

• **Chimney inspection:** Your connector pipe and chimney, or chimney pipe, should be inspected at regular intervals. Examine the connector pipe for creosote, corrosion, loose seams, or excessive soot. Clean and replace as necessary. The chimney, or chimney pipe, should be cleaned and checked by a certified specialist once a year. A small mirror

held at the cleanout door of a masonry chimney will be helpful. For a Class A prefabricated metal pipe, some disassembly is usually required.

Emergency Procedures In The Event of a Chimney Fire:

If you have a chimney fire or runaway fire, follow these safety precautions:

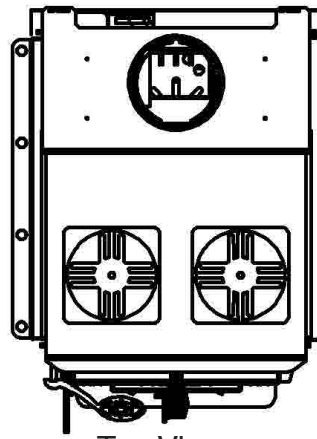
1. Close the draft damper immediately, with a slow and even motion. This cuts off the supply of oxygen to the stove.
2. Call the fire department immediately.
3. Get everyone out of the house. One adult should stay in the house to check for sparks and signs of fire. Those outside should watch the roof for signs of fire.
4. If there is a danger of a fire, discharge the fire extinguisher into the stove. Do not pour or spray water directly into the chimney as rapid contraction caused by the application of cold water could cause the tile liner in the chimney to crack.
5. After the fire is out, check the stove, chimney connector and chimney carefully for signs of damage. The entire system should be thoroughly inspected by a certified chimney professional.

Note: Chimney fires must be put out from the bottom. The entire system must be air tight to suffocate a fire; hence the importance of having a tight cover on the chimney cleanout and not venting two appliances into a single flue.

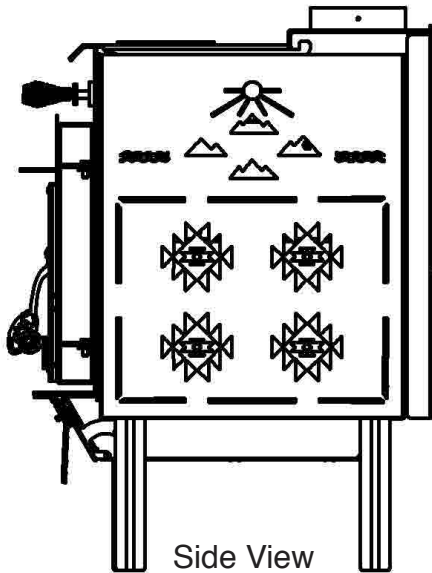
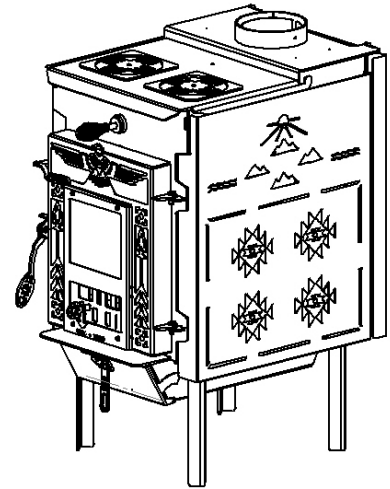
The length of time it takes to bring a chimney fire under control depends on the amount of fuel in the stove, the rate at which it is burning and the amount of oxygen available to it. The faster it is brought under control the less severe any damage is likely to be.

MODEL 212: NAVAJO AND SURVIVAL STOVE HYBRID

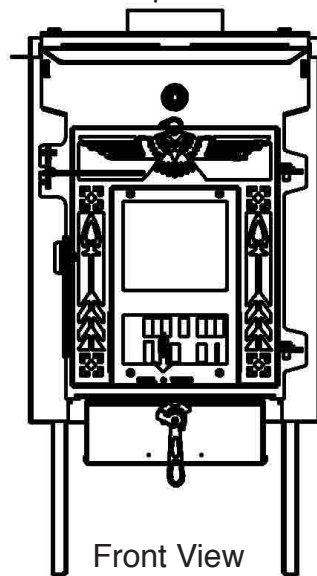
MODEL 212 VIEWS



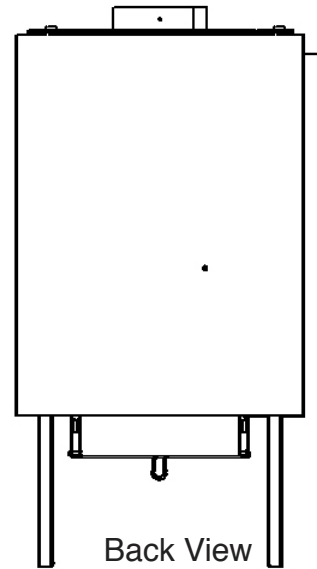
Top View



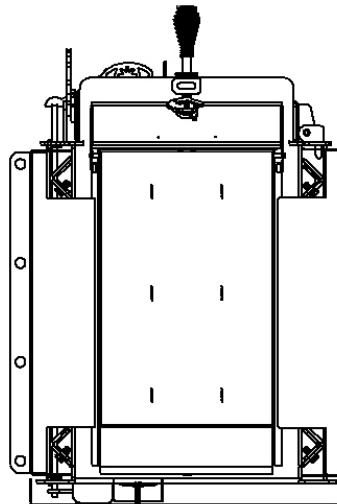
Side View



Front View



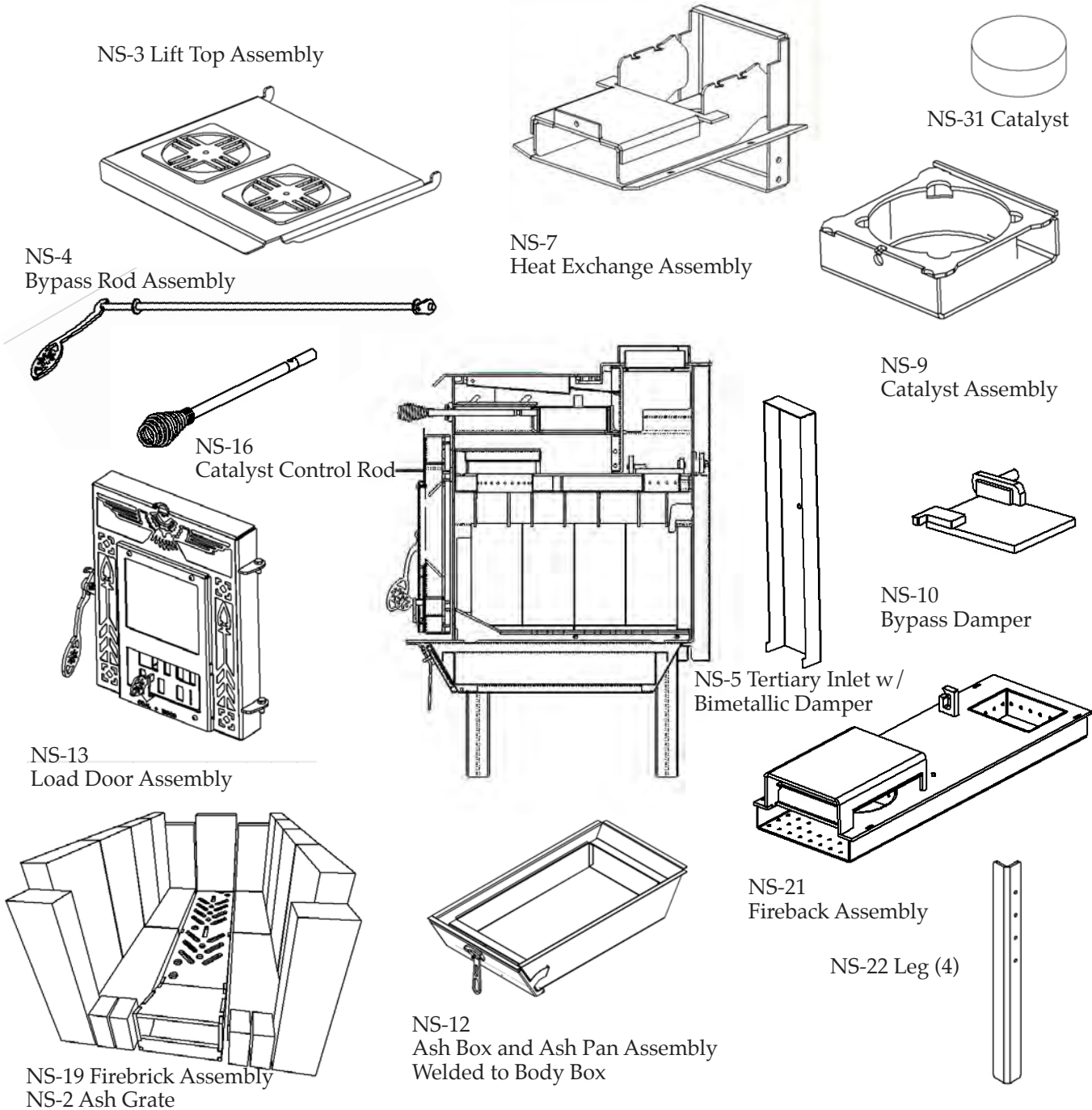
Back View



Bottom View

MODEL 212: NAVAJO AND SURVIVAL STOVE HYBRID ASSEMBLIES

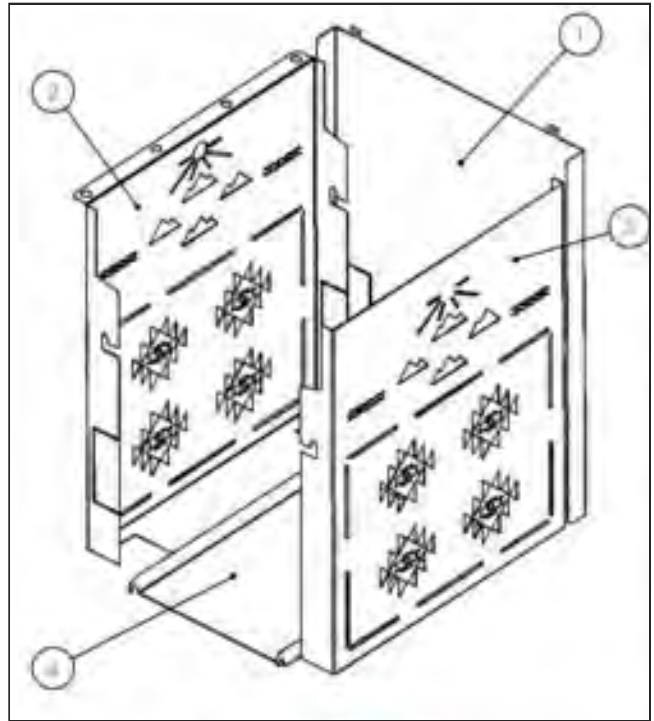
NS-2 Ash Grate	NS-13 Load Door Assembly
NS-3 Lift Top Assembly	NS-16 Catalyst Control Rod
NS-4 Bypass Rod Assembly	NS-19 Firebrick Assembly
NS-5 Tertiary Inlet/Bimetallic Assembly	NS-21 Fireback Assembly
NS-7 Heat Exchange Assembly	NS-22 Leg (4)
NS-8 Body Box	NS-25 Fixed Top Assembly
NS-9 Catalyst Assembly	NS-12 Ash Pan Assembly
NS-10 Bypass Damper	NS-31 Catalyst



MODEL 212: NAVAJO AND SURVIVAL STOVE HYBRID SHIELDS AND OUTSIDE AIR ADAPTER

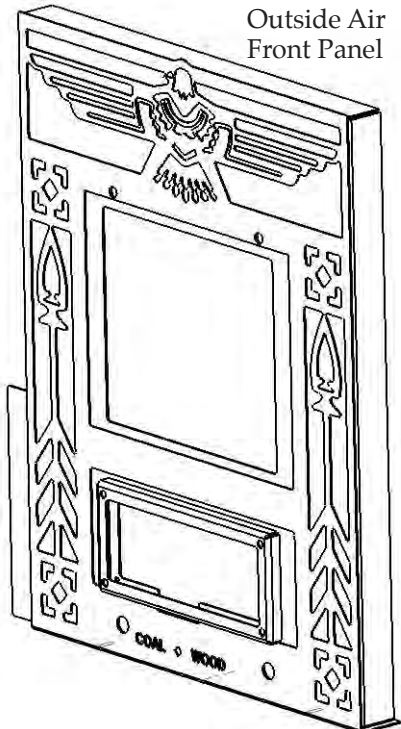
NS-18 Heat Shield Assembly

- 1. Back Shield
- 2. Left Shield/Tool Holder
- 3. Right Shield
- 4. Bottom Shield

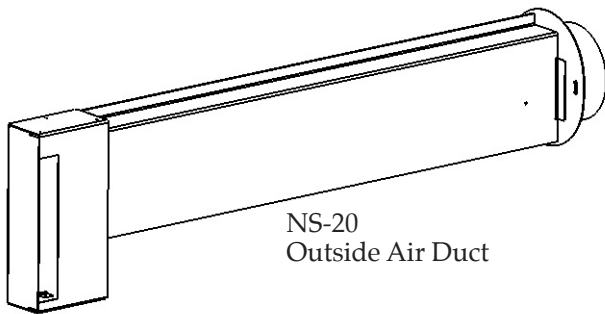


Outside Air Adapter Kit

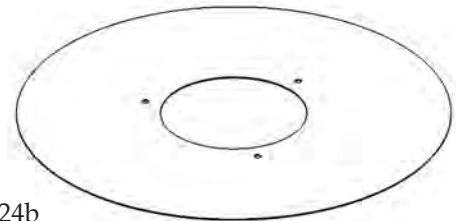
NS-23
Outside Air
Front Panel



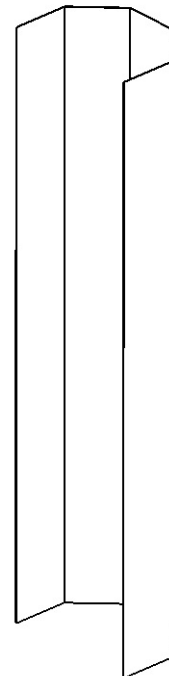
NS-20
Outside Air Duct



NS-24b
Ceiling Shield



NS-24a
Flue Shield



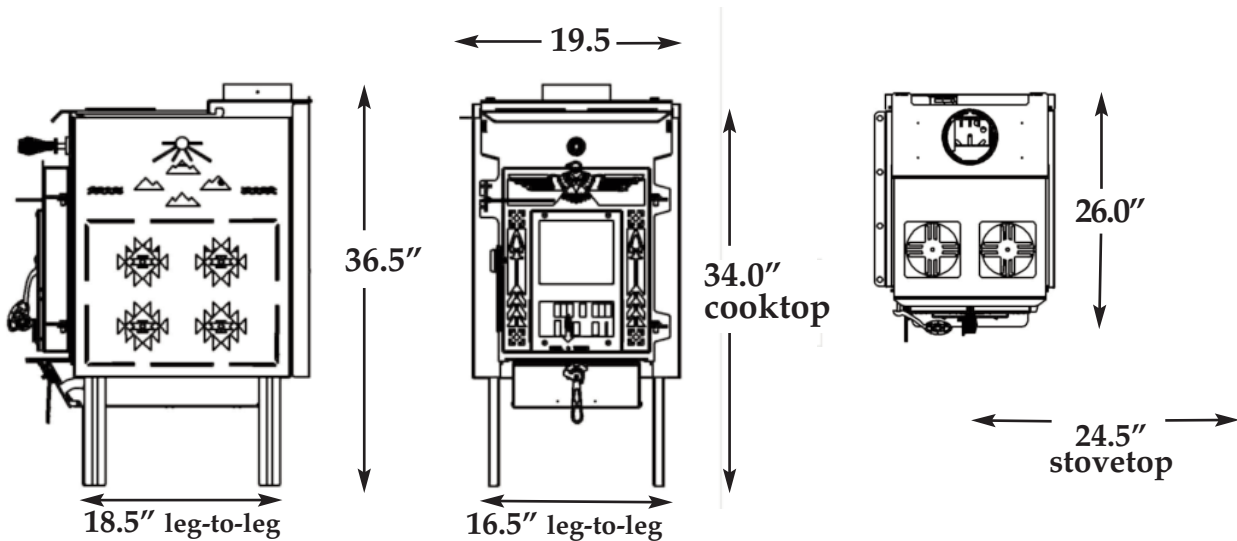
MODEL 212: NAVAJO AND SURVIVAL STOVE HYBRID
PARTS LIST

MODEL 212	Parts List	Manufacturer
NS-2	Ash Grate	Woodstock
NS-3	Lift Top	Woodstock
NS-4	Bypass Rod Assembly	Woodstock
NS-5	Tertiary Air Inlet/Bimetallic	Woodstock
NS-7	Heat Exchange Assembly	Woodstock
NS-8	Nav Body Box	Woodstock
NS-9	Catalyst Assembly	Woodstock
NS-10	Bypass Damper	Woodstock
NS-13	Nav Load Door	Woodstock
NS-16	Catalyst Control Rod	Woodstock
NS-18	Heat Shield Assembly	Woodstock
	<i>Left, right, bottom back shields</i>	
NS-19	Firebrick Assembly	Purchased Parts - Alsey Refractories
		<i>4.5" x 9" x 1.25 medium duty split brick</i>
NS-20	Outside Air Duct	Woodstock
NS-21	Fireback Assembly	Woodstock
NS-22	Leg (4)	Woodstock
NS-23	OAA Front Panel	Woodstock
NS-24	Flue Shield/Ceiling Shield	Woodstock
NS-25	Fixed Top Assembly	Woodstock
R-12	Ash Pan Assembly	Woodstock
R-54	Tertiary Damper	Woodstock
NS-31	Catalyst	Purchased Part - Clariant Corp
		<i>5.86" Dia x 2" frameless ss foil catalyst</i>
NS-32	Glass for Load Door	Purchased Part - Schott
		<i>5mm x 8" x 7" Robax</i>
Ns-35	Gasket	
	Top Lid	1.00"LD1 x 59" Fiberglass Rope
	Side Door	.75" LD2 x 70" Fiberglass Rope
	Ash Pan Door	.50" MD BHM x 30" Fiberglass Tape
	Fireback Assembly	.187" x 0.75" x 70" Fiberglass Tape
	Heat Exchange Assembly	.187" x 0.75" x 42" Fiberglass Tape
	Front Window	.187" x 0.75" x 30" Fiberglass Tape

DIMENSIONS & SPECIFICATIONS

H x W x D (standard height) 36.5"x19.5"x26"
 Cooktop Height 34"
 Maximum Cooktop Height 40"
 Footprint 16.5" W x 18.5" D
 EPA Certified Yes
 Listed to UL 1482 Yes
 EPA Emissions Rating 1.13 grams/hr
 EPA Efficiency 79.4%
 Flue Height to Center (Standard Leg) 28"
 Catalytic Combustor & Secondary Air Standard
 Bottom Heat Shield Standard
 Area Heated up to 1,000 sq. ft.
 Weight 310 lbs.
 Flue Exit Top Only

Flue Size 6"
 Ash Pan Standard
 Loading Door Front
 Loading Door Opening (W x H) 8" x 9"
 Draft Control Manual
 Back Clearance (w/Heat Shield Kit) 9.0"
 Side Clearance (w/Heat Shield Kit) 9.0"
 Corner Clearance (w/Heat Shield Kit) 9.0"
 Wood Length (Recommended Maximum) 16"
 Window Size (viewable) 7" W x 6"H
 Firebox Size 1.2 Cubic ft.
 Burn Time 6-8 hrs.
 Heat Output Range 15,332-27,294 BTU/hr



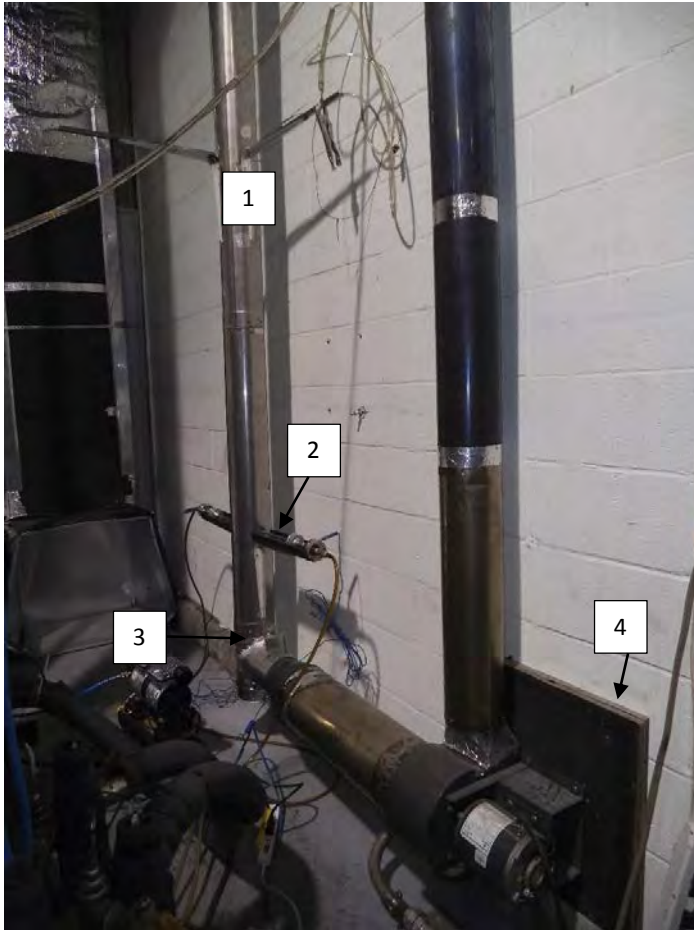


GEAR HEAD STOVES
BY WOODSTOCK SOAPSTONE COMPANY

APPENDIX 8: Photographs of test set up

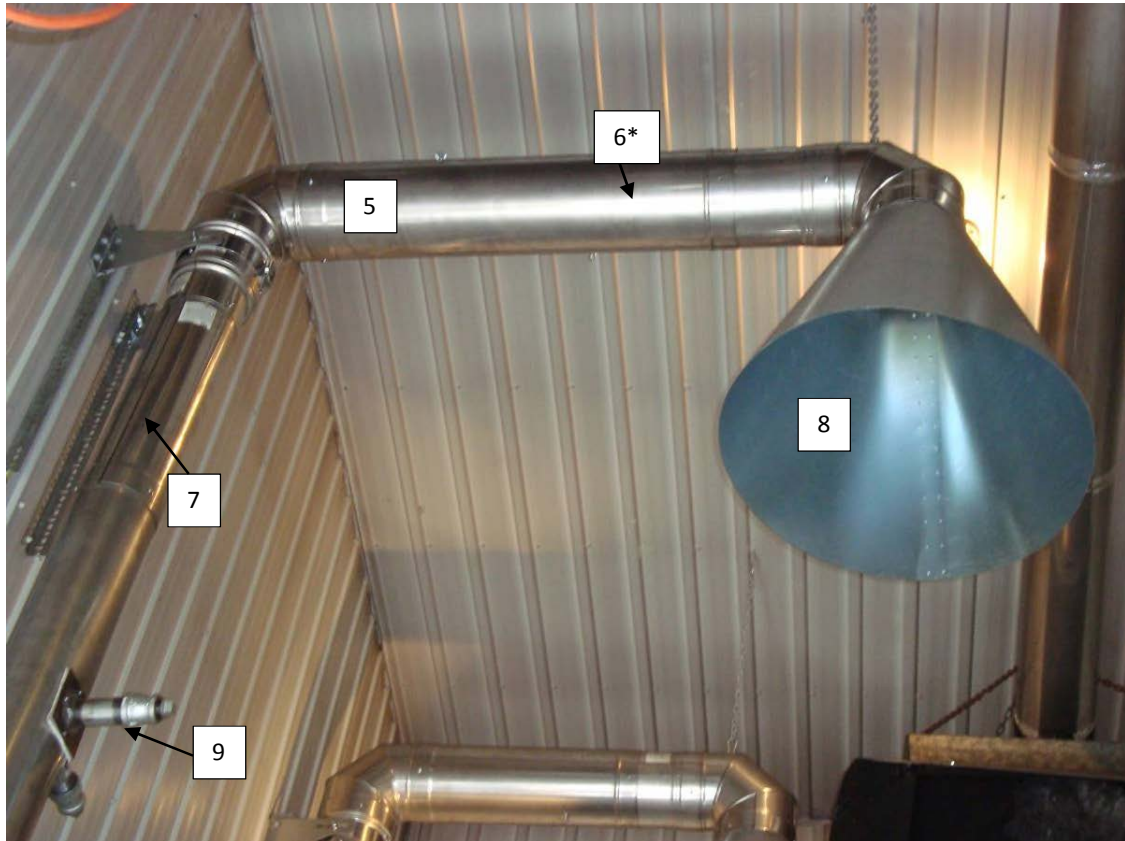
Dilution picture dia 6

Picture 1 : Sampling system



- 1 : 6 in dia Stainless steel pipe
- 2 : 16 in. Between sampling probe and lower elbow
- 3 : Air intake with damper to adjust flow rate
- 4 : Exhaust blower

Picture 2 : Hood and mixing baffle



*The arrow point the deflectors inside of the pipe

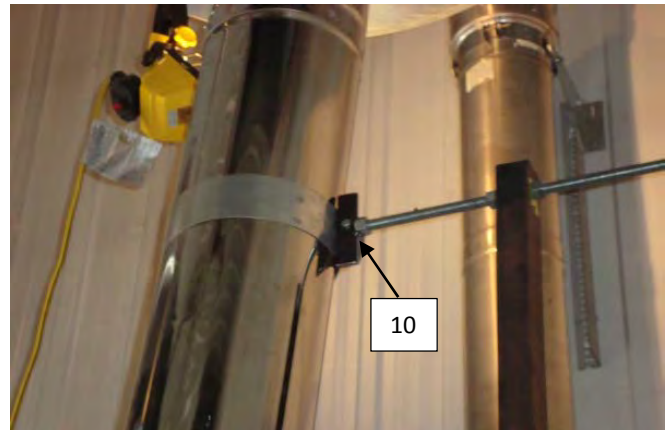
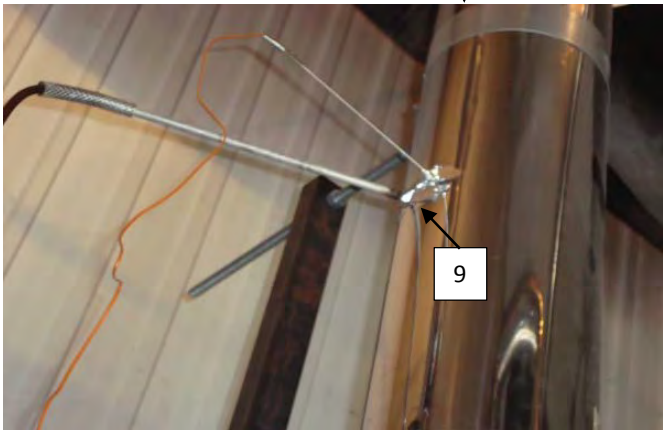
- 5** : 8 in. dia. Stainless steel pipe
- 6** : Mixing baffle (2) location 1 foot between baffles
- 7** : 4 feet long between velocity port and upper elbow
- 8** : 24 in. dia. Galvanized steel smoke captures hood, located 3 feet away from dilution tunnel
- 9** : Velocity port

Picture 3: Stack sampling



Picture 3.1: Gas analysis and temperature probe

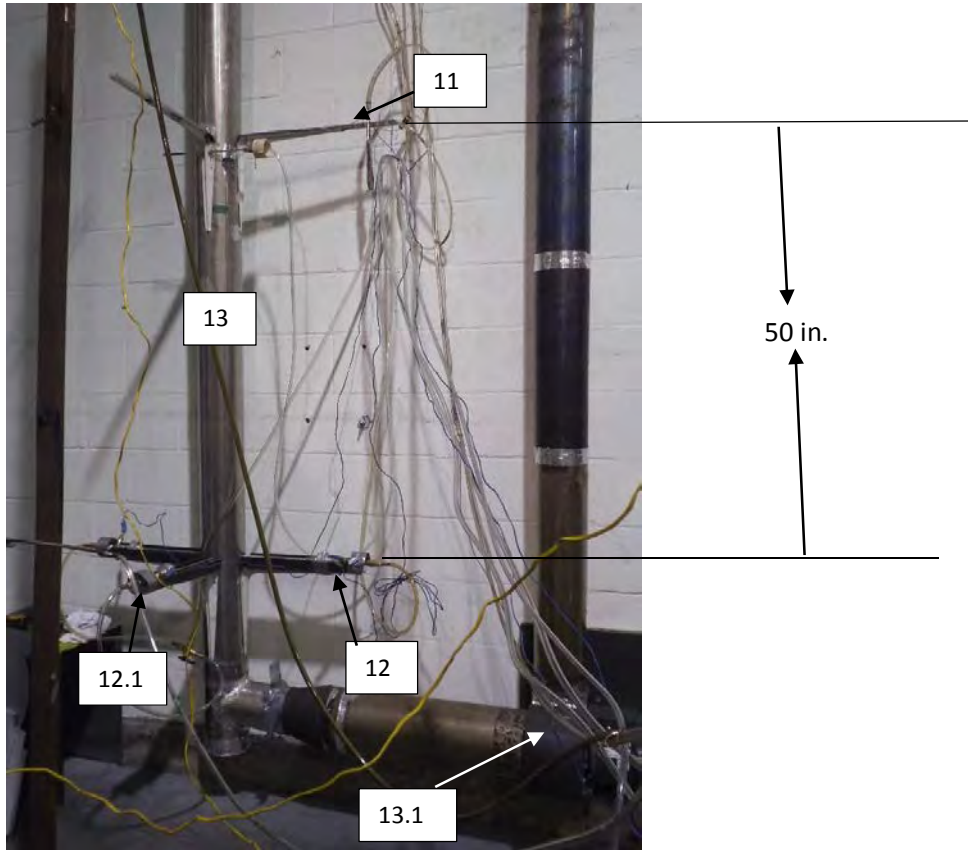
Picture 3.2: chimney support



9 : Temperature and gas analyser sampling ports located 9 feet above platform

10 : Exhaust system support bracket

Picture 4: Tunnel flow measurement and sampling probe



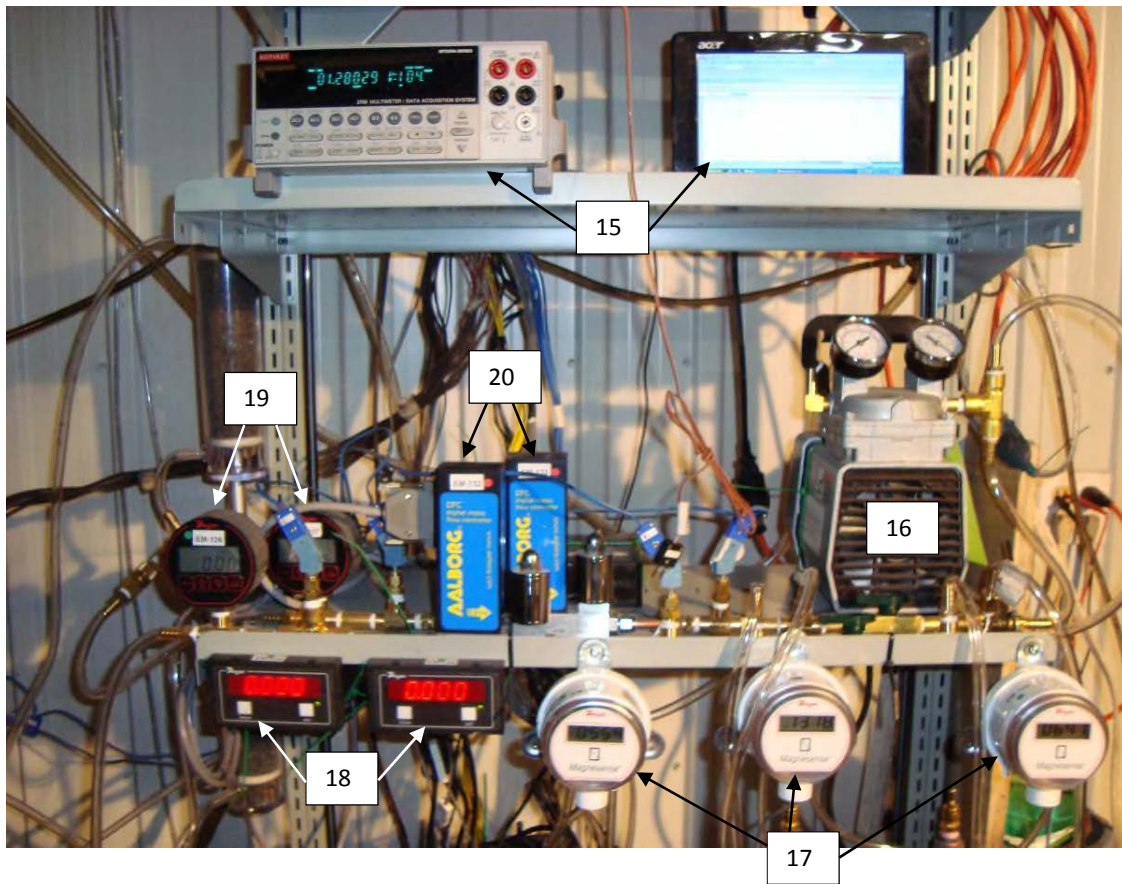
- 11 : Velocity port
- 12 : Sampling port, 2 sampling probes with 2x48 mm. dia.filter each. Filter used: Millipore AP4004700
- 12.1 : Sampling port, sampling probes with 2x48 mm. dia.filter each. Filter used: Millipore AP4004700, for first hour sampling
- 13 : 15 feet long dilution tunnel
- 13.1 : Extraction blower

Picture 5: Draft sampling



14 : Draft sampling port located 6 in. from the flue outlet

Picture 6: Equipments



- 15 : Acquisition system
- 16 : Vacuum pump
- 17 : Digital manometer
- 18 : Digital read out for mass flow meter
- 19 : Digital vacuum gage
- 20 : Mass flow meter

Picture 7: Gaz analyser

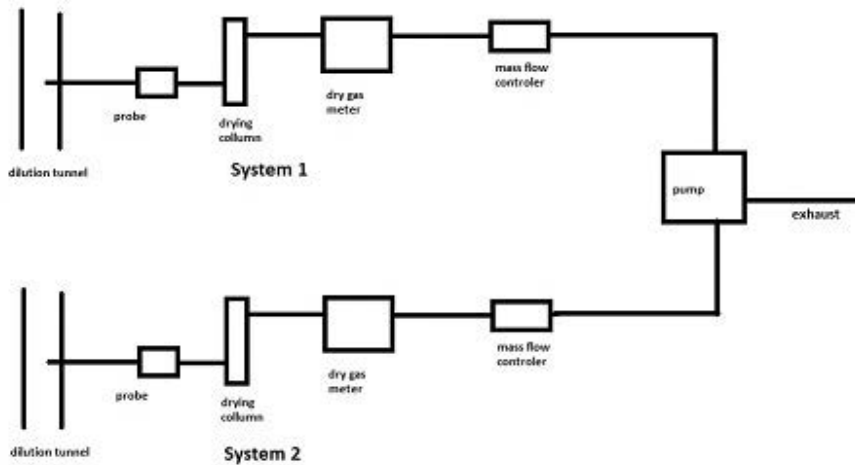


Picture 8: Reference dry gas meter





Picture 12 : Dilution tunnel sample system



Picture 13: Dilution tunnel

