EPA Certification Test Report

The following models are EPA certified under the following attached test report: **F3500**

	Model #
Wood Stoves	F3500
Wood Inserts	n/a
Wood Fireplaces	n/a
Pellet Stoves	n/a
Pellet Inserts	n/a

Full US Environmental Protection Agency ("EPA") certification test reports have been reported to the EPA. Test reports may contain sensitive, confidential business information which has been specifically excluded and/or redacted from this publicly posted test report.

Published May 14, 2015

FPI - Fireplace Products International Ltd.

Project # 015-S-21-1
Model F3500 Residential Free Standing Catalytic Wood Fired Heater

[redacted]

Prepared by:
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Affidavit:

Ben Nelke, Te

Results: Emissions

The overall weighted average emission rate based on the 4 certification runs is **1.1 g/hr**.

Table 1: Results

Category 1 < 0.80 Kg/hr		Category 2 .80 to 1.00 kg/hr		Category 3 1.25 to 1.90 kg/hr		Category 4 Maximum	
Date	3/17/2014	Date	3/18/2014	Date	3/20/2014	Date	3/21/2014
Run Number	1	Run Number	2	Run Number	4	Run Number	5
Emission Rate g/Hr	0.55	Emission Rate g/Hr.	0.60	Emission Rate g/Hr.	1.51	Emission Rate g/Hr.	2.37
Burn Rate KG/hr	0.71	Burn Rate KG/hr	0.95	Burn Rate KG/hr	1.67	Burn Rate KG/hr	2.41
BTU/Hr. (HHV)	10,959	BTU/Hr. (HHV)	14,908	BTU/Hr. (HHV)	24,654	BTU/Hr. (HHV)	33,532

Results Summary Weighted Averages:

Weighted Average –Emissions

EPA Method 28 - Weighted Average

DIRIGO LABORATORIES INC.

Weighted Average: 1.1 (g/hr)

Client: FPI
Model: F3500
Tracking No.: 0
Project No.: 015-S-021-1
Test Dates: 3/17/14 To 3/21/14

Signature/Date: 4/10/14

Burn Rate Category	1	Burn Rate Category	2
Burn Rate (kg/hr-dry)	0.71	Burn Rate (kg/hr-dry)	0.95
Emissions Rate (g/hr)	0.6	Emissions Rate (g/hr)	0.6
Emissions Rate Cap (g/hr)	15	Emissions Rate Cap (g/hr)	15
Weighting Factor	18.23%	Weighting Factor	37.45%
Run Number	1	Run Number	2

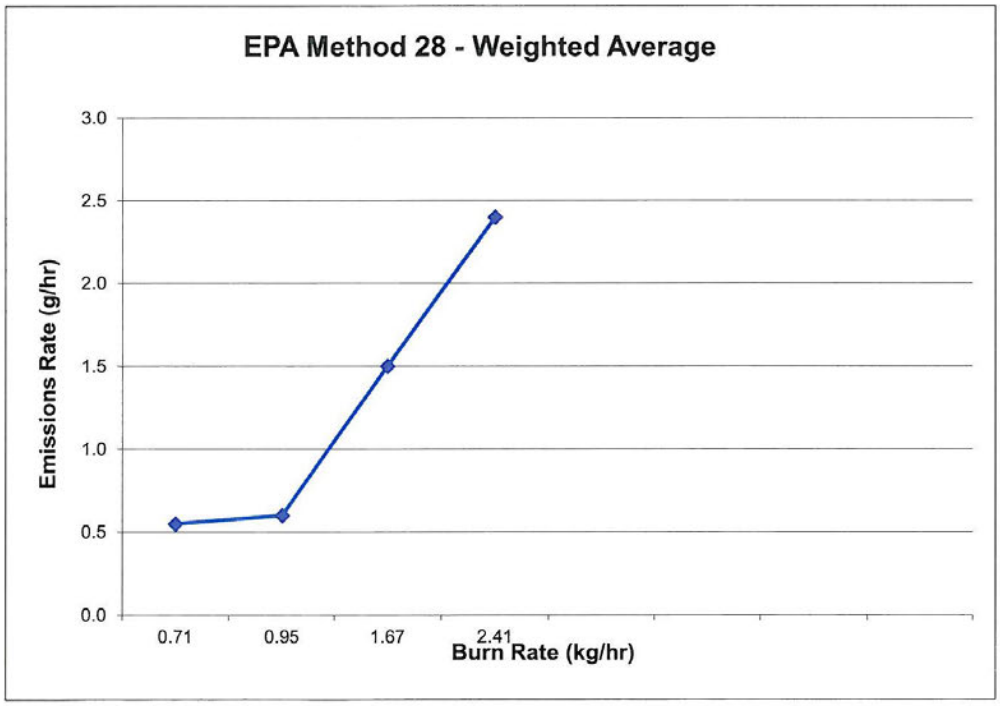
Burn Rate Category	3	Burn Rate Category	4
Burn Rate (kg/hr-dry)	1.67	Burn Rate (kg/hr-dry)	2.41
Emissions Rate (g/hr)	1.5	Emissions Rate (g/hr)	2.4
Emissions Rate Cap (g/hr)	18	Emissions Rate Cap (g/hr)	18
Weighting Factor	34.93%	Weighting Factor	9.39%
Run Number	4	Run Number	5

EPA Method 28 - Weighted Average

DIRIGO LABORATORIES INC.

Client: FPI
Model: F3500
Tracking No.: 0
Project No.: 015-S-021-1
Test Dates: 3/17/14 To 3/21/14

Signature/Date: 4/10/14



Weighted Average-Efficiency

CSA B415 - Weighted Efficiency Average

DIRIGO LABORATORIES INC.

Weighted Efficiency Average: 80.6 %

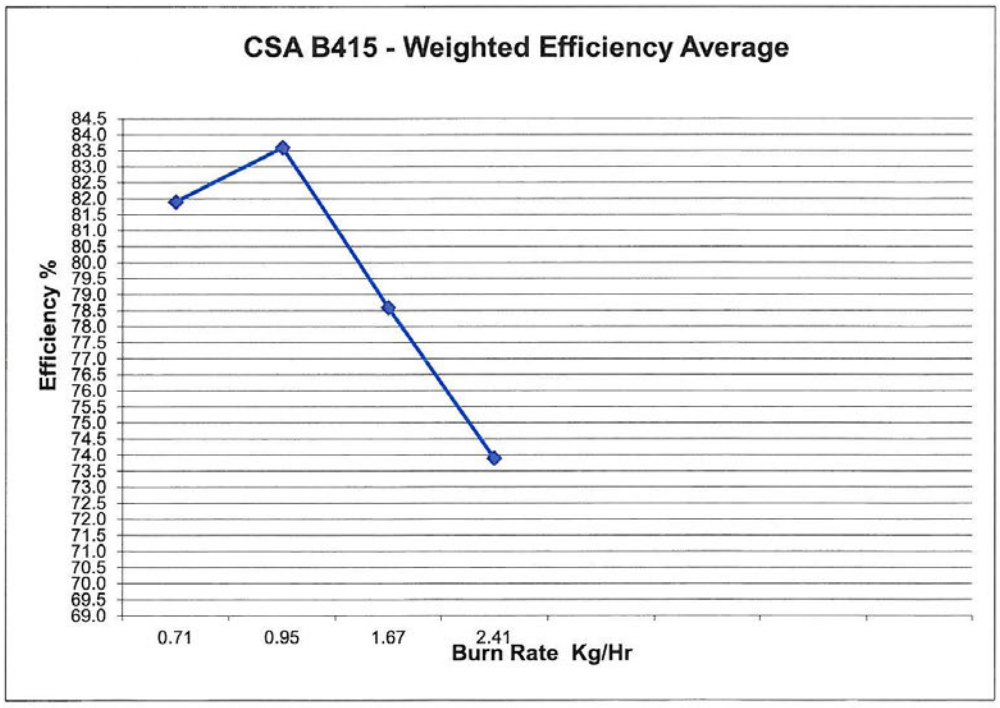
Client: FPI
Model: F3500
Tracking No.:
Project No.: 015-S-021-1
Test Dates:
Signature/Date: 4/10/14

Burn Rate Category	1	Burn Rate Category	2
Burn Rate (kg/hr-dry)	0.71	Burn Rate (kg/hr-dry)	0.95
Efficiency %	81.9	Efficiency %	83.6
Weighting Factor	18.23%	Weighting Factor	37.45%
Run Number	1	Run Number	2
Burn Rate Category	3	Burn Rate Category	4
Burn Rate (kg/hr-dry)	1.67	Burn Rate (kg/hr-dry)	2.41
Efficiency %	78.6	Efficiency %	73.9
Weighting Factor	34.93%	Weighting Factor	9.39%
Run Number	4	Run Number	5

CSA B415 - Weighted Efficiency Average

DIRIGO LABORATORIES INC.

Client:
Model:
Tracking No.:
Project No.:
Test Dates:
Signature/Date: 4/10/14



Front

Left

Time	Left	Right	Back	Top	Cat
08:02 AM	63	62	72	65	96
08:12 AM	138	146	281	167	466
08:22 AM	172	215	338	242	578
08:32 AM	231	298	386	379	969
08:42 AM	272	349	431	497	1132
08:52 AM	314	390	463	583	1112
09:02 AM	360	401	487	585	1074
09:12 AM	373	359	454	546	1046
09:22 AM	358	354	438	519	1010
09:32 AM	362	340	425	500	1088
09:42 AM	367	327	419	515	1051
09:52 AM	354	318	413	532	1139
10:02 AM	354	317	424	568	1169
10:12 AM	362	322	441	591	1171
10:22 AM	372	332	451	605	1118
10:32 AM	375	335	449	596	1097
10:42 AM	379	340	450	596	1088
10:52 AM	383	345	460	594	1075
11:02 AM	391	345	476	562	1035
11:12 AM	394	346	477	593	1088
11:22 AM	400	351	480	595	1019
11:32 AM	411	353	499	588	1013
11:42 AM	431	359	517	571	1008
11:52 AM	437	370	538	571	994
12:02 PM	434	395	547	568	934
12:12 PM	430	396	527	561	1127
12:22 PM	396	385	501	559	1038
12:32 PM	374	375	495	547	1032
12:42 PM	362	368	487	528	975
12:52 PM	352	361	474	504	939
01:02 PM	345	355	465	494	955
01:12 PM	339	348	449	487	916
01:22 PM	335	326	412	493	1010
01:32 PM	340	314	397	501	1006
01:42 PM	340	309	390	500	999
01:52 PM	342	311	391	509	1016
02:02 PM	350	318	400	524	977
02:12 PM	359	328	412	520	937
02:22 PM	352	339	399	526	968
02:32 PM	335	326	391	538	1025
02:42 PM	329	323	402	542	984
02:52 PM	330	330	422	530	987
03:02 PM	331	334	427	531	1016
03:12 PM	335	337	449	537	1011
03:22 PM	341	345	469	530	989
03:32 PM	345	349	474	521	972

03:42 PM	347	347	469	521	980
03:52 PM	349	346	465	525	986
04:02 PM	352	346	467	529	993
04:12 PM	356	348	469	534	989
04:22 PM	359	351	471	532	982
04:32 PM	361	354	473	532	976
04:42 PM	363	356	468	527	959
04:52 PM	363	357	466	516	939
05:02 PM	361	357	463	507	935
05:12 PM	361	358	461	511	965
05:22 PM	362	360	462	519	955
05:32 PM	363	360	451	499	877
05:42 PM	360	356	438	462	776
05:52 PM	354	348	427	429	722
06:02 PM	346	342	416	405	687
06:12 PM	337	337	404	388	667
06:22 PM	324	323	391	375	683
06:32 PM	328	320	429	490	1116
06:42 PM	349	348	461	567	1148
06:52 PM	379	385	504	609	1134
07:02 PM	400	417	554	613	1096
07:12 PM	416	442	589	607	1053
07:22 PM	426	449	599	594	1019
07:32 PM	414	448	554	607	1079
07:42 PM	401	440	533	634	1012
07:52 PM	399	427	529	587	971
08:02 PM	393	409	518	547	912
08:12 PM	386	393	502	514	875
08:22 PM	382	378	490	494	865
08:32 PM	383	368	482	485	877
08:42 PM	384	360	466	485	908
08:52 PM	373	345	432	501	941
09:02 PM	365	336	421	497	953
09:12 PM	362	334	421	501	945
09:22 PM	363	339	432	487	903
09:32 PM	367	348	447	471	808
09:42 PM	390	390	501	494	923
09:52 PM	414	434	543	522	975
10:02 PM	434	454	556	544	951
10:12 PM	444	461	563	544	921
10:22 PM	446	459	559	532	905
10:32 PM	447	448	536	515	880
10:42 PM	437	429	508	505	797
10:52 PM	379	384	445	505	983
11:02 PM	343	360	415	544	963
11:12 PM	322	349	403	540	1059
11:22 PM	308	347	400	546	1073

11:32 PM	304	353	406	561	1066
11:42 PM	306	360	411	573	1058
11:52 PM	308	362	418	572	1057
12:02 AM	311	360	426	579	1062
12:12 AM	316	363	434	582	1049
12:22 AM	321	366	442	579	1031
12:32 AM	327	371	451	581	1031
12:42 AM	335	377	462	582	1026
12:52 AM	342	382	473	581	1019
01:02 AM	350	387	484	579	1010
01:12 AM	360	389	494	576	992
01:22 AM	366	390	500	564	930
01:32 AM	365	382	489	520	858
01:42 AM	356	370	472	476	790
01:52 AM	349	344	433	423	735
02:02 AM	350	327	403	431	880
02:12 AM	347	317	387	440	889
02:22 AM	343	310	378	445	901
02:32 AM	340	306	375	453	922
02:42 AM	337	305	376	457	915
02:52 AM	335	306	382	461	924
03:02 AM	333	308	388	464	931
03:12 AM	336	314	400	476	945
03:22 AM	339	319	408	484	952
03:32 AM	340	325	414	499	971
03:42 AM	344	331	420	508	962
03:52 AM	348	333	425	509	954
04:02 AM	353	340	434	515	959
04:12 AM	354	344	439	530	965
04:22 AM	353	346	443	539	950
04:32 AM	353	351	446	538	935
04:42 AM	353	354	448	529	919
04:52 AM	349	356	447	507	889
05:02 AM	344	356	443	472	809
05:12 AM	338	354	435	442	760
05:22 AM	333	353	425	420	723
05:32 AM	329	347	414	402	703
05:42 AM	324	340	406	390	690
05:52 AM	319	333	399	381	676
06:02 AM	313	329	395	372	670
06:12 AM	309	326	390	368	665
06:22 AM	306	323	387	363	659
06:32 AM	303	321	383	359	651
06:42 AM	301	317	380	354	644
06:52 AM	298	315	379	350	641
07:02 AM	296	314	378	348	641
07:12 AM	294	314	379	347	642

07:22 AM	293	313	382	346	645
07:32 AM	293	311	382	346	642
07:42 AM	293	311	382	346	643
07:52 AM	295	313	389	346	715
08:02 AM	317	336	400	366	699
08:12 AM	332	345	405	384	718
08:22 AM	342	349	409	394	732
08:32 AM	350	353	412	400	735
08:42 AM	354	355	410	404	731
08:52 AM	360	354	414	405	748
09:02 AM	364	355	422	409	748
09:12 AM	365	358	425	409	749
09:22 AM	366	359	425	411	765
09:32 AM	368	358	427	416	783
09:42 AM	374	360	435	419	787
09:52 AM	385	363	442	421	798
10:02 AM	382	366	449	425	814
10:12 AM	381	369	454	427	809
10:22 AM	377	370	457	425	802
10:32 AM	364	365	491	426	963
10:42 AM	339	344	471	469	939
10:52 AM	318	327	431	439	782
11:02 AM	298	315	404	394	737
11:12 AM	285	321	400	383	819
11:22 AM	283	319	465	433	1047
11:32 AM	291	326	497	494	1074
11:42 AM	301	337	527	515	1073
11:52 AM	307	342	513	558	1130
12:02 PM	324	352	524	559	1057
12:12 PM	338	363	532	527	981
12:22 PM	341	367	507	501	936
12:32 PM	339	366	484	484	909
12:42 PM	336	364	469	471	885
12:52 PM	330	360	438	459	893
01:02 PM	324	354	435	449	854
01:12 PM	318	347	448	434	841
01:22 PM	312	339	448	428	861
01:32 PM	309	333	448	436	914
01:42 PM	308	330	447	450	948
01:52 PM	310	332	448	467	974
02:02 PM	316	339	472	482	981
02:12 PM	325	347	491	473	908
02:22 PM	330	347	486	458	882
02:32 PM	338	349	481	453	869
02:42 PM	343	347	484	450	868
02:52 PM	349	346	480	447	855
03:02 PM	355	346	481	441	839

03:12 PM	355	334	494	449	953
03:22 PM	354	330	515	467	953
03:32 PM	353	332	524	481	987
03:42 PM	351	335	519	500	1016
03:52 PM	351	337	518	511	1022
04:02 PM	353	341	523	512	1010
04:12 PM	355	347	525	513	1002
04:22 PM	357	351	519	538	1093
04:32 PM	363	361	532	578	1121
04:42 PM	378	383	566	561	1029
04:52 PM	384	399	567	537	984
05:02 PM	385	405	560	520	949
05:12 PM	384	408	554	506	930
05:22 PM	384	409	553	498	918
05:32 PM	361	393	484	515	1052
05:42 PM	343	389	451	553	1085
05:52 PM	339	388	445	575	1051
06:02 PM	339	392	442	582	1041
06:12 PM	340	397	444	581	1044
06:22 PM	343	399	451	580	1052
06:32 PM	347	404	462	574	1037
06:42 PM	352	403	472	565	1027
06:52 PM	358	401	485	556	1020
07:02 PM	365	401	499	551	1011
07:12 PM	360	404	495	544	965
07:22 PM	351	398	494	548	1039
07:32 PM	348	388	506	544	1022
07:42 PM	348	384	513	538	1020
07:52 PM	349	383	516	528	987
08:02 PM	350	384	520	518	978
08:12 PM	352	393	519	530	1011
08:22 PM	354	403	521	546	1022
08:32 PM	357	414	529	551	997
08:42 PM	362	428	533	553	969
08:52 PM	363	414	479	560	946
09:02 PM	360	390	440	540	958
09:12 PM	355	368	418	501	877
09:22 PM	352	350	406	470	840
09:32 PM	351	338	399	453	825
09:42 PM	348	328	393	437	800
09:52 PM	352	311	377	428	832
10:02 PM	356	296	364	465	913
10:12 PM	359	290	362	477	946
10:22 PM	364	288	368	484	973
10:32 PM	376	289	381	501	1016
10:42 PM	385	300	399	538	1044
10:52 PM	392	316	419	566	1038

11:02 PM	403	333	445	574	1036
11:12 PM	410	347	473	571	1039
11:22 PM	415	360	503	560	1011
11:32 PM	417	379	524	546	967
11:42 PM	414	385	531	528	925
11:52 PM	409	382	530	515	910
12:02 AM	373	383	464	499	926
12:12 AM	330	369	413	540	1035
12:22 AM	306	354	388	553	1047
12:32 AM	294	344	384	559	1033
12:42 AM	288	335	395	563	1024
12:52 AM	286	331	418	562	1026
01:02 AM	286	330	455	554	1031
01:12 AM	287	330	481	543	1013
01:22 AM	290	333	499	532	1006
01:32 AM	295	335	513	529	1014
01:42 AM	303	339	537	536	1023
01:52 AM	309	342	544	540	1017
02:02 AM	313	345	548	546	1015
02:12 AM	316	348	532	555	1015
02:22 AM	323	353	541	544	974
02:32 AM	330	355	550	516	924
02:42 AM	334	356	559	505	916
02:52 AM	336	356	548	494	900
03:02 AM	337	354	550	494	907
03:12 AM	339	351	537	488	891
03:22 AM	343	347	520	483	886
03:32 AM	347	345	503	471	836
03:42 AM	347	338	492	452	782
03:52 AM	344	332	483	428	732
04:02 AM	341	327	476	410	704
04:12 AM	336	322	471	396	686
04:22 AM	332	318	466	388	679
04:32 AM	330	316	459	381	673
04:42 AM	330	313	455	376	666
04:52 AM	332	309	452	373	664
05:02 AM	335	306	451	371	658
05:12 AM	338	303	446	367	651
05:22 AM	340	300	435	364	639
05:32 AM	343	298	427	360	637
05:42 AM	347	294	423	358	632
05:52 AM	351	290	416	356	632
06:02 AM	351	286	412	353	618
06:12 AM	345	282	402	349	613
06:22 AM	340	278	397	346	614
06:32 AM	337	277	396	344	612
06:42 AM	334	274	393	342	616

06:52 AM	330	270	383	342	621
07:02 AM	325	266	383	341	623
07:12 AM	322	265	387	340	624
07:22 AM	322	264	391	339	624
07:32 AM	324	264	394	336	618
07:42 AM	324	265	394	335	612
07:52 AM	323	267	397	333	612
08:02 AM	322	268	396	333	610
08:12 AM	324	269	396	333	612
08:22 AM	326	269	394	333	613
08:32 AM	325	270	392	334	614
08:42 AM	326	270	389	333	608
08:52 AM	329	265	368	339	799
09:02 AM	334	265	362	405	920
09:12 AM	330	270	363	438	931
09:22 AM	325	279	373	458	958
09:32 AM	325	289	384	463	942
09:42 AM	325	299	398	471	986
09:52 AM	333	315	427	498	1021
10:02 AM	348	340	458	519	988
10:12 AM	358	356	489	515	1009
10:22 AM	385	387	540	558	1069
10:32 AM	410	422	588	580	1000
10:42 AM	424	443	616	554	925
10:52 AM	430	453	607	539	924
11:02 AM	428	452	581	526	883
11:12 AM	422	441	557	507	866
11:22 AM	415	429	537	485	823
11:32 AM	412	419	519	468	795
11:42 AM	409	406	506	452	778
11:52 AM	408	395	497	440	757
12:02 PM	405	389	491	433	753
12:12 PM	403	387	494	430	762
12:22 PM	402	387	486	429	758
12:32 PM	398	386	485	428	765
12:42 PM	397	384	484	427	767
12:52 PM	396	377	481	425	775
01:02 PM	387	367	469	418	748
01:12 PM	381	366	452	415	741
01:22 PM	377	366	442	417	757
01:32 PM	373	367	433	417	748
01:42 PM	370	366	427	414	744
01:52 PM	367	367	426	412	740
02:02 PM	364	367	424	410	740

Appendix F: EPA Run Data

Run 1 Data:

015_S_021_1_Run # 1_3_17_14_report.xls PREBURN

PREBURN

JOB # 015_S_021_1
TECHNICIAI BTN
DATE: 3_17_14
RUN #: 1
READING INTERVAL: 10

Model Designation F3500

Run Time: 70

Tunnel Traverse Information

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.038	0.038	0.040	0.038	0.038	0.035	0.039	0.040	0.038
Temperature	75	75	75	75	75	75	75	75	75.000

ET	SCALE READING	FLUE DRAFT	1 LEFT SIDE	2 RIGHT SIDE	3 TEMPERATURES BACK	4 TOP	5 BOTTOM	STOVE AVG T
0	7.9	-0.07	434	441	521	710	403	501.8
10	7.1	-0.034	442	446	513	631	411	488.6
20	6.5	-0.029	428	434	491	560	400	462.6
30	5.9	-0.032	410	414	468	553	386	446.2
40	5.4	-0.036	400	401	457	547	374	435.8
50	5.1	-0.024	391	393	443	521	364	422.4
60	4.8	-0.024	383	382	428	481	357	406.2
70	4.7	-0.023	372	371	414	438	350	389

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

Tunnel Velocity: 13.0667 ft/sec.
Intial Tunnel Flow: 146.7294 scfm
Average Tunnel Flow: 145.3153 scfm

Technician _____

Dirigo Laboratories, Inc. Page 1 of 1

JOB #	015_S_021_1													
TECHNICIAN	BTN					ROOM TEMP (F)	69.0				BEG	MID	END	AVG
DATE:	3_17_14						BAROMETRIC				30.29	30.29	30.29	30.29
RUN #:	1													
READING INTERVAL:	10													
SAMPLE BOX :	A	METER Y FACTOR:	0.995				PROBE MATERIAL:			SS				
FRONT FILTER #:		[redacted]		REAR FILTER #	REAR FILTER #:		[redacted]							
FINAL LEAK RATE (CFM):		@	IN-HG		FINAL LEAK RATE (CFM)		@		IN-HG					
Run Time:	660		AMBIENT FILTER #:			VOLUME		LITERS	FUEL MOISTURE DB			20.5	%	
			FINAL LEAK RATE (CFM):			@		IN-HG						
TEST START TIME:														

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	1 TUNNEL TEMP	2 FLUE TEMP	3 FILTER TEMP	4 FB REAR TEMP	5 FB Cat	6 METER TEMP	AMBIENT TEMP
0	0.000	0.000	0.038	0.04	-0.05		NA	20.8	0	83	301	70	412	844.56	76	70
10	1.372	0.137	0.038	2.01	-2.11	12.978	101	20.3	0.5	83	200	72	351	583.98	77	70
20	2.748	0.138	0.038	1.98	-1.91	12.990	101	19.9	0.4	84	175	72	312	586.7	81	69
30	4.139	0.139	0.038	2.01	-1.56	12.978	102	19.5	0.4	83	181	71	287	685.08	84	69
40	5.539	0.140	0.038	2	-2.38	12.966	102	19.2	0.3	82	165	70	252	693.84	87	69
50	6.946	0.141	0.038	2.01	0	12.966	102	18.9	0.3	82	155	70	230	646.15	90	68
60	8.352	0.141	0.038	2	-1.43	12.966	101	18.5	0.4	82	152	70	216	637.26	92	69
70	9.768	0.142	0.038	2	-2.14	12.966	101	18.2	0.3	82	151	69	206	654.56	94	67
80	11.182	0.141	0.038	2.02	0	12.966	101	17.9	0.3	82	149	69	200	656.42	95	67
90	12.603	0.142	0.038	2.01	-0.21	12.954	101	17.6	0.3	81	150	69	195	671.6	96	67
100	14.021	0.142	0.038	2.02	0	12.954	101	17.2	0.4	81	154	68	193	716.68	97	67
110	15.445	0.142	0.038	2.02	0	12.966	101	16.8	0.4	82	156	69	194	746.86	98	67
120	16.864	0.142	0.038	2.02	-1.33	12.954	101	16.5	0.3	81	156	69	196	736.52	98	68
130	18.290	0.143	0.038	2.01	0	12.966	101	16.1	0.4	82	156	69	199	744.97	99	68
140	19.711	0.142	0.038	2.02	0	12.966	101	15.7	0.4	82	160	69	204	777.32	99	68
150	21.135	0.142	0.038	2.01	-2.2	12.966	101	15.1	0.6	82	178	70	215	872.55	99	68
160	22.556	0.142	0.038	2.02	-1.61	12.966	101	14.2	0.9	82	196	70	235	971.59	99	69
170	23.978	0.142	0.038	2.01	-1.38	12.966	101	13.3	0.9	82	209	71	268	990.32	100	70
180	25.398	0.142	0.038	2.01	-2.3	12.966	101	12.3	1	82	212	72	304	982.22	100	71
190	26.820	0.142	0.038	2	-2.23	12.978	101	11.3	1	83	217	72	338	980.12	101	71
200	28.243	0.142	0.038	1.99	-1.76	12.978	101	10.2	1.1	83	220	72	377	949.36	101	72
210	29.664	0.142	0.038	1.98	-1.35	12.978	100	9.2	1	83	220	73	405	947.28	102	71
220	31.087	0.142	0.038	2.01	-1.82	12.966	101	8.3	0.9	82	219	72	432	945.56	102	70
230	32.507	0.142	0.038	2.01	-0.48	12.966	100	7.4	0.9	82	215	71	468	940.64	102	69
240	33.934	0.143	0.038	2.01	0	12.966	101	6.8	0.6	82	209	71	470	965.31	102	70
250	35.355	0.142	0.038	2	-1.42	12.978	101	6.2	0.6	83	205	72	478	968.16	102	72
260	36.780	0.142	0.038	1.98	-0.46	12.978	101	5.6	0.6	83	199	73	482	957.75	103	72
270	38.201	0.142	0.038	1.99	0	12.978	100	5.2	0.4	83	195	73	484	961.43	103	72

Columns 1–6 (TUNNEL TEMP through METER TEMP) are grouped under TEMPERATURES.

015_S_021_1_Run #1_3_17_14_report.xls BOX A 4/2/2014

TEST START TIME:												1	2	3	4	5	6	
												TEMPERATURES						
	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight			TUNNEL	FLUE	FILTER	FB REAR	FB	METER	AMBIENT
FT	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg			TEMP	TEMP	TEMP	TEMP	Cat	TEMP	TEMP
280	39.624	0.142	0.038	2	0	12.978	100	4.7	0.5			83	194	73	484	957.18	104	72
290	41.047	0.142	0.038	2.01	-2.32	12.978	100	4.3	0.4			83	190	73	490	948.98	103	73
300	42.472	0.142	0.038	1.99	-1.9	12.990	100	4	0.3			84	184	73	491	953.03	104	72
310	43.898	0.143	0.038	2	-2.31	12.990	101	3.7	0.3			84	176	73	486	892.59	104	73
320	45.319	0.142	0.038	2	-1.16	12.990	100	3.6	0.1			84	167	73	483	803.37	104	73
330	46.748	0.143	0.038	2.02	-0.81	12.990	101	3.5	0.1			84	157	73	479	723.31	105	72
340	48.171	0.142	0.038	1.99	-0.74	12.990	100	3.3	0.2			84	149	73	468	686.45	105	73
350	49.597	0.143	0.038	1.99	-0.12	12.990	100	3.2	0.1			84	144	72	446	658.32	105	72
360	51.024	0.143	0.038	2.01	-1.9	12.990	100	3	0.2			84	140	73	429	629.79	105	72
370	52.451	0.143	0.038	2	-0.27	12.990	100	2.9	0.1			84	136	72	421	616.67	105	72
380	53.881	0.143	0.038	2.02	0	12.978	101	2.8	0.1			83	132	72	411	600.76	105	70
390	55.305	0.142	0.038	1.99	-2.25	12.978	100	2.7	0.1			83	129	71	404	585.49	104	69
400	56.735	0.143	0.038	2.03	0	12.966	101	2.6	0.1			82	127	71	392	570.87	104	69
410	58.162	0.143	0.038	2.03	-1.01	12.966	100	2.5	0.1			82	126	71	382	559.55	104	69
420	59.590	0.143	0.038	2.01	0	12.966	101	2.4	0.1			82	123	70	381	551.84	104	69
430	61.019	0.143	0.038	2.03	-0.86	12.966	101	2.3	0.1			82	122	70	380	545.31	104	70
440	62.444	0.142	0.038	2.01	-0.91	12.966	100	2.2	0.1			82	121	70	373	543.99	103	69
450	63.875	0.143	0.038	2.01	0	12.966	101	2.2	0			82	121	70	364	545.03	103	69
460	65.299	0.142	0.038	2.01	0	12.954	100	2	0.2			81	120	70	358	543.16	103	69
470	66.727	0.143	0.038	2.02	-1.95	12.966	101	1.9	0.1			82	120	70	349	545.02	103	69
480	68.156	0.143	0.038	2.02	-2.2	12.954	101	1.8	0.1			81	120	70	337	567.36	103	69
490	69.578	0.142	0.038	2.02	-1.88	12.954	100	1.7	0.1			81	121	70	325	576.88	103	68
500	71.009	0.143	0.038	2.02	-2	12.954	101	1.7	0			81	120	70	316	577.94	103	69
510	72.432	0.142	0.038	2.02	-2.09	12.954	100	1.4	0.3			81	128	70	319	572.05	102	69
520	73.859	0.143	0.038	2.01	0	12.954	101	1.3	0.1			81	121	70	313	548.64	103	68
530	75.286	0.143	0.038	2.02	-1.59	12.954	101	1.2	0.1			81	117	70	305	523.84	103	68
540	76.710	0.142	0.038	2.02	-1.05	12.954	100	1.2	0			81	117	70	303	528.4	102	68
550	78.138	0.143	0.038	2.01	-0.51	12.954	101	1.1	0.1			81	121	70	301	547.73	102	68
560	79.562	0.142	0.038	2.01	-2.28	12.954	101	1	0.1			81	123	70	300	542.31	102	68
570	80.990	0.143	0.038	2.02	-0.5	12.954	101	0.9	0.1			81	122	70	298	534.56	102	68
580	82.414	0.142	0.038	2	-1.94	12.954	100	0.8	0.1			81	122	70	299	534.72	102	68
590	83.839	0.143	0.038	2.01	-0.34	12.954	101	0.7	0.1			81	122	70	301	525.44	102	68
600	85.266	0.143	0.038	2.01	-0.76	12.954	101	0.6	0.1			81	121	70	300	518.07	102	68
610	86.689	0.142	0.038	2.01	-1.34	12.954	100	0.5	0.1			81	125	69	304	527.04	102	68
620	88.117	0.143	0.038	2.01	-1.52	12.954	101	0.4	0.1			81	126	69	305	532.26	102	68
630	89.540	0.142	0.038	1.99	-2.07	12.954	100	0.3	0.1			81	128	69	304	554.34	102	68
640	90.968	0.143	0.038	2.01	0	12.954	101	0.2	0.1			81	126	69	302	560.24	102	68
650	92.391	0.142	0.038	2.02	-2.26	12.954	100	0.1	0.1			81	126	69	300	558.4	102	68
660	93.816	0.143	0.038	2	-0.97	12.942	101	-0.1	0.2			80	125	69	297	554.89	102	68

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015_S_021_1_Run # 1_3_17_14_report.xls BOX A 4/2/2014

TEST START TIME:										1	2	3	4	5	6	
										TEMPERATURES						
	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL	FLUE	FILTER	FB REAR	FB	METER	AMBIENT
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP	TEMP	TEMP	TEMP	Cat	TEMP	TEMP
	93.816		0.038	2.01		12.967	100.7			82	156				100	69

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[redacted]

015_S_021_1_Run # 1_3_17_14_report.xls 4/2/2014

BOX B

JOB # 015_S_021_1
TECHNICIAN BTN
DATE: 3_17_14
RUN #: 1
READING INTERVAL: 10
SAMPLE BOX : B
METER Y FACTOR: 0.974
PROBE MATERIAL: SS
FRONT FILTER #:
FINAL LEAK RATE (CFM): @ IN-HG
REAR FILTER #:
FINAL LEAK RATE (CFM): @ IN-HG

Run Time: 660 Firebox Delta T 122

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	TEMPERATURES 1 LEFT SIDE	2 RIGHT SIDE	3 FILTER	4 FB TOP	5 FB BOT	6 METER	STOVE AVG T
0	0	0	NA	0	0	-1	368	367	71	435	360	74	388
10	1.537	0.154	113	-0.03	2.01	-2.19	329	326	74	377	342	75	345
20	3.017	0.148	109	-0.02	2.01	-1.44	293	290	73	338	333	76	313
30	4.433	0.142	103	-0.03	2.02	-1.76	270	268	73	325	324	80	295
40	5.851	0.142	102	-0.03	2.07	-1	252	254	71	308	315	84	276
50	7.269	0.142	102	-0.02	2.03	-1.97	238	243	71	286	310	87	261
60	8.687	0.142	101	-0.02	2.06	-1.01	228	235	71	271	307	90	251
70	10.107	0.142	101	-0.02	2.04	-1.18	221	228	70	269	304	92	246
80	11.529	0.142	101	-0.02	2.03	-2.29	216	221	70	270	301	93	242
90	12.953	0.142	101	-0.02	2.06	-2.19	214	215	70	272	297	94	239
100	14.381	0.143	101	-0.02	2.04	-2.05	214	211	69	284	293	95	239
110	15.806	0.143	101	-0.02	2.05	-1.85	215	210	70	301	290	95	242
120	17.232	0.143	101	-0.02	2.03	-2.27	216	211	70	303	287	96	243
130	18.659	0.143	101	-0.02	2.04	-2.21	218	212	71	305	284	96	244
140	20.089	0.143	101	-0.02	2.04	-1.31	222	213	70	313	282	97	247
150	21.517	0.143	101	-0.03	2.02	-2.19	227	217	70	339	279	97	255
160	22.943	0.143	100	-0.04	2.04	-2.23	242	227	71	395	278	97	275
170	24.372	0.143	101	-0.04	2.01	-2.23	261	243	72	432	280	97	297
180	25.799	0.143	100	-0.03	2.03	-1.28	279	264	73	454	284	98	317
190	27.224	0.142	100	-0.04	2.03	-1.9	296	284	73	467	289	99	335
200	28.650	0.143	100	-0.04	2.03	-1.7	316	303	74	466	292	99	351
210	30.078	0.143	100	-0.04	2.03	-1.72	331	319	74	466	294	100	363

Run No

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015_S_021_1_Run # 1_3_17_14_report.xls BOX B 4/2/2014

							TEMPERATURES						
							1	2	3	4	5	6	
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB TOP	FB BOT	METER	STOVE AVG T
220	31.505	0.143	100	-0.03	2.01	-1.93	342	329	73	469	296	100	374
230	32.932	0.143	100	-0.04	2.04	-2.21	352	339	73	470	297	100	385
240	34.362	0.143	100	-0.03	2.01	-1.61	352	338	73	484	297	100	388
250	35.792	0.143	100	-0.03	2.02	-1.34	352	338	74	494	299	100	392
260	37.218	0.143	100	-0.03	2.04	-1.92	353	339	74	496	300	100	394
270	38.646	0.143	100	-0.03	2.03	-2.02	354	340	74	493	301	101	394
280	40.076	0.143	100	-0.03	2.02	-1.99	356	341	74	490	303	101	395
290	41.504	0.143	100	-0.03	2.02	-1.58	358	342	74	488	304	101	396
300	42.932	0.143	100	-0.02	2.03	-2.27	361	342	74	482	305	102	396
310	44.364	0.143	100	-0.02	2.02	-1.3	360	341	74	461	305	102	391
320	45.792	0.143	100	-0.02	2.01	-0.99	357	338	74	421	305	102	381
330	47.221	0.143	100	-0.02	2.02	-2.13	351	333	74	381	306	102	370
340	48.653	0.143	100	-0.02	2.04	-1.15	343	327	74	353	305	102	359
350	50.086	0.143	100	-0.01	2.04	-2.25	336	318	74	334	303	102	347
360	51.514	0.143	100	-0.01	2.02	-1.64	330	309	74	317	307	102	338
370	52.945	0.143	100	-0.01	2.03	-1.34	327	302	74	307	313	102	334
380	54.379	0.143	100	-0.01	2.04	-2.11	321	295	73	298	316	102	328
390	55.809	0.143	100	-0.01	2.04	-1.33	316	291	72	290	317	102	324
400	57.241	0.143	100	-0.01	2.03	-2.31	310	287	72	284	317	102	318
410	58.677	0.144	100	0	2.04	-1.95	303	283	71	276	316	101	312
420	60.107	0.143	100	0	2.03	-1.69	296	278	72	271	314	102	308
430	61.539	0.143	100	-0.01	2.03	-1.04	290	273	71	266	311	102	304
440	62.975	0.144	100	-0.01	2.02	-1.82	285	270	71	263	307	101	300
450	64.405	0.143	100	0	2.05	-2.22	281	265	71	261	304	101	295
460	65.838	0.143	100	-0.01	2.04	-1.66	277	262	71	259	301	101	291
470	67.274	0.144	101	0	2.03	-1.06	273	258	71	257	299	100	287
480	68.704	0.143	100	0	2.03	-1.93	269	255	71	260	296	100	283
490	70.136	0.143	100	-0.01	2.04	-0.98	265	253	71	262	296	100	280
500	71.571	0.144	100	-0.01	2.04	-1.25	262	250	71	263	297	100	278
510	73.000	0.143	100	0	2.04	-1.54	265	256	71	263	298	100	280
520	74.433	0.143	100	-0.01	2.03	-1.19	269	262	71	259	301	100	281
530	75.868	0.144	100	-0.01	2.05	-2.27	271	262	70	254	304	100	279
540	77.297	0.143	100	0	2.05	-1.97	268	260	70	258	305	100	279
550	78.729	0.143	100	-0.01	2.03	-1.07	264	259	71	263	303	100	278

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015_S_021_1_Run # 1_3_17_14_report.xls

BOX B

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	TEMPERATURES 1 LEFT SIDE	2 RIGHT SIDE	3 FILTER	4 FB TOP	5 FB BOT	6 METER	STOVE AVG T
560	80.164	0.144	100	-0.01	2.02	-1.03	260	261	70	265	301	100	277
570	81.594	0.143	100	-0.01	2.05	-1.52	257	262	70	263	302	100	276
580	83.025	0.143	100	-0.01	2.03	-2.32	258	263	71	262	301	100	277
590	84.460	0.144	100	-0.01	2.04	-1.06	258	264	70	260	300	100	277
600	85.890	0.143	100	0	2.04	-1.27	255	262	70	257	300	100	275
610	87.320	0.143	100	-0.02	2.04	-1.51	250	260	71	260	298	100	274
620	88.754	0.143	101	-0.01	2.04	-2.31	248	260	70	258	299	99	274
630	90.185	0.143	100	-0.01	2.03	-0.99	248	258	70	258	297	99	273
640	91.615	0.143	100	-0.01	2.03	-2.27	245	256	70	255	294	99	270
650	93.048	0.143	100	-0.01	2.02	-0.87	244	253	70	254	292	100	269
660	94.479	0.143	100	-0.01	2.04	-1.88	242	250	70	253	290	100	266
	94.4793	0.143	100.718	-0.017	2.032727	-1.687463	285	277	72	332	302	98	122
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT

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CSA B-415 Efficiency

VERSION: 2.4 4/15/2010

Manufacturer: FPI

Model: F3500

Date: 3/24/2014

Run: 1

Control #: 015-S-021-1

Test Duration: 660

Burn Category 1

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

Temp. Units F (F or C)

Weight Units lb (kg or lb)

Wood Moisture (% DRY):	20.5
Wood Moisture (% wet):	17.01
Load Weight (lb wet):	20.80
Burn Rate (dry kg/h):	0.71
Total Particulate Emissions:	6.05 g

Fuel Data

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

(•) Douglas ( ) Oak

		Temp. (F)				
	Averages	156.2	69.4	8.78	11.78	0.39
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas	Room Temp	Flue Gas Composition (%) O2	CO2	CO
0	20.8	301.0	70.0	9.21	10.66	0.05
10	20.3	200.0	70.0	15.78	4.31	0.02
20	19.9	175.0	69.0	14.39	5.85	0.04
30	19.5	181.0	69.0	10.73	10.18	0.03
40	19.2	165.0	69.0	13.43	7.28	0.02
50	18.9	155.0	68.0	13.25	7.42	0.02
60	18.5	152.0	69.0	12.30	8.46	0.02
70	18.2	151.0	67.0	12.43	8.33	0.02
80	17.9	149.0	67.0	12.35	8.55	0.02
90	17.6	150.0	67.0	11.76	9.11	0.03
100	17.2	154.0	67.0	10.85	10.34	0.02
110	16.8	156.0	67.0	11.26	9.82	0.02
120	16.5	156.0	68.0	11.08	9.95	0.03
130	16.1	156.0	68.0	10.70	10.37	0.03
140	15.7	160.0	68.0	9.63	11.58	0.04
150	15.1	178.0	68.0	6.00	15.26	0.04
160	14.2	196.0	69.0	5.21	16.15	0.57
170	13.3	209.0	70.0	4.32	16.79	1.42
180	12.3	212.0	71.0	4.29	16.51	1.98
190	11.3	217.0	71.0	4.26	16.16	2.77
200	10.2	220.0	72.0	4.23	15.50	4.49
210	9.2	220.0	71.0	4.19	15.74	3.83
220	8.3	219.0	70.0	4.21	15.95	3.13
230	7.4	215.0	69.0	4.19	16.31	2.04
240	6.8	209.0	70.0	4.26	16.19	1.50
250	6.2	205.0	72.0	4.12	16.32	1.32

Manufacturer: FPI
Model: F3500
Date: 3/24/2014
Run: 1
Control #: 015-S-021-1
Test Duration: 660 min

	HHV	LHV
Eff	81.9%	88.5%
Comb Eff	95.4%	95.4%
HT Eff	85.8%	92.8%
Output	11,553	kJ/h
Burn Rate	0.71	kg/h
Grams CO	503	g
Input	14,104	kJ/h
MC wet	17.01	

Ultimate CO2
CO2-ult 19.64
Fo 1.063

Heat Output: 10,959 Btu/h 11,553 kJ/h
Heat Input: 13,380 Btu/h 14,104 kJ/h
Burn Duration: 11 h
Burn Rate: 1.6 lb/h 0.7 kg/h
Stack Temp: 154.0 Deg. F 67.8 Deg. C

Overall Heating Efficiency: 81.9%
Combustion Efficiency: 95.4%
Heat Transfer Efficiency: 85.8%

Air Fuel Ratio (A/F)
Dry Molecular Weight (Md)
Dry Moles Exhaust Gas (Nd):
Air Fuel Ratio (A/F)

	Averages	0.39	11.78	75.4%	20.14	8.16	69.0	20.8	98.4%	86.7%	85.3%	10.6	3.22	65.93
	INPUT DATA			Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO2 [d]	Excess Air EA	Total O2	Calc. % O2 [g]	Flue Gas (ºC)	Room Temp (ºC)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x
0	9.44	0.05	10.66	83.4%	20.23	9.55	149.4	21.1	99.9%	81.3%	81.2%	11.1	9.44	0.00
10	9.21	0.02	4.31	353.6%	20.65	16.33	93.3	21.1	100.7%	79.2%	79.7%	27.4	9.21	2.40
20	9.03	0.04	5.85	233.5%	20.55	14.68	79.4	20.6	100.2%	83.2%	83.4%	20.1	9.03	4.33
30	8.85	0.03	10.18	92.4%	20.27	10.07	82.8	20.6	100.0%	85.5%	85.6%	11.6	8.85	6.25
40	8.71	0.02	7.28	169.1%	20.46	13.17	73.9	20.6	100.3%	84.9%	85.2%	16.3	8.71	7.69
50	8.58	0.02	7.42	164.0%	20.45	13.02	68.3	20.0	100.3%	85.5%	85.7%	16.0	8.58	9.13
60	8.39	0.02	8.46	131.6%	20.38	11.91	66.7	20.6	100.2%	86.1%	86.3%	14.0	8.39	11.06
70	8.26	0.02	8.33	135.2%	20.39	12.05	66.1	19.4	100.2%	86.0%	86.2%	14.2	8.26	12.50
80	8.12	0.02	8.55	129.2%	20.37	11.81	65.0	19.4	100.2%	86.2%	86.4%	13.9	8.12	13.94
90	7.99	0.03	9.11	114.9%	20.34	11.21	65.6	19.4	100.1%	86.3%	86.4%	13.0	7.99	15.38
100	7.80	0.02	10.34	89.6%	20.26	9.91	67.8	19.4	100.1%	86.6%	86.7%	11.5	7.80	17.31
110	7.62	0.02	9.82	99.6%	20.29	10.46	68.9	19.4	100.1%	86.3%	86.4%	12.1	7.62	19.23
120	7.49	0.03	9.95	96.8%	20.28	10.32	68.9	20.0	100.0%	86.4%	86.4%	11.9	7.49	20.67
130	7.30	0.03	10.37	88.9%	20.25	9.87	68.9	20.0	100.0%	86.5%	86.5%	11.4	7.30	22.60
140	7.12	0.04	11.58	69.0%	20.17	8.57	71.1	20.0	99.9%	86.7%	86.6%	10.2	7.12	24.52
150	6.85	0.04	15.26	28.4%	19.93	4.65	81.1	20.0	99.9%	86.8%	86.7%	7.8	6.85	27.40
160	6.44	0.57	16.15	17.5%	19.84	3.40	91.1	20.6	97.2%	86.3%	83.9%	7.1	6.44	31.73
170	6.03	1.42	16.79	7.9%	19.74	2.24	98.3	21.1	93.5%	85.8%	80.2%	6.4	6.03	36.06
180	5.58	1.98	16.51	6.2%	19.72	2.22	100.0	21.7	91.1%	85.6%	77.9%	6.3	5.58	40.87
190	5.13	2.77	16.16	3.8%	19.69	2.15	102.8	21.7	87.8%	85.1%	74.8%	6.1	5.13	45.67
200	4.63	4.49	15.50	-1.7%	19.62	1.88	104.4	22.2	81.5%	84.4%	68.8%	5.6	4.63	50.96
210	4.17	3.83	15.74	0.4%	19.65	1.99	104.4	21.7	83.8%	84.6%	70.9%	5.8	4.17	55.77
220	3.77	3.13	15.95	3.0%	19.68	2.17	103.9	21.1	86.4%	84.9%	73.3%	6.0	3.77	60.10
230	3.36	2.04	16.31	7.0%	19.73	2.40	101.7	20.6	90.7%	85.4%	77.5%	6.3	3.36	64.42
240	3.09	1.50	16.19	11.0%	19.77	2.83	98.3	21.1	92.9%	85.7%	79.6%	6.6	3.09	67.31

250	2.81	1.32	16.32	11.4%	19.78	2.80	96.1	22.2	93.8%	85.9%	80.6%	6.6	2.81	70.19
260	2.54	0.84	16.22	15.1%	19.81	3.17	92.8	22.2	95.9%	86.2%	82.7%	6.9	2.54	73.08
270	2.36	0.35	16.58	16.0%	19.82	3.07	90.6	22.2	98.3%	86.6%	85.1%	7.0	2.36	75.00
280	2.13	0.36	16.49	16.6%	19.83	3.16	90.0	22.2	98.2%	86.6%	85.0%	7.0	2.13	77.40
290	1.95	0.20	16.54	17.3%	19.83	3.19	87.8	22.8	99.0%	86.8%	85.9%	7.1	1.95	79.33
300	1.81	0.05	16.00	22.4%	19.88	3.86	84.4	22.2	99.8%	86.9%	86.7%	7.4	1.81	80.77
310	1.68	0.04	13.31	47.1%	20.06	6.73	80.0	22.8	99.9%	86.7%	86.6%	8.9	1.68	82.21
320	1.63	0.03	12.04	62.7%	20.14	8.09	75.0	22.8	100.0%	86.7%	86.7%	9.9	1.63	82.69
330	1.59	0.02	11.83	65.8%	20.16	8.32	69.4	22.2	100.1%	87.0%	87.0%	10.0	1.59	83.17
340	1.50	0.03	11.90	64.7%	20.15	8.24	65.0	22.8	100.0%	87.3%	87.3%	10.0	1.50	84.13
350	1.45	0.02	11.95	64.1%	20.15	8.19	62.2	22.2	100.1%	87.4%	87.5%	9.9	1.45	84.62
360	1.36	0.02	11.93	64.4%	20.15	8.21	60.0	22.2	100.1%	87.6%	87.6%	10.0	1.36	85.58
370	1.32	0.02	12.06	62.6%	20.14	8.07	57.8	22.2	100.1%	87.7%	87.8%	9.9	1.32	86.06
380	1.27	0.03	12.24	60.1%	20.13	7.87	55.6	21.1	100.0%	87.8%	87.8%	9.7	1.27	86.54
390	1.23	0.02	12.09	62.2%	20.14	8.04	53.9	20.6	100.1%	87.8%	87.9%	9.8	1.23	87.02
400	1.18	0.03	11.40	71.9%	20.19	8.77	52.8	20.6	100.0%	87.8%	87.8%	10.4	1.18	87.50
410	1.13	0.02	11.24	74.4%	20.20	8.95	52.2	20.6	100.1%	87.8%	87.9%	10.6	1.13	87.98
420	1.09	0.02	11.81	66.0%	20.16	8.34	50.6	20.6	100.1%	88.0%	88.1%	10.1	1.09	88.46
430	1.04	0.02	11.97	63.8%	20.15	8.17	50.0	21.1	100.1%	88.1%	88.1%	9.9	1.04	88.94
440	1.00	0.03	11.66	68.0%	20.17	8.49	49.4	20.6	100.0%	88.0%	88.0%	10.2	1.00	89.42
450	1.00	0.03	11.67	67.9%	20.17	8.48	49.4	20.6	100.0%	88.0%	88.0%	10.2	1.00	89.42
460	0.91	0.04	11.42	71.4%	20.18	8.74	48.9	20.6	99.9%	88.0%	88.0%	10.4	0.91	90.38
470	0.86	0.04	11.78	66.2%	20.16	8.36	48.9	20.6	99.9%	88.1%	88.0%	10.1	0.86	90.87
480	0.82	0.04	11.58	69.0%	20.17	8.57	48.9	20.6	99.9%	88.1%	88.0%	10.2	0.82	91.35
490	0.77	0.04	11.45	71.0%	20.18	8.71	49.4	20.0	99.9%	88.0%	87.9%	10.3	0.77	91.83
500	0.77	0.04	11.32	72.9%	20.19	8.85	48.9	20.6	99.9%	88.0%	88.0%	10.5	0.77	91.83
510	0.64	0.03	11.15	75.7%	20.20	9.04	53.3	20.6	100.0%	87.7%	87.7%	10.6	0.64	93.27
520	0.59	0.02	10.85	80.7%	20.22	9.36	49.4	20.0	100.1%	87.9%	88.0%	10.9	0.59	93.75
530	0.54	0.02	11.07	77.1%	20.21	9.13	47.2	20.0	100.1%	88.1%	88.2%	10.7	0.54	94.23
540	0.54	0.04	10.20	91.8%	20.26	10.04	47.2	20.0	100.0%	87.9%	87.9%	11.6	0.54	94.23
550	0.50	0.03	10.44	87.6%	20.25	9.79	49.4	20.0	100.0%	87.8%	87.9%	11.4	0.50	94.71
560	0.45	0.02	10.35	89.4%	20.26	9.90	50.6	20.0	100.1%	87.8%	87.9%	11.5	0.45	95.19
570	0.41	0.03	10.23	91.5%	20.26	10.02	50.0	20.0	100.0%	87.8%	87.8%	11.6	0.41	95.67
580	0.36	0.04	9.97	96.2%	20.28	10.29	50.0	20.0	100.0%	87.7%	87.7%	11.9	0.36	96.15
590	0.32	0.03	9.74	101.1%	20.29	10.54	50.0	20.0	100.1%	87.7%	87.7%	12.2	0.32	96.63
600	0.27	0.03	9.76	100.6%	20.29	10.52	49.4	20.0	100.1%	87.7%	87.8%	12.1	0.27	97.12
610	0.23	0.03	9.67	102.5%	20.30	10.61	51.7	20.0	100.1%	87.5%	87.6%	12.2	0.23	97.60
620	0.18	0.04	10.02	95.3%	20.28	10.24	52.2	20.0	100.0%	87.6%	87.5%	11.8	0.18	98.08
630	0.14	0.03	9.57	104.6%	20.31	10.72	53.3	20.0	100.1%	87.4%	87.5%	12.4	0.14	98.56
640	0.09	0.04	9.63	103.1%	20.30	10.65	52.2	20.0	100.0%	87.5%	87.5%	12.3	0.09	99.04
650	0.05	0.04	9.64	102.9%	20.30	10.64	52.2	20.0	100.0%	87.5%	87.5%	12.3	0.05	99.52
660	-0.05	0.04	9.57	104.4%	20.31	10.72	51.7	20.0	100.0%	87.5%	87.5%	12.4	-0.05	100.48
0														

[redacted]

30.21	
325.51	%HC
9.32	0.88

Combustion Efficiency: 95.4%
Total Input (kJ): 155,149 147,151 (Btu)
Total Output (kJ): 127,083 120,532 (Btu)
Efficiency: 81.5%
Total CO (g): 502.81

Load Weight (kg): 9.44
Fuel Heating: HHV LHV
Value in kJ/kg - CV: 19810.00 18328.69 Btu/lb 8522.48 7885.21

Moisture of Wood (wet basis): 17.01
Initial Dry Weight Wtdo (kg): 7.83
Moisture Content Dry 20.50

0.18	65.93	155522	4.06	6.87	2.74	19810.00	17.01	79.67	21.13	3.01	10.25	0.04	0.30	39.85	33.31	
Dry Wt.	% Dry	Fuel Properties					Mw	Mass Balance					kg Wood per			IV
Now	Comsumed	Total	Carbon	Hydrogen	Oxygen	Calorific	Moisture	(moles/100 mole dry flue gas)					100 mole dfp			
Wtdn	y	Input	/12= [a]	/1= [b]	/16= [c]	Value	Fuel Burnt	[h]	[u]	[w]	[j]	[k]	Nk	CO2	O2	
7.83	0.00	0	4.06	6.87	2.74	19810.00	17.01	79.74	21.15	2.64	9.07	-0.01	0.26	40.65	36.41	
7.64	2.40	5221	4.06	6.87	2.74	19810.00	17.01	79.34	21.04	1.06	3.69	-0.02	0.11	40.84	154.79	
7.49	4.33	2984	4.06	6.87	2.74	19810.00	17.01	79.43	21.07	1.45	5.00	-0.02	0.14	40.66	102.03	
7.34	6.25	2611	4.06	6.87	2.74	19810.00	17.01	79.72	21.15	2.51	8.65	-0.01	0.25	40.74	40.30	
7.23	7.69	2238	4.06	6.87	2.74	19810.00	17.01	79.53	21.10	1.79	6.20	-0.02	0.18	40.80	73.80	
7.12	9.13	2611	4.06	6.87	2.74	19810.00	17.01	79.54	21.10	1.83	6.31	-0.02	0.18	40.80	71.59	
6.97	11.06	2611	4.06	6.87	2.74	19810.00	17.01	79.61	21.12	2.08	7.19	-0.02	0.21	40.79	57.43	
6.85	12.50	2238	4.06	6.87	2.74	19810.00	17.01	79.60	21.11	2.05	7.08	-0.02	0.20	40.80	59.01	
6.74	13.94	2238	4.06	6.87	2.74	19810.00	17.01	79.62	21.12	2.11	7.27	-0.02	0.21	40.79	56.37	
6.63	15.38	2611	4.06	6.87	2.74	19810.00	17.01	79.65	21.13	2.25	7.75	-0.01	0.22	40.74	50.14	
6.48	17.31	2984	4.06	6.87	2.74	19810.00	17.01	79.73	21.15	2.55	8.78	-0.01	0.25	40.78	39.07	
6.33	19.23	2611	4.06	6.87	2.74	19810.00	17.01	79.70	21.14	2.42	8.34	-0.01	0.24	40.79	43.45	
6.21	20.67	2611	4.06	6.87	2.74	19810.00	17.01	79.70	21.14	2.45	8.46	-0.01	0.24	40.74	42.24	
6.06	22.60	2984	4.06	6.87	2.74	19810.00	17.01	79.73	21.15	2.56	8.81	-0.01	0.25	40.74	38.77	
5.91	24.52	3730	4.06	6.87	2.74	19810.00	17.01	79.81	21.17	2.86	9.84	-0.01	0.28	40.70	30.13	
5.69	27.40	5594	4.06	6.87	2.74	19810.00	17.01	80.05	21.23	3.77	12.94	0.00	0.37	40.71	12.40	
5.35	31.73	6713	4.06	6.87	2.74	19810.00	17.01	79.88	21.19	4.14	14.05	0.08	0.41	39.24	8.26	
5.01	36.06	7086	4.06	6.87	2.74	19810.00	17.01	79.55	21.10	4.53	15.17	0.20	0.45	37.21	4.96	
4.63	40.87	7459	4.06	6.87	2.74	19810.00	17.01	79.29	21.03	4.62	15.31	0.29	0.46	35.89	4.82	
4.25	45.67	7832	4.06	6.87	2.74	19810.00	17.01	78.92	20.93	4.76	15.55	0.40	0.47	34.12	4.53	
3.84	50.96	7832	4.06	6.87	2.74	19810.00	17.01	78.13	20.73	5.08	16.16	0.65	0.51	30.65	3.71	
3.46	55.77	7086	4.06	6.87	2.74	19810.00	17.01	78.44	20.81	4.96	15.91	0.56	0.49	31.92	4.04	
3.13	60.10	6713	4.06	6.87	2.74	19810.00	17.01	78.75	20.89	4.81	15.62	0.45	0.48	33.33	4.52	
2.79	64.42	5594	4.06	6.87	2.74	19810.00	17.01	79.25	21.02	4.59	15.18	0.29	0.46	35.70	5.25	
2.56	67.31	4475	4.06	6.87	2.74	19810.00	17.01	79.48	21.08	4.41	14.72	0.21	0.44	36.91	6.46	

2.33	70.19	4475	4.06	6.87	2.74	19810.00	17.01	79.56	21.10	4.39	14.70	0.19	0.44	37.36	6.40
2.11	73.08	3730	4.06	6.87	2.74	19810.00	17.01	79.77	21.16	4.23	14.30	0.12	0.42	38.54	7.54
1.96	75.00	3357	4.06	6.87	2.74	19810.00	17.01	80.00	21.22	4.18	14.27	0.05	0.42	39.86	7.37
1.77	77.40	3357	4.06	6.87	2.74	19810.00	17.01	79.99	21.22	4.16	14.20	0.05	0.41	39.83	7.63
1.62	79.33	2611	4.06	6.87	2.74	19810.00	17.01	80.07	21.24	4.13	14.13	0.02	0.41	40.27	7.78
1.51	80.77	2238	4.06	6.87	2.74	19810.00	17.01	80.09	21.25	3.95	13.58	0.00	0.39	40.68	9.80
1.39	82.21	1492	4.06	6.87	2.74	19810.00	17.01	79.92	21.20	3.29	11.30	0.00	0.33	40.71	20.58
1.36	82.69	746	4.06	6.87	2.74	19810.00	17.01	79.84	21.18	2.97	10.22	-0.01	0.30	40.74	27.37
1.32	83.17	1119	4.06	6.87	2.74	19810.00	17.01	79.83	21.18	2.92	10.04	-0.01	0.29	40.78	28.67
1.24	84.13	1119	4.06	6.87	2.74	19810.00	17.01	79.83	21.18	2.94	10.10	-0.01	0.29	40.74	28.20
1.20	84.62	1119	4.06	6.87	2.74	19810.00	17.01	79.84	21.18	2.95	10.14	-0.01	0.29	40.78	27.95
1.13	85.58	1119	4.06	6.87	2.74	19810.00	17.01	79.84	21.18	2.94	10.12	-0.01	0.29	40.78	28.07
1.09	86.06	746	4.06	6.87	2.74	19810.00	17.01	79.85	21.18	2.97	10.23	-0.01	0.30	40.78	27.30
1.05	86.54	746	4.06	6.87	2.74	19810.00	17.01	79.86	21.18	3.02	10.39	-0.01	0.30	40.74	26.21
1.02	87.02	746	4.06	6.87	2.74	19810.00	17.01	79.85	21.18	2.98	10.26	-0.01	0.30	40.78	27.12
0.98	87.50	746	4.06	6.87	2.74	19810.00	17.01	79.80	21.17	2.81	9.68	-0.01	0.28	40.74	31.34
0.94	87.98	746	4.06	6.87	2.74	19810.00	17.01	79.79	21.17	2.77	9.54	-0.01	0.28	40.78	32.46
0.90	88.46	746	4.06	6.87	2.74	19810.00	17.01	79.83	21.18	2.91	10.02	-0.01	0.29	40.78	28.79
0.87	88.94	746	4.06	6.87	2.74	19810.00	17.01	79.84	21.18	2.95	10.15	-0.01	0.29	40.78	27.83
0.83	89.42	373	4.06	6.87	2.74	19810.00	17.01	79.82	21.17	2.88	9.90	-0.01	0.29	40.74	29.67
0.83	89.42	746	4.06	6.87	2.74	19810.00	17.01	79.82	21.17	2.88	9.91	-0.01	0.29	40.74	29.61
0.75	90.38	1119	4.06	6.87	2.74	19810.00	17.01	79.80	21.17	2.82	9.70	-0.01	0.28	40.70	31.16
0.72	90.87	746	4.06	6.87	2.74	19810.00	17.01	79.82	21.17	2.91	10.01	-0.01	0.29	40.70	28.88
0.68	91.35	746	4.06	6.87	2.74	19810.00	17.01	79.81	21.17	2.86	9.84	-0.01	0.28	40.70	30.13
0.64	91.83	373	4.06	6.87	2.74	19810.00	17.01	79.80	21.17	2.83	9.73	-0.01	0.28	40.70	30.96
0.64	91.83	1119	4.06	6.87	2.74	19810.00	17.01	79.79	21.16	2.80	9.62	-0.01	0.28	40.70	31.82
0.53	93.27	1492	4.06	6.87	2.74	19810.00	17.01	79.78	21.16	2.75	9.47	-0.01	0.27	40.74	33.02
0.49	93.75	746	4.06	6.87	2.74	19810.00	17.01	79.77	21.16	2.67	9.21	-0.01	0.27	40.78	35.19
0.45	94.23	373	4.06	6.87	2.74	19810.00	17.01	79.78	21.16	2.73	9.39	-0.01	0.27	40.78	33.63
0.45	94.23	373	4.06	6.87	2.74	19810.00	17.01	79.72	21.14	2.52	8.67	-0.01	0.25	40.69	40.07
0.41	94.71	746	4.06	6.87	2.74	19810.00	17.01	79.74	21.15	2.58	8.87	-0.01	0.26	40.74	38.22
0.38	95.19	746	4.06	6.87	2.74	19810.00	17.01	79.73	21.15	2.55	8.79	-0.01	0.25	40.78	38.99
0.34	95.67	746	4.06	6.87	2.74	19810.00	17.01	79.72	21.15	2.52	8.69	-0.01	0.25	40.74	39.89
0.30	96.15	746	4.06	6.87	2.74	19810.00	17.01	79.70	21.14	2.46	8.48	-0.01	0.25	40.69	42.00
0.26	96.63	746	4.06	6.87	2.74	19810.00	17.01	79.69	21.14	2.40	8.28	-0.01	0.24	40.74	44.09
0.23	97.12	746	4.06	6.87	2.74	19810.00	17.01	79.69	21.14	2.41	8.30	-0.01	0.24	40.74	43.91
0.19	97.60	746	4.06	6.87	2.74	19810.00	17.01	79.69	21.14	2.39	8.22	-0.01	0.24	40.74	44.72
0.15	98.08	746	4.06	6.87	2.74	19810.00	17.01	79.70	21.14	2.47	8.52	-0.01	0.25	40.69	41.57
0.11	98.56	746	4.06	6.87	2.74	19810.00	17.01	79.68	21.13	2.36	8.14	-0.01	0.23	40.74	45.64
0.08	99.04	746	4.06	6.87	2.74	19810.00	17.01	79.68	21.13	2.38	8.19	-0.01	0.24	40.69	45.01
0.04	99.52	1119	4.06	6.87	2.74	19810.00	17.01	79.68	21.14	2.38	8.20	-0.01	0.24	40.69	44.92
-0.04	100.48	373	4.06	6.87	2.74	19810.00	17.01	79.67	21.13	2.36	8.14	-0.01	0.24	40.69	45.56
0.00															

Moisture Content MCwb: 17.01

Dry kg : 7.83
CA: 48.73
HY: 6.87
OX: 43.90

0.88	0.08	290.29	34.37	11.39	342.14	1874.84	1430.87	1396.31	1379.81	1761.20	1672.47	293.94	4931.87	2940.82	16895.40			
Moles per kg of Dry Wood				Moisture Present	Stack Temp K	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp K	Energ					
CO	HC	N2	H2O			CO2	O2	CO	N2	CH4	H2O		CO2	O2	CO			
0.19	-0.03	304.10	34.58	11.39	422.59	5124.92	3851.01	3743.38	3702.19	4946.35	4479.09	294.26	208.34	140.22	54.67			
0.19	-0.22	751.84	34.97	11.39	366.48	2825.39	2149.00	2095.32	2070.92	2670.19	2509.15	294.26	115.40	332.65	54.03			
0.28	-0.12	552.04	34.77	11.39	352.59	2291.45	1748.43	1706.11	1685.96	2153.41	2043.50	293.71	93.17	178.40	79.15			
0.12	-0.05	319.03	34.62	11.39	355.93	2424.16	1848.33	1803.26	1782.04	2281.11	2159.76	293.71	98.76	74.49	34.19			
0.11	-0.10	445.76	34.73	11.39	347.04	2070.98	1582.15	1544.32	1525.99	1941.97	1849.87	293.71	84.50	116.77	31.90			
0.11	-0.10	437.39	34.72	11.39	341.48	1872.54	1432.50	1398.72	1382.01	1751.64	1675.61	293.15	76.40	102.55	31.28			
0.10	-0.08	383.88	34.68	11.39	339.82	1785.70	1366.40	1334.26	1318.31	1669.67	1598.42	293.71	72.85	78.47	27.42			
0.10	-0.08	389.84	34.68	11.39	339.26	1806.09	1382.52	1350.12	1333.96	1687.60	1617.46	292.59	73.68	81.58	27.85			
0.10	-0.08	379.86	34.68	11.39	338.15	1762.35	1349.37	1317.83	1302.04	1646.01	1578.80	292.59	71.89	76.06	27.13			
0.13	-0.06	356.18	34.64	11.39	338.71	1784.22	1365.94	1333.98	1318.00	1666.80	1598.13	292.59	72.69	68.48	38.14			
0.08	-0.05	314.50	34.63	11.39	340.93	1871.76	1432.25	1398.57	1381.85	1750.13	1675.45	292.59	76.34	55.96	22.43			
0.08	-0.06	331.03	34.64	11.39	342.04	1915.59	1465.43	1430.87	1413.78	1791.90	1714.13	292.59	78.13	63.67	23.63			
0.12	-0.05	326.34	34.62	11.39	342.04	1894.46	1449.08	1414.87	1397.98	1772.53	1694.94	293.15	77.18	61.21	34.93			
0.12	-0.05	313.24	34.61	11.39	342.04	1894.46	1449.08	1414.87	1397.98	1772.53	1694.94	293.15	77.18	56.18	33.52			
0.14	-0.03	280.50	34.58	11.39	344.26	1982.21	1515.46	1479.50	1461.88	1856.28	1772.31	293.15	80.68	45.66	39.99			
0.11	0.00	213.56	34.53	11.39	354.26	2378.90	1814.72	1770.68	1749.79	2236.58	2120.81	293.15	96.85	22.51	30.39			
1.38	0.19	194.08	34.15	11.39	364.26	2757.35	2098.52	2046.41	2022.52	2603.08	2450.69	293.71	108.20	17.34	394.75			
3.15	0.45	176.32	33.62	11.39	371.48	3026.59	2299.51	2241.46	2215.49	2865.86	2683.96	294.26	112.63	11.40	897.74			
4.30	0.62	172.36	33.28	11.39	373.15	3072.67	2333.38	2274.20	2247.91	2911.97	2723.08	294.82	110.27	11.26	1227.80			
5.85	0.85	166.64	32.83	11.39	375.93	3184.89	2417.14	2355.47	2328.32	3021.54	2820.28	294.82	108.66	10.95	1668.81			
8.88	1.29	154.49	31.95	11.39	377.59	3231.17	2451.07	2388.25	2360.78	3068.05	2859.44	295.37	99.02	9.09	2533.51			
7.77	1.13	159.07	32.27	11.39	377.59	3252.34	2467.43	2404.26	2376.59	3087.49	2878.63	294.82	103.81	9.97	2216.68			
6.54	0.95	164.55	32.63	11.39	377.04	3251.00	2467.01	2404.00	2376.30	3084.91	2878.37	294.26	108.34	11.16	1866.47			
4.47	0.64	173.49	33.24	11.39	374.82	3182.28	2416.33	2354.97	2327.76	3016.49	2819.77	293.71	113.62	12.69	1274.29			
3.42	0.49	181.17	33.55	11.39	371.48	3026.59	2299.51	2241.46	2215.49	2865.86	2683.96	294.26	111.70	14.84	975.29			

3.02	0.43	182.14	33.66	11.39	369.26	2894.76	2199.88	2144.48	2119.60	2739.85	2567.88	295.37	108.15	14.08	861.63
2.00	0.28	189.52	33.97	11.39	365.93	2760.76	2099.58	2047.07	2023.25	2609.67	2451.36	295.37	106.39	15.83	568.88
0.84	0.11	192.34	34.30	11.39	363.71	2671.60	2032.77	1982.17	1959.06	2523.22	2373.72	295.37	106.49	14.99	239.79
0.87	0.11	193.21	34.29	11.39	363.15	2649.34	2016.07	1965.95	1943.01	2501.65	2354.31	295.37	105.52	15.37	247.77
0.49	0.06	194.92	34.41	11.39	360.93	2539.19	1932.96	1885.08	1863.05	2396.09	2257.52	295.93	102.25	15.03	138.71
0.13	0.00	203.65	34.52	11.39	357.59	2427.17	1849.27	1803.84	1782.68	2286.92	2160.35	295.37	98.74	18.13	36.21
0.12	-0.02	244.42	34.55	11.39	353.15	2228.90	1699.66	1658.27	1638.74	2096.92	1986.12	295.93	90.73	34.97	34.82
0.10	-0.03	270.16	34.58	11.39	348.15	2030.35	1549.97	1512.64	1494.74	1906.38	1811.83	295.93	82.72	42.42	28.88
0.07	-0.04	275.19	34.59	11.39	342.59	1831.77	1400.27	1367.00	1350.73	1715.78	1637.53	295.37	74.70	40.15	19.60
0.10	-0.03	273.31	34.58	11.39	338.15	1635.44	1251.27	1221.80	1207.20	1529.51	1463.68	295.93	66.63	35.29	29.19
0.07	-0.04	272.45	34.59	11.39	335.37	1547.43	1184.81	1157.12	1143.25	1445.27	1386.26	295.37	63.10	33.11	19.39
0.07	-0.04	272.91	34.59	11.39	333.15	1460.25	1118.61	1092.60	1079.48	1362.63	1309.01	295.37	59.55	31.40	19.42
0.07	-0.03	269.99	34.59	11.39	330.93	1373.20	1052.46	1028.11	1015.73	1280.26	1231.79	295.37	56.00	28.73	19.21
0.10	-0.03	265.79	34.58	11.39	328.71	1328.63	1019.05	995.66	983.64	1237.04	1192.96	294.26	54.13	26.71	28.36
0.07	-0.03	269.33	34.59	11.39	327.04	1284.69	985.85	963.34	951.68	1195.06	1154.27	293.71	52.39	26.74	19.16
0.11	-0.03	285.18	34.59	11.39	325.93	1241.35	952.82	931.12	919.84	1154.22	1115.69	293.71	50.57	29.86	30.44
0.07	-0.04	289.51	34.61	11.39	325.37	1219.69	936.32	915.02	903.93	1133.83	1096.41	293.71	49.74	30.39	20.60
0.07	-0.04	275.65	34.60	11.39	323.71	1154.77	886.81	866.72	856.20	1072.76	1038.56	293.71	47.09	25.53	19.60
0.07	-0.03	272.00	34.59	11.39	323.15	1112.00	853.97	834.62	824.49	1033.02	1000.09	294.26	45.35	23.76	19.34
0.10	-0.03	278.88	34.59	11.39	322.59	1111.54	853.82	834.53	824.39	1032.12	1000.00	293.71	45.28	25.34	29.75
0.10	-0.03	278.64	34.59	11.39	322.59	1111.54	853.82	834.53	824.39	1032.12	1000.00	293.71	45.28	25.28	29.73
0.14	-0.03	284.38	34.58	11.39	322.04	1089.94	837.33	818.44	808.49	1011.84	980.73	293.71	44.36	26.09	40.46
0.14	-0.03	275.78	34.58	11.39	322.04	1089.94	837.33	818.44	808.49	1011.84	980.73	293.71	44.36	24.18	39.22
0.14	-0.03	280.50	34.58	11.39	322.04	1089.94	837.33	818.44	808.49	1011.84	980.73	293.71	44.36	25.23	39.90
0.14	-0.03	283.65	34.58	11.39	322.59	1132.68	870.17	850.53	840.19	1051.52	1019.19	293.15	46.10	26.94	40.36
0.14	-0.03	286.87	34.58	11.39	322.04	1089.94	837.33	818.44	808.49	1011.84	980.73	293.71	44.36	26.64	40.82
0.11	-0.04	291.51	34.60	11.39	326.48	1263.02	969.33	947.23	935.76	1174.63	1134.98	293.71	51.46	32.01	31.12
0.08	-0.05	299.83	34.61	11.39	322.59	1132.68	870.17	850.53	840.19	1051.52	1019.19	293.15	46.19	30.62	21.34
0.07	-0.04	293.92	34.61	11.39	320.37	1046.32	804.22	786.17	776.59	970.46	942.09	293.15	42.67	27.04	20.91
0.16	-0.04	318.04	34.61	11.39	320.37	1046.32	804.22	786.17	776.59	970.46	942.09	293.15	42.58	32.23	45.29
0.12	-0.04	311.15	34.61	11.39	322.59	1132.68	870.17	850.53	840.19	1051.52	1019.19	293.15	46.14	33.26	33.23
0.08	-0.05	314.20	34.63	11.39	323.71	1175.91	903.16	882.73	872.00	1092.15	1057.74	293.15	47.96	35.22	22.37
0.12	-0.05	317.48	34.62	11.39	323.15	1154.29	886.66	866.63	856.10	1071.82	1038.46	293.15	47.03	35.37	33.91
0.16	-0.04	325.30	34.61	11.39	323.15	1154.29	886.66	866.63	856.10	1071.82	1038.46	293.15	46.97	37.24	46.34
0.13	-0.05	333.32	34.63	11.39	323.15	1154.29	886.66	866.63	856.10	1071.82	1038.46	293.15	47.03	39.09	35.62
0.13	-0.05	332.64	34.63	11.39	322.59	1132.68	870.17	850.53	840.19	1051.52	1019.19	293.15	46.14	38.21	35.54
0.13	-0.05	335.71	34.63	11.39	324.82	1219.18	936.16	914.92	903.82	1132.85	1096.31	293.15	49.67	41.86	35.88
0.16	-0.04	323.69	34.61	11.39	325.37	1240.83	952.66	931.02	919.73	1153.22	1115.59	293.15	50.49	39.60	46.12
0.13	-0.05	339.19	34.63	11.39	326.48	1284.16	985.68	963.23	951.56	1194.02	1154.17	293.15	52.32	44.99	36.26
0.17	-0.05	336.68	34.62	11.39	325.37	1240.83	952.66	931.02	919.73	1153.22	1115.59	293.15	50.49	42.88	47.99
0.17	-0.05	336.33	34.62	11.39	325.37	1240.83	952.66	931.02	919.73	1153.22	1115.59	293.15	50.49	42.79	47.94
0.17	-0.05	338.77	34.62	11.39	324.82	1219.18	936.16	914.92	903.82	1132.85	1096.31	293.15	49.61	42.65	48.29

SUMS				AVERAGE	SUMS						
25780.34	4509.81	105091.45	34827.26	2910.10	28066	7110	20956.00	127456	7110	502.81	36.45
ry Losses (kJ/kg of Dry Fuel)				Total							
Flue Gas Constituent				Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
N2	CH4	H2O Comb	H2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
1125.84	-27.56	1675.54	551.77	3728.82	0	0	0.00	0	0	0.00	0.00
1557.00	-197.68	1625.13	529.34	4015.86	1058	-38	1096.28	4163	-38	1.40	-0.93
930.71	-110.32	1599.85	524.04	3294.99	496	-5	500.99	2487	-5	1.17	-0.30
568.52	-42.25	1596.85	525.36	2855.93	376	-1	377.45	2234	-1	0.44	-0.10
680.22	-91.35	1591.17	521.83	2935.04	332	-7	338.25	1906	-7	0.35	-0.19
604.47	-88.43	1584.82	519.85	2830.94	373	-8	380.61	2238	-8	0.41	-0.21
506.07	-69.87	1580.25	518.97	2714.16	358	-6	363.28	2253	-6	0.36	-0.17
520.03	-71.93	1581.12	519.18	2731.50	309	-5	313.53	1929	-5	0.31	-0.15
494.60	-68.47	1579.42	518.74	2699.38	305	-5	309.59	1933	-5	0.30	-0.14
469.45	-54.50	1578.67	518.96	2691.90	355	-2	356.92	2256	-2	0.50	-0.13
434.59	-45.81	1580.45	519.84	2643.82	398	-4	401.72	2585	-4	0.33	-0.12
468.01	-51.55	1582.38	520.28	2684.55	354	-4	357.47	2257	-4	0.31	-0.12
456.22	-44.64	1581.01	520.07	2685.98	354	-1	355.26	2257	-1	0.45	-0.11
437.90	-40.31	1580.57	520.07	2665.10	401	-1	402.43	2582	-1	0.50	-0.11
410.05	-24.96	1581.67	520.95	2654.04	500	3	496.86	3230	3	0.74	-0.08
373.68	-3.93	1591.55	524.92	2635.95	744	7	736.97	4850	7	0.84	-0.02
392.53	168.36	1585.02	528.67	3194.87	1083	190	892.97	5631	190	13.14	1.02
390.64	402.58	1568.52	531.33	3914.85	1400	462	938.22	5686	462	31.52	2.58
387.45	553.37	1554.07	531.78	4376.00	1648	666	981.40	5811	666	45.38	3.73
387.98	754.93	1536.19	532.88	5000.41	1977	952	1025.16	5855	952	64.74	5.35
364.71	1150.58	1496.00	533.33	6186.24	2446	1447	999.19	5386	1447	98.28	8.15
378.03	1005.51	1511.83	533.55	5759.38	2060	1145	915.49	5026	1145	77.79	6.44
391.03	845.04	1528.65	533.54	5284.24	1791	913	878.16	4922	913	62.05	5.13
403.84	573.88	1555.15	532.88	4466.34	1261	518	742.89	4333	518	35.31	2.90
401.38	435.82	1565.05	531.33	4035.41	912	317	594.93	3564	317	21.63	1.76

386.07	384.11	1566.54	530.01	3850.58	870	280	590.21	3606	280	19.12	1.56
383.45	248.90	1576.67	528.68	3428.80	646	153	492.47	3084	153	10.52	0.84
376.80	98.90	1589.60	527.80	2954.37	501	57	443.53	2856	57	3.99	0.30
375.40	102.19	1588.60	527.58	2962.43	502	59	442.99	2855	59	4.13	0.31
363.15	52.18	1590.46	526.47	2788.24	367	25	342.43	2243	25	1.80	0.12
363.05	2.46	1592.25	525.37	2636.21	298	4	293.44	1940	4	0.40	0.00
400.54	-13.63	1587.89	523.38	2658.71	200	2	198.63	1292	2	0.26	-0.02
403.82	-26.08	1583.15	521.40	2636.31	99	0	99.16	647	0	0.11	-0.02
371.71	-32.18	1577.75	519.41	2571.14	145	-1	145.93	974	-1	0.11	-0.03
329.94	-27.11	1571.22	517.43	2522.59	142	0	142.36	976	0	0.16	-0.03
311.48	-31.22	1568.96	516.55	2481.38	140	-1	140.82	979	-1	0.11	-0.03
294.60	-31.37	1566.30	515.67	2455.56	139	-1	139.37	980	-1	0.11	-0.03
274.24	-30.36	1563.53	514.79	2426.13	91	0	91.77	655	0	0.07	-0.02
261.44	-24.62	1561.60	514.35	2421.98	91	0	91.06	655	0	0.11	-0.02
256.31	-30.13	1560.82	513.91	2399.20	90	0	90.75	656	0	0.07	-0.02
262.32	-31.02	1559.58	513.47	2415.23	91	0	90.96	655	0	0.11	-0.02
261.70	-37.12	1559.53	513.25	2398.09	90	-1	90.92	656	-1	0.08	-0.03
236.02	-32.31	1557.04	512.59	2365.56	89	0	89.55	657	0	0.07	-0.02
224.26	-31.05	1555.58	512.15	2349.40	88	0	88.90	657	0	0.07	-0.02
229.91	-28.93	1555.37	512.15	2368.86	45	0	44.58	328	0	0.06	-0.01
229.71	-28.85	1555.36	512.15	2368.66	89	0	89.16	657	0	0.11	-0.02
229.92	-26.16	1554.42	511.93	2381.02	134	1	133.68	984	1	0.23	-0.03
222.97	-23.46	1554.15	511.93	2373.36	89	1	88.77	657	1	0.15	-0.02
226.78	-24.94	1554.30	511.93	2377.56	90	1	88.96	656	1	0.15	-0.02
238.32	-25.93	1555.73	512.37	2393.89	45	0	44.80	328	0	0.07	-0.01
231.93	-26.94	1554.50	511.93	2383.24	135	1	133.83	984	1	0.23	-0.03
272.79	-33.11	1560.46	513.69	2428.41	183	0	183.03	1309	0	0.23	-0.04
251.91	-40.69	1557.22	512.37	2378.96	90	-1	90.30	656	-1	0.08	-0.03
228.26	-38.64	1554.34	511.49	2346.07	44	0	44.50	329	0	0.04	-0.01
246.98	-36.72	1554.15	511.49	2396.00	45	0	44.95	328	0	0.08	-0.01
261.43	-39.59	1557.11	512.37	2403.94	91	0	90.76	655	0	0.12	-0.03
273.98	-45.67	1559.06	512.81	2405.72	91	-1	91.46	655	-1	0.08	-0.03
271.80	-41.68	1557.99	512.59	2417.00	91	0	91.30	655	0	0.13	-0.03
278.49	-39.01	1557.71	512.59	2440.34	92	0	91.61	654	0	0.17	-0.03
285.35	-46.91	1558.51	512.59	2431.28	92	0	91.97	654	0	0.13	-0.03
279.48	-46.69	1557.82	512.37	2422.88	91	0	91.65	655	0	0.13	-0.03
303.42	-47.70	1560.60	513.25	2456.98	93	0	92.96	653	0	0.13	-0.03
297.71	-38.50	1560.33	513.47	2469.23	93	0	92.69	653	0	0.17	-0.03
322.76	-48.86	1562.72	513.91	2484.10	94	0	94.01	652	0	0.13	-0.03
309.65	-42.58	1560.75	513.47	2482.64	93	0	93.28	652	0	0.18	-0.03
309.34	-42.47	1560.73	513.47	2482.28	140	0	139.90	979	0	0.27	-0.04
306.19	-43.24	1560.14	513.25	2476.89	47	0	46.54	326	0	0.09	-0.01

Run 2 Data:

[redacted]

015_S_021_1_Run # 2_3_18_14_report.xls PREBURN

PREBURN

JOB # 015_S_021_1 Model Designation F3500

TECHNICIAN BTN

DATE: 3_18_14

RUN #: 2

READING INTERVAL: 10

Run Time: 70

				1	2	3	4	5	
						TEMPERATURES			
ET	SCALE READING	FLUE DRAFT		LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	8.4	-0.062		468	461	555	704	427	523
10	7.2	-0.048		472	470	546	644	434	513.2
20	6.5	-0.037		464	468	534	592	426	496.8
30	5.8	-0.031		459	463	522	570	417	486.2
40	5.3	-0.03		450	452	519	540	408	473.8
50	5	-0.029		437	437	505	489	400	453.6
60	4.8	-0.024		424	421	478	448	392	432.6
70	4.7	-0.016		408	406	453	417	385	413.8

Tunnel Traverse Information

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.038	0.038	0.040	0.038	0.038	0.035	0.039	0.040	0.038
Temperature	75	75	75	75	75	75	75	75	75.000

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

Tunnel Velocity: 13.0825 ft/sec.

Intial Tunnel Flow: 146.7779 scfm

Average Tunnel Flow: 145.1398 scfm

Notes:

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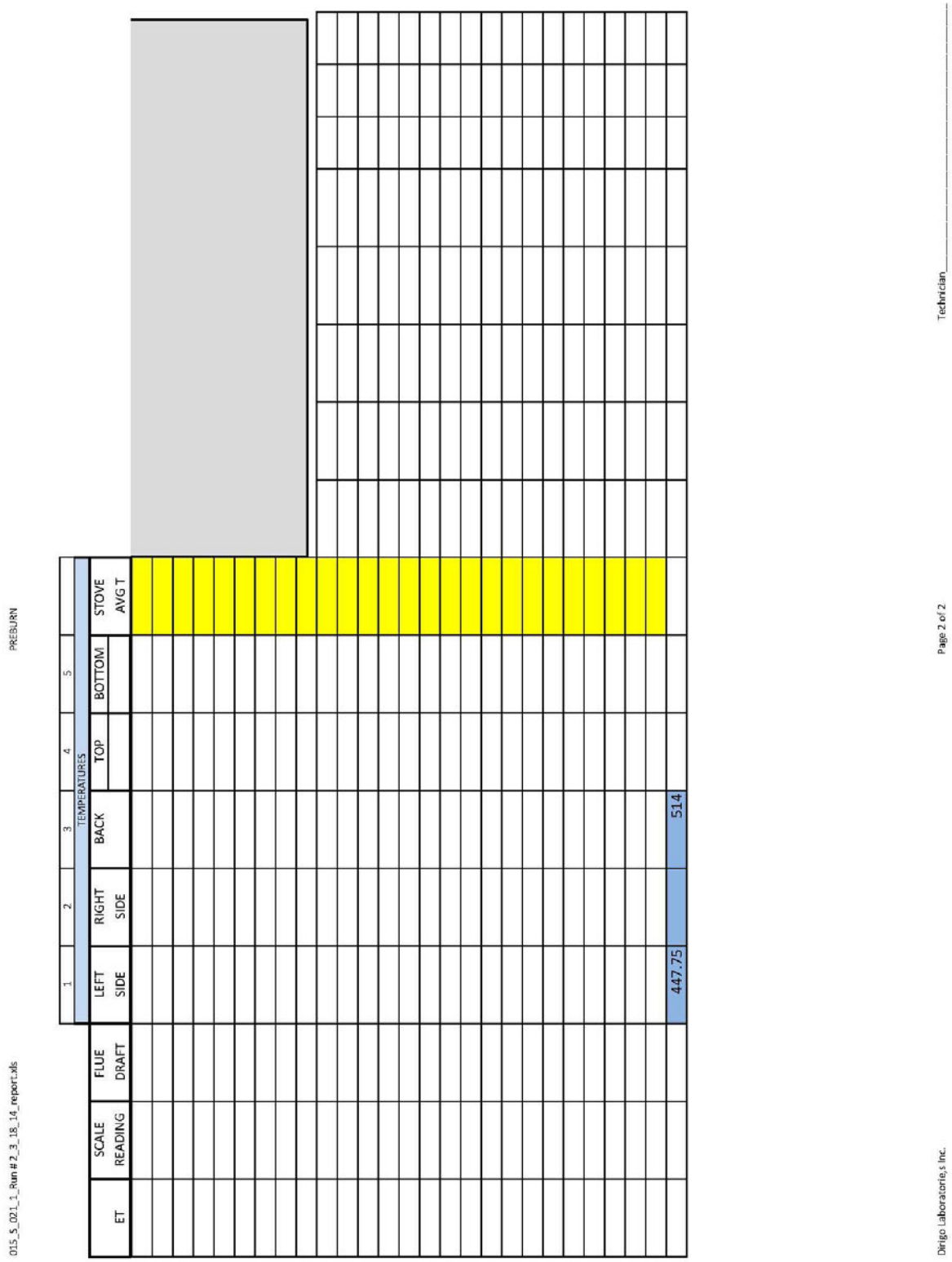
PREBURN
015_S_021_1_Run #2_3_18_14_report.xls
TEMPERATURES
ET
SCALE READING
FLUE DRAFT
LEFT SIDE
RIGHT SIDE
BACK
TOP
BOTTOM
STOVE AVG T
447.75
514
Technician
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Dirigo Laboratories, Inc.

015_S_021_1_Run # 2_3_18_14_report.xls BOX A 4/2/2014

JOB #: 015_S_021_1
TECHNICIA: BTN
DATE: 3_18_14
RUN #: 2
READING INTERVAL: 10
SAMPLE BOX: A
METER Y FACTOR: 0.995
ROOM TEMP (F): 71.0
BAROMETRIC: BEG 30.31, MID 30.31, END 30.31, AVG 30.31
PROBE MATERIAL: SS
FRONT FILTER #:
REAR FILTER #:
FINAL LEAK RATE (CFM): @ IN-HG
REAR FILTER #:
FINAL LEAK RATE (CFM): @ IN-HG
Run Time: 480
AMBIENT FILTER #:
FINAL LEAK RATE (CFM):
VOLUME: LITERS @ IN-HG
FUEL MOISTURE DB: 21.3 %
TEST START TIME:

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	TEMPERATURES 1 TUNNEL TEMP	2 FLUE TEMP	3 FILTER TEMP	4 FB REAR TEMP	5 FB Cat	6 METER TEMP	AMBIENT TEMP
0	0.000	0.000	0.038	0.07	-0.06		NA	20.3	0	84	298	71	453	798.23	77	72
10	1.372	0.137	0.038	1.98	-2.37	12.986	102	19.9	0.4	84	224	74	383	633.8	78	71
20	2.760	0.139	0.038	1.96	-0.29	12.997	102	19.6	0.3	85	209	75	340	691.22	82	72
30	4.147	0.139	0.038	1.95	-2.18	12.986	101	19	0.6	84	216	74	316	740.47	85	71
40	5.534	0.139	0.038	1.97	-1.14	12.986	101	18.6	0.4	84	194	73	281	717.68	88	71
50	6.927	0.139	0.038	1.96	0	12.974	101	17.7	0.9	83	218	73	270	894.87	91	70
60	8.327	0.140	0.038	1.97	-1.91	12.974	101	16.9	0.8	83	221	73	272	877.1	94	70
70	9.730	0.140	0.038	1.96	-2.13	12.974	100	16.2	0.7	83	228	73	276	911.67	96	71
80	11.129	0.140	0.038	1.96	-2.08	12.974	100	15.4	0.8	83	236	73	285	955.57	98	70
90	12.538	0.141	0.038	1.96	-0.13	12.974	100	14.4	1	83	252	74	305	1010.56	99	71
100	13.943	0.141	0.038	1.96	-1.2	12.986	100	13.6	0.8	84	236	74	307	927.14	99	71
110	15.350	0.141	0.038	1.95	-1.05	12.986	100	13	0.6	84	225	74	307	927.24	101	71
120	16.762	0.141	0.038	2.01	-0.31	12.986	100	12.3	0.7	84	233	74	316	948.83	101	71
130	18.183	0.142	0.038	2	-0.04	12.986	101	11.5	0.8	84	235	74	331	966.77	102	72
140	19.610	0.143	0.038	2	-0.35	12.986	101	10.9	0.6	84	231	74	338	954.77	103	72
150	21.031	0.142	0.038	2.01	-0.79	12.986	101	10.2	0.7	84	235	74	344	992.56	103	72
160	22.458	0.143	0.038	2	-1.85	12.986	101	9.5	0.7	84	242	74	357	1015.22	104	72
170	23.883	0.143	0.038	1.99	-0.98	12.986	101	8.7	0.8	84	253	74	386	1024.8	104	72
180	25.307	0.142	0.038	1.98	-2.12	12.986	101	7.8	0.9	84	252	74	422	1034.31	104	71
190	26.734	0.143	0.038	2	-1.03	12.986	101	7	0.8	84	253	74	456	1039.12	105	71
200	28.158	0.142	0.038	1.99	0	12.986	100	6.3	0.7	84	251	74	461	1089.01	105	71
210	29.587	0.143	0.038	2.01	-2.36	12.986	101	5.7	0.6	84	251	74	492	1038.6	105	72
220	31.011	0.142	0.038	2	-2.19	12.986	100	5.1	0.6	84	248	74	503	1079.57	105	72
230	32.439	0.143	0.038	1.98	-0.37	12.986	101	4.5	0.6	84	243	74	518	1066.45	105	72
240	33.867	0.143	0.038	1.97	0	12.986	101	4.1	0.4	84	236	74	526	1035.72	105	72
250	35.293	0.143	0.038	2	-0.95	12.986	101	3.7	0.4	84	228	74	560	929.61	105	71
260	36.723	0.143	0.038	2	-2.29	12.986	101	3.4	0.3	84	216	74	576	839.39	106	72
270	38.148	0.142	0.038	1.99	-1.38	12.986	100	3.1	0.3	84	207	74	575	819.32	106	71
280	39.577	0.143	0.038	2	-0.46	12.986	101	2.9	0.2	84	198	73	553	774.79	106	71
290	41.008	0.143	0.038	2	-1.86	12.986	101	2.7	0.2	84	190	73	536	738.9	106	71
300	42.434	0.143	0.038	1.99	-0.91	12.986	100	2.5	0.2	84	184	73	522	717.39	106	71
310	43.864	0.143	0.038	2.01	-1.03	12.986	101	2.4	0.1	84	179	73	512	705.09	106	71

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015_S_021_1_Run # 2_3_18_14_report.xls BOX A 4/2/2014

TEST START TIME:

	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL (1)	FLUE (2)	FILTER (3)	FB REAR (4)	FB (5)	METER (6)	AMBIENT
										TEMPERATURES						
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP	TEMP	TEMP	TEMP	Cat	TEMP	TEMP
320	45.294	0.143	0.038	1.99	-1.35	12.974	101	2.2	0.2	83	176	73	502	687.21	106	71
330	46.721	0.143	0.038	2	-2.2	12.986	101	2	0.2	84	172	73	471	673.4	106	71
340	48.153	0.143	0.038	1.99	-2.11	12.986	101	1.9	0.1	84	169	73	458	669.86	106	71
350	49.580	0.143	0.038	1.99	-1.12	12.974	101	1.8	0.1	83	167	72	454	667.37	105	71
360	51.010	0.143	0.038	1.99	-2.09	12.974	101	1.7	0.1	83	166	72	451	667.57	105	70
370	52.443	0.143	0.038	2	-1.89	12.974	101	1.5	0.2	83	165	72	444	669.32	105	70
380	53.868	0.143	0.038	2	0	12.974	100	1.4	0.1	83	165	72	433	669.13	105	70
390	55.302	0.143	0.038	1.99	0	12.974	101	1.2	0.2	83	163	72	422	667.49	105	70
400	56.728	0.143	0.038	1.99	-2.09	12.974	101	1.1	0.1	83	164	72	411	681.2	105	71
410	58.158	0.143	0.038	2	-0.34	12.986	101	1	0.1	84	163	73	402	680.58	105	72
420	59.588	0.143	0.038	1.99	-2.28	12.986	101	0.8	0.2	84	163	73	393	682.27	105	72
430	61.015	0.143	0.038	1.98	-0.38	12.986	101	0.7	0.1	84	162	73	388	677.58	105	72
440	62.446	0.143	0.038	2	-2.2	12.986	101	0.6	0.1	84	161	73	384	655.57	106	72
450	63.874	0.143	0.038	2	-2.25	12.986	101	0.4	0.2	84	158	73	382	635.35	106	72
460	65.302	0.143	0.038	1.99	0	12.986	101	0.3	0.1	84	158	73	384	642.85	106	72
470	66.732	0.143	0.038	2.01	-1.43	12.986	101	0.2	0.1	84	157	72	383	646.11	105	72
480	68.160	0.143	0.038	1.98	0	12.986	101	0	0.2	84	156	72	373	631.27	105	72
	68.160		0.038	1.99		12.983	100.7			84	206				101	71
	68.160		0.038	1.99		12.983	100.7			84	206				101	71

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015_S_021_1_Run # 2_3_18_14_report.xls

BOX B

JOB # 015_S_021_1
TECHNICIAN BTN
DATE: 3_18_14
RUN #: 2
READING INTERVAL: 10
SAMPLE BOX : 8
METER Y FACTOR: 0.974
PROBE MATERIAL: SS
FRONT FILTER #: @ IN-HG REAR FILTER #: @ IN-HG
FINAL LEAK RATE (CFM): FINAL LEAK RATE (CFM):
Run Time: 480 Firebox Delta T 97

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	TEMPERATURES 1 LEFT SIDE	2 RIGHT SIDE	3 FILTER	4 FB TOP	5 FB BOT	6 METER	STOVE AVG T
0	0	0	NA	0	0	-1	406	405	71	417	385	73	413
10	1.521	0.152	111	-0.03	2.03	-2.28	355	356	75	381	370	76	371
20	2.980	0.146	107	-0.02	1.96	-1.85	310	317	75	356	362	77	337
30	4.382	0.140	102	-0.04	1.96	-1.05	283	305	75	357	343	81	320
40	5.776	0.139	100	-0.03	2.01	-1.54	264	290	74	326	330	84	298
50	7.187	0.141	101	-0.04	2	-1.66	257	284	74	348	323	89	296
60	8.598	0.141	100	-0.04	2.01	-0.98	255	286	74	364	318	91	299
70	10.012	0.141	100	-0.04	2	-2.02	255	288	74	397	318	93	307
80	11.426	0.141	100	-0.04	2	-2.28	260	292	74	437	320	93	319
90	12.845	0.142	100	-0.04	2.02	-0.94	270	305	74	475	322	96	336
100	14.263	0.142	100	-0.04	1.98	-1.52	277	309	75	505	324	97	344
110	15.681	0.142	100	-0.03	2.01	-0.91	279	306	74	495	324	98	336
120	17.100	0.142	100	-0.04	2.03	-1.14	281	305	75	455	321	99	336
130	18.538	0.144	101	-0.04	2.06	-1.86	290	313	75	481	322	100	347
140	19.974	0.144	101	-0.04	2.05	-2.05	294	312	75	482	320	100	351
150	21.408	0.143	100	-0.04	2.05	-2.25	299	328	75	491	320	100	354
160	22.848	0.144	101	-0.04	2.04	-2.25	307	316	75	488	321	101	362
170	24.282	0.143	100	-0.05	2.03	-1.98	318	350	75	517	322	101	379
180	25.721	0.144	100	-0.04	2.03	-1.22	329	367	75	520	321	102	394
190	27.158	0.144	100	-0.04	2.06	-1.98	337	382	75	539	318	102	406
200	28.594	0.144	100	-0.04	2.03	-2.19	340	384	75	551	315	102	410
210	30.032	0.144	100	-0.04	2.03	-1.22	347	393	75	550	314	102	419
220	31.470	0.144	100	-0.03	2.04	-1.27	354	397	75	550	314	102	424
230	32.906	0.144	100	-0.03	2.03	-0.97	360	399	75	552	314	102	429
240	34.346	0.144	100	-0.04	2.04	-1.79	366	396	76	542	314	103	429
250	35.785	0.144	100	-0.03	2.02	-1.31	374	396	75	508	316	103	431
260	37.223	0.144	100	-0.03	2.04	-0.99	380	397	75	457	318	103	426
270	38.661	0.144	100	-0.03	2.03	-2.08	383	394	75	430	319	103	420
280	40.098	0.144	100	-0.03	2.03	-2.23	379	388	75	410	319	103	410
290	41.540	0.144	100	-0.02	2.04	-2.28	375	379	74	389	320	103	400
300	42.976	0.144	100	-0.03	2.03	-1.34	373	371	74	374	320	103	392
310	44.418	0.144	100	-0.02	2.04	-2.02	370	364	74	364	320	103	386
320	45.857	0.144	100	-0.02	2.04	-2.33	367	358	75	355	320	103	380
330	47.297	0.144	100	-0.02	2.03	-1.04	363	349	75	347	322	103	370
340	48.737	0.144	100	-0.02	2.05	-0.89	359	340	74	341	322	103	364
350	50.177	0.144	100	-0.02	2.04	-1.05	353	333	75	336	321	103	359
360	51.621	0.144	101	-0.02	2.03	-1.07	349	327	75	331	318	102	356

Run Notes:

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BOX B

								TEMPERATURES							
								1	2	3	4	5	6		
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB TOP	FB BOT	METER	STOVE AVG T
370	53.059	0.144	100	-0.02	2.04	-2.27	345	322	75	330	314	103	351
380	54.502	0.144	101	-0.02	2.05	-1.39	342	318	75	328	310	102	346
390	55.942	0.144	100	-0.02	2.05	-2.1	339	316	75	326	305	102	342
400	57.381	0.144	100	-0.02	2.03	-1.68	336	315	75	327	301	103	338
410	58.823	0.144	101	-0.02	2.06	-0.98	334	313	75	328	297	102	335
420	60.262	0.144	100	-0.01	2.04	-1.66	331	315	76	328	294	102	332
430	61.704	0.144	101	-0.02	2.04	-1.97	327	315	76	327	291	103	329
440	63.143	0.144	100	-0.02	2.04	-1.14	324	312	76	321	290	103	326
450	64.584	0.144	100	-0.02	2.03	-2.01	318	311	76	313	288	103	322
460	66.024	0.144	100	-0.02	2.04	-1.24	312	309	76	309	286	103	320
470	67.463	0.144	100	-0.02	2.03	-0.9	307	307	76	309	289	103	319
480	68.907	0.144	101	-0.02	2.03	-1.15	308	304	75	305	291	102	316
	68.90681	0.144	100.694	-0.029	2.029167	-1.59735	327	338	74	409	318	99	97
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT
	68.90681	0.144	100.694	-0.029	2.029167	-1.597347	327	338	74	409	318	99	97
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT

316.2

Dirigo Laboratories, Inc.

Page 2 of 2

CSA B-415 Efficiency

VERSION: 2.4
4/15/2010
lanufacturer: FPI
Model: F3500
Date: 3/24/2014
Run: 2
Control #: 015-S-021-1
est Duration: 480
urn Category 2

Appliance Type: Cat (Cat, Non-Cat, Pellet)
Temp. Units F (F or C)
Weight Units lb (kg or lb)

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

Wood Moisture (% DRY): 21.3
Wood Moisture (% wet): 17.56
Load Weight (lb wet): 20.30
Burn Rate (dry kg/h): 0.95
Total Particulate Emissions: 4.8 g

	Averages	206.3	71.3	8.31	12.24	0.17
Elapsed Time (min)	Fuel Weight Remaining (lb)	Temp. (F) Flue Gas	Temp. (F) Room Temp	Flue Gas Composition (%) O2	Flue Gas Composition (%) CO2	Flue Gas Composition (%) CO
0	20.3	298.0	72.0	9.66	10.66	0.02
10	19.9	224.0	71.0	15.12	4.74	0.03
20	19.6	209.0	72.0	13.56	6.81	0.03
30	19.0	216.0	71.0	13.32	7.14	0.02
40	18.6	194.0	71.0	12.16	8.35	0.03
50	17.7	218.0	70.0	11.19	9.67	0.01
60	16.9	221.0	70.0	9.54	11.55	0.02
70	16.2	228.0	71.0	8.12	12.90	0.02
80	15.4	236.0	70.0	6.21	14.93	0.01
90	14.4	252.0	71.0	5.26	15.91	0.10
100	13.6	236.0	71.0	9.45	11.65	0.01
110	13.0	225.0	71.0	8.81	12.18	0.02
120	12.3	233.0	71.0	5.83	15.17	0.08
130	11.5	235.0	72.0	6.99	14.34	0.01
140	10.9	231.0	72.0	7.32	13.86	0.01
150	10.2	235.0	72.0	6.45	14.66	0.03
160	9.5	242.0	72.0	5.08	16.04	0.14
170	8.7	253.0	72.0	4.21	16.06	2.01
180	7.8	252.0	71.0	4.42	16.33	0.94

190	7.0	253.0	71.0	4.32	16.31	0.90
200	6.3	251.0	71.0	4.42	16.15	0.75
210	5.7	251.0	72.0	4.02	16.33	1.05
220	5.1	248.0	72.0	4.18	16.07	0.97
230	4.5	243.0	72.0	4.86	15.48	0.44
240	4.1	236.0	72.0	5.14	15.19	0.19
250	3.7	228.0	71.0	7.36	13.14	0.01
260	3.4	216.0	72.0	7.24	13.19	0.01
270	3.1	207.0	71.0	7.41	12.95	0.01
280	2.9	198.0	71.0	8.26	11.92	0.02
290	2.7	190.0	71.0	8.12	11.98	0.02
300	2.5	184.0	71.0	8.14	11.95	0.02
310	2.4	179.0	71.0	8.17	12.00	0.02
320	2.2	176.0	71.0	9.04	11.27	0.01
330	2.0	172.0	71.0	9.06	11.11	0.03
340	1.9	169.0	71.0	9.16	11.16	0.02
350	1.8	167.0	71.0	9.15	11.15	0.01
360	1.7	166.0	70.0	9.14	11.13	0.02
370	1.5	165.0	70.0	9.30	11.09	0.02
380	1.4	165.0	70.0	9.38	11.02	0.02
390	1.2	163.0	70.0	9.33	10.99	0.03
400	1.1	164.0	71.0	9.47	11.01	0.03
410	1.0	163.0	72.0	9.46	11.01	0.03
420	0.8	163.0	72.0	9.51	11.05	0.03
430	0.7	162.0	72.0	9.97	10.53	0.03
440	0.6	161.0	72.0	10.35	10.05	0.02
450	0.4	158.0	72.0	10.05	10.53	0.02
460	0.3	158.0	72.0	9.91	10.63	0.02
470	0.2	157.0	72.0	10.18	10.20	0.03
480	0.0	156.0	72.0	10.49	10.01	0.02

Manufacturer: FPI
Model: F3500
Date: 3/24/2014
Run: 2
Control #: 015-S-021-1
Test Duration: 480 min

	HHV	LHV
Eff	83.6%	90.3%
Comb Eff	98.8%	98.8%
HT Eff	84.6%	91.4%
Output	15,715	kJ/h
Burn Rate	0.95	kg/h
Grams CO	143	g
Input	18,803	kJ/h
MC wet	17.56	

Ultimate CO2
CO2-ult 19.64
Fo 1.063

Overall Heating Efficiency:	83.6%				
Combustion Efficiency:	98.8%				
Heat Transfer Efficiency:	84.6%				
Heat Output:	14,908	Btu/h	15,715	kJ/h	
Heat Input:	17,836	Btu/h	18,803	kJ/h	
Burn Duration:	8	h			
Burn Rate:	2.1	lb/h	0.9	kg/h	
Stack Temp:	204.4	Deg. F	95.8	Deg. C	

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

	INPUT DATA			Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO2 [d]	Excess Air EA	Total O2	Calc. % O2 [g]	Flue Gas (ºC)	Room Temp (ºC)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x
	Averages	0.17	12.24	69.1%	20.12	7.80	96.8	21.8	99.3%	85.1%	84.6%	10.2	3.22	65.04
0	9.21	0.02	10.66	83.9%	20.23	9.56	147.8	22.2	100.1%	81.4%	81.5%	11.1	9.21	0.00
10	9.03	0.03	4.74	311.8%	20.63	15.87	106.7	21.7	100.4%	78.2%	78.5%	24.9	9.03	1.97
20	8.89	0.03	6.81	187.2%	20.49	13.66	98.3	22.2	100.2%	82.3%	82.5%	17.4	8.89	3.45
30	8.62	0.02	7.14	174.3%	20.47	13.32	102.2	21.7	100.3%	82.2%	82.4%	16.6	8.62	6.40
40	8.44	0.03	8.35	134.4%	20.39	12.02	90.0	21.7	100.1%	84.1%	84.2%	14.2	8.44	8.37
50	8.03	0.01	9.67	102.9%	20.30	10.63	103.3	21.1	100.2%	83.8%	84.0%	12.3	8.03	12.81
60	7.67	0.02	11.55	69.8%	20.18	8.62	105.0	21.1	100.1%	84.5%	84.6%	10.3	7.67	16.75
70	7.35	0.02	12.90	52.0%	20.09	7.18	108.9	21.7	100.0%	84.8%	84.8%	9.2	7.35	20.20
80	6.99	0.01	14.93	31.5%	19.95	5.02	113.3	21.1	100.0%	85.1%	85.1%	8.0	6.99	24.14
90	6.53	0.10	15.91	22.7%	19.88	3.92	122.2	21.7	99.5%	84.9%	84.5%	7.4	6.53	29.06
100	6.17	0.01	11.65	68.5%	20.17	8.52	113.3	21.7	100.1%	84.1%	84.2%	10.2	6.17	33.00
110	5.90	0.02	12.18	61.0%	20.13	7.94	107.2	21.7	100.1%	84.7%	84.7%	9.8	5.90	35.96
120	5.58	0.08	15.17	28.8%	19.93	4.72	111.7	21.7	99.6%	85.2%	84.9%	7.8	5.58	39.41
130	5.22	0.01	14.34	36.9%	19.99	5.65	112.8	22.2	100.1%	85.0%	85.1%	8.3	5.22	43.35
140	4.95	0.01	13.86	41.6%	20.02	6.16	110.6	22.2	100.1%	85.0%	85.1%	8.6	4.95	46.31
150	4.63	0.03	14.66	33.7%	19.97	5.30	112.8	22.2	99.9%	85.1%	85.0%	8.1	4.63	49.75
160	4.31	0.14	16.04	21.4%	19.87	3.76	116.7	22.2	99.3%	85.2%	84.6%	7.4	4.31	53.20
170	3.95	2.01	16.06	8.7%	19.75	2.68	122.8	22.2	90.7%	84.3%	76.5%	6.4	3.95	57.14
180	3.54	0.94	16.33	13.7%	19.80	3.00	122.2	21.7	95.5%	84.7%	80.9%	6.8	3.54	61.58
190	3.18	0.90	16.31	14.1%	19.80	3.04	122.8	21.7	95.6%	84.7%	81.0%	6.9	3.18	65.52
200	2.86	0.75	16.15	16.2%	19.82	3.30	121.7	21.7	96.3%	84.7%	81.6%	7.0	2.86	68.97
210	2.59	1.05	16.33	13.0%	19.79	2.94	121.7	22.2	95.0%	84.7%	80.4%	6.8	2.59	71.92
220	2.31	0.97	16.07	15.3%	19.81	3.26	120.0	22.2	95.3%	84.8%	80.7%	6.9	2.31	74.88
230	2.04	0.44	15.48	23.4%	19.89	4.19	117.2	22.2	97.7%	84.9%	83.0%	7.4	2.04	77.83
240	1.86	0.19	15.19	27.7%	19.92	4.64	113.3	22.2	99.0%	85.1%	84.3%	7.7	1.86	79.80
250	1.68	0.01	13.14	49.4%	20.07	6.93	108.9	21.7	100.1%	84.9%	84.9%	9.1	1.68	81.77

[redacted]

260	1.54	0.01	13.19	48.8%	20.07	6.87	102.2	22.2	100.1%	85.3%	85.4%	9.0	1.54	83.25
270	1.41	0.01	12.95	51.6%	20.08	7.13	97.2	21.7	100.1%	85.5%	85.6%	9.2	1.41	84.73
280	1.32	0.02	11.92	64.5%	20.15	8.22	92.2	21.7	100.1%	85.5%	85.5%	10.0	1.32	85.71
290	1.23	0.02	11.98	63.7%	20.15	8.16	87.8	21.7	100.1%	85.8%	85.8%	9.9	1.23	86.70
300	1.13	0.02	11.95	64.1%	20.15	8.19	84.4	21.7	100.1%	86.0%	86.0%	9.9	1.13	87.68
310	1.09	0.02	12.00	63.4%	20.15	8.14	81.7	21.7	100.1%	86.1%	86.2%	9.9	1.09	88.18
320	1.00	0.01	11.27	74.1%	20.20	8.92	80.0	21.7	100.2%	86.1%	86.2%	10.5	1.00	89.16
330	0.91	0.03	11.11	76.3%	20.20	9.08	77.8	21.7	100.0%	86.1%	86.1%	10.7	0.91	90.15
340	0.86	0.02	11.16	75.7%	20.20	9.03	76.1	21.7	100.1%	86.3%	86.3%	10.6	0.86	90.64
350	0.82	0.01	11.15	76.0%	20.20	9.05	75.0	21.7	100.2%	86.3%	86.5%	10.7	0.82	91.13
360	0.77	0.02	11.13	76.2%	20.20	9.06	74.4	21.1	100.1%	86.3%	86.4%	10.7	0.77	91.63
370	0.68	0.02	11.09	76.8%	20.21	9.11	73.9	21.1	100.1%	86.4%	86.4%	10.7	0.68	92.61
380	0.64	0.02	11.02	77.9%	20.21	9.18	73.9	21.1	100.1%	86.3%	86.4%	10.8	0.64	93.10
390	0.54	0.03	10.99	78.2%	20.21	9.21	72.8	21.1	100.0%	86.4%	86.4%	10.8	0.54	94.09
400	0.50	0.03	11.01	77.9%	20.21	9.19	73.3	21.7	100.0%	86.4%	86.4%	10.8	0.50	94.58
410	0.45	0.03	11.01	77.9%	20.21	9.19	72.8	22.2	100.0%	86.5%	86.5%	10.8	0.45	95.07
420	0.36	0.03	11.05	77.3%	20.21	9.14	72.8	22.2	100.0%	86.5%	86.5%	10.7	0.36	96.06
430	0.32	0.03	10.53	86.0%	20.24	9.70	72.2	22.2	100.0%	86.4%	86.4%	11.3	0.32	96.55
440	0.27	0.02	10.05	95.1%	20.28	10.22	71.7	22.2	100.1%	86.3%	86.4%	11.8	0.27	97.04
450	0.18	0.02	10.53	86.2%	20.24	9.70	70.0	22.2	100.1%	86.5%	86.6%	11.3	0.18	98.03
460	0.14	0.02	10.63	84.4%	20.24	9.60	70.0	22.2	100.1%	86.6%	86.7%	11.2	0.14	98.52
470	0.09	0.03	10.20	92.0%	20.26	10.05	69.4	22.2	100.0%	86.5%	86.5%	11.6	0.09	99.01
480	0.00	0.02	10.01	95.8%	20.28	10.26	68.9	22.2	100.1%	86.5%	86.6%	11.9	0.00	100.00
0														
0														

30.27	
319.89	%HC
9.17	0.88

Combustion Efficiency: 98.8%
Total Input (kJ): 150,421 142,667 (Btu)
Total Output (kJ): 125,723 119,243 (Btu)
Efficiency: 83.6%
Total CO (g): 143.33

Moisture of Wood (wet basis): 17.56
Initial Dry Weight Wtdo (kg): 7.59
Moisture Content Dry 21.30

Load Weight (kg): 9.21
Fuel Heating: HHV LHV
Value in kJ/kg - CV: 19810.00 18328.69 Btu/lb 8522.48 7885.21

0.13	65.04	151162	4.06	6.87	2.74	19810.00	17.56	79.79	21.17	3.06	10.48	0.01	0.30	40.37	30.30	
Dry Wt. Now Wtdn	% Dry Consumed y	Fuel Properties Total Input	Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value	Mw Moisture Fuel Burnt	Mass Balance (moles/100 mole dry flue gas) [h]	[u]	[w]	[j]	[k]	kg Wood per 100 mole dfp Nk	CO2	O2	M
7.59	0.00	0	4.06	6.87	2.74	19810.00	17.56	79.76	21.16	2.63	9.05	-0.01	0.26	40.78	36.59	
7.44	1.97	4075	4.06	6.87	2.74	19810.00	17.56	79.36	21.05	1.17	4.06	-0.02	0.12	40.74	136.39	
7.33	3.45	3334	4.06	6.87	2.74	19810.00	17.56	79.50	21.09	1.68	5.81	-0.02	0.17	40.74	81.74	
7.11	6.40	3705	4.06	6.87	2.74	19810.00	17.56	79.52	21.09	1.76	6.08	-0.02	0.17	40.80	76.11	
6.96	8.37	4816	4.06	6.87	2.74	19810.00	17.56	79.60	21.11	2.06	7.11	-0.01	0.20	40.74	58.65	
6.62	12.81	6298	4.06	6.87	2.74	19810.00	17.56	79.69	21.14	2.38	8.21	-0.02	0.24	40.84	44.87	
6.32	16.75	5557	4.06	6.87	2.74	19810.00	17.56	79.81	21.17	2.85	9.80	-0.01	0.28	40.78	30.42	
6.06	20.20	5557	4.06	6.87	2.74	19810.00	17.56	79.90	21.19	3.18	10.94	-0.01	0.32	40.78	22.69	
5.76	24.14	6669	4.06	6.87	2.74	19810.00	17.56	80.04	21.23	3.68	12.65	-0.01	0.37	40.80	13.72	
5.39	29.06	6669	4.06	6.87	2.74	19810.00	17.56	80.07	21.24	3.94	13.53	0.01	0.39	40.54	9.99	
5.09	33.00	5187	4.06	6.87	2.74	19810.00	17.56	79.82	21.17	2.87	9.88	-0.01	0.29	40.82	29.84	
4.86	35.96	4816	4.06	6.87	2.74	19810.00	17.56	79.86	21.18	3.00	10.33	-0.01	0.30	40.78	26.60	
4.60	39.41	5557	4.06	6.87	2.74	19810.00	17.56	80.03	21.23	3.76	12.90	0.00	0.37	40.59	12.64	
4.30	43.35	5187	4.06	6.87	2.74	19810.00	17.56	80.00	21.22	3.53	12.15	-0.01	0.35	40.81	16.07	
4.08	46.31	4816	4.06	6.87	2.74	19810.00	17.56	79.97	21.21	3.41	11.74	-0.01	0.34	40.81	18.13	
3.82	49.75	5187	4.06	6.87	2.74	19810.00	17.56	80.01	21.22	3.62	12.43	0.00	0.36	40.74	14.72	
3.55	53.20	5557	4.06	6.87	2.74	19810.00	17.56	80.06	21.24	3.99	13.67	0.01	0.40	40.42	9.48	
3.25	57.14	6298	4.06	6.87	2.74	19810.00	17.56	79.25	21.02	4.52	14.95	0.29	0.45	35.70	5.96	
2.92	61.58	6298	4.06	6.87	2.74	19810.00	17.56	79.73	21.15	4.29	14.46	0.13	0.43	38.30	7.03	
2.62	65.52	5557	4.06	6.87	2.74	19810.00	17.56	79.75	21.15	4.27	14.41	0.13	0.42	38.40	7.17	
2.36	68.97	4816	4.06	6.87	2.74	19810.00	17.56	79.80	21.17	4.19	14.18	0.10	0.42	38.76	7.92	
2.13	71.92	4446	4.06	6.87	2.74	19810.00	17.56	79.68	21.14	4.32	14.53	0.15	0.43	38.02	6.84	
1.91	74.88	4446	4.06	6.87	2.74	19810.00	17.56	79.70	21.14	4.23	14.26	0.14	0.42	38.18	7.75	
1.68	77.83	3705	4.06	6.87	2.74	19810.00	17.56	79.89	21.19	3.93	13.40	0.06	0.39	39.54	10.70	
1.53	79.80	2964	4.06	6.87	2.74	19810.00	17.56	79.98	21.21	3.79	12.99	0.02	0.38	40.26	12.30	
1.38	81.77	2593	4.06	6.87	2.74	19810.00	17.56	79.92	21.20	3.24	11.13	-0.01	0.32	40.81	21.51	

1.27	83.25	2223	4.06	6.87	2.74	19810.00	17.56	79.93	21.20	3.25	11.18	-0.01	0.32	40.81	21.27
1.16	84.73	1852	4.06	6.87	2.74	19810.00	17.56	79.91	21.20	3.19	10.97	-0.01	0.32	40.81	22.47
1.08	85.71	1482	4.06	6.87	2.74	19810.00	17.56	79.84	21.18	2.94	10.11	-0.01	0.29	40.78	28.13
1.01	86.70	1482	4.06	6.87	2.74	19810.00	17.56	79.84	21.18	2.95	10.16	-0.01	0.29	40.78	27.77
0.94	87.68	1111	4.06	6.87	2.74	19810.00	17.56	79.84	21.18	2.95	10.14	-0.01	0.29	40.78	27.95
0.90	88.18	1111	4.06	6.87	2.74	19810.00	17.56	79.84	21.18	2.96	10.18	-0.01	0.29	40.78	27.65
0.82	89.16	1482	4.06	6.87	2.74	19810.00	17.56	79.80	21.17	2.77	9.56	-0.01	0.28	40.82	32.31
0.75	90.15	1111	4.06	6.87	2.74	19810.00	17.56	79.78	21.16	2.74	9.43	-0.01	0.27	40.74	33.29
0.71	90.64	741	4.06	6.87	2.74	19810.00	17.56	79.79	21.16	2.75	9.47	-0.01	0.27	40.78	33.00
0.67	91.13	741	4.06	6.87	2.74	19810.00	17.56	79.79	21.16	2.74	9.46	-0.01	0.27	40.82	33.13
0.64	91.63	1111	4.06	6.87	2.74	19810.00	17.56	79.79	21.16	2.74	9.45	-0.01	0.27	40.78	33.21
0.56	92.61	1111	4.06	6.87	2.74	19810.00	17.56	79.78	21.16	2.73	9.41	-0.01	0.27	40.78	33.49
0.52	93.10	1111	4.06	6.87	2.74	19810.00	17.56	79.78	21.16	2.72	9.35	-0.01	0.27	40.78	33.98
0.45	94.09	1111	4.06	6.87	2.74	19810.00	17.56	79.77	21.16	2.71	9.33	-0.01	0.27	40.74	34.13
0.41	94.58	741	4.06	6.87	2.74	19810.00	17.56	79.77	21.16	2.72	9.35	-0.01	0.27	40.74	33.99
0.37	95.07	1111	4.06	6.87	2.74	19810.00	17.56	79.77	21.16	2.72	9.35	-0.01	0.27	40.74	33.99
0.30	96.06	1111	4.06	6.87	2.74	19810.00	17.56	79.78	21.16	2.73	9.38	-0.01	0.27	40.74	33.71
0.26	96.55	741	4.06	6.87	2.74	19810.00	17.56	79.74	21.15	2.60	8.95	-0.01	0.26	40.74	37.52
0.22	97.04	1111	4.06	6.87	2.74	19810.00	17.56	79.71	21.14	2.48	8.53	-0.01	0.25	40.79	41.46
0.15	98.03	1111	4.06	6.87	2.74	19810.00	17.56	79.75	21.15	2.59	8.94	-0.01	0.26	40.78	37.58
0.11	98.52	741	4.06	6.87	2.74	19810.00	17.56	79.75	21.15	2.62	9.02	-0.01	0.26	40.78	36.82
0.07	99.01	1852	4.06	6.87	2.74	19810.00	17.56	79.72	21.15	2.52	8.67	-0.01	0.25	40.74	40.14
0.00	100.00	741	4.06	6.87	2.74	19810.00	17.56	79.71	21.14	2.47	8.50	-0.01	0.25	40.79	41.80
0.00															
0.00															

[redacted]

Moisture Content MCwb: 17.56

Dry kg : 7.59
CA: 48.73
HY: 6.87
OX: 43.90

														SUM				
0.43	0.01	280.28	34.50	11.83	369.96	2944.63	2234.93	2177.95	2152.83	2793.30	2607.74	294.96	5806.18	3105.38	5957.99	28759.41		
Moles per kg of Dry Wood					Stack Temp	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp	Energy Losses (kJ Flue Gas Co					
CO	HC	N2	H2O	Moisture Present	K	CO2	O2	CO	N2	CH4	H2O	K	CO2	O2	CO	N2		
0.08	-0.05	305.13	34.62	11.83	420.93	5012.98	3767.34	3662.16	3621.84	4837.33	4381.95	295.37	204.45	137.86	21.93	1105.14		
0.26	-0.18	682.03	34.89	11.83	379.82	3342.39	2534.52	2469.33	2440.98	3175.66	2956.44	294.82	136.16	345.68	73.60	1664.83		
0.18	-0.11	475.56	34.73	11.83	371.48	2984.27	2266.81	2209.44	2183.88	2826.99	2645.59	295.37	121.57	185.28	51.18	1038.56		
0.11	-0.11	454.46	34.73	11.83	375.37	3162.43	2400.38	2339.21	2312.23	2999.59	2800.84	294.82	129.04	182.68	32.61	1050.82		
0.15	-0.07	388.35	34.67	11.83	363.15	2670.50	2032.43	1981.96	1958.82	2521.09	2373.50	294.82	108.79	119.21	41.71	760.72		
0.04	-0.07	336.55	34.65	11.83	376.48	3228.52	2450.25	2387.74	2360.21	3062.93	2858.92	294.26	131.84	109.95	12.05	794.32		
0.07	-0.04	281.80	34.60	11.83	378.15	3295.99	2500.55	2436.53	2408.49	3128.93	2917.27	294.26	134.41	76.07	20.16	678.72		
0.06	-0.03	252.57	34.58	11.83	382.04	3432.58	2601.65	2534.43	2505.39	3264.11	3034.29	294.82	139.97	59.02	18.05	632.79		
0.03	-0.02	218.75	34.56	11.83	386.48	3634.55	2752.40	2680.72	2650.13	3461.27	3209.25	294.26	148.30	37.75	7.81	579.72		
0.25	0.02	204.00	34.48	11.83	395.37	3976.74	3005.39	2925.62	2892.54	3800.63	3501.95	294.82	161.20	30.04	72.85	590.08		
0.04	-0.04	279.70	34.61	11.83	386.48	3613.39	2736.05	2664.72	2634.32	3441.85	3190.06	294.82	147.50	81.63	10.01	736.81		
0.07	-0.03	267.36	34.59	11.83	380.37	3364.92	2551.30	2485.61	2457.08	3197.75	2975.90	294.82	137.22	67.86	19.12	656.91		
0.21	0.01	214.11	34.50	11.83	384.82	3545.52	2685.63	2615.85	2585.96	3375.07	3131.64	294.82	143.90	33.94	61.13	553.69		
0.03	-0.02	227.65	34.57	11.83	385.93	3569.60	2702.89	2632.42	2602.39	3400.13	3151.40	295.37	145.66	43.44	8.13	592.44		
0.03	-0.02	235.46	34.57	11.83	383.71	3479.15	2635.68	2567.27	2537.92	3311.19	3073.50	295.37	141.98	47.80	8.41	597.57		
0.08	-0.01	222.36	34.55	11.83	385.93	3569.60	2702.89	2632.42	2602.39	3400.13	3151.40	295.37	145.43	39.77	23.81	578.68		
0.35	0.04	201.76	34.45	11.83	389.82	3728.22	2820.62	2746.49	2715.29	3556.43	3287.78	295.37	150.71	26.74	100.82	547.84		
4.47	0.64	176.17	33.24	11.83	395.93	3978.36	3005.89	2925.93	2892.89	3803.76	3502.27	295.37	142.04	17.92	1277.58	509.65		
2.20	0.31	186.99	33.90	11.83	395.37	3976.74	3005.39	2925.62	2892.54	3800.63	3501.95	294.82	152.30	21.14	630.32	540.87		
2.12	0.30	187.74	33.93	11.83	395.93	3999.53	3022.25	2941.94	2908.69	3823.20	3521.46	294.82	153.57	21.66	605.82	546.07		
1.80	0.25	191.54	34.02	11.83	394.82	3953.97	2988.54	2909.30	2876.39	3778.07	3482.45	294.82	153.27	23.66	514.66	550.93		
2.44	0.35	185.53	33.83	11.83	394.82	3932.80	2972.18	2893.29	2860.58	3758.63	3463.26	295.37	149.53	20.33	698.93	530.72		
2.30	0.32	189.38	33.88	11.83	393.15	3864.53	2921.63	2844.34	2812.13	3691.07	3404.75	295.37	147.56	22.63	658.81	532.55		
1.12	0.15	204.07	34.23	11.83	390.37	3750.91	2837.45	2762.80	2731.42	3578.83	3307.27	295.37	148.32	30.36	321.17	557.41		
0.50	0.05	211.96	34.42	11.83	386.48	3592.23	2719.70	2648.71	2618.51	3422.40	3170.88	295.37	144.61	33.44	143.83	555.01		
0.03	-0.03	248.23	34.58	11.83	382.04	3432.58	2601.65	2534.43	2505.39	3264.11	3034.29	294.82	140.09	55.97	8.87	621.92		

0.03	-0.03	247.30	34.58	11.83	375.37	3141.26	2384.03	2323.21	2296.42	2980.15	2781.65	295.37	128.20	50.70	8.83	567.91	
0.03	-0.03	251.84	34.59	11.83	370.37	2960.66	2249.69	2192.96	2167.54	2802.83	2625.92	294.82	120.83	50.55	8.99	545.88	
0.07	-0.04	273.13	34.59	11.83	365.37	2759.62	2099.23	2046.85	2023.01	2607.47	2451.14	294.82	112.54	59.04	19.50	552.55	
0.07	-0.03	271.78	34.59	11.83	360.93	2581.53	1965.67	1917.10	1894.67	2434.99	2295.90	294.82	105.27	54.58	19.40	514.93	
0.07	-0.04	272.45	34.59	11.83	357.59	2448.33	1865.62	1819.85	1798.49	2306.36	2179.54	294.82	99.84	52.14	19.44	490.00	
0.07	-0.03	271.33	34.59	11.83	354.82	2337.58	1782.32	1738.86	1718.39	2199.64	2082.63	294.82	95.32	49.28	19.35	466.25	
0.04	-0.05	289.06	34.62	11.83	353.15	2271.24	1732.37	1690.28	1670.36	2135.82	2024.50	294.82	92.72	55.98	10.31	482.83	
0.11	-0.04	292.55	34.60	11.83	350.93	2182.91	1665.82	1625.54	1606.34	2050.96	1947.02	294.82	88.93	55.46	31.31	469.94	
0.07	-0.04	291.57	34.61	11.83	349.26	2116.75	1615.93	1577.01	1558.34	1987.50	1888.93	294.82	86.32	53.33	20.80	454.36	
0.04	-0.05	292.14	34.62	11.83	348.15	2072.69	1582.69	1544.66	1526.36	1945.28	1850.21	294.82	84.62	52.43	10.42	445.92	
0.07	-0.04	292.35	34.61	11.83	347.59	2071.83	1582.42	1544.49	1526.17	1943.62	1850.04	294.26	84.49	52.55	20.85	446.17	
0.07	-0.04	293.39	34.61	11.83	347.04	2049.83	1565.80	1528.32	1510.18	1922.56	1830.69	294.26	83.60	52.44	20.93	443.08	
0.07	-0.04	295.24	34.61	11.83	347.04	2049.83	1565.80	1528.32	1510.18	1922.56	1830.69	294.26	83.60	53.20	21.06	445.87	
0.11	-0.04	295.72	34.60	11.83	345.93	2005.84	1532.58	1495.98	1478.21	1880.47	1791.98	294.26	81.72	52.31	31.64	437.13	
0.11	-0.04	295.18	34.60	11.83	346.48	2006.67	1532.84	1496.14	1478.39	1882.08	1792.15	294.82	81.75	52.10	31.58	436.40	
0.11	-0.04	295.18	34.60	11.83	345.93	1963.52	1499.87	1463.97	1446.60	1841.61	1753.61	295.37	79.99	50.98	31.58	427.01	
0.11	-0.04	294.13	34.60	11.83	345.93	1963.52	1499.87	1463.97	1446.60	1841.61	1753.61	295.37	79.99	50.56	31.46	425.48	
0.12	-0.04	308.52	34.61	11.83	345.37	1941.54	1483.27	1447.80	1430.62	1820.59	1734.26	295.37	79.10	55.65	33.01	441.37	
0.08	-0.05	323.51	34.63	11.83	344.82	1919.57	1466.66	1431.64	1414.63	1799.59	1714.91	295.37	78.29	60.80	23.09	457.65	
0.08	-0.05	308.87	34.62	11.83	343.15	1853.71	1416.87	1383.16	1366.70	1736.70	1656.88	295.37	75.60	53.25	22.03	422.13	
0.08	-0.05	305.99	34.62	11.83	343.15	1853.71	1416.87	1383.16	1366.70	1736.70	1656.88	295.37	75.60	52.17	21.82	418.19	
0.12	-0.05	318.41	34.62	11.83	342.59	1831.77	1400.27	1367.00	1350.73	1715.78	1637.53	295.37	74.63	56.21	34.07	430.09	
0.08	-0.06	324.79	34.63	11.83	342.04	1809.85	1383.68	1350.85	1334.76	1694.86	1618.20	295.37	73.82	57.83	23.17	433.52	

/S			AVERAGE	SUMS						
584.03	78724.02	27006.96	3060.08	24698	1823	22874.08	126464	1823	143.33	6.74
/kg of Dry Fuel)			Total							
nstituent			Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CH4	H2O Comb	H2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
-42.71	1673.82	572.16	3672.64	0	0	0.00	0	0	0.00	0.00
-162.45	1637.06	555.29	4250.16	874	-18	892.66	3201	-18	1.49	-0.60
-94.07	1619.08	551.61	3473.22	585	-7	591.85	2750	-7	0.85	-0.28
-94.48	1624.51	553.45	3478.63	651	-12	662.15	3054	-12	0.60	-0.32
-65.19	1606.63	548.39	3120.26	759	-6	764.37	4058	-6	1.00	-0.28
-58.99	1622.81	554.13	3166.12	1007	-15	1021.53	5292	-15	0.38	-0.34
-34.53	1622.26	554.83	3051.92	856	-4	860.22	4701	-4	0.55	-0.17
-24.38	1625.24	556.21	3006.91	844	-2	845.34	4714	-2	0.50	-0.12
-16.16	1630.42	558.28	2946.12	992	-3	994.61	5677	-3	0.26	-0.10
18.83	1636.82	561.74	3071.56	1034	31	1003.44	5635	31	2.40	0.11
-38.33	1632.10	558.05	3127.78	819	-7	826.36	4368	-7	0.26	-0.18
-29.51	1623.76	555.52	3030.88	737	-3	739.44	4080	-3	0.46	-0.13
9.71	1625.01	557.36	2984.75	837	20	817.62	4720	20	1.68	0.05
-19.40	1628.76	557.60	2956.63	774	-3	777.10	4413	-3	0.21	-0.09
-22.23	1626.37	556.67	2956.56	719	-3	722.19	4098	-3	0.20	-0.10
-10.30	1627.81	557.60	2962.80	776	3	772.27	4411	3	0.61	-0.05
32.33	1628.01	559.21	3045.65	854	37	817.37	4703	37	2.77	0.16
573.70	1577.90	561.75	4660.54	1482	584	898.11	4817	584	39.78	3.26
277.16	1609.39	561.74	3792.91	1206	286	919.83	5092	286	19.63	1.58
265.80	1611.26	561.97	3766.14	1057	242	814.08	4501	242	16.64	1.33
223.18	1614.45	561.51	3641.67	885	178	707.51	3931	178	12.25	0.97
308.73	1604.72	561.29	3874.26	869	224	645.23	3576	224	15.36	1.24
289.17	1604.81	560.59	3816.12	856	211	645.44	3589	211	14.48	1.16
131.04	1618.24	559.44	3365.97	630	84	545.62	3075	84	5.89	0.44
47.91	1622.34	557.83	3104.96	465	28	436.10	2499	28	2.11	0.13
-26.88	1625.50	556.21	2981.68	390	-2	392.71	2203	-2	0.11	-0.06

-26.53	1616.73	553.22	2899.06	325	-2	327.30	1898	-2	0.10	-0.05
-28.18	1611.52	551.38	2860.96	268	-2	269.33	1585	-2	0.08	-0.05
-31.50	1605.82	549.31	2867.27	214	-1	215.40	1267	-1	0.14	-0.04
-31.02	1600.40	547.47	2811.03	210	-1	211.17	1272	-1	0.14	-0.04
-31.25	1596.40	546.10	2772.67	156	-1	156.23	956	-1	0.11	-0.03
-30.85	1593.01	544.95	2737.31	154	-1	154.23	958	-1	0.11	-0.03
-41.67	1592.11	544.26	2736.53	205	-2	207.06	1277	-2	0.08	-0.06
-33.48	1588.59	543.34	2744.09	154	0	154.09	958	0	0.17	-0.03
-37.87	1587.03	542.66	2706.64	101	-1	101.88	640	-1	0.08	-0.03
-42.79	1586.19	542.20	2678.99	100	-1	101.42	641	-1	0.04	-0.03
-38.14	1585.71	542.20	2693.84	151	-1	152.12	960	-1	0.12	-0.04
-38.50	1585.08	541.97	2688.58	151	-1	151.84	961	-1	0.12	-0.04
-39.14	1585.14	541.97	2691.70	151	-1	152.04	960	-1	0.12	-0.04
-34.52	1583.33	541.51	2693.11	151	0	151.27	960	0	0.17	-0.03
-34.35	1583.32	541.51	2692.31	101	0	100.81	640	0	0.12	-0.02
-34.35	1581.98	541.06	2678.26	150	0	150.43	961	0	0.17	-0.03
-34.00	1581.95	541.06	2676.51	150	0	150.32	961	0	0.17	-0.03
-38.75	1581.77	540.83	2692.97	101	0	100.95	640	0	0.12	-0.03
-48.94	1582.14	540.60	2693.63	151	-1	152.58	960	-1	0.13	-0.05
-43.86	1579.61	539.91	2648.68	149	-1	149.84	963	-1	0.12	-0.04
-42.86	1579.51	539.91	2644.35	99	-1	99.70	642	-1	0.08	-0.03
-42.02	1578.75	539.68	2671.41	250	-1	250.56	1603	-1	0.31	-0.07
-49.38	1578.84	539.45	2657.25	99	-1	100.37	642	-1	0.09	-0.03

Run 4 Data:

PREBURN

JOB # 015_S_021_1
TECHNICIAI BTN
DATE: 3_20_14
RUN #: 4
READING INTERVAL: 10
.
Run Time: 90

Model Designation F3500

Tunnel Traverse Information									
	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.038	0.039	0.040	0.038	0.038	0.037	0.038	0.038	0.038
Temperature	85	85	85	85	85	85	85	85	85.000

			1	2	3	4	5	
			TEMPERATURES					
ET	SCALE READING	FLUE DRAFT	LEFT SIDE	RIGHT SIDE	BACK	TOP	BOTTOM	STOVE AVG T
0	14.4	-0.069	408	390	481	585	423	457.4
10	13.1	-0.061	385	372	446	574	410	437.4
20	11.4	-0.065	386	381	445	616	397	445
30	9.8	-0.061	403	401	463	645	387	459.8
40	8.4	-0.059	420	427	494	643	383	473.4
50	7.1	-0.056	448	444	543	637	384	491.2
60	5.9	-0.063	471	464	575	640	388	507.6
70	5.2	-0.054	482	475	587	612	396	510.4
80	4.8	-0.044	486	476	575	550	405	498.4
90	4.6	-0.039	475	465	536	499	417	478.4

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

Tunnel Velocity: 13.2525 ft/sec.
Intial Tunnel Flow: 145.5163 scfm
Average Tunnel Flow: 143.278 scfm

Technician_____

015_S_021_1_Run # 4_3_20_14_report.xls BOX A 4/3/2014

JOB #	015_S_021_1						
TECHNICIAN	BTN	ROOM TEMP (F)	71.0	BEG	MID	END	AVG
DATE:	3_20_14	BAROMETRIC		30.34	30.34	30.34	30.34
RUN #:	4						
READING INTERVAL:	10						
SAMPLE BOX :	A	METER Y FACTOR:	0.995	PROBE MATERIAL:	SS		
FRONT FILTER #:		REAR FILTER #		REAR FILTER #:			
FINAL LEAK RATE (CFM):		@	IN-HG	FINAL LEAK RATE (CFM)		@	IN-HG
Run Time:	280	AMBIENT FILTER #:		VOLUME		LITERS	
		FINAL LEAK RATE (CFM):		@		IN-HG	
TEST START TIME:		FUEL MOISTURE DB	21.2	%			

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	TUNNEL DELTA P	ORIFICE DELTA H	FILTER VAC	TUNNEL VEL FT/SEC	Proportional Rate (%)	Scale Weight	Weight Chg	1 TUNNEL TEMP	2 FLUE TEMP	3 FILTER TEMP	4 FB REAR TEMP	5 FB Cat	6 METER TEMP	AMBIENT TEMP
0	0.000	0.000	0.038	0.06	-0.08		NA	20.8	0	109	383	68	536	847.94	72	69
10	1.360	0.136	0.038	2.01	-1.04	13.180	102	19.8	1	101	338	74	444	814.17	73	71
20	2.740	0.138	0.038	2.02	-0.5	13.239	103	18.2	1.6	106	400	75	407	1103.61	77	72
30	4.119	0.138	0.038	1.97	-0.68	13.297	103	16.5	1.7	111	430	78	417	1142.02	82	72
40	5.502	0.138	0.038	1.94	-0.16	13.262	102	14.7	1.8	108	422	79	423	1150.61	85	74
50	6.888	0.139	0.038	1.96	-0.17	13.274	102	12.9	1.8	109	425	79	444	1165.71	89	75
60	8.281	0.139	0.038	1.96	0	13.262	101	11.2	1.7	108	422	78	482	1138.94	92	72
70	9.679	0.140	0.038	1.97	-0.5	13.251	101	9.8	1.4	107	412	78	502	1149.53	94	73
80	11.079	0.140	0.038	1.97	0	13.239	101	8.4	1.4	106	404	77	526	1130.03	96	73
90	12.484	0.140	0.038	1.99	-2.19	13.227	101	7.2	1.2	105	395	77	539	1100.8	98	72
100	13.894	0.141	0.038	1.98	-1.82	13.216	101	6.1	1.1	104	392	77	559	1106.37	99	72
110	15.301	0.141	0.038	1.98	-2.28	13.180	100	5.3	0.8	101	367	75	563	1031.02	100	72
120	16.716	0.141	0.038	1.98	-2.2	13.145	101	4.8	0.5	98	348	75	539	959.92	101	71
130	18.128	0.141	0.038	1.98	-0.86	13.145	100	4.3	0.5	98	340	76	521	962.78	101	71
140	19.544	0.142	0.038	1.99	-1.34	13.133	100	3.8	0.5	97	336	75	509	962.24	102	72
150	20.958	0.141	0.038	1.99	-0.07	13.133	100	3.3	0.5	97	334	76	502	974.62	102	71
160	22.375	0.142	0.038	1.96	-2.3	13.122	100	2.8	0.5	96	339	75	524	998.03	102	71
170	23.790	0.141	0.038	1.98	-1.03	13.122	100	2.5	0.3	96	320	75	573	883.8	102	71
180	25.207	0.142	0.038	1.98	-2.12	13.098	100	2.2	0.3	94	301	75	574	811.29	103	72
190	26.626	0.142	0.038	1.97	-0.57	13.086	100	1.9	0.3	93	290	74	577	788	103	71
200	28.045	0.142	0.038	1.99	-2.11	13.074	100	1.7	0.2	92	282	74	577	765.78	103	71
210	29.460	0.142	0.038	1.98	0	13.062	99	1.5	0.2	91	279	75	550	760.41	104	71
220	30.880	0.142	0.038	1.98	-1.7	13.062	100	1.2	0.3	91	276	74	540	753.52	104	71
230	32.297	0.142	0.038	1.98	0	13.062	99	1	0.2	91	272	74	537	740.19	104	70
240	33.716	0.142	0.038	1.98	0	13.051	100	0.8	0.2	90	270	74	529	735.9	104	71
250	35.134	0.142	0.038	1.99	-0.57	13.051	99	0.5	0.3	90	269	74	519	730.09	104	70
260	36.554	0.142	0.038	1.98	0	13.051	100	0.3	0.2	90	266	74	508	721.82	104	71
270	37.972	0.142	0.038	1.97	0	13.051	99	0.1	0.2	90	263	74	502	716.87	104	70

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015_S_021_1_Run # 4_3_20_14_report.xls BOX A 4/3/2014

TEST START TIME:										1	2	3	4	5	6	
										TEMPERATURES						
	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL	FLUE	FILTER	FB REAR	FB	METER	AMBIENT
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP	TEMP	TEMP	TEMP	Cat	TEMP	TEMP
280	39.393	0.142	0.038	1.99	-0.65	13.039	100	-0.1	0.2	89	263	74	504	718.08	104	71
	39.393		0.038	1.98		13.147	100.6			99	339				97	71

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015_S_021_1_Run # 4_3_20_14_report.xls 4/3/2014

BOX B

JOB # 015_S_021_1
TECHNICIAN BTN
DATE: 3_20_14
RUN #: 4
READING INTERVAL: 10
SAMPLE BOX : B
METER Y FACTOR: 0.974
PROBE MATERIAL: SS
FRONT FILTER #: REAR FILTER #:
FINAL LEAK RATE (CFM): @ IN-HG FINAL LEAK RATE (CFM): @ IN-HG

Run Time: 280 Firebox Delta T 78.8

								TEMPERATURES						
								1	2	3	4	5	6	
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB TOP	FB BOT	METER	STOVE AVG T
0	0	0	NA	0	0	-1	473	464	70	496	419	71	478
10	1.548	0.155	115	-0.05	2.04	-2.23	421	407	75	452	426	72	430
20	3.045	0.150	111	-0.06	1.99	-2.17	387	368	76	531	412	74	421
30	4.461	0.142	105	-0.06	2	-1.28	392	369	79	618	395	76	438
40	5.859	0.140	103	-0.06	2.01	-1.74	410	392	79	639	383	82	449
50	7.250	0.139	101	-0.07	2.01	-1.75	427	426	80	649	376	86	464
60	8.643	0.139	101	-0.06	2	-1.07	440	450	80	646	373	89	478
70	10.040	0.140	101	-0.06	2.01	-1.25	447	467	79	649	373	92	488
80	11.439	0.140	100	-0.06	2	-1.9	459	475	79	647	373	94	496
90	12.841	0.140	100	-0.06	1.98	-1.67	471	481	78	639	374	96	501
100	14.242	0.140	100	-0.06	2.01	-1.58	482	486	78	633	377	97	507
110	15.649	0.141	100	-0.05	1.99	-1.94	469	488	76	617	383	98	504
120	17.057	0.141	100	-0.05	2.02	-2.1	452	467	76	556	393	98	481
130	18.466	0.141	100	-0.05	2	-1.56	440	445	76	517	399	98	464
140	19.876	0.141	99	-0.05	2	-1.53	431	430	76	499	400	99	454
150	21.285	0.141	99	-0.05	2	-1.75	423	418	76	489	397	99	446
160	22.693	0.141	99	-0.05	2	-1.82	427	411	76	498	391	99	450
170	24.104	0.141	99	-0.04	2	-0.98	435	408	76	480	384	100	456
180	25.516	0.141	99	-0.04	2	-1.73	433	405	76	450	379	100	448
190	26.929	0.141	99	-0.04	2.01	-2.19	430	403	76	426	375	100	442
200	28.339	0.141	99	-0.04	2.01	-1.06	430	403	76	412	372	101	439

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015_S_021_1_Run # 4_3_20_14_report.xls BOX B 4/3/2014

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	TEMPERATURES 1 LEFT SIDE	2 RIGHT SIDE	3 FILTER	4 FB TOP	5 FB BOT	6 METER	STOVE AVG T
210	29.750	0.141	99	-0.04	1.99	-1.93	426	398	76	403	371	101	430
220	31.163	0.141	99	-0.04	2.01	-2.23	422	394	75	396	370	101	424
230	32.576	0.141	99	-0.04	1.99	-2.17	421	390	75	388	368	101	421
240	33.987	0.141	98	-0.04	2.01	-1.63	418	384	75	382	365	101	416
250	35.398	0.141	98	-0.04	2	-1.2	416	377	75	378	362	101	410
260	36.811	0.141	99	-0.04	2	-2.07	412	373	75	374	360	101	405
270	38.226	0.141	99	-0.04	2	-1.94	406	370	74	368	357	101	401
280	39.639	0.141	98	-0.04	2.02	-1.83	402	370	74	366	352	101	399
	39.63927	0.142	100.637	-0.048	2.003571	-1.7	431	418	76	503	381	94	79
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT

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VERSION: 2.4
4/15/2010

Manufacturer: FPI
Model: F3500
Date: 3/25/2014
Run: 4
Control #: 015-S-021-1
Test Duration: 280
Burn Category 3

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

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

Fuel Data

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

Wood Moisture (% DRY): 21.2
Wood Moisture (% wet): 17.49
Load Weight (lb wet): 20.80
Burn Rate (dry kg/h): 1.67
Total Particulate Emissions: 7.04666 g

	Averages	339.2	71.5	8.53	12.23	0.23
		Temp. (F)		Flue Gas Composition (%)		
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas	Room Temp	O2	CO2	CO
0	20.8	383.0	69.0	9.99	10.57	0.01
10	19.8	338.0	71.0	13.37	7.31	0.03
20	18.2	400.0	72.0	5.45	15.62	0.20
30	16.5	430.0	72.0	3.59	17.22	1.23
40	14.7	422.0	74.0	3.30	17.95	0.41
50	12.9	425.0	75.0	2.84	17.75	1.59
60	11.2	422.0	72.0	3.01	17.42	1.34
70	9.8	412.0	73.0	4.10	17.01	0.56
80	8.4	404.0	73.0	3.66	17.36	0.41
90	7.2	395.0	72.0	4.13	16.87	0.30
100	6.1	392.0	72.0	3.75	16.93	0.26
110	5.3	367.0	72.0	9.13	11.86	0.02
120	4.8	348.0	71.0	10.00	11.02	0.03
130	4.3	340.0	71.0	9.76	11.18	0.02
140	3.8	336.0	72.0	10.11	10.85	0.04
150	3.3	334.0	71.0	9.24	11.66	0.03
160	2.8	339.0	71.0	8.79	11.44	0.04

170	2.5	320.0	71.0	9.68	10.74	0.02
180	2.2	301.0	72.0	10.74	9.77	0.02
190	1.9	290.0	71.0	10.29	10.35	0.02
200	1.7	282.0	71.0	10.82	9.79	0.02
210	1.5	279.0	71.0	11.03	9.52	0.02
220	1.2	276.0	71.0	10.82	9.87	0.02
230	1.0	272.0	70.0	11.33	9.33	0.01
240	0.8	270.0	71.0	11.73	8.95	0.02
250	0.5	269.0	70.0	11.42	9.24	0.02
260	0.3	266.0	71.0	11.87	8.80	0.03
270	0.1	263.0	70.0	11.72	9.02	0.01
280	-0.1	263.0	71.0	11.59	9.15	0.02

Manufacturer: FPI
Model: F3500
Date: 3/25/2014
Run: 4
Control #: 015-S-021-1
Test Duration: 280 min

	HHV	LHV
Eff	78.6%	85.0%
Comb Eff	97.9%	97.9%
HT Eff	80.3%	86.8%
Output	25,989	kJ/h
Burn Rate	1.67	kg/h
Grams CO	239	g
Input	33,054	kJ/h
MC wet	17.49	

Ultimate CO2
CO2-ult 19.64
Fo 1.063

Overall Heating Efficiency: 78.6%
Combustion Efficiency: 97.9%
Heat Transfer Efficiency: 80.3%

Heat Output: 24,654 Btu/h 25,989 kJ/h
Heat Input: 31,355 Btu/h 33,054 kJ/h
Burn Duration: 4.666666667 h
Burn Rate: 3.7 lb/h 1.7 kg/h
Stack Temp: 337.7 Deg. F 169.8 Deg. C

Air Fuel Ratio (A/F)
Dry Molecular Weight (Md)
Dry Moles Exhaust Gas (Nd):
Air Fuel Ratio (A/F)

	Averages	0.23	12.23	71.0%	20.12	7.78	170.7	21.9	99.1%	80.6%	79.9%	10.3	2.87	69.58
	INPUT DATA			**Oxygen Calculation**			**Input Data**		**Combust**	**Heat**	**Net**	**Air**	**Wet Wt**	**% Wet**
Elapsed Time	**Weight Remaining (kg)**	**% CO [e]**	**% CO2 [d]**	**Excess Air EA**	**Total O2**	**Calc. % O2 [g]**	**Flue Gas (ºC)**	**Room Temp (ºC)**	**Eff %**	**Transfer %**	**Eff %**	**Fuel Ratio**	**Now Wt**	**Consumed x**
0	9.44	0.01	10.57	85.7%	20.24	9.67	195.0	20.6	100.2%	78.0%	78.1%	11.2	9.44	0.00
10	8.98	0.03	7.31	167.6%	20.46	13.13	170.0	21.7	100.2%	76.0%	76.2%	16.2	8.98	4.81
20	8.26	0.20	15.62	24.2%	19.90	4.18	204.4	22.2	99.0%	80.7%	79.9%	7.5	8.26	12.50
30	7.49	1.23	17.22	6.5%	19.72	1.89	221.1	22.2	94.4%	80.3%	75.8%	6.4	7.49	20.67
40	6.67	0.41	17.95	7.0%	19.73	1.57	216.7	23.3	98.1%	81.1%	79.6%	6.5	6.67	29.33
50	5.85	1.59	17.75	1.6%	19.66	1.12	218.3	23.9	93.1%	80.6%	75.1%	6.1	5.85	37.98
60	5.08	1.34	17.42	4.7%	19.70	1.61	216.7	22.2	94.0%	80.6%	75.8%	6.3	5.08	46.15
70	4.45	0.56	17.01	11.8%	19.78	2.49	211.1	22.8	97.3%	80.9%	78.8%	6.7	4.45	52.88
80	3.81	0.41	17.36	10.5%	19.77	2.20	206.7	22.8	98.1%	81.3%	79.7%	6.7	3.81	59.62
90	3.27	0.30	16.87	14.4%	19.81	2.79	201.7	22.2	98.6%	81.4%	80.2%	6.9	3.27	65.38
100	2.77	0.26	16.93	14.3%	19.80	2.74	200.0	22.2	98.8%	81.5%	80.5%	6.9	2.77	70.67
110	2.40	0.02	11.86	65.3%	20.16	8.29	186.1	22.2	100.1%	79.7%	79.8%	10.0	2.40	74.52
120	2.18	0.03	11.02	77.8%	20.21	9.18	175.6	21.7	100.0%	79.7%	79.8%	10.8	2.18	76.92
130	1.95	0.02	11.18	75.4%	20.20	9.01	171.1	21.7	100.1%	80.2%	80.2%	10.6	1.95	79.33
140	1.72	0.04	10.85	80.4%	20.22	9.35	168.9	22.2	99.9%	80.1%	80.0%	10.9	1.72	81.73
150	1.50	0.03	11.66	68.0%	20.17	8.49	167.8	21.7	100.0%	80.7%	80.7%	10.2	1.50	84.13
160	1.27	0.04	11.44	71.1%	20.18	8.72	170.6	21.7	99.9%	80.4%	80.3%	10.4	1.27	86.54
170	1.13	0.02	10.74	82.6%	20.23	9.48	160.0	21.7	100.1%	80.6%	80.7%	11.1	1.13	87.98
180	1.00	0.02	9.77	100.6%	20.29	10.51	149.4	22.2	100.1%	80.6%	80.7%	12.1	1.00	89.42
190	0.86	0.02	10.35	89.4%	20.26	9.90	143.3	21.7	100.1%	81.4%	81.5%	11.5	0.86	90.87
200	0.77	0.02	9.79	100.2%	20.29	10.49	138.9	21.7	100.1%	81.4%	81.5%	12.1	0.77	91.83
210	0.68	0.02	9.52	105.9%	20.31	10.78	137.2	21.7	100.2%	81.3%	81.4%	12.5	0.68	92.79
220	0.54	0.02	9.87	98.6%	20.29	10.41	135.6	21.7	100.1%	81.7%	81.8%	12.0	0.54	94.23
230	0.45	0.01	9.33	110.3%	20.32	10.99	133.3	21.1	100.3%	81.4%	81.6%	12.7	0.45	95.19
240	0.36	0.02	8.95	119.0%	20.35	11.39	132.2	21.7	100.2%	81.2%	81.4%	13.2	0.36	96.15

250	0.23	0.02	9.24	112.1%	20.33	11.08	131.7	21.1	100.2%	81.5%	81.6%	12.8	0.23	97.60
260	0.14	0.03	8.80	122.5%	20.36	11.54	130.0	21.7	100.1%	81.3%	81.3%	13.5	0.14	98.56
270	0.05	0.01	9.02	117.5%	20.34	11.32	128.3	21.1	100.3%	81.5%	81.8%	13.2	0.05	99.52
280	-0.05	0.02	9.15	114.2%	20.33	11.17	128.3	21.7	100.2%	81.7%	81.8%	13.0	-0.05	100.48

30.27	
318.62	%HC
9.13	0.88

Combustion Efficiency: 97.9%
Total Input (kJ): 154,253 (Btu)
Total Output (kJ): 121,283 (Btu)
Efficiency: 78.6%
Total CO (g): 238.54

Moisture of Wood (wet basis): 17.49
Initial Dry Weight Wtdo (kg): 7.79
Moisture Content Dry 21.20

Load Weight (kg): 9.44
Fuel Heating: HHV LHV
Value in kJ/kg - CV: 19810.00 18328.69

Btu/lb HHV LHV
8522.48 7885.21

0.07	69.58	154624	4.06	6.87	2.74	19810.00	17.49	79.77	21.16	3.07	10.51	0.02	0.31	40.24	31.20	
Dry Wt.	% Dry	Fuel Properties					Mw	Mass Balance					kg Wood per			IV
Now	Comsumed	Total	Carbon	Hydrogen	Oxygen	Calorific	Moisture	(moles/100 mole dry flue gas)					100 mole dfp			
Wtdn	y	Input	/12= [a]	/1= [b]	/16= [c]	Value	Fuel Burnt	[h]	[u]	[w]	[j]	[k]	Nk	CO2	O2	
7.79	0.00	0	4.06	6.87	2.74	19810.00	17.49	79.75	21.15	2.60	8.97	-0.01	0.26	40.83	37.34	
7.41	4.81	13349	4.06	6.87	2.74	19810.00	17.49	79.53	21.10	1.80	6.23	-0.02	0.18	40.74	73.18	
6.81	12.50	12236	4.06	6.87	2.74	19810.00	17.49	80.00	21.22	3.90	13.36	0.02	0.39	40.24	10.76	
6.18	20.67	12978	4.06	6.87	2.74	19810.00	17.49	79.66	21.13	4.59	15.40	0.18	0.46	37.73	4.13	
5.50	29.33	13349	4.06	6.87	2.74	19810.00	17.49	80.07	21.24	4.54	15.46	0.06	0.45	39.78	3.49	
4.83	37.98	12978	4.06	6.87	2.74	19810.00	17.49	79.54	21.10	4.82	16.09	0.23	0.48	37.02	2.33	
4.19	46.15	11495	4.06	6.87	2.74	19810.00	17.49	79.63	21.12	4.67	15.65	0.19	0.46	37.51	3.47	
3.67	52.88	10382	4.06	6.87	2.74	19810.00	17.49	79.94	21.20	4.35	14.77	0.08	0.43	39.34	5.76	
3.14	59.62	9641	4.06	6.87	2.74	19810.00	17.49	80.03	21.23	4.39	14.97	0.06	0.44	39.74	5.04	
2.70	65.38	8528	4.06	6.87	2.74	19810.00	17.49	80.04	21.23	4.24	14.48	0.04	0.42	40.01	6.61	
2.28	70.67	7045	4.06	6.87	2.74	19810.00	17.49	80.07	21.24	4.24	14.50	0.03	0.42	40.12	6.50	
1.98	74.52	4820	4.06	6.87	2.74	19810.00	17.49	79.83	21.18	2.92	10.06	-0.01	0.29	40.78	28.49	
1.80	76.92	3708	4.06	6.87	2.74	19810.00	17.49	79.77	21.16	2.72	9.36	-0.01	0.27	40.74	33.92	
1.61	79.33	3708	4.06	6.87	2.74	19810.00	17.49	79.79	21.16	2.76	9.49	-0.01	0.27	40.78	32.87	
1.42	81.73	3708	4.06	6.87	2.74	19810.00	17.49	79.76	21.16	2.68	9.22	-0.01	0.27	40.70	35.07	
1.24	84.13	3708	4.06	6.87	2.74	19810.00	17.49	79.82	21.17	2.88	9.90	-0.01	0.29	40.74	29.67	
1.05	86.54	2966	4.06	6.87	2.74	19810.00	17.49	79.80	21.17	2.82	9.72	-0.01	0.28	40.70	31.03	
0.94	87.98	2225	4.06	6.87	2.74	19810.00	17.49	79.76	21.16	2.65	9.12	-0.01	0.26	40.78	36.00	
0.82	89.42	2225	4.06	6.87	2.74	19810.00	17.49	79.70	21.14	2.41	8.30	-0.01	0.24	40.79	43.89	
0.71	90.87	1854	4.06	6.87	2.74	19810.00	17.49	79.73	21.15	2.55	8.79	-0.01	0.25	40.78	38.99	
0.64	91.83	1483	4.06	6.87	2.74	19810.00	17.49	79.70	21.14	2.41	8.31	-0.01	0.24	40.79	43.71	
0.56	92.79	1854	4.06	6.87	2.74	19810.00	17.49	79.68	21.14	2.35	8.09	-0.01	0.23	40.79	46.19	
0.45	94.23	1854	4.06	6.87	2.74	19810.00	17.49	79.70	21.14	2.43	8.38	-0.01	0.24	40.79	43.01	
0.37	95.19	1483	4.06	6.87	2.74	19810.00	17.49	79.67	21.13	2.30	7.92	-0.02	0.23	40.84	48.10	
0.30	96.15	1854	4.06	6.87	2.74	19810.00	17.49	79.64	21.13	2.21	7.61	-0.02	0.22	40.79	51.90	

0.19	97.60	1854	4.06	6.87	2.74	19810.00	17.49	79.66	21.13	2.28	7.85	-0.01	0.23	40.79	48.91				
0.11	98.56	1483	4.06	6.87	2.74	19810.00	17.49	79.63	21.12	2.17	7.49	-0.01	0.22	40.74	53.43				
0.04	99.52	1483	4.06	6.87	2.74	19810.00	17.49	79.65	21.13	2.22	7.66	-0.02	0.22	40.84	51.25				
-0.04	100.48	371	4.06	6.87	2.74	19810.00	17.49	79.66	21.13	2.25	7.77	-0.02	0.22	40.79	49.82				

Moisture Content MCwb: 17.49

Dry kg : 7.79
CA: 48.73
HY: 6.87
OX: 43.90

0.54	0.03	283.35	34.46	11.78	443.84	6003.09	4483.25	4351.16	4304.71	5854.43	5204.16	295.08	6976.60	3575.92	4535.02
Ioles per kg of Dry Wood				Moisture	Stack Temp	Heat Content Change - Ambient to Stack Temperature Flue Gas Constituent						Room Temp	Energ		
CO	HC	N2	H2O	Present	K	CO2	O2	CO	N2	CH4	H2O	K	CO2	O2	CO
0.04	-0.05	308.06	34.63	11.78	468.15	7080.16	5270.03	5110.38	5056.75	6943.40	6110.84	293.71	289.07	196.77	11.13
0.17	-0.09	443.22	34.71	11.78	443.15	5969.01	4465.26	4335.53	4288.87	5804.89	5186.06	294.82	243.17	326.75	48.04
0.52	0.06	206.10	34.41	11.78	477.59	7425.19	5514.11	5343.90	5288.49	7309.67	6389.07	295.37	298.79	59.31	148.56
2.70	0.39	174.55	33.75	11.78	494.26	8152.39	6033.36	5841.96	5782.47	8071.06	6982.88	295.37	307.60	24.94	778.43
0.91	0.13	177.43	34.27	11.78	489.82	7915.33	5861.93	5676.97	5618.95	7827.56	6785.99	296.48	314.85	20.43	262.27
3.32	0.48	165.88	33.56	11.78	491.48	7967.08	5897.57	5710.81	5652.58	7884.65	6826.22	297.04	294.92	13.75	957.31
2.89	0.42	171.47	33.69	11.78	489.82	7957.69	5894.65	5708.99	5650.57	7866.50	6824.38	295.37	298.51	20.45	833.06
1.30	0.18	184.87	34.16	11.78	484.26	7693.93	5705.15	5526.93	5470.06	7592.90	6607.21	295.93	302.66	32.85	373.65
0.94	0.13	183.22	34.27	11.78	479.82	7500.51	5566.84	5394.21	5338.44	7390.83	6448.96	295.93	298.11	28.06	270.70
0.71	0.09	189.83	34.34	11.78	474.82	7304.78	5427.81	5261.05	5206.33	7184.29	6290.25	295.37	292.25	35.87	205.08
0.62	0.08	189.72	34.36	11.78	473.15	7232.64	5376.06	5211.35	5157.05	7109.27	6230.98	295.37	290.15	34.97	177.56
0.07	-0.04	274.50	34.59	11.78	459.26	6634.58	4945.81	4797.84	4747.10	6490.12	5737.70	295.37	270.55	140.90	19.79
0.11	-0.04	294.92	34.60	11.78	448.71	6204.97	4636.34	4500.31	4452.15	6046.24	5382.73	294.82	252.79	157.27	31.89
0.07	-0.04	291.05	34.61	11.78	444.26	6016.13	4499.45	4368.47	4321.51	5853.02	5225.38	294.82	245.35	147.89	20.96
0.15	-0.03	299.17	34.59	11.78	442.04	5900.76	4414.72	4286.59	4240.42	5737.38	5127.56	295.37	240.14	154.84	43.10
0.10	-0.03	278.88	34.59	11.78	440.93	5874.88	4396.90	4269.67	4223.61	5708.83	5107.44	294.82	239.34	130.48	30.11
0.14	-0.03	283.89	34.58	11.78	443.71	5992.57	4482.35	4352.00	4305.18	5828.94	5205.72	294.82	243.89	139.09	40.89
0.08	-0.05	302.88	34.62	11.78	433.15	5546.55	4158.00	4039.38	3995.44	5374.81	4832.50	294.82	226.21	149.68	21.80
0.08	-0.06	332.71	34.64	11.78	422.59	5082.59	3818.30	3711.37	3670.58	4907.48	4440.72	295.37	207.31	167.59	23.94
0.08	-0.05	314.20	34.63	11.78	416.48	4848.89	3647.91	3547.03	3507.78	4670.47	4244.49	294.82	197.76	142.24	22.58
0.08	-0.06	332.04	34.64	11.78	412.04	4664.20	3512.31	3416.00	3378.02	4485.27	4087.95	294.82	190.24	153.53	23.86
0.09	-0.06	341.39	34.65	11.78	410.37	4595.09	3461.51	3366.89	3329.40	4416.10	4029.28	294.82	187.43	159.88	24.54
0.08	-0.06	329.37	34.64	11.78	408.71	4526.07	3410.73	3317.80	3280.79	4347.10	3970.63	294.82	184.60	146.68	23.66
0.04	-0.07	348.74	34.66	11.78	406.48	4455.31	3359.41	3268.37	3231.81	4274.75	3911.63	294.26	181.95	161.58	12.53
0.09	-0.07	362.99	34.66	11.78	405.37	4388.25	3309.24	3219.66	3183.62	4209.55	3853.36	294.82	179.00	171.76	26.09

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0.09	-0.07	351.66	34.65	11.78	404.82	4386.47	3308.69	3219.31	3183.24	4206.11	3853.01	294.26	178.92	161.82	25.27
0.14	-0.07	368.63	34.65	11.78	403.15	4296.56	3241.64	3154.27	3118.88	4118.19	3775.22	294.82	175.04	173.21	39.74
0.05	-0.08	360.66	34.67	11.78	401.48	4249.03	3207.32	3121.25	3086.16	4069.28	3735.82	294.26	173.54	164.38	12.96
0.09	-0.07	355.10	34.66	11.78	401.48	4227.88	3190.97	3105.24	3070.35	4049.86	3716.64	294.82	172.46	158.96	25.51

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SUMS			AVERAGE	SUMS					
33587.71	754.02	49140.09	16795.50	3978.10	32970	3291	29679.34	121654	3291	238.54	15.82
gy Losses (kJ/kg of Dry Fuel)				Total Loss Rate	Total Loss	Chemical Loss 1	Sensible and Latent Loss	Total Output	Chem Loss 2	Grams Produced CO	HC
Flue Gas Constituent N2	CH4	H2O Comb	H2O Fuel MC								
1557.78	-48.84	1734.34	589.83	4330.09	0	0	0.00	0	0	0.00	0.00
1900.90	-83.65	1706.14	578.94	4720.29	3181	-24	3204.85	10168	-24	3.15	-1.01
1089.98	51.87	1732.67	593.11	3974.29	2455	122	2333.03	9782	122	8.91	0.57
1009.34	346.90	1719.64	600.10	4786.96	3136	725	2411.18	9842	725	49.44	4.05
996.96	113.89	1739.32	597.79	4045.51	2726	249	2476.70	10623	249	17.14	1.37
937.66	430.70	1704.86	598.26	4937.46	3235	894	2340.21	9743	894	60.82	5.03
968.91	372.71	1711.36	598.24	4803.23	2787	688	2098.89	8708	688	46.88	3.85
1011.26	161.16	1727.86	595.68	4205.13	2204	276	1928.08	8179	276	19.00	1.51
978.12	115.53	1727.58	593.82	4011.92	1952	185	1767.42	7688	185	12.79	1.00
988.30	83.52	1725.72	591.95	3922.69	1689	122	1566.41	6840	122	8.58	0.64
978.40	71.19	1725.07	591.25	3868.59	1376	87	1288.70	5669	87	6.13	0.45
1303.09	-32.11	1719.57	585.44	4007.23	975	-3	978.11	3845	-3	0.47	-0.14
1313.02	-34.42	1707.54	581.26	4009.35	750	-1	750.99	2958	-1	0.58	-0.12
1257.78	-37.85	1702.48	579.41	3916.01	733	-3	736.17	2975	-3	0.38	-0.13
1268.59	-30.96	1698.33	578.25	3952.30	740	2	737.60	2968	2	0.79	-0.10
1177.88	-29.08	1697.43	578.02	3824.18	716	0	715.66	2992	0	0.55	-0.10
1222.21	-26.14	1700.51	579.17	3899.61	584	2	581.80	2382	2	0.60	-0.07
1210.13	-41.95	1689.33	574.78	3829.96	430	-2	432.40	1795	-2	0.24	-0.08
1221.25	-52.31	1676.89	570.16	3814.82	428	-3	431.62	1796	-3	0.26	-0.11
1102.14	-45.86	1669.40	567.85	3656.12	342	-2	344.36	1512	-2	0.21	-0.08
1121.63	-52.05	1664.64	566.01	3667.87	275	-2	276.73	1209	-2	0.17	-0.07
1136.62	-55.30	1662.96	565.32	3681.44	345	-3	347.42	1509	-3	0.22	-0.09
1080.58	-51.11	1660.48	564.63	3609.52	338	-3	340.38	1516	-3	0.22	-0.09
1127.07	-63.51	1659.76	563.93	3643.32	273	-4	276.59	1210	-4	0.09	-0.09
1155.61	-62.80	1657.67	563.25	3690.57	345	-3	348.83	1509	-3	0.24	-0.11

1119.43	-58.86	1657.24	563.24	3647.06	341	-3	344.47	1513	-3	0.23	-0.10		
1149.73	-58.77	1654.53	562.33	3695.80	277	-1	278.15	1206	-1	0.29	-0.08		
1113.07	-67.83	1654.13	561.86	3612.11	270	-4	274.54	1213	-4	0.09	-0.09		
1090.29	-60.05	1652.64	561.64	3601.44	67	-1	68.06	303	-1	0.05	-0.02		

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015_S_021_1_Run # 5_3_21_14_report.xls PREBURN

PREBURN

JOB # 015_S_021_1
TECHNICIAN BTN
DATE: 3_21_14
RUN #: 5
READING INTERVAL: 10

Model Designation F3500

Run Time: 70

Tunnel Traverse Information

	Pt.1	Pt.2	Pt.3	Pt.4	Pt.5	Pt.6	Pt.7	Pt.8	
dP	0.038	0.040	0.042	0.035	0.038	0.042	0.044	0.030	0.039
Temperature	120	120	120	120	120	120	120	120	120.000

ET	SCALE READING	FLUE DRAFT	1 LEFT SIDE	2 RIGHT SIDE	3 TEMPERATURES BACK	4 TOP	5 BOTTOM	STOVE AVG T
0	17.4	-0.06	538	495	649	606	479	553.4
10	15.7	-0.073	462	430	523	563	466	488.8
20	13.3	-0.076	427	397	479	631	444	475.6
30	10.7	-0.075	431	407	482	663	433	483.2
40	8.4	-0.069	462	433	523	682	431	506.2
50	6.6	-0.069	491	462	575	695	436	531.8
60	5.2	-0.066	518	491	630	701	446	557.2
70	4.4	-0.061	534	510	652	648	457	560.2

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

Tunnel Velocity: 13.62635 ft/sec.
Intial Tunnel Flow: 141.3467 scfm
Average Tunnel Flow: 143.0141 scfm

Technician _____

Dirigo Laboratories, Inc. Page 1 of 1

JOB #	015_S_021_1							ROOM TEMP (F)		76.0			BEG	MID	END	AVG
TECHNICIAN	BTN							BAROMETRIC I					30.26	30.26	30.26	30.26
DATE:	3_21_14															
RUN #:	5															
READING INTERVAL:	10															
SAMPLE BOX :	A	METER Y FACTOR:		0.995						PROBE MATERIAL:			SS			
FRONT FILTER #:					REAR FILTER #	REAR FILTER #:										
FINAL LEAK RATE (CFM):		@		IN-HG		FINAL LEAK RATE (CFM)				@		IN-HG				
Run Time:		190		AMBIENT FILTER #:				VOLUME		LITERS		FUEL MOISTURE DB			22.3	%
				FINAL LEAK RATE (CFM):				@		IN-HG						
TEST START TIME:										1	2	3	4	5	6	
										TEMPERATURES						
	GAS METER	SAMPLE	TUNNEL	ORIFICE	FILTER	TUNNEL VEL	Proportional	Scale	Weight	TUNNEL	FLUE	FILTER	FB REAR	FB	METER	AMBIENT
ET	VOLUME	RATE(FT3/MIN)	DELTA P	DELTA H	VAC	FT/SEC	Rate (%)	Weight	Chg	TEMP	TEMP	TEMP	TEMP	Cat	TEMP	TEMP
0	0.000	0.000	0.039	0.06	0		NA	20.6	0	127	482	70	654	993.22	74	74
10	1.368	0.137	0.039	2	-1.6	13.677	103	18.6	2	127	524	79	546	1182.88	75	74
20	2.749	0.138	0.039	1.98	-2.56	13.723	103	16.1	2.5	131	541	80	523	1198.12	80	75
30	4.128	0.138	0.039	2	-0.54	13.712	102	13.8	2.3	130	538	80	526	1183.05	84	76
40	5.523	0.140	0.039	2	-0.67	13.653	102	11.7	2.1	125	517	79	537	1191.65	87	76
50	6.924	0.140	0.039	1.98	-2.49	13.630	102	9.8	1.9	123	508	78	562	1226.1	90	77
60	8.325	0.140	0.039	1.98	-1.59	13.583	101	8.3	1.5	119	481	77	576	1132.9	93	77
70	9.731	0.141	0.039	2	-2.05	13.571	101	6.9	1.4	118	477	77	598	1150.88	96	77
80	11.144	0.141	0.039	1.99	-1.53	13.548	101	5.6	1.3	116	468	78	631	1115.6	98	76
90	12.557	0.141	0.039	2	-0.02	13.513	100	4.7	0.9	113	451	77	653	1055.13	100	78
100	13.978	0.142	0.039	1.98	-2.28	13.501	100	3.9	0.8	112	443	78	675	1048.59	101	77
110	15.396	0.142	0.039	2	-2.26	13.489	100	3.1	0.8	111	437	78	702	1038.03	102	77
120	16.820	0.142	0.039	1.99	-2.4	13.477	100	2.4	0.7	110	430	78	710	1001.55	103	77
130	18.239	0.142	0.039	2	-2.5	13.442	99	2	0.4	107	410	78	719	921.82	104	77
140	19.666	0.143	0.039	1.99	-0.33	13.406	99	1.6	0.4	104	390	77	714	873.39	105	77
150	21.088	0.142	0.039	2	-0.05	13.394	99	1.3	0.3	103	379	77	711	852.71	105	76
160	22.514	0.143	0.039	2	-0.27	13.370	99	0.9	0.4	101	374	77	693	838.86	105	77
170	23.938	0.142	0.039	1.97	-1.87	13.358	99	0.6	0.3	100	370	76	661	826.92	106	76
180	25.365	0.143	0.039	1.99	-0.08	13.358	99	0.3	0.3	100	363	76	621	808.81	106	75
190	26.793	0.143	0.039	1.99	-0.05	13.358	99	0	0.3	100	359	75	608	794.11	106	73
	26.793		0.039	1.99		13.514	100.5			114	447				96	76

015_S_021_1_Run # 5_3_21_14_report.xls 4/3/2014

BOX B

JOB # 015_S_021_1
TECHNICIAN BTN
DATE: 3_21_14
RUN #: 5
READING INTERVAL: 10
SAMPLE BOX : B
METER Y FACTOR: 0.974
PROBE MATERIAL: SS
FRONT FILTER #: @ IN-HG
FINAL LEAK RATE (CFM): @ IN-HG
REAR FILTER #:
FINAL LEAK RATE (CFM):

Run Time: 190 Firebox Delta T 74

									TEMPERATURES						
							1	2	3	4	5	6			
ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	LEFT SIDE	RIGHT SIDE	FILTER	FB TOP	FB BOT	METER	STOVE AVG T
0	0	0	NA	0	0	-1	535	511	71	618	459	73	555
10	1.525	0.153	113	-0.08	2.12	-1.85	484	479	80	612	462	74	517
20	2.977	0.145	108	-0.07	2.01	-1.37	466	476	81	677	444	75	517
30	4.371	0.139	103	-0.07	1.99	-1.95	477	489	81	706	427	79	525
40	5.753	0.138	101	-0.07	1.97	-2.03	494	508	79	709	423	84	534
50	7.158	0.141	101	-0.06	2.03	-1.83	508	532	79	714	426	88	548
60	8.565	0.141	101	-0.07	2.02	-1.89	523	544	79	688	430	91	552
70	9.975	0.141	100	-0.07	2.02	-1.76	542	552	79	669	431	94	558
80	11.387	0.141	100	-0.06	2.03	-2.22	538	546	79	663	429	96	561
90	12.803	0.142	100	-0.06	2.03	-2.37	522	528	79	632	432	97	553
100	14.223	0.142	99	-0.06	2.03	-1.77	515	519	79	613	436	99	552
110	15.644	0.142	99	-0.06	2.02	-2.16	511	522	79	596	441	100	554
120	17.064	0.142	99	-0.06	2.01	-1.75	505	516	79	569	441	101	548
130	18.487	0.142	99	-0.06	2.03	-0.95	504	510	79	543	442	101	544
140	19.910	0.142	98	-0.06	2.02	-1.39	498	502	79	512	442	102	534
150	21.332	0.142	98	-0.06	2.02	-2.31	495	499	78	490	440	103	527
160	22.758	0.143	98	-0.05	2.04	-1.88	491	502	78	476	437	103	520
170	24.182	0.142	98	-0.05	2.01	-1.69	482	494	78	462	434	104	507
180	25.606	0.142	98	-0.05	2.03	-1.12	475	478	79	449	429	104	490
190	27.032	0.143	98	-0.06	2.03	-1.07	473	466	79	437	423	103	481

Dirigo Laboratories, Inc. Page 1 of 2

015_S_021_1_Run # 5_3_21_14_report.xls BOX B 4/3/2014

ET	GAS METER VOLUME	SAMPLE RATE(FT3/MIN)	PROPORTIONAL RATE	FLUE DRAFT	ORIFICE DELTA H	FILTER VAC	TEMPERATURES 1 LEFT SIDE	2 RIGHT SIDE	3 FILTER	4 FB TOP	5 FB BOT	6 METER	STOVE AVG T
	27.03232	0.142	100.566	-0.059	2.024211	-1.718	502	509	79	592	436	94	74
	TOTAL	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	AVG	DT

Dirigo Laboratories, Inc. Page 2 of 2

CSA B-415 Efficiency

VERSION: 2.4
4/15/2010

Manufacturer: FPI
Model: F3500
Date: 3/25/2014
Run: 5
Control #: 015-S-021-1
Test Duration: 190
Burn Category 4

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

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

Fuel Data

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

Wood Moisture (% DRY): 22.3

Wood Moisture (% wet):	18.23
Load Weight (lb wet):	20.60
Burn Rate (dry kg/h):	2.41
Total Particulate Emissions:	7.505 g

	Averages	447.1	76.1	7.29	13.25	0.49
		Temp. (F)		Flue Gas Composition (%)		
Elapsed Time (min)	Fuel Weight Remaining (lb)	Flue Gas	Room Temp	O2	CO2	CO
0	20.6	482.0	74.0	9.12	11.75	0.02
10	18.6	524.0	74.0	4.20	16.17	2.03
20	16.1	541.0	75.0	2.84	17.16	2.81
30	13.8	538.0	76.0	2.27	17.91	2.15
40	11.7	517.0	76.0	2.53	18.13	0.97
50	9.8	508.0	77.0	2.70	17.72	1.17
60	8.3	481.0	77.0	5.64	15.56	0.01
70	6.9	477.0	77.0	4.93	15.96	0.27
80	5.6	468.0	76.0	5.80	14.63	0.20
90	4.7	451.0	78.0	7.50	13.20	0.02
100	3.9	443.0	77.0	7.19	13.45	0.02
110	3.1	437.0	77.0	8.61	11.97	0.01
120	2.4	430.0	77.0	8.48	11.96	0.02
130	2.0	410.0	77.0	9.68	10.74	0.02
140	1.6	390.0	77.0	9.84	10.50	0.02
150	1.3	379.0	76.0	9.92	10.54	0.01
160	0.9	374.0	77.0	10.08	10.44	0.01

170	0.6	370.0	76.0	11.74	8.82	0.01			
180	0.3	363.0	75.0	11.34	9.17	0.02			
190	0.0	359.0	73.0	11.48	9.13	0.02			

Manufacturer:	FPI
Model:	F3500
Date:	3/25/2014
Run:	5
Control #:	015-S-021-1
Test Duration:	190 min

	HHV	LHV
Eff	73.9%	79.9%
Comb Eff	95.3%	95.3%
HT Eff	77.6%	83.9%
Output	35,348	kJ/h
Burn Rate	2.41	kg/h
Grams CO	496	g
Input	47,809	kJ/h
MC wet	18.23	

Ultimate CO2	
CO2-ult	19.64
Fo	1.063

Overall Heating Efficiency:	73.9%				
Combustion Efficiency:	95.3%				
Heat Transfer Efficiency:	77.6%				
Heat Output:	33,532	Btu/h	35,348	kJ/h	
Heat Input:	45,352	Btu/h	47,809	kJ/h	
Burn Duration:	3.166666667	h			
Burn Rate:	5.3	lb/h	2.4	kg/h	
Stack Temp:	445.3	Deg. F	229.6	Deg. C	

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

	INPUT DATA			Oxygen Calculation			Input Data		Combust	Heat	Net	Air	Wet Wt	% Wet
Elapsed Time	Weight Remaining (kg)	% CO [e]	% CO2 [d]	Excess Air EA	Total O2	Calc. % O2 [g]	Flue Gas (ºC)	Room Temp (ºC)	Eff %	Transfer %	Eff %	Fuel Ratio	Now Wt	Consumed x
Averages		0.49	13.25	53.7%	20.03	6.54	230.6	24.5	98.0%	77.7%	76.1%	9.3	3.00	67.91
0	9.35	0.02	11.75	66.9%	20.16	8.40	250.0	23.3	100.1%	75.5%	75.5%	10.1	9.35	0.00
10	8.44	2.03	16.17	7.9%	19.74	2.55	273.3	23.3	90.7%	76.9%	69.8%	6.4	8.44	9.71
20	7.30	2.81	17.16	-1.6%	19.62	1.06	282.8	23.9	88.3%	76.9%	67.9%	5.8	7.30	21.84
30	6.26	2.15	17.91	-2.1%	19.62	0.63	281.1	24.4	91.0%	77.5%	70.6%	5.8	6.26	33.01
40	5.31	0.97	18.13	2.8%	19.68	1.06	269.4	24.4	95.7%	78.5%	75.1%	6.2	5.31	43.20
50	4.45	1.17	17.72	4.0%	19.69	1.39	264.4	25.0	94.8%	78.5%	74.4%	6.2	4.45	52.43
60	3.77	0.01	15.56	26.2%	19.91	4.35	249.4	25.0	100.0%	78.5%	78.5%	7.7	3.77	59.71
70	3.13	0.27	15.96	21.0%	19.87	3.77	247.2	25.0	98.7%	78.7%	77.7%	7.3	3.13	66.50
80	2.54	0.20	14.63	32.5%	19.96	5.23	242.2	24.4	99.0%	78.2%	77.4%	8.0	2.54	72.82
90	2.13	0.02	13.20	48.6%	20.07	6.86	232.8	25.6	100.0%	77.9%	77.9%	9.0	2.13	77.18
100	1.77	0.02	13.45	45.8%	20.05	6.59	228.3	25.0	100.0%	78.3%	78.3%	8.8	1.77	81.07
110	1.41	0.01	11.97	64.0%	20.15	8.17	225.0	25.0	100.1%	77.4%	77.5%	9.9	1.41	84.95
120	1.09	0.02	11.96	64.0%	20.15	8.18	221.1	25.0	100.1%	77.6%	77.7%	9.9	1.09	88.35
130	0.91	0.02	10.74	82.6%	20.23	9.48	210.0	25.0	100.1%	77.3%	77.3%	11.1	0.91	90.29
140	0.73	0.02	10.50	86.7%	20.25	9.74	198.9	25.0	100.1%	77.8%	77.9%	11.3	0.73	92.23
150	0.59	0.01	10.54	86.2%	20.24	9.70	192.8	24.4	100.2%	78.2%	78.4%	11.3	0.59	93.69
160	0.41	0.01	10.44	88.0%	20.25	9.81	190.0	25.0	100.2%	78.4%	78.5%	11.4	0.41	95.63
170	0.27	0.01	8.82	122.5%	20.36	11.53	187.8	24.4	100.3%	76.8%	77.0%	13.5	0.27	97.09
180	0.14	0.02	9.17	113.7%	20.33	11.15	183.9	23.9	100.2%	77.4%	77.6%	12.9	0.14	98.54
190	0.00	0.02	9.13	114.7%	20.34	11.20	181.7	22.8	100.2%	77.5%	77.6%	13.0	0.00	100.00
0														

[redacted]

30.38	
290.78	%HC
8.32	0.88

Combustion Efficiency: 95.3%
Total Input (kJ): 151,396 (Btu) 143,592
Total Output (kJ): 111,937 (Btu) 106,167
Efficiency: 73.9%
Total CO (g): 496.45

Moisture of Wood (wet basis): 18.23
Initial Dry Weight Wtdo (kg): 7.64
Moisture Content Dry 22.30

Load Weight (kg): 9.35
Fuel Heating: HHV LHV
Value in kJ/kg - CV: 19810.00 18328.69 Btu/lb 8522.48 7885.21

0.05	67.91	152498	4.06	6.87	2.74	19810.00	18.23	79.72	21.15	3.40	11.55	0.06	0.34	39.65	23.92	
Dry Wt. Now Wtdn	% Dry Consumed y	Fuel Properties Total Input	Carbon /12= [a]	Hydrogen /1= [b]	Oxygen /16= [c]	Calorific Value	Mw Moisture Fuel Burnt	Mass Balance (moles/100 mole dry flue gas) [h]	[u]	[w]	[j]	[k]	kg Wood per 100 mole dfp Nk	CO2	O2	M
7.64	0.00	0	4.06	6.87	2.74	19810.00	18.23	79.83	21.17	2.90	9.97	-0.01	0.29	40.78	29.16	
6.90	9.71	23885	4.06	6.87	2.74	19810.00	18.23	79.25	21.02	4.55	15.06	0.29	0.45	35.69	5.64	
5.97	21.84	17638	4.06	6.87	2.74	19810.00	18.23	78.97	20.95	5.02	16.42	0.41	0.50	34.37	2.12	
5.12	33.01	16168	4.06	6.87	2.74	19810.00	18.23	79.31	21.04	5.02	16.61	0.31	0.50	35.88	1.26	
4.34	43.20	14699	4.06	6.87	2.74	19810.00	18.23	79.84	21.18	4.74	16.00	0.14	0.47	38.46	2.26	
3.64	52.43	12494	4.06	6.87	2.74	19810.00	18.23	79.72	21.15	4.69	15.78	0.17	0.47	37.95	2.97	
3.08	59.71	10656	4.06	6.87	2.74	19810.00	18.23	80.08	21.24	3.83	13.18	-0.01	0.38	40.80	11.40	
2.56	66.50	9922	4.06	6.87	2.74	19810.00	18.23	80.00	21.22	4.00	13.69	0.03	0.40	40.05	9.47	
2.08	72.82	8084	4.06	6.87	2.74	19810.00	18.23	79.94	21.20	3.66	12.52	0.02	0.36	40.21	14.38	
1.74	77.18	6247	4.06	6.87	2.74	19810.00	18.23	79.92	21.20	3.25	11.19	-0.01	0.32	40.78	21.18	
1.45	81.07	5879	4.06	6.87	2.74	19810.00	18.23	79.94	21.20	3.32	11.40	-0.01	0.33	40.78	19.98	
1.15	84.95	5512	4.06	6.87	2.74	19810.00	18.23	79.85	21.18	2.95	10.15	-0.01	0.29	40.82	27.87	
0.89	88.35	4042	4.06	6.87	2.74	19810.00	18.23	79.84	21.18	2.95	10.15	-0.01	0.29	40.78	27.89	
0.74	90.29	2940	4.06	6.87	2.74	19810.00	18.23	79.76	21.16	2.65	9.12	-0.01	0.26	40.78	36.00	
0.59	92.23	2572	4.06	6.87	2.74	19810.00	18.23	79.74	21.15	2.59	8.91	-0.01	0.26	40.78	37.81	
0.48	93.69	2572	4.06	6.87	2.74	19810.00	18.23	79.75	21.15	2.59	8.94	-0.01	0.26	40.83	37.57	
0.33	95.63	2572	4.06	6.87	2.74	19810.00	18.23	79.74	21.15	2.57	8.86	-0.01	0.26	40.83	38.35	
0.22	97.09	2205	4.06	6.87	2.74	19810.00	18.23	79.64	21.12	2.17	7.49	-0.02	0.22	40.85	53.40	
0.11	98.54	3307	4.06	6.87	2.74	19810.00	18.23	79.66	21.13	2.26	7.79	-0.02	0.22	40.79	49.61	
0.00	100.00	1102	4.06	6.87	2.74	19810.00	18.23	79.65	21.13	2.25	7.76	-0.02	0.22	40.79	50.02	
0.00																

Moisture Content MCwb: 18.23

Dry kg : 7.64
CA: 48.73
HY: 6.87
OX: 43.90

														SUM				
1.05	0.11	254.28	34.29	12.39	503.76	8499.53	6268.31	6063.96	6003.37	8462.82	7246.49	297.65	6694.62	2664.82	6091.29	29254.94		
Moles per kg of Dry Wood				Moisture	Stack	Heat Content Change - Ambient to Stack Temperature						Room	Energy Losses (kJ					
						Flue Gas Constituent						Temp	Flue Gas C					
CO	HC	N2	H2O	Present	Temp K	CO2	O2	CO	N2	CH4	H2O	K	CO2	O2	CO	N2		
0.07	-0.04	277.05	34.60	12.39	523.15	9389.59	6906.61	6676.91	6611.16	9388.70	7977.52	296.48	382.91	201.42	20.10	1831.62		
4.48	0.64	174.90	33.23	12.39	546.48	10440.75	7643.84	7380.58	7309.80	10518.52	8815.36	296.48	372.61	43.07	1300.97	1278.50		
5.63	0.82	158.17	32.89	12.39	555.93	10849.52	7927.27	7650.25	7577.73	10965.00	9136.18	297.04	372.87	16.77	1635.68	1198.54		
4.31	0.63	158.88	33.27	12.39	554.26	10752.26	7857.94	7583.78	7511.80	10862.89	9056.94	297.59	385.78	9.92	1251.55	1193.49		
2.06	0.30	169.35	33.93	12.39	542.59	10222.07	7487.90	7231.06	7161.49	10289.09	8637.12	297.59	393.13	16.90	597.17	1212.82		
2.51	0.36	170.72	33.80	12.39	537.59	9974.85	7313.32	7064.11	6995.80	10025.98	8438.23	298.15	378.51	21.73	726.74	1194.33		
0.03	-0.01	209.99	34.55	12.39	522.59	9301.16	6840.02	6612.15	6547.11	9303.64	7900.02	298.15	379.49	77.96	7.59	1374.83		
0.68	0.08	200.75	34.36	12.39	520.37	9201.90	6770.08	6545.30	6480.76	9197.69	7820.40	298.15	368.55	64.11	196.18	1301.01		
0.55	0.06	219.69	34.41	12.39	515.37	9000.32	6629.23	6411.01	6347.39	8979.86	7660.54	297.59	361.86	95.30	159.07	1394.44		
0.06	-0.03	246.89	34.57	12.39	505.93	8539.04	6300.15	6095.44	6034.39	8496.26	7284.32	298.71	348.19	133.45	17.86	1489.81		
0.06	-0.02	242.34	34.57	12.39	501.48	8364.05	6177.34	5978.20	5917.99	8308.35	7144.72	298.15	341.04	123.42	17.52	1434.19		
0.03	-0.04	272.28	34.60	12.39	498.15	8217.27	6073.07	5878.33	5818.91	8153.48	7025.69	298.15	335.41	169.28	9.85	1584.36		
0.07	-0.03	272.23	34.59	12.39	494.26	8046.43	5951.55	5761.89	5703.40	7973.59	6886.91	298.15	328.13	165.97	19.69	1552.62		
0.08	-0.05	302.88	34.62	12.39	483.15	7560.74	5605.10	5429.68	5373.89	7464.27	6490.86	298.15	308.35	201.77	21.90	1627.62		
0.08	-0.05	309.75	34.62	12.39	472.04	7078.62	5259.77	5098.17	5045.14	6961.87	6095.51	298.15	288.70	198.89	22.38	1562.71		
0.04	-0.05	308.93	34.63	12.39	465.93	6836.20	5086.67	4932.14	4880.47	6708.02	5897.56	297.59	279.11	191.10	11.15	1507.73		
0.04	-0.06	311.87	34.63	12.39	463.15	6695.51	4984.30	4833.45	4782.69	6564.92	5779.74	298.15	273.37	191.13	11.26	1491.58		
0.05	-0.08	368.80	34.68	12.39	460.93	6621.30	4931.91	4783.36	4732.98	6485.90	5720.06	297.59	270.45	263.39	13.33	1745.53		
0.09	-0.07	354.33	34.66	12.39	457.04	6475.86	4828.06	4683.75	4634.18	6333.63	5601.30	297.04	264.15	239.53	25.59	1642.04		
0.09	-0.07	355.87	34.66	12.39	454.82	6423.21	4792.14	4649.74	4600.36	6274.82	5560.89	295.93	262.01	239.70	25.70	1637.15		

/S			AVERAGE	SUMS						
2063.71	35117.04	12690.16	4728.83	39459	7185	32274.31	113039	7185	496.45	38.95
/kg of Dry Fuel)			Total							
nstituent			Loss	Total	Chemical	Sensible and	Total	Chem	Grams Produced	
CH4	H2O Comb	H2O Fuel MC	Rate	Loss	Loss 1	Latent Loss	Output	Loss 2	CO	HC
-33.10	1797.15	643.56	4843.66	0	0	0.00	0	0	0.00	0.00
580.06	1754.27	653.94	5983.41	7214	2220	4994.36	16671	2220	151.26	12.42
736.17	1746.56	657.92	6364.52	5667	2066	3601.29	11972	2066	140.30	11.64
563.87	1764.23	656.94	5825.79	4755	1449	3305.38	11414	1449	98.43	8.17
266.81	1784.93	651.74	4923.49	3653	628	3025.37	11045	628	42.75	3.52
324.46	1771.46	649.27	5066.50	3195	650	2545.82	9298	650	44.24	3.64
-13.06	1792.16	642.60	4261.59	2292	-3	2295.42	8364	-3	0.39	-0.12
75.13	1779.25	641.62	4425.84	2217	133	2083.35	7705	133	9.50	0.67
51.24	1776.50	639.64	4478.05	1827	84	1743.26	6257	84	6.28	0.37
-22.53	1771.97	634.98	4373.72	1379	-2	1380.74	4868	-2	0.55	-0.13
-20.94	1766.96	633.25	4295.45	1275	-1	1275.92	4605	-1	0.50	-0.11
-35.82	1764.54	631.77	4459.39	1241	-7	1247.98	4271	-7	0.27	-0.18
-31.37	1759.23	630.05	4424.33	903	-2	905.17	3139	-2	0.39	-0.11
-42.05	1746.73	625.15	4489.48	666	-3	669.22	2274	-3	0.32	-0.11
-44.42	1733.32	620.25	4381.82	569	-3	571.83	2003	-3	0.28	-0.10
-49.14	1726.99	617.80	4284.73	556	-5	561.27	2016	-5	0.14	-0.11
-50.21	1723.03	616.34	4256.49	553	-5	557.73	2020	-5	0.14	-0.12
-70.99	1723.26	615.60	4560.57	508	-6	513.96	1697	-6	0.14	-0.14
-59.93	1717.92	614.13	4443.43	742	-6	747.54	2565	-6	0.42	-0.18
-60.46	1716.58	613.63	4434.30	247	-2	248.70	856	-2	0.14	-0.06