EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

United States
Environmental Protection Agency
Woodheater Certification Test Report

Country Stoves, Inc.
C-50A Noncatalytic Wood Heater

REPORT BY:

A.T. MYREN

G.E. WADINGTON

CONFIDENTIAL

RELEASED ONLY BY
AUTHORIZED PERSONNEL

PROJECT NO. W-95

DATE 05/16/89

* * * * * * *

CONFIDENTIAL

* * * * * * *

The data and information in this test report is confidential, proprietary information and is not to be released to and/or discussed with any party who is not authorized by the manufacturer or the testing laboratory to receive such data.

* * * * * * *

CONFIDENTIAL

* * * * * * *

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Photos This section contains two photographs of the fuel load for each test run and two color photographs (side and front view) of the wood heater tested and any other photographs pertinent to testing the unit.	Photos	vari

Appendices:

A - Example Calculations

B - Installation Description and Operating Instructions

Field Obaervation Checklist

Unit Name: Country C-50A Date: 5/02/89

Manufacturer Name: Country Stoves, Inc.

Manufacturer Address: P.O. Box 987

Auburn, WA 98071

Manufacturer Phone: (206) 872-9663

Obaervers & Affiliation: Dick Olsen, Country

EEMC'a Field Team

Supervisor: Ben Myren

Other Membera: Bill Nowak

Ron Schenck

Chip Wadington

Jerry Stoddard

Dale Stephens

Test Location: Unit C, 1315 S. Central Ave., Kent, WA 98032

Phone: (206) 859-8318

Test Site Elevation: 42 Feet

EEMC
1744 Mullowney Lane
Billings, MT 59101
(406) 252-4450

EEMC
3925 Placita de la Escarpa
Tucson, AZ 85715
(602) 749-2167

IMA
P.O. Box 5106
Missoula, MT 59806
(406) 543-6174

EEMC
Unit C
1315 S. Central Ave
Kent, WA 98032
(206) 859-8318

REPORT CERTIFICATION

The sampling and analysis for the woodstove described in this report was carried out under my direction and supervision.

Date 5/2/89 Signature Albert T. Myren Jr.

Date _____ Signature _____

I have reviewed all of the testing data and results found in this test report and hereby certify that the test report is authentic and accurate.

Date 5-12-89 Signature Ed Wadington

WST6-Form2
Rev 1/88

STATEMENT OF CONFIDENTIALITY

As a condition of being allowed to visit the woodstove testing facility and/or observe a woodstove test(s) at Energy and Environmental Measurement Corporation (EEMC), Unit C, 1315 S. Central Ave., Kent, WA 98032, I hereby agree not to release or divulge any information about the testing facility, testing personnel or testing procedures (other than the information found in the Standard Method for Measuring the Emissions and Efficiencies of Residential Woodstoves promulgated by the Oregon Department of Environmental Quality (DEQ) and/or Methods 28, 28A, 5G and 5H promulgated by the United States Environmental Protection Agency (EPA) to any other individual or firm unless specifically authorized to do so by an authorized person from EEMC or InterMountain Ambient (IMA).

SIGNED: [signature]	SIGNED:
Name	Name
Director of R&D	
Title	Title
Country Stoves	
Affiliation	Affiliation
4/3/89	
Date	Date

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Test Series Information and Discussion

Unit: Country Model#: C-50A

Manufacturer: Country Stoves, Inc.

Date Received: 3/31/89 Date(s) Aged: 3/31 and 4/20/89

Sampling Method Used: 5H Number of Test Runs: 7

The Country C-50A Noncatalytic Wood Heater

manufactured by Country Stoves

of Auburn, WA was tested by Energy and Environmental Measurement Corporation (EEMC) and InterMountain Ambient (IMA) using the United States Environmental Protection Agency's (EPA) Methods 28, "Certification and Auditing of Wood Heaters" and 5H, "Determination of Particulate Emissions from Wood Heaters from a Stack Location." (See the Federal Register/Vol. 53, No. 38/Friday, February 26, 1988/pp. 5860-5926.) The particulate matter (PM) and overall efficiency (OE) data was calculated as specified in the Wood Heater New Source Performance Standard (NSPS).

If computed and reported, the Oregon Particulate Matter (PM) emissions and efficiency data was calculated using the computer program supplied by the State of Oregon's Department of Environmental Quality's (DEQ) as part of the "Standard Method for Measuring the Emissions and Efficiency of Residential Woodstoves."

If computed and reported, the Colorado Particulate Matter (PM) emissions and Carbon Monoxide (CO) data was calculated correcting the Oregon results for altitude, and using the State of Colorado Department of Health's Regulation No. 4, "Regulation on the Sale of New Woodstoves" promulgated on June 27, 1985, and revised on September 18, 1986.

All events pertinent to the test data and test results are recorded on the data sheets in the individual test runs, particularly pp. 9, 9A, 9A-2, 9A-2 and 12.

Any deviations made or noted from the promulgated methods other than those which were accepted and certified by the EPA and/or the DEQ during the laboratory certification process are listed and discussed below. No deviations were made or noted.

The C-50A was scheduled for certification testing several times. Country cancelled the test series scheduled for 1/30/89 and 2/13/89 without showing. Country did bring the unit (the C-50) in for testing during the week of 2/27/89, but cancelled the series after performance data obtained during aging indicated that the unit would not pass if tested. Country then brought the C-50A in for testing on 4/3/89. A total of six (6) runs were performed on the unit between 4/3 and 4/5/89. Country then did not need the time scheduled during the week of 4/10/89 and so cancelled, but did use one day (4/21/89) of the time scheduled during the week of 4/17/89 for a fireplace insert reciprocal certification confirmation test. One (1) run was done on 4/21/89. (Copies of the scheduling notifications sent to EPA are to be found in the following pages.)

EEMC keeps track of the design changes made to a unit during the certification testing process by changing the model designation of the unit from the C-50 to the C-50A, C-50B, etc. The changes made to the C-50 are as follows:

C-50 - Original Stove
C-50A - Changed the number, size and spacing of the holes in the secondary manifold tubes from 16 - 1/8" holes on one inch centers to 18 - .188" holes on 1.18 inch centers and 18 - .125 inch holes on 1.18 inch centers. The holes are almost directly across from each other. (See drawing # 4.0 in the Blueprint Section.)

The C-50A was the unit tested. Thus, all of the data sheets in this test report should be labeled the C-50A.

As noted earlier, Country wishes to apply for a reciprocal certification for a freestanding unit with a pedestal (C-50P) based on the certification test data for the freestanding unit with legs (C-50L--the C-50A in this test report) and for a fireplace insert (C-55) based upon the test data for the freestanding unit with legs and the fireplace insert reciprocal certification test. Also note that Country wishes to change the model designation of the freestanding unit with legs from the C-50A to the C-50L. The Blueprint section contains drawings for all three (3) of these units.

It should also be mentioned here that the operating instructions supplied to EEMC by Country Stoves contained a measurement error for the primary air control setting for the medium high burn. The settings called for a setting of 3.75-4.00 inches and EEMC ran a test at that setting (Run #3) and got a dry

burn rate of 3.02 dry kilograms per hour. At the manufacturer's request at the end of the test run, EEMC personnel rechecked the setting to verify that the setting was correct. It was set at 4.0 inches as specified. The manufacturer's representative then rechecked his calculations and test data and found that he had made a calculation error and that the correct setting for the medium high burn should have been 2.75-3.00 inches. This fact was communicated verbally to EEMC personnel on the morning of 4/4/89 and a test (Run #4) was made at 3.00 inches.

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

Date: 11/29/88 Faxed 12/2/88 12:10

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Country Stoves

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olson

Phone: (206) 939-9663

has scheduled ✓ or cancelled _____ the

Unit Name: Country Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

1/30/88 and ending on about 2/3/88

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Ben Myren

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

Date: 1/29/99

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Corcoran Stoves

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olsen

Phone: (206) 852-9663

has scheduled _____ or cancelled X the

Unit Name: Country Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

1/30/99 and ending on about 2/3/99

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

11/2/88

Faxed 11/2/88 12:57 PDST

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Country Stoves, Inc.

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olsen

Phone: (206) 872-9663

has scheduled the

Unit Name: Country Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

2/13/88 and ending on about 2/17/88

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Ben Myren

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

Date: 2/13/89 Faxed 2/13/89

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Country Stoves, Inc.

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olsen

Phone: (206) 872-9663

has scheduled _____ or cancelled X the

Unit Name: Countess Model # C 50

for certification testing at EEMC's Kent, WA Lab starting on

2/13/89 and ending on about 2/17/89

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

This cancellation was due to an emergency/ sickness in Dick Olsen's family

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

11/2/00 Faxed 11/2/00 12:57 PDST

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Country Stoves, Inc.

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olsen

Phone: (206) 872-9663

has scheduled the

Unit Name: Country Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

2/27/00 and ending on about 3/3/00

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

Date: 3/4/09 FAXED 3/5/09 @ 1411

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Country Stoves

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olsen

Phone: (206) 872-9663

has scheduled _____ or cancelled X the

Unit Name: Country Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

2/27/09 and ending on about 3/3/09

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

Date: 3/4/09 FAXED 3/5/09 @ 1411

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Coventry Stoves

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Deb Olsen

Phone: (206) 872-9663

has scheduled X or cancelled _____ the

Unit Name: Coventry Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

4/4/09 and ending on about 4/7/09

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

Date: 3/4/89 FAXED 3/5/89 @ 1411

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Country Stoves

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olsen

Phone: (206) 572-9663

has scheduled X or cancelled ~~X~~ the

Unit Name: Country Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

4/10/89 and ending on about 4/14/89

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EEMC ENERGY AND ENVIRONMENTAL MEASUREMENT CORPORATION

Phone (406) 252-4450 ■ 1744 Mullowney Lane ■ Billings, Montana 59101

Date: 3/4/89 FAXED 3/5/89 @ 1411

Acquanetta Delaney
Woodstove Certification Program
US EPA
Mail Drop EN 341
401 M Street SW
Washington, DC 20460

Acquanetta:

RE: Woodstove Certification Test Notification

This letter is to notify EPA that

Name: Country Stoves

Address: P.O. Box 987
Auburn, WA 98071

Contact Person: Dick Olsen

Phone: (206) 872-9663

has scheduled X or cancelled _____ the

Unit Name: Country Model # C-50

for certification testing at EEMC's Kent, WA Lab starting on

4/17/89 and ending on about 4/21/89

or has scheduled additional runs on the above unit starting on _____

_____ and ending on _____.

Sincerely,

Alben T. Myren Jr.
Woodstove Testing Coordinator

ATM/im
XC: Files (3)
WST7-Form5

EPA Weighted Averages Calculations

EPA Weighted Average Particulate Emission Rate

The weighted average particulate emission rate ($\overline{PM}$) for the Country C-50A Noncatalytic Freestanding Wood Heater manufactured by Country Stoves, Inc. of Auburn, WA is 5.5 g/hr.

EPA Weighted Average Overall Efficiency

The weighted average overall efficiency ($\overline{OE}$) for the Country Stoves is default - 63 %.

II. EPA Test Results

	Run #	Dry Burn Rate/kg/hr	Grams/Hour	Overall Efficiency
*	6	0.77	2.658	
*	1	1.09	7.743	
*	4	1.83	5.521	
*	3	3.02	3.499	
*	2	3.62	5.167	
	5[1]	1.08	5.689	
	1[2]	1.24	3.092	

Notes: [1] Run 5 = Fan Confirmation Test
[2] Run 1 = Fireplace Insert Reciprocal Certification Test

III. EPA Cumulative Probability Calculations

$$P_n = \frac{[\text{Hi Prob.} - \text{Low Prob.}][\text{Act. Dry Burn Rate} - \text{Low Dry Burn Rate}]}{.05} + \text{Low Prob.} = P_n$$

$$P_1 = \frac{[\ .220 - .185\ ][\ 0.77 - 0.75\ ]}{.05} + .185 = .1990$$

$$P_2 = \frac{[\ .460 - .407\ ][\ 1.09 - 1.05\ ]}{.05} + .407 = .4494$$

$$P_3 = \frac{[\ .882 - .875\ ][\ 1.83 - 1.80\ ]}{.05} + .875 = .8792$$

$$P_4 = \frac{[\ .985 - .984\ ][\ 3.02 - 3.00\ ]}{.05} + .984 = .9844$$

$$P_5 = \frac{[\ .992 - .991\ ][\ 3.62 - 3.60\ ]}{.05} + .991 = .9914$$

$$P_6 = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_7 = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_8 = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_9 = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_{10} = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_{11} = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_{12} = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_{13} = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$$P_{14} = \frac{[\ \ - \ \ ][\ \ - \ \ ]}{.05} + \_\_\_\_ = \_\_\_\_$$

$K_1 = P_2 - P_0 =$ .4494 − .0000 = .4494

$K_2 = P_3 - P_1 =$ .8792 − .1990 = .6802

$K_3 = P_4 - P_2 =$ .9844 − .4494 = .5350

$K_4 = P_5 - P_3 =$ .9914 − .8792 = .1122

$K_5 = P_6 - P_4 =$ 1.0000 − .9844 = .0156

$K_6 = P_7 - P_5 =$ _____ − _____ = _____

$K_7 = P_8 - P_6 =$ _____ − _____ = _____

$K_8 = P_9 - P_7 =$ _____ − _____ = _____

$K_9 = P_{10} - P_8 =$ _____ − _____ = _____

$K_{10} = P_{11} - P_9 =$ _____ − _____ = _____

$K_{11} = P_{12} - P_{10} =$ _____ − _____ = _____

$K_{12} = P_{13} - P^{11} =$ _____ − _____ = _____

$K_{13} = P_{14} - P_{12} =$ _____ − _____ = _____

$K_{14} = P_{15} - P_{13} =$ _____ − _____ = _____

IV. EPA Weighted Averages Calculations

The following formula is the one set out in Equation 28-1, Section 8.1, Method 28 and is to be used to calculate both the weighted average particulate emission rate (PM) and the weighted average overall efficiency (OE) as shown below. The formula uses interpolated probabilities for a given heat output demand calculated from the values listed in Table 28-1(2) in Method 28.

$$\overline{PM} = \frac{K_1 PM_1 + K_2 PM_2 + K_3 PM_3 = \ldots K_n PM_n}{K_1 + K_2 + K_3 \ldots + K_n}$$

Where $\overline{PM}$ = The EPA weighted average particulate matter (PM) emission rate in grams per hour (g/hr).
$K_1, K_2, K_3, \ldots K_n$ = The weighting factors for the individual test runs as determined in III above.
$PM_1, PM_2, PM_3, \ldots PM_n$ = The particulate emission rates for the individual test runs as listed in II above.

And

$$\overline{OE} = \frac{K_1OE_1 + K_2OE_2 + K_3OE_3 + \ldots K_nOE_n}{K_1 + K_2 + K_3 + \ldots K_n}$$

Where $\overline{OE}$ = The EPA weighted average overall efficiency in percent (%).
$K_1, K_2, K_3, \ldots K_n$ = The weighting factors for the individual runs as determined in III above.
$OE_1, OE_2, OE_3, \ldots OE_n$ = The overall efficiencies for the individual test runs as listed in II above.

IV.A. EPA WEIGHTED AVERAGE PARTICULATE EMISSIONS CALCULATIONS

$$\overline{PM} = \frac{.4494\ (2.658) + .6802\ (7.743) + .5350\ (5.521) + .1122\ (3.499) + .0156\ (5.167) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad)}{.4494 + .6802 + .5350 + .1122 + .0156 + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad} =$$

$$\overline{PM} = \frac{1.1945 + 5.2668 + 2.9537 + 0.3926 + 0.0806 + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad}{1.7924} =$$

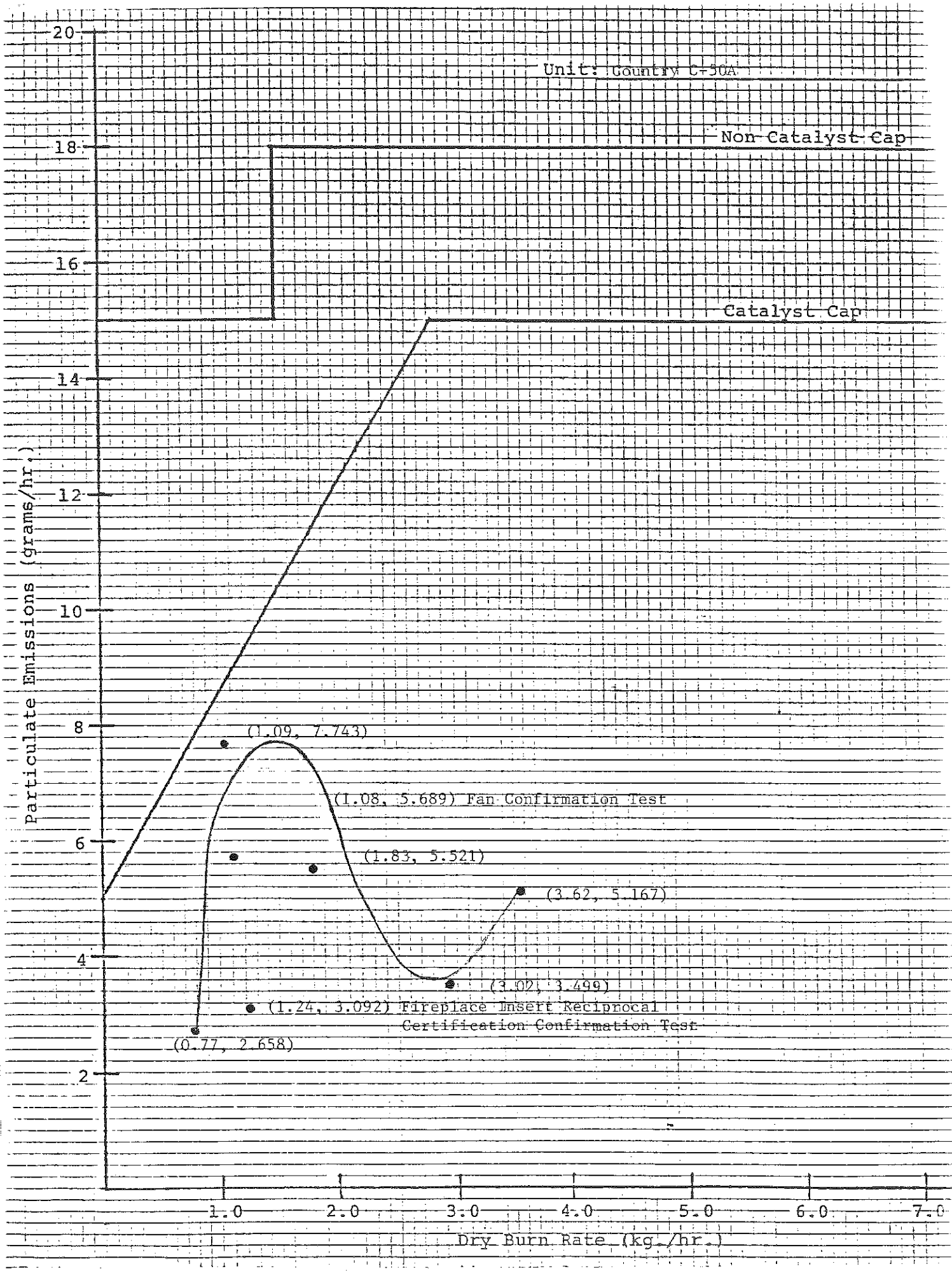
$$\overline{PM} = \frac{9.8882}{1.7924} = 5.51673 = 5.5 \text{ g/hr}$$

IV.B. EPA WEIGHTED AVERAGE OVERALL EFFICIENCY CALCULATIONS

$$\overline{OE} = \frac{(\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad) + (\quad)}{\quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad} =$$

$$\overline{OE} = \frac{\quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad + \quad}{\quad} =$$

$$\overline{OE} = \frac{\quad}{\quad} = \underline{\quad} = \underline{\quad}\ \%$$


Unit: Country C+30A
Non Catalyst Cap
Catalyst Cap
Particulate Emissions (grams/hr.)
20
18
16
14
12
10
8
6
4
2
(1.09, 7.743)
(1.08, 5.689) Fan Confirmation Test
(1.83, 5.521)
(3.62, 5.167)
(3.02, 3.499)
(1.24, 3.092) Fireplace Insert Reciprocal
Certification Confirmation Test
(0.77, 2.658)
1.0
2.0
3.0
4.0
5.0
6.0
7.0
Dry Burn Rate (kg./hr.)

Unit: Country C50A
Page 1 of 3
WST2-Form12

Woodstove Data Summary

Run #	6	1	4	3	2		5[1]	1[2]	
Particulate Emissions:									
Concentration: grains/dscf:	.1368	.2976	.1310	.0621	.0664		.2493	.1067	
grams/m^3:									
Emission Rate: grams/hr:	2.658	7.743	5.521	3.499	5.167		5.689	3.092	
Emission Factor: gms/kg: (dry fuel weight basis)									
Front Half Catch: % of total	17.70	23.49	28.07	74.95	64.04		25.01	25.64	%
Total Mass Captured: Frt & Bck Halves:	712.3	1038.1	330.2	97.0	109.3		927.2	345.9	mg
Efficiency Valves:									
Overall Appliance Efficiency									%
Combustion Efficiency									%
Heat Transfer Efficiency									%
Heat Output:									
Avg. BTU/hr for test cycle									BTU/hr
Fuel Burn Rates:									
Avg Kg/hr for test cycle (Wet basis)									Kg/hr
Avg Kg/hr for test cycle (Dry basis)	0.77	1.09	1.83	3.02	3.62		1.08	1.24	Kg/hr

Notes: [1]Run 5 = Fan Confirmation Test
[2]Run 1 = Fireplace Insert Reciprocal Certification Test

RUN #	6	1	4	3	2		5	1	
Fuel Moisture Content:									
Kindling (Wet basis)	Hot Start	9.008	Hot Start	Hot Start	9.338		8.703	8.536	%
Pretest Fuel (Wet basis)	16.107	18.016	17.264	17.264	19.159		16.232	17.910	%
Test Fuel (Wet basis)	16.522	18.633	18.094	19.038	17.904		17.435	17.304	%
Air/Fuel Ratio:									
lbs air/lbs fuel									
Average Stack Gas Composition:									
Avg. % CO_2	6.86	7.33	8.24	10.84	9.39		8.40	7.78	%
Avg. % O_2									%
Avg. % CO	1.09	1.11	0.56	0.37	0.15		1.29	0.90	%
Avg. % Excess Air									%
Avg. % Moisture	7.25	8.69	9.30	10.86	10.87		9.57	8.11	%
Average Stack Gas Flow Rate:									
Stack flow rate - EPA CMB	4.992	6.691	10.843	14.464	19.987		5.866	7.455	dscfm
CHO balance									dscfm
Tracer Gas	10.075	6.532	10.270	13.182	2.474		6.033	11.571	dscfm
Draft (Static)	-.032	-.042	-.054	-.072	-.079		-.040	-.047	in.H_2O
Proportionality - Average	100	100	100	100	100		100	100	
Average Stack Gas Emission Factors:									
CO - g/Kg									
g/hr									

RUN #	6	1	4	3	2		5	1	
Average Temperatures:									
Stack Gas	223	238	368	582	547		278	322	°F
Primary Combustion Chamber Gas	650	651	775	979	947		573	750	°F
Secondary Combustion Chamber Gas	845	833	1135	1304	1280		976	947	°F
Catalytic Combustor Exit Gas									°F
Stove Top	308	357	505	656	701		489	447	°F
Stove Left Sidewall	318	341	412	448	517		355	390	°F
Stove Back	227	233	311	403	325		402	307	°F
Stove Right Sidewall	306	304	377	433	480		322	422	°F
Stove Bottom	324	325	409	421	482		213	268	°F
Stove Temperature Change	-93	-76	-31	+19	-57		-80	-59	°F
Test Chamber Environment:									
Avg. Barometric Pressure	30.15	30.16	30.13	30.17	30.22		30.13	29.67	in Hg
Avg. Temperature	77	70	70	74	72		70	72	°F
Avg. % Ambient Moisture	1.48	1.52	1.40	1.30	1.45		1.58	1.45	% H_2O
Avg. % Relative Humidity	46	59	50	43	54		60	42	%RH
Avg. Air Velocity	0								m/sec
Avg. Dilution Tunnel Draft (If Applicable)	0								in/H_2O
Test Fuel Weight and Burn Time:									
Density (Dry basis)	.426	.474	.395	.431	.463		.396	.422	gm/cm^3
Coal Bed Weight	1.9	2.1	2.0	2.1	2.2		1.9	1.9	lbs.
Pre Test Fuel Wt (Inc Kindling)	52.4	18.9	8.5	30.8	40.6		34.3	54.1	lbs.
Test Fuel Load Weight	7.8	8.6	8.2	8.8	8.9		7.9	8.0	lbs.
Total Test Cycle Burn Time	230	175	100	65	55		165	145	min.