PARTICULATE MATTER AND CARBON MONOXIDE EMISSION MEASUREMENTS AND VISIBLE EMISSIONS OBSERVATIONS

Emissions Unit No. 001
Carbonaceous Fuel Fired Boiler

JEFFERSON POWER LC
Jefferson County, Florida

Permit No. 0650001-001-AV

Test Date: February 20, 2002
Report Date: March 26, 2002

632-01-03

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
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Responsible Official Certification:

I certify that, based upon information and belief formed after reasonable inquiry, the statements and information in the attached documents are true, accurate and complete.

S. Mitchell Larkins, General Manager:

Signature

Date:

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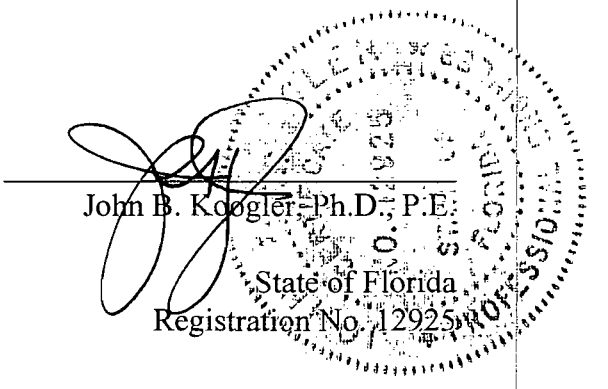
To the best of my knowledge, all applicable field and analytical procedures comply with the Florida Department of Environmental Protection requirements and all test data and plant operating data are true and correct.



John B. Koogler, Ph.D., P.E.
State of Florida
Registration No. 12925

3/25/02
Date

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1.0 INTRODUCTION

Jefferson Power LC owns and operates a carbonaceous fuel fired power plant located three miles south of Monticello, Jefferson County, Florida. On February 20, 2002, Koogler & Associates, Environmental Services of Gainesville, Florida, conducted particulate matter and carbon monoxide (CO) emission measurements and visible emissions observations on the carbonaceous fuel fired boiler located at the plant in accordance with EPA Methods 5, 10 and 9 (40 CFR 60, Appendix A). The purpose of the testing was to demonstrate compliance with the particulate matter, carbon monoxide and opacity emission limiting standards set forth in 0650001-001-AV.

Prior to the test date, the Northwest District office of the Florida Department of Environmental Protection (FDEP) in Pensacola, Florida, were notified of the test schedule and testing methods.

During the test period, the boiler was producing steam at a rate of 77,678 pounds per hour. The heat input rate averaged 114 MMBtu per hour; all from carbonaceous fuel. Permit 0650001-001-AV limits the steam production rate to 90,000 pounds per hour, and the heat input rate to 185 MMBtu per hour. The measured mass emission rate of particulate matter averaged 15.55 pounds per hour or 0.14 pounds per MMBtu. The permit limits the particulate matter emissions to 0.2 pounds per MMBtu

heat input from carbonaceous fuel, plus 0.1 pounds per MMBtu heat input from fossil fuel.

The carbon monoxide concentration in the stack gas ranged from 365-417 ppm (V/V, dry) and averaged 384 ppm. The mass emission rate of carbon monoxide averaged 53.2 pounds per hour. The permit limits the carbon monoxide emissions to less than 250 tons per 8,400-hour year; or to 59.4 pounds per hour annual average.

Visible emissions are limited to an opacity of 30 percent, except for two six-minute periods per hour during which time the opacity cannot exceed 40 percent. During the 60-minute period of testing, no visible emissions were observed.

Based upon the data presented herein, it can be concluded that during the period of testing on February 20, 2002, the carbonaceous fuel boiler was operating in compliance with the particulate matter, carbon monoxide and visible emissions limiting standards set forth in Permit No. 0650001-001-AV.

2.0 PROCESS DESCRIPTION

The boiler at Jefferson Power LC is a 90,000 pound per hour steam boiler fueled primarily by bark and waste wood. The steam generated is used to produce electric power. Particulate matter is controlled by a multi-cyclone mechanical dust collector (Western Precipitation Division of Joy Manufacturing Model 12VM35) followed by a venturi scrubber (Perry Smith Company Model 8M) and a vertical separator. Only carbonaceous fuel, as defined in Rule 62-210.200, F.A.C., can be burned.

During the test period, the steam production rate averaged 77,678 pounds per hour and the electric power generator rate averaged 5.4 megawatts. The scrubber water flow averaged 366 gallons per minute and the scrubber water pressure averaged 30 psig.

3.0 SAMPLING POINT LOCATIONS

Two sampling ports are located in the 5.83 foot diameter stack. The ports are 18 feet (3.3 diameters) downstream of a disturbance and 12 feet (2.2 diameters) upstream of the top of the stack. Using criteria established by EPA, it was determined that a two port by 12 point matrix of 24 total sampling ports was required for the velocity and sampling traverses.

A schematic diagram of the stack is shown in Figure 1.

FIGURE 1

SAMPLING POINT LOCATIONS

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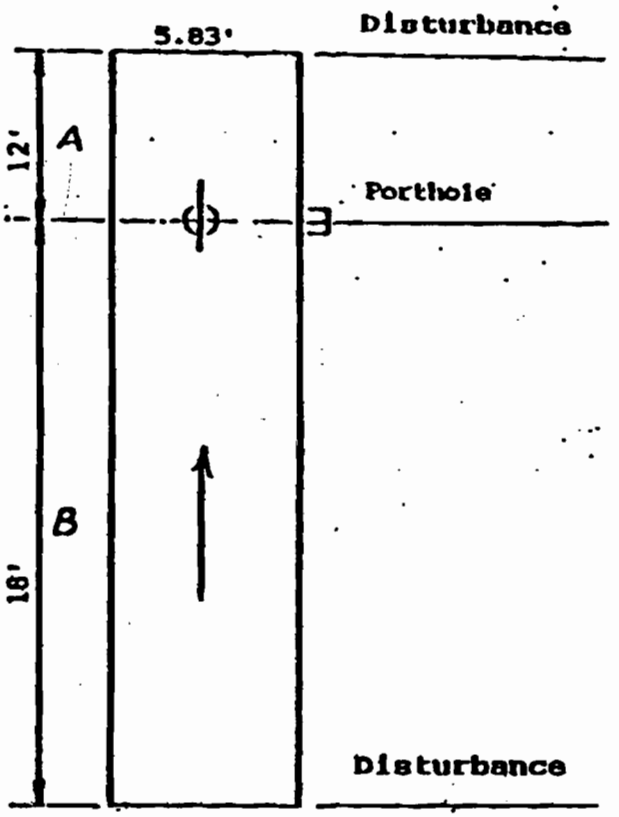
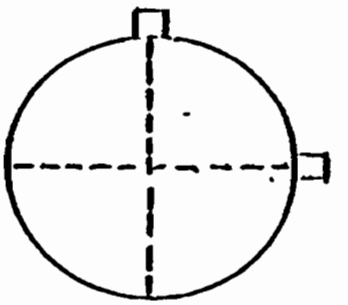
JEFFERSON COUNTY, FLORIDA





Pt. No.	Distance (")
1.	1.5
2.	4.7
3.	8.3
4.	12.4
5.	17.5
6.	24.9
7.	45.1
8.	52.5
9.	57.6
10.	61.7
11.	65.3
12.	68.5

A = 12/5.83 = 2.06

B = 18/5.83 = 3.09

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4.0 FIELD AND ANALYTICAL PROCEDURES

Particulate matter emission measurements were made using EPA Method 5 as adopted by FDEP in Rule 62-297.401(5), F.A.C. The heated filter holder was separated from the impingers with a flexible sample line as provided for in Rule 62.297.310(4)(e), F.A.C. The sampling point locations for the EPA Method 5 test were established in accordance with EPA Method 1.

The carbon monoxide measurements were conducted in accordance with EPA Method 10.

Stack gas velocity measurements and stack gas moisture measurements were made in conjunction with the EPA Method 5 tests in accordance with EPA Methods 2 and 4. Opacity observations were made in accordance with EPA Method 9 concurrent with Test Run No. 2. All EPA test methods are described in 40 CFR 60, Appendix A and have been adopted by reference by FDEP by Rule 62-297.401, F.A.C.

A schematic diagram of the sampling train used for the particulate matter emission measurement is shown in Figure 2, and the sampling system used for the carbon monoxide measurements is shown in Figure 3.

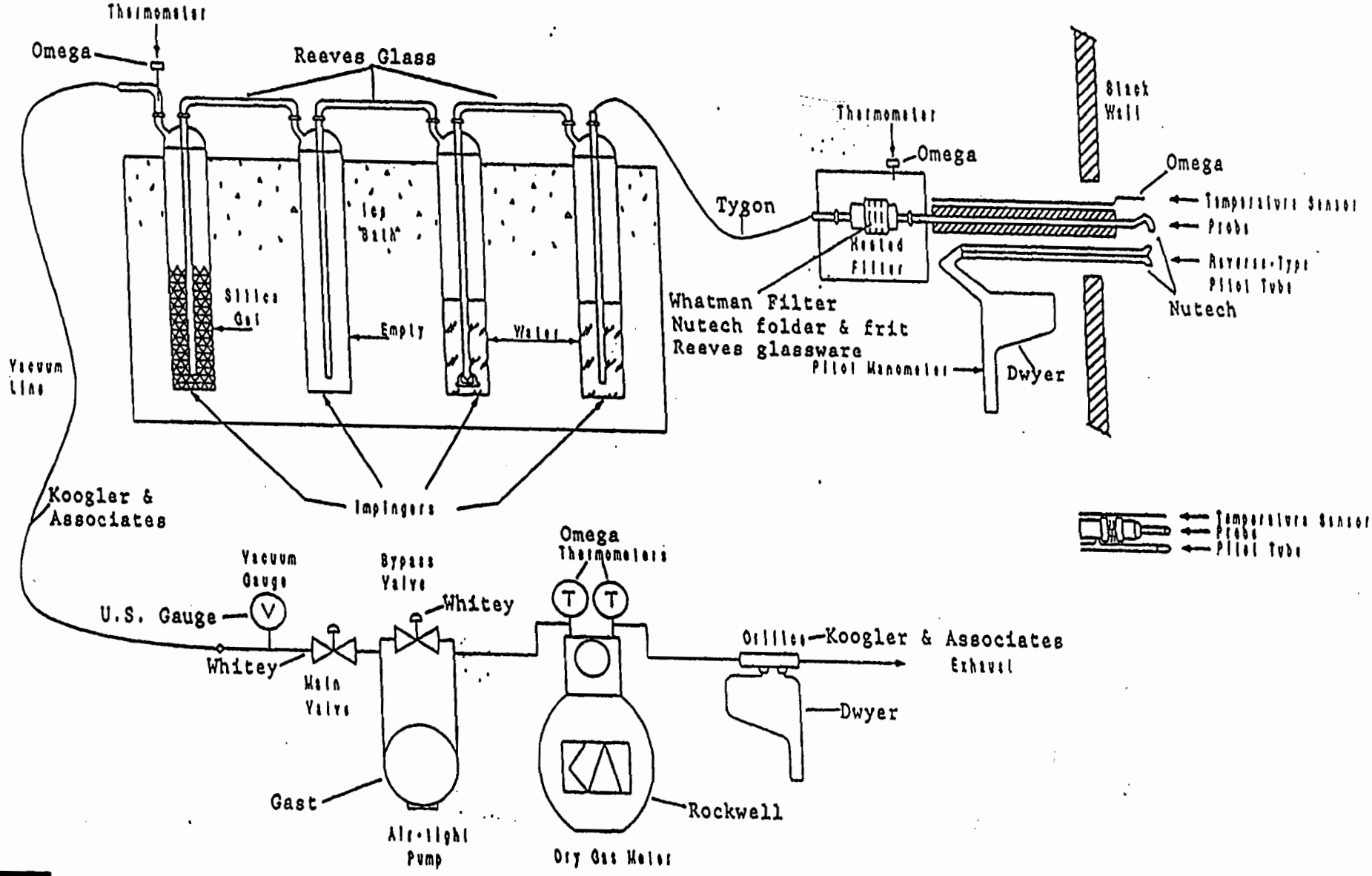

FIGURE 2

EPA METHOD 5 PARTICULATE MATTER SAMPLING TRAIN

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CEM SAMPLE TRAIN

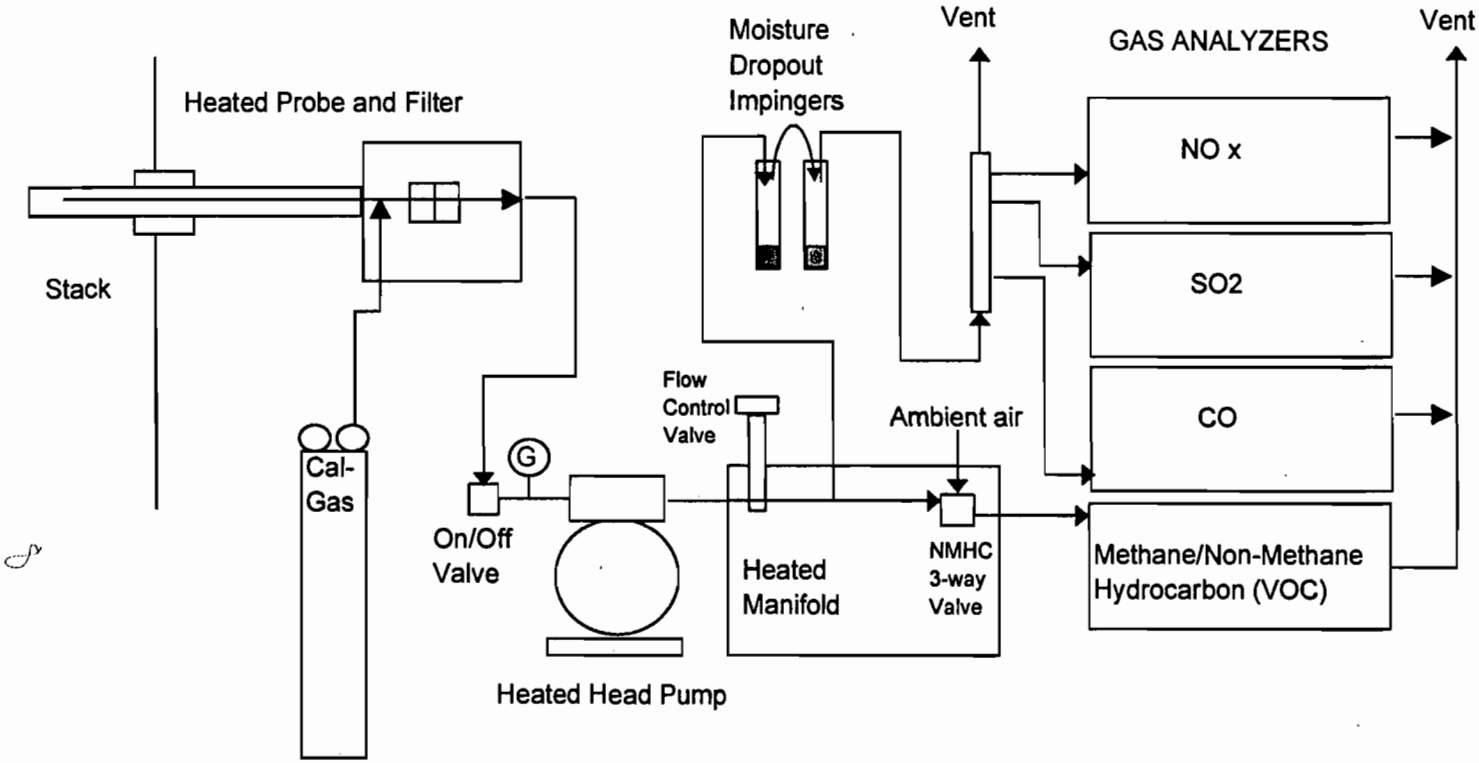

FIGURE 3

5.0 SUMMARY OF RESULTS

During the test period, the boiler was operating at a steam production rate of 77,678 pounds per hour and produced 5.4 megawatts of electric power. The heat input rate averaged 114 MMBtu per hour; all from carbonaceous waste-wood fuel. Permit No. 065001-001-AV limits the steam production rate to 90,000 pounds per hour and the heat input rate to 185 MMBtu per hour from carbonaceous fuel.

Results of the particulate matter emission measurements conducted on February 20, 2002, are summarized in Table 1. The measured mass emission rate of particulate matter ranged from 14.17 to 17.66 pounds per hour and averaged 15.55 pounds per hour or 0.14 pounds per MMBtu. The permit limits the particulate matter emissions to 0.2 pounds per MMBtu heat input from carbonaceous fuel, plus 0.1 pounds per MMBtu heat input from fossil fuel. The corresponding particulate matter concentration in the stack gas averaged 0.0572 grains per dry standard cubic foot. The measured stack gas flow rate averaged 31,715 SCFMD. The stack gas temperature averaged 150°F and the moisture content averaged 22.1 percent.

The carbon monoxide emission measurements were made concurrent with the particulate matter measurements. The stack gas carbon monoxide concentration ranged from 365-417 ppm (V/V, dry). This is equivalent to a mass emission rate ranging from 50.5-58.0 pounds per hour and averaging 53.2 pounds per hour. The

permit limits the carbon monoxide emissions to less than 250 tons per 8,400-hour year; or to 59.4 pounds per hour annual average.

Visible emissions observations were conducted for a 60-minute period concurrent with the second test run. During the observation period, no visible emissions were observed. The permit limits the opacity of emissions to 30 percent except for two six-minute periods during which time the opacity cannot exceed 40 percent.

Based upon the data presented herein, it can be concluded that during the testing on February 20, 2002, the carbonaceous fuel boiler was operating in compliance with the particulate matter, carbon monoxide and opacity limiting standards set forth in Permit No. 0650001-001-AV.

TABLE 1

SUMMARY OF PM AND CO TEST DATA February 20, 2002 CARBONACEOUS FUEL BOILER Jefferson Power LC Jefferson County, Florida							
Date	Run Number	Carbonaceous Fuel Input (Ton/hr) wet	Heat Input Rate (MMbtu/hr)	Steam Rate (lb/hr)	Stack Flow Rate (dscfm)	Stack Temperature (F)	Stack Moisture (%)
02/20/02	1	14.49	109.5	79333	31551	150	21.8
02/20/02	2	14.40	108.8	77933	31722	149	20.9
02/20/02	3	16.28	123.0	75769	31871	150	23.7
Average>>		15.06	113.8	77678	31715	150	22.1

SUMMARY OF PM AND CO TEST DATA February 20, 2002 CARBONACEOUS FUEL BOILER Jefferson Power LC Jefferson County, Florida							
Date	Run Number	Particulate Matter			Carbon monoxide		
		(gr/dscf)	(lb/hr)	(lb/MMbtu)	(ppm)	(lb/hr)	(lb/MMbtu)
02/20/02	1	0.0653	17.66	0.16	371	51.0	0.47
02/20/02	2	0.0521	14.17	0.13	365	50.5	0.46
02/20/02	3	0.0543	14.83	0.12	417	58.0	0.47
Average>>		0.0572	15.55	0.14	384	53.2	0.47

Calculations Heat Input: (MMBtu/hr) =Tons fuel / hr x 2000 lb / ton x 3777 Btu / lb x MMBtu / 10^6 Btu
Calculations CO (lb/hr) = ft^3/min(wet) x 60 min/Hr x (conc. ppm) x MW(18)/385 x10^-6
Calculations PM (lb/hr) = gr/ft^3 (dry) x ft^3/min (dry) x 60 min/hr x lb/7000gr

Allowable Particulate Matter: 0.2 lb / MMBtu or 22.7 lb / hr
Allowable Carbon Monoxide: 59.4 lb / Hr (based on 8400 hr/yr operation)

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Appendix

Calculations
Field Data Sheets
Laboratory Data
Process Data
Equipment Calibrations
Project Participants

Calculations

GENERAL DATA — DATA FILE NAME: jp_02

Company	: JEFFERSON POWER / MONTICELLO, FL.				**********
Source/Unit	: WOOD FIRED BOILER				09:55 AM
Date	: FEBRUARY 20, 2002	Cp	:	0.840	
Stack dia.	: 69.90 inch OR	Duct Length	:	0.00	inch
Oxygen Corr.	: 0.0 percent	Duct Width	:	0.00	inch
CO2 Corr.	: 0.0 percent	Std. Temp.	:	68	F

FUEL ANALYSIS DATA, (By F Factor or Fuel Use)
F Factor = F, Fuel Use = U — F — Process Wt.

Hydrogen,wt%	: 0.00	Run 1	: 19.4	Tons/hr
Carbon, wt%	: 0.00	Run 2	: 19.8	
Sulfur, wt%	: 0.00	Run 3	: 17.6	
Nitrogen,wt%	: 0.00			
Oxygen, wt%	: 0.00			
Btu/lb	: 0			

Type of Flow Meter : (1=Meter Box 2=Mass Flow Meter) 1
F-Factor : dscf/MMBtu;

FIELD DATA ------- METHOD 5	RUN 1	RUN 2	RUN 3
Meter Temp., Tm (F)	74	76	77
Stack Temp., Ts (F)	150	149	150
Sq.Rt. dP	0.47	0.47	0.49
dH (in. H2O)	1.17	1.21	1.30
Meter Vol.,Vm (ft3)	35.056	38.134	37.309
Meter Y	0.997	0.997	0.997
Bar. Press.,Pb (in.Hg.)	30.03	29.98	29.95
Vol. H2O, Vlc (ml)	206	211	242
Static Press.,Ps (in.H2O)	-0.28	-0.28	-0.28
Test Time (min.)	60.0	60.0	60.0
Nozzle Dia.,Dn (in.)	0.313	0.313	0.313
Oxygen, O2 (%)	5.8	6.7	7.9
Carbon Dioxide, CO2 (%)	12.0	11.5	11.4
Carbon Monoxide, CO (%)	0.0	0.0	0.0

Report Emission Criteria in ? 1 = lb/hr g = gr/dscf : G
Process Rate Units ? T = Ton/hr, L = Lbs/hr, C = Cans/min: T
Allowable Particulate Matter Concentration .....: 0.20

LABORATORY RESULTS	RUN 1	RUN 2	RUN 3	
GRAVIMETRIC ANALYSIS METHOD 5 :				
Front Half Wash (FHW)	0.00990	0.01010	0.00940	grams
Filterable Sample (MF)	0.13720	0.11690	0.11980	
Condensible Sample (BHW)	0.00000	0.00000	0.00000	

SOURCE TEST CALCULATIONS

PLANT : JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER

RUN NO.: 1
DATE : FEBRUARY 20, 2002

STD.TEMP, Tstd	= 68 F	STATIC PRESS.,Ps	= -0.28 in. H2O
METER TEMP, Tm	= 74.4166 F	PITOT COFF., Cp	= 0.840
STACK TEMP, Ts	= 149.5 F	STACK I.D.	= 69.90 inch
AVG.VEL.HEAD,dP	= 0.222 in. H2O	DUCT LENGTH	= inch
METER ORIFICE,dH	= 1.17 in. H2O	DUCT WIDTH	= inch
METER VOL., Vm	= 35.056 Cu.Ft.	STACK AREA, As	= 26.649 Sq.Ft.
METER COFF., Y	= 0.997	TEST TIME	= 60.00 min.
BAR. PRESS., Pb	= 30.03 in.Hg	NOZZLE DIA.	= 0.313 inch
COND.(Vlc)	= 206.0 ml	NOZZLE DIA., An	= 5.3E-04 Sq.Ft.

GAS ANALYSIS = 5.83 % O2 0.00 % CO
11.97 % CO2 82.20 % N2

****

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 34.758 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vlc = 9.696 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.218

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 0.252

Lower Bws value used.

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 36.73

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.15

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 27.50

P(stack) = Pbar + (Ps / 13.6) ..... = 30.01 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] ..... = 29.05 ft/sec

Qs = vs x As x 60 ..... = 46,446 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... = 31,551 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std) / (T(std) + 460) / 29.92] x 100 / [Time x P(stack) x An x vs x 60] ..... = 91.58 %

SOURCE TEST CALCULATIONS

PLANT : JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER

RUN NO.: 2
DATE : FEBRUARY 20, 2002

STD.TEMP, Tstd	=	68 F	STATIC PRESS.,Ps	=	-0.28 in. H2O
METER TEMP, Tm	=	76.38 F	PITOT COFF., Cp	=	0.840
STACK TEMP, Ts	=	149.4 F	STACK I.D.	=	69.90 inch
AVG.VEL.HEAD,dP	=	0.220 in. H2O	DUCT LENGTH	=	inch
METER ORIFICE,dH	=	1.21 in. H2O	DUCT WIDTH	=	inch
METER VOL., Vm	=	38.134 Cu.Ft.	STACK AREA, As	=	26.649 Sq.Ft.
METER COFF., Y	=	0.997	TEST TIME	=	60.00 min.
BAR. PRESS., Pb	=	29.98 in.Hg	NOZZLE DIA.	=	0.313 inch
COND.(Vlc)	=	211.0 ml	NOZZLE DIA., An	=	5.3E-04 Sq.Ft.

GAS ANALYSIS = 6.70 % O2 0.00 % CO
11.50 % CO2 81.80 % N2

********** **********

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	=	37.612	dscf
Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vlc	=	9.932	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	=	0.209	Lower Bws value used.
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	=	0.247	
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100	=	44.98	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)]	=	30.11	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	=	27.58	
P(stack) = Pbar + (Ps / 13.6)	=	29.96	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	=	28.91	ft/sec
Qs = vs x As x 60	=	46,221	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92)	=	31,722	dscf/min
I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std) / (T(std) + 460) / 29.92] x 100 / [Time x P(stack) x An x vs x 60]	=	98.57	%

SOURCE TEST CALCULATIONS

PLANT : JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER

RUN NO.: 3
DATE : FEBRUARY 20, 2002

STD.TEMP, Tstd	=	68 F	STATIC PRESS.,Ps	=	-0.28 in. H2O
METER TEMP, Tm	=	77.00 F	PITOT COFF., Cp	=	0.840
STACK TEMP, Ts	=	150.4 F	STACK I.D.	=	69.90 inch
AVG.VEL.HEAD,dP	=	0.236 in. H2O	DUCT LENGTH	=	inch
METER ORIFICE,dH	=	1.30 in. H2O	DUCT WIDTH	=	inch
METER VOL., Vm	=	37.309 Cu.Ft.	STACK AREA, As	=	26.649 Sq.Ft.
METER COFF., Y	=	0.997	TEST TIME	=	60.00 min.
BAR. PRESS., Pb	=	29.95 in.Hg	NOZZLE DIA.	=	0.313 inch
COND.(Vlc)	=	242.0 ml	NOZZLE DIA., An	=	5.3E-04 Sq.Ft.

GAS ANALYSIS = 7.93 % O2 0.00 % CO
11.37 % CO2 80.70 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 36.727 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vlc = 11.391 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.237 | Lower Bws value used.

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 0.253

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 59.29

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.14

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 27.26

P(stack) = Pbar + (Ps / 13.6) ..... = 29.93 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] ..... = 30.18 ft/sec

Qs = vs x As x 60 ..... = 48,259 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... = 31,871 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std) / (T(std) + 460) / 29.92] x 100 / [Time x P(stack) x An x vs x 60] ..... = 95.80 %

A. FIELD DATA SUMMARY

PLANT : JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER
DATE : FEBRUARY 20, 2002

	RUN 1	RUN 2	RUN 3
Vlc = Vol water collected in train, ml	206.0	211.0	242.0
Vm = Sample gas vol, meter cond., acf	35.056	38.134	37.309
Y = Meter calibration factor	0.9970	0.9970	0.9970
Pbar = Barometric pressure, in. Hg	30.03	29.98	29.95
Pstatic = Stack static pressure, in. H2O	-0.28	-0.28	-0.28
dH = Avg meter pressure diff, in. H2O	1.17	1.21	1.30
Tm = Absolute meter temp., degrees R	534.4	536.4	537.0
Vm(std) = Sample gas vol, Std. cond., dscf	34.758	37.612	36.727
Bws = Water vapor in gas stream, fraction	0.218	0.209	0.237
MF = Moisture factor (1 - Bws)	0.782	0.791	0.763
CO2 = Carbon Dioxide, dry, volume %	11.97	11.50	11.37
O2 = Oxygen, dry, volume %	5.83	6.70	7.93
N2 = Nitrogen, dry volume %	82.20	81.80	80.70
Md = Molecular weight of stack gas, dry	30.15	30.11	30.14
Ms = Molecular weight of stack gas, wet	27.50	27.58	27.26
Cp = Pitot tube coefficient	0.84	0.84	0.84
Sq.Rt. dP = Avg. square root of each dP	0.4707	0.4687	0.4859
Ts = Absolute stack temp., degrees R	609.5	609.4	610.4
A = Area of stack, ft2	26.65	26.65	26.65
Qstd = Volumetric flowrate, dscfm	31,551	31,722	31,871
An = Nozzle area, ft2	5.34E-04	5.34E-04	5.34E-04
O = Sample time, minutes	60.00	60.00	60.00
%I = Isokinetic variation, percent	91.58	98.57	95.80

B. PARTICULATE DATA SUMMARY

PLANT : JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER
DATE : FEBRUARY 20, 2002

	RUN 1	RUN 2	RUN 3
Sample Weight (FHW + MF + BHW), mg	147.10	127.00	129.20
Meter Volume, standard cond., Vm(std)	34.758	37.612	36.727
Carbon Dioxide, percent	11.97	11.50	11.37
Oxygen, percent	5.83	6.70	7.93
Sample Concentration :			
gr/scf	0.0511	0.0412	0.0414
gr/dscf	0.0653 (0.0651)	0.0521	0.0543
gr/dscf @ 0 % CO2	0.0655	0.0544	0.0573
gr/dscf @ 0 % O2	0.0906	0.0767	0.0875
ppm * MW (dry gas).....	3592.1	2865.9	2985.8
ppm * MW @ 0% CO2	0.0	0.0	0.0
ppm * MW @ 0% O2	4981.7	4218.1	4811.4

EMISSION RATE CALCULATIONS

PLANT :JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER

RUN NO.: 1
STANDARD TEMP. : 68 F DATE : FEBRUARY 20, 2002

Front Half Wash (FHW)	0.00990	grams	Vm(std)	34.758	ft3
Mass Filter (MF)	0.13720	grams	Vw(std)	9.696	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	31,551	dscfm
Vm(std) SO2		dscf	Bws	0.218	
CO2 CORR 0.0 %			CO2	11.97	%
O2 CORR. 0.0 %			O2	5.83	%

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... dscf/MMBtu

FUEL USE

Use Rate (gal/ton) * Process Wt. (ton/hr) ..... gal/hr
Heat Input = (Process Weight (ton/hr) x Heating .... MMBtu/hr
Value (Btu/gal) x Fuel Use Rate (gal/ton) / 1E6

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0511	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0653	gr/dscf
gr/dscf x (12 / %CO2)	0.0655	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)] ...	0.0906	@ 0% O2
0.00857 x Qs(std) x gr/dscf	17.66	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu
Particulate (lb/hr) / Heat Input (MMBtu/hr)		lb/MMBtu

17.61 +8.25

TOTAL ACID MIST

[1.0811E-4 x (Vt - Vtb) x N x Vsol] / Vol(aloq)	lb Acid Mist
[Acid Mist (lb) / Vm std (ft^3)] x Qs std x 60 ...	lb/hr
[Acid Mist (lb) / Vm std (ft^3)] x F-Factor	lb/MMBtu

SULFUR DIOXIDE (SO2)

[7.061E-5 x (Vt - Vtb) x N x Vsol] / Vol(aloq)	lb SO2
[SO2 (lb) / Vm std (ft^3)] x Qs std (ft^3/min) x 60	lb/hr
[SO2 (lb) / Vm std (ft^3)] x F	lb/MMBtu
[Mass SO2 (lb) x 385 / 64E+6 (ft^3/lb)] / Vm (std)	ppm
ppm x 0.0 % Corr. / 12.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 5.8% O2 Stack)	ppm @ 0% O2
SO2 (lb/hr / Heat Input)	lb/MMBtu

HYDROGEN CHLORIDE DATA SUMMARY

[Mass HCl(mg) x 385 x 1E6] / [453600 x 36.5 x Vm(std	ppm
ppm x 0.0 % Corr. / 12.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 12.0% O2 Stack	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)]...	lb/hr

EMISSION RATE CALCULATIONS

PLANT :JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER

RUN NO.: 2
STANDARD TEMP. : 68 F DATE : FEBRUARY 20, 2002

Front Half Wash (FHW)	0.01010	grams	Vm(std)	37.612	ft3
Mass Filter (MF)	0.11690	grams	Vw(std)	9.932	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	31,722	dscfm
Vm(std) SO2		dscf	Bws	0.209	
CO2 CORR 0.0 %			CO2	11.50	%
O2 CORR. 0.0 %			O2	6.70	%

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... dscf/MMBtu

FUEL USE

Use Rate (gal/ton) * Process Wt. (ton/hr) ..... gal/hr
Heat Input = (Process Weight (ton/hr) x Heating .... MMBtu/hr
Value (Btu/gal) x Fuel Use Rate (gal/ton) / 1E6

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0412	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0521	gr/dscf
gr/dscf x (12 / %CO2)	0.0544	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)] ...	0.0767	@ 0% O2
0.00857 x Qs(std) x gr/dscf	14.17	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu
Particulate (lb/hr) / Heat Input (MMBtu/hr)		lb/MMBtu

TOTAL ACID MIST

[1.0811E-4 x (Vt - Vtb) x N x Vsol] / Vol(aloq)	lb Acid Mist
[Acid Mist (lb) / Vm std (ft^3)] x Qs std x 60 ...	lb/hr
[Acid Mist (lb) / Vm std (ft^3)] x F-Factor	lb/MMBtu

SULFUR DIOXIDE (SO2)

[7.061E-5 x (Vt - Vtb) x N x Vsol] / Vol(aloq) .	lb SO2
[SO2 (lb) / Vm std (ft^3)] x Qs std (ft^3/min) x 60	lb/hr
[SO2 (lb) / Vm std (ft^3)] x F	lb/MMBtu
[Mass SO2 (lb) x 385 / 64E+6 (ft^3/lb)] / Vm (std)	ppm
ppm x 0.0 % Corr. / 12.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 12.0% O2 Stack	ppm @ 0% O2
SO2 (lb/hr / Heat Input)	lb/MMBtu

HYDROGEN CHLORIDE DATA SUMMARY

[Mass HCl(mg) x 385 x 1E6] / [453600 x 36.5 x Vm(std	ppm
ppm x 0.0 % Corr. / 11.5 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.5% O2 Stack	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)]...	lb/hr

EMISSION RATE CALCULATIONS

PLANT :JEFFERSON POWER / MONTICELLO, FL.
WOOD FIRED BOILER

RUN NO.: 3
STANDARD TEMP. : 68 F DATE : FEBRUARY 20, 2002

Front Half Wash (FHW)	0.00940	grams	Vm(std)	36.727	ft3
Mass Filter (MF)	0.11980	grams	Vw(std)	11.391	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	31,871	dscfm
Vm(std) SO2		dscf	Bws	0.237	
CO2 CORR 0.0 %			CO2	11.37	%
O2 CORR. 0.0 %			O2	7.93	%

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... dscf/MMBtu

FUEL USE

Use Rate (gal/ton) * Process Wt. (ton/hr) ..... gal/hr
Heat Input = (Process Weight (ton/hr) x Heating .... MMBtu/hr
Value (Btu/gal) x Fuel Use Rate (gal/ton) / 1E6

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0414	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0543	gr/dscf
gr/dscf x (12 / %CO2)	0.0573	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)] ...	0.0875	@ 0% O2
0.00857 x Qs(std) x gr/dscf	14.83	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu
Particulate (lb/hr) / Heat Input (MMBtu/hr)		lb/MMBtu

TOTAL ACID MIST

[1.0811E-4 x (Vt - Vtb) x N x Vsol] / Vol(aloq)	lb Acid Mist
[Acid Mist (lb) / Vm std (ft^3)] x Qs std x 60 ...	lb/hr
[Acid Mist (lb) / Vm std (ft^3)] x F-Factor	lb/MMBtu

SULFUR DIOXIDE (SO2)

[7.061E-5 x (Vt - Vtb) x N x Vsol] / Vol(aloq) .	lb SO2
[SO2 (lb) / Vm std (ft^3)] x Qs std (ft^3/min) x 60	lb/hr
[SO2 (lb) / Vm std (ft^3)] x F	lb/MMBtu
[Mass SO2 (lb) x 385 / 64E+6 (ft^3/lb)] / Vm (std)	ppm
ppm x 0.0 % Corr. / 12.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 12.0% O2 Stack	ppm @ 0% O2
SO2 (lb/hr / Heat Input)	lb/MMBtu

HYDROGEN CHLORIDE DATA SUMMARY

[Mass HCl(mg) x 385 x 1E6] / [453600 x 36.5 x Vm(std	ppm
ppm x 0.0 % Corr. / 11.4 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.4% O2 Stack	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)]...	lb/hr

KOOGLER AND ASSOCIATES, ENVIRONMENTAL SERVICES
SUMMARY OF VISIBLE EMISSIONS
FOR 60-MINUTES

PLANT : Jefferson Power
SOURCE: Wood Fired Boiler
DATE : February 20, 2002
TIME : 16:01-17:01

SECONDS / MINUTES	0	15	30	45
	OPACITY (%)			
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0
7	0	0	0	0
8	0	0	0	0
9	0	0	0	0
10	0	0	0	0
11	0	0	0	0
12	0	0	0	0
13	0	0	0	0
14	0	0	0	0
15	0	0	0	0
16	0	0	0	0
17	0	0	0	0
18	0	0	0	0
19	0	0	0	0
20	0	0	0	0
21	0	0	0	0
22	0	0	0	0
23	0	0	0	0
24	0	0	0	0
25	0	0	0	0
26	0	0	0	0
27	0	0	0	0
28	0	0	0	0
29	0	0	0	0
30	0	0	0	0

KOOGLER AND ASSOCIATES, ENVIRONMENTAL SERVICES
SUMMARY OF VISIBLE EMISSIONS
FOR 60-MINUTES

PLANT : Jefferson Power
SOURCE: Wood Fired Boiler
DATE : February 20, 2002
TIME : 16:01-17:01

SECONDS /	0	15	30	45
		OPACITY (%)		
31	0	0	0	0
32	0	0	0	0
33	0	0	0	0
34	0	0	0	0
35	0	0	0	0
36	0	0	0	0
37	0	0	0	0
38	0	0	0	0
39	0	0	0	0
40	0	0	0	0
41	0	0	0	0
42	0	0	0	0
43	0	0	0	0
44	0	0	0	0
45	0	0	0	0
46	0	0	0	0
47	0	0	0	0
48	0	0	0	0
49	0	0	0	0
50	0	0	0	0
51	0	0	0	0
52	0	0	0	0
53	0	0	0	0
54	0	0	0	0
55	0	0	0	0
56	0	0	0	0
57	0	0	0	0
58	0	0	0	0
59	0	0	0	0
60	0	0	0	0

AVERAGE OPACITY: 0.0 %

MAXIMUM OPACITY: 0 %

KOOGLER AND ASSOCIATES, ENVIRONMENTAL SERVICES
SIX-MINUTE AVERAGES OF VISIBLE EMISSIONS
FOR 60-MINUTES

PLANT : Jefferson Power
SOURCE: Wood Fired Boiler
DATE : February 20, 2002
TIME : 16:01-17:01

MINUTES	--- SIX-MINUTE ROLLING AVERAGES --- OPACITY (%) ---			
1	-	-	-	-
2	-	-	-	-
3	-	-	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	0.0
7	0.0	0.0	0.0	0.0
8	0.0	0.0	0.0	0.0
9	0.0	0.0	0.0	0.0
10	0.0	0.0	0.0	0.0
11	0.0	0.0	0.0	0.0
12	0.0	0.0	0.0	0.0
13	0.0	0.0	0.0	0.0
14	0.0	0.0	0.0	0.0
15	0.0	0.0	0.0	0.0
16	0.0	0.0	0.0	0.0
17	0.0	0.0	0.0	0.0
18	0.0	0.0	0.0	0.0
19	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0
21	0.0	0.0	0.0	0.0
22	0.0	0.0	0.0	0.0
23	0.0	0.0	0.0	0.0
24	0.0	0.0	0.0	0.0
25	0.0	0.0	0.0	0.0
26	0.0	0.0	0.0	0.0
27	0.0	0.0	0.0	0.0
28	0.0	0.0	0.0	0.0
29	0.0	0.0	0.0	0.0
30	0.0	0.0	0.0	0.0

KOOGLER AND ASSOCIATES, ENVIRONMENTAL SERVICES
SIX-MINUTE AVERAGES OF VISIBLE EMISSIONS
FOR 60-MINUTES

PLANT : Jefferson Power
SOURCE: Wood Fired Boiler
DATE : February 20, 2002
TIME : 16:01-17:01

MINUTES	--- SIX-MINUTE ROLLING AVERAGES --- OPACITY (%) ---			
31	0.0	0.0	0.0	0.0
32	0.0	0.0	0.0	0.0
33	0.0	0.0	0.0	0.0
34	0.0	0.0	0.0	0.0
35	0.0	0.0	0.0	0.0
36	0.0	0.0	0.0	0.0
37	0.0	0.0	0.0	0.0
38	0.0	0.0	0.0	0.0
39	0.0	0.0	0.0	0.0
40	0.0	0.0	0.0	0.0
41	0.0	0.0	0.0	0.0
42	0.0	0.0	0.0	0.0
43	0.0	0.0	0.0	0.0
44	0.0	0.0	0.0	0.0
45	0.0	0.0	0.0	0.0
46	0.0	0.0	0.0	0.0
47	0.0	0.0	0.0	0.0
48	0.0	0.0	0.0	0.0
49	0.0	0.0	0.0	0.0
50	0.0	0.0	0.0	0.0
51	0.0	0.0	0.0	0.0
52	0.0	0.0	0.0	0.0
53	0.0	0.0	0.0	0.0
54	0.0	0.0	0.0	0.0
55	0.0	0.0	0.0	0.0
56	0.0	0.0	0.0	0.0
57	0.0	0.0	0.0	0.0
58	0.0	0.0	0.0	0.0
59	0.0	0.0	0.0	0.0
60	0.0	0.0	0.0	0.0

HIGHEST SIX-MINUTE ROLLING AVERAGE: 0.0 %

EPA Protocol Gas Analyzer Calibration Data CO Concentration Instrument Range Setting (0 - 2000 ppm)						
Calibration Gas	Conc. (ppmv)	Run No.	Time	Response through Train System Loop (ppmv)	Drift (% of Range)	Accuracy Diff. from Actual (% of Range)
Zero	0.0	R1-Pre	10:20	-0.72		-0.04
Zero	0.0	R1-Post	14:50	0.06	0.04	0.00
CO	144	R1-Pre	10:35	139		-0.23
CO	144	R1-Pre	15:09	140	0.02	-0.21
CO	302	R1-Pre	10:30	287		-0.79
CO	302	R1-Post	15:04	287	0.00	-0.79
CO	855	R1-Pre	10:26	852		-0.14
CO	855	R1-Post	15:04	825	-1.35	-1.49
Zero	0.0	R2-Pre	14:50	0.06		0.00
Zero	0.0	R2-Post	17:09	-0.31	-0.02	-0.02
CO	302	R2-Pre	15:04	287		-0.77
CO	302	R2-Post	17:15	289	0.11	-0.66
Zero	0.0	R3-Pre	17:09	-0.31		-0.02
Zero	0.0	R3-Post	19:05	-0.08	0.01	0.00
CO	144	R1-Pre *	10:35	139		-0.23
CO	144	R3-Post	19:19	138	-0.06	-0.29
CO	302	R3-Pre	17:15	289		-0.66
CO	302	R3-Post	19:13	298	0.47	-0.19
CO	855	R1-Pre *	10:26	852		-0.14
CO	855	R3-Post	0.80	830	-1.14	-1.28

Cal. Gas ppm	% of Range
144	7.20
302	15.10
855	42.75

Jefferson Power LC
Jefferson County, Florida

Time	Date	Alarms	CO ppb	CO ppm	
10:10	02/20/02	-------	709000	709	
10:11	02/20/02	-------	401700	402	
10:12	02/20/02	-------	339700	340	
10:13	02/20/02	-------	516400	516	
10:14	02/20/02	-------	689100	689	
10:15	02/20/02	-------	739300	739	
10:16	02/20/02	-------	266100	266	
10:17	02/20/02	-------	36050	36	
10:18	02/20/02	-------	976.9	1	
10:19	02/20/02	-------	-1514	-2	
10:20	02/20/02	-------	-1399	-1	Zero-air
10:21	02/20/02	-------	-48.5	0	-0.7 <average
10:22	02/20/02	-------	8683	9	
10:23	02/20/02	-------	359800	360	
10:24	02/20/02	-------	851800	852	
10:25	02/20/02	-------	904700	905	
10:26	02/20/02	-------	859300	859	CO Span 855ppm
10:27	02/20/02	-------	845100	845	852.2 <average
10:28	02/20/02	-------	539200	539	
10:29	02/20/02	-------	314000	314	
10:30	02/20/02	-------	295300	295	CO Mid 302 ppm
10:31	02/20/02	-------	294800	295	295.1 <average
10:32	02/20/02	-------	281100	281	
10:33	02/20/02	-------	182500	183	
10:34	02/20/02	-------	140900	141	CO Mid 144 ppm
10:35	02/20/02	-------	138700	139	139.4 <average
10:36	02/20/02	-------	138500	139	
10:37	02/20/02	-------	136500	137	
10:38	02/20/02	-------	58500	59	
10:39	02/20/02	-------	7710	8	
10:40	02/20/02	-------	319300	319	
					<<system offline
					<<during Mill Upset conditions
12:54	02/20/02	-------	337800	338	
12:55	02/20/02	-------	321800	322	
12:56	02/20/02	-------	349400	349	
12:57	02/20/02	-------	390800	391	
12:58	02/20/02	-------	527100	527	
12:59	02/20/02	-------	722100	722	
13:00	02/20/02	-------	620600	621	
13:01	02/20/02	-------	458700	459	
13:02	02/20/02	-------	486900	487	
13:03	02/20/02	-------	800300	800	
13:04	02/20/02	-------	816800	817	
13:05	02/20/02	-------	319300	319	

13:06	02/20/02	-------	211000	211
13:07	02/20/02	-------	446300	446
13:08	02/20/02	-------	562700	563
13:09	02/20/02	-------	397500	398
13:10	02/20/02	-------	286400	286
13:11	02/20/02	-------	259600	260
13:12	02/20/02	-------	250400	250
13:13	02/20/02	-------	262400	262
13:14	02/20/02	-------	219000	219
13:15	02/20/02	-------	237500	238
13:16	02/20/02	-------	253200	253
13:17	02/20/02	-------	237600	238
13:18	02/20/02	-------	231400	231
13:19	02/20/02	-------	284000	284
13:20	02/20/02	-------	295800	296
13:21	02/20/02	-------	236200	236
13:22	02/20/02	-------	200800	201
13:23	02/20/02	-------	215100	215
13:24	02/20/02	-------	204800	205
13:25	02/20/02	-------	188900	189
13:26	02/20/02	-------	193100	193
13:27	02/20/02	-------	213300	213
13:28	02/20/02	-------	217900	218
13:29	02/20/02	-------	278900	279
13:30	02/20/02	-------	235100	235
13:31	02/20/02	-------	219000	219
13:32	02/20/02	-------	231200	231
13:33	02/20/02	-------	227800	228
13:34	02/20/02	-------	235700	236
13:35	02/20/02	-------	264100	264
13:36	02/20/02	-------	278300	278
13:37	02/20/02	-------	283700	284
13:38	02/20/02	-------	274700	275
13:39	02/20/02	-------	261400	261
13:40	02/20/02	-------	287500	288 <<Start Run 1
13:41	02/20/02	-------	404700	405
13:42	02/20/02	-------	786900	787
13:43	02/20/02	-------	1.51E+06	1508
13:44	02/20/02	-------	1.43E+06	1433
13:45	02/20/02	-------	685300	685
13:46	02/20/02	-------	375300	375
13:47	02/20/02	-------	282900	283
13:48	02/20/02	-------	280900	281
13:49	02/20/02	-------	343500	344
13:50	02/20/02	-------	294600	295
13:51	02/20/02	-------	260100	260
13:52	02/20/02	-------	251900	252
13:53	02/20/02	-------	263900	264
13:54	02/20/02	-------	258100	258
13:55	02/20/02	-------	287700	288
13:56	02/20/02	-------	390600	391

13:57	02/20/02	--------	393500	394
13:58	02/20/02	--------	312500	313
13:59	02/20/02	--------	262700	263
14:00	02/20/02	--------	254100	254
14:01	02/20/02	--------	264400	264
14:02	02/20/02	--------	290600	291
14:03	02/20/02	--------	300800	301
14:04	02/20/02	--------	279900	280
14:05	02/20/02	--------	271900	272
14:06	02/20/02	--------	275800	276
14:07	02/20/02	--------	270500	271
14:08	02/20/02	--------	323600	324
14:09	02/20/02	--------	366200	366
14:10	02/20/02	--------	349800	350
14:11	02/20/02	--------	281900	282
14:12	02/20/02	--------	268700	269
14:13	02/20/02	--------	255700	256
14:14	02/20/02	--------	256400	256
14:15	02/20/02	--------	257000	257
14:16	02/20/02	--------	162200	162 <<Port Change
14:17	02/20/02	--------	229300	229
14:18	02/20/02	--------	285900	286
14:19	02/20/02	--------	268000	268
14:20	02/20/02	--------	315200	315
14:21	02/20/02	--------	436800	437
14:22	02/20/02	--------	450300	450
14:23	02/20/02	--------	362100	362
14:24	02/20/02	--------	279400	279
14:25	02/20/02	--------	250900	251
14:26	20-Feb	--------	245000	245
14:27	20-Feb	--------	249700	250
14:28	20-Feb	--------	245200	245
14:29	20-Feb	--------	251600	252
14:30	20-Feb	--------	266800	267
14:31	20-Feb	--------	259000	259
14:32	20-Feb	--------	261000	261
14:33	20-Feb	--------	279600	280
14:34	20-Feb	--------	309200	309
14:35	20-Feb	--------	361000	361
14:36	20-Feb	--------	345900	346
14:37	20-Feb	--------	308900	309
14:38	20-Feb	--------	398500	399
14:39	20-Feb	--------	422700	423
14:40	20-Feb	--------	407800	408 <<END Run1
14:41	20-Feb	--------	408800	409
14:42	20-Feb	--------	362800	363
14:43	20-Feb	--------	337100	337
14:44	20-Feb	--------	310800	311
14:45	20-Feb	--------	250100	250
14:46	20-Feb	--------	578300	578
14:47	20-Feb	--------	283300	283

14:48	20-Feb --------	22680	23	
14:49	20-Feb --------	559.9	1	Zero-air
14:50	20-Feb --------	-449	0	0.1 <average
14:51	20-Feb --------	61270	61	
14:52	20-Feb --------	633300	633	
14:53	20-Feb --------	815000	815	
14:54	20-Feb --------	822600	823	
14:55	20-Feb --------	822800	823	
14:56	20-Feb --------	825100	825	CO Span 855ppm
14:57	20-Feb --------	825300	825	825.2 <average
14:58	20-Feb --------	811000	811	
14:59	20-Feb --------	509100	509	
15:00	20-Feb --------	300300	300	
15:01	20-Feb --------	287200	287	
15:02	20-Feb --------	286700	287	
15:03	20-Feb --------	286600	287	CO Mid 302 ppm
15:04	20-Feb --------	286700	287	286.7 <average
15:05	20-Feb --------	286600	287	
15:06	20-Feb --------	286000	286	
15:07	20-Feb --------	228000	228	
15:08	20-Feb --------	144100	144	CO Mid 144 ppm
15:09	20-Feb --------	135500	136	139.8 <average
15:10	20-Feb --------	204400	204	
15:11	20-Feb --------	329400	329	
15:12	20-Feb --------	1.03E+06	1028	

ANALYZER RESPONSE	ZERO BIAS	ACTUAL SPAN GAS VALUE	SPAN GAS ANALYZER RESPONSE	CORRECTED EFFLUANT VALUE
357.0 CO	-0.33	302.0	290.9	370.6

Jefferson Power LC
Jefferson County, Florida

Time	Date	Alarms	CO	CO ppm	
16:04	02/20/02	———	928200	928	<<START Run 2
16:05	02/20/02	———	416300	416	
16:07	02/20/02	———	301800	302	
16:08	02/20/02	———	250700	251	
16:09	02/20/02	———	251100	251	
16:10	02/20/02	———	250600	251	
16:11	02/20/02	———	295600	296	
16:12	02/20/02	———	314400	314	
16:13	02/20/02	———	275400	275	
16:14	02/20/02	———	288900	289	
16:15	02/20/02	———	347200	347	
16:16	02/20/02	———	503700	504	
16:17	02/20/02	———	660300	660	
16:18	02/20/02	———	1.42E+06	1420	
16:19	02/20/02	———	698800	699	
16:20	02/20/02	———	393900	394	
16:21	02/20/02	———	354600	355	
16:22	02/20/02	———	303200	303	
16:23	02/20/02	———	332100	332	
16:24	02/20/02	———	347800	348	
16:25	02/20/02	———	333600	334	
16:26	02/20/02	———	277100	277	
16:27	02/20/02	———	213000	213	
16:28	02/20/02	———	204200	204	
16:29	02/20/02	———	195000	195	
16:30	02/20/02	———	190600	191	
16:31	02/20/02	———	192400	192	
16:32	02/20/02	———	105700	106	
16:33	02/20/02	———	199300	199	
16:34	02/20/02	———	319300	319	
16:35	02/20/02	———	380700	381	
16:36	02/20/02	———	355800	356	
16:37	02/20/02	———	215700	216	
16:38	02/20/02	———	221400	221	
16:39	02/20/02	———	267900	268	
16:40	02/20/02	———	360700	361	
16:41	02/20/02	———	320700	321	
16:42	02/20/02	———	264100	264	
16:43	02/20/02	———	242900	243	
16:44	02/20/02	———	255700	256	
16:45	02/20/02	———	259800	260	
16:46	02/20/02	———	252200	252	
16:47	02/20/02	———	254200	254	

16:48	02/20/02	———	291300	291	
16:49	02/20/02	———	407500	408	
16:50	02/20/02	———	482600	483	
16:51	02/20/02	———	558500	559	
16:52	02/20/02	———	706200	706	
16:53	02/20/02	———	623000	623	
16:54	02/20/02	———	315800	316	
16:55	02/20/02	———	269100	269	
16:56	02/20/02	———	259800	260	
16:57	02/20/02	———	268300	268	
16:58	02/20/02	———	244000	244	
16:59	02/20/02	———	261400	261	
17:00	02/20/02	———	267700	268	
17:01	02/20/02	———	282700	283	
17:02	02/20/02	———	272400	272	
17:03	02/20/02	———	257200	257	
17:04	02/20/02	———	253100	253	<<END RUN 2
17:05	02/20/02	———	220600	221	
17:06	02/20/02	———	61950	62	
17:07	02/20/02	———	3018	3	
17:08	02/20/02	———	-220.8	0	Zero-air
17:09	02/20/02	———	-309.6	0	-0.3 <average
17:10	02/20/02	———	-385.5	0	
17:11	02/20/02	———	16490	. 16	
17:12	02/20/02	———	207800	208	
17:13	02/20/02	———	287200	287	
17:14	02/20/02	———	288700	289	CO Mid 302 ppm
17:15	02/20/02	———	288800	289	288.8 <average
17:16	02/20/02	———	288100	288	
17:17	02/20/02	———	274500	275	

ANALYZER RESPONSE	ZERO BIAS	ACTUAL SPAN GAS VALUE	SPAN GAS ANALYZER RESPONSE	CORRECTED EFFLUANT VALUE
347.3 CO	-0.12	302.0	287.7	364.5

Jefferson Power LC
Jefferson County, Florida

Time	Date	Alarms	CO	CO ppm	
17:41	02/20/02	--------	900400	900	
17:42	02/20/02	--------	780800	781	
17:43	02/20/02	--------	776500	777	
17:44	02/20/02	--------	673000	673	
17:45	02/20/02	--------	651900	652	
17:46	02/20/02	--------	723200	723	
17:47	02/20/02	--------	554300	554	
17:48	02/20/02	--------	445700	446	
17:49	02/20/02	--------	496300	496	
17:50	02/20/02	--------	495400	495	
17:51	02/20/02	--------	643400	643	
17:52	02/20/02	--------	608900	609	
17:53	02/20/02	--------	419600	420	
17:54	02/20/02	--------	336800	337	
17:55	02/20/02	--------	317400	317	
17:56	02/20/02	--------	290400	290	
17:57	02/20/02	--------	430300	430	
17:58	02/20/02	--------	447400	447	
17:59	02/20/02	--------	268600	269	
18:00	02/20/02	--------	277100	277	<<Start Run 3
18:01	02/20/02	--------	245800	246	
18:02	02/20/02	--------	261400	261	
18:03	02/20/02	--------	242200	242	
18:04	02/20/02	--------	216100	216	
18:05	02/20/02	--------	231300	231	
18:06	02/20/02	--------	245000	245	
18:07	02/20/02	--------	266700	267	
18:08	02/20/02	--------	324400	324	
18:09	02/20/02	--------	315500	316	
18:10	02/20/02	--------	325700	326	
18:11	02/20/02	--------	566100	566	
18:12	02/20/02	--------	686300	686	
18:13	02/20/02	--------	532100	532	
18:14	02/20/02	--------	330800	331	
18:15	02/20/02	--------	282900	283	
18:16	02/20/02	--------	284900	285	
18:17	02/20/02	--------	293900	294	
18:18	02/20/02	--------	285900	286	
18:19	02/20/02	--------	285400	285	
18:20	02/20/02	--------	285300	285	
18:21	02/20/02	--------	249100	249	
18:22	02/20/02	--------	261600	262	
18:23	02/20/02	--------	260900	261	
18:24	02/20/02	--------	271400	271	
18:25	02/20/02	--------	296900	297	

18:26	02/20/02	365300	365	
18:27	02/20/02	1.51E+06	1507	
18:28	02/20/02	1.88E+06	1876	
18:29	02/20/02	765600	766	
18:30	02/20/02	384300	384	
18:31	02/20/02	284500	285	
18:32	02/20/02	265000	265	
18:33	02/20/02	243000	243	
18:34	02/20/02	261100	261	
18:35	02/20/02	285500	286	
18:36	02/20/02	359600	360	
18:37	02/20/02	488300	488	
18:38	02/20/02	566400	566	
18:39	02/20/02	471400	471	
18:40	02/20/02	376400	376	
18:41	02/20/02	453900	454	
18:42	02/20/02	438800	439	
18:43	02/20/02	516700	517	
18:44	02/20/02	436100	436	
18:45	02/20/02	312100	312	
18:46	02/20/02	632600	633	
18:47	02/20/02	1.29E+06	1287	
18:48	02/20/02	511500	512	
18:49	02/20/02	333800	334	
18:50	02/20/02	309800	310	
18:51	02/20/02	281600	282	
18:48	02/20/02	511500	512	
18:49	02/20/02	333800	334	
18:50	02/20/02	309800	310	
18:51	02/20/02	281600	282	
18:52	02/20/02	273800	274	
18:53	02/20/02	284900	285	
18:54	02/20/02	301800	302	
18:55	02/20/02	302400	302	
18:56	02/20/02	277400	277	
18:57	02/20/02	284100	284	
18:58	02/20/02	288100	288	
18:59	02/20/02	366700	367	
19:00	02/20/02	392300	392	
19:01	02/20/02	377000	377	
19:02	02/20/02	295100	295	
19:03	02/20/02	49650	50	
19:04	02/20/02	2535	3	
19:05	02/20/02	-15.01	0	Zero-air
19:06	02/20/02	-144.1	0	-0.1 <average
19:07	02/20/02	31210	31	
19:08	02/20/02	567400	567	
19:09	02/20/02	820700	821	
19:10	02/20/02	830100	830	CO Span 855ppm
19:11	02/20/02	828900	829	829.5 <average
19:12	02/20/02	571800	572	

19:13	02/20/02 --------	307600	308	CO Mid 302 ppm
19:14	02/20/02 --------	288700	289	298.2 <average
19:15	02/20/02 --------	288300	288	
19:16	02/20/02 --------	288100	288	
19:17	02/20/02 --------	281500	282	
19:18	02/20/02 --------	187700	188	
19:19	02/20/02 --------	138200	138	CO Mid 144 ppm
19:20	02/20/02 --------	128200	128	138.2 <average

ANALYZER RESPONSE	ZERO BIAS	ACTUAL SPAN GAS VALUE	SPAN GAS ANALYZER RESPONSE	CORRECTED EFFLUANT VALUE
405.3 CO	-0.19	302.0	293.5	417.1

Field Data Sheets

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Multiple Methods Data Sheet

Plant: Jefferson Power Power Plant
Sample Location: Monticello, FL
Control Type: Scrubber
Sample Type: PM, CO
Date: 2/22/02 Run No.: 1
Time Start: 13:43 Time End: 15:00
Sample Time: 2.5/12/2 min/point 60 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 30.03"Hg Stack Press: "Hg Ps: -0.28"H_2O
Moisture: 22 % FDA: Gas Density Factor:
Temperature: 73 °F Wind Direction: SE Wind Speed: 20-25
Weather: clear Thermocouple Readout: KAK-2
Sample Box No.: KA-2 Meter Box No.: KA-2
Meter Y: 0.999 @ Delta H: 1.606 Pitot Corr.: 0.84
Nozzle Diameter: 0.313 inches Probe Length: 7.55 feet
Probe Heater Setting: Nomograph Cf: 5.29
Stack Dimensions: 69.9" inches
Stack Area: ft²
Effective Stack Area: ft²
Stack Height: ft

Stack Dimensions

Umbilical: KAK-200
Thermocouple
Probe No.: KAK-72
Pitot Tube: KA-551

Material Processing Rate:
Final Gas Meter Reading: 987.657 ft³
Initial Gas Meter Reading: 952.601 ft³
Total Metered Gas Volume: 35.056 ft³
Condensate Gain in Impingers: 198 mL
Weight Gain in Silica Gel: 8 g
Total Moisture Gain 206 mL
Silica Gel Container No.: 40
Filter Number:

Leak Check - Meter Box:
Initial: 0.016 cfm @ 15 inches Hg
Final: 0.000 cfm @ 7 inches Hg

Leak Check - Pitot Tubes
Impact 3 "H^20 for 15 sec: (Stable) Leak
Static 3 "H^20 for 15 sec (Stable) Leak
Test Conducted By: G. Haven, S. Clartier, R. Paul
O_2 % CO_2 %
Stack Test Observers:

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_2O)	Meter Orifice Pressure Difference (H_2O)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average												
1-1			52.6	0.21	1.11	1.11	152	261	63	72	3	
2			54.2	0.21	1.11	1.11	146	258	54	72	3	
3			55.7	0.22	1.16	1.16	143	245	53	72	3	
4			57.3	0.22	1.16	1.16	146	230	52	72	3	
5			58.2	0.23	1.22	1.22	147	233	53	72	4	
6			59.9	0.24	1.27	1.27	151	228	52	72	4	
7			61.6	0.23	1.22	1.22	149	228	52	72	4	
8			63.3	0.24	1.27	1.27	150	250	53	73	4	

~~21,507 dscfm Ts 150~~ 31,551

5.29

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
1-9			64.9	0.23	1.22	1.22	149	252	53	73	4	
10			66.5	0.21	1.11	1.11	146	245	59	73	4	
11			68.0	0.19	1.01	1.01	150	247	52	74	4	
12			69.5	0.16	0.85	0.85	147	248	52	74	3	
2-1			70.8	0.20	1.05	1.05	150	258	59	75	4	
2			72.2	0.21	1.11	1.11	151	262	54	75	4	
3			73.7	0.21	1.11	1.11	151	270	52	75	4	
4			75.3	0.22	1.16	1.16	151	278	52	75	4	
5			76.8	0.21	1.11	1.11	150	263	52	76	5	
6		filter plugged	78.0	0.22	1.16	1.16	147	249	62	77	3 ↓	977.681
7			78.4	0.28	1.48	1.48	153	232	57	77	3	~~977.800~~
9			80.0	0.24	1.27	1.27	155	237	54	77	3	LC= 0.0
9			81.6	0.24	1.27	1.27	153	239	52	77	4	
10		8.2	83.2	0.24	1.27	1.27	151	237	51	77	4	978.0
11		10.7	84.9	0.24	1.27	1.27	152	237	51	77	4	
12		13.2	86.4	0.23	1.22	1.22	149	237	51	77	4	
	end run	15.7										
			987.976 raw									
		-	0.319		leak check							
			987.657									

cubic footage down due to leak check

-0.319

clock reset

977.681

977.800

LC= 0.0 @ 13"

978.0

17.8

18.2 15.7

BEST AVAILABLE COPY

Multiple Methods Data Sheet

Plant: Jefferson Power
Sample Location: Monticello, FL
Control Type: Scrubbers
Sample Type: PM, CO
Date: 2/20/02 Run No.: 2
Time Start: 15:57 Time End: 17:06
Sample Time: 2-5/12/2 min/point 60 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 30.29 "Hg Stack Press: "Hg Ps: -0.28 "H_2O
Moisture: 22 % FDA: Gas Density Factor:
Temperature: 68 °F Wind Direction: SW Wind Speed: 8-10
Weather: Cloudy Thermocouple Readout: KAK-2
Sample Box No.: KA-2 Meter Box No.: KA-2
Meter Y: 0.999 @ Delta H: 1.606 Pitot Corr.: 0.84
Nozzle Diameter: 0.313 inches Probe Length: 7 5 5 feet
Probe Heater Setting: Nomograph Cf: 5.49
Stack Dimensions: 69.9 inches Umbilical: KAK-200
Stack Area: ft^2 Thermocouple
Effective Stack Area: ft^2 Probe No.: KAK-72
Stack Height: ft Pitot Tube: KA-SS11

Stack Dimensions

Material Processing Rate:
Final Gas Meter Reading: 1026.434 ft^3
Initial Gas Meter Reading: 988.300 ft^3
Total Metered Gas Volume: 38.134 ft^3
Condensate Gain in Impingers: 204 mL
Weight Gain in Silica Gel: 7 g
Total Moisture Gain 211 mL
Silica Gel Container No.: 37
Filter Number:

Leak Check - Meter Box:
Initial: 0.012 cfm @ 15 inches Hg
Final: 0.006 cfm @ 7 inches Hg

Leak Check - Pitot Tubes
Impact 3 "H^20 for 15 sec: (Stable) Leak
Static 3 "H^20 for 15 sec: (Stable) Leak
Test Conducted By: GH, SC, R.P.
O_2 % CO_2 %
Stack Test Observers:

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_2O)	Meter Orifice Pressure Difference (H_2O)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average												
1-1			88.3	0.2	1.1	1.1	148	232	56	75	3	
2			89.9	0.2	1.1	1.1	151	281	49	75	3	
3			91.3	0.18	1.0	1.0	153	307	49	75	3	
4		1600 off	92.2	0.2	1.0	1.0	155	270	51	75	3	
5		1605 on	94.2	0.22	1.21	1.2	149	301	51	75	4	
6			95.7	0.24	1.32	1.3	150	287	48	75	4	
7			97.4	0.25	1.37	1.4	151	290	49	75	5	
8			99.1	0.23	1.26	1.3	149	292	48	75	5	

31.965 31.737

5.49

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
1-9			100.7	0.23	1.26	1.3	144	290	49	75	5	
10			101.8	0.23	1.26	1.3	143	289	49	76	5	
11			105.5	0.21	1.21	1.20	150	263	50	76	5	
12		30 min →	107.2	0.20	—	—	151	277	52	77	5	
2-1			108.7	0.21	1.21	1.2	146	269	53	76	4	
2			110.2	0.22	1.21	1.2	149	275	50	77	5	
3			111.8	0.22	1.21	1.2	149	269	51	77	5	
4			112.2	0.22	1.21	1.2	150	260	50	77	5	
5			113.5	0.22	1.21	1.2	150	256	50	77	6	
6		↓	115.0	0.23	1.26	1.3	152	257	51	77	6	
7			116.6	0.24	1.32	1.3	153	241	51	78	6	
8			118.4	0.24	1.32	1.3	152	256	51	78	6.5	
9			120.0	0.24	1.32	1.3	148	264	50	78	6.5	
10			121.6	0.22	1.21	1.2	148	259	50	78	6.5	
11			123.2	0.22	1.21	1.2	147	261	50	78	6.5	
12		60 min → Stop	124.9	0.21	1.21	1.2	148	265	51	78	6.5	

Multiple Methods Data Sheet

Plant: Jefferson Power Power Plant
Sample Location: Monticello, FL
Control Type: Scrubber
Sample Type: PM, CD
Date: 2/20/02 Run No.: 3
Time Start: 18:03 Time End: 19:07
Sample Time: 25/12/2 min/point 60 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 29.95 "Hg Stack Press: "Hg Ps: -0.28 "H_20
Moisture: 21 % FDA: Gas Density Factor:
Temperature: °F Wind Direction: SE Wind Speed: 10-12
Weather: Rain + Overcast Thermocouple Readout: KAK-2
Sample Box No.: KA-1 Meter Box No.: KA-2
Meter Y: 0.999 @ Delta H: 1.606 Pitot Corr.: 0.84
Nozzle Diameter: 0.313 inches Probe Length: 7.55 feet
Probe Heater Setting: Nomograph Cf: 5.49
Stack Dimensions: 69.9 inches
Stack Area: ft²
Effective Stack Area: ft²
Stack Height: ft

Stack Dimensions

Umbilical: KAK-200
Thermocouple
Probe No.: KAK-72
Pitot Tube: KA-55TL

Material Processing Rate:
Final Gas Meter Reading: 64,110 ft³
Initial Gas Meter Reading: 26,801 ft³
Total Metered Gas Volume: 37.309 ft³
Condensate Gain in Impingers: 232 mL
Weight Gain in Silica Gel: 10 g
Total Moisture Gain 242 mL
Silica Gel Container No.: 2
Filter Number:

Leak Check - Meter Box:
Initial: 0.010 cfm @ 15 inches Hg
Final: 0.000 cfm @ 12 inches Hg

Leak Check - Pitot Tubes
Impact 3 "H^20 for 15 sec: (Stable) Leak
Static 3 "H^20 for 15 sec: (Stable) Leak
Test Conducted By: G.M, S.C, R.P.
O_2 % CO_2 %
Stack Test Observers:

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average:												
1-1			26.8	0.24	1.32	1.32	150	250	57	74	4	
2			28.5	0.24	1.32	1.32	151	247	52	74	4	
3			30.1	0.24	1.32	1.32	151	260	50	74	4	
4			31.7	0.23	1.26	1.26	154	262	51	74	5	
5			33.3	0.22	1.21	1.21	153	254	51	75	5	
6			34.9	0.23	1.26	1.26	148	252	53	75	5	
7			36.5	0.25	1.37	1.37	147	249	53	75	5	
8			38.2	0.25	1.37	1.37	151	242	54	75	6	

31,923

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
1-9			39.9	0.24	1.32	1.32	152	243	54	76	6	
10			41.6	0.22	1.21	1.21	154	243	53	74	6	
11			43.2	0.21	1.15	1.15	154	239	53	76	6	
12			44.8	0.24	1.32	1.32	150	244	53	77	6	
2-1			46.3	0.23	1.26	1.26	152	242	54	77	6	
2			47.8	0.24	1.32	1.32	153	247	53	78	6	
3			49.4	0.24	1.32	1.32	153	241	53	78	6	
4			50.7	0.23	1.26	1.26	144	242	52	78	6	
5			52.3	0.22	1.21	1.21	143	238	53	78	6	
6			53.8	0.23	1.26	1.26	140	237	53	79	7	
7			55.5	0.25	1.37	1.37	154	227	53	79	7	
8			57.1	0.24	1.32	1.32	150	234	53	80	7	
9			58.6	0.25	1.37	1.37	150	244	53	80	8	
10			100.3	0.25	1.37	1.37	150	245	53	80	10	
11			61.8	0.24	1.32	1.32	153	252	54	80	10	
12			63.2	0.24	1.32	1.32	153	244	53	80	11	

Traverse Data Sheet

Plant: Jefferson Power

Location/Site: Monticello, FL

Date: 8/20/02

Stack: Power Plant

Stack Dimensions: 69.9"

Stack Area (ft.²): _____

Pitot Corr. Factor: 0.84

DB: _____ °F WB: _____ °F DP: _____ °F

V.P. at DP: _____ "Hg Fract. D.A.: _____

Density Factor: _____

Weather: clear

Temp: 72 °F Barometric Pressure: 30.03

Wind Direction: SE Wind Speed: 20-25

Stack Cross Section

Leak √ good

Pitot Traverse

Point Number	Distance From Stack Wall	Traverse No. 1		Traverse No. 2		Traverse No. 3		Traverse No. 4	
		Stack Pressure: -0.28		Stack Pressure:		Stack Pressure:		Stack Pressure:	
		ΔP	Stack Temp	ΔP	Stack Temp	ΔP	Stack Temp	ΔP	Stack Temp
1		0.21	158						
2		0.21							
3		0.22							
4		0.22							
5		0.21							
6		0.25							
7		0.24							
8		0.24							
9		0.24							
10		0.24							
11		0.23							
12		0.21							
13		0.20							
14		0.21							
15		0.21							
16		0.22							
17		0.22							
18		0.22							
19		0.23							
20		0.26							
21		0.25							
22		0.24							
23		0.23							
24		0.22							

Sampling Rate Calculations

Plant Name: Jefferson Power Date: 2/20/02

Location: Monticello, FL Source: Power Plant

ΔH	=	Orifice Reading (Inches H_20)
Dn	=	Nozzle Diameter (Inches)
ΔH@	=	Meter Box Constant
Bw	=	Moisture Fraction
Tm	=	Meter Temperature (°F)
Ts	=	Stack Temperature (°F)
Ms	=	Wet Molecular Weight of Stack Gas (from Table)
ΔP	=	Pitot Reading (Inches H_20)

$$\left[\frac{Tm + 460}{MS(Ts=460)} (1 - Bw)^2 \; \Delta H@ \; (Dn)^4 \; 17741\right] \Delta P = \Delta H$$

Moisture Fraction	MS
0.0	29.0
0.05	28.5
0.10	27.9
0.15	27.4
0.20	26.8
0.25	26.2
0.30	25.7
0.35	25.2
0.40	24.6

$\frac{530}{(26.4)\ 615}$ $\frac{538}{(150+460)}$

	Run No. 1		Run No. 2		Run No. 3
$\frac{Tm + 460}{MS(Ts+460)}$ =	0.0326		0.033		
x $(1 - Bw)^2$ =	0.5929		0.6084		
x ΔH@ =	1.606		1.606		
x $(Dn)^4$ =	0.0177	0.0036 0.0096	0.00966		
x 17741 =	17741		17741		
x ΔP =	0.22				

9.75 5.49

5.29 5.29 2.0

KAForms: Sampling Rate Calculations
jhm,05/01/01

Laboratory Data

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Particulate Lab Data Sheet

Test Date: 2-20-02

Plant Name: Jefferson Power

Source: Wood fired Boiler

	Run No. 1	Run No. 2	Run No. 3	Blank
Container No.	110	116	107	114
Total Volume (ml)	150	150	150	150
Aliquot Evaporated (ml)	150	150	150	150
Final Weight (g)	107.2348	109.8078	114.0747	111.1036
Tare Weight (g)	107.2249	109.7977	114.0653	111.1032
Gross Weight Gained (g)	0.0099	0.0101	0.0094	
Average Blank (g)	—	—	—	
Net Weight (g)	0.0099	0.0101	0.0094	
Aliquot Factor	x 1.0	x 1.0	x 1.0	x
Total Net Weight (mg)	9.9	10.1	9.4	

Container No.	1-A/1-B	2-A	3-A	BL-2
Filter No.	2880/2881	2882	2790	2907
Final Weight (g)	0.5049/0.4350	0.5202	0.5222	0.4021
Tare Weight (g)	0.4022/0.4005	0.4033	0.4024	0.4022
Gross Weight Gained	0.1372	0.1169	0.1198	-0.0001
Average Blank (g)	—	—	—	—
Total Net Weight (mg)	137.2	116.9	119.8	

Tare Balance Check

0.0 ✓ 10.0 ✓
1.0 ✓ 50.0 ✓
5.0 ✓ 100.0 ✓
T/H 72-46

R Paul
Signature

2-18-02
Date

Final Balance Check

0.0 ✓ 10.0 ✓
1.0 ✓ 50.0 ✓
5.0 ✓ 100.0 ✓
T/H 74-48

R Paul
Signature

2-21-02
Date

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Chain of Custody

Project Number: _____ Project Name: Jefferson Power

Source Name: Wood fired Boiler Sample Location: Monticello, FL

Sample Identification	Remarks
FR1 JP	Filter Run #1
FR2	" " #2
FR3	" " #3
PWR1	Probe Wash Run #1
PW R2	" " " #2
PW R3	" " " #3
SG# 40	Silica Gel # 40
SG# 37	" " # 37
SG# 2	" " # 2

Sampled by: Glen A. Hans 2/22/02 See DATA SHEETS
Signature Date Time

Relinquished by: _____ _____ _____
Signature Date Time

Received by: _____ _____ _____
Signature Date Time

Relinquished by: _____ _____ _____
Signature Date Time

Laboratory:
Received by: Glen A. Hans 2/22/02 17:00
Signature Date Time

Sample Shipped Via: O UPS O Federal Express O Other

Shipping Bill Number: _____

KAForms: Chain of Custody
jhm,10/22/01

PLANT : Jefferson Power

DATE : 2/22/02

SOURCE : Wood Fired Boiler

EPA METHOD 3

ORSAT ANALYSIS

ANALYSIS TOLERANCE
CO2 = 0.9 %
O2 = 0.7 %
CO = 1.2 %

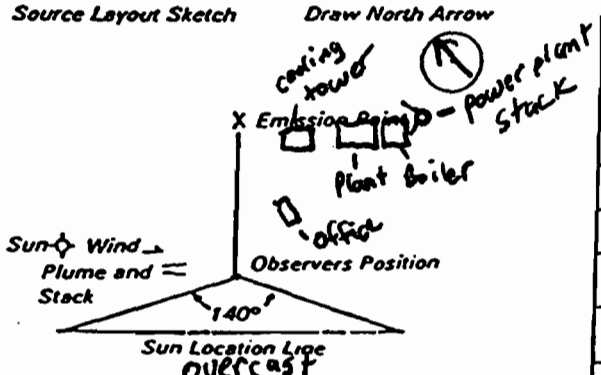
RUN NO.	ANALYSIS NO.	OXYGEN PERCENT	OXYGEN AVERAGE	CARBON DIOXIDE PERCENT	CARBON DIOXIDE AVERAGE
1	1	5.9		11.9	
	2	5.9		11.9	
	3	5.7	5.83	12.1	11.97
2	1	6.7		11.5	
	2	6.6		11.4	
	3	6.7	6.67	11.5	11.47
3	1	8.0		11.4	
	2	7.9		11.4	
	3	8.0	7.93	11.3	11.37
4	1				
	2				
	3				
5	1				
	2				
	3				
6	1				
	2				
	3				
7	1				
	2				
	3				
8	1				
	2				
	3				
9	1				
	2				
	3				
10	1				
	2				
	3				

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

CONTINUED ON VEO FORM NUMBER | 1 | of | 1 |

SOURCE NAME	Jefferson Power
ADDRESS	Near US 19
	Jefferson County
CITY	Monticello
STATE	FL
ZIP	
PHONE	850 643-2641
SOURCE ID NUMBER	0105001
PROCESS EQUIPMENT	Power Plant coal bonaceous fuel fired boiler
OPERATING MODE	
CONTROL EQUIPMENT	Scrubber
OPERATING MODE	
DESCRIBE EMISSION POINT START	Rusty Steel Stack STOP Same
HEIGHT ABOVE GROUND LEVEL START	80' STOP 80'
HEIGHT RELATIVE TO OBSERVER START	80' STOP 80'
DISTANCE FROM OBSERVER START	≈ 275' STOP ≈ 275'
DIRECTION FROM OBSERVER START	129° STOP 129°
DESCRIBE EMISSIONS START	Lofting ~~ASHPHALTING~~ steam plume STOP same
EMISSION COLOR START	White STOP White
PLUME TYPE: CONTINUOUS	X FUGITIVE ☐ INTERMITTENT ☐
WATER DROPLETS PRESENT:	NO ☐ YES X
IF WATER DROPLET PLUME:	ATTACHED X DETACHED ☐
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED START	~~NE~~ NNE STOP 40' end of steam plume
DESCRIBE BACKGROUND START	Overcast SKY STOP same
BACKGROUND COLOR START	Grey white STOP same
SKY CONDITIONS START	Overcast w/Rain STOP same
WIND SPEED START	10-12 STOP 10 12
WIND DIRECTION START	SE STOP SE
AMBIENT TEMP. START	67 STOP 65
WET BULB TEMP.	65
RH percent	90%

Source Layout Sketch — Draw North Arrow



OBSERVATION DATE	START TIME	STOP TIME
2/20/02	16:01	17:01

MIN \ SEC	0	15	30	45	MIN \ SEC	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	NUMBER OF READINGS ABOVE % WERE
RANGE OF OPACITY READINGS MINIMUM	MAXIMUM
OBSERVER'S NAME (PRINT)	Glen A. Haven
OBSERVER'S SIGNATURE	Glen A. Haven
DATE	2/20/02
ORGANIZATION	K+A
CERTIFIED BY	ETA
DATE	12/01
VERIFIED BY	
DATE	

COMMENTS: Concurrent PM Run #2

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE | TITLE | DATE

Debbie — ETA

May 16 Rem.

Certified - Last 10/5/01 Fall 01 JAX

Jefferson Power 2/19/02

Calc. CO @ 59.4 lbs/hr

59lb/hr	1hr/60min	15.mol/28lb	385dscf/lbmol	min/dscf 24000

$= 5.63 \times 10^{-4} = 563 \times 10^{-6}$ or 563 ppm

@ flow = 24,000 dscfm

Max heat input > 185 mmBTU/hr
+ std. compliance demostration level
> = 41,111 lb fuel/hr
@ 4500 BTU/lb

Record:
1) ΔP of scrubber min 4 in H_2O
2) fuel feed lb/hr
3)

~~Jefferson Power~~
Boiler Stack (CO) 2/20/02

9-10 > Instrument + fuel problems / Boiler upset conditions

Start Calibration of CO monitor
10:10 Ø air ON
10:25 Reset Ø > SPAN 855 ppm CO ON
10:28 Set SPAN 855 > Mid 302.4 ON
10:31 Low 144.1 ppm ON
10:40 ON Stack
10:50 > Boiler Upset CO ↑ > 10,000 ppm
11:10 > Trailer power failure (pumps/recorder)
11:13 > power ON OK

11:25 > Repeating Upsets (CO) 10,000 max
13:30 > Mill Boiler has lined out for start of test
13:40 > start Run1
14:11 > port change
14:16 > on stack
14:45 > ~~SPAN 855 ON~~ ZeroAir
14:49 > SPAN 855 ON
14:56 > mid 302 ON

Jefferson Power
Boiler Stack (CO) 2/20/02

15:55 Start Run2
17:02 End Run2
17:02 Ø air ON
17:09 Mid 302 ON
17:14 Cal gases OFF
1800 > Start R3
1900 > End R3
1900 > Ø air ON
1905 > SPAN 855 ON

Process Data

Galbraith Laboratories, Inc.

Accuracy with Speed – Since 1950

LABORATORY REPORT

Mr. Steve Cloutier
Koogler & Associates
4014 NW 13th St
Gainesville, FL 32609

Report Date: 03/06/02

Purchase Order #: 632-01-03
Fax Number: 352-377-7158

SAMPLE ID	LAB ID	ANALYSIS	RESULTS		As Fired
J.P. Run 1 2/20/02	M-3278	Heat of Combustion (dry basis)	8080	Btu/lb	4486 Btu/lb
		Loss on Drying	44.48	%	
J.P. Run 2 2/20/02	M-3279	Heat of Combustion (dry basis)	8137	Btu/lb	3530
		Loss on Drying	56.62	%	
J.P. Run 3 2/20/02	M-3280	Heat of Combustion (dry basis)	8191	Btu/lb	3314
		Loss on Drying	59.54	%	
					3777 Btu/lb

Heating Value as Fired

$$= \left[\frac{(100 - \text{moisture \%})}{100} \times \text{Heat of Comb (dry basis)} \right]$$

Authorized Release of Data

Lee Bates, Director of Client Services

LB:csh

U.S. Mail: P.O. Box 51610 ◆ Knoxville, TN 37950-1610
Other Carriers: 2323 Sycamore Drive ◆ Knoxville, TN 37921-1750
Tel: 865/546-1335 ◆ Fax: 865/546-7209 ◆ Internet: www.galbraith.com ◆ e-mail: labinfo@galbraith.com

REQUEST FOR ANALYSIS

Tracking #: _____

Galbraith Laboratories, Inc.
2323 Sycamore Drive, Knoxville, TN 37921
Toll Free: 877-449-8797 ◆ Tel: 865-546-1335
Fax: 865-546-7209 ◆ www.galbraith.com ◆ labinfo@galbraith.com

◆ Print all information ◆

◆ To avoid delays, please complete ALL areas of this form ◆

Sample I.D. J.P. Run | 2/20/02

Amount of Sample _____

Report To: Dr. / (Mr.) / Ms. (CIRCLE ONE) Steve Cloutier

Title _____

Company Koogler and Associates

Address 4014 NW 13th Street
Gainesville, FL 32609

Phone (352) 377-5822

Fax (352) 377-7158

METHOD OF PAYMENT

Purchase Order # 632-01-03

Prepayment Check # _____ Amount $ _____

Quotation # (if applicable) _____

Credit Card: ☒ Visa ☐ MasterCard ☐ American Express

Holder Name John B. Koogler

Billing / Cardholder Address: 4014 NW 13th Street
Gainesville, FL

Acct # _____

Exp. Date 05/02

Signature glen A. Ham

TYPE OF SERVICE

☐ 24-48 Hour Rush* ☐ QA Level: Basic*
☐ 3-5 Day Rush* ☐ QA Level: Intermediate*
☒ Regular (incl. faxed report) ☐ QA Level: Regulatory*
☐ Phone ☐ Single ☐ QA Level: Custom*
☐ Overnight Delivery* ☐ Duplicate*
☐ Raw Data Copies* ☐ Duplicate only if 1st analysis disagrees
☐ QC Summary* with theory/range*

SAMPLE TYPE

☐ Black Liquor	☐ Organic	☐ Protein
☐ Coal/Coke	☐ Organometallic	☐ RDF
☐ Drug	☐ Paint/Ink	☐ Soil
☐ Food	☐ Paper/Pulp	☐ Water
☐ Inorganic	☐ Petroleum	☒ Wood
☐ Medical Device	☐ Polymer	☐ Other _____

HANDLING & PREPARATION

☐ MSDS	☐ Sensitive to _____
☒ Refrigerate @ 4 C	☐ Weigh under N_2*
☐ Freeze @ -8 C	☐ Weigh under Ar*
☐ Grind*	☐ Hygroscopic

☐ Dry before analysis* _____ hrs _____ C _____ vacuum

SAMPLE CHARACTERISTICS

☒ Non-hazardous ☐ Inhalation: respiratory protection (specify): _____
☐ Hazardous
☐ Explosive ☐ Skin absorption: gloves (specify): _____
☐ Volatile
☐ Carcinogenic/toxic ☐ Other protective equipment (specify): _____
☐ Pyrophoric
☐ Biohazardous
☐ Other _____

MP _____ C BP _____ C @ _____ mmHg

Mol. Wt. _____ Soluble in _____

LIST ANALYSES DESIRED

If repeat analyses are required due to lack of information, extra charges will apply.
If sample size is limited, please prioritize analyses requested.

Test	Theory / Range	Detection Limits Required	Method (if required)
Moisture	30-50%		
Heat of Comb.	7000-10000 Btu/LB		

Matrix or other elements present:

wood chips

Structure and/or Name of Compound:

wood chips

REGULATED STUDIES

Check regulations only if they are specifically required for your current sample submission. Extra charges apply.

☐ EPA GLP	☐ FDA GLP	☒ EPA	☐ GLP/GMP
☐ FIFRA	☐ RCRA	☐ CERCLA	☐ TSCA
☐ CONEG	☐ DRINKING WATER	☐ OTHER	

AUTHORIZED RELEASE OF INFORMATION:

☒ Yes ☐ No (please initial) GAH

List names below Koogler and Associates
Steve Cloutier

SAMPLE RETURN / DISPOSAL
This Section Must Be Completed

Note: The original sample remains the client's property at all times.

This sample ☒ is ☐ is not suitable for disposal in a sanitary landfill or sewer without treatment or packaging.

Signature: glen A. Ham Date: 2/21/02

Samples submitted for analysis are not retained for regulatory purposes. We retain samples for 90 days prior to disposal or return. Any unused sample portions that are not suitable for disposal in a landfill or sewer will be returned. Please be sure to include a return address if different from the report address. Samples with no instructions regarding return/disposal will be returned to the submitter.*

Sample Return Address: _____

Comments:

*See notes on reverse side.

REQUEST FOR ANALYSIS

Tracking #: _____

Galbraith Laboratories, Inc.
2323 Sycamore Drive, Knoxville, TN 37921
Toll Free: 877-449-8797 ◆ Tel: 865-546-1335
Fax: 865-546-7209 ◆ www.galbraith.com ◆ labinfo@galbraith.com

◆ Print all information ◆

◆ To avoid delays, please complete ALL areas of this form ◆

Sample I.D. J.P. Run 2 2/20/02

Amount of Sample _____

Report To: Dr. / (Mr.) / Ms. Steve Cloutier (CIRCLE ONE)

Title _____

Company Koogler and Associates

Address 4014 NW 13th Street
Gainesville, FL 32609

Phone (352) 377-5822

Fax (352) 377-7158

METHOD OF PAYMENT

Purchase Order # 632-01-03

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Quotation # (if applicable) _____

Credit Card: ☒ Visa ☐ MasterCard ☐ American Express

Holder Name John B. Koogler

Billing / Cardholder Address: 4014 NW 13th Street
Gainesville, FL

Acct # _____

Exp. Date 05/02

Signature Glen A. Ham

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☐ Phone ☐ Single ☐ QA Level: Custom*
☐ Overnight Delivery* ☐ Duplicate*
☐ Raw Data Copies* ☐ Duplicate only if 1st analysis disagrees
☐ QC Summary* with theory/range*

SAMPLE TYPE

☐ Black Liquor ☐ Organic ☐ Protein
☐ Coal/Coke ☐ Organometallic ☐ RDF
☐ Drug ☐ Paint/Ink ☐ Soil
☐ Food ☐ Paper/Pulp ☐ Water
☐ Inorganic ☐ Petroleum ☒ Wood
☐ Medical Device ☐ Polymer ☐ Other _____

HANDLING & PREPARATION

☐ MSDS ☐ Sensitive to _____
☒ Refrigerate @ 4 C ☐ Weigh under N_2*
☐ Freeze @ -8 C ☐ Weigh under Ar*
☐ Grind* ☐ Hygroscopic
☐ Dry before analysis* _____ hrs _____ C _____ vacuum

SAMPLE CHARACTERISTICS

☒ Non-hazardous ☐ Inhalation: respiratory protection (specify):
☐ Hazardous _____
☐ Explosive ☐ Skin absorption: gloves (specify):
☐ Volatile _____
☐ Carcinogenic/toxic ☐ Other protective equipment (specify):
☐ Pyrophoric _____
☐ Biohazardous
☐ Other _____

MP _____ C BP _____ C @ _____ mmHg

Mol. Wt. _____ Soluble in _____

LIST ANALYSES DESIRED

If repeat analyses are required due to lack of information, extra charges will apply.
If sample size is limited, please prioritize analyses requested.

Test	Theory / Range	Detection Limits Required	Method (if required)
Moisture	20-50%		
Heat of Comb.	7000-10,000 BTU/LB		

Matrix or other elements present:

wood chips

Structure and/or Name of Compound:

wood chips

REGULATED STUDIES

Check regulations only if they are specifically required for your current sample submission. Extra charges apply.

☐ EPA GLP ☐ FDA GLP ☒ EPA ☐ GLP/GMP
☐ FIFRA ☐ RCRA ☐ CERCLA ☐ TSCA
☐ CONEG ☐ DRINKING WATER ☐ OTHER _____

AUTHORIZED RELEASE OF INFORMATION:

☒ Yes ☐ No (please initial) GH

List names below Koogler and Associates
Steve Cloutier

SAMPLE RETURN / DISPOSAL
This Section Must Be Completed

Note: The original sample remains the client's property at all times.

This sample ☒ is ☐ is not suitable for disposal in a sanitary landfill or sewer without treatment or packaging.

Signature: Glen A. Ham Date: 2/21/02

Samples submitted for analysis are not retained for regulatory purposes. We retain samples for 90 days prior to disposal or return. Any unused sample portions that are not suitable for disposal in a landfill or sewer will be returned. Please be sure to include a return address if different from the report address. Samples with no instructions regarding return/disposal will be returned to the submitter.*

Sample Return Address: _____

Comments:

*See notes on reverse side.

REQUEST FOR ANALYSIS

Tracking #: _____

Galbraith Laboratories, Inc.
2323 Sycamore Drive, Knoxville, TN 37921
Toll Free: 877-449-8797 ◆ Tel: 865-546-1335
Fax: 865-546-7209 ◆ www.galbraith.com ◆ labinfo@galbraith.com

◆ Print all information ◆

◆ To avoid delays, please complete ALL areas of this form ◆

Sample I.D. J.P. Run 3 2/20/02

Amount of Sample _____

Report To: Dr. / (Mr.) / Ms. Steve Cloutier (CIRCLE ONE)

Title _____

Company Koogler and Associates

Address 4014 NW 13th Street

Gainesville, FL 32609

Phone (352) 377-5822

Fax (352) 377-7158

METHOD OF PAYMENT

Purchase Order # 632-01-03

Prepayment Check # _____ Amount $ _____

Quotation # (if applicable) _____

Credit Card: ☒ Visa ☐ MasterCard ☐ American Express

Holder Name John B. Koogler

Billing / Cardholder Address: 4014 NW 13th Street

Gainesville, FL

Acct # _____

Exp. Date 05/02

Signature Glen A. Haan

TYPE OF SERVICE

- ☐ 24-48 Hour Rush*
- ☐ 3-5 Day Rush*
- ☒ Regular (incl. faxed report)
- ☐ Phone
- ☐ Overnight Delivery*
- ☐ Raw Data Copies*
- ☐ QC Summary*
- ☐ QA Level: Basic*
- ☐ QA Level: Intermediate*
- ☐ QA Level: Regulatory*
- ☐ QA Level: Custom*
- ☐ Single
- ☐ Duplicate*
- ☐ Duplicate only if 1st analysis disagrees with theory/range*

SAMPLE TYPE

☐ Black Liquor	☐ Organic	☐ Protein
☐ Coal/Coke	☐ Organometallic	☐ RDF
☐ Drug	☐ Paint/Ink	☐ Soil
☐ Food	☐ Paper/Pulp	☐ Water
☐ Inorganic	☐ Petroleum	☒ Wood
☐ Medical Device	☐ Polymer	☐ Other _____

HANDLING & PREPARATION

- ☐ MSDS
- ☒ Refrigerate @ 4 C
- ☐ Freeze @ -8 C
- ☐ Grind*
- ☐ Dry before analysis* _____ hrs _____ C _____ vacuum
- ☐ Sensitive to _____
- ☐ Weigh under N_2*
- ☐ Weigh under Ar*
- ☐ Hygroscopic

SAMPLE CHARACTERISTICS

- ☒ Non-hazardous
- ☐ Hazardous
- ☐ Explosive
- ☐ Volatile
- ☐ Carcinogenic/toxic
- ☐ Pyrophoric
- ☐ Biohazardous
- ☐ Other _____
- ☐ Inhalation: respiratory protection (specify): _____
- ☐ Skin absorption: gloves (specify): _____
- ☐ Other protective equipment (specify): _____

MP _____ C BP _____ C @ _____ mmHg

Mol. Wt. _____ Soluble in _____

LIST ANALYSES DESIRED

If repeat analyses are required due to lack of information, extra charges will apply.
If sample size is limited, please prioritize analyses requested.

Test	Theory / Range	Detection Limits Required	Method (if required)
Moisture	20-50%		
Heat of Comb.	7000-10000 BTU/LB		

Matrix or other elements present:

wood chips

Structure and/or Name of Compound:

wood chips

REGULATED STUDIES

Check regulations only if they are specifically required for your current sample submission. Extra charges apply.

☐ EPA GLP	☐ FDA GLP	☒ EPA	☐ GLP/GMP
☐ FIFRA	☐ RCRA	☐ CERCLA	☐ TSCA
☐ CONEG	☐ DRINKING WATER	☐ OTHER	

AUTHORIZED RELEASE OF INFORMATION:

☒ Yes ☐ No (please initial) GAH

List names below Koogler and Associates

Steve Cloutier

SAMPLE RETURN / DISPOSAL

This Section Must Be Completed

Note: The original sample remains the client's property at all times.

This sample ☒ is ☐ is not suitable for disposal in a sanitary landfill or sewer without treatment or packaging.

Signature: Glen A. Haan Date: 2/21/02

Samples submitted for analysis are not retained for regulatory purposes. We retain samples for 90 days prior to disposal or return. Any unused sample portions that are not suitable for disposal in a landfill or sewer will be returned. Please be sure to include a return address if different from the report address. Samples with no instructions regarding return/disposal will be returned to the submitter.*

Sample Return Address: _____

Comments:

*See notes on reverse side.

Chain of Custody

Project Number: 632-01-03 Project Name: Jefferson Power

Sample Location: Montrello, FL

Sample Identification	Remarks
JP Run 1 2/20/02	Wood Chip Sample Run 1 Jefferson Power
JP Run 2 2/20/02	Wood Chip Sample Run 2 Jefferson Power
JP Run 3 2/20/02	Wood Chip Sample Run 3 Jefferson Pow.

Sampled by: [signature] Signature 2/20/02 Date See data sheets Time

Relinquished by: [signature] Signature 2/21/02 Date 15:00 Time

Received by: _____ Signature _____ Date _____ Time

Relinquished by: _____ Signature _____ Date _____ Time

Received by: _____ Signature _____ Date _____ Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

KOOGLER & ASSOCIATES

KAForms: Chain of Custody
jhm,08/22/01

TEST # 1

JEFFERSON POWER STACK TEST OPERATING DATA

04/20/02

TEST # / TIME/DATE	5 MINUTES: FEED SCREWS %	5 MINUTES: O2 READING	5 MINUTES: % OF BUCKETS ON RECLAIMER	5 MINUTES: STEAM RATE / STEAM PRESSURE / STEAM TEMP	5 MINUTES: FEEDWATER VALVE % / FEEDWATER TEMP / FEEDWATER PRESS	5 MINUTES: POWER GENERATED	5 MINUTES: SCRUBBER WATER FLOW RATE	5 MINUTES: SCRUBBER WATER PRESSURE
1:40 PM	20 26.9	278		80,000 / 360 / 750°	65 / 260° / 600	5.8	390	30
1:45	11/16/1	500		80,000 / 350 / 250°	64 / 260° / 600	5.8	390	30
1:50	13/18/3	288		80,000 / 360 / 250°	63 / 260° / 600	5.8	390	30
1:55	21/26/10	280		80,000 / 360 / 150°	100 / 260° / 600	5.8	390	30
2:00	15/21/14	250		80,000 / 360 / 700°	62 / 260° / 600	5.8	390	30
2:05	17/23/7	278		80,000 / 360 / 750°	64 / 260° / 600	5.8	390	30
2:10	18/25/9	270		80,000 / 360 / 750°	65 / 260° / 600	5.8	390	30
2:15	19/25/9	264		80,000 / 360 / 750°	65 / 260° / 600	5.8	390	30
2:20	19/25/9	265		80,000 / 360 / 750°	63 / 260° / 600	5.8	390	30
2:25	17/23/7	261		80,000 / 360 / 750°	63 / 260° / 600	5.8	390	30
2:30	18/23/7	247		80,000 / 360 / 750°	62 / 260° / 600	5.8	390	30
2:35	29/33/11	329		80,000 / 360 / 750°	62 / 260° / 600	5.8	390	30
2:40	29/33/12	400		73,000 / 280 / 750°	59 / 260° / 600	4.8	390	30
2:45	29/34/17	291		74,000 / 285 / 750°	57 / 260° / 600	5.2	390	30
2:50	23/28/9	*		80,000 / 305 / 750°	60 / 260° / 600	5.8	390	30
2:55	19/24/6	*		83,000 / 345 / 750°	66 / 260° / 600	6.2	390	30
3:00	26/31/12	*		85,000 / 360 / 750°	67 / 260° / 600	6.0	390	30

23 BUCKETS OF FUEL TOTAL FOR THIS RUN

× 1680 lb/bucket × 1/80 min × 60 min/hr

= 28,980 lb/hr

× 3777 Btu/lb = 109 MM Btu/hr

*TESTERS CALIBRATING CO TESTING MONITORS

TEST #2
02/20/02

JEFFERSON POWER STACK TEST OPERATING DATA

TEST #2 TIME/DATE	5 MINUTES FEED SCREWS %	5 MINUTES CO READING	5 MINUTES # OF BUCKETS ON RECLAIMER	5 MINUTES STEAM RATE STEAM PRESSURE STEAM TEMP	5 MINUTES FEEDWATER VALVE % FEEDWATER TEMP FEEDWATER PRESS	5 MINUTES POWER GENERATED	5 MINUTES SCRUBBER WATER FLOW RATE	5 MINUTES SCRUBBER WATER PRESSURE
3:55P	21/20/8	320		720	65/250/600	5.8	354	30
4:00P	26/31/12	380		720	68/250/600	5.8	354	30
4:05P	15/23/4	394		720	67/250/600	5.7	354	30
4:10P	26/25/6	248		720	67/250/600	5.6	354	29
4:15P	24/5	650		720	64/250/600	5.5	353	29
4:20P	9/14/0	310		720	66/250/600	5.4	350	29
4:25P	16/21/2	332		720	65/250/600	4.8	357	29
4:30P	16/21/3	191		720	66/250/600	5.0	357	29
4:35P	24/29/9	335		720	66/250/600	4.9	352	29
4:40P	16/22/3	362		720	56/250/600	4.9	356	29
4:44P	21/26/7	260		720	58/250/600	5.3	350	30
4:50P	24/29/9	475		720	66/250/605	5.6	347	29
4:55P	16/22/3	265		720	68/250/600	5.4	351	30
5:00	17/21/3	271		720	64/250/600	5.2	353	30
5:05	17/21/4	258		720	65/250/600	5.2	352	30

20 TOTAL BUCKETS OF FUEL FOR TEST

× 1680 lb/bucket × 1/20 min × 60 min/hr

= 28,800 lb/hr

× 3777 Btu/lb = 109 MMBtu/hr

TEST #3

03/20/02

JEFFERSON POWER STACK TEST OPERATING DATA

TEST #3 TIME/DATE	5 MINUTES FEED SCREWS %	5 MINUTES O2 READING	5 MINUTES # OF BUCKETS ON RECLAIMER	5 MINUTES STEAM RATE STEAM PRESSURE STEAM TEMP	5 MINUTES FEEDWATER VALVE % FEEDWATER TEMP FEEDWATER PRESS	5 MINUTES POWER GENERATED	5 MINUTES SCRUBBER WATER FLOW RATE	5 MINUTES SCRUBBER WATER PRESSURE
6:00	21/26/7	243		720	55/720/610	5.0	352	29
6:05	21/26/7	260		720	58/720/610	5.2	354	30
6:10	24/29/9	306		720	60/720/610	5.4	352	30
6:15	16/20/1	285		720	59/720/610	5.4	351	30
6:20	21/26/6	284		720	62/720/610	5.2	356	30
6:25	24/30/11	281		720	60/720/610	5.4	350	30
6:30	24/30/3	296		720	60/720/610	5.4	350	30
6:35	22/26/7	287		720	60/720/610	5.4	354	30
6:40	6/9/0	382		720	57/720/610	5.4	353	30
6:45	16/14/0	315		720	60/720/610	4.8	359	30
6:50	21/19/9	292		720	55/720/610	4.8	363	30
6:55	25/24/11	306		720	58/720/610	5.0	362	30
7:00	22/19/9	385		720	58/720/610	5.2	362	30
7:05								

↑

21 TOTAL BUCKETS OF FUEL FOR TEST RUN

x 1680 lb/bucket x 1/65 hr x 60 min/hr

= 32,566 lb/hr

x 3707 Btu/lb = 123 MMBtu/hr

Equipment Calibrations

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Nozzle Calibration

Date: 2/20/02

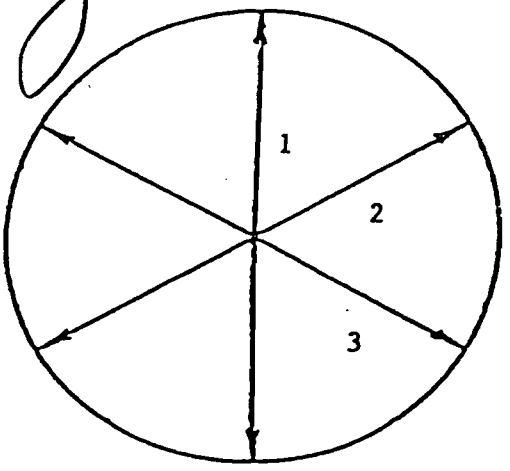
Plant Name: Jefferson Power

Location: Monticello, FL

Source: Power Plant

Measurement Number	Inside Diameter (inches)
1	0.314
2	0.313
3	0.312
Average	0.313
Area of Nozzle	_____ $Ft.^2$

Calibrated by: _____



Nozzle X-Section

KAForms: Nozzle Calibration
jhm,04/24/01

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Pitot Tube Calibration Measurements

Pitot Tube Identification Number: SS-II

Date Calibrated: 7-2-01

Pitot Tube Assembly Level: Yes ☑ No ☐

Pitot Tube Openings Damaged: Yes ☐ No ☑, If yes, please explain: _____

α_1 = 2.0 ° (<10°) α_2 = 1.5 ° (<10°)

β_1 = 1.5 ° (<5°) β_2 = 2.0 ° (<5°)

γ = 20 °, θ = 1.0 °, A = 0.929 in. = (PA+PB)

Z = A SIN γ = 0.0324 in. (<0.125 in.)

W = A SIN θ = 0.0162 in. (<0.031 in.)

P_A 0.464 in. P_b 0.465 in.

Dt 0.373 in. (≥ 0.1875 in. ≤ 0.3750 in.)

Comments: Pitot tube looked o.k. day of test

Calibration required? Yes ☐ No ☑

Calibrated by: R Paul

KAForms: Pitot Tube Calibration Measurements
jhm,06/25/01

Post Test Thermocouple Calibration

Date: 2/20/02

Plant Name: Jefferson Power

Location: Monticello, FL

Source: Wood fired Boiler

Thermocouple Readout No.	KAK-2
Umbilical Cord No.	KAK-200
Switch Box No.	KAK-2
Thermocouple No.	KAK-72
Average Stack Temperature °F	150
* Observed Mercury in Glass (ASTM) °F	150
Observed Thermocouple Reading °F	150

* Observed temperature must be within ten percent of the average stack temperature.

Percent Difference $\frac{(\text{ASTM} + 460) - (\text{Thermo} + 460)}{(\text{ASTM} + 460)} \times 100 =$ 0 %

Tolerance ≤ 1.5%

Signature: Glen A. Kooglen

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES
4014 NW THIRTEENTH STREET
GAINESVILLE, FLORIDA 32609
352/377-5822 FAX 377-7158

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION

KA70 RO/UMB		ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	KA70 RO/UMB	
KA1/100' -	STACK	33	33	65	66	200	199	415	417	KA1/100'	STAC
	BOX	32	32	66	67	200	200	418	418		BOX
	IMP	32	32	66	67	201	200	417	416		IMP
KA2/200'	STACK	33	32	66	66	200	201	420	420	KA2/200'	STAC
	BOX	33	33	65	66	201	201	420	421		BOX
	IMP	32	32	66	67	201	200	422	423		IMP
KA3/25'	STACK	33	33	65	66	201	200	406	405	KA3/25'	STAC
SWBXKA3	BOX	33	33	65	66	200	201	405	405		BOX
	IMP	32	32	66	66	201	202	405	404		IMP
KA4/25'	STACK	32	32	65	66	205	203	411	410	KA4/25'	STAC
SWBXKA3	BOX	33	33	64	65	203	202	411	411		BOX
	IMP	32	33	66	65	202	202	412	413		IMP
KAK/200K	STACK	31	33	67	66	200	201	414	415	KAK/200K	STAC
KAK-38	BOX	32	33	67	67	202	202	415	414	KAK-38	BOX
SWBXKAK1	IMP	33	33	67	66	203	202	415	416		IMP
KA1/200'	STACK	33	32	67	66	203	203	420	418	KA1/200'	STAC
	BOX	33	33	67	66	203	203	420	420		BOX
	IMP	31	33	67	66	204	203	421	422		IMP
KA2/100'	STACK	32	33	66	65	203	202	426	425	KA2/100'	STAC
	BOX	31	33	65	66	203	202	424	423		BOX
	IMP	32	32	65	66	205	204	422	422		IMP

Date 3-14-01

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION

THERMOCOUPLE #	ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	THERMOCOUPLE
KA-06	32	34	68	68	200	201	414	415	KA-06
KA-07	34	33	68	67	202	201	414	414	KA-07
KA-08	33	33	67	68	203	203	413	412	KA-08
KA-09	32	33	67	68	204	205	413	413	KA-09
KA-10	34	34	68	69	204	203	410	409	KA-10
KA-11	33	34	67	68	203	202	406	407	KA-11
KA-12	34	34	69	67	206	205	408	408	KA-12
KA-38	33	32	69	67	205	206	404	405	KA-38
KA-39	33	33	68	68	206	207	410	411	KA-39
KA-50	32	33	68	68	200	201	412	412	KA-50
KA-64	33	32	68	67	208	209	411	413	KA-64
KA-70	33	32	70	69	205	205	420	418	KA-70
KA-71	33	33	69	69	207	207	414	414	KA-71
KA-72	33	32	69	68	203	202	410	409	KA-72
KA-105	33	33	68	68	208	209	409	408	KA-105
KA-108	33	32	68	67	205	204	412	413	KA-108
KA-115	32	32	67	67	204	203	411	411	KA-115
KA-126	34	33	68	68	206	206	406	407	KA-126

THERMOCOUPLE #	ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	THERMOCOUPLE
KAK-08	33	33	70	69	207	205	411	413	KAK-08
KAK-09	33	32	70	70	207	207	411	411	KAK-09
KAK-10	32	33	69	68	205	204	410	409	KAK-10
KAK-11	32	33	69	69	203	202	414	415	KAK-11
KAK-12	33	32	71	70	207	208	409	408	KAK-12
KAK-38	34	32	71	69	208	209	412	413	KAK-38
KAK-65	34	33	69	68	211	211	412	412	KAK-65
KAK-72	33	32	69	70	210	210	408	406	KAK-72
KAK-110	32	33	71	69	209	208	414	415	KAK-110
KAK-07	32	33	67	68	204	205	413	412	KAK-07

VOST SWITCH BOX	T.COUPLE				
CH#1	C-1	33	33	68	69
CH#2	C-1	32	33	70	69
CH#3	C-1	32	33	71	70
VOST SWITCH BOX					
CH#1	C-2	31	32	70	70
CH#2	C-2	32	33	68	68
CH#3	C-2	32	32	69	68

Date 3-14-01

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION

Range - (ºC)	Measured Voltage (mV)	Measured Voltage (V)	Calc. Temp. (ºC)	Readout Temp. (ºC)	Percent Difference (%)
KAK-12	21.9	0.022	530	531	-0.26034
	35.9	0.036	865	868	-0.39525
KAK-38	22.3	0.022	539	536	0.552884
	36.1	0.036	870	872	-0.28207
KAK-72	22.7	0.023	548	550	-0.30284
	36.4	0.036	877	880	-0.34147
KAK-65	22.9	0.023	553	555	-0.35806
	36.8	0.037	887	887	-0.00335
KA-110	22.0	0.022	532	530	0.368610
	35.4	0.035	852	855	-0.32885

EQUATIONS :

T (calc.)=(0.226584602+(24152.109*V)+(67233.4248*V^2)+(2210340.682*V^3)
-(860963914.9*V^4)+(48350600000*V^5)-(1184520000000*V^6)
+(13869000000000*V^7)-(63370800000000*V^8))

Where :

V = Measured Voltage (Volts)
T(calc.) = Temperature calculated based on voltage

Date 3-14-01

POST-TEST DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

ENVIRONMENTAL SUPPLY COMPANY
Quality - Service - Reliability

1) Select one critical orifice to calibrate the dry gas meter which represents the observed operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

COMPANY: Jefferson Power

SOURCE: Wood Fired boiler

DATE: 3/18/02

PRETEST Y: 0.999

METER PART #: KA-2

METER SERIAL #: KA-2

CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	30.18	30.18	30.18

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	$\Delta H_@$
17	1	0.4505	20	133.523	139.411	5.888	76	74	75	74	75	74.5	10.00	1.05	5.8830	5.8743	0.9985	1.7116
17	2	0.4505	20	139.411	146.197	6.786	76	77	76	77	75	76	11.50	1.05	6.7813	6.7618	1.0001	1.7084
17	3	0.4505	20	146.197	153.881	7.684	76	77	76	77	78	77.5	13.00	1.05	7.6147	7.6366	1.0029	1.7116
																AVG =	1.0005	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.0005

PRETEST Y= 0.999

AVERAGE DELTA Y= 0.0016

DELTA Y LIMIT = 0.05

IS TEST WITHIN 5%? YES

(1) $V_m(std) = K_1 V_m \dfrac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\dfrac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

$\Delta H_@ = \left(\dfrac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H$

(3) $Y = \dfrac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

1) Select three critical orifices to calibrate the dry gas meter which bracket the expected operating range.
2) Record barometric pressure before and after calibration procedure.
3) Run at tested vacuum (from Orifice Calibration Report), for a period of time necessary to achieve a minimum total volume of 5 cubic feet.
4) Record readings in outlined boxes below, other columns are automatically calculated.

DATE: 1/10/02 | METER SERIAL #: KA2 | BAROMETRIC PRESSURE (In Hg): INITIAL 30.28, FINAL 30.28, AVG (P_{bar}) 30.28

METER PART #: KA2 | CRITICAL ORIFICE SET SERIAL #: 1376

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (In Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (In H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
32	1	0.8892	18	869.948	878.898	18.950	68	68	68	68	68	68	16.50	3.95	19.3656	19.3397	0.9987		1.6173
32	2	0.8892	18	878.898	888.071	9.173	68	68	68	68	68	68	8.00	3.95	9.3742	9.3768	1.0003		1.6173
32	3	0.8892	18	888.071	905.915	17.844	68	68	69	68	69	68.5	15.50	3.95	18.2181	18.1676	0.9972		1.6173
																AVG =	0.9987	0.00	
22	1	0.5636	18	838.40	845.196	6.796	67	66	66	66	66	66	9.00	1.7	6.9337	6.930	0.9995		1.6128
22	2	0.5636	18	845.196	852.757	7.561	67	66	66	66	66	66	10.00	1.7	7.7142	7.7001	0.9982		1.6128
22	3	0.5636	18	852.757	859.948	7.191	67	66	68	66	68	67	9.50	1.7	7.3228	7.3150	0.9989		1.6128
																AVG =	0.9989	0.01	
12	1	0.316	20	905.915	911.874	5.959	68	69	68	69	68	68.5	14.50	0.49	6.0333	6.0388	1.0011		1.5888
12	2	0.316	20	911.874	917.230	5.356	68	69	69	69	69	69	13.00	0.49	5.4176	5.4150	0.9995		1.5888
12	3	0.316	20	917.230	923.022	5.792	68	69	69	69	69	69	14.00	0.49	5.8587	5.8315	0.9964		1.5888
																AVG =	0.9987	-0.01	

USING THE CRITICAL ORIFICES AS CALIBRATION STANDARDS:

The following equations are used to calculate the standard volumes of air passed through the DGM, V_m (std), and the critical orifice, V_{cr} (std), and the DGM calibration factor, Y. These equations are automatically calculated in the spreadsheet above.

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 0.9987

AVERAGE $\Delta H_@$ = 1.6062

(1) $V_m(std) = K_1 V_m \dfrac{P_{bar} + (\Delta H/13.6)}{T_m}$ = Net volume of gas sample passed through DGM, corrected to standard conditions

K_1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)

T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $V_{cr}(std) = K' \sqrt{\dfrac{P_{bar}\,\theta}{T_{amb}}}$ = Volume of gas sample passed through the critical orifice, corrected to standard conditions

T_{amb} = Absolute ambient temperature (°R - English, °K - Metric)

K' = Average K' factor from Critical Orifice Calibration

(3) $Y = \dfrac{V_{cr}(std)}{V_m(std)}$ = DGM calibration factor

$$\Delta H_@ = \left(\frac{0.75\,\theta}{V_{cr}(std)}\right)^2 \Delta H$$

AIR PRODUCTS

January 28, 2002

Koogler & Associates
Gainesville, FL

CERTIFICATE OF CONFORMANCE

This document certifies that the product listed below is supplied via Air Products & Chemicals, Inc. and complies with a minimum purity specification.

Product: AIR

Grade: UHP/ZERO

Batch:	854-01336	Barcode: DJY972 SG475737
	854-01360	Barcode: DJV981 SG53155A
Oxygen:		23.5%
Total Hydrocarbons:		0.5 Molar ppm
Water:		3.5 Molar ppm

Certified by: E Edward Hendrix Facility Manager

Airgas
Specialty Gases
5480 Hamilton Blvd.
Theodore, AL 36582
P.O. Box 190969
Mobile, AL 36619
Phone: (334) 653-2500
FAX: (334) 653-2530

Certificate of Analysis: E.P.A. Protocol Gas Mixture

Cylinder No :	CC126107	Order No.	431496
Cylinder Pressure:	2000 PSI	Expiration Date:	2/12/04
Certification Date	2/12/01	Laboratory:	ASG-MOBILE

Reference Standard Information:

Type	Component	Cyl. Number	Concentration
GMIS	CARBON MONOXIDE	CC45624	280.1PPM
NTRM81668	PROPANE	CC47113	96.2PPM

Instrumentation:

Instrument/Model/Serial No.	Analytical Principle
Siemens Ultramat 5E J9-662	NDIR
Siemens Fidamat 5E-P K4-391	FID

Analytical Methodology does not require correction for analytical interferences.

Certified Concentrations:

Component	Concentration	Accuracy	Procedure
CARBON MONOXIDE	144.1 ppm	+/- 1%	G1
PROPANE	91.80 ppm	+/- 1%	G1
NITROGEN	BALANCE		

Analytical Results:

1st Component: CARBON MONOXIDE

1st Analysis Date: 2/5/01

R	280.0	S	143.8	Z	0.0	Conc	143.9 ppm
S	143.8	Z	0.0	R	280.0	Conc	143.9 ppm
Z	0.0	R	280.0	S	143.8	Conc	143.9 ppm
						AVG:	143.9 ppm

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2nd Analysis Date: 2/12/01

R	280.0	S	144.2	Z	0.0	Conc	144.3 ppm
S	144.2	Z	0.0	R	280.0	Conc	144.3 ppm
Z	0.0	R	280.0	S	144.2	Conc	144.3 ppm
						AVG:	144.3 ppm

2nd Component: PROPANE

1st Analysis Date: 2/12/01

R	96.200	S	91.800	Z	0.000	Conc	91.80 ppm
S	91.800	Z	0.000	R	96.200	Conc	91.80 ppm
Z	0.000	R	96.200	S	91.800	Conc	91.80 ppm
						AVG:	91.80 ppm

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.

Do not use cylinder below 150 psig.

Carla Stewart
Approved for Release

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Certificate of Analysis: E.P.A. Protocol Gas Mixture

Cylinder No :	CC126120	Order No.	431496
Cylinder Pressure:	2000 PSI	Expiration Date:	2/12/04
Certification Date	2/12/01	Laboratory:	ASG-MOBILE

Reference Standard Information:

Type	Component	Cyl. Number	Concentration
GMIS	CARBON MONOXIDE	CC45624	280.1PPM
NTRM81668	PROPANE	CC47113	96.2PPM

Instrumentation:

Instrument/Model/Serial No.	Analytical Principle
Siemens Ultramat 5E J9-662	NDIR
Siemens Fidamat 5E-P K4-391	FID

Analytical Methodology does not require correction for analytical interferences.

Certified Concentrations:

Component	Concentration	Accuracy	Procedure
CARBON MONOXIDE	302.4 ppm	+/- 1%	G2
PROPANE	7.060 ppm	+/- 1%	G1
NITROGEN	BALANCE		

Analytical Results:

1st Component: CARBON MONOXIDE

1st Analysis Date: 2/5/01

R	280.0	S	302.0	Z	0.0	Conc	302.1 ppm
S	302.0	Z	0.0	R	280.0	Conc	302.1 ppm
Z	0.0	R	280.0	S	302.0	Conc	302.1 ppm
						AVG:	302.1 ppm

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2nd Analysis Date: 2/12/01

R	280.0	S	302.6	Z	0.0	Conc	302.7 ppm
S	302.6	Z	0.0	R	280.0	Conc	302.7 ppm
Z	0.0	R	280.0	S	302.6	Conc	302.7 ppm
						AVG:	302.7 ppm

2nd Component: PROPANE

1st Analysis Date: 2/12/01

R	96.200	S	7.060	Z	0.000	Conc	7.060 ppm
S	7.060	Z	0.000	R	96.200	Conc	7.060 ppm
Z	0.000	R	96.200	S	7.060	Conc	7.060 ppm
						AVG:	7.060 ppm

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.

Do not use cylinder below 150 psig.

Craig Stewart
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Certificate of Analysis: E.P.A. Protocol Gas Mixture

Cylinder No :	CC19585	Order No.	400220
Cylinder Pressure:	2000 PSIG	Expiration Date:	6/30/03
Certification Date	6/30/00	Laboratory:	ASG-MOBILE

Reference Standard Information:

Type	Component	Cyl. Number	Concentration
NTRM81681	CARBON MONOXIDE	CC67933	1005PPM

Instrumentation:

Instrument/Model/Serial No.	Analytical Principle
SIEMENS ULTRAMAT 5E J9-661	NDIR

Analytical Methodology does not require correction for analytical interferences.

Certified Concentrations:

Component	Concentration	Accuracy	Procedure
CARBON MONOXIDE	855.2 PPM	+/-1%	G1
NITROGEN	Balance		

Analytical Results:

1st Component: CARBON MONOXIDE

1st Analysis Date: 6/23/00

R	1005	S	855.0	Z	0.000	Conc	855.0
S	855.0	Z	0.000	R	1005	Conc	855.0
Z	0.000	R	1005	S	855.0	Conc	855.0
						AVG:	855.0

2nd Analysis Date: 6/30/00

R	1004	S	855.0	Z	0.000	Conc	855.9
S	855.0	Z	0.000	R	1005	Conc	855.0
Z	0.000	R	1005	S	855.0	Conc	855.0
						AVG:	855.3

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed.

Do not use cylinder below 150 psig.

Brickst H. Nickerson
Approved for Release

Project Participants

PROJECT PARTICIPANTS

Koogler & Associates

John B. Koogler, Ph.D., P.E. ..... Project Advisor
Steve Cloutier ..... Technical Manager
Glen Haven ..... Field Test Crew
Rodney C. Paul ..... Field Test Crew

Jefferson Power LC

S. Mitchell Larkins ..... General Manager

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES