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PRELIMINARY TRIAL BURN REPORT

NITROGEN OXIDE, SULFUR DIOXIDE AND OPACITY VIA CONTINUOUS MONITORING SYSTEMS

PARTICULATE MATTER AND CARBON MONOXIDE VIA EMISSION MEASUREMENTS

AND

OPERATIONS PARAMETRIC DATA

Power Plant

CENTRAL POWER AND LIME, INC.
Brooksville, Florida

Permit No.: 0530021-023-AC

Test Dates: January 5-22, 2010
Report Date: April 14, 2010

308-09-08

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES
4014 NW 13th STREET
GAINESVILLE, FL 32609-1923
352/377-5822 ▪ FAX/377-7158

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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.

Terry Woodard
Manager, Power Plant Terry Woodard
Signature

Date: 4-19-10

308-09-08

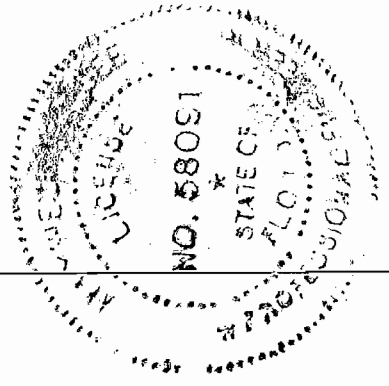
KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

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.

Max Lee, Ph.D., P.E.

State of Florida
License No. 58091

4/14/10
Date



KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Table of Contents

1.0 INTRODUCTION

Central Power and Lime, Inc. (CPL) owns a 150-MW coal-fired electric generating unit (EGU) at a co-generation facility that also includes a cement plant complex that is owned and operated by Cemex Construction Materials Florida, L.L.C. (CEMEX) in Hernando County, northwest of Brooksville, Florida. Air Construction Permit No. 0530021-023-AC allows CPL to conduct a temporary trial burn of commercially manufactured wood pellets to supplement the primary fuel of coal in the power plant boiler. The purpose of this project is to examine the feasibility of receiving, storing, handling, and firing the commercial-grade wood pellets. The project affects only the Power Plant Boiler, having a maximum heat input of 1850 mmBtu/hr (EU 018).

The purpose of this report is to provide a summary report as required under permit condition A.3 of the following:

- fuel firing rates of each fuel (tons/hour);
- heat input rates from firing each fuel (MMBtu/hour);
- power generated (MW);
- steam generating rates (lb/hour);
- total flue gas flow rate;
- flue gas oxygen content;
- temperature at the baghouse inlet;
- whether or not the cement plant was operating;
- problems with receiving, storing, handling and firing the commercial wood pellets;
- overall operational feasibility of commercial wood pellets as an alternative fuel;
- performance of the fuel feed system
- performance of the bottom ash and fly ash removal systems;
- results of the ultimate,
- proximate and heat content analyses;
- comparison of emissions between firing only coal with co-firing commercial wood pellets with coal.

Emissions data includes nitrogen oxides (CEMS-power plant duct), sulfur dioxide (CEMS-main stack), opacity, particulate matter (Method 5), and carbon monoxide (Method 10) at baseline (coal fueled only) and three levels of supplemental wood pellet input fired in the boiler. For comparison, process monitor CO data is also provided in Table 1 results. The cement kiln No. 1 shares a common stack with the power boiler and was not online during all emission measurements testing.

Prior to the test dates, the Southwest District FDEP office in Temple Terrace, Florida was notified of the test schedule.

Tests were conducted as follows:

Baseline: January 5, 2010

Low-level: (6.1 percent of heat input): January 19, 2010

Mid-level: (11.4 percent of heat input): January 21, 2010

High-level: (16.2 percent of heat input): January 22, 2010 (partially completed)

Particulate matter and carbon monoxide emissions measurements were conducted by Koogler and Associates, Inc. of Gainesville, Florida. Nitrogen oxides, sulfur dioxide and opacity were monitored by certified continuous emission rate monitors. Particulate matter emission measurements were conducted in accordance with EPA Method 5 and the carbon monoxide emission measurements were conducted in

accordance with EPA Method 10. All test methods are described in 40 CFR 60, Appendix A.

The power plant is permitted to operate at a generating rate of 150 megawatts with a heat input rate not to exceed 1850 mmBTU/hr.

2.0 PROCESS DESCRIPTION

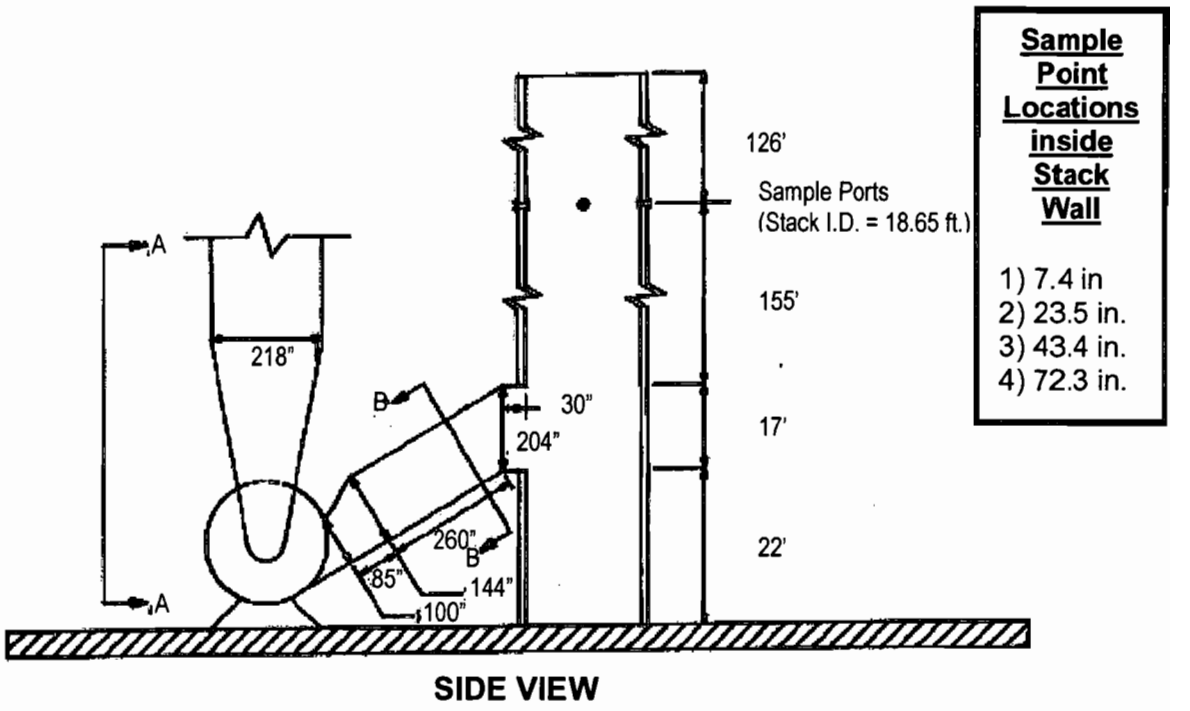
The CPL power facility is a cogenerating facility including power plant. The power plant is permitted for a generating rate of 150 megawatts. The plant is normally fired with low-sulfur coal with a maximum permitted heat input rate of 1850 mmBTU per hour; however, commercially manufactured wood pellets to supplement the coal is allowed for the temporary trial burn.

3.0 LOCATION OF SAMPLING PORTS – PM AND CO TESTING

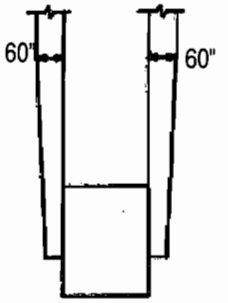
The locations of the sampling points used for the particulate matter and volumetric stack gas flow rate sampling are shown in Figure 1. The main stack gas flow rate and particulate matter measurements for the power plant emissions were made through four sampling ports located at the 194-foot level of the stack (see Figure 1). The sampling ports are located at 90 degrees to one another in the 18.65-foot diameter stack; 155 feet above the point where the stack gases are introduced to

the stack and 126 feet below the top of the stack. A total of 16 sampling points were used for the velocity and sampling traverses. The sampling points were located in accordance with criteria established by EPA Test Method 1 (40 CFR 60, Appendix A).

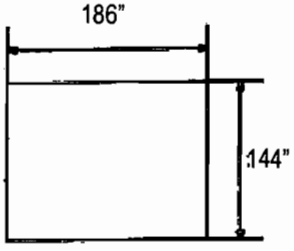
Measurements of the carbon monoxide concentrations in the exhaust gas from the power plant were made at a single point near the center of a 11.75 foot by 11.75 foot duct exhausting the power plant prior to the point where the power plant and cement plant exhaust gases are combined. This location is shown in Figure 2.



SIDE VIEW



FAN INLET
(SECTION A-A)



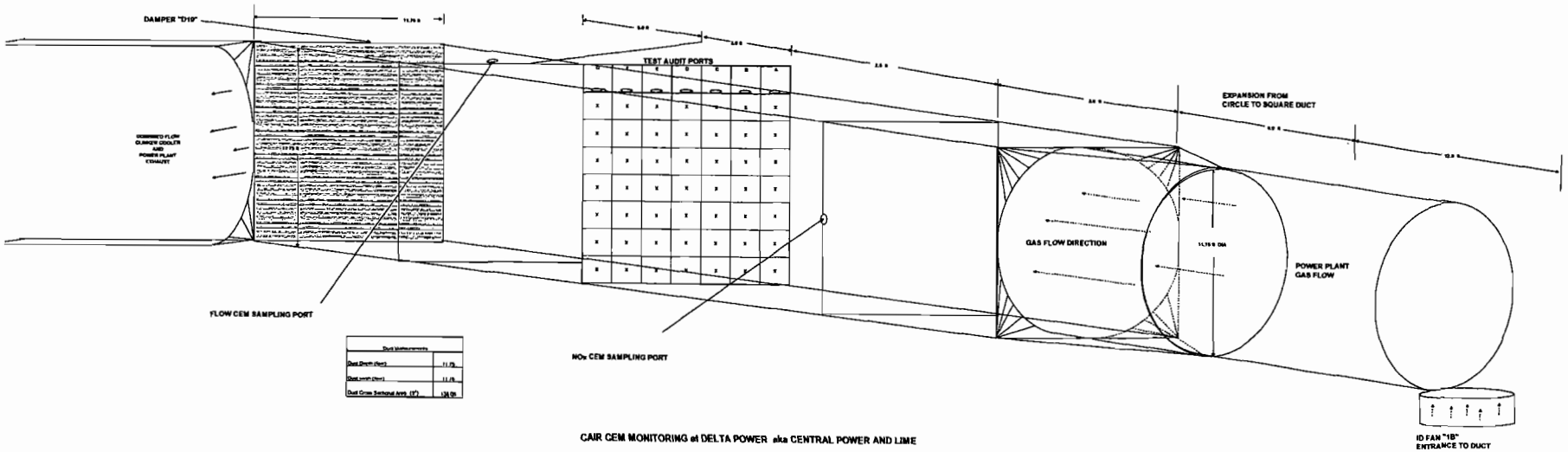
FAN OUTLET
(SECTION B-B)

FIGURE 1

Fan Inlet/Outlet Duct
Dimensions and
Stack Dimensions

CEMEX, INC./DELTA POWER

Brooksville, Florida



CAIR CEM MONITORING at DELTA POWER aka CENTRAL POWER AND LIME

4.0 TEST METHODS

The particulate matter measurements were conducted in accordance with EPA Method 5. These samples were collected at the 194-foot level of the stack. The particulate matter emission rate are representative of baseline power plant emissions. Moisture, stack gas flow rate, oxygen and CO_2 were measured in accordance with EPA Methods 2, 3 and 4.

Carbon monoxide emission measurements were conducted in accordance with EPA Method 10 (40 CFR 60, Appendix A). The main stack gas flow measurements used to determine CO emission rates were conducted using EPA Method 1-3 and dry bulb/wet bulb temperature measurements and psychometric tables were used to determine the stack gas moisture content.

All referenced test methods are described in 40 CFR 60, Appendix A.

The nitrogen oxides CMS is operated in accordance 40 CFR Part 75 and the sulfur dioxide and opacity CMS are operated in accordance with the provisions of 40 CFR 60, Appendix F and B.

5.0 SUMMARY OF RESULTS

The purpose of this report is to provide a summary report as required under permit condition A.3 of the following:

- fuel firing rates of each fuel (tons/hour);
- heat input rates from firing each fuel (MMBtu/hour);
- power generated (MW);
- steam generating rates (lb/hour);
- total flue gas flow rate;
- flue gas oxygen content;
- temperature at the baghouse inlet;
- comparison of emissions between firing only coal with co-firing commercial wood pellets with coal.

These items are summarized in Table 1.

- problems with receiving, storing, handling and firing the commercial wood pellets;
- overall operational feasibility of commercial wood pellets as an alternative fuel;
- performance of the fuel feed system
- performance of the bottom ash and fly ash removal systems;
- results of the ultimate,
- proximate and heat content analyses;

These items are summarized in Sections 5.2.

- whether or not the cement plant was operating;

The cement plant was not operating at all times during testing.

5.1 Baseline Emission Summary

The results of the baseline emissions data for January 5, 2010 are summarized in Table 1. During the particulate matter and carbon monoxide baseline emission test period for the power plant on January 5, 2010, the power plant was operating at a generating rate of 144.3 megawatts with an average coal feed rate of 108.6 tons per hour (or 1412 mmBTU per hour at 13,000 BTU per pound of coal).

The test results showed the baseline emissions from the power plant alone to be:

a. The particulate matter emissions rate averaged 11.5 pounds per hour and 0.008 pounds per mmBTU.
b. The carbon monoxide emissions rate averaged 542 pounds per hour and 0.384 pounds per mmBTU.
c. The nitrogen oxide emission rate averaged 482 pounds per hour and 0.30 pounds per mmBTU.
d. The sulfur dioxide emission rate averaged 640 pounds per hour and 0.34 pounds per mmBTU.

5.2 Supplemental Fuel Trial Summary

The trial burn tests with wood pellets were conducted on January 19, 21 and 22, 2010 by Koogler and Associates, Inc.. The particulate matter emission measurements were only required to be performed during the highest level of supplementary fuel use which was on January 22, 2010. However, due to the inclement weather the PM measurements were not completed. For comparison, process monitor CO data is also provided in Table 1 results.

The test results showed the supplemental fuel trial emissions to be:

Low-Level (6.1% heat replacement)

a. The carbon monoxide emissions rate averaged 414 pounds per hour and 0.341 pounds per mmBTU (EPA Method 10).

b. The nitrogen oxide emission rate averaged 421 pounds per hour and 0.285 pounds per mmBTU.

c. The sulfur dioxide emission rate averaged 696 pounds per hour and 0.370 pounds per mmBTU.

Mid-Level (11.4% heat replacement)

a. The carbon monoxide emissions rate averaged 677 pounds per hour and 0.487 pounds per mmBTU (EPA Method 10).

b. The nitrogen oxide emission rate averaged 450 pounds per hour and 0.288 pounds per mmBTU.

c. The sulfur dioxide emission rate averaged 677 pounds per hour and 0.366 pounds per mmBTU.

High-Level (16.2% heat replacement)

a. The particulate matter emissions rate averaged 10.4 pounds per hour and 0.007 pounds per mmBTU.

b. The carbon monoxide emissions rate averaged 1020 pounds per hour and 0.759 pounds per mmBTU (EPA Method 10).

c. The nitrogen oxide emission rate averaged 633 pounds per hour and 0.416 pounds per mmBTU.

d. The sulfur dioxide emission rate averaged 668 pounds per hour and 0.562 pounds per mmBTU.

Calculations, field and analytical data sheets, plant information, equipment calibration data and a list of the project participants are included in the Appendix of this report.

Summary Discussion of Wood Pellets as an Alternative Fuel

- **problems with receiving, storing, handling and firing the commercial wood pellets;**

The shipment of 250 tons of wood pellets arrived by train and was stored in covered rail cars. Rain conditions on January 20, 21, and 22 limited handling to certain times of those days as the pellets quickly absorb a significant amount of moisture which drastically changes the handling characteristics. If the pellets are wet, the normally dry, hard pellets soften, expand and break apart and thus do not transfer as easily from conveyors and hoppers.

- **overall operational feasibility of commercial wood pellets as an alternative fuel;**

Wood pellets were shown to be a viable alternative fuel to coal. The most significant problems are prevention of moisture, blending of coal and wood pellets, and segregation between loading and entering the feed system. However, the boiler operators considered the trial period too short to adjust the factors that appeared to impact emissions and boiler performance.

The goal of future trial burns:

1) Evaluate the handling conditions to control and predict pellet properties (e.g., control moisture content and hardness of pellets).
2) Evaluate methods to increase the blending ratio of wood pellets with coal.

3) Improve the grinding efficiency of the mill which will allow a greater percentage of wood pellets to be ground thus improving the grinding process in the coal mill after recent maintenance, replacing grinding rings, and balls.
4) Conduct longer trial burns to give more ability to adjust operation conditions to improve the boiler operations.

- **performance of the fuel feed system**

Changes due to moisture content from rain water and a lesser extent changes in humidity result in changes of the pellet composition. The primary concern for wood pellet fuel is the change of bulk heat content. Also, it was noted by operators that the pellets segregated when transferred from the coal yard to the coal bin and Merrick feeder. If the pellets properties change from the time of analysis to input to the boiler, the heat content, moisture, and general heat properties become unknown variables.

The operators realized such problems as controlling the heat distribution and needed temperatures were affected by pellets composition changes and pellets segregation resulting in plugs of wood pellets into the boiler. This plug flow causing inferior boiler operation is suspected given the change in CO emissions.

- **performance of the bottom ash and fly ash removal systems;**

The bottom and fly ash operations were not observed to be impacted by the input of wood pellets.

- **results of the ultimate, proximate and heat content analyses;**

Results of analyses are attached.

Table 1

Wood Pellets Trial Burn, AC Permit 0530021-023-AC
Summary of NOx, SO2, PM, and CO Emissions Test Data

CEMEX / CPL Co-located Facility

Brooksville, Florida

Central Power and Lime, Inc. (CPL)
Brooksville, Florida
Power Boiler Operational Data

Run No.	Date	Sample Start Time (hh:mm)	Sample End Time (hh:mm)	Generator Rate (MW)	Steam Rate (1000lb/hr)	Economizer Oxygen (%)	Baghouse Inlet Temp. (°F)	Coal Feed (tons/hr)	Wood Pellet Feed (tons/hr)	Coal Input (1) (MMBtu/hr)	Wood Input (1) (MMBtu/hr)	Total Input (1) (MMBtu/hr)	Stack Gas Parameters		
													Flow (dscfm)	Temp. (F)	Moisture (%)
1	5-Jan	12:25	13:46	143.8	951.5	5.39	260.8	54.1	0	1406	0	1406	484321	274	5.3
2	5-Jan	14:12	15:23	143.7	951.0	5.44	260.9	54.2	0	1409	0	1409	475865	275	5.7
3	5-Jan	15:41	16:52	145.4	957.9	5.43	268.7	54.6	0	1420	0	1420	482930	281	5.3
Ave.>				144.3	953.5	5.42	263.5	54.3	0	1412	0	1412	481039	277	5.4
Pellet Fuel Trials															
1	19-Jan	12:52	15:08	122.7	826.1	6.61	300.5	43.8	4.4	1139	74	1213	431848	295	6.8
1	21-Jan	11:49	14:04	139.9	951.7	5.00	323.6	47.3	9.5	1231	159	1390	420619	311	8.1
1	22-Jan	16:30	17:39	134.0	922.5	5.99	310.3	43.3	13.0	1125	218	1343	426062	306	7.6

(1) Coal Heating Value = 13000 Btu/lb; Wood Pellet Heating Value = 8400 Btu/lb
Calculated Btu value

Central Power and Lime, Inc. (CPL)
Brooksville, Florida
Power Boiler Emission Data

Run No.	Pellet % Heat Input (%)	Opacity (%)	Power Duct CEMS Nitrogen Oxides		Stack CEMS Sulfur Dioxide		Process Monitor Carbon Monoxide		Stack Test Emission Data				
									Carbon Monoxide		Particulate Matter		
			(lb/hr)	(lb/MMBtu)	(lb/hr)	(lb/MMBtu)	(lb/hr)	(lb/MMBtu)	(lb/hr)	(lb/MMBtu)	(gr/dscf)	(lb/hr)	(lb/MMBtu)
Baseline													
1	Baseline	3.4	475	0.294	680	0.338	535	0.380	444	0.316	0.0025	10.5	0.007
2	Baseline	2.3	477	0.295	621	0.339	550	0.391	468	0.332	0.0029	11.9	0.008
3	Baseline	2.4	493	0.310	618	0.347	726	0.511	714	0.503	0.0029	12.1	0.008
Ave.>		2.7	482	0.300	640	0.341	604	0.427	542	0.384	0.0028	11.5	0.008
Pellet Fuel Trials													
9%wood	6.1	3.4	421	0.285	696	0.370	587	0.484	414	0.341	NA	NA	NA
17% wood	11.4	3.5	450	0.288	677	0.366	828	0.596	677	0.487	NA	NA	NA
23%wood	16.2	2.6	633	0.416	668	0.562	1066	0.793	1020	0.759	0.0028	10.4	0.007

NOTES: SO2, CO, and PM emission rate of lb/mmbtu is calculated from 1) measured lb/hr and 2) calculated mmbtu/hr based on fuel input amounts.

Appendix

Particulate Matter Emission Measurements (Jan. 5)

- Calculations
- Field and Analytical Data Sheets

Carbon monoxide Emission Measurements (Jan. 5)

- Calibration Calculations and Concentrations
- Field Data Sheets

Particulate Matter Emission Measurements (Jan. 22)

- Calculations
- Field and Analytical Data Sheets

Carbon monoxide Emission Measurements (Jan. 19, 21 and 22)

- Calibration Calculations and Concentrations
- Field Data Sheets

Particulate Matter Equipment Calibrations and Calibration Gas Certifications

Plant Operating Data

Project Participants

Particulate Matter Emission Measurements (Jan. 5)

Calculations

SUMMARY OF PARTICULATE MATTER EMISSION TEST DATA

CENTRAL POWER & LIME, INC. (CPL) EU 018: POWER PLANT COAL BASELINE JANUARY 05, 2010					
				Particulate Matter	
Run No.	Stack Gas Flow Rate (SCFMD)	Stack Gas Temperature (F)	Stack Gas Moisture (%)	Conc. (gr/dscf)	Emission Rate (Lbs/Hr)
1	484,321	274	5.3	0.0025	10.52
2	475,865	275	5.7	0.0029	11.95
3	482,930	281	5.3	0.0029	12.06
Avg.	481,039	277	5.4	0.0028	11.51

GENERAL DATA

Plant :	CENTRAL POWER & LIME, INC. (CPL)				
Source/Unit :	EU 018: POWER PLANT COAL BASELINE				
Date :	JANUARY 05, 2010		Cp :	0.840	
Stack dia. :	223.80	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 :	0 Tons/hr
Carbon, wt% :	0.00	Run 2 :	0
Sulfur, wt% :	0.00	Run 3 :	0
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)	63	66	66
Stack Temp., Ts (F)	274	275	281
Sq.Rt. dP	0.66	0.65	0.66
dH (in. H2O)	1.31	1.31	1.35
Meter Vol.,Vm (ft3)	43.175	44.311	45.064
Vol. H2O, Vlc (ml)	52.0	58.0	54.0
Meter Y	0.996	0.996	0.996
Bar. Press.,Pb (in.Hg.)	30.12	30.12	30.12
Static Press.,Ps (in.H2O)	-0.83	-0.83	-0.83
Test Time (min.)	64.0	64.0	64.0
Nozzle Dia.,Dn (in.)	0.266	0.266	0.266
Oxygen, O2 (%)	13.0	12.0	13.0
Carbon Dioxide, CO2 (%)	9.0	9.0	8.5
Carbon Monoxide, CO (%)	0.0	0.0	0.0
Report Emission Criteria in ? l = lb/hr g = gr/dscf :			grains
Process Rate Units ? T = Ton/hr, L = Lbs/hr, C = Cans/min:			T
Allowable Particulate Matter Concentration .....:			0

LABORATORY RESULTS	RUN 1 grams	RUN 2 grams	RUN 3 grams
GRAVIMETRIC ANALYSIS METHOD 5 :			
Front Half Wash (FHW)	0.00410	0.00680	0.00540
Filterable Sample (MF)	0.00310	0.00170	0.00320
Condensible Sample (BHW)	0.00000	0.00000	0.00000

A. FIELD DATA SUMMARY

Plant: CENTRAL POWER & LIME, INC. (CPL)
Source/Unit: EU 018: POWER PLANT COAL BASELINE
Date: JANUARY 05, 2010

	RUN 1	RUN 2	RUN 3
Vlc = Vol water collected in train, ml	52.0	58.0	54.0
Vm = Sample gas vol, meter cond., acf	43.175	44.311	45.064
Y = Meter calibration factor	0.9960	0.9960	0.9960
Pbar = Barometric pressure, in. Hg	30.12	30.12	30.12
Pstatic = Stack static pressure, in. H2O	-0.83	-0.83	-0.83
dH = Avg meter pressure diff, in. H2O	1.31	1.31	1.35
Tm = Absolute meter temp., degrees R	522.9	525.5	525.5
Vm(std) = Sample gas vol, Std. cond., dscf	43.854	44.783	45.548
Bws = Water vapor in gas stream, fraction	0.053	0.057	0.053
MF = Moisture factor (1 - Bws)	0.947	0.943	0.947
CO2 = Carbon Dioxide, dry, volume %	9.00	9.00	8.50
O2 = Oxygen, dry, volume %	13.00	12.00	13.00
N2 = Nitrogen, dry volume %	78.00	79.00	78.50
Md = Molecular weight of stack gas, dry	29.96	29.92	29.88
Ms = Molecular weight of stack gas, wet	29.33	29.24	29.25
Cp = Pitot tube coefficient	0.84	0.84	0.84
Sq.Rt. dP = Avg. square root of each dP	0.6589	0.6500	0.6590
Ts = Absolute stack temp., degrees R	734.3	735.4	740.6
A = Area of stack, ft2	273.18	273.18	273.18
Qstd = Volumetric flowrate, dscfm	484,321	475,865	482,930
An = Nozzle area, ft2	3.86E-04	3.86E-04	3.86E-04
0 = Sample time, minutes	64.00	64.00	64.00
%I = Isokinetic variation, percent	100.15	104.09	104.32

B. PARTICULATE DATA SUMMARY

Plant: CENTRAL POWER & LIME, INC. (CPL)
Source/Unit: EU 018: POWER PLANT COAL BASELINE
Date: JANUARY 05, 2010

	RUN 1	RUN 2	RUN 3
Sample Weight (FHW + MF + BHW), mg	7.20	8.50	8.60
Meter Volume, standard cond., Vm(std)	43.854	44.783	45.548
Carbon Dioxide, percent	9.00	9.00	8.50
Oxygen, percent	13.00	12.00	13.00
Sample Concentration :			
gr/scf	0.0024	0.0028	0.0028
gr/dscf	0.0025	0.0029	0.0029
gr/dscf @ 0 % CO2	0.0034	0.0039	0.0041
gr/dscf @ 0 % O2	0.0067	0.0069	0.0077
ppm * MW (dry gas).....	139.4	161.1	160.3
ppm * MW @ 0% CO2	0.0	0.0	0.0
ppm * MW @ 0% O2	368.7	378.3	424.0

EMISSION RATE CALCULATIONS

Plant :	CENTRAL POWER & LIME, INC. (CPL)				
Source/Unit :	EU 018: POWER PLANT COAL BASELINE				
Date:	JANUARY 05, 2010		RUN N	1	
STANDARD TEMP. :	68 F				

Front Half Wash (FHW)	0.00410	grams	| Vm(st	43.854	ft3
Mass Filter (MF)	0.00310	grams	| Vw(st	2.448	ft3
Back Half Wash (BHW)	0.00000	grams	| Qs(st	484,321	dscfm
Vm(std) SO2		dscf	| Bws	0.053	
CO2 CORF 0.0 %			| CO2	9.00	%
O2 CORR. 0.0 %			| O2	13.00	%

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 Value (Btu/gal) x Fuel Use Rate (gal/ton) / 1E6		MMBtu/hr

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0024	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0025	gr/dscf
gr/dscf x (12 / %CO2)	0.0034	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0067	@ 0% O2
0.00857 x Qs(std) x gr/dscf	10.52	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. / 9.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 13.0% 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. / 9.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 9.0% O2 Stack)	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)].....	lb/hr

EMISSION RATE CALCULATIONS

Plant :	CENTRAL POWER & LIME, INC. (CPL)				
Source/Unit :	EU 018: POWER PLANT COAL BASELINE				
Date:	JANUARY 05, 2010		RUN N	2	
STANDARD TEMP. :	68 F				

Front Half Wash (FHW)		0.00680	grams	| Vm(st	44.783	ft3
Mass Filter (MF)		0.00170	grams	| Vw(st	2.730	ft3
Back Half Wash (BHW)		0.00000	grams	| Qs(st	475,865	dscfm
Vm(std) SO2			dscf	| Bws	0.057	
CO2 CORF	0.0 %			| CO2	9.00	%
O2 CORR.	0.0 %			| O2	12.00	%

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)] ...	0.0028	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0029	gr/dscf
gr/dscf x (12 / %CO2)	0.0039	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0069	@ 0% O2
0.00857 x Qs(std) x gr/dscf	11.95	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. / 9.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 9.0% 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. / 9.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 9.0% O2 Stack)	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)].....	lb/hr

EMISSION RATE CALCULATIONS

Plant :	CENTRAL POWER & LIME, INC. (CPL)				
Source/Unit :	EU 018: POWER PLANT COAL BASELINE				
Date:	JANUARY 05, 2010		RUN N	3	
STANDARD TEMP. :	68 F				

Front Half Wash (FHW)	0.00540	grams	| Vm(st	45.548	ft3
Mass Filter (MF)	0.00320	grams	| Vw(st	2.542	ft3
Back Half Wash (BHW)	0.00000	grams	| Qs(st	482,930	dscfm
Vm(std) SO2		dscf	| Bws	0.053	
CO2 CORF 0.0 %			| CO2	8.50	%
O2 CORR. 0.0 %			| O2	13.00	%

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 .... Value (Btu/gal) x Fuel Use Rate (gal/ton) / 1E6	MMBtu/hr

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0028	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0029	gr/dscf
gr/dscf x (12 / %CO2)	0.0041	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0077	@ 0% O2
0.00857 x Qs(std) x gr/dscf	12.06	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. / 9.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 9.0% 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. / 8.5 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 8.5% O2 Stack)	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)].....	lb/hr

SOURCE TEST CALCULATIONS

Plant : CENTRAL POWER & LIME, INC. (CPL)
Source/Unit : EU 018: POWER PLANT COAL BASELINE RUN NO.: 1
Date: JANUARY 05, 2010

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.83	in. H2O
METER TEMP, Tm =	62.875	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	274.3	F	STACK I.D. =	223.80	inch
AVG.VEL.HEAD,dP =	0.434	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.31	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	43.175	Cu.Ft.	STACK AREA, As =	273.179	Sq.Ft.
METER COFF., Y =	0.996		TEST TIME =	64.00	min.
BAR. PRESS., Pb =	30.12	in.Hg	NOZZLE DIA. =	0.266	inch
COND.(Vlc) =	52.0	ml	NOZZLE DIA., An =	3.9E-04	Sq.Ft.

GAS ANALYSIS = 13.00 % O2 0.00 % CO
9.00 % CO2 78.00 % N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x
(Pb + (dH / 13.6)) / (Tm + 460)..... = 43.854 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 2.448 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.053 | Lower | Bws

Bws @ Saturated Conditions = Vapor Press. of H2O | value
@ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000 | used.

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 171.23

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.96

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 29.33

P(stack) = Pbar + (Ps / 13.6) ..... = 30.06 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460)
/ (Ms x P(stack))] ..... = 43.18 ft/sec

Qs = vs x As x 60 ..... = 707,813 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460))
x (P(stack)/29.92) ..... = 484,321 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] ..... = 100.15 %

SOURCE TEST CALCULATIONS

Plant : CENTRAL POWER & LIME, INC. (CPL)
Source/Unit : EU 018: POWER PLANT COAL BASELINE RUN NO.: 2
Date : JANUARY 05, 2010

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.83	in. H2O
METER TEMP, Tm =	65.50	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	275.4	F	STACK I.D. =	223.80	inch
AVG.VEL.HEAD,dP =	0.423	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.31	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	44.311	Cu.Ft.	STACK AREA, As =	273.179	Sq.Ft.
METER COFF., Y =	0.996		TEST TIME =	64.00	min.
BAR. PRESS., Pb =	30.12	in.Hg	NOZZLE DIA. =	0.266	inch
COND.(Vlc) =	58.0	ml	NOZZLE DIA., An =	3.9E-04	Sq.Ft.

GAS ANALYSIS =	12.00	% O2	0.00	% CO
	9.00	% CO2	79.00	% N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x
(Pb + (dH / 13.6)) / (Tm + 460)..... = 44.783 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 2.730 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.057 | Lower | Bws

Bws @ Saturated Conditions = Vapor Press. of H2O | value
@ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000 | used.

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 135.50

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.92

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 29.24

P(stack) = Pbar + (Ps / 13.6) ..... = 30.06 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460)
/ (Ms x P(stack))] ..... = 42.70 ft/sec

Qs = vs x As x 60 ..... = 699,915 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460))
x (P(stack)/29.92) ..... = 475,865 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] ..... = 104.09 %

SOURCE TEST CALCULATIONS

Plant : CENTRAL POWER & LIME, INC. (CPL)
Source/Unit : EU 018: POWER PLANT COAL BASELINE RUN NO.: 3
Date : JANUARY 05, 2010

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.83	in. H2O
METER TEMP, Tm =	65.50	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	280.6	F	STACK I.D. =	223.80	inch
AVG.VEL.HEAD,dP =	0.434	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.35	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	45.064	Cu.Ft.	STACK AREA, As =	273.179	Sq.Ft.
METER COFF., Y =	0.996		TEST TIME =	64.00	min.
BAR. PRESS., Pb =	30.12	in.Hg	NOZZLE DIA. =	0.266	inch
COND.(Vlc) =	54.0	ml	NOZZLE DIA., An =	3.9E-04	Sq.Ft.

GAS ANALYSIS =	13.00	% O2	0.00	% CO
	8.50	% CO2	78.50	% N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460).....	=	45.548	dscf
Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc	=	2.542	scf
Bws = Vw(std) / (Vm(std) + Vw(std)).....	=	0.053	| Lower | Bws
Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.)	=	1.000	| value | used.
%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 =		168.31	
Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] =		29.88	
Ms = (Md x (1-Bws)) + (18.0 x Bws).....	=	29.25	
P(stack) = Pbar + (Ps / 13.6) ..... =		30.06	in. Hg
vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))]	=	43.43	ft/sec
Qs = vs x As x 60	=	711,841	acf/min
Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... =		482,930	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] ..... =		104.32	%

Particulate Matter Emission Measurements (Jan. 5)

Field and Analytical Data Sheets

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

Multiple Methods Data Sheet

Plant: CPL - Power Plant - Brownsville
Sample Location: Main Stack
Control Type: Baghouse
Sample Type: Post
Date: 1-5-10 | Run No.: 1
Time Start: 1225 | Time End: 1346
Sample Time: 4 | min/point 64 | Total Mins.
Dry Bulb: °F | Wet Bulb: °F | VP@DP:
Bar. Pres: 30.12 "Hg | Stack Pres: 30.05 "Hg | Ps: -0.83 "H_2O
Moisture: 8 % | FDA: | Gas Density Factor:
Temp: 45 °F | Wind Direction: Var | Wind Speed: 2-3
Weather: Clear | Thermocouple Readout: KAK-7
Sample Box No.: KAK-7 | Meter Box No.: KAK-7
Meter Y: 0.996 @ | Delta H: 1.54 | Pitot Corr.: 0.84
Nozzle Diameter: 0.266 inches | Probe Length: 10.5 feet
Probe Heater Setting: 242 | Nomograph Cf: 3.0
Stack Dimensions: 223.8 inches
Stack Area: 273.8 ft^2
Effective Stack Area: 273.8 ft^2
Stack Height: ft

Stack Dimensions

Umbilical: KOAK-100
Thermocouple Probe No. KAK-110
Pitot Tube: KA-5ST

Material Processing Rate:
Final Gas Meter Reading: 331,475 ft^3
Initial Gas Meter Reading: 288,300 ft^3
Total Metered Gas Volume: 43,175 ft^3
Condensate Gain in Impingers: 44 mL
Weight Gain in Silica Gel: 3.0 g
Total Moisture Gain: 58 mL
Silica Gel Container No.: 16
Filter Number: I

Leak Check - Meter Box:
Initial: 0.000 cfm @ 10 inches Hg
Final: 0.000 cfm @ 5 inches Hg

Leak Check - Pitot Tubes:
Impact 3 "H_2O for 15 sec: (Stable) Leak
Static 3 "H_2O for 15 sec: (Stable) Leak

Test Conducted By: R Paul - J Langston
O_2: 13.0 % | CO_2: 7.0 %
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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O_2)
					Calculated	Actual						
1-1			88.3	0.53	1.59	1.59	273	248	47	57	2	
2			91.2	0.50	1.5	1.5	274	250	41	58	2	
3			94.0	0.50	1.5	1.5	273	249	40	59	2	
4			96.8	0.41	1.23	1.23	271	247	40	60	2	
2-1			99.3	0.43	1.36	1.36	273	252	46	61	2	
2			302.0	0.43	1.36	1.36	274	243	39	62	2	
3			4.6	0.40	1.27	1.27	274	250	39	63	2	
4			7.2	0.36	1.14	1.14	273	248	39	63	2	

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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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O2)
					Calculated	Actual						
3-1			9.7	0.43	1.36	1.36	273	237	37	64	2	
2			12.4	0.40	1.27	1.27	275	239	36	64	2	
3			15.0	0.37	1.17	1.17	275	259	38	65	2	
4			17.5	0.37	1.17	1.17	273	243	36	65	2	
4-1			20.0	0.50	1.59	1.59	276	260	38	66	2	
2			23.0	0.48	1.52	1.52	278	253	38	66	2	
3			25.9	0.43	1.36	1.36	277	256	38	67	2	
4			28.7	0.43	1.36	1.36	276	261	39	66	2	

Multiple Methods Data Sheet

Plant: CPL - Brooksville
Sample Location: Power Plant
Control Type: Baghouse
Sample Type: Part
Date: 1-5-10 | Run No.: 2
Time Start: 1412 | Time End: 1523
Sample Time: 4x4x4 | min/point 64 | Total Mins.
Dry Bulb: °F | Wet Bulb: °F | VP@DP:
Bar. Pres: 30.12 "Hg | Stack Pres: 30.06 "Hg | Ps: -0.83 "H_2O
Moisture: ~~RW~~ 4.5 % | FDA: | Gas Density Factor:
Temp: 45 °F | Wind Direction: West | Wind Speed: 2 - 3
Weather: Clear | Thermocouple Readout: KAL-7
Sample Box No: KAL 7 | Meter Box No.: KAL-7
Meter Y: 0.996 | Delta H: 1.54 | Pitot Corr.: 0.84
Nozzle Diameter: 0.260 inches | Probe Length: 10 ft | feet
Probe Heater Setting: 242 | Nomograph Cf: 3.1
Stack Dimensions: 223.8 inches
Stack Area: 273.18 ft^2
Effective Stack Area: 273.18 ft^2
Stack Height: ft

Stack Dimensions

Umbilical: KAL-100 RP
Thermocouple Probe No.: KAL-110
Pitot Tube: KAL-SST

Material Processing Rate:
Final Gas Meter Reading: 376.011 ft^3
Initial Gas Meter Reading: 331.700 ft^3
Total Metered Gas Volume: 44.311 ft^3
Condensate Gain in Impingers: 50 mL
Weight Gain in Silica Gel: 8 g
Total Moisture Gain: 58 mL
Silica Gel Container No.: 14
Filter Number: II

Leak Check - Meter Box:
Initial: 0.000 cfm @ 10 inches Hg
Final: 0.004 cfm @ 5 inches Hg

Leak Check - Pitot Tubes:
Impact 3 "H_2O for 15 sec: Stable, Leak
Static 3 "H_2O for 15 sec: Stable, Leak

Test Conducted By: RPaul-JLangston
O_2: 12.0 % | CO_2: 9.0 %
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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O_2)
					Calculated	Actual						
1-1			31.7	0.51	1.58	1.58	276	232	44	63	3	
2			34.7	0.45	1.4	1.4	278	250	42	63	3	
3			37.6	0.45	1.4	1.4	276	236	41	64	3	
4			40.4	0.40	1.24	1.24	276	259	41	64	3	
2-1			43.0	0.42	1.3	1.3	273	242	40	65	3	
2			45.7	0.40	1.24	1.24	277	246	40	65	3	
3			48.5	0.40	1.24	1.24	275	244	38	66	3	
4			51.1	0.33	1.02	1.02	277	254	39	65	2	

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ENVIRONMENTAL SERVICES

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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O2)
					Calculated	Actual						
3-1			535	0.45	1.4	1.4	274	266	39	66	3	
2			543	0.40	1.24	1.24	275	261	39	65	3	
3			59.1	0.40	1.24	1.24	275	265	39	67	3	
4			61.7	0.36	1.11	1.11	275	262	39	66	3	
4-1			64.3	0.47	1.46	1.46	272	262	40	67	4	
2			67.2	0.47	1.46	1.46	276	256	39	66	3	
3			70.2	0.47	1.46	1.46	276	258	40	68	3	
4			73.3	0.40	1.24	1.24	275	265	40	68	3	

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Multiple Methods Data Sheet

Plant: CPZ-Brooksville
Sample Location: Power Plant
Control Type: Baghouse
Sample Type: Port
Date: 1-5-10 | Run No.: 3
Time Start: 1541 | Time End: 1652
Sample Time: 4 X 4 X 4 | min/point 4 | Total Mins.
Dry Bulb: °F | Wet Bulb: °F | VP@DP:
Bar. Pres: 30.12 "Hg | Stack Pres: 29.96 "Hg | Ps: -0.43 "H_2O
Moisture: 6 % | FDA: | Gas Density Factor:
Temp: 45 °F | Wind Direction: Var | Wind Speed: 2-3
Weather: Clear | Thermocouple Readout: KAK-7
Sample Box No.: KAK-7 | Meter Box No.: KAK-7
Meter Y: 0.996 @ | Delta H: 1.54 | Pitot Corr.: 0.84
Nozzle Diameter: 0.266 inches | Probe Length: 10.0 feet
Probe Heater Setting: 242 | Nomograph Cf: 3.1
Stack Dimensions: 223.8 inches
Stack Area: 273.18 ft^2
Effective Stack Area: 273.18 ft^2
Stack Height: ft

Stack Dimensions

Umbilical: KAK-106
Thermocouple Probe No. KAK-110
Pitot Tube: KA-55I

Material Processing Rate:
Final Gas Meter Reading: 421.265 ft^3
Initial Gas Meter Reading: 376.201 ft^3
Total Metered Gas Volume: 45.064 ft^3
Condensate Gain in Impingers: 44 mL
Weight Gain in Silica Gel: 10 g
Total Moisture Gain: 54 mL
Silica Gel Container No.: 1
Filter Number: III

Leak Check - Meter Box:
Initial: 0.005 cfm @ 10 inches Hg
Final: 0.006 cfm @ 5 inches Hg

Leak Check - Pitot Tubes:
Impact 3 "H_2O for 15 sec: (Stable) Leak
Static 3 "H_2O for 15 sec: (Stable) Leak

Test Conducted By: R Paul - J Langston
O_2: 13.0 % | CO_2: 8.5 %
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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O_2)
					Calculated	Actual						
1-1			76.2	0.50	1.55	1.55	279	234	47	65	3	
2			79.2	0.50	1.55	1.55	279	243	44	64	3	
3			82.1	0.48	1.49	1.49	279	241	44	65	3	
4			85.1	0.41	1.27	1.27	280	261	44	65	3	
2-1			87.8	0.45	1.4	1.4	280	265	44	66	3	
2			90.7	0.45	1.4	1.4	283	262	42	65	2	
3			93.5	0.39	1.21	1.21	281	251	42	66	2	
4			96.2	0.35	1.09	1.09	281	266	41	66	2	

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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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O2)
					Calculated	Actual						
3-1			98.6	0.46	1.43	1.43	260	233	40	66	3	
2			101.7	0.40	1.24	1.24	253	247	40	65	3	
3			4.4	0.40	1.24	1.24	282	256	40	66	2	
4			7.2	0.37	1.15	1.15	279	242	38	66	2	
4-1			9.7	0.53	1.64	1.64	280	250	40	66	3	
2			12.8	0.42	1.3	1.3	280	263	37	66	3	
3			15.6	0.45	1.4	1.4	281	258	41	66	3	
4			18.5	0.41	1.27	1.27	282	256	41	65	3	

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SAMPLING RATE CALCULATIONS

Plant Name: CPY - Power Plant **Date:** 1-5-10

Location: Brooksville **Source:** Main stack

1) Calculate the optimum Cf: $\Delta H @ / \Delta P_{avg} = Cf$

DH	/DP$_{avg}$	= Cf

2) Calculate the optimum nozzle size:

Record Values		
R1	R2	R3
65	68	
0.04 0.07	0.06	
286 28.3	28.4	
270	275	
1.54	1.54	
0.266		

Tm = Meter Temperature (°F) (Add 5 °F for initial temp.)

Bw = Moisture Fraction

Ms = Wet Molecular Weight of Stack Gas (from Table)

Ts = Stack Temperature (°F)

ΔH@ = Meter Box Constant (box front)

ΔP = Average Pitot Reading (Inches H20)

Dn = Nozzle Diameter (Inches) measured

Moisture Fraction	MS
0	29
0.05	28.5
0.1	27.9
0.15	27.4
0.2	26.8
0.25	26.2
0.3	25.7
0.35	25.2
0.4	24.6

1-0.55 TS-270
2-0.53
3-0.50
4-0.40

$$Dn = \left[\frac{Cf}{\left(\frac{Tm+460}{MS(Ts+460)}\right) * \left(1-\frac{Bw}{100}\right)^2 * (\Delta H@) * (1774)} \right]^{0.25}$$

3) Calculate the correction factor Cf. Cf times the stack ΔP will determine the manometer setting ΔH:

$$Cf = \left[\frac{Tm+460}{Ms*(Ts+460)} \right] * (1-Bw)^2 * \Delta H@ * Dn^4 * 1774 \qquad Cf * \Delta P = \Delta H$$

Calculation	Run No. 1		Run No. 2		Run No. 3	
Tm + 460 =	525	525	528			
/ [MS*(Ts+460)] =	20659	20878	20874			
* (1 - Bw)^2 =	0.8649	0.9216	0.8836			
* ΔH@ =	1.54	1.54	1.54			
* (Dn)^4 =	0.00501	0.00501	0.00501			
* 17741 = Cf	3.0	3.17	3.1			
	6005					

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Chain of Custody

Plant Name: CPJ Project Number: 308-09-08

Location: Brooksville Source: Power Plant

Sample Identification	Remarks
1-CPJ-P	Probe Wash R-1
2-CPJ-P	" " " 2
3-CPJ-P	" " " 3
I	Filter Holder R-1
II	" " " 2
III	" " " 3
16	Silica Gel R-1
14	" " " 2
1	" " " 3

Sampled by: RPaul 1-5-10 See data

Signature Date Time

Relinquished by: _____ _____ _____

Signature Date Time

Received by: _____ _____ _____

Signature Date Time

Relinquished by: _____ _____ _____

Signature Date Time

Laboratory:

Received by: RPaul 1-6-10 1500

Signature Date Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

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Particulate Lab Data Sheet

Test Date: 1-5-10

Plant Name: CPL-Brunswick

Source: Power Plant

	Run No. 1	Run No. 2	Run No. 3	Blank
Container No.	2	425	10	391
Total Volume (ml)	105	120	135	100
Aliquot Evaporated (ml)	105	120	135	100
Final Weight (g)	113.8773	113.2528	116.6993	112.8331
Tare Weight (g)	113.8732	113.2460	116.6939	112.8328
Gross Weight Gained (g)	0.0041	0.0068	0.0054	0.0003
Average Blank (g)	—	—	—	
Net Weight (g)	0.0041	0.0068	0.0054	
Aliquot Factor	x 1.0	x 1.0	x 1.0	x
Total Net Weight (mg)	4.1	6.8	5.4	

Container No.	1-F	2-F	3-F	BL-A
Filter No.	5331	5332	5333	5341
Final Weight (g)	0.4358	0.4349	0.4334	0.4316
Tare Weight (g)	0.4327	0.4332	0.4302	0.4316
Gross Weight Gained	0.0031	0.0017	0.0032	0.0000
Average Blank (g)	—	—	—	
Total Net Weight (mg)	3.1	1.7	3.2	

Tare Balance Check

0.0 ✓ 10.0 ✓
1.0 ✓ 50.0 ✓
5.0 ✓ 100.0 ✓
T/H 68/38

R Paul
Signature

1-7-10
Date

Final Balance Check

0.0 ✓ 10.0 ✓
1.0 ✓ 50.0 ✓
5.0 ✓ 100.0 ✓
T/H 67/39

R Paul
Signature

1-8-10
Date

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Carbon Monoxide Emission Measurements (Jan. 5)

Calibration Calculations and Concentrations

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Analyzer Calibration Calculations Summary
Method 10

Cal. Gas ppm	% of Span
201.4	39.3
512.9	100.0

Span is Equal to: 512.9
(M7E Sec. 3.4)

Method 7E Calibration Specifications
Mid (Down scale) (40-60%Span); High(Upscale) (100%Span) (M7E-Sec.3.3.2+3.3.3)

EPA Protocol Gas Analyzer Calibration Data
Analyzer Calibration Error
Instrument Range Setting {ppmv} 0 to 1000

Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response Instrument Direct (ppmv)	Accuracy Diff. from Actual (% of Span)(1)
Zero	0.00	R1-Pre	1/5/2010 11:51	0.63	0.12
CO	201.4	R1-Pre	1/5/2010 12:03	197	-0.87
CO	512.9	R1-Pre	1/5/2010 11:59	508	-0.98

Method 7E Calibration Specifications
(1) Analyzer Calibration Error + 2% of Span (Section 12.2,Equation 7E-1)

EPA Protocol Gas Analyzer Calibration Data
System Bias Check
Instrument Range Setting {ppmv} 0 to 1000

Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response through Train System Loop (ppmv)	5% Max System Bias (% of Span)(2)	3% Max Drift(3)
Zero	0.00	R1-Pre	1/5/2010 12:20	-0.50	-0.22	
Zero	0.00	R1-Post	1/5/2010 13:54	-0.50	-0.22	0.00
CO	201.4	R1-Pre	1/5/2010 12:14	192.0	-0.96	
CO	201.4	R1-Post	1/5/2010 13:58	192.3	-0.90	0.06
Zero	0.00	R2-Pre	1/5/2010 13:54	-0.50	-0.22	
Zero	0.00	R2-Post	1/5/2010 15:30	-0.50	-0.22	0.00
CO	201.4	R2-Pre	1/5/2010 13:58	192.3	-0.90	
CO	201.4	R2-Post	1/5/2010 15:25	189.4	-1.46	0.56
Zero	0.00	R3-Pre	1/5/2010 15:30	-0.50	-0.22	
Zero	0.00	R3-Post	1/5/2010 17:00	-0.50	-0.22	0.00
CO	201.4	R3-Pre	1/5/2010 15:25	189.4	-1.46	
CO	201.4	R3-Post	1/5/2010 16:56	187.5	-1.83	0.37

Method 7E Calibration Specifications
(2) Section 12.3, Equation 7E-2
(3) Section 12.4, Equation 7E-4

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials (Baseline PM/CO Emission Data)

Date Time	CO ppmv			
1/5/2010 11:45	20.3			
1/5/2010 11:46	16.8			
1/5/2010 11:47	16.3			
1/5/2010 11:48	16.8			
1/5/2010 11:49	16.3			
1/5/2010 11:50	15.8			
1/5/2010 11:51	5.3	<< Nitrogen Direct		
1/5/2010 11:52	0.8		CO	
1/5/2010 11:53	0.5		0.63	<average
1/5/2010 11:54	6.8			
1/5/2010 11:55	303.2			
1/5/2010 11:56	491.5			
1/5/2010 11:57	501.3			
1/5/2010 11:58	490.0			
1/5/2010 11:59	492.7	<< 512.9 ppmv CO Direct		
1/5/2010 12:00	509.0		CO	
1/5/2010 12:01	506.8		507.89	<average
1/5/2010 12:02	507.8			
1/5/2010 12:03	345.5	<< 201.4 ppmv CO Direct		
1/5/2010 12:04	199.0		CO	
1/5/2010 12:05	194.8		196.92	<average
1/5/2010 12:06	194.5			
1/5/2010 12:07	187.0			
1/5/2010 12:08	32.8			
1/5/2010 12:09	-0.5	<< Nitrogen Direct		
1/5/2010 12:10	-0.3		CO	
1/5/2010 12:11	-0.3		-0.25	<average
1/5/2010 12:12	59.8			
1/5/2010 12:13	136.7			
1/5/2010 12:14	208.1	<< 201.4.9 ppmv CO System		
1/5/2010 12:15	193.8		CO	
1/5/2010 12:16	192.5		193.17	<average
1/5/2010 12:17	193.3			
1/5/2010 12:18	142.2			
1/5/2010 12:19	5.3			
1/5/2010 12:20	-0.5	<< Nitrogen System		
1/5/2010 12:21	-0.5		CO	
1/5/2010 12:22	-0.5		-0.50	<average
1/5/2010 12:23	34.3			
1/5/2010 12:25	102.4	<< START RUN #1		
1/5/2010 12:26	111.9			
1/5/2010 12:27	114.4			
1/5/2010 12:28	120.2			
1/5/2010 12:29	164.2			
1/5/2010 12:30	192.5			
1/5/2010 12:31	144.5			
1/5/2010 12:32	162.5			
1/5/2010 12:33	228.3			
1/5/2010 12:34	179.0			
1/5/2010 12:35	151.7			
1/5/2010 12:36	143.2			
1/5/2010 12:37	140.7			
1/5/2010 12:38	160.2			
1/5/2010 12:39	154.0			
1/5/2010 12:40	160.0			
1/5/2010 12:41	269.7			
1/5/2010 12:42	291.2			
1/5/2010 12:43	198.5			
1/5/2010 12:44	129.7			
1/5/2010 12:45	206.3			
1/5/2010 12:46	263.1			
1/5/2010 12:47	217.6			
1/5/2010 12:48	178.3			
1/5/2010 12:49	227.6			
1/5/2010 12:50	204.6			
1/5/2010 12:51	203.1			
1/5/2010 12:52	192.3			
1/5/2010 12:53	207.8			

1/5/2010 12:54	201.3				
1/5/2010 12:55	227.1				
1/5/2010 12:56	202.1				
1/5/2010 12:57	197.5				
1/5/2010 12:58	229.6				
1/5/2010 12:59	235.1				
1/5/2010 13:00	274.2				
1/5/2010 13:01	282.4				
1/5/2010 13:02	205.6				
1/5/2010 13:03	198.3				
1/5/2010 13:04	246.1				
1/5/2010 13:05	189.0				
1/5/2010 13:06	264.1				
1/5/2010 13:07	270.4				
1/5/2010 13:08	230.6				
1/5/2010 13:09	303.0				
1/5/2010 13:10	245.9				
1/5/2010 13:11	279.4				
1/5/2010 13:12	233.1				
1/5/2010 13:13	196.5				
1/5/2010 13:14	244.1				
1/5/2010 13:15	270.7				
1/5/2010 13:16	235.9				
1/5/2010 13:17	202.6				
1/5/2010 13:18	227.8				
1/5/2010 13:19	245.1				
1/5/2010 13:20	223.8				
1/5/2010 13:21	255.1				
1/5/2010 13:22	243.9				
1/5/2010 13:23	244.6				
1/5/2010 13:24	226.6				
1/5/2010 13:25	212.6				
1/5/2010 13:26	189.0				
1/5/2010 13:27	211.8				
1/5/2010 13:28	197.5				
1/5/2010 13:29	214.6				
1/5/2010 13:30	188.0				
1/5/2010 13:31	162.5				
1/5/2010 13:32	176.0				
1/5/2010 13:33	197.3				
1/5/2010 13:34	168.5				
1/5/2010 13:35	156.7				
1/5/2010 13:36	184.0				
1/5/2010 13:37	173.5				
1/5/2010 13:38	175.0				
1/5/2010 13:39	164.0				
1/5/2010 13:40	149.2				
1/5/2010 13:41	197.3				
1/5/2010 13:42	187.3				
1/5/2010 13:43	161.7				
1/5/2010 13:44	159.2				
1/5/2010 13:45	153.7				
1/5/2010 13:46	167.8	<< END RUN #1			
1/5/2010 13:47	148.2				
1/5/2010 13:48	154.2				
1/5/2010 13:49	162.7				
1/5/2010 13:50	164.5				
1/5/2010 13:51	118.2				
1/5/2010 13:52	115.7				
1/5/2010 13:53	58.3				
1/5/2010 13:54	0.0	<< Nitrogen System			
1/5/2010 13:55	-0.5		CO		
1/5/2010 13:56	-0.5		-0.50	<average	
1/5/2010 13:57	63.3				
1/5/2010 13:58	183.0	<< 201.4.9 ppmv CO System			
1/5/2010 13:59	192.5		CO		
1/5/2010 14:00	192.0		192.29	<average	
1/5/2010 14:01	191.0				
1/5/2010 14:02	193.0				

RUN (1)	ANALYZER RESPONSE TO STACK GAS ppmv	ZERO BIAS ppmv	ACTUAL CAL.GAS VALUE ppmv	ANALYZER RESPONSE TO CAL. GAS ppmv	CORRECTED STACK GAS CONC. ppmv
CO	201.2	-0.50	201.4	192.73	210.2

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials (Baseline PM/CO Emission Data)

Date Time	CO ppmv	
1/5/2010 14:10	262.1	
1/5/2010 14:11	237.4	
1/5/2010 14:12	246.6	<< START RUN #2
1/5/2010 14:13	237.4	
1/5/2010 14:14	254.1	
1/5/2010 14:15	248.1	
1/5/2010 14:16	253.4	
1/5/2010 14:17	221.1	
1/5/2010 14:18	202.6	
1/5/2010 14:19	283.9	
1/5/2010 14:20	304.0	
1/5/2010 14:21	285.4	
1/5/2010 14:22	236.9	
1/5/2010 14:23	211.1	
1/5/2010 14:24	182.0	
1/5/2010 14:25	176.8	
1/5/2010 14:26	160.0	
1/5/2010 14:27	151.7	
1/5/2010 14:28	161.5	
1/5/2010 14:29	173.0	
1/5/2010 14:30	190.5	
1/5/2010 14:31	178.0	
1/5/2010 14:32	223.6	
1/5/2010 14:33	257.6	
1/5/2010 14:34	218.6	
1/5/2010 14:35	153.0	
1/5/2010 14:36	135.0	
1/5/2010 14:37	128.7	
1/5/2010 14:38	188.5	
1/5/2010 14:39	156.7	
1/5/2010 14:40	111.4	
1/5/2010 14:41	146.5	
1/5/2010 14:42	132.4	
1/5/2010 14:43	134.0	
1/5/2010 14:44	163.2	
1/5/2010 14:45	237.4	
1/5/2010 14:46	252.4	
1/5/2010 14:47	145.0	
1/5/2010 14:48	136.2	
1/5/2010 14:49	149.5	
1/5/2010 14:50	159.7	
1/5/2010 14:51	227.6	
1/5/2010 14:52	259.6	
1/5/2010 14:53	175.8	

1/5/2010 14:54	131.7				
1/5/2010 14:55	159.2				
1/5/2010 14:56	157.7				
1/5/2010 14:57	161.0				
1/5/2010 14:58	180.0				
1/5/2010 14:59	235.1				
1/5/2010 15:00	262.9				
1/5/2010 15:01	246.1				
1/5/2010 15:02	287.9				
1/5/2010 15:03	409.6				
1/5/2010 15:04	324.2				
1/5/2010 15:05	218.6				
1/5/2010 15:06	196.3				
1/5/2010 15:07	188.8				
1/5/2010 15:08	220.8				
1/5/2010 15:09	177.8				
1/5/2010 15:10	185.5				
1/5/2010 15:11	216.8				
1/5/2010 15:12	295.2				
1/5/2010 15:13	316.0				
1/5/2010 15:14	216.6				
1/5/2010 15:15	215.6				
1/5/2010 15:16	322.7				
1/5/2010 15:17	259.4				
1/5/2010 15:18	220.3				
1/5/2010 15:19	227.1				
1/5/2010 15:20	255.6				
1/5/2010 15:21	285.4				
1/5/2010 15:22	332.5				
1/5/2010 15:23	230.6	<< END RUN #2			
1/5/2010 15:24	268.2				
1/5/2010 15:25	210.6	<< 201.4.9 ppmv CO System			
1/5/2010 15:26	190.0			CO	
1/5/2010 15:27	188.8			189.41	<average
1/5/2010 15:28	188.5				
1/5/2010 15:29	129.4				
1/5/2010 15:30	2.8	<< Nitrogen System			
1/5/2010 15:31	-0.5			CO	
1/5/2010 15:32	-0.5			-0.50	<average

RUN (2)	ANALYZER RESPONSE TO STACK GAS ppmv	ZERO BIAS ppmv	ACTUAL CAL.GAS VALUE ppmv	ANALYZER RESPONSE TO CAL. GAS ppmv	CORRECTED STACK GAS CONC. ppmv
CO	213.7	-0.50	201.4	190.85	225.5

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials (Baseline PM/CO Emission Data)

Date Time	CO ppmv	
1/5/2010 15:40	362.8	
1/5/2010 15:41	316.2	<< START RUN #3
1/5/2010 15:42	270.7	
1/5/2010 15:43	376.1	
1/5/2010 15:44	456.9	
1/5/2010 15:45	374.3	
1/5/2010 15:46	487.0	
1/5/2010 15:47	511.0	
1/5/2010 15:48	628.9	
1/5/2010 15:49	429.4	
1/5/2010 15:50	434.9	
1/5/2010 15:51	318.2	
1/5/2010 15:52	423.1	
1/5/2010 15:53	514.8	
1/5/2010 15:54	453.9	
1/5/2010 15:55	342.5	
1/5/2010 15:56	304.2	
1/5/2010 15:57	354.0	
1/5/2010 15:58	389.3	
1/5/2010 15:59	521.0	
1/5/2010 16:00	419.6	
1/5/2010 16:01	321.5	
1/5/2010 16:02	352.8	
1/5/2010 16:03	346.5	
1/5/2010 16:04	379.8	
1/5/2010 16:05	382.1	
1/5/2010 16:06	362.5	
1/5/2010 16:07	284.9	
1/5/2010 16:08	282.4	
1/5/2010 16:09	285.4	
1/5/2010 16:10	306.2	
1/5/2010 16:11	338.3	
1/5/2010 16:12	344.3	
1/5/2010 16:13	296.4	
1/5/2010 16:14	349.5	
1/5/2010 16:15	344.8	
1/5/2010 16:16	303.5	
1/5/2010 16:17	320.5	
1/5/2010 16:18	338.3	
1/5/2010 16:19	338.5	
1/5/2010 16:20	328.2	
1/5/2010 16:21	277.2	
1/5/2010 16:22	210.6	
1/5/2010 16:23	244.6	

1/5/2010 16:24	288.2				
1/5/2010 16:25	274.9				
1/5/2010 16:26	309.5				
1/5/2010 16:27	236.6				
1/5/2010 16:28	365.8				
1/5/2010 16:29	318.0				
1/5/2010 16:30	349.5				
1/5/2010 16:31	282.9				
1/5/2010 16:32	262.1				
1/5/2010 16:33	244.9				
1/5/2010 16:34	254.4				
1/5/2010 16:35	245.4				
1/5/2010 16:36	269.2				
1/5/2010 16:37	239.9				
1/5/2010 16:38	283.9				
1/5/2010 16:39	235.4				
1/5/2010 16:40	234.9				
1/5/2010 16:41	185.3				
1/5/2010 16:42	182.3				
1/5/2010 16:43	195.8				
1/5/2010 16:44	285.4				
1/5/2010 16:45	242.1				
1/5/2010 16:46	248.4				
1/5/2010 16:47	236.9				
1/5/2010 16:48	206.3				
1/5/2010 16:49	178.3				
1/5/2010 16:50	173.0				
1/5/2010 16:51	185.8				
1/5/2010 16:52	152.0	<< END RUN #3			
1/5/2010 16:53	157.0				
1/5/2010 16:54	164.0				
1/5/2010 16:55	182.5				
1/5/2010 16:56	187.0	<< 201.4.9 ppmv CO System			
1/5/2010 16:57	187.0		CO		
1/5/2010 16:58	188.0		187.53	<average	
1/5/2010 16:59	129.9				
1/5/2010 17:00	2.5	<< Nitrogen System			
1/5/2010 17:01	-0.5		CO		
1/5/2010 17:02	-0.5		-0.50	<average	

RUN (3)	ANALYZER RESPONSE TO STACK GAS ppmv	ZERO BIAS ppmv	ACTUAL CAL.GAS VALUE ppmv	ANALYZER RESPONSE TO CAL. GAS ppmv	CORRECTED STACK GAS CONC. ppmv
CO	317.1	-0.50	201.4	188.47	338.5

Carbon Monoxide Emission Measurements (Jan. 5)

Field Data Sheets

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

BP: 30.12

O = 2.5.04ppm
Fscale = 5.01.755

KOOGLER AND ASSOCIATES, INC.
INSTRUMENTAL GAS SAMPLING FIELD DATA RECORD

PLANT	CEMEX / CPL			**DATE**	01-05-10		
LOCATION	Brooksville FL			**EMISSION UNIT**	Kiln #1 Power Plant		
TEST(s)	CO, PM			**SYSTEM LEAK CHECK (Limit 1 inHg/2min)**			
				Init. VAC inHg	15	**Final VAC inHg**	
INSTRUMENT RANGE (R) (0-XXX)				**Calibration Gas Certified Concentration Value**			
Instrument	Available R	Selected R	Teloger Vdc	Test	mid-gas	mid-gas	high-gas(span)
NOx (M7E)				NOx (M7E)			
SO2 (M6C)				SO2 (M6C)			
CO (M10)				CO (M10)	Zero Air	201.4	512.9
THC (M25A)				THC (M25A)			
NMHC				NMHC			

TIME	Action Comment	TIME	Action Comment
Dried 11:49			
11:42	Zero Air on	15:32	Zero Air off / Stack Gas
11:54	Zero Air off / 512.9 on	15:41	Start Run #3
12:00	512.9 CO = 510.015	16:52	END Run #3
12:02	512.9 CO off / 201.4 CO on	16:52	~~Zero~~ 201.4 CO ON
12:05	201.4 CO = 194.7	16:56	201.4 CO = 186.78
12:07	201.4 CO off / Zero on	16:58	201.4 CO off / Zero Air on
12:09	Zero = -0.5	17:00	Zero Air = 7.5
12:11	Zero off	17:02	Zero Air off
Loop			
12:13	201.4 CO on		
12:15	201.4 CO = 194		
12:17	201.4 CO off / Zero Air on		
12:20	Zero Air = -.5		
12:22	Zero Air off / Stack Gas		
12:25	Start Run 1 PM / CO Run		
13:46	~~Start CO Run~~ END PM Run #1		
	~~Start PM Run #2~~		
	~~END CO Run #1~~		
13:52	Zero Air on		
13:54	Zero Air = 5.2		
13:56	Zero Air off / 201.4 CO on		
13:59	201.4 CO = 192.78		
14:01	201.4 CO off / Stack Gas		
14:12	Start Run #2		
15:23	END Run # 2		
15:24	204.1 CO on		
15:26	204.1 CO = 196.5		
15:28	204.1 CO off / Zero Air on		
15:30	Zero Air = 1.002		

Run #1 PM O_2 = 13.0 CO_2 = 9.0
Run #2 PM O_2 = 12.0 CO_2 = 9.0
Run #3 PM O_2 = 13.0 CO_2 = 8.5

Particulate Matter Emission Measurements (Jan. 22)

Calculations

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

SUMMARY OF PARTICULATE MATTER EMISSION TEST DATA

CENTRAL POWER AND LIME, INC. Brooksville EU 018: POWER PLANT (23 % Wood Fuel) JANUARY 22, 2010					
				Particulate Matter	
Run No.	Stack Gas Flow Rate (SCFMD)	Stack Gas Temperature (F)	Stack Gas Moisture (%)	Conc. (gr/dscf)	Emission Rate (Lbs/Hr)
1	426,062	306	7.6	0.0028	10.39

GENERAL DATA

Plant :	CENTRAL BROOKSVILLE, FL				
Source/Unit :	EU 018: POWER PLANT (23 % Wood Fuel)				
Date :	JANUARY 22, 2010		Cp :	0.840	
Stack dia. :	223.80	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 :	0 Tons/hr
Carbon, wt% :	0.00	Run 2 :	0
Sulfur, wt% :	0.00	Run 3 :	0
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)	73	0	0
Stack Temp., Ts (F)	306	0	0
Sq.Rt. dP	0.61	0.00	0.00
dH (in. H2O)	2.11	0.00	0.00
Meter Vol.,Vm (ft3)	53.438	0.000	0.000
Vol. H2O, Vlc (ml)	93.0	0.0	0.0
Meter Y	1.004	1.004	1.004
Bar. Press.,Pb (in.Hg.)	29.78	29.78	29.78
Static Press.,Ps (in.H2O)	-0.59	-0.59	-0.59
Test Time (min.)	64.0	64.0	64.0
Nozzle Dia.,Dn (in.)	0.306	0.306	0.306
Oxygen, O2 (%)	19.0	0.0	0.0
Carbon Dioxide, CO2 (%)	10.0	0.0	0.0
Carbon Monoxide, CO (%)	0.0	0.0	0.0
Report Emission Criteria in ? l = lb/hr g = gr/dscf :			grains
Process Rate Units ? T = Ton/hr, L = Lbs/hr, C = Cans/min:			T
Allowable Particulate Matter Concentration .....:			0

LABORATORY RESULTS

	RUN 1	RUN 2	RUN 3
	grams	grams	grams
GRAVIMETRIC ANALYSIS METHOD 5 :			
Front Half Wash (FHW)	0.00670	0.00000	0.00000
Filterable Sample (MF)	0.00310	0.00000	0.00000
Condensible Sample (BHW)	0.00000	0.00000	0.00000

A. FIELD DATA SUMMARY

Plant: CENTRAL POWER AND LIME, INC. Brooksville
Source/Unit: EU 018: POWER PLANT (23 % Wood Fuel)
Date: JANUARY 22, 2010

	RUN 1
Vlc = Vol water collected in train, ml	93.0
Vm = Sample gas vol, meter cond., acf	53.438
Y = Meter calibration factor	1.0040
Pbar = Barometric pressure, in. Hg	29.78
Pstatic = Stack static pressure, in. H2O	-0.59
dH = Avg meter pressure diff, in. H2O	2.11
Tm = Absolute meter temp., degrees R	533.3
Vm(std) = Sample gas vol, Std. cond., dscf	53.145
Bws = Water vapor in gas stream, fraction	0.076
MF = Moisture factor (1 - Bws)	0.924
CO2 = Carbon Dioxide, dry, volume %	10.00
O2 = Oxygen, dry, volume %	19.00
N2 = Nitrogen, dry volume %	71.00
Md = Molecular weight of stack gas, dry	30.36
Ms = Molecular weight of stack gas, wet	29.42
Cp = Pitot tube coefficient	0.84
Sq.Rt. dP = Avg. square root of each dP	0.6113
Ts = Absolute stack temp., degrees R	766.3
A = Area of stack, ft2	273.18
Qstd = Volumetric flowrate, dscfm	426,062
An = Nozzle area, ft2	5.11E-04
0 = Sample time, minutes	64.00
%I = Isokinetic variation, percent	104.26

B. PARTICULATE DATA SUMMARY

Plant: CENTRAL POWER AND LIME, INC. Brooksville
Source/Unit: EU 018: POWER PLANT (23 % Wood Fuel)
Date: JANUARY 22, 2010

	RUN 1
Sample Weight (FHW + MF + BHW), mg	9.80
Meter Volume, standard cond., Vm(std)	53.145
Carbon Dioxide, percent	10.00
Oxygen, percent	19.00
Sample Concentration :	
gr/scf	0.0026
gr/dscf	0.0028
gr/dscf @ 0 % CO2	0.0034
gr/dscf @ 0 % O2	0.0313
ppm * MW (dry gas).....	156.5
ppm * MW @ 0% CO2	0.0
ppm * MW @ 0% O2	1721.7

EMISSION RATE CALCULATIONS

Plant :	CENTRAL POWER AND LIME, INC. Brooksville		
Source/Unit :	EU 018: POWER PLANT (23 % Wood Fuel)		
Date:	JANUARY 22, 2010	RUN N	1
STANDARD TEMP. :	68 F		

Front Half Wash (FHW)		0.00670	grams	| Vm(st	53.145	ft3
Mass Filter (MF)		0.00310	grams	| Vw(st	4.378	ft3
Back Half Wash (BHW)		0.00000	grams	| Qs(st	426,062	dscfm
Vm(std) SO2			dscf	| Bws	0.076	
CO2 CORF	0.0 %			| CO2	10.00	%
O2 CORR.	0.0 %			| O2	19.00	%

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 Value (Btu/gal) x Fuel Use Rate (gal/ton) / 1E6 .... MMBtu/hr

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0026	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0028	gr/dscf
gr/dscf x (12 / %CO2)	0.0034	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0313	@ 0% O2
0.00857 x Qs(std) x gr/dscf	10.39	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. / 10.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 19.0% 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. / 10.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 10.0% O2 Stack)	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)].....	lb/hr

EMISSION RATE CALCULATIONS

Plant :	CENTRAL POWER AND LIME, INC. Brooksville				
Source/Unit :	EU 018: POWER PLANT (23 % Wood Fuel)				
Date:	JANUARY 22, 2010		RUN N	2	
STANDARD TEMP. :	68 F				
Front Half Wash (FHW)		0.00000 grams	| Vm(st	ft3	
Mass Filter (MF)		0.00000 grams	| Vw(st	ft3	
Back Half Wash (BHW)		0.00000 grams	| Qs(st	dscfm	
Vm(std) SO2		dscf	| Bws		
CO2 CORF	0.0 %		| CO2	%	
O2 CORR.	0.0 %		| O2	%	

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)] ... gr/scf

15.432 x (FHW + MF + BHW) / (Vm(std) ..... gr/dscf

gr/dscf x (12 / %CO2) ..... @ 0% CO2

gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)] ..... @ 0% O2

0.00857 x Qs(std) x gr/dscf ..... 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. / 10.0 % CO2 in Stack ..... ppm @ 0% CO2

ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 10.0% 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. / 0.0 % CO2 in Stack ..... ppm @ 0% CO2

ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 0.0% O2 Stack) ppm @ 0% O2

[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)]..... lb/hr

EMISSION RATE CALCULATIONS

Plant :	CENTRAL POWER AND LIME, INC. Brooksville				
Source/Unit :	EU 018: POWER PLANT (23 % Wood Fuel)				
Date:	JANUARY 22, 2010		RUN N	3	
STANDARD TEMP. :	68 F				

Front Half Wash (FHW)		0.00000	grams	| Vm(st	ft3
Mass Filter (MF)		0.00000	grams	| Vw(st	ft3
Back Half Wash (BHW)		0.00000	grams	| Qs(st	dscfm
Vm(std) SO2			dscf	| Bws	
CO2 CORF	0.0 %			| CO2	%
O2 CORR.	0.0 %			| O2	%

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 .... Value (Btu/gal) x Fuel Use Rate (gal/ton) / 1E6	MMBtu/hr

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	gr/dscf
gr/dscf x (12 / %CO2)	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	@ 0% O2
0.00857 x Qs(std) x gr/dscf	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. / 10.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 10.0% 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. / 0.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 0.0% O2 Stack)	ppm @ 0% O2
[Mass HCl(mg) x 60 x Qs / (Vm(std) x 453,600)].....	lb/hr

SOURCE TEST CALCULATIONS

Plant : CENTRAL POWER AND LIME, INC. Brooksville
Source/Unit : EU 018: POWER PLANT (23 % Wood Fuel) RUN NO.: 1
Date: JANUARY 22, 2010

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.59	in. H2O
METER TEMP, Tm =	73.3125	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	306.3	F	STACK I.D. =	223.80	inch
AVG.VEL.HEAD,dP =	0.374	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	2.11	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	53.438	Cu.Ft.	STACK AREA, As =	273.179	Sq.Ft.
METER COFF., Y =	1.004		TEST TIME =	64.00	min.
BAR. PRESS., Pb =	29.78	in.Hg	NOZZLE DIA. =	0.306	inch
COND.(Vlc) =	93.0	ml	NOZZLE DIA., An =	5.1E-04	Sq.Ft.

GAS ANALYSIS = 19.00 % O2 0.00 % CO
10.00 % CO2 71.00 % N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x
(Pb + (dH / 13.6)) / (Tm + 460)..... = 53.145 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 4.378 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.076 | Lower Bws value used.

Bws @ Saturated Conditions = Vapor Press. of H2O
@ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = -7421.87

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.36

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 29.42

P(stack) = Pbar + (Ps / 13.6) ..... = 29.74 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460)
/ (Ms x P(stack))] ..... = 41.09 ft/sec

Qs = vs x As x 60 ..... = 673,428 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460))
x (P(stack)/29.92) ..... = 426,062 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] ..... = 104.26 %

Particulate Matter Emission Measurements (Jan. 22)

Field and Analytical Data Sheets

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

Multiple Methods Data Sheet

Plant: CPL
Sample Location: Kiln
Control Type: B.H
Sample Type: PM Method 5.
Date: 1/22/10 Run No.: 1
Time Start: 16.30 Time End: 1739
Sample Time: 64 min @ 4 min. min/point 4 Total Mins. 64
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pres: 29.78 "Hg Stack Pres: - "Hg Ps: -.54 "H_2O
Moisture: 9 % FDA: Gas Density Factor:
Temp: 70 °F Wind Direction: NW Wind Speed: 10+
Weather: P.C. Thermocouple Readout: KA-8
Sample Box No.: KA-8 Meter Box No.: KA-8
Meter Y: 1.024 @ Delta H: 1.73 Pitot Corr.: .84
Nozzle Diameter: .306 inches Probe Length: 10 ft. feet
Probe Heater Setting: 250 Nomograph Cf: 5.56
Stack Dimensions: inches
Stack Area: ft^2
Effective Stack Area: ft^2
Stack Height: ft

30% wood pellets

CP@Tm=85
SG1 CP@Tm=80

Stack Dimensions

Umbilical: KA-100
Thermocouple Probe No. KAK-110
Pitot Tube: SS II

Material Processing Rate:
Final Gas Meter Reading: 372.735 ft^3
Initial Gas Meter Reading: 319.297 ft^3
Total Metered Gas Volume: 53.438 ft^3
Condensate Gain in Impingers: 80 mL
Weight Gain in Silica Gel: 13 g
Total Moisture Gain: 93 mL
Silica Gel Container No.: 18
Filter Number:

Leak Check - Meter Box:
Initial: .007 cfm @ 9 inches Hg
Final: .002 cfm @ 6 inches Hg

Leak Check - Pitot Tubes:
Impact 3 "H_2O for 15 sec: Stable, Leak
Static 3 "H_2O for 15 sec: Stable, Leak

Test Conducted By: J. Langston A. West
O_2: 9 % CO_2: 10 %
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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading ($\%O_2$)
					Calculated	Actual						
1-1		0	319.297	.41	2.23	2.23	305	248	67	73	3	
2		4	22.6	.39	2.17	2.17	308	256	63	72	3	
3		8	26.1	.39	2.17	2.17	311	267	59	72	3	
4		12		.39	2.17	2.17	305	260	58	71	3	
2-1		16	32.6	.45	2.50	2.50	307	252	57	72	3	
2		20	36.1	.38	2.11	2.11	307	248	56	72	3	
3		24	39.5	.36	2.00	2.00	304	246	57	73	3	
4		28	42.6	.34	1.89	1.89	304	247	55	74	3	

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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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O2)
					Calculated	Actual						
3-1		32	45.6	.43	2.39	2.39	306	257	57	74	3	
2		36	49.0	.38	2.11	2.11	308	258	55	74	3	
3		40	52.3	.41	2.28	2.28	306	250	54	74	3	
4		44	55.6	.41	2.28	2.28	306	246	55	74	3	
4-1		48	59.0	.44	2.45	2.45	306	248	56	74	3	
2		52	62.6	.43	2.39	2.39	307	249	55	74	3	
3		56	66.1	.40	2.22	2.22	306	347	55	75	3	
4		60	69.4	.38	2.11	2.11	305	350	55	75	3	
	END	64										

P_s = .59

10 CO_2 9 O_2

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SAMPLING RATE CALCULATIONS

Plant Name: CPC **Date:** 1/22/10

Location: Brooksville FL **Source:** Kiln

1) Calculate the optimum Cf: $\Delta H @ / \Delta P_{avg} = Cf$

ΔH	/ΔP$_{avg}$	= Cf
		48

2) Calculate the optimum nozzle size:

Record Values		
R1	R2	R3
85		
29		
28.0		
320		
1.73		
.36		
.306		

Tm = Meter Temperature (°F) (Add 5 °F for initial temp.)
Bw = Moisture Fraction
Ms = Wet Molecular Weight of Stack Gas (from Table)
Ts = Stack Temperature (°F)
ΔH@ = Meter Box Constant (box front)
ΔP = Average Pitot Reading (Inches H20)
Dn = Nozzle Diameter (Inches) measured

Moisture Fraction	MS
0	29
0.05	28.5
0.1	27.9
0.15	27.4
0.2	26.8
0.25	26.2
0.3	25.7
0.35	25.2
0.4	24.6

$$Dn = \left[\frac{Cf}{\left(\frac{Tm + 460}{MS * (Ts + 460)} \right) * (1 - Bw)^2 * (\Delta H @) * 17741} \right]^{0.25}$$

$= .245$

$\left(\frac{545}{21840}\right) \cdot (.8281)(1.73)(17741$

634.236

628.417766

3) Calculate the correction factor Cf. Cf times the stack ΔP will determine the manometer setting ΔH:

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

Calculation	Run No. 1		Run No. 2		Run No. 3	
Tm + 460 =	545					
/ [MS*(Ts+460)] =	21840					
* (1 - Bw)^2 =	.8281					
* ΔH@ =	1.73					
* (Dn)^4 =	.008760					
* 17741 = Cf						

5.56

Chain of Custody

Plant Name: CPL Project Number: 308-09-08

Location: Kiln no.1 Brooksville, FL Source: Kiln

Sample Identification	Remarks
R1 PM F	Run 1 PM Filter
R1 PM PR	Run 1 PM Probe Rinse - acetone
R1 Silica	Run 1 Silica Gel

Sampled by: [signature] 1/22/10 See Data Sheets
Signature Date Time

Relinquished by: _____ _____ _____
Signature Date Time

Received by: _____ _____ _____
Signature Date Time

Relinquished by: _____ _____ _____
Signature Date Time

Laboratory:

Received by: [signature] 1/22/10 2030
Signature Date Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

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Particulate Lab Data Sheet

Test Date: 1/22/10

Plant Name: CPL

Source: Power Plant

	Run No. 1	Run No. 2	Run No. 3	Blank
Container No.	713	717	204	7211
Total Volume (ml)	200			150
Aliquot Evaporated (ml)	200			
Final Weight (g)	112.4848			110.5214
Tare Weight (g)	112.4781	111.1596	98.9357	110.5211
Gross Weight Gained (g)	.0067			.0003
Average Blank (g)	0	0	0	0
Net Weight (g)	.0067			.0003
Aliquot Factor	x 1.0	x	x	x 1.0
Total Net Weight (mg)	6.7 ~~6~~ 5.0			.3

Container No.	1B			BL
Filter No.	005346			5308
Final Weight (g)	0.4369			0.4162
Tare Weight (g)	0.4338			0.4162
Gross Weight Gained	0.0031			—
Average Blank (g)	—			—
Total Net Weight (mg)	3.1			0.0

Tare Balance Check

0.0 0.0000 10.0 10.0002
1.0 0.9999 50.0 50.0004
5.0 5.0001 100.0 100.0004
T/H 70/44

Signature

1/21/10
Date

Final Balance Check

0.0 0.0000 10.0 9.997
1.0 0.9996 50.0 49.9997
5.0 4.9998 100.0 100.0001
T/H 70/40

Signature

1/28/10
Date

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Carbon Monoxide Emission Measurements (Jan. 19, 21 and 22)

Calibration Calculations and Concentrations

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

Analyzer Calibration Calculations Summary
Method 10

Cylinder ID #	Cal. Gas ppm	% of Span
CC-115823	512.9	51.2
CC-251816	1002.1	100.0

Span is Equal to: 1002.1 (M7E Sec. 3.4)

Method 7E Calibration Specifications
Mid (Down scale) (40-60%Span); High(Upscale) (100%Span) (M7E-Sec.3.3.2+3.3.3)

EPA Protocol Gas Analyzer Calibration Data
Analyzer Calibration Error
Instrument Range Setting (ppmv) 0 to 2000

Cylinder ID #	Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response Instrument Direct ppmv	Accuracy Diff. from Actual (% of Span)(1)
ABS981	Zero	0.00	R1-Pre	1/19/2010 12:18	-1.00	-0.10
CC-115823	CO	512.9	R1-Pre	1/19/2010 12:29	502	-1.06
CC-251816	CO	1002.1	R1-Pre	1/19/2010 12:24	1008	0.61

Method 7E Calibration Specifications
(1) Analyzer Calibration Error + 2% of Span (Section 12.2,Equation 7E-1)

EPA Protocol Gas Analyzer Calibration Data
System Bias Check
Instrument Range Setting (ppmv) 0 to 2000

Cylinder ID #	Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response through Train System Loop ppmv	5% Max System Bias (% of Span)(2)	3% Max Drift(3)
ABS981	Zero	0.00	R1-Pre	1/19/2010 12:44	-1.00	0.00	
ABS981	Zero	0.00	R1-Post	1/19/2010 15:09	-1.00	0.00	0.00
CC-115823	CO	512.9	R1-Pre	1/19/2010 12:39	496.7	-0.55	
CC-115823	CO	512.9	R1-Post	1/19/2010 15:13	483.5	-1.87	1.32

Method 7E Calibration Specifications
(2) Section 12.3, Equation 7E-2
(3) Section 12.4, Equation 7E-4

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials
10% Wood Pellet

Date	Time	CO ppmv			
1/19/2010	12:15	21.5			
1/19/2010	12:16	126.2			
1/19/2010	12:17	6.5			
1/19/2010	12:18	-1.0	<< Nitrogen Direct		
1/19/2010	12:19	-1.0		CO	
1/19/2010	12:20	24.0		-1.00	<average
1/19/2010	12:21	710.6			
1/19/2010	12:22	1010.5			
1/19/2010	12:23	985.5			
1/19/2010	12:24	1006.5	<< 1002.1 ppmv CO Direct		
1/19/2010	12:25	1010.0		CO	
1/19/2010	12:26	1008.0		1008.26	<average
1/19/2010	12:27	991.5			
1/19/2010	12:28	627.9			
1/19/2010	12:29	503.3	<< 512.9 ppmv CO Direct		
1/19/2010	12:30	501.3		CO	
1/19/2010	12:31	494.7		502.25	<average
1/19/2010	12:32	135.7			
1/19/2010	12:33	-1.0	<< Nitrogen Direct		
1/19/2010	12:34	-1.0		CO	
1/19/2010	12:35	1.5		-1.00	<average
1/19/2010	12:36	181.8			
1/19/2010	12:37	293.4			
1/19/2010	12:38	458.2			
1/19/2010	12:39	496.2	<< 512.9 ppmv CO System		
1/19/2010	12:40	497.2		CO	
1/19/2010	12:41	496.2		496.75	<average
1/19/2010	12:42	414.1			
1/19/2010	12:43	39.6			
1/19/2010	12:44	-1.0	<< Nitrogen System		
1/19/2010	12:45	-1.0		CO	
1/19/2010	12:46	-1.0		-1.00	<average
1/19/2010	12:47	33.6			
1/19/2010	12:48	188.3			
1/19/2010	12:49	227.8			
1/19/2010	12:50	226.8			
1/19/2010	12:51	185.8			
1/19/2010	12:52	186.8	<< START RUN #1		
1/19/2010	12:53	204.3			
1/19/2010	12:54	171.3			
1/19/2010	12:55	180.8			
1/19/2010	12:56	227.8			
1/19/2010	12:57	247.9			
1/19/2010	12:58	206.8			
1/19/2010	12:59	257.4			
1/19/2010	13:00	224.3			
1/19/2010	13:01	243.4			
1/19/2010	13:02	256.4			
1/19/2010	13:03	235.9			
1/19/2010	13:04	239.9			
1/19/2010	13:05	219.8			
1/19/2010	13:06	245.9			
1/19/2010	13:07	220.8			
1/19/2010	13:08	334.0			
1/19/2010	13:09	838.8			
1/19/2010	13:10	578.9			
1/19/2010	13:11	206.8			
1/19/2010	13:12	209.8			

1/19/2010 13:13	223.3
1/19/2010 13:14	250.4
1/19/2010 13:15	245.4
1/19/2010 13:16	225.8
1/19/2010 13:17	264.4
1/19/2010 13:18	239.4
1/19/2010 13:19	230.8
1/19/2010 13:20	285.9
1/19/2010 13:21	308.0
1/19/2010 13:22	367.1
1/19/2010 13:23	354.0
1/19/2010 13:24	337.5
1/19/2010 13:25	298.9
1/19/2010 13:26	320.5
1/19/2010 13:27	776.7
1/19/2010 13:28	779.2
1/19/2010 13:29	444.2
1/19/2010 13:30	272.4
1/19/2010 13:31	256.4
1/19/2010 13:32	209.3
1/19/2010 13:33	193.3
1/19/2010 13:34	183.3
1/19/2010 13:35	205.3
1/19/2010 13:36	205.3
1/19/2010 13:37	210.3
1/19/2010 13:38	214.3
1/19/2010 13:39	272.9
1/19/2010 13:40	275.4
1/19/2010 13:41	224.8
1/19/2010 13:42	242.4
1/19/2010 13:43	310.0
1/19/2010 13:44	284.4
1/19/2010 13:45	262.9
1/19/2010 13:46	243.4
1/19/2010 13:47	213.8
1/19/2010 13:48	237.9
1/19/2010 13:49	254.9
1/19/2010 13:50	204.8
1/19/2010 13:51	217.3
1/19/2010 13:52	497.7
1/19/2010 13:53	439.7
1/19/2010 13:54	311.0
1/19/2010 13:55	210.3
1/19/2010 13:56	176.8
1/19/2010 13:57	164.7
1/19/2010 13:58	197.8
1/19/2010 13:59	243.4
1/19/2010 14:00	252.4
1/19/2010 14:01	243.4
1/19/2010 14:02	262.9
1/19/2010 14:03	222.8
1/19/2010 14:04	209.8
1/19/2010 14:05	251.4
1/19/2010 14:06	404.6
1/19/2010 14:07	375.1
1/19/2010 14:08	344.5
1/19/2010 14:09	211.8
1/19/2010 14:10	159.2
1/19/2010 14:11	168.3
1/19/2010 14:12	162.7
1/19/2010 14:13	172.3
1/19/2010 14:14	208.3
1/19/2010 14:15	195.3
1/19/2010 14:16	193.3
1/19/2010 14:17	169.8
1/19/2010 14:18	185.8

1/19/2010 14:19	164.2				
1/19/2010 14:20	144.2				
1/19/2010 14:21	127.2				
1/19/2010 14:22	120.2				
1/19/2010 14:23	120.2				
1/19/2010 14:24	116.2				
1/19/2010 14:25	105.2				
1/19/2010 14:26	99.6				
1/19/2010 14:27	91.6				
1/19/2010 14:28	94.6				
1/19/2010 14:29	116.2				
1/19/2010 14:30	116.2				
1/19/2010 14:31	109.2				
1/19/2010 14:32	104.7				
1/19/2010 14:33	102.7				
1/19/2010 14:34	97.1				
1/19/2010 14:35	106.2				
1/19/2010 14:36	107.2				
1/19/2010 14:37	102.2				
1/19/2010 14:38	92.1				
1/19/2010 14:39	93.1				
1/19/2010 14:40	100.7				
1/19/2010 14:41	101.2				
1/19/2010 14:42	91.1				
1/19/2010 14:43	104.2				
1/19/2010 14:44	99.6				
1/19/2010 14:45	93.6				
1/19/2010 14:46	91.6				
1/19/2010 14:47	82.1				
1/19/2010 14:48	82.1				
1/19/2010 14:49	90.1				
1/19/2010 14:50	88.1				
1/19/2010 14:51	89.1				
1/19/2010 14:52	87.1				
1/19/2010 14:53	86.1				
1/19/2010 14:54	96.1				
1/19/2010 14:55	95.6				
1/19/2010 14:56	81.6				
1/19/2010 14:57	81.1				
1/19/2010 14:58	96.1				
1/19/2010 14:59	90.6				
1/19/2010 15:00	85.1				
1/19/2010 15:01	85.1				
1/19/2010 15:02	81.1				
1/19/2010 15:03	80.1				
1/19/2010 15:04	76.6				
1/19/2010 15:05	76.6				
1/19/2010 15:06	85.6	<< END RUN #1			
1/19/2010 15:07	87.6				
1/19/2010 15:08	28.5				
1/19/2010 15:09	-1.0	<< Nitrogen System			
1/19/2010 15:10	-1.0		CO		
1/19/2010 15:11	-1.0		-1.00	<average	
1/19/2010 15:12	134.2				
1/19/2010 15:13	451.7	<< 512.9 ppmv CO System			
1/19/2010 15:14	483.2		CO		
1/19/2010 15:15	483.7		483.48	<average	

RUN (1)	ANALYZER RESPONSE TO STACK GAS ppmv	ZERO BIAS ppmv	ACTUAL CAL.GAS VALUE ppmv	ANALYZER RESPONSE TO CAL. GAS ppmv	CORRECTED STACK GAS CONC. ppmv
CO	209.2	-1.00	512.9	490.11	219.6

SUMMARY OF MOISTURE EMISSION TEST DATA

CPL BROOKSVILLE FL KILN #1 JANUARY 19, 2010			
Run No.	Stack Gas Flow Rate (SCFMD)	Stack Gas Temperature (F)	Stack Gas Moisture (%)
1	431,848	295	6.8

GENERAL DATA

Plant :	CPL BROOKSVILLE FL				
Source/Unit :	KILN #1				
Date :	JANUARY 19, 2010		Cp :	0.840	
Stack dia. :	223.80	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 :	0 Tons/hr
Carbon, wt% :	0.00	Run 2 :	0
Sulfur, wt% :	0.00	Run 3 :	0
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	0	0
Stack Temp., Ts (F)	295	0	0
Sq.Rt. dP	0.60	0.00	0.00
dH (in. H2O)	0.00	0.00	0.00
Meter Vol.,Vm (ft3)	95.033	0.000	0.000
Vol. H2O, Vlc (ml)	146.0	0.0	0.0
Meter Y	1.004	0.000	0.000
Bar. Press.,Pb (in.Hg.)	30.00	0.00	0.00
Static Press.,Ps (in.H2O)	0.00	0.00	0.00
Test Time (min.)	128.0	0.0	0.0
Nozzle Dia.,Dn (in.)	0.000	0.000	0.000
Oxygen, O2 (%)	13.5	0.0	0.0
Carbon Dioxide, CO2 (%)	7.0	0.0	0.0
Carbon Monoxide, CO (%)	0.0	0.0	0.0
Report Emission Criteria in ? l = lb/hr g = gr/dscf :			grains
Process Rate Units ? T = Ton/hr, L = Lbs/hr, C = Cans/min:			T
Allowable Particulate Matter Concentration .....:			0

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

A. FIELD DATA SUMMARY

Plant: CPL BROOKSVILLE FL
Source/Unit: KILN #1
Date: JANUARY 19, 2010

	RUN 1
Vlc = Vol water collected in train, ml	146.0
Vm = Sample gas vol, meter cond., acf	95.033
Y = Meter calibration factor	1.0040
Pbar = Barometric pressure, in. Hg	30.00
Pstatic = Stack static pressure, in. H2O	0.00
dH = Avg meter pressure diff, in. H2O	0.00
Tm = Absolute meter temp., degrees R	534.3
Vm(std) = Sample gas vol, Std. cond., dscf	94.549
Bws = Water vapor in gas stream, fraction	0.068
MF = Moisture factor (1 - Bws)	0.932
CO2 = Carbon Dioxide, dry, volume %	7.00
O2 = Oxygen, dry, volume %	13.50
N2 = Nitrogen, dry volume %	79.50
Md = Molecular weight of stack gas, dry	29.66
Ms = Molecular weight of stack gas, wet	28.87
Cp = Pitot tube coefficient	0.84
Sq.Rt. dP = Avg. square root of each dP	0.6010
Ts = Absolute stack temp., degrees R	754.8
A = Area of stack, ft2	273.18
Qstd = Volumetric flowrate, dscfm	431,848
An = Nozzle area, ft2	
0 = Sample time, minutes	128.00
%I = Isokinetic variation, percent	

SOURCE TEST CALCULATIONS

Plant : CPL BROOKSVILLE FL
Source/Unit : KILN #1 RUN NO.: 1
Date: JANUARY 19, 2010

STD.TEMP, Tstd =	68 F	| STATIC PRESS.,Ps =	0.00	in. H2O
METER TEMP, Tm =	74.25 F	| PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	294.8 F	| STACK I.D. =	223.80	inch
AVG.VEL.HEAD,dP =	0.361 in. H2O	| DUCT LENGTH =		inch
METER ORIFICE,dH=	0.00 in. H2O	| DUCT WIDTH =		inch
METER VOL., Vm =	95.033 Cu.Ft.	| STACK AREA, As =	273.179	Sq.Ft.
METER COFF., Y =	1.004	| TEST TIME =	128.00	min.
BAR. PRESS., Pb =	30.00 in.Hg	| NOZZLE DIA. =		inch
COND.(Vlc) =	146.0 ml	| NOZZLE DIA., An =		Sq.Ft.

GAS ANALYSIS =	13.50 % O2	0.00 % CO		
	7.00 % CO2	79.50 % N2		

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x
(Pb + (dH / 13.6)) / (Tm + 460)..... = 94.549 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 6.872 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.068 | Lower | Bws

Bws @ Saturated Conditions = Vapor Press. of H2O | value
@ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000 | used.

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 180.29

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.66

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.87

P(stack) = Pbar + (Ps / 13.6) ..... = 30.00 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460)
/ (Ms x P(stack))] ..... = 40.29 ft/sec

Qs = vs x As x 60 ..... = 660,408 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460))
x (P(stack)/29.92) ..... = 431,848 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] ..... = %

Analyzer Calibration Calculations Summary
Method 10

Cylinder ID #	Cal. Gas ppm	% of Span
CC-115823	512.9	51.2
CC-251816	1002.1	100.0

Span is Equal to: 1002.1 (M7E Sec. 3.4)

Method 7E Calibration Specifications

Mid (Down scale) (40-60%Span); High(Upscale) (100%Span) (M7E-Sec.3.3.2+3.3.3)

EPA Protocol Gas Analyzer Calibration Data
Analyzer Calibration Error
Instrument Range Setting {ppmv} 0 to 2000

Cylinder ID #	Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response Instrument Direct ppmv	Accuracy Diff. from Actual (% of Span)(1)
ABS981	Zero	0.00	R1-Pre	1/21/2010 9:20	3.76	0.37
CC-115823	CO	512.9	R1-Pre	1/21/2010 9:30	508	-0.46
CC-251816	CO	1002.1	R1-Pre	1/21/2010 9:26	1007	0.49

Method 7E Calibration Specifications

(1) Analyzer Calibration Error + 2% of Span (Section 12.2,Equation 7E-1)

EPA Protocol Gas Analyzer Calibration Data
System Bias Check
Instrument Range Setting {ppmv} 0 to 2000

Cylinder ID #	Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response through Train System Loop ppmv	5% Max System Bias (% of Span)(2)	3% Max Drift(3)
ABS981	Zero	0.00	R1-Pre	1/21/2010 9:52	4.26	0.05	
ABS981	Zero	0.00	R1-Post	1/21/2010 14:12	0.50	-0.32	0.37
CC-115823	CO	512.9	R1-Pre	1/21/2010 9:48	502.5	-0.57	
CC-115823	CO	512.9	R1-Post	1/21/2010 14:08	496.0	-1.22	0.65

Method 7E Calibration Specifications

(2) Section 12.3, Equation 7E-2

(3) Section 12.4, Equation 7E-4

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials
20% Wood Pellet

Date	Time	CO ppmv			
1/21/2010	9:15	482.2			
1/21/2010	9:16	317.0			
1/21/2010	9:17	48.6			
1/21/2010	9:18	30.5			
1/21/2010	9:19	26.0			
1/21/2010	9:20	10.0	<< Nitrogen Direct		
1/21/2010	9:21	4.0		CO	
1/21/2010	9:22	3.5		3.76	<average
1/21/2010	9:23	53.1			
1/21/2010	9:24	740.6			
1/21/2010	9:25	999.0			
1/21/2010	9:26	1006.5	<< 1002.1 ppmv CO Direct		
1/21/2010	9:27	1006.5		CO	
1/21/2010	9:28	1007.5		1007.01	<average
1/21/2010	9:29	984.5			
1/21/2010	9:30	624.4	<< 512.9 ppmv CO Direct		
1/21/2010	9:31	509.8		CO	
1/21/2010	9:32	506.8		508.26	<average
1/21/2010	9:33	481.2			
1/21/2010	9:34	90.1			
1/21/2010	9:35	4.0	<< Nitrogen Direct		
1/21/2010	9:36	3.5		CO	
1/21/2010	9:37	4.5		4.01	<average
1/21/2010	9:38	50.1			
1/21/2010	9:39	145.2			
1/21/2010	9:40	146.2			
1/21/2010	9:41	320.5			
1/21/2010	9:42	886.3			
1/21/2010	9:43	996.0	<< 1002.1 ppmv CO System		
1/21/2010	9:44	1000.0		CO	
1/21/2010	9:45	1001.0		1000.50	<average
1/21/2010	9:46	913.4			
1/21/2010	9:47	563.3			
1/21/2010	9:48	504.3	<< 512.9 ppmv CO System		
1/21/2010	9:49	502.3		CO	
1/21/2010	9:50	502.8		502.50	<average
1/21/2010	9:51	442.7			
1/21/2010	9:52	69.6	<< Nitrogen System		
1/21/2010	9:53	5.5		CO	
1/21/2010	9:54	3.0		4.26	<average
1/21/2010	11:45	200.3			
1/21/2010	11:46	185.3			
1/21/2010	11:47	207.3			

1/21/2010 11:48	208.3	
1/21/2010 11:49	222.8	<< START RUN #1
1/21/2010 11:50	236.4	
1/21/2010 11:51	234.4	
1/21/2010 11:52	227.3	
1/21/2010 11:53	212.3	
1/21/2010 11:54	234.9	
1/21/2010 11:55	261.4	
1/21/2010 11:56	230.3	
1/21/2010 11:57	251.4	
1/21/2010 11:58	287.4	
1/21/2010 11:59	291.4	
1/21/2010 12:00	324.0	
1/21/2010 12:01	316.5	
1/21/2010 12:02	279.9	
1/21/2010 12:03	281.4	
1/21/2010 12:04	258.9	
1/21/2010 12:05	219.8	
1/21/2010 12:06	272.4	
1/21/2010 12:07	257.9	
1/21/2010 12:08	299.4	
1/21/2010 12:09	278.4	
1/21/2010 12:10	235.9	
1/21/2010 12:11	220.8	
1/21/2010 12:12	257.9	
1/21/2010 12:13	280.4	
1/21/2010 12:14	277.9	
1/21/2010 12:15	297.9	
1/21/2010 12:16	300.5	
1/21/2010 12:17	286.9	
1/21/2010 12:18	265.9	
1/21/2010 12:19	295.9	
1/21/2010 12:20	306.0	
1/21/2010 12:21	302.0	
1/21/2010 12:22	297.4	
1/21/2010 12:23	266.9	
1/21/2010 12:24	293.9	
1/21/2010 12:25	298.4	
1/21/2010 12:26	356.5	
1/21/2010 12:27	399.6	
1/21/2010 12:28	377.6	
1/21/2010 12:29	356.5	
1/21/2010 12:30	349.0	
1/21/2010 12:31	320.5	
1/21/2010 12:32	394.6	
1/21/2010 12:33	393.6	
1/21/2010 12:34	364.0	
1/21/2010 12:35	347.0	
1/21/2010 12:36	370.6	
1/21/2010 12:37	419.6	
1/21/2010 12:38	435.2	
1/21/2010 12:39	456.7	

1/21/2010 12:40	504.3
1/21/2010 12:41	437.7
1/21/2010 12:42	495.2
1/21/2010 12:43	499.8
1/21/2010 12:44	397.6
1/21/2010 12:45	373.1
1/21/2010 12:46	461.7
1/21/2010 12:47	452.2
1/21/2010 12:48	377.6
1/21/2010 12:49	419.1
1/21/2010 12:50	499.2
1/21/2010 12:51	573.9
1/21/2010 12:52	540.3
1/21/2010 12:53	517.8
1/21/2010 12:54	550.3
1/21/2010 12:55	555.8
1/21/2010 12:56	528.3
1/21/2010 12:57	503.3
1/21/2010 12:58	514.8
1/21/2010 12:59	518.8
1/21/2010 13:00	524.3
1/21/2010 13:01	513.3
1/21/2010 13:02	534.3
1/21/2010 13:03	491.2
1/21/2010 13:04	421.1
1/21/2010 13:05	512.3
1/21/2010 13:06	597.4
1/21/2010 13:07	484.7
1/21/2010 13:08	469.2
1/21/2010 13:09	462.7
1/21/2010 13:10	444.7
1/21/2010 13:11	438.2
1/21/2010 13:12	498.7
1/21/2010 13:13	554.3
1/21/2010 13:14	475.2
1/21/2010 13:15	538.3
1/21/2010 13:16	533.8
1/21/2010 13:17	613.4
1/21/2010 13:18	595.4
1/21/2010 13:19	540.3
1/21/2010 13:20	429.6
1/21/2010 13:21	365.0
1/21/2010 13:22	362.0
1/21/2010 13:23	412.6
1/21/2010 13:24	420.6
1/21/2010 13:25	376.6
1/21/2010 13:26	392.6
1/21/2010 13:27	360.5
1/21/2010 13:28	389.1
1/21/2010 13:29	346.5
1/21/2010 13:30	400.1
1/21/2010 13:31	425.6

1/21/2010 13:32	389.1				
1/21/2010 13:33	349.5				
1/21/2010 13:34	362.5				
1/21/2010 13:35	355.0				
1/21/2010 13:36	364.5				
1/21/2010 13:37	303.0				
1/21/2010 13:38	334.0				
1/21/2010 13:39	291.4				
1/21/2010 13:40	275.4				
1/21/2010 13:41	290.4				
1/21/2010 13:42	280.4				
1/21/2010 13:43	254.4				
1/21/2010 13:44	247.9				
1/21/2010 13:45	275.9				
1/21/2010 13:46	262.4				
1/21/2010 13:47	268.9				
1/21/2010 13:48	248.9				
1/21/2010 13:49	242.9				
1/21/2010 13:50	308.0				
1/21/2010 13:51	279.9				
1/21/2010 13:52	305.5				
1/21/2010 13:53	258.9				
1/21/2010 13:54	222.3				
1/21/2010 13:55	221.8				
1/21/2010 13:56	209.8				
1/21/2010 13:57	185.8				
1/21/2010 13:58	200.3				
1/21/2010 13:59	215.3				
1/21/2010 14:00	215.3				
1/21/2010 14:01	212.8				
1/21/2010 14:02	254.9				
1/21/2010 14:03	242.4				
1/21/2010 14:04	198.8	<< END RUN #1			
1/21/2010 14:05	240.4				
1/21/2010 14:06	298.9				
1/21/2010 14:07	471.2				
1/21/2010 14:08	496.2	<< 512.9 ppmv CO System			
1/21/2010 14:09	495.2		CO		
1/21/2010 14:10	496.7		495.99	<average	
1/21/2010 14:11	354.0				
1/21/2010 14:12	22.0	<< Nitrogen System			
1/21/2010 14:13	1.0		CO		
1/21/2010 14:14	0.0		0.50	<average	

RUN (1)	ANALYZER RESPONSE TO STACK GAS ppmv	ZERO BIAS ppmv	ACTUAL CAL.GAS VALUE ppmv	ANALYZER RESPONSE TO CAL. GAS ppmv	CORRECTED STACK GAS CONC. ppmv
CO	359.4	2.38	512.9	499.25	368.5

SUMMARY OF MOISTURE EMISSION TEST DATA

CPL, BROOKSVILLE FL KILN #1 JANUARY 21, 2010			
Run No.	Stack Gas Flow Rate (SCFMD)	Stack Gas Temperature (F)	Stack Gas Moisture (%)
1	420,619	311	8.1

GENERAL DATA

Plant :	CPL, BROOKSVILLE FL				
Source/Unit :	KILN #1				
Date :	JANUARY 21, 2010		Cp :	0.840	
Stack dia. :	223.80	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 :	0 Tons/hr
Carbon, wt% :	0.00	Run 2 :	0
Sulfur, wt% :	0.00	Run 3 :	0
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)	81	0	0
Stack Temp., Ts (F)	311	0	0
Sq.Rt. dP	0.60	0.00	0.00
dH (in. H2O)	0.00	0.00	0.00
Meter Vol.,Vm (ft3)	95.874	0.000	0.000
Vol. H2O, Vlc (ml)	176.0	0.0	0.0
Meter Y	1.004	1.004	1.004
Bar. Press.,Pb (in.Hg.)	29.89	29.89	29.89
Static Press.,Ps (in.H2O)	-0.51	-0.51	-0.51
Test Time (min.)	128.0	128.0	128.0
Nozzle Dia.,Dn (in.)	0.000	0.000	0.000
Oxygen, O2 (%)	10.5	0.0	0.0
Carbon Dioxide, CO2 (%)	9.0	0.0	0.0
Carbon Monoxide, CO (%)	0.0	0.0	0.0
Report Emission Criteria in ? l = lb/hr g = gr/dscf :			grains
Process Rate Units ? T = Ton/hr, L = Lbs/hr, C = Cans/min:			T
Allowable Particulate Matter Concentration .....:			0

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

A. FIELD DATA SUMMARY

Plant: CPL, BROOKSVILLE FL
Source/Unit: KILN #1
Date: JANUARY 21, 2010

	RUN 1
Vlc = Vol water collected in train, ml	176.0
Vm = Sample gas vol, meter cond., acf	95.874
Y = Meter calibration factor	1.0040
Pbar = Barometric pressure, in. Hg	29.89
Pstatic = Stack static pressure, in. H2O	-0.51
dH = Avg meter pressure diff, in. H2O	0.00
Tm = Absolute meter temp., degrees R	541.0
Vm(std) = Sample gas vol, Std. cond., dscf	93.850
Bws = Water vapor in gas stream, fraction	0.081
MF = Moisture factor (1 - Bws)	0.919
CO2 = Carbon Dioxide, dry, volume %	9.00
O2 = Oxygen, dry, volume %	10.50
N2 = Nitrogen, dry volume %	80.50
Md = Molecular weight of stack gas, dry	29.86
Ms = Molecular weight of stack gas, wet	28.90
Cp = Pitot tube coefficient	0.84
Sq.Rt. dP = Avg. square root of each dP	0.6019
Ts = Absolute stack temp., degrees R	770.5
A = Area of stack, ft2	273.18
Qstd = Volumetric flowrate, dscfm	420,619
An = Nozzle area, ft2	
0 = Sample time, minutes	128.00
%I = Isokinetic variation, percent	

SOURCE TEST CALCULATIONS

Plant : CPL, BROOKSVILLE FL
Source/Unit : KILN #1 RUN NO.: 1
Date: JANUARY 21, 2010

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.51	in. H2O
METER TEMP, Tm =	81	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	310.5	F	STACK I.D. =	223.80	inch
AVG.VEL.HEAD,dP =	0.362	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	0.00	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	95.874	Cu.Ft.	STACK AREA, As =	273.179	Sq.Ft.
METER COFF., Y =	1.004		TEST TIME =	128.00	min.
BAR. PRESS., Pb =	29.89	in.Hg	NOZZLE DIA. =		inch
COND.(Vlc) =	176.0	ml	NOZZLE DIA., An =		Sq.Ft.

GAS ANALYSIS =	10.50	% O2	0.00	% CO
	9.00	% CO2	80.50	% N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x
(Pb + (dH / 13.6)) / (Tm + 460)..... = 93.850 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 8.284 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.081 | Lower | Bws

Bws @ Saturated Conditions = Vapor Press. of H2O | value
@ Dew Point Temp. / (Ps, in.Hg.) ..... = 1.000 | used.

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = 97.66

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 29.86

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.90

P(stack) = Pbar + (Ps / 13.6) ..... = 29.85 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460)
/ (Ms x P(stack))] ..... = 40.85 ft/sec

Qs = vs x As x 60 ..... = 669,493 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460))
x (P(stack)/29.92) ..... = 420,619 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] ..... = %

Analyzer Calibration Calculations Summary
Method 10

Cylinder ID #	Cal. Gas ppm	% of Span
CC-251816	512.9	34.0
CC-251876	1000.2	66.2

Span is Equal to: 1510.0
(M7E Sec. 3.4)

Method 7E Calibration Specifications
Mid (Down scale) (40-60%Span); High(Upscale) (100%Span) (M7E-Sec.3.3.2+3.3.3)

EPA Protocol Gas Analyzer Calibration Data
Analyzer Calibration Error
Instrument Range Setting {ppmv} 0 to 2000

Cylinder ID #	Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response Instrument Direct ppmv	Accuracy Diff. from Actual (% of Span)(1)
ABS981	Zero	0.00	R1-Pre	1/22/2010 11:30	-0.75	-0.05
CC-251876	CO	512.9	R1-Pre	1/22/2010 11:26	493.7	-1.27
CC-251816	CO	1000.2	R1-Pre	1/22/2010 11:22	1007.0	0.45
CC-251950	CO	1510.0	R1-Pre	1/22/2010 11:18	1512.5	0.17

Method 7E Calibration Specifications
(1) Analyzer Calibration Error + 2% of Span (Section 12.2,Equation 7E-1)

EPA Protocol Gas Analyzer Calibration Data
System Bias Check
Instrument Range Setting {ppmv} 0 to 2000

Cylinder ID #	Calibration Gas	Conc. (ppmv)	Run No.	Date / Time	Response through Train System Loop ppmv	5% Max System Bias (% of Span)(2)	3% Max Drift(3)
ABS981	Zero	0.00	R1-Pre	1/22/2010 11:52	-0.50	0.02	
ABS981	Zero	0.00	R1-Post	1/22/2010 17:50	-1.00	-0.02	0.03
CC-251816	CO	512.9	R1-Pre	1/22/2010 11:48	491.2	-0.17	
CC-251816	CO	512.9	R1-Post	1/22/2010 17:49	486.5	-0.48	0.32

Method 7E Calibration Specifications
(2) Section 12.3, Equation 7E-2
(3) Section 12.4, Equation 7E-4

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials
30 % Pellets

Date Time	CO ppmv			
1/22/2010 11:05	-1.0			
1/22/2010 11:06	-0.5			
1/22/2010 11:07	147.7			
1/22/2010 11:08	169.8			
1/22/2010 11:09	59.6			
1/22/2010 11:10	3.0			
1/22/2010 11:11	-1.0	<< Nitrogen Direct		
1/22/2010 11:12	-1.0		CO	
1/22/2010 11:13	76.6		-1.00	<average
1/22/2010 11:14	1136.2			
1/22/2010 11:15	1514.8			
1/22/2010 11:16	1515.3	<< 1510 ppmv CO Direct		
1/22/2010 11:17	1514.8		CO	
1/22/2010 11:18	1510.3		1512.5	<average
1/22/2010 11:19	1467.2			
1/22/2010 11:20	1076.1	<< 1002. ppmv CO Direct		
1/22/2010 11:21	983.0		CO	
1/22/2010 11:22	981.5		982.2	<average
1/22/2010 11:23	947.4			
1/22/2010 11:24	593.9			
1/22/2010 11:25	495.2	<< 512.9 ppmv CO Direct		
1/22/2010 11:26	492.2		CO	
1/22/2010 11:27	461.7		493.7	<average
1/22/2010 11:28	79.1			
1/22/2010 11:29	-0.5	<< Nitrogen Direct		
1/22/2010 11:30	-1.0		CO	
1/22/2010 11:31	9.0		-0.75	<average
1/22/2010 11:32	118.7			
1/22/2010 11:33	132.7			
1/22/2010 11:34	426.6			
1/22/2010 11:35	1379.1			
1/22/2010 11:36	1499.8			
1/22/2010 11:37	1502.3	<< 1510 ppmv CO System		
1/22/2010 11:38	1501.3		CO	
1/22/2010 11:39	1323.5		1501.75	<average
1/22/2010 11:40	1004.0			
1/22/2010 11:41	977.5			
1/22/2010 11:42	974.0	<< 1002.1 ppmv CO System		
1/22/2010 11:43	975.5		CO	
1/22/2010 11:44	813.7		974.71	<average
1/22/2010 11:45	519.8			
1/22/2010 11:46	492.2			
1/22/2010 11:47	491.2	<< 512.9 ppmv CO System		
1/22/2010 11:48	491.2		CO	
1/22/2010 11:49	339.0		491.24	<average
1/22/2010 11:50	19.5			
1/22/2010 11:51	-0.5	<< Nitrogen System		
1/22/2010 11:52	-0.5		CO	
			-0.50	<average

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials
30 % Pellets

Date Time	CO ppmv	
1/22/2010 16:30	662.5	<<Start CO Run 1
1/22/2010 16:31	640.0	
1/22/2010 16:32	613.4	
1/22/2010 16:33	677.5	
1/22/2010 16:34	695.5	
1/22/2010 16:35	672.0	
1/22/2010 16:36	541.8	
1/22/2010 16:37	556.8	
1/22/2010 16:38	578.4	
1/22/2010 16:39	540.3	
1/22/2010 16:40	555.8	
1/22/2010 16:41	589.9	
1/22/2010 16:42	549.8	
1/22/2010 16:43	574.9	
1/22/2010 16:44	572.9	
1/22/2010 16:45	540.3	
1/22/2010 16:46	509.8	
1/22/2010 16:47	504.3	
1/22/2010 16:48	600.4	
1/22/2010 16:49	574.4	
1/22/2010 16:50	465.2	
1/22/2010 16:51	442.2	
1/22/2010 16:52	510.3	
1/22/2010 16:53	553.3	
1/22/2010 16:54	463.2	
1/22/2010 16:55	470.2	
1/22/2010 16:56	497.2	
1/22/2010 16:57	361.0	
1/22/2010 16:58	423.6	
1/22/2010 16:59	455.7	
1/22/2010 17:00	454.2	
1/22/2010 17:01	416.1	
1/22/2010 17:02	409.6	
1/22/2010 17:03	373.1	
1/22/2010 17:04	438.2	
1/22/2010 17:05	536.3	
1/22/2010 17:06	472.2	
1/22/2010 17:07	459.7	
1/22/2010 17:08	555.3	
1/22/2010 17:09	532.3	
1/22/2010 17:10	500.3	
1/22/2010 17:11	621.9	
1/22/2010 17:12	550.8	
1/22/2010 17:13	587.9	
1/22/2010 17:14	586.4	
1/22/2010 17:15	589.4	
1/22/2010 17:16	513.3	
1/22/2010 17:17	410.1	

Central Power & Lime Co.
Brooksville Cement and Power Plant Complex
Brooksville, Florida

Wood Pellet Fuel Trials
30 % Pellets

Date Time	CO ppmv	
1/22/2010 17:18	449.2	
1/22/2010 17:19	573.4	
1/22/2010 17:20	658.5	
1/22/2010 17:21	617.4	
1/22/2010 17:22	497.2	
1/22/2010 17:23	585.9	
1/22/2010 17:24	515.8	
1/22/2010 17:25	400.6	
1/22/2010 17:26	375.6	
1/22/2010 17:27	366.0	
1/22/2010 17:28	457.2	
1/22/2010 17:29	503.8	
1/22/2010 17:30	478.7	<<END CO Run 1
1/22/2010 17:31	451.2	
1/22/2010 17:32	427.1	
1/22/2010 17:33	385.6	
1/22/2010 17:34	337.0	
1/22/2010 17:35	376.6	
1/22/2010 17:36	375.1	
1/22/2010 17:37	412.6	
1/22/2010 17:38	387.6	
1/22/2010 17:39	270.9	
1/22/2010 17:40	261.4	
1/22/2010 17:41	372.6	
1/22/2010 17:42	480.2	
1/22/2010 17:43	485.7	
1/22/2010 17:44	486.7	<< 512.9 ppmv CO System
1/22/2010 17:45	486.2	CO
1/22/2010 17:46	347.5	486.48 <average
1/22/2010 17:47	19.5	
1/22/2010 17:48	-1.0	<< Nitrogen System
1/22/2010 17:49	-1.0	CO
1/22/2010 17:50	-1.0	-1.00 <average

RUN (1)	ANALYZER RESPONSE TO STACK GAS ppmv	ZERO BIAS ppmv	ACTUAL CAL.GAS VALUE ppmv	ANALYZER RESPONSE TO CAL. GAS ppmv	CORRECTED STACK GAS CONC. ppmv
CO	522.6	-0.75	512.9	488.86	548.3

Carbon Monoxide Emission Measurements (Jan. 19, 21 and 22)

Field Data Sheets

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

KOOGLER AND ASSOCIATES, INC.
INSTRUMENTAL GAS SAMPLING FIELD DATA RECORD

PLANT	CPH Brooksville FL	**DATE**	01-19-10
LOCATION	Kiln #1	**EMISSION UNIT**	Kiln # 1
TEST(s)	CO + Moisture & Flows 10% wood Pellets	**SYSTEM LEAK CHECK (Limit 1 inHg/2min)**	
		Init. VAC inHg 15	**Final VAC inHg** 15

INSTRUMENT RANGE (R) (0-XXX)

Instrument	Available R	Selected R	Teloger Vdc
NOx (M7E)			
SO2 (M6C)			
CO (M10)			
THC (M25A)			
NMHC			

Calibration Gas Certified Concentration Value

Test	mid-gas	mid-gas	high-gas(span)
NOx (M7E)			
SO2 (M6C)			
CO (M10)	Zero Air	~~201.4~~ 512.8 ~~512.9~~	1002.1
THC (M25A)			
NMHC			

TIME	Action Comment
11:37	Zero Air on
11:40	Zero Air = 1.002
11:42	Zero Air off / S12.9 CO on
11:47	S12.9 CO = S11.768
11:49	S12.9 CO off / 201.4 CO on
11:51	201.4 CO = 202.3
11:53	201.4 CO off / zero Air on
11:56	Zero Air = 2.003
11:57	Zero Air off
12:16	Zero Air on
12:18	Zero Air = -.5
12:20	Zero Air off / 1002.1 CO on
12:25	1002.1 CO = 1008.5
12:27	1002.1 CO off / S12.9 CO on
12:29	S12.9 CO = S11.267
12:31	S12.9 CO off / Zero Air
12:33	Zero Air = 0.5
12:35	Zero Air off
12:36	S12.9 CO on
12:39	S12.9 CO = 495.2
12:41	S12.9 CO off / Zero Air on
12:44	Zero Air = 0.3
12:46	Zero Air off / Stack Gas
12:52	Start Run 10% wood Pellets
15:06	End Run 10% wood Pellets
15:07	Zero Air on
15:09	Zero Air = 1.0
15:11	Zero Air off / S12.9 CO on
15:14	S12.9 CO = 483.2
15:16	S12.9 CO off

Direct

System

Direct

System

~~13:11~~ 13:11 - 13:26 - ~~13:31~~

PS 15 min

13:52 - 14:05 -

Multiple Methods Data Sheet

Plant: CPL Brooksville FL
Sample Location: K-1
Control Type: Baghouse
Sample Type: Method 4 Moisture
Date: 1/19/10 | Run No.: 1
Time Start: 1252 | Time End: 1506
Sample Time: 120 min | min/point | Total Mins. 128
Dry Bulb: °F | Wet Bulb: °F | VP@DP:
Bar. Pres: 30.00 "Hg | Stack Pres: "Hg | Ps: -.51 "H_2O
Moisture: 6 % | FDA: | Gas Density Factor:
Temp: 72 °F | Wind Direction: VAR | Wind Speed: 3-5
Weather: Clear | Thermocouple Readout: KA-8
Sample Box No.: KA-8 | Meter Box No.: KA-8
Meter Y: 1.004 @ | Delta H: 1.73 | Pitot Corr.: .84
Nozzle Diameter: - inches | Probe Length: 10 S.S. feet
Probe Heater Setting: 250 | Nomograph Cf: -

Stack Dimensions: inches
Stack Area: ft^2
Effective Stack Area: ft^2
Stack Height: ft

Stack Dimensions

Umbilical: KAK-100
Thermocouple
Probe No. KAK-110
Pitot Tube: STH

Material Processing Rate:
Final Gas Meter Reading: 223.034 ft^3
Initial Gas Meter Reading: 128.001 ft^3
Total Metered Gas Volume: 95.033 ft^3
Condensate Gain in Impingers: 128 mL
Weight Gain in Silica Gel: 18 g
Total Moisture Gain: 146 mL
Silica Gel Container No.: 10
Filter Number:

Leak Check - Meter Box:
Initial: .001 cfm @ 7 inches Hg
Final: .002 cfm @ 5 inches Hg

Leak Check - Pitot Tubes:
Impact 3 "H_2O for 15 sec (Stable), Leak
Static 3 "H_2O for 15 sec: (Stable) Leak

Test Conducted By: J. Langston A West.
O_2: 13.5 % | CO_2: 7.0 %
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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O_2)
					Calculated	Actual						
1-1		0	128.0	.34	1.73	1.73	297	248	57	70	2	
2		4	30.8	.36			297	264	52	70	2	
2-1		8	33.8	.36			296	265	50	70	2	
2		12	36.7	.36			294	264	50	70	2	
3-1		16	39.6	.32			300	264	50	70	2	
2		20	42.6	.35			291	239	49	73	2	
4-1		24	45.6	.30			291	240	49	72	2	
2		28	48.5	.37			292	249	49	74	2	

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O2)
					Calculated	Actual						
2-1-1		32	51.4	.37	1.73	1.73	290	232	53	74	2	
2		36	54.4	.37			298	242	50	74	2	
2-1		40	57.4	.35			297	250	50	74	2	
2		44	60.3	.36			295	234	49	74	2	
3-1		48	63.3	.35			295	232	49	74	2	
"		52	66.0	.32			294	240	49	75	2	
4-1		56	69.1	.30			281	237	49	74	2	
2		60	72.1	.32			293	222	48	74	2	
3-1-1		64	75.0	.42			286		50	74	2	
1		68	78.0	.39			299		50	74	2	
2-1		72	80.9	.39			294		49	75	2	
2		76	83.8	.39			299		50	75	2	
3-1		80	86.8	.42			298		50	75	2	
2		84	89.8	.39			297		49	75	2	
4-1		88	92.7	.34			296		50	76	2	
2		92	95.7	.36			296		51	77	2	
4-1-1		96	98.6	.41			291		53	76	2	
1		100	201.7	.39			298		51	77	2	
2-1		104	04.7	.39			298		50	77	2	
2		108	07.9	.35			296	247	50	76	2	
3-1		112	11.0	.37			296	252	50	76	2	
2		116	14.4	.37	1.73	1.73	295	254	50	77	2	
4-1		120	17.2	.35	1.73	1.73	294	232	50	77	2	
2		124	220.1	.35	1.73	1.73	293	245	50	77	2	
		128	[illegible]									

← lost box heat but no filter

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

KOOGLER AND ASSOCIATES, INC.
INSTRUMENTAL GAS SAMPLING FIELD DATA RECORD

PLANT	CPL			**DATE**	01-21-10		
LOCATION	Brooksville FL			**EMISSION UNIT**	Kiln #1		
TEST(s)	CO + moisture & Flows 20% wood Pellets 2 Coal mills			**SYSTEM LEAK CHECK (Limit 1 inHg/2min)**			
				Init. VAC inHg	15	**Final VAC inHg**	15
INSTRUMENT RANGE (R) (0-XXX)				**Calibration Gas Certified Concentration Value**			
Instrument	Available R	Selected R	Teloger Vdc	Test	mid-gas	mid-gas	high-gas(span)
NOx (M7E)				NOx (M7E)			
SO2 (M6C)				SO2 (M6C)			
CO (M10)				CO (M10)	Zero Air	512.9	1002.1
THC (M25A)				THC (M25A)			
NMHC				NMHC			

TIME	Action Comment	TIME	Action Comment
09:19	Zero Air on		
09:21	Zero Air = 5.5		
09:23	Zero Air off / 1002.1 CO on		
09:27	1002.1 CO = 1006.009		
09:29	1002.1 CO off / 512.9 CO on		
09:31	512.9 CO = 517.777		
09:33	512.9 CO off / Zero Air on ~~20% CO on~~		
09:35	Zero Air = 5.508		
09:37	Zero Air off		
09:40	1002.1 CO on		
09:43	1002.1 CO = 982.975		
09:45	1002.1 CO off / 512.9 CO on		
09:48	512.9 CO = 509.264		
09:50	512.9 CO off / Zero Air on		
09:53	Zero Air = 9.514		
09:55	Zero Air off		
11:49	Start 20% Wood Pellet trail Run #1		
14:04	END 20% Wood Pellet Trial Run #1		
14:05	~~to~~ 512.9 CO on		
14:0	~~512.9 CO off / Zero Air on~~		
14:08	~~20~~ 512.9 = 491.738		
14:10	512.9 off / Zero Air on		
14:13	Zero Air = 3.012		
14:15	Zero Air off		

Direct ↓

System ↓

Multiple Methods Data Sheet

Plant: CPL
Sample Location: Kiln
Control Type: B.H.
Sample Type: Method 4, moisture
Date: 1/20/10 | Run No.: 1
Time Start: 1149 | Time End: 14:04
Sample Time: 128 | min/point 8 | Total Mins. 128
Dry Bulb: °F | Wet Bulb: °F | VP@DP:
Bar. Pres: 29.49 "Hg | Stack Pres: "Hg | Ps: -.51 "H_2O
Moisture: % | FDA: | Gas Density Factor:
Temp: 83 °F | Wind Direction: VAR | Wind Speed: 3-5
Weather: PC. | Thermocouple Readout: KA-8
Sample Box No.: KA-8 | Meter Box No.: KA-8
Meter Y: 1.004 @ | Delta H: 1.73 | Pitot Corr.: .84
Nozzle Diameter: — inches | Probe Length: 10 S.S. / feet
Probe Heater Setting: 250 | Nomograph Cf: —

20% wood pellets.

Stack Dimensions:
Stack Area: ft^2
Effective Stack Area: ft^2
Stack Height: ft

Umbilical: KAK-100
Thermocouple Probe No. KAK-110
Pitot Tube: SS III

Material Processing Rate:
Final Gas Meter Reading: 319.083 ft^3
Initial Gas Meter Reading: 223.209 ft^3
Total Metered Gas Volume: 95.874 ft^3
Condensate Gain in Impingers: 156 mL
Weight Gain in Silica Gel: 20 g
Total Moisture Gain: 176 mL
Silica Gel Container No.: 3
Filter Number:

Leak Check - Meter Box:
Initial: .000 cfm @ 6 inches Hg
Final: .000 cfm @ 5 inches Hg

Leak Check - Pitot Tubes:
Impact 3 "H_2O for 15 sec: (Stable) Leak
Static 3 "H_2O for 15 sec: (Stable) Leak

Test Conducted By: T. Langston, A. West.
O_2: 0.5 % | CO_2: 9.0 %
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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O_2)
					Calculated	Actual						
4-1		0	223.2	.41	1.73	1.73	302	7	74	78	2	
2		4	26.0	.40			304		64	79	2	
2-1		8	28.9	.41			304		63	79	2	
2		12	31.9	.41			305		62	79	2	
3-1		16	34.8	.39			307		63	79	2	
2		20	37.9	.42			305		63	79	2	
4-1		24	41.0	.37			306		63	80	2	
2		28	44.0	.36	↓	↓	305		63	80	2	

KOOGLER & ASSOCIATES, INC. ENVIRONMENTAL SERVICES

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 Temp (°F)	Sample Box Temp (°F)	Last Impinger Temp (°F)	Meter Temp (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (%O2)
					Calculated	Actual						
2-1-1		32	46.9	.39	1.73	1.73	307		64	81	2	
2		36	49.9	.39			310		60	81	2	
2-1		40	52.9	.41			311		62	82	2	
2		44	55.9	.37			311		62	82	2	
3-1		48	58.8	.33			314		62	82	2	
2		52	61.8	.35			310		61	82	2	
4-1		56	64.8	.37			311		61	82	2	
2		60	67.7	.38			311		61	82	2	
3-1-1		64	70.6	.36			310		64	83	2	
2		68	74.6	.33			313		58	83	2	
2-1		72	76.7	.31			314		58	83	2	
2		76	79.6	.30			314		59	83	2	
3-1		80	82.7	.35			314		59	83	2	
2		84	85.6	.32			314		59	83	2	
4-1		88	88.6	.34			312		59	83	2	
2		92	91.6	.29			312		59	83	2	
4-1-1		96	94.5	.35			311		63	83	2	
2		100	97.5	.35			314		62	83	2	
2-1		104	300.7	.34			315		62	83	2	
2		108	03.7	.39			314		63	83	2	
3-1		112	06.9	.39			314		63	83	2	
2		116	10.0	.35			314		64	83	2	
4-1		120	13.0	.33	↓	↓	314		64	83	2	
2		124	16.0	.33	1.73	1.73	314		64	83	2	
		128										

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

KOOGLER AND ASSOCIATES, INC.
INSTRUMENTAL GAS SAMPLING FIELD DATA RECORD

PLANT CPL				**DATE** 01-22-10			
LOCATION Bradenville FL				**EMISSION UNIT** Kiln #1			
TEST(s) CO + PM				**SYSTEM LEAK CHECK (Limit 1 inHg/2min)**			
				Init. VAC inHg 15		**Final VAC inHg** 15	
INSTRUMENT RANGE (R) (0-XXX)				**Calibration Gas Certified Concentration Value**			
Instrument	Available R	Selected R	Teloger Vdc	Test	mid-gas	mid-gas	high-gas(span)
NOx (M7E)				NOx (M7E)			
SO2 (M6C)				SO2 (M6C)	CC-251876	CC-251816	CC-117907
CO (M10)				CO (M10)	512.9	1002.1	1510
THC (M25A)				THC (M25A)			
NMHC				NMHC			

Direct

System

TIME	Action Comment	TIME	Action Comment
11:09	Zero Air on	14:59	Zero Air off / Stack Gas
11:11	Zero Air = -1.0	16:30	Start Run #1 30% wood Pellets
11:13	Zero Air off / 1510 CO on	17:39	END Run #1
11:17	1510 CO = 1513.777	17:40	512.9 CO on
11:19	1510 CO off / 1002.1 CO on	17:43	512.9 CO = 481.228
11:21	1002.1 CO = 991.487	17:45	512.9 CO off / Zero Air on
11:23	1002.1 CO off / 512.9 CO on	17:48	Zero Air = 3.5
11:25	512.9 CO = 502.754	17:50	Zero Air off
11:27	512.9 CO off / Zero Air on		
11:29	Zero Air = 3.505		
11:31	Zero Air off		
11:33	1510 CO on		
11:36	1510 CO = 1490.736		
11:38	1510 CO off / 1002.1 CO on		
11:40	1002.1 CO = 1016.		
11:43	1002.1 CO off / 512.9 CO on		
11:46	512.9 CO = 495.243		
11:48	512.9 CO off / Zero Air on		
11:51	Zero Air = 2.003		
11:53	Zero Air off / Stack Gas		
	~~Re Start Run #1 30% wood Pellets~~		
	~~END Run #1 30% wood Pellets~~		
14:43	1002.1 CO on		
14:46	1002.1 CO = 972.964		
14:48	1002.1 CO off / 512.9 CO on		
14:51	512.9 CO = 496.482		
14:53	512.9 CO off / Zero Air on		
14:57	Zero Air = 2.003		

Particulate Matter Equipment Calibrations and Calibration Gas Certifications

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

Nozzle Calibration

Date: 1-5-10

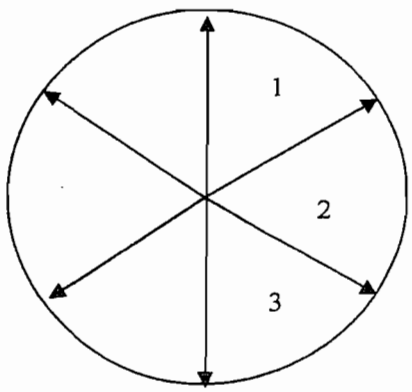
Plant Name: CPL-Power Plant

Location: Brooksville

Source: Main Stack

Measurement Number	Inside Diameter (inches)
1	0.265
2	0.267
3	0.266
Average	0.266
Area of Nozzle	38.6-5 Ft.^{2}

Calibrated by: R Pruitt



Nozzle X-Section

ROGGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Pitot Tube Calibration Measurements

Pitot Tube Identification Number: SSI

Date Calibrated: 10-8-09

Pitot Tube Assembly Level: Yes ☑ No ☐

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

Dt_A = 0.370 in. (Dt_A = 0.1875 - 0.3750 in.)

Dt_B = 0.370 in. (Dt_B = 0.1875 - 0.3750 in.)

α_A = 3.0° (<10°) α_B = 2.5° (<10°)

β_A = 2.0° (<5°) β_B = 2.0° (<5°)

γ = 0.5°, θ = 0.5°,

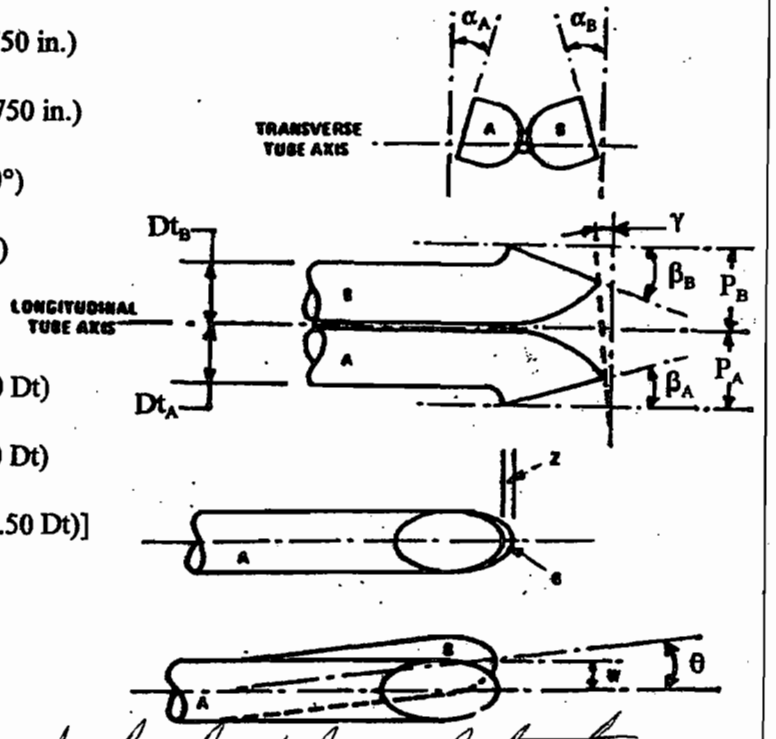
P_A = 0.466 (P_A = 1.05 Dt to 1.50 Dt)

P_B = 0.466 (P_B = 1.05 Dt to 1.50 Dt)

$P_A + P_B = A$ = 0.932 [A = 2x(1.05 Dt to 1.50 Dt)]

Z = A SIN γ = <0.01 in. (<0.125 in.)

W = A SIN θ = <0.01 in. (<0.031 in.)



Comments: Pitot tube leaked OK day of test

Calibration required? Yes ☐ No ☐

Calibrated by: Rodney Paul

KAForms: Pitot Tube Calibration Measurements
jhm, 10/23/01

Post Test Thermocouple Calibration

Date: 1-5-10

Plant Name: CPI

Location: Brooksville

Source: Power Plant

Thermocouple Readout No.	KAK-7
Umbilical Cord No.	KAK-100
Switch Box No.	KAK-7
Thermocouple No.	KAK-110
Average Stack Temperature °F	277
* Observed Mercury in Glass (ASTM) °F	277
Observed Thermocouple Reading °F	277

* Per Alternative Method 2 Thermocouple Calibration Procedure (ALT-011)

Percent Difference $\frac{(\text{ASTM} + 460) - (\text{Thermo} + 460) \times 100}{(\text{ASTM} + 460)} =$ 0.0%

Tolerance ± 2 °F

Signature: R Paul

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

FIELD DATA SHEET: **POST-TEST DRY GAS METER CALIBRATION USING CRITICAL ORIFICES**

Koogler & Associates
Environmental Services

1) Select one critical orifice to calibrate the dry gas meter which approximates the test average delta H 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.

COMPANY: CPF - Brooksville
SOURCE: Main Stack
TEST DATE: 1-5-10
METER Y: 0.996
AVG. DELTA H: 1.3

METER SERIAL #: RAL-7
CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL
	30.13	30.13

RUN	ORIFICE NO.	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	TEMPERATURES °F ORIFICE	TEMPERATURES °F DGM INITIAL	TEMPERATURES °F DGM FINAL	ELAPSED TIME (MIN)	DGM ΔH ($in H_2O$)
1	22	0.5836	18	428.700	434.212	67	69	71	7.0	1.6
2	〃		〃	434.212	442.148	67	71	74	10.0	1.6
3	〃		〃	442.148	448.120	67	74	76	7.5	1.6

Test Conducted by: ROC
Signature: Rodney Paul
Date: 1-7-10

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

POST-TEST DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Koogler & Associates Environmental Services

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: CPL - BROOKSVILLE, FL.
SOURCE: MAIN STACK
DATE: JANUARY 5, 2010
PRETEST Y: 0.996

METER SERIAL #: KAK-7
CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	30.13	30.13	30.13

RUN NO.	ORIFICE NO.	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 ORIFICE	TEMPERATURES °F DGM INITIAL	TEMPERATURES °F DGM FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN)	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	(4) $\Delta H_@$
1	22	0.5836	18	428.700	434.212	5.512	67	69	71	70	7.0	1.6	5.55	5.36	0.966	1.533
2	22	0.5836	18	434.212	442.148	7.936	67	71	74	73	10.0	1.6	7.96	7.66	0.963	1.533
3	22	0.5836	18	442.148	448.120	5.972	67	74	76	75	7.5	1.6	5.96	5.75	0.964	1.533
														AVG =	0.964	

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 = 0.964
AVERAGE DELTA Y= -0.032
DELTA Y LIMIT = 0.05
IS TEST WITHIN 5%? YES

(1) $$V_m(std) = K_1 V_m Y \left[\frac{P_{bar} + \left(\Delta H / 136\right)}{T_m} \right]$$

(2) $$V_{cr}(std) = K' \left[\frac{P_{bar}\,\theta}{\sqrt{T_{amb}}} \right]$$

(3) $$Y = \frac{V_{cr}(std)}{V_m(std)}$$

(4) $$\Delta H_@ = \left(\frac{0.75 * \theta}{V_{CR}(sdt)} \right)^2 * \Delta H$$

V_m(std) = Net volume of gas sample passed through DGM, corrected to standard conditions.
K_1 = 17.64 °R/in. Hg
Y = DGM calibration factor
V_{cr}(std) = Volume of gas sample passed through the critical orifice, corrected to standard conditions.
Pbar = Barometric pressure at the sampling site (in. Hg).
ΔH = Orifice pressure differential (in. H2O).
θ = Total smapling time (min.)
T_m = Absolute DGM avg. temperature °R
T_{amb} = Absolute ambient temperature °R
K' = Average K' factor from Critical Orifice Calibration

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Koogler & Associates
Environmental Services

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 data and information in the GREEN cells, YELLOW cells are calculated.

DATE: 1/8/2010
METER PART #: KAK-7
METER SERIAL #: KAK-7
CRITICAL ORIFICE SET SERIAL #: 1376
BAROMETRIC PRESSURE (in Hg): INITIAL 30.06, FINAL 30.06, AVG (P_{bar}) 30.06

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 Orifice	TEMPERATURES °F DGM INITIAL	TEMPERATURES °F DGM FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH ($in H_2O$)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
26	1	0.7005	18	501.505	510.736	9.231	67	73	76	74.5	10.00	2.35	9.2157	9.1753	0.996		1.57
	2	0.7005	18	510.736	519.549	8.813	67	76	78	77	9.50	2.35	8.7574	8.7165	0.995		1.56
	3	0.7005	18	519.549	527.011	7.462	67	78	80	79	8.00	2.35	7.3874	7.3402	0.994		1.55
														AVG =	0.995	-0.84	
22	1	0.5836	18	485.50	490.825	5.325	67	71	73	72	7.00	1.6	5.3314	5.3509	1.004		1.54
	2	0.5836	18	490.825	496.165	5.340	67	72	73	72.5	7.00	1.6	5.3414	5.3509	1.002		1.54
	3	0.5836	18	496.165	501.505	5.340	67	73	75	74	7.00	1.6	5.3264	5.3509	1.005		1.54
														AVG =	1.003	0.01	
17	1	0.4452	18	527.011	534.005	6.994	67	78	78	78	12.00	0.91	6.9127	6.9976	1.012		1.49
	2	0.4452	18	534.005	542.170	8.165	67	78	78	78	14.00	0.91	8.0701	8.1638	1.012		1.49
	3	0.4452	18	542.170	549.759	7.589	67	78	78	78	13.00	0.91	7.5008	7.5807	1.011		1.49
														AVG =	1.012	0.83	

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 = 1.003

AVERAGE $\Delta H_@$ = 1.53

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions
K1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= 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) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

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

Nozzle Calibration

Date: 1/22/10

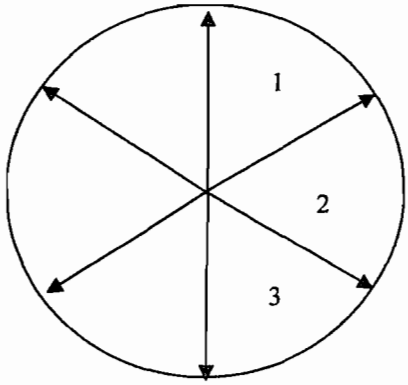
Plant Name: CPL

Location: Brooksville FL

Source: Kiln

Measurement Number	Inside Diameter (inches)
1	.307
2	.305
3	.306
Average	.306
Area of Nozzle	5.10705×10^{-4} Ft.^{2}

Calibrated by: James D Langston



Nozzle X-Section

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Post Test Thermocouple Calibration

Date: 1-19-10

Plant Name: Central Power & Light

Location: Brooksville, FL

Source: Kiln

Thermocouple Readout No.	KA-8
Umbilical Cord No.	KAK-100
Switch Box No.	KA-9
Thermocouple No.	KAK-110
Average Stack Temperature °F	300
* Observed Mercury in Glass (ASTM) °F	401
Observed Thermocouple Reading °F	403

* Per Alternative Method 2 Thermocouple Calibration Procedure (ALT-011)

Percent Difference $\frac{(\text{ASTM} + 460) - (\text{Thermo} + 460) \times 100}{(\text{ASTM} + 460)} =$ -.5

Tolerance ± 2 °F

Signature:

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

KOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Pitot Tube Calibration Measurements

Pitot Tube Identification Number: KA-S5II

Date Calibrated: 4/1/09

Pitot Tube Assembly Level: Yes ☑ No ☐

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

Dt_A = 0.374 in. (Dt_A = 0.1875 - 0.3750 in.)

Dt_B = 0.374 in. (Dt_B = 0.1875 - 0.3750 in.)

α_A = 4 ° (<10°) α_B = 6 ° (<10°)

β_A = 2 ° (<5°) β_B = 2 ° (<5°)

γ = 1.0°, θ = 1.0°,

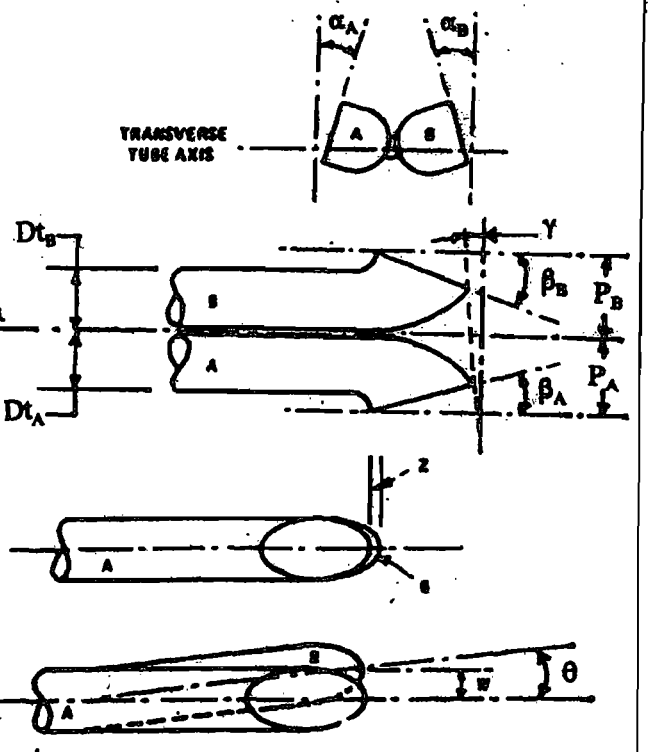
P_A = 0.496 (P_A = 1.05 Dt to 1.50 Dt)

P_B = 0.496 (P_B = 1.05 Dt to 1.50 Dt)

$P_A + P_B = A$ = 0.992 [A = 2x(1.05 Dt to 1.50 Dt)]

Z = A SIN γ = 0.015 in. (<0.125 in.)

W = A SIN θ = 0.015 in. (<0.031 in.)



Comments: Measurements O.K. Day of test

Calibration required? Yes ☐ No ☐

Calibrated by: James D. Leighton

FIELD DATA SHEET: **POST-TEST DRY GAS METER CALIBRATION USING CRITICAL ORIFICES**

Koogler & Associates
Environmental Services

1) Select one critical orifice to calibrate the dry gas meter which approximates the test average delta H 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.

COMPANY: CPL
SOURCE: Kiln #1
TEST DATE: 01-25-10
METER Y: 1.004
AVG. DELTA H: 25

METER SERIAL #: KA-8
CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL
	29.83	29.83

RUN	ORIFICE NO.	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	TEMPERATURES °F ORIFICE	TEMPERATURES °F DGM INITIAL	TEMPERATURES °F DGM FINAL	ELAPSED TIME (MIN)	DGM ΔH (in H_2O)
1	26	0.7005	18	396.553 ~~396.351~~	402.851	70	71	71	7.0	2.6
2	26	0.7005	18	402.851	409.166	70	71	71	7.0	2.6
3	26	0.7005	18	409.166	415.499	70	71	71		2.6

Test Conducted by: C. Ennall
Signature:
Date: 01-25-10

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

POST-TEST DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Koogler & Associates Environmental Services

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: CPL
SOURCE: KILN#1
DATE: 1/25/10
PRETEST Y: 1.004

METER SERIAL #: KA-8
CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	#	FINAL	AVG (P_{bar})
	29.83	#	29.83	29.83

RUN NO.	ORIFICE NO.	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	NET (V_m)	TEMPERATURES °F ORIFICE	TEMPERATURES °F DGM INITIAL	TEMPERATURES °F DGM FINAL	TEMPERATURES °F DGM AVG	ELAPSED TIME (MIN)	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	(4) $\Delta H_@$
1	26	0.7005	18	396.553	402.851	6.298	71	70	70	70	7.0	2.6	6.30	6.35	1.008	1.778
2	26	0.7005	18	402.851	409.166	6.315	71	70	70	70	7.0	2.6	6.31	6.35	1.006	1.778
3	26	0.7005	18	409.166	415.499	6.333	71	70	70	70	7.0	2.6	6.33	6.35	1.003	1.778
														AVG =	1.006	

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.

(1) $$V_m(std) = K_1 V_m Y \left[\frac{P_{bar} + (\Delta H / 13.6)}{T_m} \right]$$

(2) $$V_{cr}(std) = K' \left[\frac{P_{bar}\,\theta}{\sqrt{T_{amb}}} \right]$$

(3) $$Y = \frac{V_{cr}(std)}{V_m(std)}$$

(4) $$\Delta H_@ = \left(\frac{0.75 * \theta}{V_{CR}(sdt)} \right)^2 * \Delta H$$

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y = 1.006
AVERAGE DELTA Y= 0.002
DELTA Y LIMIT = 0.05
IS TEST WITHIN 5%? YES

V_m(std) = Net volume of gas sample passed through DGM, corrected to standard conditions.
K_1 = 17.64 °R/in. Hg
Y = DGM calibration factor
V_{cr} (std) = Volume of gas sample passed through the critical orifice, corrected to standard conditions.
Pbar = Barometric pressure at the sampling site (in. Hg).
ΔH = Orifice pressure differential (in. H2O).
θ = Total smapling time (min.)
T_m = Absolute DGM avg. temperature °R
T_{amb} = Absolute ambient temperature °R
K' = Average K' factor from Critical Orifice Calibration

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

Koogler & Associates
Environmental Services

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 data and information in the GREEN cells, YELLOW cells are calculated.

DATE: 11/16/2009 | METER SERIAL #: KA-8 | METER PART #: KA-8 | CRITICAL ORIFICE SET SERIAL #: 1378

BAROMETRIC PRESSURE (In Hg): INITIAL 29.82 | FINAL 29.82 | AVG (P_{bar}) 29.82

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 (%)	$\Delta H_@$
17	1	0.4452	18	579.862	585.113	5.251	77	79	79	80	80	79.5	9.00	1	5.1354	5.1576	1.004		1.68
	2	0.4452	18	585.113	590.343	5.230	77	79	79	80	81	79.75	9.00	1	5.1125	5.1576	1.009		1.67
	3	0.4452	18	590.343	595.560	5.217	78	79	80	81	81	80.25	9.00	1	5.0951	5.1528	1.011		1.68
																AVG =	1.008	0.40	
22	1	0.5836	18	563.779	569.144	5.365	77	79	79	80	80	79.5	7.00	1.8	5.2572	5.2585	1.000		1.76
	2	0.5836	18	569.144	574.504	5.360	77	79	79	80	80	79.5	7.00	1.8	5.2523	5.2585	1.001		1.76
	3	0.5836	18	574.504	579.862	5.358	77	79	79	80	80	79.5	7.00	1.8	5.2504	5.2585	1.002		1.76
																AVG =	1.001	-0.32	
26	1	0.7005	18	595.560	602.881	7.321	78	80	80	81	81	80.5	8.00	2.6	7.1747	7.2088	1.004		1.77
	2	0.7005	18	602.881	608.384	5.503	78	80	80	81	81	80.5	6.00	2.6	5.3931	5.4051	1.002		1.77
	3	0.7005	18	608.384	613.880	5.496	78	80	80	81	81	80.5	6.00	2.6	5.3862	5.4051	1.004		1.77
																AVG =	1.003	-0.08	

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 = 1.004

AVERAGE $\Delta H_@$ = 1.73

(1) $$Vm_{(std)} = K_1 * Vm * \frac{Pbar + (\Delta H / 13.6)}{Tm}$$

= Net volume of gas sample passed through DGM, corrected to standard conditions
K1 = 17.64 °R/in. Hg (English), 0.3858 °K/mm Hg (Metric)
T_m = Absolute DGM avg. temperature (°R - English, °K - Metric)

(2) $$Vcr_{(std)} = K' * \frac{Pbar * \Theta}{\sqrt{Tamb}}$$

= 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) $$Y = \frac{Vcr_{(std)}}{Vm_{(std)}}$$

= DGM calibration factor

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

KOOGLER & ASSOCIATES, Inc.
THERMOCOUPLE CALIBRATION

"K" TYPE											
	Ice			Ambient			Hot Oil			Average	Average
Probe ID	NIST (F°)	Probe (F°)	% Δ	NIST (F°)	Probe (F°)	% Δ	NIST (F°)	Probe (F°)	% Δ	% Δ	Δ (F°)
KAK-5	36	37	-2.8	74	73	1.4	406	404	0.5	-0.3	-0.3
KAK-8	38	39	-2.6	74	74	0.0	405	406	-0.2	-1.0	-1.0
KAK-9	36	37	-2.8	74	73	1.4	406	408	-0.5	-0.6	-0.6
KAK-10	36	36	0.0	92	91	1.1	405	407	-0.5	0.2	0.2
KAK-11	33	32	3.0	92	91	1.1	402	402	0.0	1.4	1.4
KAK-14	34	34	0.0	85	84	1.2	395	395	0.0	0.4	0.4
KAK-20	34	34	0.0	85	84	1.2	399	400	-0.3	0.3	0.3
KAK-35	36	36	0.0	74	74	0.0	401	401	0.0	0.0	0.0
KAK-36	34	36	-5.9	86	84	2.3	402	406	-1.0	-1.5	-1.5
KAK-50	36	37	-2.8	86	86	0.0	401	401	0.0	-0.9	-0.9
KAK-51	36	37	-2.8	74	72	2.7	403	404	-0.2	-0.1	-0.1
KAK-52	35	37	-5.7	86	85	1.2	401	400	0.2	-1.4	-1.4
KAK-60	36	36	0.0	86	85	1.2	404	404	0.0	0.4	0.4
KAK-61	36	37	-2.8	86	85	1.2	399	401	-0.5	-0.7	-0.7
KAK-62	34	35	-2.9	86	85	1.2	400	402	-0.5	-0.8	-0.8
KAK-63A	36	37	-2.8	85	84	1.2	398	398	0.0	-0.5	-0.5
KAK-63	36	36	0.0	84	84	0.0	401	402	-0.2	-0.1	-0.1
KAK-64	36	37	-2.8	85	84	1.2	400	401	-0.3	-0.6	-0.6
KAK-65	36	34	5.6	86	86	0.0	397	399	-0.5	1.7	1.7
KAK-70	36	36	0.0	85	85	0.0	400	401	-0.3	-0.1	-0.1
KAK-71	36	37	-2.8	84	84	0.0	394	395	-0.3	-1.0	-1.0
KAK-72A	34	34	0.0	86	85	1.2	394	393	0.3	0.5	0.5
KAK-72	34	33	2.9	86	85	1.2	393	393	0.0	1.4	1.4
KAK-75	34	34	0.0	86	85	1.2	400	401	-0.3	0.3	0.3
KAK-78	36	36	0.0	86	86	0.0	396	397	-0.3	-0.1	-0.1
KAK-80	36	36	0.0	86	85	1.2	396	396	0.0	0.4	0.4
KAK-111	36	36	0.0	84	83	1.2	397	398	-0.3	0.3	0.3
KAK-110	34	33	2.9	85	84	1.2	401	403	-0.5	1.2	1.2
KAK-112	36	37	-2.8	85	85	0.0	397	398	-0.3	-1.0	-1.0
Secondary Standard Thermocouple with Hand Held OMEGA (HH 509 R) s/n 51001062											
KAK # 1	35	37	-5.7	84	83	1.2	406	408	-0.5	-1.7	-1.7
KAK # 2	36	36	0.0	84	84	0.0	402	402	0.0	0.0	0.0

DATE: 6/23-24/2009
TESTER: J. Langston, C. Enwall

Liquid Technology Corporation

Industry Leader in Specialty Gases, Equipment and Service

Certificate of Analysis

- EPA PROTOCOL GAS -

Customer	Koogler & Associates (Gainesville, Florida)
Date	October 30, 2008
Delivery Receipt	DR-22922
Gas Standard	500.0 ppm Propane, 500.0 ppm CO/Nitrogen - EPA PROTOCOL
Final Analysis Date	October 30, 2008
Expiration Date	October 30, 2011
Component	Propane, Carbon Monoxide
Balance Gas	Nitrogen

Analytical Data: **DO NOT USE BELOW 150 psig**

EPA Protocol, Section No. 2.2, Procedure G-1

Reported Concentrations

Propane: 520.2 ppm +/- 5.2 ppm

Carbon Monoxide: 512.9 ppm +/- 5.1 ppm

Nitrogen: Balance

Reference Standards:

SRM/GMIS:	GMIS/GMIS	GMIS/GMIS
Cylinder Number:	CC-166431/CC-231417	CC-166528/CC-115896
Concentration:	494.8 ppm C3H8/1003.9 ppm C3H8.	496.3 ppm CO/755.8 ppm CO
Expiration Date:	05/02/12 - 04/07/10	04/06/09 - 08/11/09

Certification Instrumentation

Component:	Propane	Carbon Monoxide
Make/Model:	HP5890-II	Nicolet - NEXUS 470
Serial Number:	3336A59393	AEP99000154
Principal of Measurement:	GC-FID	FTIR
Last Calibration:	October 02, 2008	October 23, 2008

Cylinder Data

Cylinder Serial Number:	CC-251876	Cylinder Outlet:	CGA 350
Cylinder Volume:	140 Cubic Feet	Cylinder Pressure:	2000 psig, 70°F

Analytical Uncertainty and NIST Traceability are in compliance with EPA-600/R-97/121.

Certified by:

Date: October 30, 2008

Unmatched Excellence

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Certificate of Analysis

- EPA PROTOCOL GAS -

Customer	Koogler & Associates (Gainesville, Florida)
Date	October 30, 2008
Delivery Receipt	DR-22922
Gas Standard	1000 ppm Propane, 1000 ppm CO/Nitrogen - EPA PROTOCOL
Final Analysis Date	October 30, 2008
Expiration Date	October 30, 2011
Component	Propane, Carbon Monoxide
Balance Gas	Nitrogen

Analytical Data: **DO NOT USE BELOW 150 psig**

EPA Protocol, Section No. 2.2, Procedure G-1

Reported Concentrations

Propane: 1017.0 ppm +/- 10 ppm

Carbon Monoxide: 1002.1 ppm +/- 10 ppm

Nitrogen: Balance

Reference Standards:

SRM/GMIS:	GMIS	GMIS
Cylinder Number:	CC-231417	CC-159055
Concentration:	1003.9 ppm C3H8/Nitrogen	999.5 ppm CO/Nitrogen
Expiration Date:	04/07/10	08/18/09

Certification Instrumentation

Component:	Propane	Carbon Monoxide
Make/Model:	HP5890-II	Nicolet - NEXUS 470
Serial Number:	3336A59393	AEP99000154
Principal of Measurement:	GC-FID	FTIR
Last Calibration:	October 02, 2008	October 23, 2008

Cylinder Data

Cylinder Serial Number:	CC-251816	Cylinder Outlet:	CGA 350
Cylinder Volume:	140 Cubic Feet	Cylinder Pressure:	2000 psig, 70°F

Analytical Uncertainty and NIST Traceability are in compliance with EPA-600/R-97/121.

Certified by:

Date: October 30, 2008

Unmatched Excellence

2564 Pemberton Drive ~ Apopka, Florida 32703 ~ Phone (407)-292-2990 ~ Fax (407)-292-3313
~ www.liquidtechcorp.com ~

Liquid Technology Corporation

Industry Leader in Specialty Gases, Equipment and Service

Certificate of Analysis
- EPA PROTOCOL GAS -

Customer	Koogler & Associates (Gainesville, Florida)
Date	August 31, 2007
Delivery Receipt	DR-19963
Gas Standard	1500 ppm CO, 3000 ppm Propane/Nitrogen-EPA PROTOCOL
Final Analysis Date	August 31, 2007
Expiration Date	August 31, 2010
Components	Carbon Monoxide, Propane
Balance Gas	Nitrogen

Analytical Data: **DO NOT USE BELOW 150 psig**
EPA Protocol, Section No. 2.2, Procedure G-1

Replicate Concentrations

Carbon Monoxide: 1510.0 ppm +/- 15 ppm
Propane: 2895.3 ppm +/- 28 ppm
Nitrogen: Balance

Reference Standards:

SRM/GMIS:	GMIS	GMIS
Cylinder Number:	CC-158957	CC-125482
Concentration:	1505.7 ppm CO/Nitrogen	2865.1 ppm Propane/Nitrogen
Expiration Date	08/08/09	11/04/09

Certification Instrumentation

Component:	Carbon Monoxide	Propane
Make/Model:	Nicolet - NEXUS 470	HP5890 -II
Serial Number:	AEP99000154	3336A59393
Principal of Measurement:	FTIR	GC (FID)
Last Calibration:	August 01, 2007	August 01, 2007

Cylinder Data

Cylinder Serial Number:	CC-251950	Cylinder Outlet:	CGA 350
Cylinder Volume:	140 Cubic Feet	Cylinder Pressure:	2000 psig, 70 F

Analytical Uncertainty and NIST Traceability are in compliance with EPA-600/R-97/121.

Certified by: Litter L Pelt
Date: August 31, 2007

Unmatched Excellence

2564 Pemberton Drive ~ Apopka, Florida 32703 ~ Phone (407)-292-2990 ~ Fax (407)-292-3313
~ www.liquidtechcorp.com ~

Plant Operating Data

KOOGLER & ASSOCIATES, INC.
ENVIRONMENTAL SERVICES

Electrabel
Regentlaan 8
1000 Brussels
Belgium

Celebrating 125 years
Alfred H Knight

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	45978
DATE OF ISSUE	:	27th March 2009
OUR REFERENCE	:	290147.E
MATERIAL	:	Woodpellets
VESSEL	:	SAGA EXPLORER
ELECTRABEL LOT	:	0902005 A
SUPPLIER CODE	:	USA05
SAMPLED	:	On Discharge
DATE SAMPLED	:	20th-21st March 2009
PORT	:	Vlissingen Ovet Terminal, Netherlands
DESTINATION	:	Antwerpen Kaai 95
WEIGHT	:	9425.572 Mt

Report of Analysis

PARAMETER					TEST METHOD
TOTAL MOISTURE	%	4,2	-	-	CEN/TS 14774
ASH CONTENT	%	0,5	-	-	CEN/TS 14775
VOLATILE MATTER	%	80,2	83,9	84,1	CEN/TS 15148
FIXED CARBON	%	15,1	15,8	15,9	By Difference
TOTAL SULPHUR	%	0,02	0,02	0,02	CEN/TS 15289
CHLORINE	ppm	67	70	70	CEN/TS 15289
FLUORINE	ppm	34	35	35	ASTM D3761
ARSENIC	ppm	0,2	0,2	0,2	ICP/OES
CARBON	%	49,6	51,9	52,0	CEN/TS 15104
HYDROGEN	%	5,92	6,18	6,21	CEN/TS 15104
NITROGEN	%	0,10	0,10	0,10	CEN/TS 15104
OXYGEN	%	39,7	41,5	41,7	By Difference
GROSS CALORIFIC VALUE	KCal/Kg	4704	4912	4933	CEN/TS 14918
	MJ/Kg	19,694	20,564	20,663	CEN/TS 14918
NET CALORIFIC VALUE *	KCal/Kg	4389	-	-	CEN/TS 14918
	MJ/Kg	18,377	-	-	CEN/TS 14918
SiO2 IN ASH	%	-	21,04	-	ASTM D4326
EMISSION FACTOR **	tCO2/TJ	99	-	-	2003/87/EN

* Net Calorific Value @ Constant Volume
** Emission Factor as per European Parliament Directive 2003/87/EN

For and on behalf of
KNIGHT ENERGY SERVICES LIMITED

KNIGHT ENERGY SERVICES LIMITED
De Hoogjens 36, 4254 XW Sleeuwijk, The Netherlands
Tel : (31) 183307050 Fax : (31) 183304502
Email : arno.kant@lma-xrf.nl

Electrabel
Regentlaan 8
1000 Brussels
Belgium

Celebrating 125 years
Alfred H Knight

CERTIFICATE OF ANALYSIS

CERTIFICATE NUMBER	:	45979
DATE OF ISSUE	:	27th March 2009
OUR REFERENCE	:	290147.F
MATERIAL	:	Woodpellets
VESSEL	:	SAGA EXPLORER
ELECTRABEL LOT	:	0902002 A
SUPPLIER CODE	:	USA05
SAMPLED	:	On Discharge
DATE SAMPLED	:	20th-21st March 2009
PORT	:	Vlissingen Ovet Terminal, Netherlands
DESTINATION	:	Rodenhuize Power Plant
WEIGHT	:	40198.889 Mt

Report of Analysis

PARAMETER	UNIT	AS RECEIVED	DRY	DRY ASH FREE	TEST METHOD
TOTAL MOISTURE	%	4,2		-	CEN/TS 14774
ASH CONTENT	%	0,5		-	CEN/TS 14775
VOLATILE MATTER	%	80,5	84,0	84,4	CEN/TS 15148
FIXED CARBON	%	14,9	15,5	15,6	By Difference
TOTAL SULFUR	%	0,03	0,03	0,03	CEN/TS 15289
CHLORINE	ppm	67	70	70	CEN/TS 15289
FLUORINE	ppm	29	30	30	ASTM D3761
ARSENIC	ppm	0,2	0,2	0,2	ICP/OES
CARBON	%	49,8	51,9	52,2	CEN/TS 15104
HYDROGEN	%	5,98	6,24	6,27	CEN/TS 15104
NITROGEN	%	0,10	0,10	0,10	CEN/TS 15104
OXYGEN	%	39,4	41,1	41,3	By Difference
GROSS CALORIFIC VALUE *	KCal/Kg	4723	4928	4954	CEN/TS 14918
	MJ/Kg	19,775	20,631	20,741	CEN/TS 14918
NET CALORIFIC VALUE *	KCal/Kg	4406	-	-	CEN/TS 14918
	MJ/Kg	18,447	-	-	CEN/TS 14918
SIO2 IN ASH	%	-	21,14	-	ASTM D4326
EMISSION FACTOR **	tCO2/TJ	99	-	-	2003/87/EN

* Net Calorific Value @ Constant Volume
** Emission Factor as per European Parliament Directive 2003/87/EN

For and on behalf of
KNIGHT ENERGY SERVICES LIMITED

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Email : arno.kant@lms-xrf.nl

Bankwerkerstraat 16
3077 MB Rotterdam
P.O. Box 91244
3007 ME Rotterdam
The Netherlands
T. +31 (0)10-28 23 292
F. +31 (0)10-28 23 273
e-mail: info@tlr.nl
website: www.tlr.nl

TLR international laboratories

Analytical Report

To whom it may concern

Reportnr.	:**182737 version 2**	Disponent Number	:41153
Product recognized as	:Hout/Wood/Bois/Holz/Madera		
Product Specification	:Wood Fuel Pellets (White)	Sampling Date	:21-Apr-2009
Reference	:	Samplesize (kg)	:3,051
AWB / BarCode	:6164	Sealed / Seal Code	:No /
Packing	:Plastic	Sample Arrival Date	:21-Apr-2009 13:41
Sample Type	:BIS	ReportDate Version	:**27-Apr-2009 17:17**
Seller Unloader	:Green Circle Bio Energy Inc.	TonnageEx Lot (mt)	:11148,000
Ex	:Star Fuji / Star Fraser	Lot/Colli Number	: 1
Hold/Batch Number	:99190000	Destination	:ESSENT GTB
Buyer	:Essent Trading International S.A. (ETISA		
Disp. SampleType	:Loadport		
Disp. Remark	:Pre-shipment sample Green Circle		

Preparation

Common

Parameter	Amount (a.r.)	Amount (o.d.)	Amount (as det.)		
Preparation sample	Biomass preparation according CEN14780&CEN14418				Q

Composition Determination

Common

Parameter	Amount (a.r.)	Amount (o.d.)	Amount (as det.)		
AFT (oxid) DT			1180	gr.C	Q
AFT (oxid) ST			1180	gr.C	Q
AFT (oxid) HT			1190	gr.C	Q
AFT (oxid) FT			1220	gr.C	Q
particles >4 mm			0,88	%	
particles >2 - <4 mm			10,03	%	
particles 1> - <2 mm			37,88	%	
particles >0,5 - <1 mm			28,02	%	
particles >0,213 - <0,5 mm			14,01	%	
particles >0,1 - <0,212mm			6,60		
particles <0,1mm			2,47		

Metal and other elements

Parameter	Amount (a.r.)	Amount (o.d.)	Amount (as det.)		
Cl (Chlorine)			< 0,010	%	Q

Ash Determination

Common

Parameter	Amount (a.r.)	Amount (o.d.)	Amount (as det.)

Demanded 21-Apr-2009 by PBL
Analyses according to annex
Drs. ing. H. Janssens Technical Director TLR International Laboratories

Bankwerkerstraat 16
3077 MB Rotterdam
P.O. Box 91244
3007 ME Rotterdam
The Netherlands
T. +31 (0)10-28 23 292
F. +31 (0)10-28 23 273
e-mail: info@tlr.nl
website: www.tlr.nl

TLR international laboratories

Analytical Report

Reportnr.	: 182737 version 2	Disponent Number	: 41153
Product recognized as	: Hout/Wood/Bois/Holz/Madera		
Product Specification	: Wood Fuel Pellets (White)	Sampling Date	: 21-Apr-2009
Reference	:	Samplesize (kg)	: 3,051
AWB / BarCode	: 6164	Sealed / Seal Code	: No /
Packing	: Plastic	Sample Arrival Date	: 21-Apr-2009 13:41
Sample Type	: BIS	ReportDate Version	: 27-Apr-2009 17:17

SiO_2	22,48	%
Al_2O_3	3,02	%
Fe_2O_3	1,76	%
CaO	34,08	%
MgO	11,63	%
Na_2O	2,63	%
K_2O	10,95	[illegible]
TiO_2	< 0,20	[illegible]
P_2O_5	4,29	[illegible]
SO_3	2,93	[illegible]

Contaminations

Metal and other elements

Parameter	Amount (a.r.)	Amount (o.d.)	Amount (as det.)		
Cd (Cadmium)			0,085	mg/kg	Q
Pb (Lead)			0,16	mg/kg	Q
As (Arsenic)			< 0,020	mg/kg	Q
Mo (Molybdenum)			< 0,5	mg/kg (ppm)	
Hg (Mercury)			< 0,020	mg/kg	Q
Sb (Antimony)			< 2,0	mg/kg	
Tl (Thallium)			< 1,0	mg/kg (ppm)	
Te (Tellurium)			1,9	mg/kg (ppm)	
Mn (Manganese)			143,5	mg/kg	Q
Zn (Zinc)			9,1	mg/kg	Q
Ni (Nickel)			< 3,0	mg/kg	
Se (Selenium)			< 1,00	[illegible]	Q
Cr (Chromium)			< 5,0	[illegible]	Q
Ba (Barium)			6,7	mg/kg (ppm)	
Co (Cobalt)			< 0,10	mg/kg	Q
Cu (Copper;AAS)			< 5,00	mg/kg	Q
F (Fluorine)			< 5,0	mg/kg	Q
V (Vanadium)			< 1,0	mg/kg (ppm)	Q
Sn (Tin)			< 0,3	mg/kg (ppm)	

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Sample Type	: BIS	ReportDate Version	: 27-Apr-2009 17:17

Q - Analysis accredited by RvA

This is version number 2 of the certificate. It cancels and replaces version number 1.

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Demanded 21-Apr-2009 by PBL
Analyses according to annex
Drs. ing. H. Janssens Technical Director TLR International Laboratories

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Analytical Report

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Product Specification	: Wood Fuel Pellets (White)	Sampling Date	: 21-Apr-2009
Reference	:	Samplesize (kg)	: 3,051
AWB / BarCode	: 6164	Sealed / Seal Code	: No /
Packing	: Plastic	Sample Arrival Date	: 21-Apr-2009 13:41
Sample Type	: BIS	ReportDate Version	: **27-Apr-2009 17:17**

ANNEX

Method Descriptions

Composition Determination

Common

Method Description	Method Code
Determination of fusibility of ash; temperature-tube method	NEN-ISO 540

Metal and other elements

Method Description	Method Code
Determination of fluoride (F); IC method	Own method

Contaminations

Metal and other elements

Method Description	Method Code
Determination of arsenic (As); hydrid-AAS, Destruction :NEN-EN 14084 ; analysis: draft NEN-EN 14546/(14827)	Own method
Determination of Chromium (Cr);AAS	Own method
Determination of cobalt (Co); AAS	Own method
Determination of copper (Cu); AAS, Equivalent to NEN-EN-ISO 6869 Wood: own method	Own method
Determination of fluoride (F); IC method	Own method
Determination of lead (Pb); grafit AAS, Destruction :NEN-EN 14084 ; analysis: NEN-EN 14083	Own method
Determination of manganese (Mn); AAS. Equivalent to NEN-EN-ISO 6869 Wood: own method	Own method
Determination of mercury (Hg); AAS, Destruction :NEN-EN 14084 ; analysis: NEN-EN 13806	Own method
Determination of selen (Se); AAS	Own method
Determination of vanadium (V); AAS	Own method
Determination of zinc (Zn); AAS. Eq. to NEN-EN-ISO 6869 Wood: own method	Own method

Demanded 21-Apr-2009 by PBL
Analyses according to annex
Drs. ing. H. Janssens Technical Director TLR International Laboratories

STANDARD LABORATORIES INC.
NORTHERN DIVISION
P.O. BOX 214
CRESSON, PA 16630
(814) 886-7400
STANDARD LABORATORIES,INC.

DATE: 8- 4-2009
SAMPLE NO. 1005096

RILEY POWER, INC.
5 NEPONSET ST.
P.O. BOX 15040
WORCESTER,, MA. 01615-0040

SAMPLE ID: WOOD PELLETS #53258

OPERATING CO.:
SAMPLED BY: CUSTOMER PROVIDED
MINE:
LOCATION:

DATE SAMPLED: 7/30/09
DATE RECEIVED: 7/30/09
WEATHER:
GROSS WEIGHT:

OTHER ID:

CERTIFICATE OF ANALYSIS

	ASTM METHOD	AS RECEIVED	DRY BASIS
MOISTURE	D2961 D3302 D3173	6.45%	
VOLATILE	D3175M	79.47%	84.95%
FIXED CARBON	D3172	13.44%	14.37%
ASH	D3174	0.64%	0.68%
SULFUR	D4239 METHOD B	0.12%	0.12%
CARBON	D3178 D5373	47.49%	50.76%
HYDROGEN	D3178 D5373	5.81%	6.21%
NITROGEN	D3179 D5373	0.15%	0.16%
OXYGEN	D3176	39.34%	42.07%
BTU/LB	D5865	8417	8998
MAF BTU/LB			9059
LBS OF SO2 PER MILLION BTU			0.27
LBS OF SULFUR PER MILLION BTU		0.143	
CHLORINE	D4208	153ppm	163ppm

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BLACK SEAL ANALYSIS

STANDARD LABORATORIES INC.
NORTHERN DIVISION
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CRESSON, PA 16630
(814) 886-7400
STANDARD LABORATORIES, INC.

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OPERATING CO.:
SAMPLED BY: CUSTOMER PROVIDED
MINE:
LOCATION:

DATE SAMPLED: 7/30/09
WEATHER:
GROSS WEIGHT:

DATE RECEIVED: 7/30/09

OTHER ID:

CERTIFICATE OF ANALYSIS

ASH FUSION TEMPERATURE(S)

D1857	REDUCING ATMOSPHERE
INITIAL DEFORMATION	2185
SOFTENING TEMPERATURE	2190
HEMISPHERICAL TEMPERATURE	2200
FLUID TEMPERATURE	2210

D1857	OXIDIZING ATMOSPHERE
INITIAL DEFORMATION	2190
SOFTENING TEMPERATURE	2200
HEMISPHERICAL TEMPERATURE	2210
FLUID TEMPERATURE	2220

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BLACK SEAL ANALYSIS

STANDARD LABORATORIES INC.
NORTHERN DIVISION
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STANDARD LABORATORIES,INC.

DATE: 8- 4-2009
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RILEY POWER, INC.
5 NEPONSET ST.
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SAMPLE ID: WOOD PELLETS #53258

OPERATING CO.:
SAMPLED BY: CUSTOMER PROVIDED
MINE:
LOCATION:

DATE SAMPLED: 7/30/09
WEATHER:
GROSS WEIGHT:

DATE RECEIVED: 7/30/09

OTHER ID:

CERTIFICATE OF ANALYSIS

ASH MINERAL
D2795 D3682

SILICON DIOXIDE	30.07 %
ALUMINUM OXIDE	7.04 %
FERRIC OXIDE	5.27 %
TITANIUM DIOXIDE	0.45 %
PHOSPHOROUS PENTOXIDE	1.00 %
CALCIUM OXIDE	23.10 %
MAGNESIUM OXIDE	8.99 %
SODIUM OXIDE	2.19 %
POTASSIUM OXIDE	7.51 %
SULFUR TRIOXIDE	14.18 %

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BLACK SEAL ANALYSIS

Project Participants

PROJECT PARTICIPANTS

Koogler and Associates, Inc.

John B. Koogler, Ph.D., P.E. ..... Project Advisor
Max Lee, Ph.D., P.E. ..... Senior Project Engineer
Steven L. Cloutier ..... Technical Manager
Veronica Sgro ..... Project Engineer
Chris Enwall ..... Field Technician
James Langston ..... Field Technician
Adam West ..... Field Technician
Glen Haven ..... Field Technician
Rodney Paul ..... Field Technician

CEMEX Construction Materials Florida, LLC/Central Power and Lime, Inc.

Larry Roberts ..... Power Plant Operations Manager
Rick Pellage ..... Power Plant Technical Supervisor