RECEIVED
OCT 11 2004
BUREAU OF AIR REGULATION

ACID MIST, LEAD, AND MERCURY EMISSION MEASUREMENTS

Kiln/Raw Mill/Clinker Cooler System

RINKER MATERIALS CORPORATION
Miami Cement Plant
Miami, Florida

Permit Nos. 0250014-008-AC (PSD-FL-324)
and
0250014-009-AV

Test Dates: August 6, 2004
Report Date: September 20, 2004

263-04-05

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

ACID MIST, LEAD, AND MERCURY EMISSION MEASUREMENTS

Kiln/Raw Mill/Clinker Cooler System

RINKER MATERIALS CORPORATION
Miami Cement Plant
Miami, Florida

Permit Nos. 0250014-008-AC (PSD-FL-324) and
0250014-009-AV

Test Dates: August 6, 2004
Report Date: September 20, 2004

Koogler & Associates Environmental Services
4014 N.W. 13th Street
Gainesville, Florida 32609
(352) 377-5822

263-04-05

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

ACID MIST, LEAD, AND MERCURY EMISSION MEASUREMENTS

Kiln/Raw Mill/Clinker Cooler System

RINKER MATERIALS CORPORATION
Miami Cement Plant
Miami, Florida

Permit Nos. 0250014-008-AC (PSD-FL-324) and
0250014-009-AV

Test Dates: August 6, 2004
Report Date: September 20, 2004

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.

Ed Allsopp, Vice President, Cement Operations

Signature

Date:

263-04-05

KOOGLER & ASSOCIATES
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.

John B. Koogler, Ph.D., P.E.

State of Florida
Registration No. 12925

09/20/09

Date

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Table of Contents

1.0 INTRODUCTION

Rinker Materials Corporation (Rinker) owns and operates a preheater/precalciner Portland cement plant located at 1200 N.W. 137th Avenue, Miami, Dade County, Florida. The plant is rated at a preheater feed rate of 220 tons per hour (tph) and a clinker production rate of 138 tph. Rinker is currently operating under FDEP approval to evaluate operating at a preheater feed rate of 267 tph and a clinker production rate of 162 tph.

During the period August 6, 2004, Koogler & Associates, Inc. of Gainesville, Florida, conducted acid mist, lead and mercury emission measurements on the kiln/raw mill/clinker cooler exhaust stack in accordance with EPA Method 8 and Method 29, respectively, (40 CFR 60, Appendix A). At Rinker the kiln, raw mill and clinker cooler are all exhausted through a common baghouse and stack. The emission measurements were conducted with the raw mill operating.

The purpose of the testing was to demonstrate compliance with the acid mist, lead and mercury emission limiting standard of Permit 0250014-009-AV while operating at the increased production rate.

The emissions on the kiln/raw mill/cooler were conducted on August 6, 2004 with the raw mill operating. During the test period, the preheater feed rate averaged 245 tons per hour and the clinker production rate averaged 147 tons per hour. The acid

mist emission rate averaged 0.436 pounds per hour, or 0.0030 pounds per ton of clinker, the lead emission rate averaged 0.0026 pounds per hour, or 0.000018 pounds per tons of clinker, and the mercury emission rate averaged 0.00099 pounds per hour or 0.000007 pounds per ton of clinker. The permit limits the emission rates of acid mist, lead and mercury to 0.014, 0.000075 and 0.000024 pounds per ton of clinker, respectively.

Based on the data presented herein, it can be concluded that during the test period of August 6, 2004, the acid mist, lead, and mercury emissions from the kiln/raw mill/clinker cooler system of Rinker's Miami Cement Plant were well within the limits established by Permit 0250014-009-AV.

2.0 LOCATION OF SAMPLE PORTS

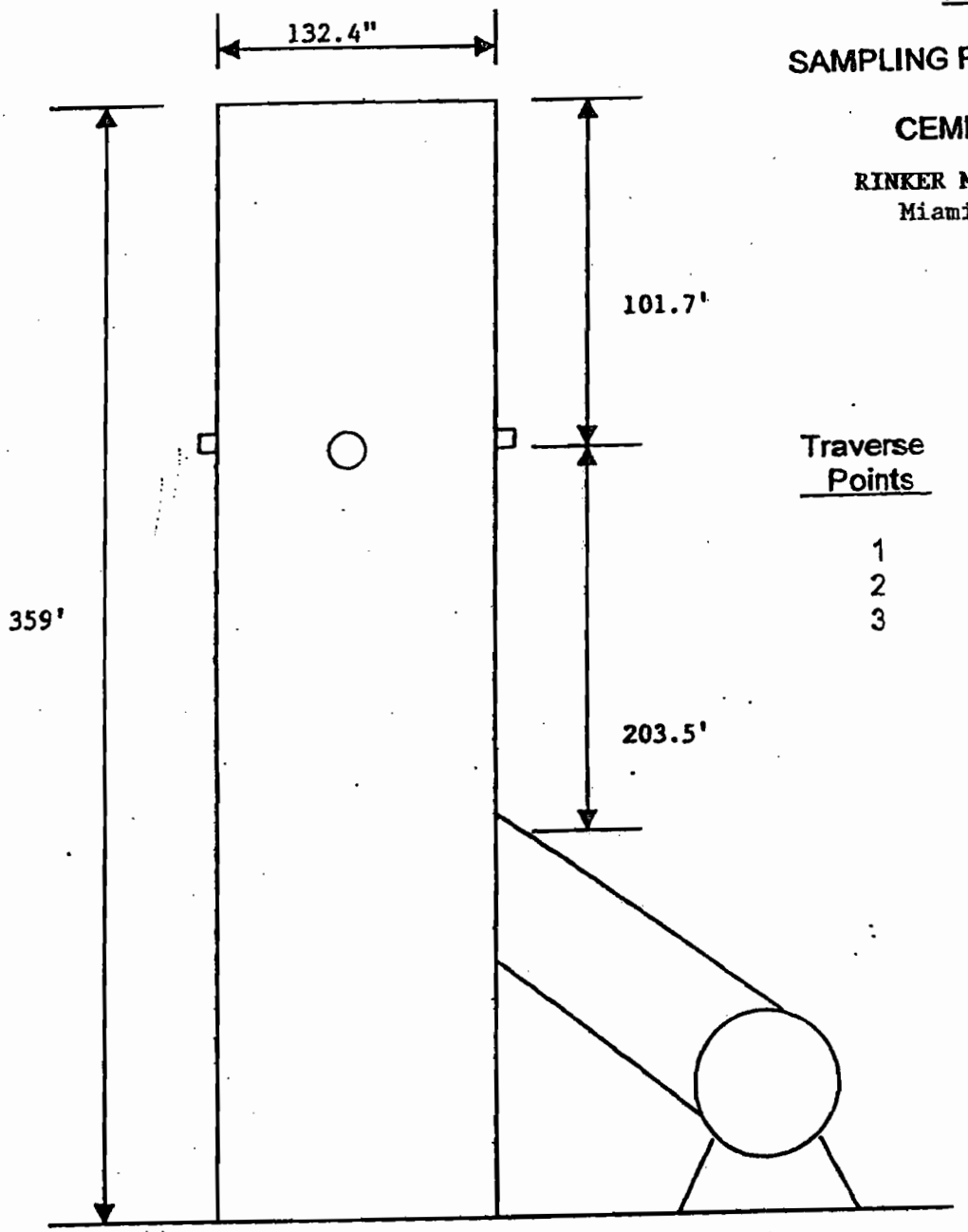
The locations of the sampling points are shown in Figure 1. Stack gas flow rate measurements and sample collection for dioxin/furan emission measurements were made through four sampling ports located 90 degrees to one another in the 136.5-inch diameter stack. The ports are located 203.5 feet (18.5 diameters) above the point where the stack gas enters the stack and 101.7 feet (9.3 diameters below the top of the stack. A total of 12 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).

FIGURE 1

SAMPLING POINT LOCATIONS

CEMENT PLANT

RINKER MATERIALS CORP
Miami, Florida



Traverse Points	Distance from Inside Stack Wall
1	6.01
2	19.9
3	40.4

3.0 FIELD AND ANALYTICAL PROCEDURES

Acid mist emission measurements were made on the kiln/raw mill/clinker cooler stack in accordance with EPA Method 8 and the emission measurements for lead and mercury were conducted in accordance with EPA Method 29. The requirements of three methods were followed without exception. The sample time of each lead and mercury test run was two hours and the sample time of the acid mist test runs was one hour.

The sampling point locations were established in accordance with EPA Method 1, the stack gas velocity measurements and stack gas moisture measurements were made in conjunction with the EPA Method 8 and Method 29 tests in accordance with EPA Methods 2 and 4. Measurements to determine the dry molecular weight of the stack gas were made in accordance with EPA Method 3. All EPA test methods are described in 40 CFR 60, Appendix A and have been adopted by reference by FDEP by Rule 62-297.401, F.A.C.

4.0 SUMMARY OF RESULTS

During the test period on August 6, 2004, with the raw mill operating, the feed rate to the preheater averaged 245 tons per hour and the clinker production averaged 147 tons per hour. The pyroprocessing system (kiln and precalciner) was fired with coal and oil. The coal firing rate was equivalent to a heat input rate of approximately 394 mmBTU per hour and the oil contributed 2.0 mmBTU per hour for a total heat input of about 396 mmBTU per hour.

During the acid mist emission tests (see Table 1), the stack gas flow rate from the kiln/raw mill/clinker cooler averaged 220,947 dry standard cubic feet per minute at a stack gas temperature of 249°F. The moisture content of the stack gas averaged 15.6 percent. The acid mist emission rate ranged from 0.0022 to 0.0044 pounds per ton of clinker and averaged 0.0030 pounds per ton of clinker. The permit limit for acid mist is 0.014 pounds per ton of clinker.

During the lead and mercury emission tests (see Table 2), the stack gas flow rate averaged 200,559 dry standard cubic feet per minute at a stack gas temperature of 246°F. The moisture content of the stack gas averaged 16.4 percent. The lead and mercury emission rates averaged 0.000018 and 0.000007 pounds per ton of clinker, respectively. The emission limit for lead is 0.000075 pounds per ton of clinker, and the limit for mercury is 0.000024 pounds per ton of clinker.

Based on the data presented herein, it can be concluded that during the period of testing on August 6, 2004 while operating at a preheater feed rate of 245 tons per hour and a clinker production rate of 147 tons per hour, the Rinker Miami Cement Plant was operating in compliance with permitted emission limiting standards for acid mist, lead and mercury.

Table 1
Acid Mist Emission Summary
Rinker Miami Cement Plant
Facility ID - 0250014
August 6, 2004

Run	Preheater Feed (tph)	Clinker Production (tph)	Stack Gas			Acid Mist	
			Flow (dscfm)	Temp (°F)	Moist (%)	(lb/hr)	(lb/ton clinker)
1	244.4	146.7	218354	254	15.2	0.333	0.0023
2	245.5	147.4	228686	243	16.0	0.655	0.0044
3	245.3	147.3	215801	249	15.6	0.322	0.0022
Average	245.1	147.1	220947	249	15.6	0.436	0.0030

Permit Limit = 1.92 lb/hr and 0.014 lb/ton clinker

Table 2
Lead and Mercury Emission Summary
Rinker Miami Cement Plant
Facility ID - 0250014
August 6, 2004

Run	Preheater Feed (tph)	Clinker Production (tph)	Stack Gas			Lead		Mercury	
			Flow (dscfm)	Temp (°F)	Moist (%)	(lb/hr)	(lb/ton clinker)	(lb/hr)	(lb/ton clinker)
1	244.4	146.7	196147	248	16.8	0.00137	0.9 E-05	0.00093	0.6 E-05
2	245.3	147.3	203565	249	16.2	0.00391	2.7 E-05	0.00109	0.7 E-05
3	245.4	147.3	201965	242	16.1	0.00263	1.8 E-05	0.00094	0.6 E-05
Average	245.0	147.1	200559	246	16.4	0.00264	1.8 E-05	0.00099	0.7 E-05

Lead Permit Limit = 0.01 lb/hr and 7.5 E-05 lb/ton clinker
Mercury Permit Limit = 0.0033 lb/hr and 2.4 E-05 lb/ton clinker

Appendix

Sulfuric Acid Mist

- Calculations
- Field Data Sheets
- Laboratory Data Sheets
- Equipment Calibration Data

Lead and Mercury

- Calculations
- Field Data Sheets
- Laboratory Data Sheets
- Equipment Calibration Data

Process Data

Project Participants

Sulfuric Acid Mist

Calculations

GENERAL DATA

Plant	:	RINKER - MIAMI, FL.			
Source/Unit	:	CEMENT KILN			
Date	:	AUG. 6, 2004	Cp	0.840	
Stack dia.	:	136.50 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)	89	83	82
Stack Temp., Ts (F)	254	243	249
Sq.Rt. dP	0.87	0.91	0.87
dH (in. H2O)	1.41	1.61	1.44
Meter Vol.,Vm (ft3)	43.629	45.926	44.100
Vol. H2O, Vlc (ml)	159.5	181.0	169.0
Meter Y	1.000	1.000	1.000
Bar. Press.,Pb (in.Hg.)	29.78	29.78	29.78
Static Press.,Ps (in.H2O)	-0.72	-0.72	-0.72
Test Time (min.)	60.0	60.0	60.0
Nozzle Dia.,Dn (in.)	0.240	0.240	0.240
Oxygen, O2 (%)	11.8	11.5	11.2
Carbon Dioxide, CO2 (%)	11.0	12.2	14.5
Carbon Monoxide, CO (%)	0.0	0.0	0.0

Report Emission Criteria in ? l = lb/hr g = gr/dscf : grams

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: RINKER - MIAMI, FL.
Source/Unit: CEMENT KILN
Date: AUG. 6, 2004

	RUN 1	RUN 2	RUN 3
Vlc = Vol water collected in train, ml	159.5	181.0	169.0
Vm = Sample gas vol, meter cond., acf	43.629	45.926	44.100
Y = Meter calibration factor	1.0000	1.0000	1.0000
Pbar = Barometric pressure, in. Hg	29.78	29.78	29.78
Pstatic = Stack static pressure, in. H2O	-0.72	-0.72	-0.72
dH = Avg meter pressure diff, in. H2O	1.41	1.61	1.44
Tm = Absolute meter temp., degrees R	549.3	542.9	542.4
Vm(std) = Sample gas vol, Std. cond., dscf	41.884	44.631	42.879
Bws = Water vapor in gas stream, fraction	0.152	0.160	0.156
MF = Moisture factor (1 - Bws)	0.848	0.840	0.844
CO2 = Carbon Dioxide, dry, volume %	11.00	12.20	14.50
O2 = Oxygen, dry, volume %	11.80	11.50	11.20
N2 = Nitrogen, dry volume %	77.20	76.30	74.30
Md = Molecular weight of stack gas, dry	30.23	30.41	30.77
Ms = Molecular weight of stack gas, wet	28.37	28.42	28.77
Cp = Pitot tube coefficient	0.84	0.84	0.84
Sq.Rt. dP = Avg. square root of each dP	0.8697	0.9140	0.8671
Ts = Absolute stack temp., degrees R	713.7	703.3	708.7
A = Area of stack, ft2	101.62	101.62	101.62
Qstd = Volumetric flowrate, dscfm	218,354	228,686	215,801
An = Nozzle area, ft2	3.14E-04	3.14E-04	3.14E-04
0 = Sample time, minutes	60.00	60.00	60.00
%I = Isokinetic variation, percent	103.42	105.23	107.13

EMISSION RATE CALCULATIONS

Plant : RINKER - MIAMI, FL.
Source/Unit : CEMENT KILN
Date: AUG. 6, 2004 RUN NO.: 1
STANDARD TEMP. : 68 F

Front Half Wash (FHW)	0.00000	grams	Vm(std)	41.884	ft3
Mass Filter (MF)	0.00000	grams	Vw(std)	7.508	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	218,354	dscfm
Vm(std) SO2	41.884	dscf	Bws	0.152	
CO2 CORR. 0.0 %			CO2	11.00	%
O2 CORR.: 0.0 %			O2	11.80	%

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)] ...	0.0000	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0000	gr/dscf
gr/dscf x (12 / %CO2)	0.0000	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0000	@ 0% O2
0.00857 x Qs(std) x gr/dscf	0.00	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 ...	0.33	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. / 11.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.8% O2 Stack)	ppm @ 0% O2
SO2 (lb/hr / Heat Input)	lb/MMBtu

HYDROGEN CHLORIDE DATA SUMMARY

[Mass HCl(mg) x 385 x 1E6] / [453600 x 36.5 x Vm(std)]..	ppm
ppm x 0.0 % Corr. / 11.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.0% O2 Stack)	ppm @ 0% O2

EMISSION RATE CALCULATIONS

Plant : RINKER - MIAMI, FL.
Source/Unit : CEMENT KILN
Date: AUG. 6, 2004 RUN NO.: 2
STANDARD TEMP. : 68 F

Front Half Wash (FHW)	0.00000	grams	Vm(std)	44.631	ft3
Mass Filter (MF)	0.00000	grams	Vw(std)	8.520	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	228,686	dscfm
Vm(std) SO2	44.631	dscf	Bws	0.160	
CO2 CORR. 0.0 %			CO2	12.20	%
O2 CORR.: 0.0 %			O2	11.50	%

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)] ...	0.0000	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0000	gr/dscf
gr/dscf x (12 / %CO2)	0.0000	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0000	@ 0% O2
0.00857 x Qs(std) x gr/dscf	0.00	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 ...	0.65	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. / 11.0 % CO2 in Stack		ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.0% 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. / 12.2 % CO2 in Stack		ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 12.2% O2 Stack)		ppm @ 0% O2

EMISSION RATE CALCULATIONS

Plant : RINKER - MIAMI, FL.
Source/Unit : CEMENT KILN
Date: AUG. 6, 2004 RUN NO.: 3
STANDARD TEMP. : 68 F

Front Half Wash (FHW)	0.00000	grams	Vm(std)	42.879	ft3
Mass Filter (MF)	0.00000	grams	Vw(std)	7.955	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	215,801	dscfm
Vm(std) SO2	42.879	dscf	Bws	0.156	
CO2 CORR. 0.0 %			CO2	14.50	%
O2 CORR.: 0.0 %			O2	11.20	%

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)] ...	0.0000	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0000	gr/dscf
gr/dscf x (12 / %CO2)	0.0000	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0000	@ 0% O2
0.00857 x Qs(std) x gr/dscf	0.00	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 ...	0.32	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. / 11.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.0% 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. / 14.5 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 14.5% O2 Stack)	ppm @ 0% O2

SOURCE TEST CALCULATIONS

Plant : RINKER - MIAMI, FL.
Source/Unit : CEMENT KILN RUN NO.: 1
Date: AUG. 6, 2004

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.72	in. H2O
METER TEMP, Tm =	89.33333	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	253.7	F	STACK I.D. =	136.50	inch
AVG.VEL.HEAD,dP =	0.756	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.41	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	43.629	Cu.Ft.	STACK AREA, As =	101.623	Sq.Ft.
METER COFF., Y =	1.000		TEST TIME =	60.00	min.
BAR. PRESS., Pb =	29.78	in.Hg	NOZZLE DIA. =	0.240	inch
COND.(Vlc) =	159.5	ml	NOZZLE DIA., An =	3.1E-04	Sq.Ft.

GAS ANALYSIS = 11.80 % O2 0.00 % CO
11.00 % CO2 77.20 % N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 41.884 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 7.508 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.152 | 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 = 137.52

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.23

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.37

P(stack) = Pbar + (Ps / 13.6) ..... = 29.73 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] ..... = 57.45 ft/sec

Qs = vs x As x 60 ..... = 350,299 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... = 218,354 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] ..... = 103.42 %

SOURCE TEST CALCULATIONS

Plant : RINKER - MIAMI, FL.
Source/Unit : CEMENT KILN RUN NO.: 2
Date : AUG. 6, 2004

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.72	in. H2O
METER TEMP, Tm =	82.92	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	243.3	F	STACK I.D. =	136.50	inch
AVG.VEL.HEAD,dP =	0.835	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.61	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	45.926	Cu.Ft.	STACK AREA, As =	101.623	Sq.Ft.
METER COFF., Y =	1.000		TEST TIME =	60.00	min.
BAR. PRESS., Pb =	29.78	in.Hg	NOZZLE DIA. =	0.240	inch
COND.(Vlc) =	181.0	ml	NOZZLE DIA., An =	3.1E-04	Sq.Ft.

GAS ANALYSIS =	11.50	% O2	0.00	% CO
	12.20	% CO2	76.30	% N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x
(Pb + (dH / 13.6)) / (Tm + 460)..... = 44.631 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 8.520 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.160 | 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 = 133.05

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.41

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.42

P(stack) = Pbar + (Ps / 13.6) ..... = 29.73 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460)
/ (Ms x P(stack))] ..... = 59.88 ft/sec

Qs = vs x As x 60 ..... = 365,131 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460))
x (P(stack)/29.92) ..... = 228,686 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] ..... = 105.23 %

SOURCE TEST CALCULATIONS

Plant : RINKER - MIAMI, FL.
Source/Unit : CEMENT KILN RUN NO.: 3
Date : AUG. 6, 2004

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.72	in. H2O
METER TEMP, Tm =	82.42	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	248.7	F	STACK I.D. =	136.50	inch
AVG.VEL.HEAD,dP =	0.752	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.44	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	44.100	Cu.Ft.	STACK AREA, As =	101.623	Sq.Ft.
METER COFF., Y =	1.000		TEST TIME =	60.00	min.
BAR. PRESS., Pb =	29.78	in.Hg	NOZZLE DIA. =	0.240	inch
COND.(Vlc) =	169.0	ml	NOZZLE DIA., An =	3.1E-04	Sq.Ft.

GAS ANALYSIS =	11.20	% O2	0.00	% CO
	14.50	% CO2	74.30	% N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 42.879 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 7.955 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.156 | 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 = 133.09

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.77

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.77

P(stack) = Pbar + (Ps / 13.6) ..... = 29.73 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] ..... = 56.68 ft/sec

Qs = vs x As x 60 ..... = 345,606 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... = 215,801 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] ..... = 107.13 %

Field Data Sheets

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Multiple Methods Data Sheet

Plant: Rinker - Miami, FL
Sample Location: Cement Kiln
Control Type: Baghouse
Sample Type: Acid Mist
Date: 8-6-04 Run No.: 1
Time Start: 1023 Time End: 1130
Sample Time: 5 min/point 60 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 29.78 Hg Stack Press: 29.73 Hg Ps: 0.7 "H2O
Moisture: 12 % FDA: Gas Density Factor:
Temperature: °F Wind Direction: W Wind Speed: 5-8
Weather: Partly Cldy Thermocouple Readout: KA-2
Sample Box No.: KA-2 Meter Box No.: KA-2
Meter Y: 1.000 @ Delta H: 1.54 Pitot Corr.: 0.84
Nozzle Diameter: 0.240 inches Probe Length: 10 feet
Probe Heater Setting: Nomograph Cf: 1.85
Stack Dimensions: 136.5 inches
Stack Area: 101.62 ft²
Effective Stack Area: 101.62 ft²
Stack Height: ft

Purged for 15 min at 1.4 ΔH

Stack Dimensions

Material Processing Rate:
Final Gas Meter Reading: 1040.029 ft³
Initial Gas Meter Reading: 996.400 ft³
Total Metered Gas Volume: 43.629 ft³
Condensate Gain in Impingers: 140 mL
Weight Gain in Silica Gel: 19.5 g
Total Moisture Gain mL
Silica Gel Container No.: 39
Filter Number:

Leak Check - Meter Box:
Initial: 0.006 cfm @ 15 inches Hg
Final: 0.002 cfm @ 6 inches Hg

Leak Check - Pitot Tubes
Impact 3 "H²0 for 15 sec: Stable, Leak
Static 3 "H²0 for 15 sec: Stable, Leak
Test Conducted By: R Paul - C Bell

Umbilical: 200'
Thermocouple Probe No.: KA-50
Pitot Tube: KA-55II

O_2 11.8 % CO_2 11.0 %
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 Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average												
1-1			96.4	0.86	1.59	1.59	288		64	88	5	
2			100.3	0.86	1.59	1.59	269		62	88	5	
3			4.0	0.66	1.22	1.22	257		57	89	5	
2-1			7.5	0.82	1.52	1.52	260		56	90	5	
2			11.0	0.64	1.18	1.18	249		57	90	4	
3			15.0	0.64	1.18	1.18	252		56	90	4	
3-1			18.3	0.88	1.63	1.63	253		58	90	5	
2			22.1	0.85	1.57	1.57	249		56	89	5	

KÜGLER & 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_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
3			25.9	0.60	1.11	1.11	240		57	90	4	
4-1			29.5	0.86	1.59	1.59	248		60	90	5	
2			32.9	0.86	1.59	1.59	243		58	89	5	
3			36.8	0.60	1.11	1.11	236		59	89	4	

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Multiple Methods Data Sheet

Plant: Rinker - Miami, Fl.
Sample Location: Cement Kiln
Control Type: Baghouse
Sample Type: Acid Mist
Date: 8-6-04 Run No.: 2
Time Start: 1205 Time End: 1311
Sample Time: 5 min/point 60 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 29.78 "Hg Stack Press: 29.73 "Hg Ps: 0.72 "H_2O
Moisture: 14 % FDA: Gas Density Factor:
Temperature: 85 °F Wind Direction: W Wind Speed: 10-12
Weather: Partly Cldy Thermocouple Readout: KA-2
Sample Box No.: KA-2 Meter Box No.: KA-2
Meter Y: 1.000 @ Delta H: 1.54 Pitot Corr.: 0.84
Nozzle Diameter: 0.240 inches Probe Length: 10 feet
Probe Heater Setting: Nomograph Cf: 1.9
Stack Dimensions: 136.5 inches
Stack Area: 101.62 ft²
Effective Stack Area: 101.62 ft²
Stack Height: ft

Purged for 15 min at 66 ΔH

Stack Dimensions

Umbilical: 200'
Thermocouple
Probe No.: KA-5C
Pitot Tube: KA-5 S II

Material Processing Rate:
Final Gas Meter Reading: 97.326 ft³
Initial Gas Meter Reading: 51.400 ft³
Total Metered Gas Volume: 45.926 ft³
Condensate Gain in Impingers: 154 mL
Weight Gain in Silica Gel: 22.1 g
Total Moisture Gain mL
Silica Gel Container No.: 19
Filter Number:

Leak Check - Meter Box:
Initial: 0.004 cfm @ 15 inches Hg
Final: 0.006 cfm @ 6 inches Hg

Leak Check - Pitot Tubes
Impact 3 "$H^2$0 for 15 sec. Stable, Leak
Static 3 "$H^2$0 for 15 sec. Stable, Leak
Test Conducted By: K Paul - C Bell
O_2 11.5 % CO_2 12.2 %
Stack Test Observers:

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft³)	Stack Velocity Head (H_2O)	Meter Orifice Pressure Difference (H_2O)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average												
1			51.4	0.90	1.7	1.7	239		63	84	5	
2			55.6	0.78	1.48	1.48	237		42	84	4	
3			59.2	0.55	1.05	1.05	237		44	84	3	
2-1			62.4	0.91	1.73	1.73	242		46	85	4	
2			66.2	0.88	1.67	1.67	242		48	85	4	
3			70.2	0.90	1.7	1.7	245		50	84	4	
3-1			74.0	1.05	2.0	2.0	251		53	83	5	
2			77.9	0.97	1.84	1.84	248		57	83	5	

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_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
3			82.2	0.61	1.16	1.16	241		51	82	3	
4-1			85.6	1.1	2.1	2.1	250		57	80	5	
2			89.8	0.92	1.75	1.75	247		50	81	5	
3			93.8	0.57	1.08	1.08	247		50	80	3	

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Multiple Methods Data Sheet

Plant: Reiber - Miami, FL
Sample Location: Cement Kiln
Control Type: Baghouse
Sample Type: Acid Mist
Date: 8-6-04 Run No.: 3
Time Start: 1346 Time End: 1454
Sample Time: 5 min/point 60 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 29.78 "Hg Stack Press: 29.73 "Hg Ps: -0.72 H_2O
Moisture: 14 % FDA: Gas Density Factor:
Temperature: 85 °F Wind Direction: W Wind Speed: 10-12
Weather: Cloudy Thermocouple Readout: KA-2
Sample Box No.: KA-2 Meter Box No.: KA-2
Meter Y: 1.000 @ Delta H: 1.54 Pitot Corr.: 0.84
Nozzle Diameter: 0.240 inches Probe Length: 10 Teflon feet
Probe Heater Setting: Nomograph Cf: 1.9
Stack Dimensions: 136.5 inches
Stack Area: 101.62 ft^2
Effective Stack Area: 101.62 ft^2
Stack Height: ft

Purged for 15 min at 1.44 ΔH

Stack Dimensions

Umbilical: 200'
Thermocouple
Probe No.: KA-150
Pitot Tube: KA-SS II

Material Processing Rate:
Final Gas Meter Reading: 153.500 ft^3
Initial Gas Meter Reading: 109.400 ft^3
Total Metered Gas Volume: 44.100 ft^3
Condensate Gain in Impingers: 140 mL
Weight Gain in Silica Gel: 28.9 g
Total Moisture Gain mL
Silica Gel Container No.: 9
Filter Number: —

Leak Check - Meter Box:
Initial: 0.006 cfm @ 15 inches Hg
Final: 0.003 cfm @ 6 inches Hg

Leak Check - Pitot Tubes
Impact 3 "$H^2$0 for 15 sec: Stable Leak
Static 3 "$H^2$0 for 15 sec: Stable Leak
Test Conducted By: R Faul C Bell
O_2 11.2 % CO_2 14.5 %
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) Calculated	Meter Orifice Pressure Difference (H_2O) Actual	Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
Average												
1-1			9.4	0.81	1.54	1.54	249		64	81	4	
2			13.3	0.88	1.67	1.67	245		46	81	4	
3			17.2	0.74	1.41	1.41	246		48	81	4	
2-1			20.8	0.91	1.73	1.73	252		52	82	5	
2			24.8	0.83	1.58	1.58	250		55	82	4	
3			28.5	0.61	1.16	1.16	246		55	82	3	
3-1			31.8	0.88	1.67	1.67	254		59	83	4	
2			35.4	0.78	1.48	1.48	250		56	83	4	

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_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
3			39.4	0.55	1.05	1.05	244	(	55	83	4	
4-1			43.0	0.80	1.52	1.52	252		57	83	4	
2			46.7	0.72	1.37	1.37	251		54	84	4	
3			50.3	0.57	1.08	1.08	245	)	54	84	3	

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Sampling Rate Calculations

Plant Name: Rinker Date: 9-6-04

Location: Miami Source: Cement Kiln Acid Mist

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

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

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

$\frac{555}{277}$ (760) 2105

$\frac{545}{275}$ (700) 19250

	Run No. 1		Run No. 2		Run No. 3
$\frac{Tm + 460}{MS(Ts+460)}$ =	0.02636		0.0283		
x $(1 - Bw)^2$ =	0.7744		0.7396		
x ΔH@ =	1.54		1.54		
x $(Dn)^4$ =			0.00332		
x 17741 =	17741		17741		
x ΔP =	1.85		1.9		

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

Laboratory Data Sheets

Lab Data
SO_2 or Acid Mist

Plant Name: Rinker Date Analyzed: 8-10-04

Analyzed by: R Paul

Stack	Sample No.	V.T. (ml)	V.T.B. (ml)	N.	V. Soln (ml)	V.A. (ml)
Cement	1-1	0.3	0.2	0.00985	500	50
Kiln	2	0.3	0.2			5
	2-1	0.4				50
	2	0.4				5
	3-1	0.3				50
	2	0.3				5

V.T. = Volume of Barium Perchlorate Titrant used for Sample (ml)
V.T.B. = Volume of Barium Perchlorate Titrant used for Blank (ml)
N. = Normality of Barium Perchlorate
V. Soln. = Total Solution Volume
V.A. = Volume of Sample Aliquot Titrated (ml)

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Chain of Custody

Plant Name: Rinker Project Number: _____

Location: Miami, FL Source: Cement Kiln

Sample Identification	Remarks
1-AM-R	Probe Wash - filter & 1 mp catch R-1
2-AM-R	R-2
3-AM-R	R-3
39	Silica Gel Run 1
19	2
9	3

Sampled by: R Paul 8-6-04 See data

Signature Date Time

Relinquished by: _____ _____ _____

Signature Date Time

Received by: _____ _____ _____

Signature Date Time

Relinquished by: _____ _____ _____

Signature Date Time

Laboratory:

Received by: R Paul 8-9-04 0800

Signature Date Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Equipment Calibration Data

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Nozzle Calibration

Date: 8-6-04

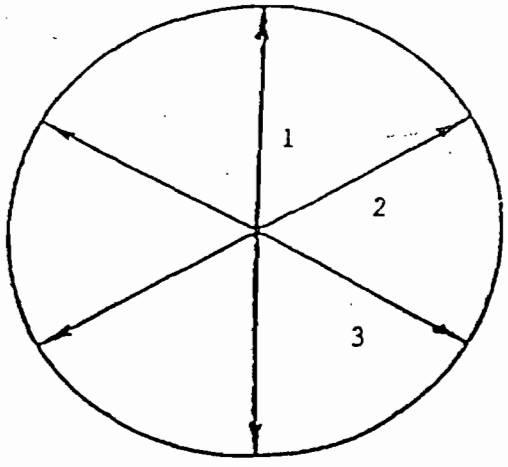
Plant Name: Rinker

Location: Miami, Fl.

Source: Cement Kiln Acid Mist

Measurement Number	Inside Diameter (inches)
1	0.241
2	0.239
3	0.240
Average	0.240
Area of Nozzle	0.000314 Ft.^{2}

Calibrated by: R Paul



Nozzle X-Section

KAForms: Nozzle Calibration
jhm,04/24/01

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Pitot Tube Calibration Measurements

Pitot Tube Identification Number: SS II

Date Calibrated: 7-1-03

Pitot Tube Assembly Level: Yes ☑ No ☐

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

Dt_A = 0.373 in. (Dt_A = 0.1875 - 0.3750 in.)

Dt_B = 0.373 in. (Dt_B = 0.1875 - 0.3750 in.)

α_A = 1.5° (<10°) α_B = 2.0° (<10°)

β_A = 1.5° (<5°) β_B = 1.5° (<5°)

γ = 1.0°, θ = 1.0°,

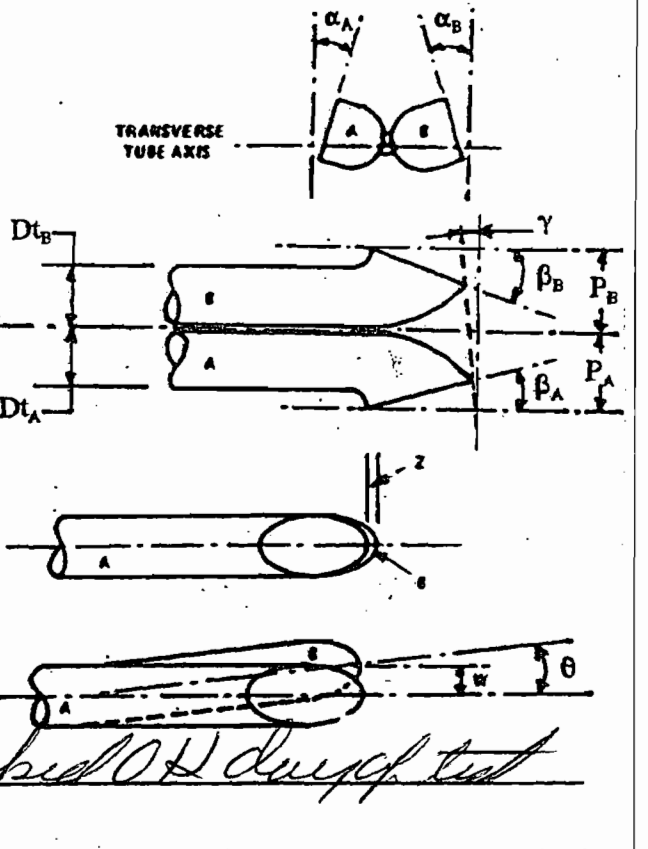
P_A = 0.465 (P_A = 1.05 Dt to 1.50 Dt)

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

$P_A + P_B = A$ = 0.931 [A = 2x(1.05 Dt to 1.50 Dt)]

$Z = A \sin \gamma$ = 0.016 in. (<0.125 in.)

$W = A \sin \theta$ = 0.016 in. (<0.031 in.)



Comments: Pitot tubes leaked OK during test

Calibration required? Yes ☐ No ☐

Calibrated by: Rodney Paul

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

Post Test Thermocouple Calibration

Date: 8-6-04

Plant Name: Rinker

Location: Miami

Source: Cement Kiln

Thermocouple Readout No.	KA-2
Umbilical Cord No.	200'
Switch Box No.	KA-2
Thermocouple No.	KA-50
Average Stack Temperature °F	249
* Observed Mercury in Glass (ASTM) °F	252
Observed Thermocouple Reading °F	252

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

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

Tolerance ≤ 1.5%

Signature: R Paul

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

KAForms: Post Test Thermocouple Calibration
jhm,07/30/01

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION
MAY 5-6, 2003

KA70 RO/UMB		ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	KA70 RO/UMB	
KA1/100'	STACK	31	32	78	77	211	210	421	420	KA1/100'	STACK
	BOX	33	33	77	77	210	210	421	420		BOX
	IMP	32	33	77	78	210	209	420	421		IMP
KA2/200'	STACK	32	33	78	77	210	209	414	415	KA2/200'	STACK
	BOX	31	33	78	77	210	209	417	416		BOX
	IMP	32	32	77	77	211	210	419	418		IMP
KA3/25'	STACK	33	33	77	78	211	210	413	412	KA3/25'	STACK
SWBXKA3	BOX	32	33	78	78	212	211	410	411		BOX
	IMP	34	33	78	77	210	211	410	411		IMP
KA4/25'	STACK	33	32	77	78	212	213	412	413	KA4/25'	STACK
SWBXKA3	BOX	32	33	78	77	211	211	413	413		BOX
	IMP	32	33	77	78	212	212	413	414		IMP
KAK/200K	STACK	32	33	78	78	209	211	417	418	KAK/200K	STACK
KAK-38	BOX	32	32	78	78	210	211	418	419	KAK-38	BOX
SWBXKAK1	IMP	31	32	78	78	212	212	420	419		IMP
KA1/200'	STACK	31	32	77	77	211	210	423	422	KA1/200'	STACK
	BOX	31	32	77	77	209	210	421	420		BOX
	IMP	33	32	77	78	210	211	420	420		IMP
KA2/100'	STACK	33	33	77	78	208	209	420	419	KA2/100'	STACK
	BOX	31	32	78	77	210	211	420	421		BOX
	IMP	32	33	78	78	210	210	422	421		IMP

Signature Glen A. Kooger

Date 5/6/03

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION
MAY 5-6, 2003

THERMOCOUPLE #	ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	THERMOCOUPLE #
KA-06	32	32	77	78	211	210	420	419	KA-06
KA-07	32	33	78	77	212	211	420	421	KA-07
KA-08	34	33	77	78	209	210	423	422	KA-08
KA-09	33	33	77	78	212	211	420	419	KA-09
KA-10	33	32	78	77	212	212	417	418	KA-10
KA-11	35	34	78	78	209	209	415	416	KA-11
KA-12	34	34	79	78	211	210	419	418	KA-12
KA-38	33	33	79	78	212	211	422	422	KA-38
KA-39	33	32	78	77	209	210	420	421	KA-39
KA-50	31	32	77	77	210	211	420	420	KA-50
KA-64	33	34	77	78	213	212	414	415	KA-64
KA-70	35	34	77	78	210	209	416	417	KA-70
KA-71	34	33	78	78	212	211	418	418	KA-71
KA-72	31	32	76	77	211	210	421	421	KA-72
KA-105	31	32	77	78	210	210	421	420	KA-105
KA-108	33	33	76	77	212	211	422	423	KA-108
KA-115	33	33	77	77	211	212	421	422	KA-115
KA-126	31	32	77	78	211	210	424	423	KA-126

THERMOCOUPLE #	ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	THERMOCOUPLE #
KAK-08	32	32	77	77	210	210	420	419	KAK-08
KAK-09	32	31	78	78	212	211	418	418	KAK-09
KAK-10	31	32	76	77	211	210	420	421	KAK-10
KAK-11	33	33	78	77	211	212	424	423	KAK-11
KAK-12	32	33	77	78	211	210	423	422	KAK-12
KAK-38	34	33	78	77	210	209	420	420	KAK-38
KAK-65	33	32	76	77	209	208	417	418	KAK-65
KAK-72	32	31	77	77	211	211	415	416	KAK-72
KAK-110	34	33	79	78	211	210	421	422	KAK-110
KAK-07	32	32	78	77	212	211	421	421	KAK-07

Signature _____

Date 5/6/03

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION
MAY 5-6, 2003

Range (C)	Measured Voltage (mV)	Measured Voltage (V)	Calc. Temp. (C)	Readout Temp. (C)	Percent Difference (%)
KAK-12	33.0	0.033	793	796	-0.3453
	41.0	0.041	993	989	0.4131
KAK-38	32.5	0.033	781	784	-0.3728
	41.4	0.041	1003	999	0.4346
KAK-72	32.8	0.033	788	790	-0.2045
	41.1	0.041	996	993	0.2676
KAK-65	32.1	0.032	771	769	0.3079
	40.9	0.041	991	995	-0.4500
KA-110	32.7	0.033	786	788	-0.2605
	40.5	0.041	980	981	-0.0695

EQUATIONS :

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

Where :

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

Signature Glen A. Koogler

Date 5/6/03

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: Rinker
SOURCE: Kiln
DATE: 8/10/04
PRETEST Y: 1

METER SERIAL #: KA-2
CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	30.50	30.50	30.50

RUN NO.	ORIFICE NO.	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT³) INITIAL	DGM READINGS (FT³) FINAL	NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN)	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	(4) $\Delta H_@$
1	17	0.4505	18	165.999	171.874	5.875	72.5	72.5	72.5	74.9	75.1	74	10.0	0.95	5.94	5.98	1.003	1.506
2	17	0.4505	18	171.874	179.044	7.170	73	74	76	75.1	75.7	75	12.0	0.95	7.23	7.14	0.988	1.508
3	17	0.4505	18	179.044	188.003	8.959	74	75	77	75.8	77	76	15.0	0.95	9.02	8.92	0.990	1.511
																AVG =	0.994	

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

(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

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y =	0.994
AVERAGE DELTA Y=	-0.006
DELTA Y LIMIT =	0.05
IS TEST WITHIN 5%?	YES

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: Baker, Miami
SOURCE: K, LW
TEST DATE: August 10, 2004
METER Y: 1.000
AVG. DELTA H: 1.54

METER SERIAL #: KA-2
CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL
	30.50	30.50

RUN	ORIFICE NO.	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	ELAPSED TIME (MIN)	DGM ΔH (in H_2O)
1	17	.4505	18"	165.999	171.874	72.5	72.5	72.5	74.9	75.1	10.0	~~1.54~~ .95
2	17	.4505	18"	171.874	179.044	73	74	76	75.1	75.7	12.0	.95
3	17	.4505	18"	179.044	188.003	74	75	77	75.8	77.0	15.00	.95

Test Conduted by: Cory J Bell
Signature: Cory J Bell
Date: 08/10/04

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

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

DATE: 6/2204 | METER SERIAL #: KA-2 | BAROMETRIC PRESSURE (in Hg): INITIAL 29.95, FINAL 29.95, AVG (P_{bar}) 29.95

METER PART #: KA-2 | CRITICAL ORIFICE SET SERIAL #: 1376

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH (in H_2O)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
17	1	0.4505	18	689.311	695.673	6.362	78	78	78	78	78	78	10.70	0.94	6.2655	6.2260	0.994		1.54
	2	0.4505	18	695.673	702.817	7.144	78	78	78	78	78	78	12.00	0.94	7.0357	6.9824	0.992		1.54
	3	0.4505	18	702.817	710.457	7.640	78	77	78	77	78	77.5	12.90	0.94	7.5312	7.5061	0.997		1.54
																AVG =	0.994	-0.62	
22	1	0.5836	18	628.759	636.326	7.567	76	76	77	77	77	76.75	10.00	1.6	7.4817	7.5519	1.009		1.56
	2	0.5836	18	636.326	644.024	7.698	78	75	75	78	78	76.5	10.00	1.6	7.6148	7.5378	0.990		1.57
	3	0.5836	18	653.457	661.064	7.607	78	76	78	76	76	76.5	10.00	1.6	7.5248	7.5378	1.002		1.57
																AVG =	1.000	-0.01	
26	1	0.7142	16	661.064	670.70	9.636	78	78	77	78	77	77.5	10.40	2.3	9.5304	9.5937	1.007		1.50
	2	0.7142	16	670.70	680.075	9.375	78	77	77	77	77	77	10.10	2.3	9.2809	9.3169	1.004		1.51
	3	0.7142	16	680.075	689.311	9.236	78	77	78	77	78	77.5	10.00	2.4	9.1370	9.2247	1.010		1.57
																AVG =	1.007	0.63	

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 = 1.000

AVERAGE $\Delta H_@$ = 1.54

(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

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

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

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

= 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

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

Lead and Mercury

Calculations

GENERAL DATA

Plant	:	Rinker Materials				
Source/Unit	:	Cement Kiln				
Date	:	August 6,2004		Cp	0.840	
Stack dia.	:	136.50 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)	96	90	93
Stack Temp., Ts (F)	248	249	242
Sq.Rt. dP	0.79	0.82	0.81
dH (in. H2O)	1.16	1.23	1.13
Meter Vol.,Vm (ft3)	77.109	80.599	75.553
Vol. H2O, Vlc (ml)	310.6	312.9	290.5
Meter Y	0.988	0.988	0.988
Bar. Press.,Pb (in.Hg.)	29.78	29.78	29.78
Static Press.,Ps (in.H2O)	-0.72	-0.72	-0.72
Test Time (min.)	120.0	120.0	120.0
Nozzle Dia.,Dn (in.)	0.233	0.233	0.233
Oxygen, O2 (%)	11.8	11.2	12.0
Carbon Dioxide, CO2 (%)	11.0	14.5	12.0
Carbon Monoxide, CO (%)	0.0	0.0	0.0

Report Emission Criteria in ? l = lb/hr g = gr/dscf : grams

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

SOURCE TEST CALCULATIONS

Plant : Rinker Materials
Source/Unit : Cement Kiln RUN NO.: 1
Date: August 6,2004

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.72	in. H2O
METER TEMP, Tm =	96.04167	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	248.2	F	STACK I.D. =	136.50	inch
AVG.VEL.HEAD,dP =	0.625	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.16	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	77.109	Cu.Ft.	STACK AREA, As =	101.623	Sq.Ft.
METER COFF., Y =	0.988		TEST TIME =	120.00	min.
BAR. PRESS., Pb =	29.78	in.Hg	NOZZLE DIA. =	0.233	inch
COND.(Vlc) =	310.6	ml	NOZZLE DIA., An =	3.0E-04	Sq.Ft.

GAS ANALYSIS = 11.80 % O2 0.00 % CO
11.00 % CO2 77.20 % N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 72.210 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 14.620 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.168 | 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 = 137.52

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.23

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.17

P(stack) = Pbar + (Ps / 13.6) ..... = 29.73 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] ..... = 52.22 ft/sec

Qs = vs x As x 60 ..... = 318,414 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... = 196,147 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] ..... = 105.30 %

SOURCE TEST CALCULATIONS

Plant : Rinker Materials
Source/Unit : Cement Kiln RUN NO.: 2
Date : August 6,2004

STD.TEMP, Tstd =	68	F	STATIC PRESS.,Ps =	-0.72	in. H2O
METER TEMP, Tm =	89.71	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	249.2	F	STACK I.D. =	136.50	inch
AVG.VEL.HEAD,dP =	0.676	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.23	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	80.599	Cu.Ft.	STACK AREA, As =	101.623	Sq.Ft.
METER COFF., Y =	0.988		TEST TIME =	120.00	min.
BAR. PRESS., Pb =	29.78	in.Hg	NOZZLE DIA. =	0.233	inch
COND.(Vlc) =	312.9	ml	NOZZLE DIA., An =	3.0E-04	Sq.Ft.

GAS ANALYSIS = 11.20 % O2 0.00 % CO
14.50 % CO2 74.30 % N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 76.360 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 14.728 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.162 | 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 = 133.09

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.77

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.70

P(stack) = Pbar + (Ps / 13.6) ..... = 29.73 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] ..... = 53.84 ft/sec

Qs = vs x As x 60 ..... = 328,265 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... = 203,565 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] ..... = 107.30 %

SOURCE TEST CALCULATIONS

Plant : Rinker Materials
Source/Unit : Cement Kiln RUN NO.: 3
Date : August 6,2004

STD.TEMP., Tstd =	68	F	STATIC PRESS.,Ps =	-0.72	in. H2O
METER TEMP, Tm =	92.50	F	PITOT COFF., Cp =	0.840	
STACK TEMP, Ts =	242.4	F	STACK I.D. =	136.50	inch
AVG.VEL.HEAD,dP =	0.651	in. H2O	DUCT LENGTH =		inch
METER ORIFICE,dH=	1.13	in. H2O	DUCT WIDTH =		inch
METER VOL., Vm =	75.553	Cu.Ft.	STACK AREA, As =	101.623	Sq.Ft.
METER COFF., Y =	0.988		TEST TIME =	120.00	min.
BAR. PRESS., Pb =	29.78	in.Hg	NOZZLE DIA. =	0.233	inch
COND.(Vlc) =	290.5	ml	NOZZLE DIA., An =	3.0E-04	Sq.Ft.

GAS ANALYSIS = 12.00 % O2 0.00 % CO
12.00 % CO2 76.00 % N2

Vm(std) = [(T(std) + 460) / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 71.200 dscf

Vw(std) = (8.9148 x 10e-5) x (Tstd + 460) x Vlc = 13.674 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.161 | 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 = 148.81

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 30.40

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.40

P(stack) = Pbar + (Ps / 13.6) ..... = 29.73 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x P(stack))] ..... = 52.87 ft/sec

Qs = vs x As x 60 ..... = 322,340 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (P(stack)/29.92) ..... = 201,965 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] ..... = 100.84 %

A. FIELD DATA SUMMARY

Plant: Rinker Materials
Source/Unit: Cement Kiln
Date: August 6,2004

	RUN 1	RUN 2	RUN 3
Vlc = Vol water collected in train, ml	310.6	312.9	290.5
Vm = Sample gas vol, meter cond., acf	77.109	80.599	75.553
Y = Meter calibration factor	0.9880	0.9880	0.9880
Pbar = Barometric pressure, in. Hg	29.78	29.78	29.78
Pstatic = Stack static pressure, in. H2O	-0.72	-0.72	-0.72
dH = Avg meter pressure diff, in. H2O	1.16	1.23	1.13
Tm = Absolute meter temp., degrees R	556.0	549.7	552.5
Vm(std) = Sample gas vol, Std. cond., dscf	72.210	76.360	71.200
Bws = Water vapor in gas stream, fraction	0.168	0.162	0.161
MF = Moisture factor (1 - Bws)	0.832	0.838	0.839
CO2 = Carbon Dioxide, dry, volume %	11.00	14.50	12.00
O2 = Oxygen, dry, volume %	11.80	11.20	12.00
N2 = Nitrogen, dry volume %	77.20	74.30	76.00
Md = Molecular weight of stack gas, dry	30.23	30.77	30.40
Ms = Molecular weight of stack gas, wet	28.17	28.70	28.40
Cp = Pitot tube coefficient	0.84	0.84	0.84
Sq.Rt. dP = Avg. square root of each dP	0.7908	0.8223	0.8071
Ts = Absolute stack temp., degrees R	708.2	709.2	702.4
A = Area of stack, ft2	101.62	101.62	101.62
Qstd = Volumetric flowrate, dscfm	196,147	203,565	201,965
An = Nozzle area, ft2	2.96E-04	2.96E-04	2.96E-04
0 = Sample time, minutes	120.00	120.00	120.00
%I = Isokinetic variation, percent	105.30	107.30	100.84

B. PARTICULATE DATA SUMMARY

Plant: Rinker Materials
Source/Unit: Cement Kiln
Date: August 6,2004

	RUN 1	RUN 2	RUN 3
Sample Weight (FHW + MF + BHW), mg	0.00	0.00	0.00
Meter Volume, standard cond., Vm(std)	72.210	76.360	71.200
Carbon Dioxide, percent	11.00	14.50	12.00
Oxygen, percent	11.80	11.20	12.00
Sample Concentration :			
gr/scf	0.0000	0.0000	0.0000
gr/dscf	0.0000	0.0000	0.0000
gr/dscf @ 0 % CO2	0.0000	0.0000	0.0000
gr/dscf @ 0 % O2	0.0000	0.0000	0.0000
ppm * MW (dry gas).....	0.0	0.0	0.0
ppm * MW @ 0% CO2	0.0	0.0	0.0
ppm * MW @ 0% O2	0.0	0.0	0.0

EMISSION RATE CALCULATIONS

Plant : Rinker Materials
Source/Unit : Cement Kiln
Date: August 6,2004 RUN NO.: 1
STANDARD TEMP. : 68 F

Front Half Wash (FHW)	0.00000	grams	Vm(std)	72.210	ft3
Mass Filter (MF)	0.00000	grams	Vw(std)	14.620	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	196,147	dscfm
Vm(std) SO2		dscf	Bws	0.168	
CO2 CORR. 0.0 %			CO2	11.00	%
O2 CORR.: 0.0 %			O2	11.80	%

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)] ...	0.0000	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0000	gr/dscf
gr/dscf x (12 / %CO2)	0.0000	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0000	@ 0% O2
0.00857 x Qs(std) x gr/dscf	0.00	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. / 11.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.8% O2 Stack)	ppm @ 0% O2
SO2 (lb/hr / Heat Input)	lb/MMBtu

HYDROGEN CHLORIDE DATA SUMMARY

[Mass HCl(mg) x 385 x 1E6] / [453600 x 36.5 x Vm(std)]..	ppm
ppm x 0.0 % Corr. / 11.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.0% O2 Stack)	ppm @ 0% O2

EMISSION RATE CALCULATIONS

Plant : Rinker Materials
Source/Unit : Cement Kiln
Date: August 6,2004 RUN NO.: 2
STANDARD TEMP. : 68 F

Front Half Wash (FHW)	0.00000	grams	Vm(std)	76.360	ft3
Mass Filter (MF)	0.00000	grams	Vw(std)	14.728	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	203,565	dscfm
Vm(std) SO2		dscf	Bws	0.162	
CO2 CORR. 0.0 %			CO2	14.50	%
O2 CORR.: 0.0 %			O2	11.20	%

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)] ...	0.0000	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0000	gr/dscf
gr/dscf x (12 / %CO2)	0.0000	@ 0% C02
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0000	@ 0% O2
0.00857 x Qs(std) x gr/dscf	0.00	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. / 11.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.0% 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. / 14.5 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 14.5% O2 Stack)	ppm @ 0% O2

EMISSION RATE CALCULATIONS

Plant : Rinker Materials
Source/Unit : Cement Kiln
Date: August 6,2004 RUN NO.: 3
STANDARD TEMP. : 68 F

Front Half Wash (FHW)	0.00000	grams	Vm(std)	71.200	ft3
Mass Filter (MF)	0.00000	grams	Vw(std)	13.674	ft3
Back Half Wash (BHW)	0.00000	grams	Qs(std)	201,965	dscfm
Vm(std) SO2		dscf	Bws	0.161	
CO2 CORR. 0.0 %			CO2	12.00	%
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)] ...	0.0000	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0000	gr/dscf
gr/dscf x (12 / %CO2)	0.0000	@ 0% CO2
gr/dscf x [(20.9 - Oxygen corr.) / (20.9 - %O2)]	0.0000	@ 0% O2
0.00857 x Qs(std) x gr/dscf	0.00	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. / 11.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 11.0% 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. / 12.0 % CO2 in Stack	ppm @ 0% CO2
ppm x (20.9% - 0.0% O2 Corr)/(20.9% - 12.0% O2 Stack)	ppm @ 0% O2

Field Data Sheets

Multiple Methods Data Sheet

Plant: Rinker Materials, Miami
Sample Location: Cement Kiln
Control Type: Baghouse
Sample Type: Method 29
Date: 8/6/04 Run No.: 1
Time Start: 10:20 Time End: 12:30
Sample Time: 10 min/point 120 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 29.78 "Hg Stack Press: "Hg Ps: .72 "H_2O
Moisture: 12 % FDA: Gas Density Factor:
Temperature: °F Wind Direction: Wind Speed: 10-15 mph
Weather: Clear Thermocouple Readout: KA-6
Sample Box No.: KA-6 Meter Box No.: KA-6
Meter Y: .988 @ Delta H: 1.61 Pitot Corr.: .84
Nozzle Diameter: .233 inches Probe Length: 4 feet
Probe Heater Setting: 250 Nomograph Cf: 1.85
Stack Dimensions: 136.5 inches
Stack Area: 101.62 ft^2
Effective Stack Area: 101.62 ft^2
Stack Height: ~300' ft

Stack Dimensions

Umbilical: KA-100
Thermocouple
Probe No.: KAK 55
Pitot Tube:

Material Processing Rate:
Final Gas Meter Reading: 251.309 ft^3
Initial Gas Meter Reading: 174.200 ft^3
Total Metered Gas Volume: 77.109 ft^3
Condensate Gain in Impingers: 298 mL
Weight Gain in Silica Gel: ~~13~~ 12.6 g
Total Moisture Gain 311 mL
Silica Gel Container No.: 3
Filter Number:

Leak Check - Meter Box:
Initial: .013 cfm @ 12 inches Hg
Final: 0.0 cfm @ 4 inches Hg

Leak Check - Pitot Tubes
Impact 3 "H^20 for 15 sec: (Stable), Leak
Static 3 "H^20 for 15 sec: (Stable), Leak
Test Conducted By: E. Flowers, A. West, G. Hoven
O_2 11.8 % CO_2 11 %
Stack Test Observers:

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_2O)	Meter Orifice Pressure Difference (H_2O)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average:												
1-1A		0	174.2	.76	1.41	1.41	297	260	68	92	3	
1B		5	177.7	.7	1.3	1.3	291	256	63	93	3	
2A		10	181.1	~~+0.54~~	1.0	1.3	280	242	62	95	3	
2B		15	184.1	.7	1.3	1.3	266	~~6~~ 260	63	96	3	
3A		20	187.5	.51	.94	.94	259	244	64	97	~~5~~ 3	
3B		25	190.3	.51	.94	.94	247	259	65	98	3	
2-1A		30	193.7	.72	1.33	1.33	246	233	66	98	3	
1B		35	196.8	.72	1.33	1.33	254	246	61	99	3	

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
2-2A		40	200.2	.64	1.18	1.18	250	254	60	99	3	
2B		45	203.6	.66	1.22	1.22	249	244	61	99	3	
3A		50	206.8	.51	.94	.94	246	252	62	99	3	
3B		55	209.8	.51	.94	.94	238	255	63	99	3	
3-1A		60	212.7	.74	1.37	1.37	243	252	68	96	3	
1B		65	216.1	.75	1.39	1.39	241	246	63	97	3	
2A		70	219.7	.67	1.24	1.24	238	247	64	96	3	
2B		75	223.0	.65	1.2	1.2	234	244	65	95	3	
3A		80	26.3	.51	.94	.94	232	257	62	95	3	
3B		85	29.2	.51	.94	.94	226	252	63	94	3	
4 1A		90	32.1	~~.73~~ .7	1.3	1.3	232	~~252~~ 251	66	93	3	
~~1B~~		95	35.4	.72	1.33	1.33	240	235	65	94	3	
2A		100	~~38~~.8	.65	1.2	1.2	241	255	67	95	3	
2B		105	42.1	.65	1.2	1.2	240	254	66	95	3	
3A		110	45.4	.53	.98	.98	235	247	65	96	3	
3B		115	48.3	.53	.98	.98	232	252	66	95	3	
		120-END										

Multiple Methods Data Sheet

Rinker Materials Miami

Sample Location: Cement Kiln

Control Type: Baghouse

Sample Type: Method 29 (Multi Metals) Lead + Hg

Date: 8/6/04 Run No.: 2

Time Start: 12:45 Time End: 14:50

Sample Time: 10 min/point 120 Total Minutes

Dry Bulb: °F Wet Bulb: °F VP@DP:

Bar. Pressure: 29.78 "Hg Stack Press: "Hg Ps: -.72 "H_2O

Moisture: 14 % FDA: Gas Density Factor:

Temperature: °F Wind Direction: Wind Speed: 25-30

Weather: Overcast/windy Thermocouple Readout: KA-6

Sample Box No.: KA-4 Meter Box No.: KA-4

Meter Y: .988 @ Delta H: 1.61 Pitot Corr.: .84

Nozzle Diameter: .233 inches Probe Length: 4 feet

Probe Heater Setting: 250 Nomograph Cf: 1.81

Stack Dimensions: 136.5 inches

Stack Area: 101.62 ft^2

Effective Stack Area: 101.62 ft^2

Stack Height: ~300 ft

Stack Dimensions

Umbilical: KA-100

Thermocouple

Probe No.: KAK-55

Pitot Tube:

Material Processing Rate:

Final Gas Meter Reading: 332.199 ft^3

Initial Gas Meter Reading: 251.600 ft^3

Total Metered Gas Volume: 80.599 ft^3

Condensate Gain in Impingers: 295 mL

Weight Gain in Silica Gel: 17.9 g

Total Moisture Gain 313 mL

Silica Gel Container No.: 4

Filter Number:

Leak Check - Meter Box:

Initial: 0.0 cfm @ 10 inches Hg

Final: 0.009 cfm @ 5 inches Hg

Leak Check - Pitot Tubes

Impact 3 "H^20 for 15 sec: Stable, Leak

Static 3 "H^20 for 15 sec: Stable, Leak

Test Conducted By: E. Thomas, G. Haven, C.S. Bell, A. West

O_2 11.2 % CO_2 14.5 %

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 Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average:												
1 1A		0	251.6	.82	1.48	1.48	250	240	67	91	4	
1B		5	55.1	.8	1.45	1.45	252	237	66	91	4	
2A		10	59.1	.73	1.32	1.32	253	240	66	90	4	
2B		15	63.1	.72	1.3	1.3	251	232	65	89	4	
3A		20	67.1	.54	.98	.98	242	246	66	89	3	
3B		25	69.9	.56	1.01	1.01	242	245	64	88	3	
2 1A		30	73.0	.76	1.38	1.38	252	241	64	89	3	
1B		35	76.0	.76	1.38	1.38	252	237	64	89	3	

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_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
2-2A		40	79.6	.7	1.27	1.27	251	240	65	90	3	
2B		45	83.0	.68	1.23	1.23	249	~~249~~241	65	89	3	
3A		50	86.2	.57	1.03	1.03	246	241	66	89	3	
3B		55	89.3	.52	.94	.94	238	251	63	90	3	
3-1A		60	92.2	.74	1.34	1.34	250	257	64	88	3	
1B		65	95.7	.76	1.38	1.38	251	244	61	89	3	
2A		70	99.1	.72	1.3	1.3	251	235	60	90	3	
2B		75	302.5	.7	1.27	1.27	249	230	61	89	3	
3A		80	5.9	.58	1.05	1.05	246	255	61	90	3	
3B		85	9.2	.59	1.07	1.07	245	247	61	90	3	
4-1A		90	12.2	.73	1.32	1.32	255	236	60	89	3	
1B		95	15.5	.76	1.38	1.38	254	229	62	90	4	
2A		100	19.0	.7	1.27	1.27	254	246	64	90	4	
2B		105	22.5	.7	1.27	1.27	251	257	59	91	4	
3A		110	25.9	.6	1.08	1.08	252	239	59	91	4	
3B		115	29.2	.56	1.01	1.01	245	254	60	92	3	
		(120end)										

Multiple Methods Data Sheet

Plant: Rinker Materials, Miami
Sample Location: Cement Kiln
Control Type: Baghouse
Sample Type: Method 29 (Multi-Metals) Pb + Hg
Date: 8/6/04 Run No.: 3
Time Start: 15:09 Time End: 17:15
Sample Time: 10 min/point 120 Total Minutes
Dry Bulb: °F Wet Bulb: °F VP@DP:
Bar. Pressure: 29.78 "Hg Stack Press: "Hg Ps: -.72 "H_20
Moisture: % FDA: Gas Density Factor:
Temperature: °F Wind Direction: W Wind Speed: 20-25
Weather: Overcast Thermocouple Readout: KA-6
Sample Box No.: KA-6 Meter Box No.: KA-6
Meter Y: .988 @ Delta H: 1.61 Pitot Corr.: .84
Nozzle Diameter: .233 inches Probe Length: 4 feet
Probe Heater Setting: 250 Nomograph Cf: 1.72
Stack Dimensions: 136.5 inches
Stack Area: 101.62 ft^2
Effective Stack Area: 101.62 ft^2
Stack Height: ~ 200 ft

Stack Dimensions

Umbilical: KA-100 ~~KAK-5~~
Thermocouple
Probe No.: KAK 55
Pitot Tube:

Material Processing Rate:
Final Gas Meter Reading: 408.411 ft^3
Initial Gas Meter Reading: ~~332.604~~ 332.858 ft^3
Total Metered Gas Volume: 75.752 ft^3
Condensate Gain in Impingers: ~~295~~ 272 mL
Weight Gain in Silica Gel: ~~18~~ 18.5 g
Total Moisture Gain ~~295~~ ~~305~~ 291 mL
Silica Gel Container No.: 27
Filter Number:

Leak Check - Meter Box:
Initial: .010 cfm @ 10 inches Hg
Final: .009 cfm @ 6 inches Hg
Leak Check - Pitot Tubes
Impact 3 "H^20 for 15 sec: Stable, Leak
Static 3 "H^20 for 15 sec: Stable, Leak
Test Conducted By: E. Thomas, G. Hoven, A. West
O_2 12 % CO_2 12 %
Stack Test Observers:

Port and Traverse Point No.	Distance from Inside Stack Wall (in.)	Clock Time	Gas Meter Reading (ft^3)	Stack Velocity Head (H_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temp. (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
Average												
1-1A		0	332.8	.73	1.26	1.26	254	232	66	89	5	
1B		5	36.1	.73	1.26	1.26	253	230	62	89	3	
2A		10	39.3	.68	1.17	1.17	249	231	62	90	3	
2B		15	42.5	.68	1.17	1.17	247	249	62	90	3	
3A		20	45.7	.58	1.0	1.0	244	244	62	91	3	
3B		25	48.7	.54	.93	.93	238	252	63	91	3	
2-1A		30	51.6	.75	1.29	1.29	249	247	63	91	3	
1B		35	55.0	.74	1.28	1.28	248	258	63	91	3	

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_20)	Meter Orifice Pressure Difference (H_20)		Stack Gas Temperature (°F)	Sample Box Temperature (°F)	Last Impinger Temperature (°F)	Meter Temperature (°F)	Vacuum on Sample Train ("Hg)	Oxygen Meter Reading (% O_2)
					Calculated	Actual						
2-2A		40	58.4	.65	1.12	1.12	245	256	65	93	3	
2B		45	61.6	.67	1.15	1.15	244	252	67	93	3	
3A		50	64.8	.54	.93	.93	236	247	65	93	3	
3B		55	67.8	.55	.95	.95	236	245	69	93	3	
3-1A		60	70.7	.72	1.24	1.24	248	261	68	94	3	
1B		65	73.7	.75	1.29	1.29	249	254	65	93	3	
2A		70	77.6	.68	1.17	1.17	249	262	68	94	3	
2B		75	80.8	.7	1.2	1.2	243	260	68	94	3	
3A		80	84.0	.55	.95	.95	238	247	68	94	3	
3B		85	86.9	.55	.95	.95	232	245	67	94	3	
4-1A		90	89.9	.72	1.24	1.24	234	253	63	94	3	
1B		95	93.2	.75	1.29	1.29	242	241	63	94	3	
2A		100	96.4	.7	1.2	1.2	241	254	63	93	3	
2B		105	99.7	.7	1.2	1.2	238	247	62	94	3	
3A		110	402.8	.52	.89	.89	234	246	64	94	3	
3B		115	5.6	.52	.89	.89	226	254	63	94	3	
		120 end										

KODGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

SAMPLING RATE CALCULATIONS

Date: 8/6/04

Plant Name/Location: Rinker, Miami

Source: Cement Kiln

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

DH	DP_{avg}	Cf
	*	=

2) Calculate the optimum nozzle size:

Record Values			
~~90~~ 97 (99)	90	Tm =	Meter Temperature (°F) (Add 5 °F for initial temp.)
.12 | .14	.15	Bw =	Moisture Fraction
27.7 | 27.5	27.4	Ms =	Wet Molecular Weight of Stack Gas (from Table)
250 | 240	250	Ts =	Stack Temperature (°F)
1.61	1.61	ΔH@ =	Meter Box Constant (box front)
		ΔP =	Average Pitot Reading (Inches H20)
.233	.233	Dn =	Nozzle Diameter (Inches) measured

Moisture Fraction	MS
0	29
0.05	28.5
0.1 (.12)	27.9 (27.7)
0.15	27.4
0.2	26.8
0.25	26.2
0.3	25.7
0.35	25.2
0.4	24.6

$$Dn = \left[\frac{Cf}{\left(\frac{Tm+460}{MS(Ts+460)}\right) * \left(1-\frac{Bw}{100}\right)^2 * (\Delta H@) * (17.74)} \right]^{0.25}$$

5/9
19454
.7225
1.61
.00295
17741

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 =	557		559		550	
/ [MS*(Ts+460)] =	19667		19250		19454	
* (1 - Bw)^2 =	~~.7744~~		.7396		.7225	
* ΔH@ =	1.61		1.61		1.61	
* (Dn)^4 =	.00295		.00295		.00295	
* 17741 = Cf	17741		17741		17741	
	(1.85) ~~1.84~~		(1.81)		(1.72)	

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Cont. #

Rinker
Pb + Hg
MZ9
Run 1
8/6/04

1 - Filter

Rinse (ml)

3 - 150 ml 0.1N HNO_3

Gain

4 ~~295~~ 295

Rinse (ml)
100 0.1N HNO_3

Gain

5A 1

Rinse (ml)
100 0.1N HNO_3

Gain

5B 21

Rinse (ml)
100 $KMnO_4$ + 100 H_2O

5C

Rinse ml
200 DI + 25 8N HCL

6G3 #1 13(g)

Total moisture gain

Cont.

Rinker
M29
Run 2
8/6/04

1 Filter

3 150 rinse

4 Main
204
192
106

Rinse
100 0.1N HNO_3

5A 3 100 0.1N HNO_3

5B -7 100 $KMnO_4$ + 100 H_2O

5C — 200 DI + 25 ml 8N HCL

5G# 18
4

Cont. #

Rinker
M29
Run 3
8/6/04

1 Filter

3 150 ml 0.1N HNO_3 Rinse

Gain
4 192
172
115 Rinse

5A 100 ml 0.1N HNO_3 Rinse

5B Gain
~~85~~ 5

5C 25ml 8N HCl 200 ml H_2O

56 18g

Laboratory Data Sheets

PPB ENVIRONMENTAL LABORATORIES, INC.

6821 SW Archer Road, Gainesville, FL 32608 Ph: (352) 377-2349 Fax: (352) 395-6639 E-mail: ppb@ppb-envlabs.com NELAP Certified—FDH # E82001

September 16, 2004

Mr. Neal Lofgren
Koogler and Associates
4014 NW 13 St
Gainesville, FL 32609

Dear Mr. Lofgren::

Enclosed are the hard copy analytical results for the Rinker samples received August 11, 2004.

If you have any questions concerning this report, please contact me.

Sincerely,

Paul Berman

Paul Berman
Project Manager

Enclosures

Post-It™ brand fax transmittal memo 7671	# of pages ▸ 5
To John Koogler	From Paul Berman
Co. Koogler & Associates	Co. PPB
Dept.	Phone #
Fax # 377-7158	Fax #

REPORT OF ANALYSES
(SN-00003499)

Mr. Neal Lofgren
Koogler and Associates
4014 NW 13 St
Gainesville, FL 32609

Project No.: 87-011
Date: September 16, 2004
FDH No.: E82001

Table 1. Run 1 Lead and Mercury results for Rinker Samples Received August 11, 2004.

Client ID	Lab ID	Sample Volume, mL	Mercury, Total µg	Lead, Total µg
Filter & Probe Rinse	257396	110	0.03	<4.0
Impingers 1 - 3	257398	580	1.34	1.8
0.1 N HNO3	257399	100	0.03	NA
Potassium Permanganate	257400	400	0.22	NA
8N HCl	257401	230	1.33	NA

REPORT OF ANALYSES
(SN-00003499)

Mr. Neal Lofgren
Koogler and Associates
4014 NW 13 St
Gainesville, FL 32609

Project No.: 87-011
Date: September 16, 2004
FDH No.: E82001

Table 2. Run 2 Lead and Mercury results for Rinker Samples Received August 11, 2004.

Client ID	Lab ID	Sample Volume, mL	Mercury, Total µg	Lead, Total µg
Filter & Probe Rinse	257402	120	0.01	<4.0
Impingers 1 - 3	257404	590	1.85	9.1
0.1 N HNO3	257405	96	0.01	NA
Potassium Permanganate	257406	380	0.37	NA
8N HCl	257407	220	1.35	NA

REPORT OF ANALYSES
(SN-00003499)

Mr. Neal Lofgren
Koogler and Associates
4014 NW 13 St
Gainesville, FL 32609

Project No.: 87-011
Date: September 16, 2004
FDH No.: E82001

Table3. Run 3 Lead and Mercury results for Rinker Samples Received August 11, 2004.

Client ID	Lab ID	Sample Volume, mL	Mercury, Total µg	Lead, Total µg
Filter & Probe Rinse	257408	150	0.03	<6.0
Impingers 1 - 3	257410	510	1.20	4.0
0.1 N HNO3	257411	100	0.01	NA
Potassium Permanganate	257412	370	0.55	NA
8N HCl	257413	230	1.19	NA

REPORT OF ANALYSES
(SN-00003499)

Mr. Neal Lofgren
Koogler and Associates
4014 NW 13 St
Gainesville, FL 32609

Project No.: 87-011
Date: September 16, 2004
FDH No.: E82001

Table 4. Blanks Lead and Mercury results for Rinker Samples Received August 11, 2004.

Client ID	Lab ID	Sample Volume, mL	Mercury, Total µg	Lead, Total µg
0.1 N HNO3 Blank	257414	300	<0.01	0.5
5% HNO3/10% H2O2	257416	200	0.04	NA
KMnO4 Blank	257417	100	0.02	NA
8 N HCl Blank	257418	225	0.22	NA
Filter Blank	257419	250	<0.01	<10.0

Chain of Custody

Plant Name: RINKER Project Number: 263-04-05

Location: MIAMI, FL Source: Kiln

Sample Identification	Remarks
Run 1 Cont. 1	Filter
~~Run 1 Cont. 2~~	NO PM N/A
Run 1 Cont. 3	PROBE RINSE
RUN 1 Cont. 4	IMPINGERS 1-3
RUN 1 Cont. 5A	0.1 N HNO_3
RUN 1 Cont. 5B	$KMnO_4$ / H_2SO_4
RUN 1 Cont. 5C	8 N HCl
	Analysis → LEAD and MERCURY

Sampled by:	Glen Haven	8/6/04	
	Signature	Date	Time
Relinquished by:	Glen Haven	8/9/04	
	Signature	Date	Time
Received by:	Neil Lofgren	8/11/04	
	Signature	Date	Time
Relinquished by:	Neil Lofgren	8/11/04	
	Signature	Date	Time
Laboratory:			
Received by:	Paul Brown	8/11/04	1015
	Signature	Date	Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Chain of Custody

Plant Name: RINKER Project Number: 263-04-05

Location: MIAMI, FL Source: Kiln

Sample Identification	Remarks
Run 2 Cont. 1	Filter
~~Run 2 Cont. 2~~	NO PM N/A
Run 2 Cont. 3	PROBE RINSE
RUN 2 Cont. 4	IMPINGER 1-3
RUN 2 Cont. 5A	0.1 N HNO_3
RUN 2 Cont. 5B	$KMnO_4$ / H_2SO_4
RUN 2 Cont. 5C	8 N HCl
	Analysis → LEAD and
	MERCURY

Sampled by:	Glen Haven	8/6/04	
	Signature	Date	Time
Relinquished by:	Glen Haven	8/9/04	
	Signature	Date	Time
Received by:	Neil Lofgren	8/11/04	
	Signature	Date	Time
Relinquished by:	Neil Lofgren	8/11/04	
	Signature	Date	Time
Laboratory:			
Received by:	Paul Bem	8/11/04	1015
	Signature	Date	Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Chain of Custody

Plant Name: RINKER Project Number: 263-04-05

Location: MIAMI, FL Source: Kiln

Sample Identification	Remarks
Run 3 Cont. 1	Filter
~~Run 3 Cont. 2~~	No PM N/A
Run 3 Cont. 3	Probe Rinse
Run 3 Cont. 4	Impinger 1-3
Run 3 Cont. 5A	0.1 N HNO_3
Run 3 Cont. 5B	$KMnO_4$ / H_2SO_4
Run 3 Cont. 5C	8 N HCl
	Analysis → Lead and
	Mercury

Sampled by:	Glen Haven	8/6/04	
	Signature	Date	Time
Relinquished by:	Glen Haven	8/9/04	
	Signature	Date	Time
Received by:	Neil Lofgren	8/11/04	
	Signature	Date	Time
Relinquished by:	Neil Lofgren	8/11/04	
	Signature	Date	Time
Laboratory:			
Received by:	[illegible]	8/11/04	1015
	Signature	Date	Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Chain of Custody

Plant Name: RUNKER Project Number: 263-04-05

Location: Miami Source: Kiln

Sample Identification	Remarks
Cont. 8 A	1 N HNO_3 BLANK
Cont. 8 B	D.I. H_2O BLANK
Cont. 9	5% HNO_3 / 10% H_2O_2
Cont. 10	$KMnO_4$ BLANK
Cont 11	8 N HCl BLANK
Cont 12	Filter Blanks (3)

Sampled by: Glen Haven 8/6/04 _____
Signature Date Time

Relinquished by: Glen Haven 8/9/04 _____
Signature Date Time

Received by: _____ 8/11/04 _____
Signature Date Time

Relinquished by: _____ 8/11/04 _____
Signature Date Time

Laboratory:
Received by: _____ 8/11/04 1015
Signature Date Time

Sample Shipped Via: ○ UPS ○ Federal Express ○ Other

Shipping Bill Number: _____

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Equipment Calibration Data

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Nozzle Calibration

Date: 8/6/04

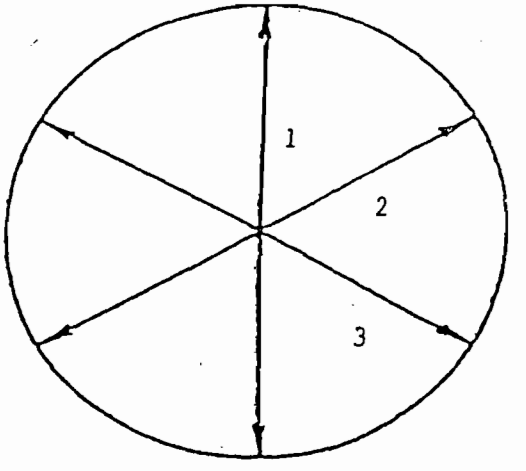
Plant Name: Rinker, Miami

Location: Miami, FL

Source: Cement Kiln

Measurement Number	Inside Diameter (inches)
1	.233
2	.253
3	.283
Average	.253
Area of Nozzle	_____ Ft.^{2}

Calibrated by: _____



Nozzle X-Section

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

Pitot Tube Calibration Measurements

Pitot Tube Identification Number: SSI

Date Calibrated: 7-1-03

Pitot Tube Assembly Level: Yes ☑ No ☐

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

Dt_A = 0.372 in. (Dt_A = 0.1875 - 0.3750 in.)

Dt_B = 0.373 in. (Dt_B = 0.1875 - 0.3750 in.)

α_A = 1.5° (<10°) α_B = 1.0° (<10°)

β_A = 1.5° (<5°) β_B = 2.0° (<5°)

γ = 0.5°, θ = 0.5°,

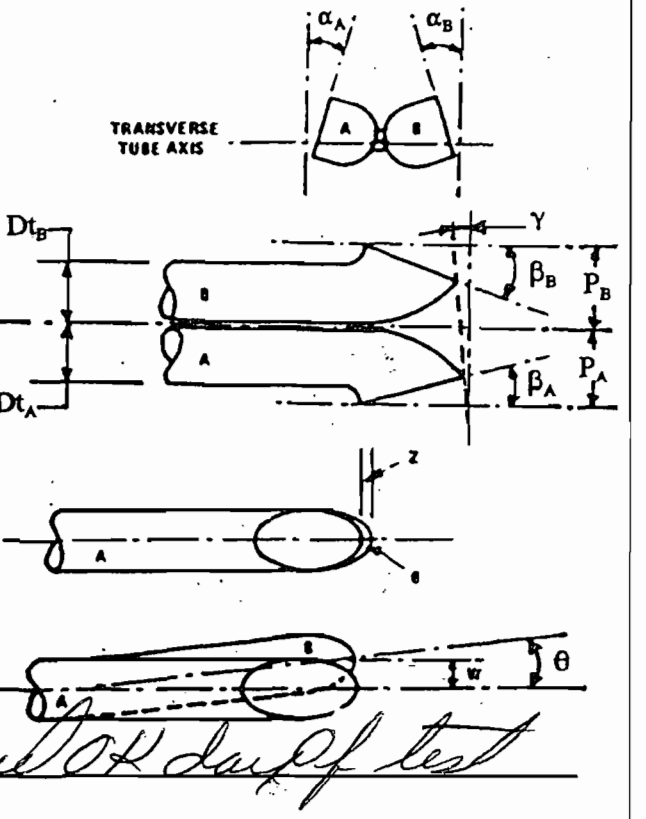
P_A = 0.464 (P_A = 1.05 Dt to 1.50 Dt)

P_B = 0.467 (P_B = 1.05 Dt to 1.50 Dt)

$P_A + P_B = A$ = 0.931 [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 tubes leak tested OK during test

Calibration required? Yes ☐ No ☐

Calibrated by: Rodney Paul

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

Post Test Thermocouple Calibration

Date: 8-6-04

Plant Name: Renbar

Location: Miami

Source: Cement Kiln

Thermocouple Readout No.	KAK-6
Umbilical Cord No.	KAK-100
Switch Box No.	KAK-6
Thermocouple No.	KAK-55
Average Stack Temperature °F	246
* Observed Mercury in Glass (ASTM) °F	248
Observed Thermocouple Reading °F	248

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

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

Tolerance ≤ 1.5%

Signature: R Paul

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

KAForms: Post Test Thermocouple Calibration
jhm,07/30/01

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION
MAY 5-6, 2003

KA70 RO/UMB		ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	KA70 RO/UMB	
KA1/100'	STACK	31	32	78	77	211	210	421	420	KA1/100'	STACK
	BOX	33	33	77	77	210	210	421	420		BOX
	IMP	32	33	77	78	210	209	420	421		IMP
KA2/200'	STACK	32	33	78	77	210	209	414	415	KA2/200'	STACK
	BOX	31	33	78	77	210	209	417	416		BOX
	IMP	32	32	77	77	211	210	419	418		IMP
KA3/25'	STACK	33	33	77	78	211	210	413	412	KA3/25'	STACK
SWBXKA3	BOX	32	33	78	78	212	211	410	411		BOX
	IMP	34	33	78	77	210	211	410	411		IMP
KA4/25'	STACK	33	32	77	78	212	213	412	413	KA4/25'	STACK
SWBXKA3	BOX	32	33	78	77	211	211	413	413		BOX
	IMP	32	33	77	78	212	212	413	414		IMP
KAK/200K	STACK	32	33	78	78	209	211	417	418	KAK/200K	STACK
KAK-38	BOX	32	32	78	78	210	211	418	419	KAK-38	BOX
SWBXKAK1	IMP	31	32	78	78	212	212	420	419		IMP
KA1/200'	STACK	31	32	77	77	211	210	423	422	KA1/200'	STACK
	BOX	31	32	77	77	209	210	421	420		BOX
	IMP	33	32	77	78	210	211	420	420		IMP
KA2/100'	STACK	33	33	77	78	208	209	420	419	KA2/100'	STACK
	BOX	31	32	78	77	210	211	420	421		BOX
	IMP	32	33	78	78	210	210	422	421		IMP

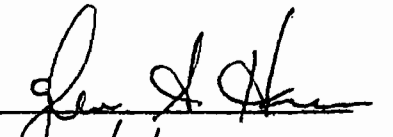
Signature Glen H. Koogler

Date 5/6/03

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION
MAY 5-6, 2003

THERMOCOUPLE #	ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	THERMOCOUPLE #
KA-06	32	32	77	78	211	210	420	419	KA-06
KA-07	32	33	78	77	212	211	420	421	KA-07
KA-08	34	33	77	78	209	210	423	422	KA-08
KA-09	33	33	77	78	212	211	420	419	KA-09
KA-10	33	32	78	77	212	212	417	418	KA-10
KA-11	35	34	78	78	209	209	415	416	KA-11
KA-12	34	34	79	78	211	210	419	418	KA-12
KA-38	33	33	79	78	212	211	422	422	KA-38
KA-39	33	32	78	77	209	210	420	421	KA-39
KA-50	31	32	77	77	210	211	420	420	KA-50
KA-64	33	34	77	78	213	212	414	415	KA-64
KA-70	35	34	77	78	210	209	416	417	KA-70
KA-71	34	33	78	78	212	211	418	418	KA-71
KA-72	31	32	76	77	211	210	421	421	KA-72
KA-105	31	32	77	78	210	210	421	420	KA-105
KA-108	33	33	76	77	212	211	422	423	KA-108
KA-115	33	33	77	77	211	212	421	422	KA-115
KA-126	31	32	77	78	211	210	424	423	KA-126

THERMOCOUPLE #	ICE (F)	ASTM (F)	AMB. (F)	ASTM (F)	212 (F)	ASTM (F)	400 (F)	ASTM (F)	THERMOCOUPLE #
KAK-08	32	32	77	77	210	210	420	419	KAK-08
KAK-09	32	31	78	78	212	211	418	418	KAK-09
KAK-10	31	32	76	77	211	210	420	421	KAK-10
KAK-11	33	33	78	77	211	212	424	423	KAK-11
KAK-12	32	33	77	78	211	210	423	422	KAK-12
KAK-38	34	33	78	77	210	209	420	420	KAK-38
KAK-65	33	32	76	77	209	208	417	418	KAK-65
KAK-72	32	31	77	77	211	211	415	416	KAK-72
KAK-110	34	33	79	78	211	210	421	422	KAK-110
KAK-07	32	32	78	77	212	211	421	421	KAK-07

Signature 

Date 5/6/03

KOOGLER & ASSOCIATES, ENVIRONMENTAL SERVICES
ANNUAL THERMOCOUPLE CALIBRATION
MAY 5-6, 2003

Range (C)	Measured Voltage (mV)	Measured Voltage (V)	Calc. Temp. (C)	Readout Temp. (C)	Percent Difference (%)
KAK-12	33.0	0.033	793	796	-0.3453
	41.0	0.041	993	989	0.4131
KAK-38	32.5	0.033	781	784	-0.3728
	41.4	0.041	1003	999	0.4346
KAK-72	32.8	0.033	788	790	-0.2045
	41.1	0.041	996	993	0.2676
KAK-65	32.1	0.032	771	769	0.3079
	40.9	0.041	991	995	-0.4500
KA-110	32.7	0.033	786	788	-0.2605
	40.5	0.041	980	981	-0.0695

EQUATIONS :

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

Where :

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

Signature Jeff A. Haun

Date 5/6/03

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: RINKER - MIAMI, FL.
SOURCE: CEMENT KILN
DATE: 8/9/04
PRETEST Y: 0.988

METER SERIAL #: KA6
CRITICAL ORIFICE SERIAL #: 1376

BAROMETRIC PRESSURE (in Hg):	INITIAL	FINAL	AVG (P_{bar})
	30.08	30.08	30.08

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 AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	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	828.500	836.169	7.669	75	62	63	76	77	70	10.0	1.9	7.73	7.59	0.983	1.854
2	22	0.5836	18	836.169	843.075	6.906	75	63	63	77	77	70	9.0	1.9	6.95	6.83	0.983	1.854
3	22	0.5836	18	843.075	850.748	7.673	75	63	63	77	78	70	10.0	1.9	7.72	7.59	0.984	1.854
																AVG =	0.983	

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

(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

AVERAGE DRY GAS METER CALIBRATION FACTOR, Y =	0.983
AVERAGE DELTA Y=	-0.005
DELTA Y LIMIT =	0.05
IS TEST WITHIN 5%?	YES

METHOD 5 DRY GAS METER CALIBRATION USING CRITICAL ORIFICES

ENVIRONMENTAL SUPPLY COMPANY

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: May 24, 2004 | METER SERIAL #: KA-6 | BAROMETRIC PRESSURE (in Hg): INITIAL 30.05, FINAL 30.05, AVG (P_{bar}) 30.05

METER PART #: KA-6 | CRITICAL ORIFICE SET SERIAL #: 1376

IF Y VARIATION EXCEEDS 2.00%, ORIFICE SHOULD BE RECALIBRATED

ORIFICE #	RUN #	K' FACTOR (AVG)	TESTED VACUUM (in Hg)	DGM READINGS (FT^3) INITIAL	DGM READINGS (FT^3) FINAL	DGM READINGS (FT^3) NET (V_m)	TEMPERATURES °F AMBIENT	DGM INLET INITIAL	DGM INLET FINAL	DGM OUTLET INITIAL	DGM OUTLET FINAL	DGM AVG	ELAPSED TIME (MIN) θ	DGM ΔH ($in H_2O$)	(1) V_m (STD)	(2) V_{cr} (STD)	(3) Y	Y VARIATION (%)	$\Delta H_@$
22	1	0.5836	20	978.714	985.870	7.156	74	81	81	81	81	81	8.30	1.7	7.0448	7.0599	1.002		1.63
	2	0.5836	20	985.870	992.478	6.608	74	81	82	81	82	81.5	8.30	1.7	6.4883	6.4526	0.994		1.63
	3	0.5836	20	992.414	1,000.973	8.559	76	82	83	82	83	82.5	11.00	1.7	8.4827	8.3426	0.983		1.61
																AVG =	0.996	0.02	
17	1	0.4595	18	1,000.973	1,006.413	5.440	74	83	83	83	83	83	9.00	1.05	5.3279	5.2740	0.990		1.65
	2	0.4595	18	6.413	12.780	6.367	72	82	83	82	83	82.5	10.50	1.03	6.2408	6.1945	0.993		1.65
	3	0.4595	18	19.171	26.857	5.486	72	83	84	83	84	83.5	14.00	1.01	5.3821	5.2194	0.980		1.64
																AVG =	0.988	0.15	
12	1	0.316	18	26.857	36.547	9.690	71	83	83	83	83	83	23.00	0.46	9.5716	9.4807	0.988		1.55
	2	0.316	18	36.547	42.796	6.249	72	83	83	83	83	83	14.50	0.48	6.1119	5.9713	0.977		1.54
	3	0.316	18	42.796	47.968	5.172	72	83	83	83	83	83	12.00	0.45	5.0575	4.9418	0.977		1.56
																AVG =	0.978	-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 = 0.988

AVERAGE $\Delta H_@$ = 1.61

(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

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

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

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

= 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

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

Process Data

				AAGLOGS Kiln												Raw Mill	
	0.6003		461-KL1_ONTIME		431-RW1-FZ1		481-RW1-FZ1	481-BU1-FZ1	451-RW1-FZ1	461-2K1-AZ3	461-2K1-AZ1	461-2K1-AZ2	441-2K1-AZ3	441-2K1-AZ1	441-2K1-AZ2	421-BF1-TZ4	421-BF1-TZ5
			kiln run time	Kiln run Hours	kiln feed flow rate	Clinker Rate	pulv. coal to kiln	oil to kiln	pulv. coal to calciner	kiln O2	kiln CO	kiln NO	pre heater O2	pre heater CO	pre heater NO	MAIN BAGHOUSE INLET TEMPERATURE MIXING	MAIN BAGHOUSE INLET TEMPERATURE MIXING
4-Aug-04	0:00:00	1:00:00	13739.7	1.0	250.6	150.4	6.6	0.0	8.8	1.2	312.1	633.4	5.0	717.4	325.2	255.0	235.8
4-Aug-04	1:00:00	2:00:00	13740.7	1.0	250.4	150.3	6.6	0.0	8.9	1.0	279.6	551.4	3.8	779.2	349.9	263.1	241.2
4-Aug-04	2:00:00	3:00:00	13741.7	1.0	250.4	150.3	6.5	0.0	9.0	0.8	458.8	507.5	3.3	801.1	357.0	303.2	289.2
4-Aug-04	3:00:00	4:00:00	13742.7	1.0	250.4	150.3	6.6	0.0	9.1	1.7	162.8	621.4	3.5	740.6	380.8	248.4	233.7
4-Aug-04	4:00:00	5:00:00	13743.6	1.0	250.4	150.3	6.7	0.2	9.0	1.2	164.7	802.7	3.5	740.5	398.4	254.9	236.3
4-Aug-04	5:00:00	6:00:00	13744.6	1.0	250.4	150.3	6.6	0.0	9.6	1.2	159.0	1877.7	3.0	693.6	543.1	268.4	243.7
4-Aug-04	6:00:00	7:00:00	13745.6	1.0	250.5	150.4	6.4	0.1	9.9	1.8	156.2	2015.8	2.9	684.6	573.4	283.5	252.2
4-Aug-04	7:00:00	8:00:00	13746.6	1.0	248.3	149.0	6.5	0.2	9.9	1.4	158.7	1924.3	2.7	702.6	548.4	290.3	254.7
4-Aug-04	8:00:00	9:00:00	13747.6	1.0	245.6	147.4	6.6	0.1	9.9	0.8	175.6	1858.5	2.7	695.0	525.5	295.6	254.5
4-Aug-04	9:00:00	10:00:00	13748.6	1.0	245.6	147.4	6.5	0.0	9.8	0.3	241.7	1360.2	2.6	738.6	466.2	295.9	253.9
4-Aug-04	10:00:00	11:00:00	13749.6	1.0	245.6	147.4	6.4	0.1	9.7	0.2	308.6	1385.7	2.6	721.0	472.6	298.4	256.1
4-Aug-04	11:00:00	12:00:00	13750.6	1.0	245.6	147.4	6.2	0.2	9.7	0.2	359.7	1542.7	2.3	787.9	473.6	328.9	288.8
4-Aug-04	12:00:00	13:00:00	13751.6	1.0	245.5	147.4	6.1	0.4	9.7	0.8	163.7	1940.2	2.7	718.7	513.7	404.2	328.8
4-Aug-04	13:00:00	14:00:00	13752.6	1.0	245.5	147.4	6.2	0.4	9.7	0.5	210.5	1753.5	2.8	758.6	499.4	382.4	368.5
4-Aug-04	14:00:00	15:00:00	13753.6	1.0	245.6	147.4	6.3	0.4	9.5	0.2	218.2	1670.4	2.3	818.9	476.5	337.1	263.0
4-Aug-04	15:00:00	16:00:00	13754.6	1.0	245.6	147.4	6.3	0.5	9.5	0.0	354.1	1124.3	2.3	831.4	452.5	358.4	273.4
4-Aug-04	16:00:00	17:00:00	13755.6	1.0	245.6	147.4	6.4	0.4	9.5	0.1	309.9	1288.1	2.3	866.9	438.6	367.9	273.1
4-Aug-04	17:00:00	18:00:00	13756.6	1.0	245.6	147.4	6.4	0.5	9.3	0.1	225.3	1424.7	2.4	814.9	457.5	378.3	278.7
4-Aug-04	18:00:00	19:00:00	13757.6	1.0	245.6	147.4	6.4	0.4	9.6	1.6	183.4	1551.6	2.9	706.8	489.1	264.2	239.6
4-Aug-04	19:00:00	20:00:00	13758.6	1.0	245.2	147.2	6.3	0.3	9.5	2.7	163.5	1455.4	2.9	681.6	491.2	263.1	239.7
4-Aug-04	20:00:00	21:00:00	13759.6	1.0	250.6	150.5	6.4	0.2	9.7	2.9	163.2	1355.2	2.7	733.6	480.3	272.9	248.2
4-Aug-04	21:00:00	22:00:00	13760.6	1.0	250.6	150.4	6.5	0.2	9.6	4.6	229.7	1238.6	2.6	773.5	459.4	310.1	287.0
4-Aug-04	22:00:00	23:00:00	13761.6	1.0	250.6	150.4	6.5	0.2	9.6	1.0	403.9	1514.3	2.6	819.5	449.2	351.2	353.9
4-Aug-04	23:00:00	0:00:00	13762.6	1.0	250.6	150.4	6.4	0.0	9.6	1.0	321.5	1542.2	2.7	771.5	456.6	253.9	236.9
5-Aug-04	0:00:00	1:00:00	13763.6	1.0	250.5	150.4	6.4	0.1	9.8	1.1	285.8	1449.1	2.7	778.5	451.8	259.8	240.4
5-Aug-04	1:00:00	2:00:00	13764.6	1.0	250.6	150.4	6.4	0.0	9.8	0.8	352.5	1306.1	2.7	790.4	437.4	262.1	239.0
5-Aug-04	2:00:00	3:00:00	13765.6	1.0	250.5	150.4	6.4	0.0	9.6	0.7	406.8	1260.8	2.8	775.8	434.1	264.7	241.4
5-Aug-04	3:00:00	4:00:00	13766.6	1.0	250.5	150.4	6.4	0.1	9.5	0.8	276.5	1317.7	2.9	753.8	445.5	267.1	245.2
5-Aug-04	4:00:00	5:00:00	13767.6	1.0	250.6	150.4	6.4	0.1	9.4	1.0	270.5	1198.7	2.9	782.4	422.2	342.0	331.9
5-Aug-04	5:00:00	6:00:00	13768.6	1.0	250.6	150.4	6.4	0.1	9.4	0.9	478.4	1025.0	3.0	800.6	413.9	331.2	330.4
5-Aug-04	6:00:00	7:00:00	13769.5	1.0	250.6	150.5	6.3	0.0	9.6	1.3	262.7	1059.3	3.1	756.8	427.9	290.4	280.3
5-Aug-04	7:00:00	8:00:00	13770.5	1.0	248.2	149.0	6.3	0.1	9.5	1.4	371.7	910.2	3.1	764.2	402.8	427.6	432.3
5-Aug-04	8:00:00	9:00:00	13771.5	1.0	245.6	147.4	6.3	0.1	9.2	0.8	458.3	1145.4	3.1	727.9	428.0	510.1	517.0
5-Aug-04	9:00:00	10:00:00	13772.5	1.0	245.6	147.4	6.2	0.1	9.6	0.6	392.0	1385.1	2.8	745.6	442.8	508.5	515.5
5-Aug-04	10:00:00	11:00:00	13773.5	1.0	245.6	147.4	6.2	0.1	9.4	0.5	409.6	1508.9	2.8	753.5	447.1	508.7	515.4
5-Aug-04	11:00:00	12:00:00	13774.5	0.2	165.3	99.2	1.5	0.1	2.3	14.1	161.3	410.7	14.6	421.4	151.9	512.1	516.9
5-Aug-04	12:00:00	13:00:00	13774.8	0.5	124.0	74.4	0.0	13.5	2.9	6.3	1134.3	484.5	9.9	396.1	238.3	437.0	437.5
5-Aug-04	13:00:00	14:00:00	13775.3	1.0	222.8	133.7	2.6	14.4	8.8	1.6	372.7	1659.2	2.8	845.9	469.8	453.9	459.9
5-Aug-04	14:00:00	15:00:00	13776.3	1.0	245.6	147.4	6.3	1.6	9.1	1.2	290.3	1255.3	2.4	885.9	457.9	498.4	505.2

			0.6003	461-KL1_ONTIME		431-RW1-FZ1		481-RW1-FZ1	481-BU1-FZ1	451-RW1-FZ1	451-2K1-AZ3	461-2K1-AZ1	461-2K1-AZ2	441-2K1-AZ3	441-2K1-AZ1	441-2K1-AZ2	421-BF1-TZ4	421-BF1-TZ5
				kiln run time	Kiln run Hours	kiln feed flow rate	Clinker Rate	pulv. coal to kiln	oil to kiln	pulv. coal to calciner	kiln O2	kiln CO	kiln NO	pre heater O2	pre heater CO	pre heater NO	MAIN BAGHOUSE INLET TEMPERATURE	MAIN BAGHOUSE INLET TEMPERATURE
5-Aug-04	15:00:00	16:00:00		13777.3	1.0	245.6	147.4	6.5	0.3	9.3	3.3	159.3	1420.8	3.0	720.8	528.7	505.5	512.3
5-Aug-04	16:00:00	17:00:00		13778.3	0.7	245.6	147.4	4.4	0.0	6.4	6.9	129.2	1191.5	7.4	708.8	382.3	506.0	513.0
5-Aug-04	17:00:00	18:00:00		13779.0	0.8	174.4	104.7	0.3	17.0	5.7	5.7	300.3	1273.2	8.7	521.7	323.0	473.1	475.7
5-Aug-04	18:00:00	19:00:00		13779.8	1.0	239.3	143.7	6.1	0.4	9.6	3.8	160.7	1911.5	2.8	756.8	455.8	484.6	490.8
5-Aug-04	19:00:00	20:00:00		13780.8	1.0	245.6	147.4	6.2	0.1	9.1	4.4	156.9	1639.7	3.1	751.9	478.0	505.0	510.7
5-Aug-04	20:00:00	21:00:00		13781.8	1.0	237.4	142.5	6.2	0.0	8.8	4.5	157.0	1709.5	3.4	691.6	494.1	385.9	402.2
5-Aug-04	21:00:00	22:00:00		13782.8	1.0	235.6	141.4	6.2	0.0	8.9	5.0	153.4	1782.3	3.9	614.2	499.5	236.9	225.9
5-Aug-04	22:00:00	23:00:00		13783.7	1.0	235.6	141.4	6.2	0.1	8.7	4.3	154.8	1805.2	3.7	613.7	530.7	243.3	230.3
5-Aug-04	23:00:00	0:00:00		13784.7	1.0	235.6	141.4	6.2	0.0	8.7	3.5	158.9	1698.5	3.6	616.5	552.6	247.8	233.8
6-Aug-04	0:00:00	1:00:00		13785.7	1.0	235.6	141.4	6.2	0.0	8.7	3.9	157.3	1567.0	3.6	625.5	518.7	242.1	228.8
6-Aug-04	1:00:00	2:00:00		13786.7	1.0	235.6	141.4	6.3	0.0	8.5	3.2	161.7	1169.1	3.4	670.7	452.2	243.3	229.7
6-Aug-04	2:00:00	3:00:00		13787.7	1.0	235.6	141.4	6.4	0.0	8.5	2.2	175.7	1151.8	3.5	677.7	457.2	249.6	232.7
6-Aug-04	3:00:00	4:00:00		13788.7	1.0	235.6	141.4	6.4	0.0	8.6	2.2	176.6	1208.3	3.5	680.4	459.6	249.2	232.0
6-Aug-04	4:00:00	5:00:00		13789.7	1.0	218.1	130.9	6.2	0.0	7.7	3.2	163.3	1046.7	4.3	641.1	437.9	254.2	235.4
6-Aug-04	5:00:00	6:00:00		13790.7	1.0	205.1	123.1	6.0	0.1	7.7	3.0	168.3	1123.9	4.0	621.7	424.4	261.5	276.0
6-Aug-04	6:00:00	7:00:00		13791.7	0.0	125.2	75.1	0.1	4.4	0.2	3.8	3488.3	216.6	9.7	194.2	89.4	337.2	342.3
6-Aug-04	7:00:00	8:00:00		13791.7	0.0	151.4	90.9	0.0	4.4	0.0	3.1	822.8	439.1	8.1	156.2	271.1	289.5	295.1
6-Aug-04	8:00:00	9:00:00		13791.7	0.9	131.6	79.0	0.0	21.0	5.2	4.1	153.7	1443.4	5.4	547.8	488.8	358.0	372.2
6-Aug-04	9:00:00	10:00:00		13792.7	1.0	234.8	140.9	3.5	10.9	9.3	2.1	469.0	2216.5	2.2	1131.7	492.6	394.2	415.0
6-Aug-04	10:00:00	11:00:00		13793.7	1.0	244.4	146.7	6.5	0.3	8.8	2.3	324.6	1800.7	3.0	756.6	517.3	248.0	237.7
6-Aug-04	11:00:00	12:00:00		13794.7	1.0	244.4	146.7	6.5	0.2	9.2	2.5	213.8	2014.2	3.2	702.2	527.9	241.5	228.2
6-Aug-04	12:00:00	13:00:00		13795.7	1.0	245.5	147.4	6.5	0.2	9.4	1.9	181.1	1837.7	3.0	760.8	504.4	264.0	243.4
6-Aug-04	13:00:00	14:00:00		13796.7	1.0	245.4	147.3	6.5	0.2	9.6	1.8	194.9	1800.6	3.1	739.9	508.3	266.2	245.1
6-Aug-04	14:00:00	15:00:00		13797.7	1.0	245.3	147.3	6.3	0.2	10.0	2.4	181.3	1763.7	3.2	658.7	533.7	270.1	246.4
6-Aug-04	15:00:00	16:00:00		13798.6	1.0	245.4	147.3	6.3	0.3	10.0	2.5	170.1	1877.0	3.4	627.0	557.2	261.3	241.2
6-Aug-04	16:00:00	17:00:00		13799.6	1.0	245.4	147.3	6.3	0.3	9.9	3.1	174.6	1723.5	3.3	662.2	545.6	254.9	236.2
6-Aug-04	17:00:00	18:00:00		13800.6	1.0	245.4	147.3	6.3	0.3	9.8	2.6	171.7	1723.5	3.3	647.9	541.1	254.4	235.8
6-Aug-04	18:00:00	19:00:00		13801.6	1.0	245.5	147.3	6.3	0.3	9.9	2.2	165.8	1725.8	3.1	686.3	525.5	262.1	239.1
6-Aug-04	19:00:00	20:00:00		13802.6	1.0	245.4	147.3	6.3	0.2	9.7	2.2	163.3	1707.8	3.2	702.5	525.7	268.8	244.5
6-Aug-04	20:00:00	21:00:00		13803.6	1.0	245.5	147.3	6.3	0.1	9.9	2.6	162.8	1641.0	3.3	661.1	535.3	264.9	242.2
6-Aug-04	21:00:00	22:00:00		13804.6	1.0	245.6	147.4	6.2	0.0	9.9	1.7	188.2	1856.1	3.1	675.9	535.6	260.5	237.4
6-Aug-04	22:00:00	23:00:00		13805.6	1.0	245.6	147.4	6.2	0.0	9.9	2.1	161.5	1913.0	3.3	644.1	552.2	261.7	238.4
6-Aug-04	23:00:00	0:00:00		13806.6	1.0	245.6	147.4	6.2	0.0	10.0	1.7	162.6	1910.8	3.1	673.5	540.7	258.4	237.1
7-Aug-04	0:00:00	1:00:00		13807.6	1.0	245.6	147.4	6.2	0.0	9.9	2.2	161.2	1839.7	3.0	671.1	520.7	344.4	334.6
7-Aug-04	1:00:00	2:00:00		13808.6	1.0	245.6	147.4	6.2	0.1	9.7	3.2	160.2	1714.9	3.0	704.2	512.6	370.9	375.3
7-Aug-04	2:00:00	3:00:00		13809.6	1.0	245.6	147.4	6.4	0.1	9.4	8.9	110.0	1196.1	3.2	680.2	542.3	259.8	248.6
7-Aug-04	3:00:00	4:00:00		13810.6	1.0	245.6	147.4	6.5	0.0	9.6	20.5	-4.2	-4.2	3.1	710.9	540.8	252.2	234.1
7-Aug-04	4:00:00	5:00:00		13811.6	1.0	245.6	147.4	6.5	0.0	9.4	20.5	-4.0	0.4	3.1	720.1	516.6	246.0	230.4
7-Aug-04	5:00:00	6:00:00		13812.6	1.0	245.6	147.4	6.5	0.0	9.1	20.5	-4.0	-3.9	3.3	721.4	489.7	235.1	224.2
7-Aug-04	6:00:00	7:00:00		13813.6	1.0	245.6	147.4	6.6	0.0	9.1	20.5	-4.0	-4.0	3.3	693.4	484.8	239.2	225.6
7-Aug-04	7:00:00	8:00:00		13814.6	1.0	245.5	147.4	6.6	0.0	9.0	10.4	107.6	884.7	2.9	772.8	480.3	277.4	240.8
7-Aug-04	8:00:00	9:00:00		13815.6	1.0	245.5	147.4	6.6	0.0	9.0	1.3	209.7	1298.9	2.5	988.6	432.6	348.5	263.7
7-Aug-04	9:00:00	10:00:00		13816.6	1.0	245.6	147.4	6.5	0.1	8.9	1.0	255.8	933.1	2.5	1090.2	373.3	360.1	261.9
7-Aug-04	10:00:00	11:00:00		13817.6	1.0	245.6	147.4	6.4	0.1	9.2	1.0	249.8	1298.2	2.5	924.3	424.5	366.8	282.0

			0.6003		451-KL1_CNTRSE		431-RW1-FZ1		451-RW1-FZ1	451-BU1-FZ1	451-RW1-FZ1	451-2K1-AZ3	451-2K1-AZ1	451-2K1-AZ2	441-2K1-AZ3	451-2K1-AZ1	451-2K1-AZ2	421-SF1-TZ4	421-SF1-TZ5
					kiln run time	Kiln run Hours	kiln feed flow rate	Clinker Rate	pulv. coal to kiln	oil to kiln	pulv. coal to calciner	kiln O2	kiln CO	kiln NO	pre heater O2	pre heater CO	pre heater NO	MAIN BAGHOUSE INLET TEMPERATURE RXING	MAIN BAGHOUSE INLET TEMPERATURE RXING
7-Aug-04	11:00:00	12:00:00		13818.6	1.0	245.6	147.4	6.3	0.1	9.6	2.1	173.2	1550.3	2.6	808.0	458.2	381.3	306.2
7-Aug-04	12:00:00	13:00:00		13819.6	1.0	245.6	147.4	6.3	0.1	9.4	3.1	172.6	1464.6	2.7	825.9	445.2	319.3	248.6
7-Aug-04	13:00:00	14:00:00		13820.6	1.0	245.6	147.4	6.3	0.1	9.0	3.1	196.8	1439.1	3.2	716.4	445.1	305.3	254.5
7-Aug-04	14:00:00	15:00:00		13821.6	1.0	245.6	147.4	6.3	0.1	9.2	12.1	125.4	501.4	3.0	797.1	410.2	350.9	258.4
7-Aug-04	15:00:00	16:00:00		13822.6	1.0	245.6	147.4	6.3	0.1	9.6	2.9	194.4	1335.9	3.3	715.0	452.8	423.9	408.9
7-Aug-04	16:00:00	17:00:00		13823.6	1.0	245.6	147.4	6.3	0.0	9.2	2.1	232.7	1224.2	2.7	867.3	405.3	357.4	288.1
7-Aug-04	17:00:00	18:00:00		13824.5	1.0	237.8	142.8	6.3	0.0	8.9	3.0	242.9	732.5	3.3	778.9	383.3	355.5	267.4
7-Aug-04	18:00:00	19:00:00		13825.5	1.0	205.6	123.4	6.1	0.0	7.9	20.0	0.4	18.4	3.3	621.1	367.4	239.6	225.4
7-Aug-04	19:00:00	20:00:00		13826.5	1.0	205.6	123.4	6.0	0.0	7.6	20.6	-4.6	-4.6	3.3	609.9	377.4	247.4	228.7
7-Aug-04	20:00:00	21:00:00		13827.5	1.0	205.6	123.4	6.1	0.0	7.5	20.7	-4.3	-3.5	3.5	583.5	388.1	247.2	227.6
7-Aug-04	21:00:00	22:00:00		13828.5	1.0	205.6	123.4	6.1	0.0	7.5	6.9	159.4	1328.7	3.7	554.5	432.6	245.3	225.6
7-Aug-04	22:00:00	23:00:00		13829.5	1.0	205.6	123.4	6.0	0.1	7.7	1.1	254.9	1839.8	3.7	545.6	447.1	257.8	234.9
7-Aug-04	23:00:00	0:00:00		13830.5	1.0	205.6	123.4	6.0	0.2	7.7	1.9	288.6	1402.5	4.2	532.4	408.5	256.3	234.0
8-Aug-04	0:00:00	1:00:00		13831.5	1.0	205.6	123.4	6.0	0.3	7.7	2.8	162.7	1389.9	4.1	518.5	417.1	249.9	227.7
8-Aug-04	1:00:00	2:00:00		13832.5	1.0	205.6	123.4	6.0	0.2	7.9	1.6	182.2	1403.0	4.2	532.1	400.2	251.4	228.7
8-Aug-04	2:00:00	3:00:00		13833.5	1.0	205.6	123.4	6.0	0.2	7.8	3.4	160.4	1864.6	4.2	483.5	501.1	262.3	242.0
8-Aug-04	3:00:00	4:00:00		13834.5	1.0	205.6	123.4	5.9	0.2	7.9	3.2	155.5	2508.4	4.1	478.7	557.6	257.4	235.2
8-Aug-04	4:00:00	5:00:00		13835.5	1.0	205.6	123.4	5.9	0.2	8.3	3.0	155.2	2529.0	4.0	486.9	549.6	264.8	243.5
8-Aug-04	5:00:00	6:00:00		13836.5	1.0	208.6	125.2	5.9	0.2	8.5	2.5	156.6	2438.8	3.5	517.2	522.2	267.6	245.5
8-Aug-04	6:00:00	7:00:00		13837.5	1.0	224.9	135.0	6.3	0.2	9.0	2.5	166.8	2341.3	4.1	565.3	490.6	270.0	248.6
8-Aug-04	7:00:00	8:00:00		13838.5	1.0	242.0	145.3	6.5	0.2	9.4	3.2	161.0	2140.6	3.3	680.5	483.6	462.6	464.8
8-Aug-04	8:00:00	9:00:00		13839.5	1.0	245.6	147.4	6.5	0.2	9.5	2.6	166.7	1778.7	3.2	771.9	437.7	511.4	516.0
8-Aug-04	9:00:00	10:00:00		13840.5	1.0	245.6	147.4	6.5	0.2	9.5	2.1	183.6	1359.7	3.3	832.0	387.9	510.3	514.9
8-Aug-04	10:00:00	11:00:00		13841.5	1.0	245.6	147.4	6.6	0.3	9.4	1.9	170.2	1176.6	3.5	791.6	380.5	514.3	518.8
8-Aug-04	11:00:00	12:00:00		13842.5	1.0	237.0	142.3	6.6	0.3	8.9	2.4	158.6	1250.2	5.5	601.1	370.3	434.8	451.7
8-Aug-04	12:00:00	13:00:00		13843.5	1.0	235.6	141.4	6.6	0.3	8.7	2.2	171.1	955.7	6.3	591.1	333.9	293.8	289.9
8-Aug-04	13:00:00	14:00:00		13844.5	1.0	235.6	141.4	6.6	0.3	8.5	1.9	169.7	829.3	6.5	582.0	308.4	244.5	228.6
8-Aug-04	14:00:00	15:00:00		13845.5	1.0	235.6	141.4	6.6	0.2	8.3	1.7	172.2	763.8	6.8	581.6	291.0	242.6	227.1
8-Aug-04	15:00:00	16:00:00		13846.5	1.0	235.6	141.4	6.6	0.2	8.4	2.1	164.6	748.0	6.7	591.4	291.2	250.5	231.1
8-Aug-04	16:00:00	17:00:00		13847.5	1.0	235.6	141.4	6.7	0.3	8.4	1.4	198.6	561.1	6.8	604.0	283.2	262.2	238.0
8-Aug-04	17:00:00	18:00:00		13848.5	1.0	235.6	141.4	6.7	0.3	8.3	1.1	1135.8	489.6	6.6	600.6	273.1	265.6	241.1
8-Aug-04	18:00:00	19:00:00		13849.5	1.0	235.6	141.4	6.7	0.3	7.9	5.4	2697.8	212.6	7.0	581.6	266.2	260.4	236.9
8-Aug-04	19:00:00	20:00:00		13850.5	1.0	235.6	141.4	6.7	0.3	8.1	2.2	163.8	857.5	6.9	571.6	290.3	241.4	226.0
8-Aug-04	20:00:00	21:00:00		13851.4	1.0	228.8	136.1	6.9	0.3	7.7	1.9	185.2	856.0	7.5	520.9	304.7	245.3	227.9
8-Aug-04	21:00:00	22:00:00		13852.4	1.0	225.5	135.4	6.9	0.3	7.8	2.3	172.1	1785.3	7.8	465.9	398.9	256.3	235.7
8-Aug-04	22:00:00	23:00:00		13853.4	1.0	225.5	135.4	6.9	0.2	7.8	1.7	209.8	2136.8	8.0	453.9	427.3	262.4	239.3
8-Aug-04	23:00:00	0:00:00		13854.4	-13854.4	225.5	135.3	6.7	0.1	8.4	1.2	302.4	1983.4	7.6	465.7	400.9	275.9	245.8

GEOCHEMICAL TESTING
Environmental and Energy Analysis

Mike Miller
2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/04/2004

Analyzed on: 08/13/2004

Description: Coal Sample 10:00

LAB NO. 04-069547

	As Received	Dry	Dry Ash-Free
Total Moisture...D2961-02..	1.43		
Ash.....D3174-02..	17.30	17.55	
Sulfur.....D4239-02..	1.09	1.11	
BTU/LB.....D5865-03..	12330	12509	15172
Free Swelling Index D720-91	7.5		
Lbs Sulfur/Million Btu	0.88		
Nitrogen.....D5373....	1.34	1.36	1.65
Mercury.....ASTM D3684-01		.173 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/04/2004

Analyzed on: 08/13/2004

Description: Coal Sample 14:00

LAB NO. 04-069548

	As Received	Dry	Dry Ash-Free
Total Moisture...D2961-02..	1.33		
Ash.....D3174-02..	17.21	17.44	
Sulfur.....D4239-02..	1.11	1.12	
BTU/LB.....D5865-03..	12414	12581	15239
Free Swelling Index D720-91	7.5		
Lbs Sulfur/Million Btu	0.89		
Nitrogen.....D5373....	1.31	1.33	1.61
Mercury.....ASTM D3684-01		.181 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/05/2004

Analyzed on: 08/13/2004

Description: Coal Sample 10:00

LAB NO. 04-069549

	As Received	Dry	Dry Ash-Free
Total Moisture...D2961-02..	1.36		
Ash.....D3174-02..	17.69	17.93	
Sulfur.....D4239-02..	1.11	1.13	
BTU/LB.....D5865-03..	12318	12488	15216
Free Swelling Index D720-91	7.5		
Lbs Sulfur/Million Btu	0.90		
Nitrogen.....D5373....	1.29	1.31	1.59
Mercury.....ASTM D3684-01		.206 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/05/2004

Analyzed on: 08/13/2004

Description: Coal Sample 14:00

LAB NO. 04-069550

	As Received	Dry	Dry Ash-Free
Total Moisture...D2961-02..	1.45		
Ash.....D3174-02..	18.99	19.27	
Sulfur.....D4239-02..	1.08	1.10	
BTU/LB.....D5865-03..	11961	12137	15034
Free Swelling Index D720-91	7.0		
Lbs Sulfur/Million Btu	0.90		
Nitrogen.....D5373....	1.26	1.28	1.58
Mercury.....ASTM D3684-01		.257 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/06/2004

Analyzed on: 08/13/2004

Description: Coal Sample 14:00

LAB NO. 04-069551

		As Received	Dry	Dry Ash-Free
Total Moisture	D2961-02	1.52		
Ash	D3174-02	18.32	18.60	
Sulfur	D4239-02	1.11	1.13	
BTU/LB	D5865-03	12129	12316	15131
Free Swelling Index	D720-91	7.5		
Lbs Sulfur/Million Btu		0.92		
Nitrogen	D5373	1.27	1.29	1.58
Mercury	ASTM D3684-01		.241 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/07/2004

Analyzed on: 08/13/2004

Description: Coal Sample 06:00

LAB NO. 04-069552

	As Received	Dry	Dry Ash-Free
Total Moisture...D2961-02..	1.43		
Ash.....D3174-02..	18.18	18.44	
Sulfur.....D4239-02..	1.05	1.07	
BTU/LB.....D5865-03..	12188	12365	15161
Free Swelling Index D720-91	7.5		
Lbs Sulfur/Million Btu	0.86		
Nitrogen.....D5373....	1.32	1.34	1.64
Mercury.....ASTM D3684-01		.201 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/07/2004

Analyzed on: 08/13/2004

Description: Coal Sample 10:00

LAB NO. 04-069553

	As Received	Dry	Dry Ash-Free
Total Moisture...D2961-02..	1.55		
Ash.....D3174-02..	17.05	17.32	
Sulfur.....D4239-02..	1.09	1.11	
BTU/LB.....D5865-03..	12400	12595	15234
Free Swelling Index D720-91	7.5		
Lbs Sulfur/Million Btu	0.88		
Nitrogen.....D5373....	1.34	1.36	1.65
Mercury.....ASTM D3684-01		.255 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N Center Ave
Somerset PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

COAL ANALYSIS REPORT

Client: RINKER MATERIALS CORP

Sampled by: Oliver Sohn

Sampling Date: 08/07/2004

Analyzed on: 08/13/2004

Description: Coal Sample 14:00

LAB NO. 04-069554

	As Received	Dry	Dry Ash-Free
Total Moisture...D2961-02..	1.64		
Ash.....D3174-02..	16.18	16.45	
Sulfur.....D4239-02..	1.11	1.13	
BTU/LB.....D5865-03..	12551	12760	15272
Free Swelling Index D720-91	7.0		
Lbs Sulfur/Million Btu	0.88		
Nitrogen.....D5373....	1.32	1.34	1.61
Mercury.....ASTM D3684-01		.174 mg/kg, dry	

Robert L. Stull
Director of Coal Services

MEMBER ACIL

Project Participants

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES

PROJECT PARTICIPANTS

Koogler & Associates

John B. Koogler, Ph.D., P.E. . . . . Project Advisor
Steven Cloutier . . . . . Technical Manager
Glen Haven . . . . . Field Test Crew
Rodney Paul . . . . . Field Test Crew
Cory J Bell . . . . . Field Test Crew
Adam West . . . . . Field Test Crew
Eric Thomas . . . . . Field Test Crew

Rinker Materials Corporation

Michael Vardeman . . . . . Environmental Manager, Cement Division
Tom Stokes

KOOGLER & ASSOCIATES
ENVIRONMENTAL SERVICES