see NEDS data

#B-11|A-14#

(5)

PRINCETON CHEMICAL RES NC.

ROUTE 206 NORTH OF ROUTE

Cable:
"PRINCHEM"
Princeton, New Jersey 08540

P. O. Box 652
Princeton, New Jersey 08540
(609) 924-3035

AP-42 Section 11.17
Reference 14
Report Sect. 4
Reference 11

STACK SAMPLING REPORT

OF

OFFICIAL AIR POLLUTION EMISSION TESTS

CONDUCTED ON

KILN #2 SCRUBBER

AT

J. E. BAKER COMPANY

MILLERSVILLE, OHIO

3 runs on a coal-fired rotary kiln controlled by venturi.
PM-filt, PM-cond, SO_2.

$\frac{81.9 \text{ lb part/hr}}{11 \text{ ton product/hr}} = 7.4 \frac{\text{lb}}{\text{ton product}}$ (filterable) after venturi scrubber

Project No.: 254

Purchase Order No.: 84899-08

Test Date: April 30, 1975

Report Date: May 21, 1975

SUMMARY OF RESULTS

Test #	1	2	3	Avg.
Particulate, lb/hr				
Found	69.41	129.14	47.28	81.94
Allowable	34.46	34.46	34.46	34.46
Sulfur Oxides, as SO_2, ppmv				
Found	471	397	514	461
Allowable	2000	2000	2000	2000

The above data indicate that the scrubber stack from Kiln #2 is not in compliance with Ohio Air Pollution Regulation EP-11-11.

The stack is in compliance with Ohio Air Pollution Regulation EP-11-12 (Sulfur Dioxide).

PURPOSE

Princeton Chemical Research, Inc. was retained by the J. E. Baker Co. of York, Pa. to test the gas cleaning equipment (venturi scrubber) installed on Kiln #2 at their Millersville, Ohio plant. The purpose of these tests was to determine whether the sulfur oxide and particulate emissions from the kiln's normal operation is in compliance with the Ohio Air Pollution Regulations EP-11-11 and EP-11-12.

SCOPE

Three (3) particulate tests and three sulfur oxide tests were taken on the operating equipment. The particulate tests and the sulfur oxide tests were run simultaneously using the same sample traverse. The impinger liquids were set up for a sulfur oxide test as described in EPA Method No. 8. A four-inch Type A glass filter was placed in the heated section of the impinger box upstream of the impingers. This modification was approved by Mr. K. Cherry of the Northwest Office of OEPA.

The tests were drawn through the ports on the separator (outlet) stack. The sampling was isokinetic and in accordance with EPA Methods No. 5 and 8 (Federal Register, Vol. 36, No. 247, Part II, dated December 23, 1971). The analytical techniques are described in a separate section below.

A description of the sampling train is included below.

A copy of the operating log of J. E. Baker Company Kiln #2 is included with copies of the original data sheets in the Appendix to this report.

DISCUSSION

The unit being tested is an inclined rotary kiln fired with crushed coal. The process material is dolomite limestone and magnetite. The particulate emission from this operation is controlled by a venturi scrubber.

Mr. K. Cherry, of NW District Office of OEPA, was notified of our intent to test the unit. Mr. Cherry was also informed of our desire to do both particulates and sulfur oxides simultaneously. He approved this system, provided the liquid from each impinger be kept separate, analyzed and reported separately. This was done. On the day of testing, Mr. Cherry was on-site as an observer.

As requested by Mr. Cherry, the liquid catch was analyzed and the results are included in this report. These results are not included in the particulate weights reported.

Standard gravimetric analyses, as described below, were used to determine the weight of particulate matter collected in each sample.

The volumetric methods of EPA Method No. 8 were used to determine the oxides of sulfur present. The amounts of sulfuric acid, H_2SO_4, and sulfur trioxide, SO_3, found were converted to equivalent amounts of sulfur dioxide in the calculations.

VELOCITY TRAVERSE MEASUREMENTS

Date	4-30-75
Time	1125
Stack Designation	Kiln #2
Stack Dimensions:	
Circular Stack Diameter (inches)	84
Rectangular Stack Dimensions (inches)	--
Stack CSA ($ft.^2$)	38.465
Stack Temperature (°F)	181
DB/WB (°F)	181/181
Volume % H_2O	52
Specific Gravity	0.847
Barometric Pressure ("Hg)	29.22
Average Velocity (ft./min.)*	2365
Actual CFM @ Stack °F**	90,975
Standard CFM @ 70°F**	74,744
Dry SCFM @ 70°F	35,877

Orsat Analysis (% By Volume)

Carbon Dioxide	21.3
Oxygen	5.4
Carbon Monoxide	0.0
Nitrogen	73.3

* 16 Point Pitot Tube Traverse.
** Includes H_2O vapor.

Production rate on last page

STACK SAMPLING MEASUREMENTS - PARTICULATES AND SO_2

Run No.	1
Date	4-30-75
Time	1230

Sampling Data:

Probe Size (inches)	3/8
Sampling Period (minutes)	96
Number of Sampling Points (total)	16
Sample volume (ACF @ Stack)*	120.35
Sample volume (SCFD)**	95.84
% of Isokinetic rate	103.4
Barometric Pressure ("Hg)	29.22
Sampling Technique	EPA #5

Emissions Data:

	Allowable	
Particulates, lb/hr	34.46	69.41
Sulfur Dioxide, ppmv	2000	471
Particulates, wet catch, lb/hr		1.79

* Actual cubic feet @ stack temperature, pressure and humidity.
** Dry standard cubic feet (@ 70°F).

STACK SAMPLING MEASUREMENTS - PARTICULATES AND SO_2

Run No.	2
Date	4-30-75
Time	1500

Sampling Data:

Probe Size (inches)	3/8
Sampling Period (minutes)	96
Number of Sampling Points (total)	16
Sample volume (ACF @ Stack)*	112.08
Sample volume (SCFD)**	90.23
% of Isokinetic rate	96.0
Barometric Pressure ("Hg)	29.22
Sampling Technique	EPA #5

Emissions Data:	Allowable	
Particulates, lb/hr	34.46	129.14
Sulfur Dioxide, ppmv	2000	397
Particulates, wet catch, lb/hr		0.59

* Actual cubic feet @ stack temperature, pressure and humidity.
** Dry standard cubic feet (@ 70°F).

STACK SAMPLING MEASUREMENTS - PARTICULATES AND SO_2

Run No.			3
Date			4-30-75
Time			1755
Sampling Data:			
Probe Size (inches)			
Sampling Period (minutes)			
Number of Sampling Points			
Sample volume (ACF @ Stack			
Sample volume (SCFD)**			
% of Isokinetic rate			5.4
Barometric Pressure ("Hg)			29.22
Sampling Technique			EPA #5
Emissions Data:			
Particulates, lb/hr			47.28
Sulfur Dioxide, ppmv	2000		514
Particulates, wet catch, lb/hr			0.89

* Actual cubic feet @ stack temperature, pressure and humidity.
** Dry standard cubic feet (@ 70°F).

257	51	154	264	.2
257	16	150	264	25

OHIO KILN NO. 2 **DATE** 4-30-7[illegible]

Venturi DIFF	ID FAN AMPS	KILN AMPS	PRESS. Hood	PRESS. Feed	COOLER AIR FLOW	COOLER AIR LOCK	COOLER FAN PRESS.	COOLER FAN AMPS	BOWL MILL EXH. PRESS	#2 MILL AMPS / BOWL MILL AMPS	MILL DIFF. / BOWL MILL INLET PRESS	PRI. TEMP. / BOWL MILL INLET TEMP.	FAN TEMP. / BOWL MILL EXH. TEMP.	HOOD TEMP.	% OXYGEN	KING VALVE / % CON
					[illegible]	[illegible]	[illegible]									
7.8	280	135 150	.04	.5	0	5.7	1160		1.6	108		[illegible]	[illegible]		.7	[illegible]
8.2	280	135 180	+04	.4	0	5.8	1260		1.6	108		500	159		.11	[illegible]
8.0	[illegible]	135	+04	[illegible]	-02	5.9	1400		1.4	108		[illegible]	[illegible]		[illegible]	[illegible]
8.7	290	135 180	+04	.3	+02	6.6	1260		1.3	108		500	118		.9	[illegible]
8.2	280	135 180	+04	.3	+06	6.4	1220		1.3	108		525	180		.4	[illegible]
8.0	280	135 180	+04	.4	+08	6.4	1140		1.3	108		550	154		.7	[illegible]
9.8	280	135 180	+04	.4	0	6.0	1380		1.3	108		525	180		.7	[illegible]
9.9	280	135 180	+04	.7	0	6.2	1440		1.2	109		500	178		.5	[illegible]
8.0	280	135 180	+04	.4	+04	6.2	1400		1.4	108		550	156		.5	[illegible]
9.0	278	135 180	+04	.4	+08	6.2	1240		1.5	108		550	154		1.1	open
8.9	275	135 180	+03	.3	+06	6.2	1310		1.4	108		550	160		.5	open
8.7	275	135 180	+03	.2	+.10	6.0	1260		1.1	108		500	171		.4	[illegible]
8.4	275	135 180	+03	.3	+.10	5.9	1330		1.3	108		500	175		.7	[illegible]
8.0	272	135 180	+03	.3	+.10	5.9	1410		1.2	108		500	130		1.2	[illegible]
8.6	275	135 180	+05	.4	+.08	6.2	1320		1.1	108		[illegible]	171		.7	[illegible]
8.6	275	135 180	+04	.4	+.02	6.2	1390		1.2	108		475	184		1.7	open
8.1	275	135 180	+.10	.3	+.25	6.1	1390		1.1	108		475	[illegible]		[illegible]	[illegible]
8.0	279	135 180	+.04	.3	+.06	6.0	1340		.8	108		430	192		.5	open
7.6	279	135 180	+.05	.3	+.10	5.9	1290		.8	108		320	194		.6	open
8.0	279	135 180	+.02	.4	+.08	6.0	1320		1.0	108		360	185		.7	[illegible]
8.6	279	135 180	0	.2	+.08	6.2	1300		1.4	108		500	158		.1	open
7.6	279	135 180	+.04	.2	+.06	6.3	1280		1.4	108		500	158		.7	open
7.5	279	135 180	+.05	.2	+.06	6.3	1360		1.2	108		500	170		.5	open
7.8	280	135 180	+.04	.3	+.08	6.2	1400		1.1	108		500	183		.6	open
8.5	280	135 180	+.04	.3	+.08	6.3	1400		.9	108		450	186		.5	open

(12-8) KILN TURNS 27388 FEED CONV. 6431500. IRON CONV. 1103570 (8-4) KILN TURNS 27700

4 [illegible] coal from pad to bin #523 - clean coal pit.
[illegible] from [illegible] to dump

4 - [illegible]
8 - Backlite [illegible]
4 Backlite [illegible]
#4 Bin full 10:30 [illegible]

T/hr [illegible]
2[illegible] Stone 963500 #/24hr
3.086 coal 109000 #/24 x 1.35
.839 IRON 40260 #/24h
23.978 = Σ = 46365 #/hr

CAR TICKET NUMBER	CUSTOMER	BINS	TONS	INT.
Coal = 59 [illegible]	Million BTU/hr			
79.70[illegible]	13000 BTU/#			

CAR TICKET NUMBER
74C-[illegible]
74C-[illegible]2045

COAL [illegible] LBS./FT. IRON [illegible] LBS./FT. LOST TIME 0 HRS. 0 MIN. STONE ____ LBS./FT.

See NEDS data

B-11/A-14 DUPLICATE

K-617

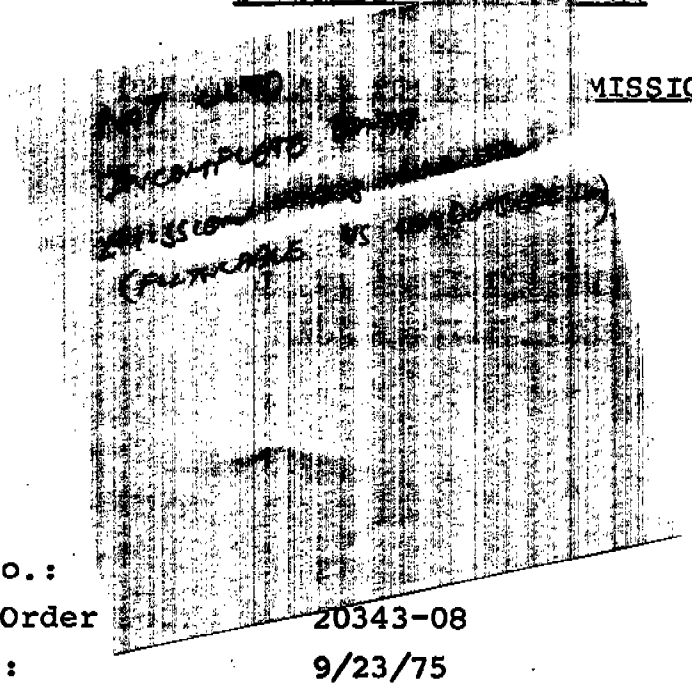
PCR RESEARCH, INC.

ROUTE 206 NORTH OF ROUTE 518

Cable:
"PRINCHEM"
Princeton, New Jersey 08540

P. O. Box 652
Princeton, New Jersey 08540
(609) 924-3035

STACK SAMPLING REPORT



MISSION TEST

Project No.:
Purchase Order : 20343-08
Test Date: 9/23/75
Report Date: 10/14/75

$\frac{10.6\ lb/hr}{13\ ton\ product/hr} = 0.8\ \frac{lb\ part.\ (filterable)}{ton\ product}$

after venturi scrubber
(~15" w.g.)

SUMMARY

Traverse #	1	2	3
Particulates, lb./hr.			
Found	7.82	10.88	13.19 - 10.6-Avg
Allowable	40.18	40.18	40.18

The data above indicate that the air pollution abatement equipment on Kiln #2 IS IN COMPLIANCE with the Ohio Air Pollution Regulation.

PURPOSE

J. E. Baker Co. of York, Pennsylvania, retained Princeton Chemical Research, Inc. to test the gas cleaning equipment (venturi scrubber) installed on Kiln #2 at their Millersville, Ohio plant. The purpose of this test was to determine whether the particulate emissions from the kiln's normal operation was in compliance with the Ohio Air Pollution Regulations.

SCOPE

Three particulate traverses were taken on the operating equipment. The traverses were made through two ports at a 90 degree separation (in the same plane) on the separator (outlet) stack. The sampling was performed isokinetically and in accordance with EPA Method #5, Federal Register, Vol. 36, No. 247, Part II, dated December 23, 1971.

Descriptions of the sampling train, the sampling procedure, and the analytical procedures are included in the following pages.

A copy of the operating log of Kiln #2, J. E. Baker Company, is included with the copies of the original data sheets in the Appendix to this report.

PERSONNEL

PCR personnel participating in the project included:

R. Clark
H. Benda
M. Ehrlich
F. Wagner
R. Fleming

DISCUSSION

The unit tested was an inclined rotary kiln fired with crushed coal. The process material was dolomitic limestone and magnetite. The particulate emissions from this operation are controlled by a venturi scrubbing system.

Mr. K. Cherry, of N.W. District Office of OEPA, was notified of our intent to test this unit. On the day of testing, Mr. R. Sturtz, District Engineer, was on site as an observer. Mr. C. H. Dorward, of the J. E. Baker Company, was also present to coordinate the tests.

As requested by Mr. Cherry, the liquid catch was analyzed and the results are included in this report. However, only non-filterable material is included in the insoluble particulate weights reported.

Standard gravimetric analyses, as previously described, were used to determine the weight of particulate matter collected in each sample. All calculations were performed using an IBM-360-157 computer. These calculations were based on standard formulas which have also been included in the report.

An examination of the test data shows that the system is in compliance with Ohio Air Pollution Regulations.

Approved by:

Manuel H. Ehrlich, Jr.
Technical Director

Submitted by:

Richard Fleming
Sr. Pollution Analyst

RF:iod

VELOCITY TRAVERSE MEASUREMENTS - RUN 1

Date	9/23/75
Time	1:45 PM
Stack Designation	Kiln #2
Stack Dimensions:	
Circular Stack Diameter (inches)	84
Rectangular Stack Dimensions (inches)	-
Stack CSA ($ft.^2$)	38.48
Stack Temperature (°F) °R	614
DB/WB (°F)	-
Volume % H_2O	.90
Specific Gravity	1.065
Barometric Pressure ("Hg)	29.32
Average Velocity (ft./min.)*	715.9
Actual CFM @ Stack °F**	27552
Standard CFM @ 70°F**	23323

* 24 Point Pitot Tube Traverse.
** Includes H_2O vapor.

STACK SAMPLING MEASUREMENTS - PARTICULATES

Run No.	1
Date	9/23/75
Time	1345

Sampling Data:

Probe Size (inches)	3/8
Sampling Period (minutes)	96
Number of Sampling Points (total)	24
Sample volume (ACF @ Stack)*	59.24
Sample volume (SCFD)**	49.69
% of Isokinetic rate	112.8
Barometric Pressure ("Hg)	29.32
Sampling Technique	EPA #5

Emissions Data: (Particulates)

	gr/SCFD	lb/hr
Insolubles	0.039	7.82
Solubles	0.035	7.00

* Actual cubic feet @ stack temperature, pressure and humidity.
** Dry standard cubic feet (@ 70°F).

VELOCITY TRAVERSE MEASUREMENTS - RUN #2

Date	9/23/75
Time	4:10 PM
Stack Designation	Kiln #2
Stack Dimensions:	
Circular Stack Diameter (inches)	84
Rectangular Stack Dimensions (inches)	-
Stack CSA ($ft.^2$)	38.48
Stack Temperature (~~in~~) °R	611
DB/WB (°F)	-
Volume % H_2O	2.7
Specific Gravity	1.060
Barometric Pressure ("Hg)	29.24
Average Velocity (ft./min.)*	624.5
Actual CFM @ Stack °F**	24033
Standard CFM @ 70°F**	20393

* 24 Point Pitot Tube Traverse.
** Includes H_2O vapor.

STACK SAMPLING MEASUREMENTS - PARTICULATES

Run No.	2
Date	9/23/75
Time	1610

Sampling Data:

Probe Size (inches)	3/8
Sampling Period (minutes)	96
Number of Sampling Points (total)	24
Sample volume (ACF @ Stack)*	50.29
Sample volume (SCFD)**	41.51
% of Isokinetic rate	109.8
Barometric Pressure ("Hg)	29.24
Sampling Technique	EPA #5

Emissions Data: (Particulates)

	gr/SCFD	lb/hr
Insoluble	0.064	10.88
Soluble	0.037	6.25

* Actual cubic feet @ stack temperature, pressure and humidity.

** Dry standard cubic feet (@ 70°F).

VELOCITY TRAVERSE MEASUREMENTS - RUN #3

Date	9/23/75
Time	7:05 PM
Stack Designation	Kiln #2
Stack Dimensions:	
Circular Stack Diameter (inches)	84
Rectangular Stack Dimensions (inches)	-
Stack CSA ($ft.^2$)	38.48
Stack Temperature (~~°F~~) °R	610.7
DB/WB (°F)	-
Volume % H_2O	1.5
Specific Gravity	1.066
Barometric Pressure ("Hg)	29.30
Average Velocity (ft./min.)*	656.8
Actual CFM @ Stack °F**	25276
Standard CFM @ 70°F**	21182

* 24 Point Pitot Tube Traverse.
** Includes H_2O vapor.

STACK SAMPLING MEASUREMENTS - PARTICULATES

Run No.	3
Date	9/23/75
Time	1905

Sampling Data:

Probe Size (inches)	3/8
Sampling Period (minutes)	96
Number of Sampling Points (total)	24
Sample volume (ACF @ Stack)*	53.99
Sample volume (SCFD)**	45.24
% of Isokinetic rate	112.1
Barometric Pressure ("Hg)	29.30
Sampling Technique	EPA #5

Emissions Data: (Particulates)

	gr/SCFD	lb/hr
Insoluble	0.073	13.19
Soluble	0.029	5.31

* Actual cubic feet @ stack temperature, pressure and humidity.
** Dry standard cubic feet (@ 70°F).

1 PM - 9 PM 9/23/75

8 hrs

	Stone	Iron	Coal
1	52106520	2901970	Engineering
M	51694500	2886250	1-9 PM =
F	412020 LBS	15720 LBS	55100 LBS

206 tons feed → ~103 ton product ~ 13 ton product / h

TOTAL = 482840 LBS = 241.42 TON IN 8 HRS } Total feed

= 30.18 TONS / HR

E = allowable emissions in lbs / hour

$E = 4.10 \times 30.18^{.67} = 552.05$

E = 9.50

E = = 40.18

Allowable Emissions = 40.18 lbs / Hour