State of Wisconsin

CORRESPONDENCE/MEMORANDUM

→ U.S. EPA Region V

DATE: May 25 1999

File Code: 4530

55 071 00025
REY 051

PRELIMINARY* STACK TEST REVIEW

By: Jeannine Campion

Test Date: April 8 1999

Name of Source: Rockwell Lime

FID #: 436-034-390

Address: 4110 Rockwood Rd

Stack #: S11

City: Manitowoc

Process #: P36

Permit #: 93-RV-108

Date Issued: Feb 7, 1995

Description of Source Tested: Limestone quarry (lime kiln)

Description of Control Equipment: Baghouse

Test Firm: EMT

Crew Chief & Phone#: Jay Whitaker 847-467-6666

Pollutant Tested: PM

Test Method: 5/202

Pollutant Tested:

Test Method:

Pollutant Tested:

Test Method:

Test Production Level: Ave = 26.49 tons/hr

Rated Production Level: 25 tons stone feed/hr

Discussion of Results:

Poll. Test Ave. = 0.5900 lb/ton stone feed

Limit = 0.300 lb/ton stone feed

In Compliance? Y (N)

Poll. Test Ave. =

Limit =

In Compliance? Y N

Poll. Test Ave. =

Limit =

In Compliance? Y N

Poll. Test Ave. =

Limit =

In Compliance? Y N

Is This a Valid Test? (Y) N If answer is no, please indicate the reason.

* Test may be reviewed in depth later, if necessary.

CC Joe Perez - AM/7
US EPA Region V

ANUM 053
6/23/99

SUMMARY TABLE #1 - LIME KILN EXHAUST RESULTS

COMPANY: Rockwell Lime Company
LOCATION: Manitowoc, WI (Rockwood)
SOURCE: Lime Kiln Exhaust
TEST DATE: 4-8-99

TEST RUN	1	2	3	AVERAGE
GAS PARAMETERS				
Velocity (ft/sec)	28.4	28.6	29.6	28.9
Volume flow (acfm)	46801.2	47202.1	48879.3	47627.6
Volume flow (scfh, wb)	1758989.8	1782748.5	1838631.4	1793456.5
Volume flow (dscfh)	1634710.5	1653174.7	1703907.7	1663931.0
Temperature (deg. F)	376.7	372.6	376.0	375.1
Oxygen (%)	10.0	8.5	8.5	9.0
Carbon Dioxide (%)	22.0	22.0	21.5	21.8
Moisture (% by volume)	7.1	7.3	7.3	7.2
PARTICULATE SAMPLE				
Sample Volume (dscf)	34.058 ✓	33.041 ✓	33.344 ✓	
Isokinetic	109.3 ✓	104.9 ✓	102.7 ✓	
Mass Collected (mg)	158.8 ✓	142.1 ✓	127.6 ✓	142.83
Concentration (gr/dscf)	0.07194 ✓	0.06636 ✓	0.05905 ✓	0.06578
Emission rate (lb/hr)	16.81 ✓	15.68 ✓	14.38 ✓	15.62
Emission Rate, lb/Ton Stone Feed	0.6062 ✓	0.6185 ✓	0.5451 ✓	0.5900

Not in compliance - over limit

PROCESS DATA				
Stone Feed (Tons/hr)	27.73	25.35	26.38	26.49

OPACITY RESULTS

The Opacity CEM read 3-4 % throughout the entire test period.
Strip chart attached to this report by Rockwell Lime Company, prior to submittal to WDNR.

Environmental Monitoring & Technologies, Inc.

SUMMARY TABLE #2 - PROCESS DATA / SUPPLEMENTARY RESULTS

Company: Rockwell Lime Company
Location: Rockwood, WI
Source: Lime Kiln Exhaust
Run #: 1-3
Date: 4-8-99

Manufacturing Data Compiled During EMT's Stack Test on #2 Kiln

Test Run	Time	Natural Gas (CF)	Coal/Coke Blend (Lbs)	Stone Feed (Tons)	Baghouse Pressure Differential Readings Across Each Compartment #1	#2	#3	#4	#5	#6	#7	#8
#1	0831 - 0944	24,800	6,154	27.73	2.3	2.4	2.5	off	2.1	2.1	1.9	2.4
#2	1010 - 1114	22,800	5,555	25.35	2.3	2.5	2.5	off	1.9	3.0	2.5	2.4
#3	1141 - 1248	22,800	5,689	26.38	2.0	1.9	2.6	off	2.6	2.3	2.7	2.3

Pressure drops - too low

Particulate lb/Ton Stone Feed = Particulate lb/hr ÷ Ton Stone Feed/hr

Test Run	Stone Feed (Tons/hr)	Particulates (lb/hr)	**Particulates (lb/Ton Stone Feed)**
#1	27.73	16.81	**0.61**
#2	25.35	15.68	**0.62**
#3	26.38	14.38	**0.55**

Ave. .593
Limit .30

PARTICULATE CHECKLIST

Name of Source: Rockwell Lime Test Date: April 8, 1999

1. Are the isokinetics per run between 90 and 110%? YES ✓ NO__
   If the %I for a run is outside the range, void the run. See 5.

2. Is the sample volume per run ≥ 30 DSCF? YES ✓ NO__
   If the sample volume for a run is < 30 DSCF, void the run. See 5.

3. Is the sample time per run ≥ 60 min.? YES ✓ NO__
   If the sample time for a run is < 60 min., void the run. See 5.

4. Is the sample time per sample point ≥ two min.? YES ✓ NO__
   If the sample time per point for a run is < two min., void the run. See 5.

5. A stack test shall consist of three valid runs or, at a minimum, two valid runs if one run is voided. Is this a valid test? YES ✓ NO__
   If no, inform the District or the source that the test is unacceptable and should be redone. Your review is over.

6. Is the total particulate per run added correctly? YES ✓ NO__
   If an incorrect total is found, correct the total and the results or call the consultant and ask for a correction.

7. Was the backhalf included in the total particulate? YES ✓ NO__
   NSPS sources are exempt from including the backhalf. All other sources must include the backhalf. If they don't, the test is invalid. See 5.

Eq. 1 Gr/DSCF = 15.43* g of part./sample volume of run in DSCF

Eq. 2 Gr/DSCF @ 12% CO_2 = (Gr/DSCF)*12/Stack CO_2

Eq. 3 Gr/DSCF @ 7% O_2 = (Gr/DSCF)*(20.9-7)/(20.9-Stack O_2)

Eq. 4 Lb/DSCF = (Gr/DSCF)/7000 Eq. 5 $Lb/MLb_{DRY} = 385.6*10^3*(Lb/DSCF)/MW_{DRY}$

Eq. 6 $Lb/MLb_{WET} = 385.6*10^3*(Lb/DSCF)*(1-(\%\ Moisture/100))/MW_{WET}$

Eq. 7 Lb/Hr = 60*DSCFM*(Lb/DSCF) Eq. 8 Lb/10^6 BTU = (Lb/Hr)/(10^6 BTU/Hr)

Eq. 9 Lb/10^6 BTU = (Lb/DSCF)*F Factor*20.9/(20.9-Stack O_2)

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8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or Lb/10^6 BTU, solve the needed Eq. Do your results match the consultant's? N/A YES__ NO__
   If no, fix the problem or call the consultant for a correction.

9. Is the three run(or two run) average correct? YES ✓ NO__
   If no, write in the correct average.

10. Is the average result in compliance? YES__ NO ✓
    If no, the District should issue an NOV.

11. Was the source operating at a level representative of full capacity? YES ✓ NO__
    If no, the permit release may need to provide conditions to cap the source at the test level until a stack test at a higher production level(showing compliance) is performed. If the test was not for permit release, other actions may be warranted.

Rockwell Lime 8-Apr-99

Stack11/Process36
Method 5/202 - Particulates

	Run: 1	Run: 2	Run: 3	
Barometric Pressure (PB):	29.71	29.71	29.71	Inches Hg
Stack Static Pressure:	-0.14	-0.15	-0.14	Inches H20
Stack Pressure (PS):	29.70	29.70	29.70	Inches Hg
Orifice Pressure (OP) or delta H:	1.21	1.12	1.14	Inches Hg Abs.
Volume H20 CONDENSED (VLc):	50	44	50	mL condensed
Volume H20 in SILICA GEL (VLsg):	5	11	6	mL in silica gel
Total Volume H20 in impingers (VL):	55	55	56	mL total
Total particulate mass (MT):	0.1588	0.1421	0.1276	Grams
Test Time (T):	60	60	60	Minutes
Number of Points:	24	24	24	Points
Time per point:	2.5	2.5	2.5	Minutes
% 02:	10	8.5	8.5	%
% CO2:	22	22	21.5	%
% N2:	68	69.5	70	%
Pitot tube coefficient (CP):	0.84	0.84	0.84	(dimensionless)
Stack Temperature Avg. (TS):	377	373	376	Deg. F
Stack Temperature (TS): Rankine	836	832	835	Deg. R
Meter Temperature Avg. (TM):	62	64	65	Deg. F
Meter Temperature (TM): Rankine	522	523	524	Deg.R
Gas Meter Volume (VM):	33.76	32.86	33.22	Cubic Feet
Nozzle Diameter:	0.31	0.31	0.31	Inches
Nozzle Area (AN):	5.24E-04	5.24E-04	5.24E-04	Square Feet
Stack Area (AS):	27.49	27.49	27.49	Square Feet
Dry Gas Meter correction factor (Y):	1.002	1.002	1.002	(dimensionless)
F-factor:				DSCF/10^6 BTU
Sqr Rt Velocity Pressure Avg (VP^.5):	0.41	0.42	0.43	Inches H20
Heat Input (H):				MMBTU/Hr

Dry Gas Meter Volume (VMSTD):	34.1	33.1	33.4	Dry Standard Cubic Feet
Condensed H20 Volume (VWSTD):	2.589	2.590	2.636	Wet Standard Cubic Feet
% Moisture:	7.1	7.3	7.3	%
Mole Fraction (MD):	0.929	0.927	0.927	Fraction
Dry Molecular Weight (MWD):	31.9	31.9	31.8	Lb/Lb-mole dry stack gas
Wet Molecular Weight (MWS):	30.9	30.9	30.8	Lb/Lb-mole wet stack gas
Stack Gas Velocity Avg (VS):	28.4	28.6	29.6	Feet/Second
Actual Stack Flow Rate (QACT):	46796	47194	48858	ACF/M
Dry Stack Flow Rate (QSTD):	27238	27543	28393	DSCF/M
% Excess Air	126	86	85	%
Part. Mass Rate-Areas Method(PMRA):	18.36	16.43	14.76	Lbs/Hr
Part. Mass Rate-Conc. Method (PMRC):	16.79	15.66	14.37	Lbs/Hr
Part. Mass Rate-Average (PMRAVG):	17.58	16.05	14.56	Lbs/Hr
Part. Emisson Concentration (C):	**0.0719**	**0.0663**	**0.0590**	GR/DSCF
Emission rate Avg (E):				lb/10^6 BTU Input
Dry Stack Gas Mass Flow Rate (DGR):	135289	136550	140409	lbs. of dry gas/hr
Emisson Rate Avg-dry gas (LB/MLBD):	0.130	0.118	0.104	lb/10^3 lb of dry gas
Wet Stack Gas Mass Flow Rate (WGR):	131204	132318	136034	lb of wet gas/hr
Emisson Rate Avg-wet gas (LB/MLBW):	0.134	0.121	0.107	lb/10^3 of wet gas
Emission Rate by Fuel Factor (EF):				lb/10^6 BTU Input
EF (fronthalf only)	#VALUE!	#VALUE!	#VALUE!	lb/10^6 BTU Input
% Isokinetics (90% < Iso < 110%)	**109.4**	**104.9**	**102.7**	%

Method 5/202 - Particulates		Checklist		
	Run: 1	Run: 2	Run: 3	
Isokinetics	Good	Good	Good	
Sample Volume (dscf)	Good	Good	Good	
Sample Time Per run	Good	Good	Good	
Per point	Good	Good	Good	
Operating at Full Capacity?	Yes	Yes	Yes	
Compliance		No		unknown units

Permit # and Date	93-RV-108	2/7/95
Limit or Regulation	0.300	lb/ton stone feed

Production Data:				
Rated Full Capacity		25		tons/hr stone feed
Operating Rate during test	27.73	25.35	26.38	tons/hr stone feed
Percent of Full Capacity	110.9	101.4	105.5	% of rated full capacity

Compliance determination for PM:

Run #1: 0.6062 lb PM/ton stone feed
Run #2: 0.6185 lb PM/ton stone feed
Run #3: 0.5451 lb PM/ton stone feed

Average: 0.5900 lb PM/ton stone feed