

File

CORRESPONDENCE/MEMORANDUM

DATE: 3/21/06

WACD ID: DE-STK-16225
witnessed: n
Report Rec=d: 3/10/06
File Code: 4530

PRELIMINARY* STACK TEST REVIEW

By: Tim Dallmann Test Date: 1/19/06
Name of Source: Western Lime Corporation FID #: 405033970
Address: 101 James Street Stack #: S18
City: Green Bay Process #: P38
Permit #: 405033970-P01 Date Issued: 10/16/98

Description of Source Tested: Lime Kiln #2; used for the production of High Calcium Lime.

Description of Control Equipment: Baghouse

Test Firm: CleanAir Engineering
Crew Chief & Phone#: K. O'Halloren (800) 627-0033

Pollutant Tested: PM Test Method: EPA Methods 5, 202
Pollutant Tested: SO2 Test Method: EPA Method 6C
Pollutant Tested: NOx Test Method: EPA Method 7E
Pollutant Tested: CO Test Method: EPA Method 10

Test Production Level: 33.31 tons stone/hr
Rated Production Level:

Discussion of Results:

Poll. Test Ave. =(PM) 1.7 lbs/hr Limit = 4.8 lbs/hr In Compliance? (Y) N
Poll. Test Ave. =(PM) 0.05 lbs/ton stone Limit = 0.12 lbs/ton stone In Compliance? (Y) N
Poll. Test Ave. =(SO2) 1.2 lbs/hr Limit = 10.0 lbs/hr In Compliance? (Y) N
Poll. Test Ave. =(NOx) 47.0 lbs/hr Limit = 60.0 lbs/hr In Compliance? (Y) N
Poll. Test Ave. =(CO) 28 lbs/hr Limit = 102 lbs/hr 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 [Redacted]
Michelle Farley - NER

PARTICULATE CHECKLIST

Name of Source: Western Lime Corp Test Date: 1/19/06

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 \geq 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 \geq 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 \geq 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 Region 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 $Gr/DSCF = 15.43 * g \text{ of part./sample volume of run in DSCF}$

Eq. 2 $Gr/DSCF @ 12\% CO_2 = (Gr/DSCF) * 12 / \text{Stack } CO_2$

Eq. 3 $Gr/DSCF @ 7\% O_2 = (Gr/DSCF) * (20.9 - 7) / (20.9 - \text{Stack } O_2)$

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

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

Eq. 7 $Lb/Hr = 60 * DSCFM * (Lb/DSCF)$ Eq. 8 $Lb/10^6 \text{ BTU} = (Lb/Hr) / (10^6 \text{ BTU/Hr})$

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

8. If the emission limit is in Gr/DSCF, Lb/DSCF, Lb/MLb, Lb/Hr or Lb/10⁶ BTU, solve the needed Eq. Do your results match the consultant's? 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 Region should take appropriate action.
11. Was the source operating at a level representative of capacity? YES NO
If no, the Region may cap the source at the test level until a stack test at a higher production level (showing compliance) is performed.

GASEOUS TEST CHECKLIST

Name of Source: Western Lime Gas Tested: SO₂ Test Date: 1/19/06

1. 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 Region or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET} / (1 - \% \text{ Moisture as Decimal})$

Eq. 2 $PPM_{DRY@ 7\% O_2} = PPM_{DRY} * (20.9 - 7) / (20.9 - \text{Stack } O_2)$

Eq. 3 $PPM_{DRY@ 12\% CO_2} = PPM_{DRY} * 12 / \text{Stack } CO_2$

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES NO
 If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY} * \text{Molecular Weight of Gas} / 24.06$

Eq. 5 $Lb/DSCF = 2.595 * 10^{-9} * PPM_{DRY} * \text{Molecular Weight of Gas}$

Eq. 6 $Lb/DSCF = 6.243 * 10^{-8} * (mg/DSCM)$

Eq. 7 $Lb/Hr = 60 * DSCFM * (Lb/DSCF)$ Eq. 8 $Lb/10^6 \text{ BTU} = (Lb/Hr) / (10^6 \text{ BTU/Hr})$

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

3. If the limit is in $mg/DSCM$, $Lb/DSCF$, Lb/Hr , or $Lb/10^6 \text{ BTU}$, solve the needed Eq. Eq. 1-3 may also be needed. Do your results match the consultant's? YES NO
 If no, fix the problem or call the consultant for a correction.

Eq. 10 $\% \text{ Capture Eff.} = \frac{(\text{Lb VOC/Hr to Control Equip.}) * 100}{(\text{Lb VOC/Hr Input to Process})}$

Eq. 11 $\% \text{ Destruction Eff.} = \frac{(\text{Inlet Lb VOC/Hr} - \text{Outlet Lb VOC/Hr}) * 100}{(\text{Inlet Lb VOC/Hr})}$

Eq. 12 $\% \text{ Overall Eff.} = (\% \text{ Cap. Eff.} / 100) * (\% \text{ Dest. Eff.} / 100) * 100$

4. If the limit is in terms of $\% \text{ Capture Eff.}$, $\% \text{ Dest. Eff.}$, or $\% \text{ Overall Eff.}$, solve the needed Eq. Eq. 1-9 may also be needed. Do your results match the consultant's? YES NO
 If no, fix the problem or call the consultant for a correction.

5. Is the three run (or two run) average correct? YES NO
 If no, write in the correct average.

6. Is the average result in compliance? YES NO
 If no, the Region should take appropriate action.

7. Was the source operating at a level representative of capacity? YES NO
 If no, the Region may cap the source at the test level until a stack test at a higher production level (showing compliance) is performed.

GASEOUS TEST CHECKLIST

Name of Source: Western Lime Gas Tested: NO Test Date: 1/19/06

1. 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 Region or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET} / (1 - \% \text{ Moisture as Decimal})$

Eq. 2 $PPM_{DRY@ 7\% O_2} = PPM_{DRY} * (20.9 - 7) / (20.9 - \text{Stack } O_2)$

Eq. 3 $PPM_{DRY@ 12\% CO_2} = PPM_{DRY} * 12 / \text{Stack } CO_2$

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES NO
 If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY} * \text{Molecular Weight of Gas} / 24.06$

Eq. 5 $Lb/DSCF = 2.595 * 10^{-9} * PPM_{DRY} * \text{Molecular Weight of Gas}$

Eq. 6 $Lb/DSCF = 6.243 * 10^{-8} * (mg/DSCM)$

Eq. 7 $Lb/Hr = 60 * DSCFM * (Lb/DSCF)$ Eq. 8 $Lb/10^6 \text{ BTU} = (Lb/Hr) / (10^6 \text{ BTU/Hr})$

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

3. If the limit is in $mg/DSCM$, $Lb/DSCF$, Lb/Hr , or $Lb/10^6 \text{ BTU}$, solve the needed Eq. Eq. 1-3 may also be needed. Do your results match the consultant's? YES NO
 If no, fix the problem or call the consultant for a correction.

Eq. 10 $\% \text{ Capture Eff.} = \frac{(\text{Lb VOC/Hr to Control Equip.}) * 100}{(\text{Lb VOC/Hr Input to Process})}$

Eq. 11 $\% \text{ Destruction Eff.} = \frac{(\text{Inlet Lb VOC/Hr} - \text{Outlet Lb VOC/Hr}) * 100}{(\text{Inlet Lb VOC/Hr})}$

Eq. 12 $\% \text{ Overall Eff.} = (\% \text{ Cap. Eff.} / 100) * (\% \text{ Dest. Eff.} / 100) * 100$

4. If the limit is in terms of $\% \text{ Capture Eff.}$, $\% \text{ Dest. Eff.}$, or $\% \text{ Overall Eff.}$, solve the needed Eq. Eq. 1-9 may also be needed. Do your results match the consultant's? YES NO
 If no, fix the problem or call the consultant for a correction.

5. Is the three run (or two run) average correct? YES NO
 If no, write in the correct average.

6. Is the average result in compliance? YES NO
 If no, the Region should take appropriate action.

7. Was the source operating at a level representative of capacity? YES NO
 If no, the Region may cap the source at the test level until a stack test at a higher production level (showing compliance) is performed.

GASEOUS TEST CHECKLIST

Name of Source: Western Lime Gas Tested: CO Test Date: 1/19/06

1. 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 x NO
 If no, inform the Region or the source that the test is unacceptable and should be redone. Your review is over.

Eq. 1 $PPM_{DRY} = PPM_{WET} / (1 - \% \text{ Moisture as Decimal})$

Eq. 2 $PPM_{DRY@ 7\% O_2} = PPM_{DRY} * (20.9 - 7) / (20.9 - \text{Stack } O_2)$

Eq. 3 $PPM_{DRY@ 12\% CO_2} = PPM_{DRY} * 12 / \text{Stack } CO_2$

2. If the limit is in PPM_{DRY} or in PPM_{DRY} corrected to a certain O_2 or CO_2 value, solve Eq. 1-3. Do your results match the consultant's? YES ___ NO
 If no, fix the problem or call the consultant for a correction.

Eq. 4 $mg/DSCM = PPM_{DRY} * \text{Molecular Weight of Gas} / 24.06$

Eq. 5 $Lb/DSCF = 2.595 * 10^{-9} * PPM_{DRY} * \text{Molecular Weight of Gas}$

Eq. 6 $Lb/DSCF = 6.243 * 10^{-8} * (mg/DSCM)$

Eq. 7 $Lb/Hr = 60 * DSCFM * (Lb/DSCF)$ Eq. 8 $Lb/10^6 \text{ BTU} = (Lb/Hr) / (10^6 \text{ BTU/Hr})$

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

3. If the limit is in $mg/DSCM$, $Lb/DSCF$, Lb/Hr , or $Lb/10^6 \text{ BTU}$, solve the needed Eq. Eq. 1-3 may also be needed. Do your results match the consultant's? YES x NO
 If no, fix the problem or call the consultant for a correction.

Eq. 10 $\% \text{ Capture Eff.} = \frac{(\text{Lb VOC/Hr to Control Equip.}) * 100}{(\text{Lb VOC/Hr Input to Process})}$

Eq. 11 $\% \text{ Destruction Eff.} = \frac{(\text{Inlet Lb VOC/Hr} - \text{Outlet Lb VOC/Hr}) * 100}{(\text{Inlet Lb VOC/Hr})}$

Eq. 12 $\% \text{ Overall Eff.} = (\% \text{ Cap. Eff.} / 100) * (\% \text{ Dest. Eff.} / 100) * 100$

4. If the limit is in terms of $\% \text{ Capture Eff.}$, $\% \text{ Dest. Eff.}$, or $\% \text{ Overall Eff.}$, solve the needed Eq. Eq. 1-9 may also be needed. Do your results match the consultant's? YES ___ NO
 If no, fix the problem or call the consultant for a correction.

5. Is the three run (or two run) average correct? YES x NO
 If no, write in the correct average.

6. Is the average result in compliance? YES x NO
 If no, the Region should take appropriate action.

7. Was the source operating at a level representative of capacity? YES x NO
 If no, the Region may cap the source at the test level until a stack test at a higher production level (showing compliance) is performed.

WESTERN LIME CORPORATION
GREEN BAY, WI

Client Reference No: 102505MRM
CleanAir Project No: 9859

PROJECT OVERVIEW

1-2

Table 1-2:
Summary of Test Results

Source Constituent	Sampling Method	Average Emission	Permit Limit ¹
<u>Kiln No. 2 Stack</u>			
Particulate (lb/hr)	EPA M5/202	1.7	4.8
Particulate (lb/ton of stone)	EPA M5/202	0.051	0.12
SO ₂ (lb/hr)	EPA 6C	1.2	10
NO _x (lb/hr)	EPA 7E	47	60
CO (lb/hr)	EPA 10	28	102

¹ Permit limits obtained from Western Lime permit number: 405033970-P01

DISCUSSION OF TEST PROGRAM

A cyclonic flow check was performed prior to any testing. The result of the cyclonic flow check is presented in Appendix D. No substantial cyclonic flow was observed.

Testing of SO₂, NO_x and CO was performed using calibrated Continuous Emissions Monitoring Equipment. Volumetric flow rates from the Method 5/202 test runs were used in all pounds per hour emission rate calculations.

WESTERN LIME CORPORATION
GREEN BAY, WI

Client Reference No: 102505MRM
CleanAir Project No: 9859

RESULTS

2-1

Table 2-1:
Kiln No. 2 Stack - Particulate

Run No.	1	2	3	Average
Date (2006)	Jan 19	Jan 19	Jan 19	
Start Time (approx.)	09:32	11:40	13:34	
Stop Time (approx.)	10:40	12:47	14:36	
Process Conditions				
R _p Production rate - (tons of stone/hour)	33.31	33.31	33.31	33.31
Gas Conditions				
O ₂ Oxygen (dry volume %)	6.3	6.3	6.1	6.3
CO ₂ Carbon dioxide (dry volume %)	25.8	25.8	26.3	26.0
T _s Sample temperature (°F)	358	350	347	352
B _w Actual water vapor in gas (% by volume)	6.5	6.7	6.4	6.5
Gas Flow Rate				
Q _a Volumetric flow rate, actual (acfm)	48,494	46,989	48,438	47,974
Q _{std} Volumetric flow rate, dry standard (dscfm)	28,607	27,894	28,998	28,500
Sampling Data				
V _{mstd} Volume metered, standard (dscf)	41.49	40.26	41.28	41.01
%I Isokinetic sampling (%)	101.3	100.8	99.4	100.5
Laboratory Data from Method 5				
m _n Total Method 5 Matter (g)	0.00481	0.00481	0.00481	
Laboratory Data from Method 202				
m _{CPM} Total CPM (g)	0.01546	0.01125	0.01475	
Total Particulate Matter				
m _{Part} Total Particulate Matter (g)	0.02028	0.01606	0.01957	
Total Particulate Matter Results				
C _{sd} Particulate Concentration (lb/dscf)	1.1E-06	8.8E-07	1.0E-06	1.0E-06
C _{sd} Particulate Concentration (gr/dscf)	0.0075	0.0062	0.0073	0.0070
C _{sd} Particulate Concentration (mg/dscm)	17.3	14.1	16.7	16.0
E _{lb/hr} Particulate Rate (lb/hr)	1.8	1.5	1.8	1.7
E _{Rp} Particulate Rate - Production-based (lb/ton of stone)	0.056	0.044	0.055	0.051

WESTERN LIME CORPORATION
GREEN BAY, WI

Client Reference No: 102505MRM
CleanAir Project No: 9859

RESULTS

2-2

Table 2-2:
Kiln No. 2 Stack - SO₂, NO_x, CO

Run No.		1	2	3	Average
Date (2006)		Jan 19	Jan 19	Jan 3	
Start Time (approx.)		09:34	11:41	13:34	
Stop Time (approx.)		10:41	12:48	14:35	
Process Conditions					
R _p	Production Rate - (tons of stone/hour)	33.31	33.31	33.31	33.31
Gas Conditions¹					
O ₂	Oxygen (dry volume %)	6.3	6.3	6.1	6.3
CO ₂	Carbon Dioxide (dry volume %)	25.8	25.8	26.3	26.0
B _{wd}	Moisture (volume %)	6.5	6.7	6.4	6.5
Q _{std}	Standard conditions (dscfm)	28,607	27,894	28,998	28,500
Sulfur Dioxide					
C	Concentration (ppmdv)	3.8	2.5	6.6	4.3
E	Emission rate (lb/hr)	1.1	0.69	1.9	1.2
E	Emission rate (lb/ton of stone)	0.033	0.021	0.058	0.037
Nitrogen Oxides					
C	Concentration (ppmdv)	231	246	215	231
E	Emission rate (lb/hr)	47.4	49.1	44.6	47.0
E	Emission rate (lb/ton of stone)	1.4	1.5	1.3	1.4
Carbon Monoxide					
C	Concentration (ppmdv)	197	151	328	226
E	Emission rate (lb/hr)	24.6	18.4	41.5	28.2
E	Emission rate (lb/ton of stone)	0.74	0.55	1.2	0.85

¹ Stack flow and moisture conditions obtained from Method 5/202 testing.

Scott Brown

From: Mindy Ochs [mochs@westernlime.com]
Sent: Monday, January 30, 2006 2:20 PM
To: Scott Brown
Subject: RE: process data

Hi Scott,

Here is the data for the kilns. Let me know if you need anything else.

Eden Kiln 1	Coal	3.3
Eden Kiln 1	Stone	23.52
Eden Kiln 2	Coal	3.46
Eden Kiln 2	Stone	31.14
Green Bay Kiln 1	Coal	2.41
Green Bay Kiln 1	Stone	14.95
Green Bay Kiln 2	Coal	4.1
Green Bay Kiln 2	Stone	33.31

Thank You,

Mindy Ochs, P.E.
 Environmental and Regulatory Director
 Western Lime Corporation
 206 N 6th Avenue
 PO Box 57
 West Bend, WI 53095
 262-334-3005
 262-334-2874 FAX
 262-305-3321 CELL

-----Original Message-----

From: Scott Brown [mailto:scott_brown@cleanair.com]
Sent: Monday, January 30, 2006 2:09 PM
To: Mindy Ochs
Subject: process data

Hello Mindy,

I was wondering if I was going to be receiving any process data from the kiln testing at Eden and G.B. In terms of the particulate compliance I believe that I need tons of stone processes during each test.

I am still waiting on the particulate data from the lab. The CEM stuff all looked good.

Let me know if I can expect process data to include in the report(s).

Scott Brown
 Project Manager
 CleanAir
 847-654-4544