Mercury Emissions Performance Test Report

Performed for

National Lime Association

At the

Western Lime Eden Facility
Kiln 1 Exhaust Stack and
Kiln 2 Exhaust Stack
Eden, Wisconsin
April 26 and 27, 2011

Platt Environmental Services, Inc.

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Report Submittal Date:
June 29, 2011

Prepared By

Platt Environmental Services, Inc.

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1.0 EXECUTIVE SUMMARY

The National Lime Association (NLA) sponsored a test program to determine the fate of mercury (Hg) in lime kiln systems. The test program was conducted at the Western Lime Corporation, WLC, Eden, WI facility in April 2011.

The facility was chosen, in part, because it had two completely different kiln systems that burned the same fuels and limestone which allowed comparing mercury behavior (i.e., speciation and retention). The test program consisted of two phases; 1) a four week solid sampling campaign and 2) stack sampling.

All solid and stack testing adsorbent trap samples were analyzed by thermal desorption followed by atomic adsorption using an Ohio Lumex Analyzer.
The following are the major observations of the test program:

Solids Sampling Results and Conclusions

- For WLC, the major and most variable source of Hg input was coal which varied from 12 ppb to 50 ppb.
- The limestone had negligible Hg content at about 1 ppb.
- The lime had < 1 ppb Hg and can likely be eliminated from solid sampling campaigns.
- LKD adsorption of Hg is inversely proportional to atmospheric Hg emissions
    - More Hg on LKD = Less Hg to atmosphere.
- Solids sampling should be conducted and the samples analyzed upfront of any planned stack testing.
- Using total potential to emit minus that adsorbed on LKD is a good first cut to decide on stack testing,

Stack Testing Results and Conclusions

- The straight kiln system with heat exchanger upstream of baghouse retained >85% of Hg input,
    - The effluent temperature and its variation at the heat exchanger and particulate matter control device(s) greatly affected mercury adsorption onto the LKD.
    - As the heat exchanger cooled by ambient rain and wind, Hg emissions decreased. As the day warmed, so did the heat exchanger temperature with a subsequent rise in Hg emissions.
    - Emissions varied, with a maximum value of about 3 lb Hg/MM ton lime.
- The pre-heater kiln system retained <10% of Hg input to the system (12-15 lb Hg/MM tons lime),
    - The preheater tower and baghouse temperatures are very consistent once system equilibration is achieved and thus Hg is in a

state of adsorption/desorption resulting in little retention and thus steady emissions.

- The great differences in the Hg emissions from the two kiln systems was not expected,
  - It is unclear whether the difference is a result of the heat exchanger upfront of the baghouse for the straight kiln, or whether the baghouse, filter media and/or unburned carbon in the LKD also played a role.
- The results for speciated mercury on both kiln systems was found to be >80% elemental mercury (Hg^{0}) with the remainder oxidized mercury (Hg^{+2}).
  - Control of Hg using dry sorbents and activated carbon, or by scrubbers is determined by the speciation state of the mercury compounds.

2.0 INTRODUCTION AND SUMMARY OF RESULTS

PLATT ENVIRONMENTAL SERVICES, INC. (PES) conducted six one-hour paired total mercury test runs and six one-hour paired speciated mercury test runs on the Kiln 1 Exhaust Stack and Kiln 2 Exhaust Stack for the National Lime Association at the Western Lime Eden Facility in Eden, Wisconsin on April 26 and 27, 2011. This report summarizes the results of the test program and test methods used.

The test location, test dates, and test parameters are summarized below, in Table 1.

Table 1

Test Overview

Test Location	Test Dates	Test Parameters
Kiln 1 Exhaust Stack	April 26, 2011	Mercury (Hg) by Method 30B, Volumetric Flow, and Oxygen (O_2)
Kiln 2 Exhaust Stack	April 27, 2011	

The identification of individuals associated with the test program is summarized below, in Table 2.

Table 2

Contact Information

Location	Address	Contact
Test Facility	Western Lime Corporation 206 N 6th Avenue / PO Box 57 West Bend, WI 53095	Ms. Mindy Ochs Environmental and Regulatory Director 262-334-3005 ext.101 (phone) mochs@westernlime.com
Test Coordinator	National Lime Association 200 N. Glebe Road Suite 800 Arlington, VA 22203	Ms. Arline Seeger Executive Director 703-243-5488 (phone) 703-243-5489 (fax) aseeger@lime.org
Testing Company Representative	Platt Environmental Services, Inc. 1520 Kensington Road Suite 204 Oak Brook, Illinois 60523	Mr. Eric Ehlers Senior Project Manager (630) 521-9400 (phone) (630) 521-9494 (fax) eehlers@plattenv.com

The test crew consisted of D. Quedens, R. Granskog, and E. Ehlers of PES. Dr. Laura Kinner of Emissions Monitoring ,Inc. (EMI) observed the test program.

Selected results of the test program are summarized below, in Table 3. A complete summary of emission test results follows the narrative portion of this report.

Table 3

Test Results

Test Location	Parameter	Test Average (30B Standard Traps)
Kiln 1 Exhaust Stack	Hg, ppb	0.013
	Hg, ug/dscm	0.112
	Hg, lb/mm ton of lime	1.09

Test Location	Parameter	Test Average (Speciated Traps)		
		Oxidized	Elemental	Total
Kiln 1 Exhaust Stack	Hg, ppb	0.002	0.012	0.014
	Hg, ug/dscm	0.016	0.097	0.113
	Hg, lb/mm ton of lime	0.18	0.92	1.10

Test Location	Parameter	Test Average (30B Standard Traps)
Kiln 2 Exhaust Stack	Hg, ppb	0.302
	Hg, ug/dscm	2.519
	Hg, lb/mm ton of lime	14.11

Test Location	Parameter	Test Average (Speciated Traps)		
		Oxidized	Elemental	Total
Kiln 2 Exhaust Stack	Hg, ppb	0.051	0.270	0.322
	Hg, ug/dscm	0.429	2.254	2.683
	Hg, lb/mm ton of lime	2.19	12.80	14.99

The test consisted of six one-hour paired Method 30B Hg sampling runs and six paired speciated sampling runs. Each sample was extracted at a single test point.

3.0 TEST METHODOLOGY

Emission testing was conducted following the methods specified in 40 CFR, Part 60, Appendix A and USEPA Method 30B. Schematics of the sampling trains used and copies of field data sheets for each test run are included in the Appendix.

The following methodologies were used during the test program:

Method 1 Sample Traverse Determination

Test measurement points were selected in accordance with Method 1, 40 CFR, Part 60, Appendix A. The characteristic of the measurement location is summarized below, in Table 4.

Table 4

Sample Point Selection

Location	Upstream Diameters	Downstream Diameters	Test Parameter	Number of Sampling Points
Kiln 1 and 2 Exhaust Stacks	> 0.5 Diameters	> 2.0 Diameters	Hg, Moisture	1
			Volumetric Flow	16

Method 2 Volumetric Flow Rate Determination

Gas velocity was measured following Method 2, for purposes of calculating stack gas volumetric flow rate and mercury mass emission rates. An S-type pitot tube, differential pressure gauge, thermocouple and temperature readout were used to determine gas velocity at each sample point. All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data is presented in the Appendix.

Method 3A Oxygen (O_2) Determination

The flue gas carbon dioxide (CO_2) and oxygen (O_2) content was determined in accordance with Method 3A. Servomex analyzers were used to determine flue gas CO_2 and O_2 content of each exhaust kiln. All of the equipment used was calibrated in accordance with the specifications of the Method.

Mercury Determination by Method 30B (Sorbent Trap Method)

Paired Method 30B standard sorbent traps were performed along with simultaneous paired speciated sorbent traps collected on in-situ sorbent traps. The standard sorbent traps consisted of two sections of carbon, one to collect sample, the second to determine if breakthrough of mercury had occurred. The speciated sorbent traps consisted of three oxidized sections, the first to scrub any acid from the flue gas, the second section consisted of potassium chloride (KCl) to collect oxidized mercury, and a third section consisting of KCl to determine if breakthrough of oxidized mercury had occurred. Two standard carbon sections followed the the KCl sections to collect elemental mercury and verify that breakthrough of elemental mercury was within method QA/QC.

Mercury concentrations on Exhaust Kiln 1 were below the expected levels required to perform an appropriate set of three spiked samples. One spiked sample was performed during the sixth run to verify spike recovery was within method tolerance.

The sample trains used for this test program was designed by Apex, Inc. and meet all requirements for Method 30B sampling. Samples were analyzed onsite utilizing an Ohio Lumex, Inc. analyzer for total gaseous mercury.

Method 4 Moisture Determination

Stack gas moisture content was determined using a Method 4 sampling train. Utilizing this technique, stack gas is drawn through a series of four impingers. The first two impingers were each charged with 100 mls of deionized water. Impinger three was left empty and impinger four was charged with clean, dried silica gel. The entire impinger train was measured before and after each test run to determine the mass of moisture condensed.

During testing, the sample train was operated in the manner specified in USEPA Method 4. All of the data specified in Method 4 (gas volume, delta H, impinger outlet well temperature, etc.) was recorded on field data sheets.

All of the equipment used was calibrated in accordance with the specifications of the Method. Calibration data is presented in the Appendix.

4.0 TEST RESULTS SUMMARIES

Standard Method 30B Mercury Test Results Summary
Western Lime - Eden, Wisconsin
Kiln 1 Stack

Test No.	Date	Start Time	End Time	V_m (standard L)	ng detected	ppb	ug/dscm	ug/wscm	lb/hr	Stone Feed	Lime	lb Hg/mm tons of lime
1A	4/26/2011	7:15	8:15	106.890	1.10	0.001	0.010	0.010	0.000001	22.62	11.31	0.11
1B	4/26/2011	7:15	8:15	106.793	1.60	0.002	0.015	0.014	0.000002			0.15
Run 1 Average					**1.35**	**0.002**	**0.013**	**0.010**	**0.000001**	**22.62**	**11.31**	**0.13**
2A	4/26/2011	8:45	9:45	106.572	4.20	0.005	0.039	0.037	0.000004	22.45	11.23	0.39
2B	4/26/2011	8:45	9:45	106.288	4.20	0.005	0.040	0.037	0.000004			0.40
Run 2 Average					**4.20**	**0.005**	**0.039**	**0.040**	**0.000004**	**22.45**	**11.23**	**0.39**
3A	4/26/2011	10:10	11:10	105.701	11.10	0.013	0.105	0.099	0.000011	22.70	11.35	1.00
3B	4/26/2011	10:10	11:10	105.574	11.10	0.013	0.105	0.099	0.000011			1.00
Run 3 Average					**11.10**	**0.013**	**0.105**	**0.100**	**0.000011**	**22.70**	**11.35**	**1.00**
4A	4/26/2011	11:30	12:30	105.239	14.00	0.016	0.133	0.125	0.000014	22.67	11.34	1.27
4B	4/26/2011	11:30	12:30	105.478	15.00	0.017	0.142	0.134	0.000015			1.36
Run 4 Average					**14.50**	**0.016**	**0.138**	**0.130**	**0.000015**	**22.67**	**11.34**	**1.32**
5A	4/26/2011	12:50	13:50	103.036	32.30	0.038	0.313	0.297	0.000035	22.70	11.35	3.08
5B	4/26/2011	12:50	13:50	103.507	32.50	0.038	0.314	0.297	0.000035			3.09
Run 5 Average					**32.40**	**0.038**	**0.314**	**0.300**	**0.000035**	**22.70**	**11.35**	**3.08**
6A	4/26/2011	14:20	15:20	101.578	7.30	0.009	0.072	0.068	0.000008	22.80	11.40	0.70
6B	4/26/2011	14:20	15:20	101.426	5.30	0.006	0.052	0.049	0.000006			0.51
Run 6 Average					**6.30**	**0.007**	**0.062**	**0.060**	**0.000007**	**22.80**	**11.40**	**0.61**
Overall Average					**11.64**	**0.013**	**0.112**	**0.107**	**0.000012**	**22.66**	**11.33**	**1.09**

Speciated Method 30B Mercury Test Results Summary
Western Lime - Eden, Wisconsin
Kiln 1 Stack

Test No.	Date	Start Time	End Time	V_m (standard L)	ng detected	ppb	ug/dscm	ug/wscm	lb/hr	Stone Feed	Lime	lb Hg/mm tons of lime
1A-Oxidized	4/26/2011	7:15	8:15	56.121	1.50	0.003	0.027	0.030	0.000004	22.62	11.31	0.32
1A-Elemental	4/26/2011	7:15	8:15	56.121	0.20	0.000	0.004	0.000	0.000000			0.00
Run 1A Total					**1.70**	**0.004**	**0.030**	**0.030**	**0.000004**	**22.62**	**11.31**	**0.32**
1B-Oxidized	4/26/2011	7:15	8:15	55.632	0.70	0.002	0.013	0.010	0.000001	22.62	11.31	0.11
1B-Elemental	4/26/2011	7:15	8:15	55.632	0.00	0.000	0.000	0.000	0.000000			0.00
Run 1B Total					**0.70**	**0.002**	**0.013**	**0.010**	**0.000001**	**22.62**	**11.31**	**0.11**
2A-Oxidized	4/26/2011	8:45	9:45	55.206	0.70	0.002	0.013	0.012	0.000001	22.45	11.23	0.13
2A-Elemental	4/26/2011	8:45	9:45	55.206	1.70	0.004	0.031	0.029	0.000003			0.31
Run 2A Total					**2.40**	**0.005**	**0.043**	**0.041**	**0.000005**	**22.45**	**11.23**	**0.44**
2B-Oxidized	4/26/2011	8:45	9:45	54.510	0.90	0.002	0.017	0.016	0.000002	22.45	11.23	0.17
2B-Elemental	4/26/2011	8:45	9:45	54.510	1.90	0.004	0.035	0.033	0.000004			0.35
Run 2B Total					**2.80**	**0.006**	**0.051**	**0.049**	**0.000006**	**22.45**	**11.23**	**0.51**
3A-Oxidized	4/26/2011	10:10	11:10	51.214	1.20	0.003	0.023	0.022	0.000003	22.70	11.35	0.22
3A-Elemental	4/26/2011	10:10	11:10	51.214	2.00	0.005	0.039	0.037	0.000004			0.37
Run 3A Total					**3.20**	**0.007**	**0.062**	**0.059**	**0.000007**	**22.70**	**11.35**	**0.60**
3B-Oxidized	4/26/2011	10:10	11:10	50.431	1.00	0.002	0.020	0.019	0.000002	22.70	11.35	0.19
3B-Elemental	4/26/2011	10:10	11:10	50.431	2.30	0.005	0.046	0.043	0.000005			0.44
Run 3B Total					**3.30**	**0.008**	**0.065**	**0.061**	**0.000007**	**22.70**	**11.35**	**0.62**
4A-Oxidized	4/26/2011	11:30	12:30	47.502	0.60	0.002	0.013	0.012	0.000001	22.67	11.34	0.12
4A-Elemental	4/26/2011	11:30	12:30	47.502	4.70	0.012	0.099	0.093	0.000011			0.95
Run 4A Total					**5.30**	**0.013**	**0.112**	**0.105**	**0.000012**	**22.67**	**11.34**	**1.07**
4B-Oxidized	4/26/2011	11:30	12:30	46.215	0.90	0.002	0.019	0.018	0.000002	22.67	11.34	0.19
4B-Elemental	4/26/2011	11:30	12:30	46.215	4.90	0.013	0.106	0.100	0.000011			1.01
Run 4B Total					**5.80**	**0.015**	**0.125**	**0.118**	**0.000014**	**22.67**	**11.34**	**1.20**
5A-Oxidized	4/26/2011	12:50	13:50	38.971	0.80	0.002	0.021	0.019	0.000002	22.70	11.35	0.20
5A-Elemental	4/26/2011	12:50	13:50	38.971	13.00	0.040	0.334	0.316	0.000037			3.28
Run 5A Total					**13.80**	**0.042**	**0.354**	**0.335**	**0.000039**	**22.70**	**11.35**	**3.48**
5B-Oxidized	4/26/2011	12:50	13:50	38.629	0.80	0.002	0.021	0.020	0.000002	22.70	11.35	0.20
5B-Elemental	4/26/2011	12:50	13:50	38.629	12.30	0.038	0.318	0.302	0.000036			3.13
Run 5B Total					**13.10**	**0.041**	**0.339**	**0.321**	**0.000038**	**22.70**	**11.35**	**3.33**
6A-Oxidized	4/26/2011	14:20	15:20	47.119	0.40	0.001	0.008	0.008	0.000001	22.80	11.40	0.08
6A-Elemental	4/26/2011	14:20	15:20	47.119	3.10	0.008	0.066	0.062	0.000007			0.64
Run 6A Total					**3.50**	**0.009**	**0.074**	**0.070**	**0.000008**	**22.80**	**11.40**	**0.73**
6B-Oxidized	4/26/2011	14:20	15:20	47.193	0.20	0.001	0.004	0.004	0.000000	22.80	11.40	0.04
6B-Elemental	4/26/2011	14:20	15:20	47.193	4.00	0.010	0.085	0.080	0.000009			0.83
Run 6B Total					**4.20**	**0.011**	**0.089**	**0.084**	**0.000010**	**22.80**	**11.40**	**0.87**
Oxidized Overall Average					**0.81**	**0.002**	**0.016**	**0.016**	**0.000002**	**22.66**	**11.33**	**0.18**
Elemental Overall Average					**4.18**	**0.012**	**0.097**	**0.091**	**0.000011**			**0.92**
Total Overall Average					**4.98**	**0.014**	**0.113**	**0.107**	**0.000013**			**1.10**

Standard Method 30B Mercury Test Results Summary
Western Lime - Eden, Wisconsin
Kiln 2 Stack

Test No.	Date	Start Time	End Time	V_m (standard L)	ng detected	ppb	ug/dscm	ug/wscm	lb/hr	Stone Feed	Lime	lb Hg/mm tons of lime
1A	4/27/2011	7:20	8:20	57.155	142.40	0.299	2.491	2.370	0.000290	40.60	20.30	14.30
1B	4/27/2011	7:20	8:20	57.094	132.40	0.278	2.319	2.208	0.000270			13.32
Run 1 Average					**137.40**	**0.288**	**2.405**	**2.290**	**0.000280**	**40.60**	**20.30**	**13.81**
2A	4/27/2011	8:45	9:45	45.912	111.40	0.291	2.426	2.310	0.000283	40.60	20.30	13.94
2B	4/27/2011	8:45	9:45	45.779	107.90	0.283	2.357	2.244	0.000275			13.54
Run 2 Average					**109.65**	**0.287**	**2.392**	**2.280**	**0.000279**	**40.60**	**20.30**	**13.74**
3A	4/27/2011	10:10	11:10	45.427	129.00	0.340	2.840	2.689	0.000319	40.60	20.30	15.71
3B	4/27/2011	10:10	11:10	45.259	128.70	0.341	2.844	2.693	0.000319			15.73
Run 3 Average					**128.85**	**0.341**	**2.842**	**2.690**	**0.000319**	**40.60**	**20.30**	**15.72**
4A	4/27/2011	11:45	12:45	45.212	102.30	0.271	2.263	2.143	0.000254	40.60	20.30	12.52
4B	4/27/2011	11:45	12:45	45.194	109.10	0.289	2.414	2.286	0.000271			13.35
Run 4 Average					**105.70**	**0.280**	**2.338**	**2.210**	**0.000263**	**40.60**	**20.30**	**12.94**
5A	4/27/2011	13:05	14:05	45.224	115.10	0.305	2.545	2.405	0.000287	40.60	20.30	14.12
5B	4/27/2011	13:05	14:05	45.063	118.90	0.316	2.639	2.493	0.000297			14.63
Run 5 Average					**117.00**	**0.311**	**2.592**	**2.450**	**0.000292**	**40.60**	**20.30**	**14.37**
6A	4/27/2011	14:35	15:35	45.109	110.10	0.293	2.441	2.307	0.000275	40.60	20.30	13.54
6B	4/27/2011	14:35	15:35	44.891	118.80	0.317	2.646	2.501	0.000298			14.68
Run 6 Average					**114.45**	**0.305**	**2.544**	**2.400**	**0.000286**	**40.60**	**20.30**	**14.11**
Overall Average					**118.84**	**0.302**	**2.519**	**2.387**	**0.000287**	**40.60**	**20.30**	**14.11**

Speciated Method 30B Mercury Test Results Summary
Western Lime - Eden, Wisconsin
Kiln 2 Stack

Test No.	Date	Start Time	End Time	V_m (standard L)	ng detected	ppb	ug/dscm	ug/wscm	lb/hr	Stone Feed	Lime	lb Hg/mm tons of lime
1A-Oxidized	4/27/2011	7:20	8:20	52.925	42.40	0.096	0.801	0.760	0.000093	40.60	20.30	4.59
1A-Elemental	4/27/2011	7:20	8:20	52.925	104.80	0.237	1.980	1.890	0.000231			11.40
Run 1A Total					**147.20**	**0.333**	**2.781**	**2.650**	**0.000325**	**40.60**	**20.30**	**15.99**
1B-Oxidized	4/27/2011	7:20	8:20	52.518	45.20	0.103	0.861	0.820	0.000100	40.60	20.30	4.95
1B-Elemental	4/27/2011	7:20	8:20	52.518	101.00	0.231	1.923	1.830	0.000224			11.04
Run 1B Total					**146.20**	**0.334**	**2.784**	**2.650**	**0.000325**	**40.60**	**20.30**	**15.99**
2A-Oxidized	4/27/2011	8:45	9:45	45.954	8.60	0.022	0.187	0.178	0.000022	40.60	20.30	1.07
2A-Elemental	4/27/2011	8:45	9:45	45.954	101.70	0.265	2.213	2.107	0.000258			12.71
Run 2A Total					**110.30**	**0.288**	**2.400**	**2.285**	**0.000280**	**40.60**	**20.30**	**13.79**
2B-Oxidized	4/27/2011	8:45	9:45	45.704	12.80	0.034	0.280	0.267	0.000033	40.60	20.30	1.61
2B-Elemental	4/27/2011	8:45	9:45	45.704	100.20	0.263	2.192	2.087	0.000256			12.59
Run 2B Total					**113.00**	**0.296**	**2.472**	**2.354**	**0.000288**	**40.60**	**20.30**	**14.20**
3A-Oxidized	4/27/2011	10:10	11:10	52.062	18.90	0.044	0.363	0.344	0.000041	40.60	20.30	2.01
3A-Elemental	4/27/2011	10:10	11:10	52.062	128.50	0.296	2.468	2.337	0.000277			13.65
Run 3A Total					**147.40**	**0.339**	**2.831**	**2.681**	**0.000318**	**40.60**	**20.30**	**15.66**
3B-Oxidized	4/27/2011	10:10	11:10	51.729	26.80	0.062	0.518	0.491	0.000058	40.60	20.30	2.87
3B-Elemental	4/27/2011	10:10	11:10	51.729	126.20	0.292	2.440	2.310	0.000274			13.50
Run 3B Total					**153.00**	**0.355**	**2.958**	**2.801**	**0.000332**	**40.60**	**20.30**	**16.36**
4A-Oxidized	4/27/2011	11:45	12:45	48.953	16.00	0.039	0.327	0.310	0.000037	40.60	20.30	1.81
4A-Elemental	4/27/2011	11:45	12:45	48.953	103.70	0.254	2.118	2.006	0.000238			11.72
Run 4A Total					**119.70**	**0.293**	**2.445**	**2.316**	**0.000275**	**40.60**	**20.30**	**13.53**
4B-Oxidized	4/27/2011	11:45	12:45	48.601	17.60	0.043	0.362	0.343	0.000041	40.60	20.30	2.00
4B-Elemental	4/27/2011	11:45	12:45	48.601	101.40	0.250	2.086	1.976	0.000234			11.54
Run 4B Total					**119.00**	**0.294**	**2.449**	**2.319**	**0.000275**	**40.60**	**20.30**	**13.55**
5A-Oxidized	4/27/2011	13:05	14:05	47.869	12.30	0.031	0.257	0.243	0.000029	40.60	20.30	1.43
5A-Elemental	4/27/2011	13:05	14:05	47.869	122.40	0.307	2.557	2.416	0.000288			14.18
Run 5A Total					**134.70**	**0.337**	**2.814**	**2.659**	**0.000317**	**40.60**	**20.30**	**15.61**
5B-Oxidized	4/27/2011	13:05	14:05	47.618	14.60	0.037	0.307	0.290	0.000035	40.60	20.30	1.70
5B-Elemental	4/27/2011	13:05	14:05	47.618	114.30	0.288	2.400	2.268	0.000270			13.31
Run 5B Total					**128.90**	**0.324**	**2.707**	**2.558**	**0.000305**	**40.60**	**20.30**	**15.01**
6A-Oxidized	4/27/2011	14:35	15:35	47.915	19.50	0.049	0.407	0.385	0.000046	40.60	20.30	2.26
6A-Elemental	4/27/2011	14:35	15:35	47.915	113.20	0.283	2.363	2.233	0.000266			13.10
Run 6A Total					**132.70**	**0.332**	**2.769**	**2.617**	**0.000312**	**40.60**	**20.30**	**15.36**
6B-Oxidized	4/27/2011	14:35	15:35	47.517	22.60	0.057	0.476	0.449	0.000054	40.60	20.30	2.64
6B-Elemental	4/27/2011	14:35	15:35	47.517	109.50	0.276	2.304	2.178	0.000259			12.78
Run 6B Total					**132.10**	**0.333**	**2.780**	**2.627**	**0.000313**	**40.60**	**20.30**	**15.42**
Oxidized Overall Average					**21.44**	**0.051**	**0.429**	**0.407**	**0.000049**			**2.19**
Elemental Overall Average					**110.58**	**0.270**	**2.254**	**2.137**	**0.000256**	**40.60**	**20.30**	**12.80**
Total Overall Average					**132.02**	**0.322**	**2.683**	**2.543**	**0.000305**			**14.99**

National Lime Association (Western Lime) - Hg Solid Analyses

Samples were dried before analyses

Stone

Daily Samples	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
3/21/11	0.6392	0.5	0.78	0	0.78
3/22/11	0.6249	0.4	0.64	0	0.64
3/23/11	0.7535	0.7	0.93	0	0.93
3/24/11	0.6321	0.5	0.79	0	0.79
3/25/11	0.6300	0.5	0.79	0	0.79
Composite Samples					
Comp Week 1	0.6202	0.5	0.81	0	0.81
Comp Week 2	1.0135	1.5	1.48	0	1.48
Comp Week 3	0.8937	1.0	1.12	0	1.12
Comp Week 4	1.0585	1.3	1.23	0	1.23
STACK TEST DAYS	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
4/26/11	0.9978	0.7	0.70	0	0.70
4/27/11	1.0088	0.8	0.79	0	0.79

National Lime Association (Western Lime) - Hg Solid Analyses

Samples were dried before analyses

Lime Kiln Dust

	Kiln 1						Kiln 2				
Daily Samples	Mass (g)	ng Hg	ppb	% H_2O	ppb dry	Daily Samples	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
3/21/11	1.0196	120	117.69	0	117.69	3/21/11	0.6592	16	24.27	0	24.27
3/22/11	1.0439	121	115.91	0	115.91	3/22/11	0.6621	12	18.12	0	18.12
3/23/11	1.0510	149	141.77	0	141.77	3/23/11	0.6634	10	15.07	0	15.07
3/24/11	1.1601	164	141.37	0	141.37	3/24/11	0.6409	11	17.16	0	17.16
3/25/11	1.0498	153	145.74	0	145.74	3/25/11	0.6635	18	27.13	0	27.13
Composite Samples						Composite Samples					
Comp Week 1	0.9453	122	129.06	0	129.06	Comp Week 1	0.6703	12	17.90	0	17.90
Comp Week 2	0.5136	78	151.87	0	151.87	Comp Week 2	0.5694	15	26.34	0	26.34
Comp Week 3	0.6715	77	114.67	0	114.67	Comp Week 3	0.6346	16	25.21	0	25.21
Comp Week 4	0.6248	97	155.25	0	155.25	Comp Week 4	0.6219	13	20.90	0	20.90
STACK TEST DAYS	Mass (g)	ng Hg	ppb	% H_2O	ppb dry	STACK TEST DAYS	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
4//26/11 - 1A	0.5009	29	57.90	0	57.90	4/27/11	0.4980	9.7	19.48	0	19.48
4/26/11 - 1B	0.4927	29	58.86	0	58.86						
Run Average	0.4968	29	58.38	0	58.38						

National Lime Association (Western Lime) - Hg Solid Analyses

Samples were dried before analyses

Fuel

Composite Samples	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
Comp Week 1A (in-house rerun)	0.2362	3	12.70	0	12.70
Comp Week 1B (in-house rerun)	0.2040	3.6	17.65	0	17.65
Comp Week 1 (field run)	0.2006	10	49.85	0	49.85
Comp Week 2 (In-house rerun)	0.2058	9.1	44.22	0	44.22
Comp Week 2	0.2692	13	48.29	0	48.29
Comp Week 3A (in-house rerun)	0.2036	9.5	46.66	0	46.66
Comp Week 3B (in-house rerun)	0.2069	4.8	23.20	0	23.20
Comp Week 3	0.2079	10	48.10	0	48.10
Comp Week 4A (in-house rerun)	0.2384	5.4	22.65	0	22.65
Comp Week 4B (in-house rerun)	0.2079	6	28.86	0	28.86
Comp Week 4	0.2456	10	40.72	0	40.72

STACK TEST DAYS	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
4/26/11	0.2363	6.5	27.51	0	27.51
4/27/11	0.2080	8.2	39.42	0	39.42
Run Average	0.22215	7.35	33.47	0	33.47

National Lime Association (Western Lime) - Hg Solid Analyses

Samples were dried before analyses

Lime K1

Daily Samples	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
3/21/11	0.6222	0.4	0.64	0	0.64
3/22/11	0.6074	0.6	0.99	0	0.99
3/23/11	0.6684	0.3	0.45	0	0.45
3/24/11	0.7316	0.5	0.68	0	0.68
3/25/11	0.6182	0.1	0.16	0	0.16
Composite Samples					
Comp Week 1	0.6610	0.3	0.45	0	0.45
Comp Week 2	0.5897	0.5	0.85	0	0.85
Comp Week 3	0.7266	0.3	0.41	0	0.41
Comp Week 4	0.6118	0.5	0.82	0	0.82

STACK TEST DAYS	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
4/26/2011	0.5046	0.5	0.99	0	0.99

National Lime Association (Western Lime) - Hg Solid Analyses

Samples were dried before analyses

Lime K2

Daily Samples	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
3/21/11	0.5031	0.1	0.20	0	0.20
3/21/11	0.4940	0.0	0.00	0	0.00
3/22/11	0.5060	0.1	0.20	0	0.20
3/22/11	0.5078	0.0	0.00	0	0.00
3/23/11	0.4971	0.0	0.00	0	0.00
3/23/11	0.4923	0.0	0.00	0	0.00
3/24/11	0.5035	0.0	0.00	0	0.00
3/24/11	0.4957	0.0	0.00	0	0.00
3/25/11	0.5037	0.0	0.00	0	0.00
3/25/11	0.4946	0.1	0.20	0	0.20
Composite Samples					
Comp Week 1	0.5025	0.0	0.00	0	0.00
Comp Week 1	0.4932	0.0	0.00	0	0.00
Comp Week 2	0.6400	0.5	0.78	0	0.78
Comp Week 3	0.6088	0.5	0.82	0	0.82
Comp Week 4	0.6763	0.5	0.74	0	0.74
STACK TEST DAYS	Mass (g)	ng Hg	ppb	% H_2O	ppb dry
4/27/11	0.5096	0.3	0.59	0	0.59

5.0 OPERATING DATA

Operating data was recorded and retained by Western Lime personnel during each test run.

6.0 CONCLUSION AND CERTIFICATION

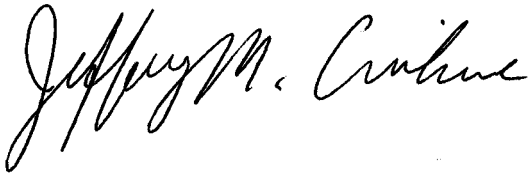
PLATT ENVIRONMENTAL SERVICES is pleased to have been of service to National Lime Association and to Western Lime. If you have any questions regarding this test report, please do not hesitate to contact us at 630-521-9400.

CERTIFICATION

As program manager, I hereby certify that this test report represents a true and accurate summary of emissions test results and the methodologies employed to obtain those results, and the test program was performed in accordance with the methods specified in this test report.

PLATT ENVIRONMENTAL SERVICES

_____ Program Manager
Eric L. Ehlers



_____ Quality Assurance
Jeffrey M. Crivlare

APPENDIX