

Report of...

Compliance Emission Testing

Performed for the...

Michigan Sugar Company
Bay City, Michigan

On the...

Lime Kiln Exhaust

January 22, 2015

022.25

RECEIVED

FEB 19 2015

AIR QUALITY DIV.

Network Environmental, Inc.
Grand Rapids, MI

I. INTRODUCTION

Network Environmental, Inc. was retained by the Michigan Sugar Company to perform compliance emission sampling on the exhaust of the Lime Kiln located at their Bay City, Michigan facility. The purpose of the study was to meet the testing requirements of Michigan Department of Environmental Quality (MDEQ) – Air Quality Division Permit to Install No. 91-07A. MDEQ Air Permit No. 91-07A has established the following emission limits for this source:

Pollutant	Emission Limit	
PM	0.20 Lbs/1000Lbs gas, Dry	
SO ₂	8.0 Lbs/Hr	35.0 Tons/Year

The following reference test methods were employed to conduct the sampling:

- PM – U.S. EPA Methods 17
- SO₂ – U.S. EPA Method 6C
- Exhaust Gas Parameters – U.S. EPA Methods 1 through 4

The sampling was performed on January 22, 2015 by Stephan K. Byrd, R. Scott Cargill, and Richard D. Eerdmans of Network Environmental, Inc.. Assisting with the study was Mr. Steve Smock of the Michigan Sugar Company. Mr. Tom Gasloli and Ms Sharon LeBlanc of the Michigan Department of Environmental Quality (MDEQ) – Air Quality Division were present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

**II.1 TABLE 1
PM EMISSION RESULTS SUMMARY
LIME KILN EXHAUST
MICHIGAN SUGAR COMPANY
BAY CITY, MICHIGAN
JANUARY 22, 2015**

Sample	Date	Time	Air Flow Rate DSCFM ⁽¹⁾	Concentration	Emission Rate
				Lbs/1000 Lbs, Dry ⁽²⁾	Lbs/Hr ⁽³⁾
1	1/22/15	9:31-10:34	438	0.0637	0.146
2	1/22/15	10:52-11:56	473	0.0728	0.179
3	1/22/15	12:18-13:21	490	0.0755	0.186
Average			467	0.0707	0.170

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)

(2) Lbs/1000 Lbs, Dry = Pounds of Particulate Per Thousand Pounds of Exhaust Gas on a Dry Basis

(3) Lbs/Hr = Pounds of Particulate Per Hour

**II.2 TABLE 2
SULFUR DIOXIDE (SO₂) EMISSION RESULTS SUMMARY
LIME KILN EXHAUST
MICHIGAN SUGAR COMPANY
BAY CITY, MICHIGAN
JANUARY 22, 2015**

Sample	Time	Air Flow Rate DSCFM ⁽¹⁾	Concentration	Emission Rate	
			PPM ⁽²⁾	Lbs/Hr ⁽³⁾	TPY ⁽⁴⁾
1	9:30-10:30	438	3.6	0.0169	0.0740
2	10:53-11:53	473	5.4	0.0262	0.1148
3	12:16-13:16	490	3.0	0.0139	0.0609
Average		467	4.0	0.0190	0.0832

(1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)

(2) PPM = Parts Per Million (v/v) On A Dry Basis

(3) Lbs/Hr = Pounds of SO₂ Per Hour (Non Detect @ 0.00871 Lbs/Hr and 0.0382 ton/Yr)

(4) TPY = Tons of SO₂ per year based on 8,760 hours per year of operation

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Tables 1 and 2 (Sections II.1 and II.2). The results are presented as follows:

III.1 PM Emission Results (Table 1)

Table 1 summarizes the PM emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 In. Hg)
- Particulate Concentration (Lbs/1000 Lbs, Dry) – Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

A more detailed breakdown for each sample can be found in Appendix A.

III.2 SO₂ Emission Results (Table 2)

Table 2 summarizes the SO₂ emission results as follows:

- Sample
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 In. Hg)
- SO₂ Concentration (PPM) – Parts Per Million (v/v) On A Dry Basis
- SO₂ Mass Emission Rate (Lbs/Hr) – Pounds of SO₂ Per Hour
- SO₂ Mass Emission Rate (TPY) – Tons of SO₂ Per Year (Calculated based on 8,760 hours per year of operation with actual normal operations being 5,200 hours per year or less)

A more detailed breakdown for each sample can be found in Appendix A.

IV. SAMPLING AND ANALYTICAL PROTOCOL

IV.1 PM – The particulate sampling was conducted in accordance with U.S. EPA Method 17. Method 17 is an in-stack filtration method. The samples were collected isokinetically on filters. Three (3) samples were collected from the Lime Kiln exhaust. Each sample was sixty (60) minutes in duration and had a minimum sample volume of thirty (30) dry standard cubic feet. The nozzle rinses and filters were analyzed gravimetrically for particulate in accordance with Method 17. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis. The particulate sampling train is shown in Figure 1.

IV.2 Sulfur Dioxide -

The SO₂ sampling was conducted in accordance with U.S. EPA Reference Method 6C. A Bovar Model 721-M gas analyzer was used to monitor the exhaust. The exhaust gas was extracted using a heated probe. A heated Teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzer. The analyzer produces instantaneous readouts of the SO₂ concentrations (PPM).

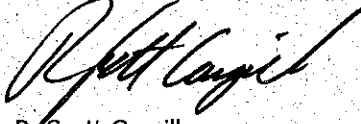
The analyzer was calibrated by direct injection prior to the testing. A span gas of 253.9 PPM was used to establish the initial instrument calibration. Calibration gases of 147.9 PPM and 94.72 PPM were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using the 94.72 PPM gas to determine the system bias. After each sample, a system zero and system injection of 94.72 PPM were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the exhaust. All quality assurance and quality control requirements specified in the method were incorporated in the performance of this determination. A diagram of the sampling train is shown in Figure 2.

IV.4 Exhaust Gas Parameters – The exhaust gas parameters (air flow rate, temperature, moisture and density) were determined in conjunction with the other sampling by employing U.S. EPA Methods 1 through 4. Oxygen and carbon dioxide content were determined in conjunction with the RATA by employing U.S. EPA Reference Method 3A. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

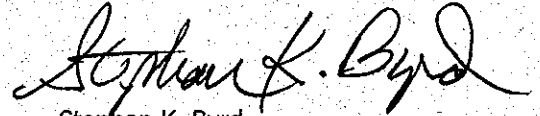
IV.5 Sampling Location – The sampling location for the Lime Kiln exhaust was on the 13 inch I.D. exhaust stack at a location that exceeded the maximum criteria of U.S. EPA Reference Method 1. A picture of the sampling location can be seen in Appendix F,

This report was prepared by:



R. Scott Cargill
Vice President

This report was reviewed by:



Stephan K. Byrd
President

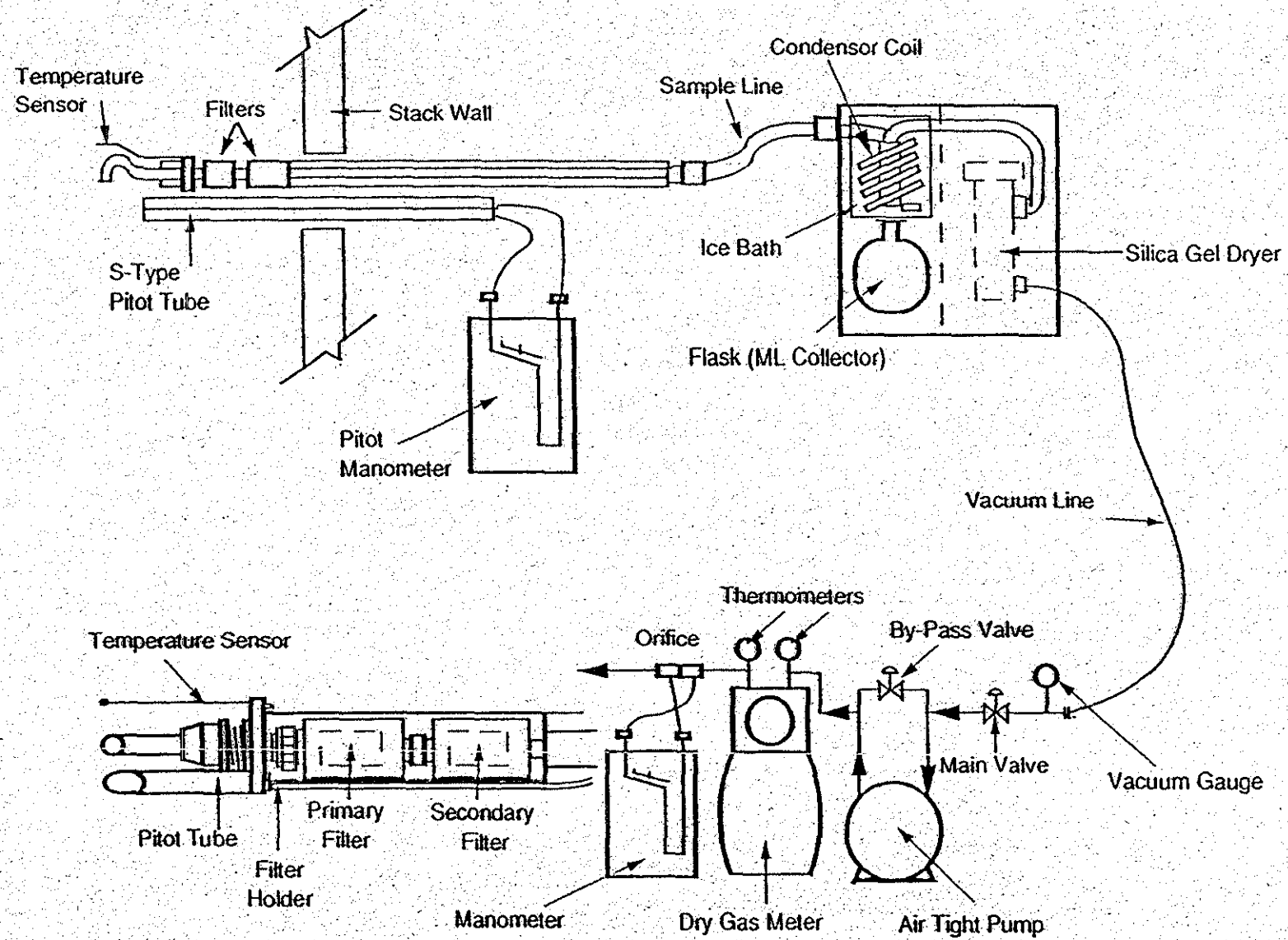


Figure 1
Particulate Sampling Train

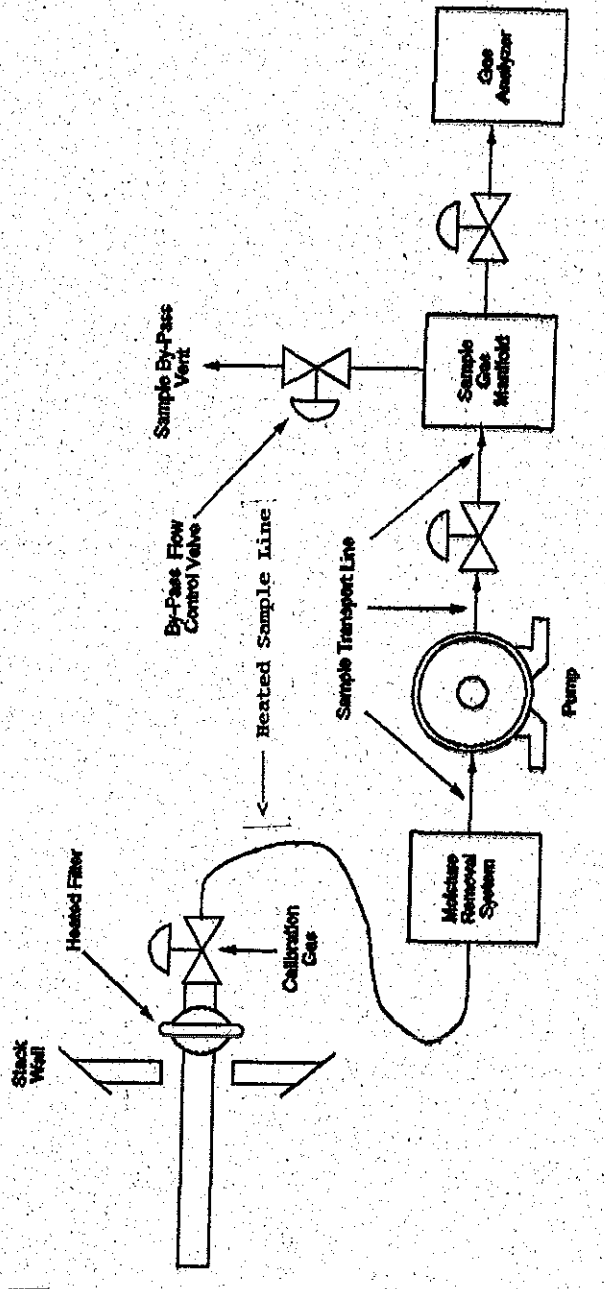


Figure 2
SO₂ Sampling Train