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Report of...

Compliance Emission Testing

performed for...

Biewer Sawmill, Inc.
McBain, Michigan

On the...

Wood Fired Boiler Exhaust

November 22, 2022

253.15

Network Environmental, Inc.
Grand Rapids, MI

Performed For:

**Biewer Sawmill, Inc.
6251 W Gerwoude
McBain, MI 49657
Contact: Chris Demel
Phone: (231) 825-2855
Cell: (989) 302-3278
e-mail: k.demel@biewerlumber.com**

Performed by:

**Network Environmental, Inc.
2629 Remico, Suite B
Grand Rapids, MI 49519
Contact: R. Scott Cargill
Phone: (616) 530-6330
Fax: (616) 530-0001
Cell: (616) 260-6802
e-mail: netenviro@aol.com**

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I. INTRODUCTION

Network Environmental, Inc. was retained by Biewer Sawmill of McBain, Michigan, to conduct emission sampling at their facility. The purpose of this project was to conduct total particulate (front half filterable and back half condensable) emission testing from the exhaust of the wood fired boiler in order to document compliance with Renewable Operating Permit (ROP) MI-ROP-N1722-2022. The boiler particulate emission limits are as follows:

Source	Pollutant	Emission Limit
Boiler Exhaust	Particulate	0.10 lbs./1000lbs. at 50% excess air
	PM-10	0.10 lbs./1000lbs. at 50% excess air
	Particulate	0.10 lbs./MMBtu heat input
	Particulate	6.04 pph
	PM-10	6.04 pph

Three (3) test runs were conducted on the exhaust for PM. Each test run was sixty (60) minutes in duration. Each PM test run had a minimum sample volume of thirty (30) dry standard cubic feet. The total particulate (front half filterable and back half condensable) emissions were determined by adding the condensable particulate to the filterable particulate.

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

- Particulate – U.S. EPA Methods 17 & 202
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Reference Methods 1 through 4.

The sampling was performed on November 22, 2022 by R. Scott Cargill and Richard D. Eerdmans of Network Environmental, Inc. Assisting with the sampling was Mr. Chris Demel of Biewer Sawmill. Mr. Rob Dickman and Mr. Kurt Childs of the EGLE – Air Quality Division were present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

**II.1 TABLE 1
TOTAL PARTICULATE⁽¹⁾ EMISSION RESULTS SUMMARY
WOOD FIRED BOILER EXHAUST
BIEWER SAWMILL
McBAIN, MICHIGAN
NOVEMBER 22, 2022**

Sample	Time	Air Flow Rate DSCFM ⁽²⁾	Lbs./1000lbs, Dry at 50% EA ⁽³⁾	Emission Rate Lbs/Hr ⁽⁴⁾
1	9:18-10:23	22,640	0.1438	8.272
2	11:09-12:15	22,579	0.1761	8.754
3	13:09-14:14	23,401	0.1423	8.638
Average		22,874	0.1541	8.555

(1) Total Particulate = Front Half Filterable Particulate Plus Back Half Condensable Particulate

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

(3) Lbs/1000 Lbs, Dry @50% EA = Pounds of Particulate Per Thousand pounds Of Exhaust Gas On A Dry Basis Corrected To Fifty Percent Excess Air

(4) Lbs/Hr = Pounds Of Particulate Per Hour

**II.2 TABLE 2
 FILTERABLE PARTICULATE⁽¹⁾ EMISSION RESULTS SUMMARY
 WOOD FIRED BOILER EXHAUST
 BIEWER SAWMILL
 McBAIN, MICHIGAN
 NOVEMBER 22, 2022**

Sample	Time	Air Flow Rate DSCFM ⁽²⁾	Lbs./1000lbs, Dry at 50% EA ⁽³⁾	Lbs/MMBtu heat Input (PM Only) ⁽⁴⁾	Emission Rate Lbs/Hr ⁽⁵⁾
1	9:18-10:23	22,640	0.1386	0.1531	7.972
2	11:09-12:15	22,579	0.1690	0.1871	8.402
3	13:09-14:14	23,401	0.1424	0.1574	8.240
Average		22,874	0.1500	0.1659	8.205

- (1) Total FilterableParticulate = Front Half Filterable Particulate Only
 (2) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
 (3) Lbs/1000 Lbs, Dry @50% EA = Pounds of Particulate Per Thousand pounds Of Exhaust Gas On A Dry Basis Corrected To Fifty Percent Excess Air
 (4) Lbs/MMBtu = Pounds Of Particulate Per Million BTU of Heat Input. Calculated Using The Formula Found in section 2.1 of Method 19 for O₂ On a dry Basis With An F Factor Of 9,240.
 (5) Lbs/Hr = Pounds Of Particulate Per Hour

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 Wood Fired Boiler Exhaust Total Particulate (Table 1)

Table 1 summarizes the total (Total Filterable PM and Back Half Condensable Particulate) particulate emission results for the Boiler Exhaust as follows:

- Sample

- Time
- Air Flow Rate (DSCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration – Lbs/1000 Lbs, Dry @ 50% Excess Air = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis Corrected To 50% Excess Air.
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

III.2 Wood Fired Boiler Exhaust Filterable Particulate (Table 2)

Table 2 summarizes only the filterable particulate emission results for the Boiler Exhaust as follows:

- Sample
- Time
- Air Flow Rate (DSCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Particulate Concentration – Lbs/1000 Lbs, Dry @ 50% Excess Air = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On A Dry Basis Corrected To 50% Excess Air.
- Particulate Mass Emission Rate - Lbs/MMBtu = Pounds of Particulate Per Million BTU of Heat Input. Calculated using the formula found in section 2.1 Of Method 19 For O₂ On a dry Basis With An F Factor Of 9,240.
- Particulate Mass Emission Rate (Lbs/Hr) – Pounds of Particulate Per Hour

IV. SOURCE DESCRIPTION

IV.1 Wood Fired Boiler Exhaust – The source tested was the exhaust of the wood fired boiler. The boiler is rated at 60.4 MMBtu/Hr heat input and 40,000 Lbs/Hr of steam output. There is an electrostatic precipitator (ESP) for emission control. Process operating data during the test can be found in Appendix B.

V. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location was as follows:

- The testing was performed on the 41 inch I.D. exhaust at a location approximately 5 duct diameters downstream and 2.5 duct diameters upstream from the nearest disturbances. There are 2 sample ports 90 degrees from each other on the same plane (Twenty 20)

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There are 2 sample ports 90 degrees from each other on the same plane. Twenty (20) sampling points (10 per port) were used for the isokinetic sampling. A cyclonic flow check was performed prior to testing and there was no cyclonic flow detected.

The sampling/traverse points for the inlet were as follows:

<u>Sample Point</u>	<u>Dimension (Inches)</u>
1	1.07
2	3.36
3	5.99
4	9.27
5	14.02
6	26.98
7	31.73
8	35.01
9	37.64
10	39.93

V.1 Particulate – The particulate (including back half condensable analysis) sampling was conducted in accordance with U.S. EPA Reference Methods 5 and 202. Method 5 is an out-stack filtration method using a heated filter and probe. The samples were collected isokinetically on filters and in an impinger train (dry impinger technique). Three (3) samples were collected from the wood fired boiler exhaust. Each sample was sixty (60) minutes in duration and had a minimal sample volume of thirty (30) dry standard cubic feet. The nozzle rinses and filter were analyzed gravimetrically for particulate in accordance with Method 5. The condensate (back half) was extracted and analyzed for particulate in accordance with Method 202. A nitrogen purge was conducted on all three samples per the method. All of the quality control procedures listed in the methods were incorporated in the sampling and analysis. The particulate and condensable sampling train is shown in Figure 1.

V.2 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. Air flow rates, temperatures and moistures were determined using the Method 5 sampling train. Bag samples were collected from the Method 5 sampling trains and analyzed for oxygen and carbon dioxide by

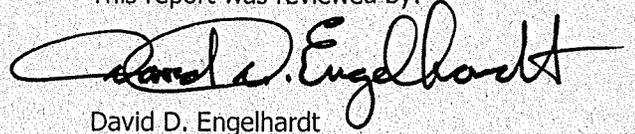
Orsat. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:



R. Scott Cargill
Project Manager

This report was reviewed by:



David D. Engelhardt
Vice President

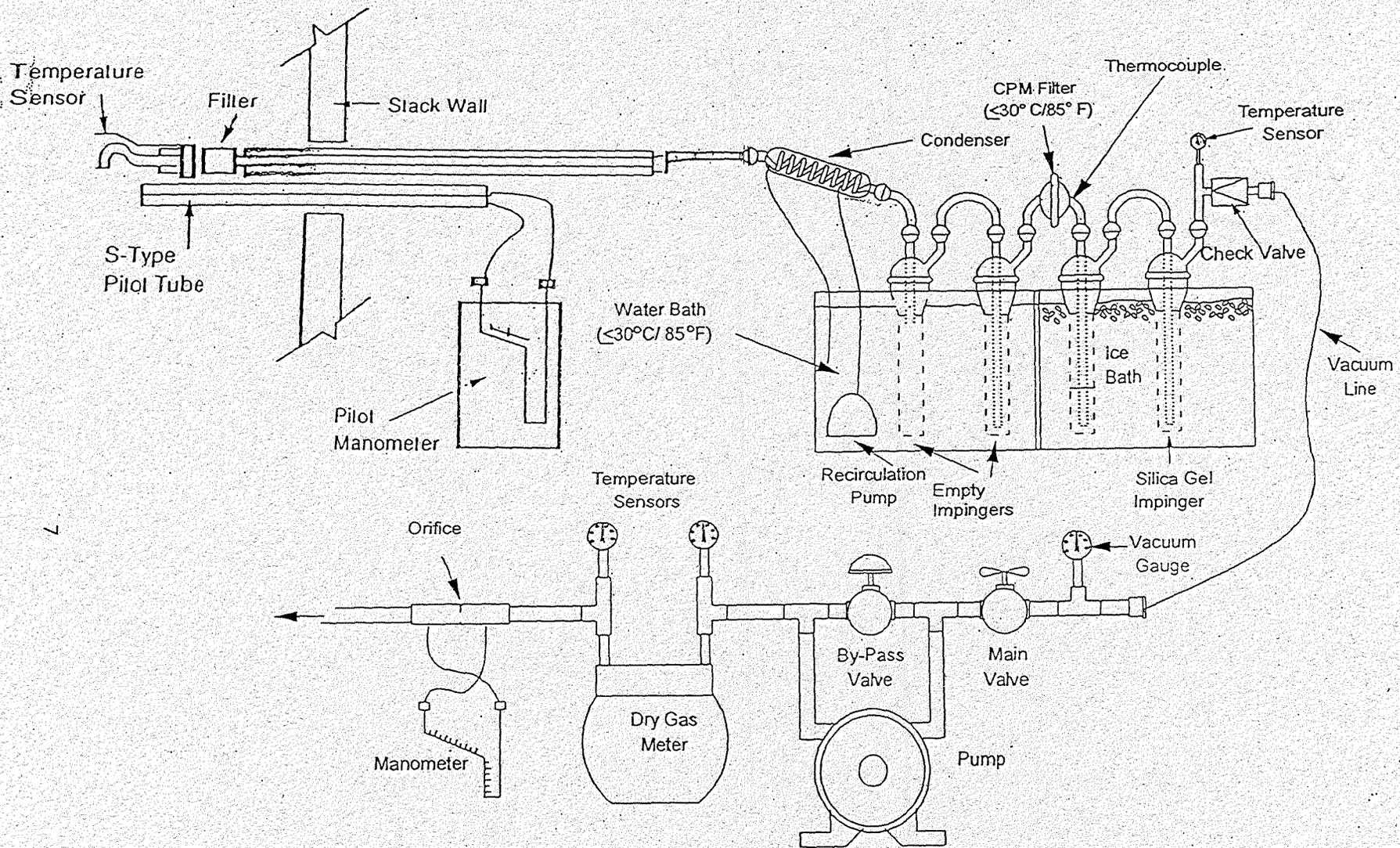


Figure 1
PM & PM₁₀ Sampling Train