

**RECEIVED**

DEC 18 2015

**AIR QUALITY DIV.**

Report of...

# Compliance Emission Testing

performed for...

## Holland Board of Public Works

James DeYoung Generating Station  
Holland, Michigan

on

## Unit 3 and 4 Boiler Exhausts

December 1 and 2, 2015

215.08

Network Environmental, Inc.  
Grand Rapids, MI

**Performed For:**

**Holland Board of Public Works  
James DeYoung Generating Station  
64 Pine Avenue  
Holland, Michigan 49423  
Contact: Judy Visscher  
Phone: (616) 3551210  
e-mail: [jvisscher@hollandbpw.com](mailto:jvisscher@hollandbpw.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  
e-mail: [netenviro@aol.com](mailto:netenviro@aol.com)**

## **TABLE OF CONTENTS**

	<u>Page</u>
I. Introduction	1
II. Presentation of Results	2-3
II.1 Table 1 – Particulate Emission Results Unit 3	2
II.2 Table 2 - Particulate Emission Results Unit 4	3
III. Discussion of Results	3
IV. Source Description and Operation	4
V. Sampling and Analytical Protocol	4-6
V.1 Particulates	4
V.3 Exhaust Gas Parameters	4-6
Figures – Particulate Sampling Train	7

## **Appendices**

Exhaust Gas Data	A
Field Data	B
Process Operating Data	C
Calculations	D
Raw Data	E

**RECEIVED**

DEC 18 2015

**AIR QUALITY DIV.**

**I. INTRODUCTION**

Network Environmental, Inc. was retained by Holland Board of Public Works in Holland, Michigan to perform compliance emission testing on their Boilers #3 and #4 exhausts. The purpose of the sampling was to document compliance with their Michigan Renewable Operating Permit MI-ROP-B2357-2014. The testing was for the following selected compound:

\* Particulate

Sampling was conducted on the exhaust by employing the following reference test methods:

\* Particulate - U.S. EPA Reference Method 17

\* Exhaust Gas Parameters (airflow rate, temperature, moisture & density) - U.S. EPA Methods 1-4

The particulate sampling was conducted on December 1 and 2, 2015. R. Scott Cargill and Richard D. Eerdmanis of Network Environmental, Inc. performed the testing. Ms. Judy Visscher of Holland BPW was present to observe the testing and coordinate source operation. Mr. Steve LaChance and Mr. Jeremy Howe of the MDEQ, Air Quality Division, were present to observe the testing and source operation.

## **II. PRESENTATION OF RESULTS**

**II.1 TABLE 1  
PARTICULATE EMISSION RESULTS  
HOLLAND BPW  
UNIT 3 EXHAUST  
DECEMBER 1, 2015**

Sample	Time	Air Flow Rate SCFM <sup>(1)</sup>	Particulate Concentration Lbs/1000Lbs, Wet @50%EA <sup>(2)</sup>	Particulate Mass Rates Lbs/Hr <sup>(3)</sup>
1 <sup>(4)</sup>	9:00-10:15	35,739	0.00510	0.890
2	10:36-11:45	35,695	0.00433	0.748
3	12:48-13:56	35,410	0.00464	0.784
<b>Average</b>		<b>35,615</b>	<b>0.00469</b>	<b>0.807</b>

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 In. Hg)

(2) Lbs/1000Lbs, Wet @50%EA = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On an Actual Basis Corrected to 50% Excess Air

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

(4) Soot was blown during Sample 1

**II.2 TABLE 2  
PARTICULATE EMISSION RESULTS  
HOLLAND BPW  
UNIT 4 EXHAUST  
DECEMBER 2, 2015**

Sample	Time	Air Flow Rate SCFM <sup>(1)</sup>	Particulate Concentration Lbs/1000Lbs Wet @50%EA <sup>(2)</sup>	Particulate Mass Rates Lbs/Hr <sup>(3)</sup>
1 <sup>(4)</sup>	8:38-9:49	71,246	0.00351	1.224
2	10:25-11:31	66,125	0.00374	1.208
3	12:43-13:52	66,111	0.00414	1.338
<b>Average</b>		<b>67,827</b>	<b>0.00380</b>	<b>1.256</b>

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 In. Hg)

(2) Lbs/1000Lbs, Wet @50%EA = Pounds of Particulate Per Thousand Pounds of Exhaust Gas On an Actual Basis Corrected to 50% Excess Air

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

(4) Soot was blown during Sample 1

### **III. DISCUSSION OF RESULTS**

The results of the emission testing performed on December 1 and 2, 2015 can be found in Section II, Tables II.1 and II.2. The results of the testing are expressed in terms of pounds of particulate per 1000 pounds of exhaust gas corrected to 50% excess air (Lbs/1000Lbs, @50% EA) and pounds of particulate per hour (Lbs/Hr).

The emission limits for these sources are 0.30 Lbs/1000Lbs @50% EA for Unit 3 and 0.26 Lbs/1000Lbs @50% EA for Unit 4.

#### **IV. SOURCE DESCRIPTION AND OPERATION**

Unit 3 is a Riley-stoker RP wall fired, dry bottom, coal and natural gas fired boiler. The exhaust gas is passed through a electrostatic precipitator (ESP) before being emitted to atmosphere. The rated capacity for Unit 3 is 11.5 Mega Watts (MW) and 125,000 pounds of steam per hour. The boiler operated at approximately 8.6-9 MW for the testing.

Unit 4 is a Riley-stoker r4-2 wall fired, dry bottom, coal and natural gas fired boiler. The exhaust gas is passed through a cyclone separator and ESP before being emitted to atmosphere. The rated capacity for Unit 4 is 22 Mega Watts (MW) and 220,000 pounds of steam per hour. The boiler operated at approximately 18 MW for the testing.

#### **V. SAMPLING AND ANALYTICAL PROTOCOL**

The determinations were preformed in accordance with the following sampling and analytical protocols.

**V.1 Particulate** - The particulate emission sampling was conducted in accordance with U.S. EPA Method 17. Figure 1 is a schematic diagram of the Method 17 sampling train. Method 17 is an in stack filtration method. Each sample had a minimum of sample volume of thirty (30) dry standard cubic feet. The samples were collected isokinetically on glass fiber filters. The filters and nozzle rinses were analyzed gravimetrically for weight gain for the particulate analysis. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

**V.2 Exhaust Gas Parameters** - The exhaust gas parameters (airflow rate, temperature, moisture, and density) were determined in conjunction with the other sampling by employing U.S. EPA Reference Methods 1 through 4. All the sampling was conducted on the exhaust stack. The sampling location on Unit 3 was on the 60x54 inch exhaust at a location approximately four (4) duct diameters downstream and four (4) duct diameters upstream from any disturbances. For

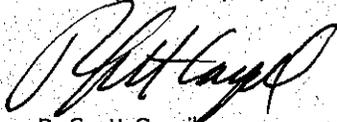
Unit 3, there were three sampling ports on the exhaust. A twenty-four (24) point (8 points per port) traverse was used to perform the sampling on Unit 3. The sampling location for Unit 4 was on the 78 inch exhaust at a location approximately 7 duct diameters downstream and greater than two (2) duct diameters to the exhaust. Unit 4 had two ports and twelve (12) sampling points were used for the traverse and testing. The traverse/sampling ports are as follows:

<b>Unit 3</b>	
<b>Point #</b>	<b>Point Location (Inches)</b>
1	3.75
2	11.25
3	18.75
4	26.25
5	33.75
6	41.25
7	48.75
8	56.25

<b>Unit 4</b>	
<b>Point #</b>	<b>Point Location (Inches)</b>
1	3.43
2	11.38
3	23.08
4	54.91
5	66.61
6	74.56

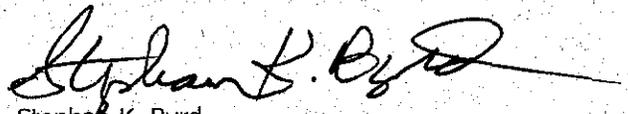
Bags were collected from each sampling train and analyzed for O<sub>2</sub> and CO<sub>2</sub> content by the Orsat method. The moisture was determined from the isokinetic sampling trains. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:



R. Scott Cargill  
Project Manager

This report was reviewed by:



Stephan K. Byrd  
President

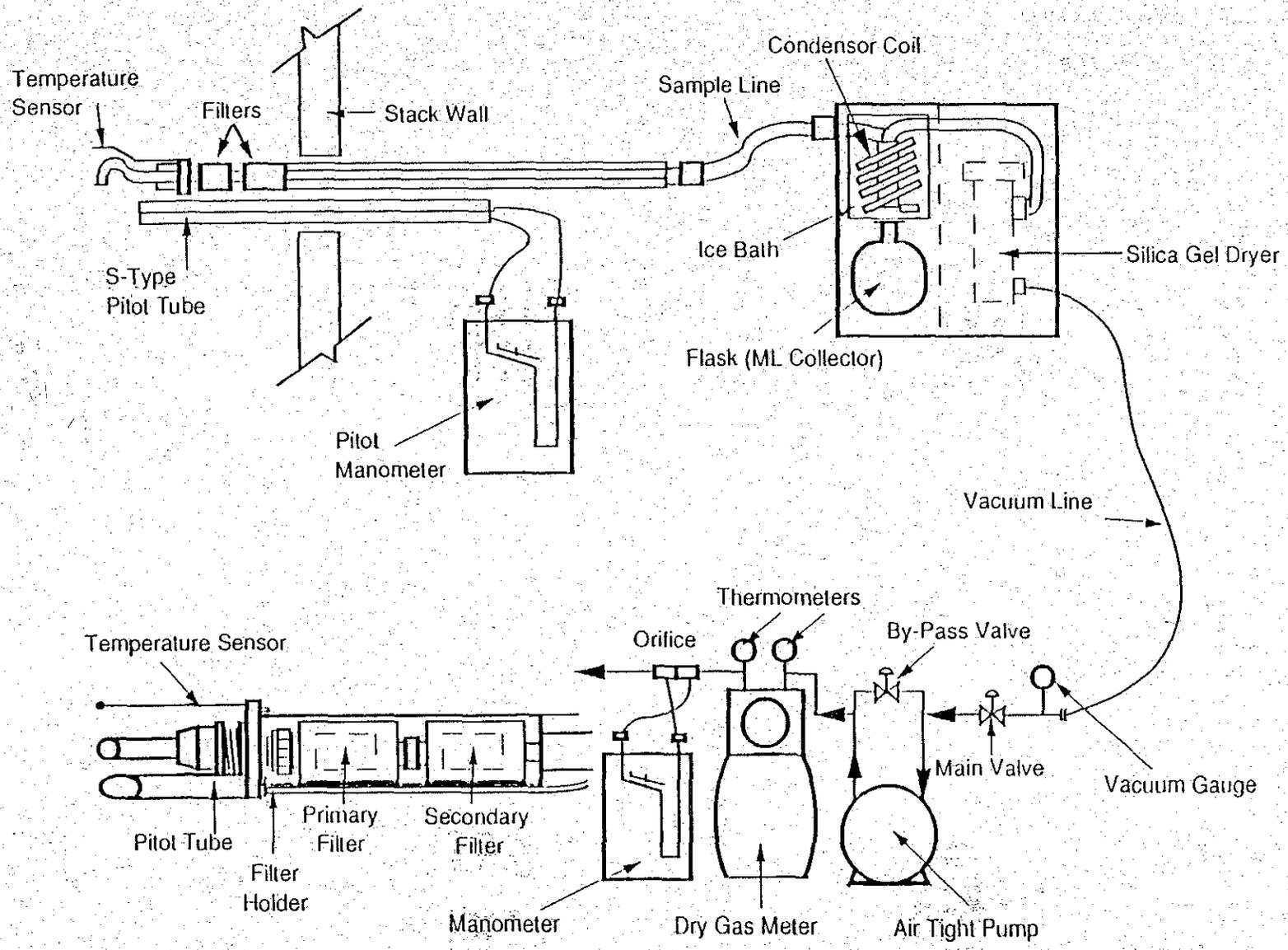


Figure 1  
Particulate Sampling Train