

I. INTRODUCTION

Network Environmental, Inc. was retained by the Genesee Power Station of Flint, Michigan to conduct an acrolein emission study at their facility. The purpose of the study was to meet the emission testing requirements of Renewable Operating Permit (ROP) No. MI-ROP-N3570-2018.

The following is a list of the applicable emission limits for the boiler exhaust:

Emission Limit(s)

Acrolein: 0.053 Lbs/Hr

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

- Acrolein – U.S. EPA Method 0011
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Methods 1- 4

The sampling was performed on August 5, 2020 by Stephan K. Byrd, R. Scott Cargill, Richard D. Eerdmans, and David D. Engelhardt of Network Environmental, Inc.. Assisting with the study were Ms. Roxanna Day of the Genesee Power Station, Ms. Kathryn Cunningham of CMS Energy and the operating staff of the facility. Ms. Regina Angellotti of the Michigan Department of Environment, Great Lakes and Energy (EGLE) – Air Quality Division was present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

**II.1 TABLE 1
ACROLEIN EMISSION RESULTS
WOOD FIRED BOILER EXHAUST
GENESEE POWER STATION
FLINT, MICHIGAN**

Sample	Date	Time	Air Flow Rate DSCFM ⁽¹⁾	Concentration	Mass Rates	
				Mg/M ³ (2)	Lbs/MMBTU ⁽³⁾	Lbs/Hr ⁽⁴⁾
1	8/5/20	12:59-13:47	95,929	0.028	1.93E-05	0.010
2	8/5/20	14:01-14:53	95,638	0.028	1.97E-05	0.010
3	8/5/20	15:46-16:42	96,873	0.054	3.71E-05	0.020
Average			96,147	0.037	2.54E-05	0.013

- (1) DSCFM = Dry Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 in. Hg)
- (2) Mg/M³ = Milligrams Per Dry Standard Cubic Meter.
- (3) Lbs/MMBTU = Pounds Per Million BTU Of Heat Input. Calculated Using EPA Method 19 (Equation 19-1) With An F_d Factor Of 9,260 DSCF/MMBTU. The F_d Factor was supplied by Genesee Power.
- (4) Lbs/Hr = Pounds Per Hour.

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Table 1 (Section II.1). The results are presented as follows:

III.1 Acrolein Emission Results (Table 1)

Table 1 summarizes the acrolein emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Acrolein Concentration (Mg/M³) – Milligrams of Acrolein Per Dry Standard Cubic Meter
- Acrolein Mass Emission Rates:
 - ◇ Lbs/Hr – Pounds of Acrolein Per Hour
 - ◇ Lbs/MMBTU – Pounds of Acrolein Per Million BTU of Heat Input (Calculated Using U.S. EPA Method 19 With An F-Factor of 9,260 DSCF/MMBTU)

IV. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location for the boiler exhaust was on the 94 inch diameter exhaust at a location approximately 6 duct diameters downstream and 20 duct diameters upstream from the nearest disturbances. Two (2) sample ports. Twelve (12) sampling points (6 per port) were used for the isokinetic sampling. The sampling point dimensions were as follows:

<u>Sample Point</u>	<u>Dimension (Inches)</u>
1	4.14
2	13.92
3	27.82
4	66.18
5	80.28
6	89.86

IV.1 Acrolein – The Acrolein emission sampling was conducted in accordance with U.S. EPA Method 0011. The sampling was performed isokinetically in accordance with the method. Three (3) samples were collected from the boiler exhaust. Each sample was forty-eight (48) minutes in duration. The acrolein was collected in the first two impingers of the sampling train, which contained 100 mls of dinitrophenylhydrazine (DNPH). Immediately following each sample, the probe rinse and the impinger catch were combined and a methylene chloride extraction was performed on the samples to separate the Acrolein from the DNPH. The samples were analyzed for Acrolein by high-pressure liquid chromatography (HPLC) as described in the method.

In addition to the three collected samples, a spiked duplicate sample (T-4) was performed for quality assurance purposes. The recovery for the spiked duplicate sample was 75.72%. All the quality assurance and quality control requirements specified in the method were incorporated in the sampling and analysis. A diagram of the sampling train is shown in Figure 1.

IV.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, moistures and densities were determined using the isokinetic sampling trains. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

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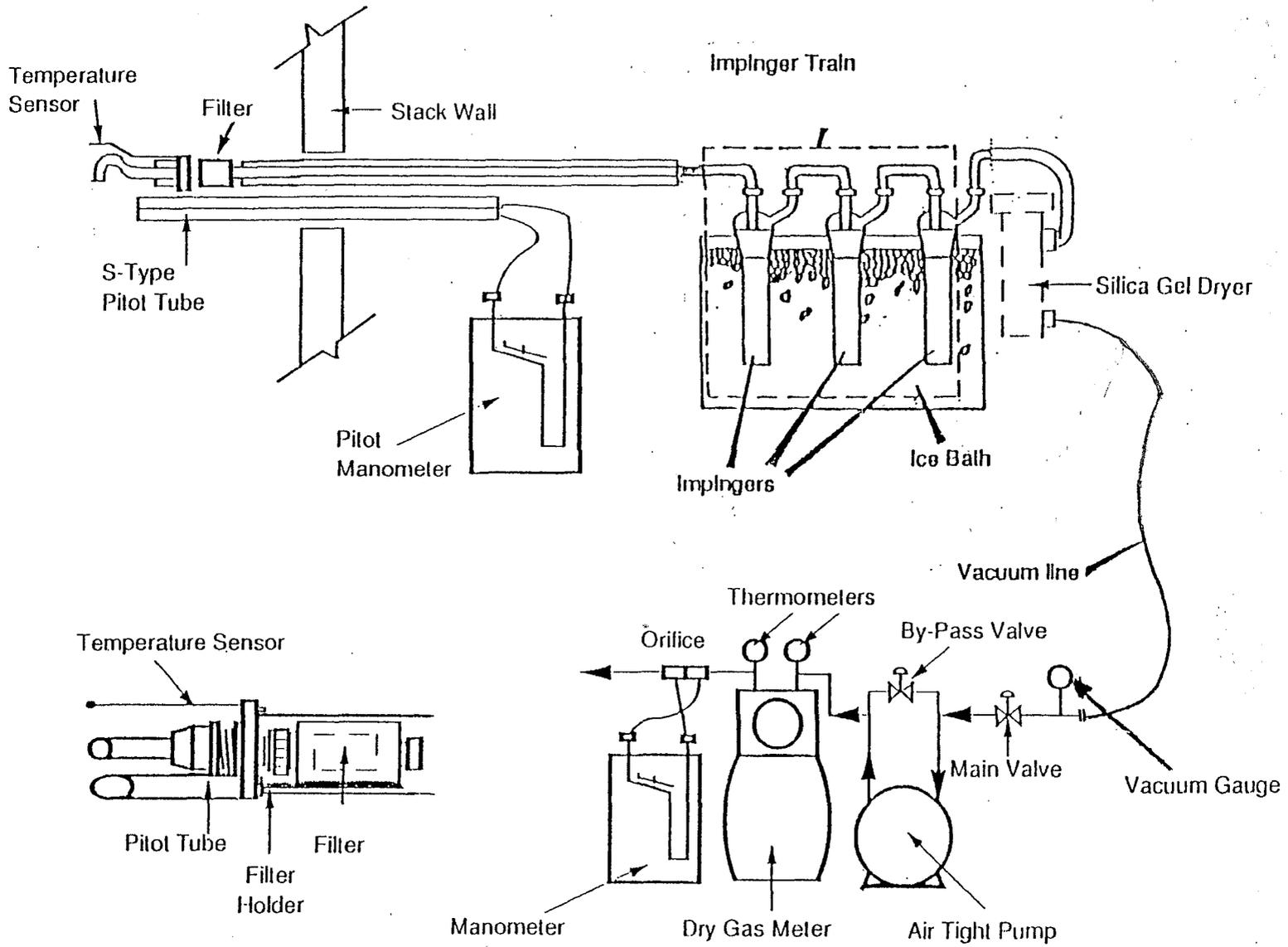


Figure 1
Acrolein
Sampling Train