

Performed for:

National Energy of Lincoln  
509 W. State Street  
Lincoln, MI 48742  
Contact: Robert Travis  
Telephone : (989) 736-6618 Ext: 1  
Cell: (989) 619-0580  
E-mail: robert.travis@nssccorp.com

Performed by:

Network Environmental, Inc.  
2629 Remico Street, Suite B  
Grand Rapids, MI 49519  
Contact: David D. Engelhardt  
Telephone: (616) 530-6330  
Fax: (616) 530-0001  
E-mail: netenviro@aol.com

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## **I. INTRODUCTION**

Network Environmental, Inc. was retained by National Energy of Lincoln, Michigan to perform an air flow study on their wood fired boiler. The purpose of the study was to document the air flow rate from the wood fired boiler under normal operating conditions.

The air flow sampling was performed on August 22, 2023. Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. conducted the sampling in accordance with the following reference test methods:

- Exhaust Gas Parameters – U.S. EPA Methods 1 through 4

Assisting with the study were Mr. Kenny Mumma and Mr. Robert Travis of National Energy of Lincoln. Mr. Dave Bowman and Mr. Daniel J. Droste of the Michigan Department of Environment, Great Lakes and Energy (EGLE) - Air Quality Division were present to observe the sampling and source operation.

## II. PRESENTATION OF RESULTS

**II.1 TABLE 1  
AIR FLOW RESULTS  
WOOD FIRED BOILER EXHAUST  
NATIONAL ENERGY  
LINCOLN, MICHIGAN  
AUGUST 22, 2023**

Sample	Time	Air Flow Rates	
		SCFM <sup>(1)</sup>	DSCFM <sup>(2)</sup>
1	16:55-17:05	64,319	51,063
2	18:04-18:14	63,517	50,426
3	18:25-18:35	63,487	50,402
<b>Average</b>		<b>63,774</b>	<b>50,630</b>

(1) SCFM = Standard Cubic Feet Per Minute (Standard Temperature & Pressure = 68 °F & 29.92 in. Hg)

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

### III. SAMPLING AND ANALYTICAL PROTOCOL

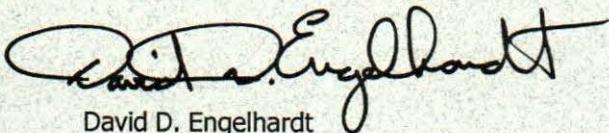
**III.1 Moisture** – The moisture sample was collected in accordance with U.S. EPA Method 4. The sample was withdrawn from the stack and passed through a condensing coil with drop out before being passed through pre-weighed silica gel. The water collected was measured to the nearest 1 ml and the silica gel was re-weighed to the nearest 0.5 g. The moisture collected along with the sample volume was used to determine the percent moisture in the exhaust. The sample was thirty (30) minutes in duration and had a minimum sample volume of twenty-one (21) standard cubic feet. A diagram of the moisture sampling train is shown in Figure 1.

**III.2 Air Flows** – The air flow rates were determined by employing U.S. EPA Reference Methods 1 and 2. The sampling for the source was conducted on the 71 inch I.D. exhaust stack. A total of 12 traverse points were used for the air flow determinations. The sample point dimensions are shown in Appendix C.

Velocity pressures were determined using an S-Type pitot tube. Temperatures were measured using a Type K thermocouple. A diagram of the air flow sampling train is shown in Figure 2.

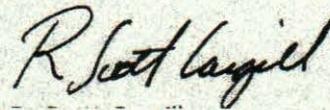
**III.3 Gas Density** – The gas density was determined by collecting an integrated bag sample from the exhaust of the moisture sampling train and ORSAT analysis.

This report was prepared by:

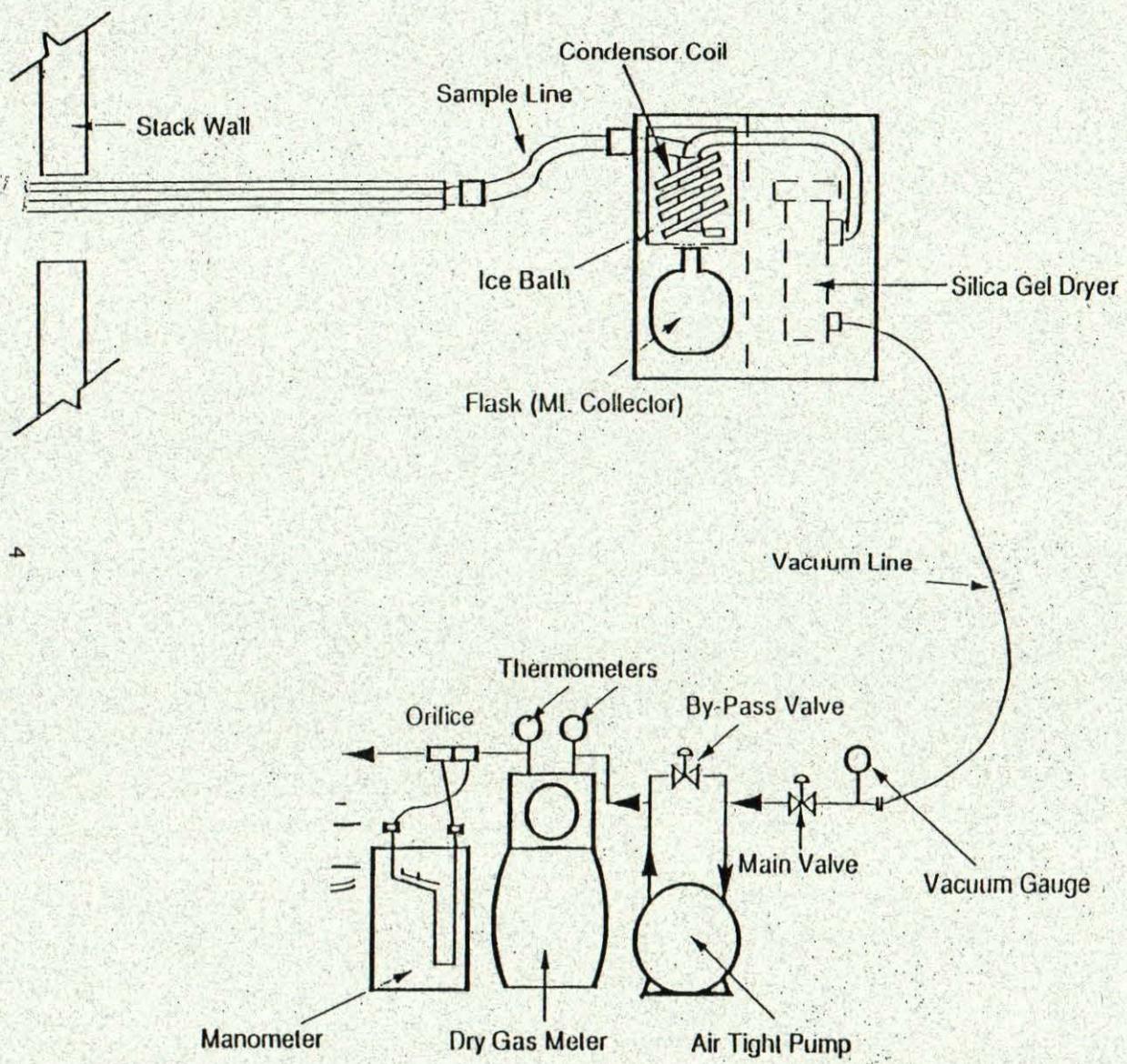


David D. Engelhardt  
Vice President

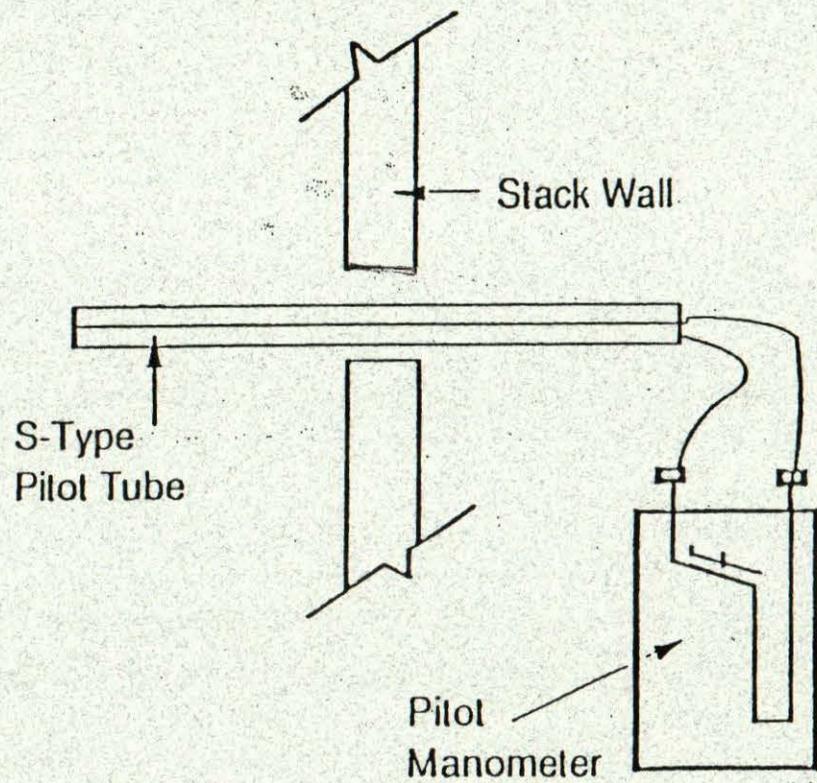
This report was reviewed by:



R. Scott Cargill  
Project Manager



**Figure 1**  
**Moisture**  
**Sampling Train**



**Figure 2**  
**Air Flow**  
**Sampling Train**