AIR HYGIENE, INC.

Testing Solutions for a Better World

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AIR QUALITY DIVISION

EMISSION COMPLIANCE TEST
FOR THE
FUEL GAS HEATER, UNIT #FGH1
PREPARED FOR
INDECK NILES, LLC
AT THE
INDECK NILES ENERGY CENTER
NILES, MICHIGAN
JUNE 23, 2022

Permit No: 75-16B
Report Date: July 15, 2022

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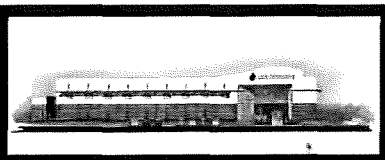

Corporate Headquarters
1600 W Tacoma Street
Broken Arrow, Oklahoma 74012

AIR HYGIENE, INC.

(918) 307-8865 or (888) 461-8778
www.airhygiene.com

Remote Testing Offices
Las Vegas, NV 89156
Ft. Worth, TX 76028
Humble, TX 77338
Shreveport, LA 71115
Miami, FL 33101
Pittsburgh, PA 15205

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Prepared and Reviewed by:

Darin Grimes
Sr. Testing Solutions Specialist

Thomas K. Graham, PE, QSTI
Director of AHU

I, _____
Cole McBride, QSTI
Sr. Project Manager
certify that this testing was conducted and this report was created in conformance with the requirements of ASTM D7036

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CERTIFICATION OF INFORMATION

I certify under penalty of law that I believe the information provided in this document is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fine or imprisonment or both, for submitting false, inaccurate or incomplete information.

Cole McBride, QSTI
Sr. Project Manager
Air Hygiene International, Inc.

July 4, 2022
Date

FACILITY CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attached documents and, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil and criminal penalties, including the possibility of fine or imprisonment or both, for submitting false, inaccurate or incomplete information.

I am the responsible official with direct knowledge and overall responsibility for the information contained in this report.

_____
Name

_____
Title

_____
Signature

_____
Date

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APPENDICES

Emissions Compliance Test
Fuel Gas Heater, Unit #FGH1
Indeck Niles, LLC
Indeck Niles Energy Center
Niles, Michigan
June 23, 2022

1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the Emissions Compliance Test for particulate matter (PM) from the exhaust of the Fuel Gas Heater, Unit #FGH1 for Indeck Niles, LLC at the Indeck Niles Energy Center in Niles, Michigan. This report details the background, results, process description, and the sampling/analysis methodology of the stack sampling survey conducted on June 23, 2022.

1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to conduct an initial compliance emission test to document levels of selected pollutants at maximum load. The information will be used to confirm compliance with the operating permit issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE). The specific objective was to determine the emission concentration of PM from the exhaust of Indeck Niles, LLC's Fuel Gas Heater, Unit #FGH1.

1.2 SUMMARY OF TEST PROGRAM

The following list details pertinent information related to this specific project:

1.2.1 Participating Organizations
- Michigan Department of Environment, Great Lakes, and Energy (EGLE)
- Indeck Niles, LLC
- Kiewit Corporation
- Air Hygiene

1.2.2 Industry
- Electric Utility / Electric Services

1.2.3 Air Permit Requirements
- Permit Number: 75-16B

1.2.4 Plant Location
- Indeck Niles Energy Center in Niles, Michigan
  - GPS Coordinates [Latitude 41.85831, Longitude -86.22417]
  - Physical Address: 2200 Progressive Dr., Niles, Michigan 49120
  - Federal Registry System / Facility Registry Service (FRS) No. – 110017413985
  - Source Classification Code (SCC) – 20100201

1.2.5 Equipment Tested
- Fuel Gas Heater, Unit #FGH1

1.2.6 Emission Points
- Exhaust from the Fuel Gas Heater, Unit #FGH1
- For O_2/CO_2 one sample point in the stack from the Fuel Gas Heater, Unit #FGH1, determined after conducting a stratification test
- For all PM testing, 24 sampling points in the stack from the Fuel Gas Heater, Unit #FGH1

1.2.7 Emission Parameters Measured
- PM
- Flow
- H_2O
- CO_2
- O_2

1.2.8 Date of Emission Test
- June 23, 2022

1.2.9 Federal Certifications
- Stack Testing Accreditation Council AETB Certificate No. 3796.02
- International Standard ISO/IEC 17025:2005 Certificate No. 3796.01

1.3 KEY PERSONNEL

Indeck Niles, LLC:	Tom Krysiak (tkrysiak@indeckenergy.com)	716-225-6478
Kiewit Corporation:	Derek Goettemoeller (Derek.Goettemoeller@Kiewit.com)	913-905-9068
Air Hygiene:	Cole McBride (cmcbride@airhygiene.com)	918-307-8865
Air Hygiene:	Swanson Bierman	918-307-8865
Air Hygiene:	Colby Gniech	918-307-8865
Air Hygiene:	Harold Jones	918-307-8865
Air Hygiene:	Jason Hass	918-307-8865
Air Hygiene:	Trevor Thompson	918-307-8865
Air Hygiene:	Sean Barnes	918-307-8865

2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on Indeck Niles, LLC's Fuel Gas Heater, Unit #FGH1 located at the Indeck Niles Energy Center on June 23, 2022 are summarized in the following table and relate only to the items tested.

The results of all measured pollutant emissions were below the required limits. All testing was performed without any real or apparent errors. All testing was conducted according to the approved testing protocol.

TABLE 2.1
SUMMARY OF FUEL GAS HEATER, UNIT #FGH1
RESULTS

Parameter	Max Load Emissions	Permit Limits
Boiler Fuel Flow (SCFH)	2,769	--
Heat Input (MMBtu/hr)	2.98	--
Filterable PM (mg)	1.40	--
Filterable PM (gr/dscf)	9.75E-04	--
Filterable PM (lb/hr)	0.01	--
Filterable PM (lb/MMBtu)	0.0019	0.002

3.0 SOURCE OPERATION

3.1 PROCESS DESCRIPTION

Indeck Niles, LLC owns and operates the Indeck Niles Energy Center located at 2200 Progressive Dr., in Niles, Michigan. The facility includes two combined-cycle natural gas fired combustion turbine generators (CTGs). The two CTGS are rated at 3,651 million British thermal unit per hour (MMBtu/hr) and are coupled with heat recovery steam generators (HRSG) in a two-on-one configuration with a steam turbine generator. Each HRSG is equipped with a natural gas-fired duct burner rated at 71 MMBtu/hr to provide heat for additional steam production. The HRSGs are not capable of operating independently from each CTG. Each CTG/HRSG is equipped with dry low NOx burners (DLNB), selective catalytic reduction (SCR), and an oxidation catalyst. In addition, two fuel gas heaters (FGHs) are located at the facility to support unit startup.

3.2 SAMPLING LOCATION

The FGH stacks are vertical, circular, and measure 1.94 feet (ft) (23.25 inches) in diameter at the test ports which are approximately 14 ft above grade level with an exit elevation of approximately 30 ft above grade level. The test ports are located approximately 9.17 ft (110 inches) [4.7 dia] downstream and approximately 16 ft (192 inches) [8.3 dia] upstream from the nearest disturbances. Air Hygiene has field verified the measurable dimensions. Non-field verified dimensions are provided by Indeck Niles, LLC. All exhaust samples for gaseous emissions were continuously drawn from the exhaust system at the sample ports from a single point determined after conducting a stratification test for oxides of nitrogen (NOx) and O_2. During the stratification test six points were traversed from each of the two ports. The probe was allowed to remain at a point for at least two times the system response time. For PM testing, an initial velocity traverse was performed across the stack from 24 total points to confirm the absence of cyclonic flow. All PM sampling occurred from the same 24 points by leaving the probe at each for an equal amount of time.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

The emission test on the Fuel Gas Heater, Unit #FGH1 at the Indeck Niles Energy Center was performed following United States Environmental Protection Agency (EPA) methods described by the Code of Federal Regulations (CFR). Table 4.1 outlines the specific methods performed on June 23, 2022.

TABLE 4.1
SUMMARY OF SAMPLING METHODS

Pollutant or Parameter	Sampling Method	Analysis Method
Sample Point Location	EPA Method 1	Equal Area Method
Stack Flow Rate	EPA Method 2	S-Type Pitot Tube
Oxygen	EPA Method 3A	Paramagnetic Cell
Carbon Dioxide	EPA Method 3A	Nondispersive Infrared Analyzer

Pollutant or Parameter	Sampling Method	Analysis Method
Stack Moisture Content	EPA Method 4	Gravimetric Analysis
Particulate Matter	EPA Method 5	Front Half Filterables
Stack Flow Rate	EPA Method 19	Dry Oxygen F Factor
Fuel Content Analysis	ASTM D-1945	Fuel Gas Sample and Laboratory Analysis

4.2 INSTRUMENT CONFIGURATION AND OPERATIONS FOR GAS ANALYSIS

The sampling and analysis procedures used during these tests conform with the methods outlined in the Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A, Methods 1, 2, 3A, 4, 5, and 19.

Figure 4.1 depicts the sample system used for the real-time gas analyzer tests. The gas sample was continuously pulled through the probe and transported, via heat-traced Teflon® tubing, to a stainless-steel minimum-contact condenser designed to dry the sample. Transportation of the sample, through Teflon® tubing, continued into the sample manifold within the mobile laboratory via a stainless steel/Teflon® diaphragm pump. From the manifold, the sample was partitioned to the real-time analyzers through rotameters that controlled the flow rate of the sample. Exhaust samples were routed to the wet based analyzer prior to gas conditioning.

Figure 4.1 shows that the sample system was also equipped with a separate path through which a calibration gas could be delivered to the probe and back through the entire sampling system. This allowed for convenient performance of system bias checks as required by the testing methods.

All instruments were housed in a climate controlled, trailer-mounted mobile laboratory. Gaseous calibration standards were provided in aluminum cylinders with the concentrations certified by the vendor. EPA Protocol No. 1 was used to determine the cylinder concentrations where applicable (i.e., O_2 calibration gases).

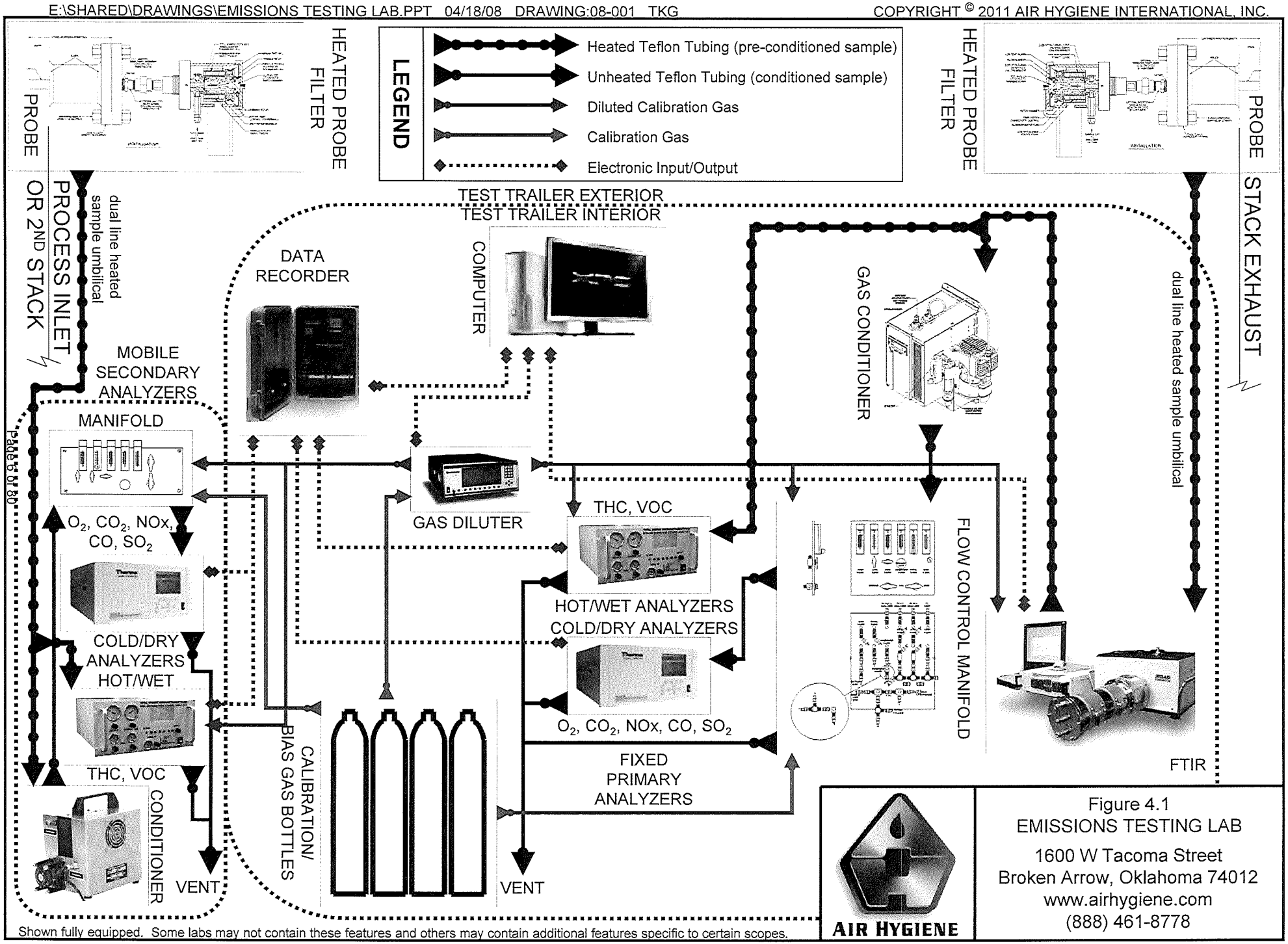
Table 4.2 provides a description of the analyzers used for the instrument portion of the tests. All data from the continuous monitoring instruments were recorded on a Logic Beach Portable Data Logging System which retrieves calibrated electronic data from each instrument every one second and reports an average of the collected data every 30 seconds.

Figure 4.2 represents the sample system used for the PM tests. A heated stainless-steel probe with a glass liner and nozzle was inserted into the sample ports of the stack to extract gas measurements from the emission stream through a filter and glass impinger train. Flow rates are monitored with oil filled manometers and total sample volumes are measured with a dry gas meter.

The stack gas analysis for O_2 and CO_2 concentrations was performed in accordance with procedures set forth in EPA Method 3A. The O_2 analyzer uses a paramagnetic cell detector and the CO_2 analyzer uses a continuous nondispersive infrared analyzer.

TABLE 4.2
ANALYTICAL INSTRUMENTATION

Parameter	Manufacturer and Model	Range	Sensitivity	Detection Principle
CO_2	SERVOMEX 1440	0-20%	0.1%	Nondispersive infrared
O_2	SERVOMEX 1440	0-25%	0.1%	Paramagnetic cell, inherently linear.



Shown fully equipped. Some labs may not contain these features and others may contain additional features specific to certain scopes.

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Figure 4.1
EMISSIONS TESTING LAB

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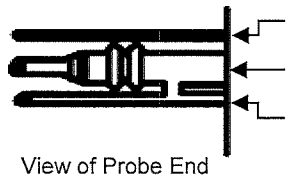
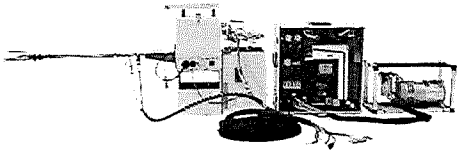


View of Probe End
(from the bottom)



Wet Chemistry Assembly
(photo)

Temperature Sensor
Stack Wall
Liner (glass, stainless steel, or inconel)
Probe Housing (heated opt.)
Nozzle
Type S Pitot Tube
Oil-Filler Manometer
Temperature Sensor
Glass Filter Holder
Heated Area
Hot Box
could add more impingers or other components to system
Impingers
Temperature Sensor
Ice Water Bath
Cold Box
Vacuum Line
Vacuum Gauge
Filled with water or other various chemicals to cause capture of condensed liquid or reaction with target compounds
Temperature Sensor
Temperature Sensor
Orifice
By-pass Valve
Main Valve
Dry Gas Meter
Air-Tight Pump
Oil-Filler Manometer

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Figure 4.2
WET CHEMISTRY ASSEMBLY

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Broken Arrow, Oklahoma 74012
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APPENDIX A

TEST RESULTS AND CALCULATIONS

TABLE A.1: EMISSIONS TESTING SCHEDULE

Unit	Load	Component	Run	Date	Start	Stop	Time Sync	Duration
FGH1	Max	Cyc. Flow Chk.	FGH1_PM-V1	06/23/22	7:50:00	8:10:00	DAHS	0:20:00
FGH1	Max	PM	FGH1_PM-1	06/23/22	9:50:00	10:59:00	DAHS	1:09:00
FGH1	Max	PM	FGH1_PM-2	06/23/22	11:18:00	12:27:00	DAHS	1:09:00
FGH1	Max	PM	FGH1_PM-3	06/23/22	12:41:00	13:48:00	DAHS	1:07:00