Emission Guarantee Test
Auxiliary Boiler
Indeck Niles, LLC
Indeck Niles Energy Center
Niles, Michigan
October 27, 2021

1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the Emission Guarantee Test for nitrogen oxides (NOx), and sulfur dioxide (SO_2) from fuel analysis from the exhaust of the Auxiliary Boiler 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 October 27, 2021.

The facility State Registration Number is N6921. The auxiliary boiler's Emission Unit ID is EUAUXBOILER. The auxiliary boiler is a D-Type industrial water- tube package boiler firing natural gas and is equipped with low-NOx burners. The boiler is rated at 65,000 lb/hr steam operating at 350 psig. The design heat input of the burner is 85 MMBtu/hr (HHV basis). Expected operating heat input is 83 MMBtu/hr.

1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to conduct an initial guarantee emission test to document levels of selected pollutants at maximum achievable load. The information will be used to confirm compliance with certain operating guarantee limits. The specific objective was to determine the emission concentration of NOx and SO_2 from fuel from the exhaust of Indeck Niles, LLC's Auxiliary Boiler.

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 (Michigan EGLE)
- Indeck Niles, LLC
- Kiewit Corporation
- Air Hygiene

1.2.2 Industry
- Electric Utility / Electric Services

1.2.3 Air Permit Requirements
- Permit to Install: 75-16B
- State Registration No: N6921

1.2.4 Plant Location
- Indeck Niles Energy Center in Niles, Michigan
  - GPS Coordinates [Latitude 41.861712, Longitude -86.22072]
  - Physical Address: 2200 Progressive Dr., Niles, Michigan 49120
  - Federal Registry System / Facility Registry Service (FRS) No. – 110070395350
  - Source Classification Code (SCC) – 20100201

1.2.5 Equipment Tested
- Auxiliary Boiler, Emission Unit ID: EUAUXBOILER

1.2.6 Emission Points

- Exhaust from the Auxiliary Boiler
- For all gases, three sample points in the exhaust stack from the Auxiliary Boiler, at 16.7, 50.0, and 83.3 percent of the diameter, determined after conducting a stratification test
- For all wet chemistry testing, 24 sampling points in the exhaust duct from the Auxiliary Boiler

1.2.7 Emission Parameters Measured

- NOx
- SO_2 from fuel
- H_2O
- O_2

1.2.8 Date of Emission Test

- October 27, 2021

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
Michigan EGLE:	Lindsey Wells (Wellsl8@michigan.gov)	517-282-2345
Kiewit Corporation:	Steven Hukriede (steven.hukriede@kiewit.com)	816-274-2474
Air Hygiene:	Chandler King (cking@airhygiene.com)	918-307-8865
Air Hygiene:	Taylor Williams	918-307-8865
Air Hygiene:	Gharabet Torossian	918-307-8865
Air Hygiene:	Bobby Raynor	918-307-8865

2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on Indeck Niles, LLC's Auxiliary Boiler, Emission Unit ID: EUAUXBOILER, located at the Indeck Niles Energy Center on October 27, 2021 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 conducted according to the approved testing protocol. All testing was performed without any real or apparent errors.

TABLE 2.1
SUMMARY OF AUX BOILER RESULTS

Parameter	Emissions Data	Permit Limits
Boiler Fuel Flow (lb/min)	53.28	--
Total Fuel Flow (SCFH)	71,049	--
Stack Flow (RM19) (SCFH)	788,979	--
Heat Input (MMBtu/hr)	78.2	--
NOx (ppmvd)	28.83	--
NOx (lb/MMBtu)	0.035	0.04
Fuel Sulfur (grains / 100 dscf)	0.0030	--
SO_2 from fuel sulfur (lb/MMscf)	0.0086	0.6
SO_2 from fuel sulfur (lb/MMBtu)	0.0000078	0.0006

3.0 SOURCE OPERATION

3.1 PROCESS DESCRIPTION

Indeck Niles, LLC owns and operates the Indeck Niles Energy Center facility located at 2200 Progressive Dr., in Niles, Michigan. The interest of this test report is the at 85 pounds per million British thermal units (lb/MMBtu) Auxiliary Boiler located within the facility.

3.2 SAMPLING LOCATION

The Auxiliary Boiler stack is vertical, circular, and measures 3 feet (ft) (36 inches) in diameter at the test ports which are approximately 34 ft above grade level with an exit elevation of approximately 95 ft above grade level. The test ports are located approximately 7.5 ft (90 inches) [2.51 diameters] downstream and approximately 61 ft (732 inches) [20.32 diameters] 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 three points located at 16.7, 50, and 83.3 percent of the stack diameter, determined after conducting a stratification test. During the stratification test six points were traversed from two of the four ports. The probe was allowed to remain at a point for at least two times the system response time.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

The emission test on the Auxiliary Boiler 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 October 27, 2021.

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
Stack Moisture Content	EPA Method 4	Gravimetric Analysis
Nitrogen Oxides	EPA Method 7E	Chemiluminescent Analyzer

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, 3A, 4, 7E, 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., NOx 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.

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

EPA Method 7E was used to determine concentrations of NOx. A chemiluminescent analyzer was used to determine the nitrogen oxides concentration in the gas stream. A NO_2 in nitrogen certified gas cylinder was used to verify at least a 90 percent NO_2 conversion on the day of the test.

TABLE 4.2
ANALYTICAL INSTRUMENTATION

Parameter	Manufacturer and Model	Range	Sensitivity	Detection Principle
NOx	THERMO 42 series	User may select up to 5,000 ppm	0.1 ppm	Thermal reduction of NO_2 to NO. Chemiluminescence of reaction of NO with O_3. Detection by PMT. Inherently linear for listed ranges.
O_2	SERVOMEX 1440	0-25%	0.1%	Paramagnetic cell, inherently linear.

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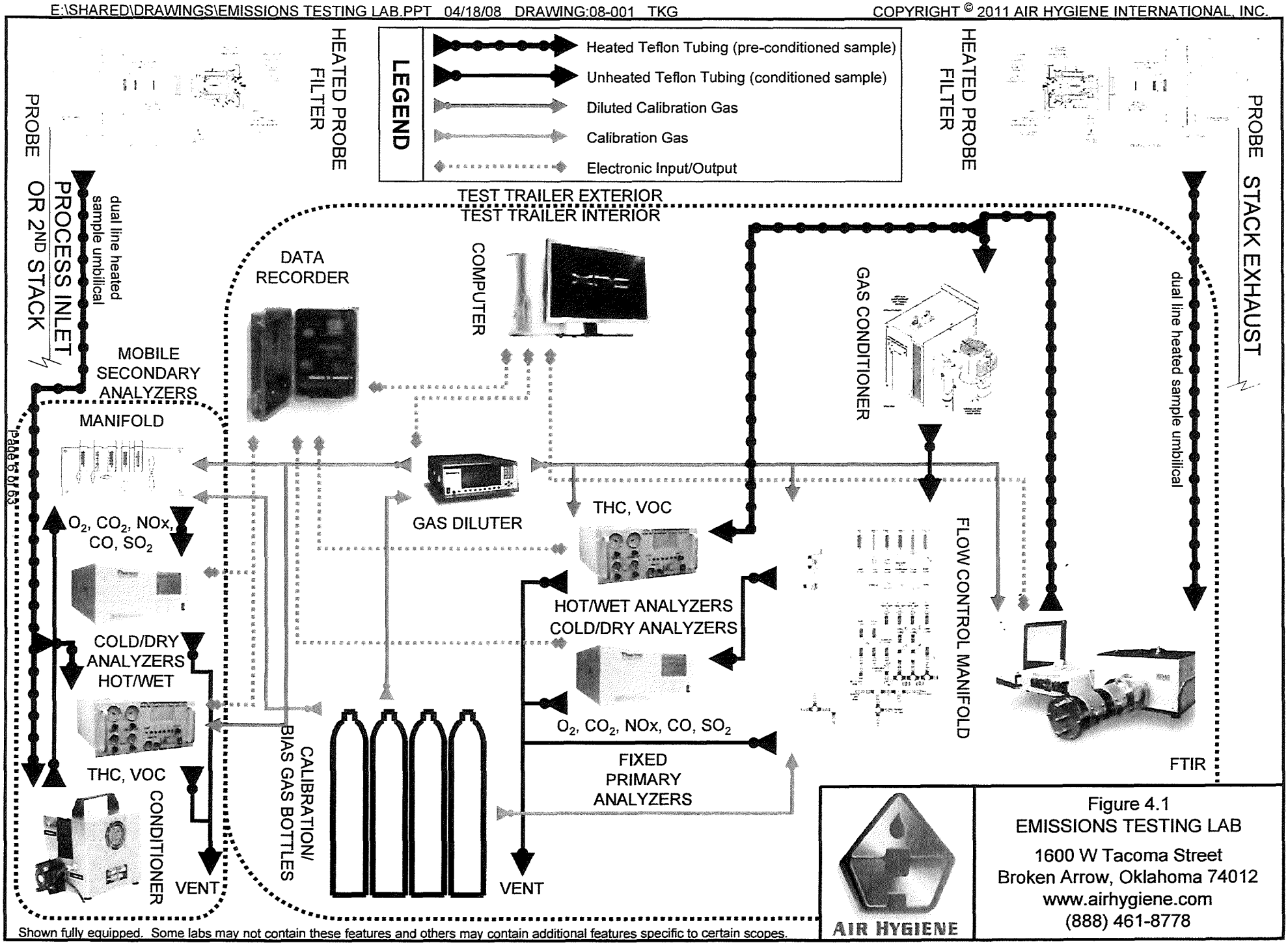

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Shown fully equipped. Some labs may not contain these features and others may contain additional features specific to certain scopes.

Figure 4.1
EMISSIONS TESTING LAB

1600 W Tacoma Street
Broken Arrow, Oklahoma 74012
www.airhygiene.com
(888) 461-8778

APPENDIX A

TEST RESULTS AND CALCULATIONS

TABLE A.1: EMISSIONS TESTING SCHEDULE

Unit	Component	Run	Date	Start	Stop	Time Sync	Duration
Aux Boiler	Stratification Test	1	10/27/21	09:39	10:11	DAHS	00:32
Aux Boiler	NOx, CO, VOC	1	10/27/21	17:01	18:00	DAHS	01:00
Aux Boiler	NOx, CO, VOC	2	10/27/21	18:24	19:23	DAHS	01:00
Aux Boiler	NOx, CO, VOC	3	10/27/21	19:35	20:34	DAHS	01:00

TEST RESULTS AND CALCULATIONS

NOx Emissions Data

AUX BOILER DATA SUMMARY

Parameter	Run - 1	Run - 2	Run - 3	Average
Start Time (hh:mm:ss)	17:01:22	18:24:22	19:35:22	17:01:22
End Time (hh:mm:ss)	18:00:52	19:23:52	20:34:52	20:34:52
Run Duration (min / run)	60	60	60	60
Bar. Pressure (in. Hg)	29.96	29.94	29.97	29.96
Amb. Temp. (°F)	51	49	49	50
Rel. Humidity (%)	75	74	76	75
Spec. Humidity (lb water / lb air)	0.005916	0.005417	0.005559	0.005631
Boiler Fuel Flow (lb/min)	53	53	53	53
Total Fuel Flow (SCFH)	71,050	71,039	71,057	71,049
Stack Flow (RM19) (SCFH)	787,816	788,569	790,551	788,979
Heat Input (MMBtu/hr)	78.2	78.1	78.2	78.2
NOx (ppmvd)	28.34	28.95	29.22	28.83
NOx (lb/MMBtu)	0.034	0.035	0.035	0.035
Fuel Sulfur (grains / 100 dscf)	0.0030	--	--	0.0030
SO_2 from fuel sulfur (lb/MMscf)	0.0086	--	--	0.0086
SO_2 from fuel sulfur (lb/MMBtu)	0.0000078	--	--	0.0000078
O_2 (%)	2.84	2.86	2.90	2.87