EMISSION COMPLIANCE TEST
EPA 40 CFR PART 63 SUBPART LLL
FOR THE
CLINKER COOLER 22
PREPARED FOR
HOLCIM (US) INC. D/B/A LAFARGE, SRN B1477
AT THE
ALPENA PLANT
ALPENA, MICHIGAN
JANUARY 31-FEBRUARY 1, 2020

Prepared and Reviewed by:

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certify that this testing was conducted and this report was created in conformance with the requirements of ASTM D7036

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Clinker Cooler 22
Holcim (US) Inc. d/b/a Lafarge, SRN B1477
Alpena Plant
Alpena, Michigan
January 31-February 1, 2020

1.0 INTRODUCTION

Air Hygiene International, Inc. (Air Hygiene) has completed the Emissions Compliance Test for particulate matter (PM) from the exhaust of the Clinker Cooler 22 for Holcim (US) Inc. d/b/a Lafarge, SRN B1477 at the Alpena Plant in Alpena, Michigan. This report details the background, results, process description, and the sampling/analysis methodology of the stack sampling survey conducted on January 31-February 1, 2020.

1.1 TEST PURPOSE AND OBJECTIVES

The purpose of the test was to conduct a periodic compliance emission test to document levels of selected pollutants. The information will be used to confirm compliance with 40 Code of Federal Regulations (CFR) 63, Subpart LLL the operating permit issued by the Michigan Environment, Great Lakes, and Energy (Michigan EGLE). The specific objective was to determine the emission concentration of PM from the exhaust of Holcim (US) Inc. d/b/a Lafarge, SRN B1477's Clinker Cooler 22.

1.2 SUMMARY OF TEST PROGRAM

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

1.2.1 Participating Organizations
- Michigan Environment, Great Lakes, and Energy (Michigan EGLE)
- Holcim (US) Inc. d/b/a Lafarge, SRN B1477
- Air Hygiene

1.2.2 Industry
- Cement

1.2.3 Air Permit and Federal Requirements
- Permit Number: MI-ROP-B1477-2012
- 40 CFR 63, Subpart LLL

1.2.4 Plant Location
- Alpena Plant in Alpena, Michigan
  - GPS Coordinates [Latitude 45.07095, Longitude -83.41489]
  - 1435 Ford Avenue, Alpena, Michigan 49707
  - Federal Registry System / Facility Registry Service (FRS) No. – 110015742605
  - Source Classification Codes (SCC) – 30501120, 30500699, and 30500613

1.2.5 Equipment Tested
- Clinker Cooler 22

1.2.6 Emission Points
- Exhaust from the Clinker Cooler 22
- For all molecular weight gases, a single point in each exhaust stack
- For all wet chemistry testing, 28 sampling points in the exhaust duct from the Clinker Cooler 22

1.2.7 Emission Parameters Measured

- PM
- Flow
- H_2O
- CO_2
- O_2

1.2.8 Dates of Emission Test

- January 31-February 1, 2020

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

Holcim (US) Inc. d/b/a Lafarge, SRN B1477:	Travis Weide (travis.weide@lafargeholcim.com)	989-358-3321
Air Hygiene:	Mars Sharief (msharief@airhygiene.com)	918-307-8865
Air Hygiene:	James Reynolds	918-307-8865
Air Hygiene:	Jeremy Johnson	918-307-8865

2.0 SUMMARY OF TEST RESULTS

Results from the sampling conducted on Holcim (US) Inc. d/b/a Lafarge, SRN B1477's Clinker Cooler 22 located at the Alpena Plant on January 31-February 1, 2020 are summarized in the following tables 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 with the exception that Run 1 was not used to calculate the final average. A Kiln upset during Run 1 caused the run to be void. Run data is presented throughout the report.

TABLE 2.1

CLINKER COOLER 22 PM EMISSIONS SUMMARY

Historical Data	CC22-PM-1	CC22-PM-2	CC22-PM-3	CC22-PM-4	Average	Units	Limits
Run Start Time	11:09	09:05	10:22	11:42		hh:mm	
Run Stop Time	12:14	10:09	11:26	12:47		hh:mm	
Test Date	01/31/20	02/01/20	02/01/20	02/01/20		mm/dd/yy	
Production Rate	---	86.73	87.67	83.31	85.90	ton/hr	--
Emission Rate Data	**CC22-PM-1**	**CC22-PM-2**	**CC22-PM-3**	**CC22-PM-4**	**Average**	**Units**	**Limits**
Filterable PM Mass	16.11	9.23	7.43	12.64	9.77	mg	--
Filterable PM Emission Rate	1.94	1.11	0.89	1.53	1.18	lb/hr	--
	---	0.013	0.010	0.018	0.014	lb/ton	0.07

Note: Run 1 not used to calculate the average due to kiln production upset

TABLE 2.2
PM-CPMS SUMMARY RESULTS

Unit	PM Emissions lb/tons clinker	PM Limit lb/ton clinker	PM-CPMS mA	Operating Limit mA
Clinker Cooler 22	0.01	0.07	4.10	4.35

Table 2.2 represents the PM-CPMS Operating limits. The sources must comply with PC MACT Regulation 40 CFR 63, Subpart LLL. The PM-CPMS Operating Limit was calculated using the equations:

$Oi = z + ((0.75*L)/R)$ and $R = Y_1/(X_1-z)$

Where,
Oi = Operating limit for PM CPMS on a 30-day rolling average (mA)
L = Source emission limit (lb/ton clinker)
z = Instrument zero (mA)
R = Relative lb/ton of clinker per mA
Y_1 = Three run average lb/ton of clinker PM concentration
X_1 = Three run average mA

3.0 SOURCE OPERATION

3.1 PROCESS DESCRIPTION

The Alpena Plant is located in Alpena, Michigan. The Raw Mill System mixes and grinds the raw materials (limestone, sand, bauxite, Bell shale, gypsum) and alternate raw materials (slag, iron ore, fly ash, and CKD) then sends the materials to the kilns.

Holcim (US) Inc. d/b/a Lafarge, SRN B1477 operates five rotary kilns, which manufacture Portland cement clinker using the dry process. A mixture of pulverized bituminous coal and petroleum coke, with a heating value of approximately 11,750 Btu per pound, serves as the primary fuel fed to the kilns. Coal and coke are fed to a Raymond bowl mill and ground to a fineness of approximately 95% passing a 200-mesh sieve.

A Clinker Cooler cools the clinker, reclaims the hot air for return to the kilns, and moves clinker to FG CLINKER SYS. As the clinker is conveyed toward the clinker storage building, the recovered heat from Clinker Cooler (92) and (93) is re-circulated back to Kiln Group 5 (KG 5), the recovered heat from Clinker Cooler 22 is re-circulated back to Kiln 22, and the recovered heat from Clinker Cooler 23 is re-circulated back to Kiln 23.

3.2 SAMPLING LOCATION

The existing test ports from the clinker coolers were used to measure manual PM with EPA Method 5 during the re-certification test period. The duct at this location is 66 inches wide and 85 inches deep. A total of three EPA Method 5 test runs with full particulate traverses were conducted on the clinker cooler. The signal output (mA) from the PCMS (PM monitor) was recorded every minute during the corresponding Method 5 test runs from the PM monitor from the Lafarge DHAS system. The average signal output was used to confirm the value established for the CPMS per the PC MACT regulation.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 TEST METHODS

The emission test on the Clinker Cooler 22 at the Alpena Plant 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 January 31-February 1, 2020.

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
Stack Moisture Content	EPA Method 4	Gravimetric Analysis
Particulate Matter	EPA Method 5	Front Half Filterables

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, and 5.

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.

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.

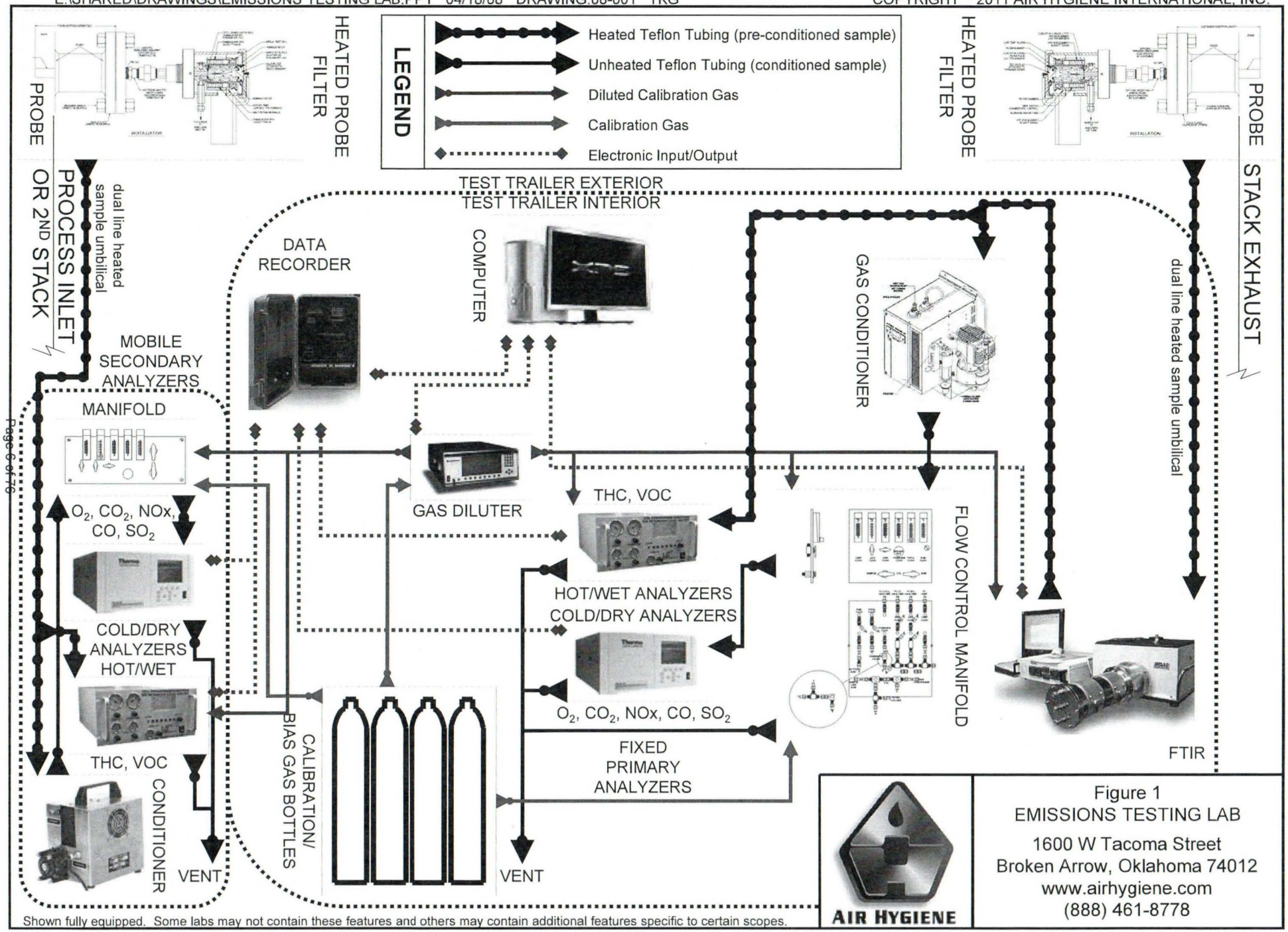
All instruments were housed in a climate controlled, trailer-mounted mobile laboratory. Gaseous calibration standards were provided in aluminum cylinders with the concentrations certified by the vendor. EPA Protocol No. 1 was used to determine the cylinder concentrations where applicable (i.e. O_2 calibration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

Figure 4.2 represents the sample system used for the wet chemistry tests (PM). A heated stainless-steel probe with a glass liner and stainless-steel 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.

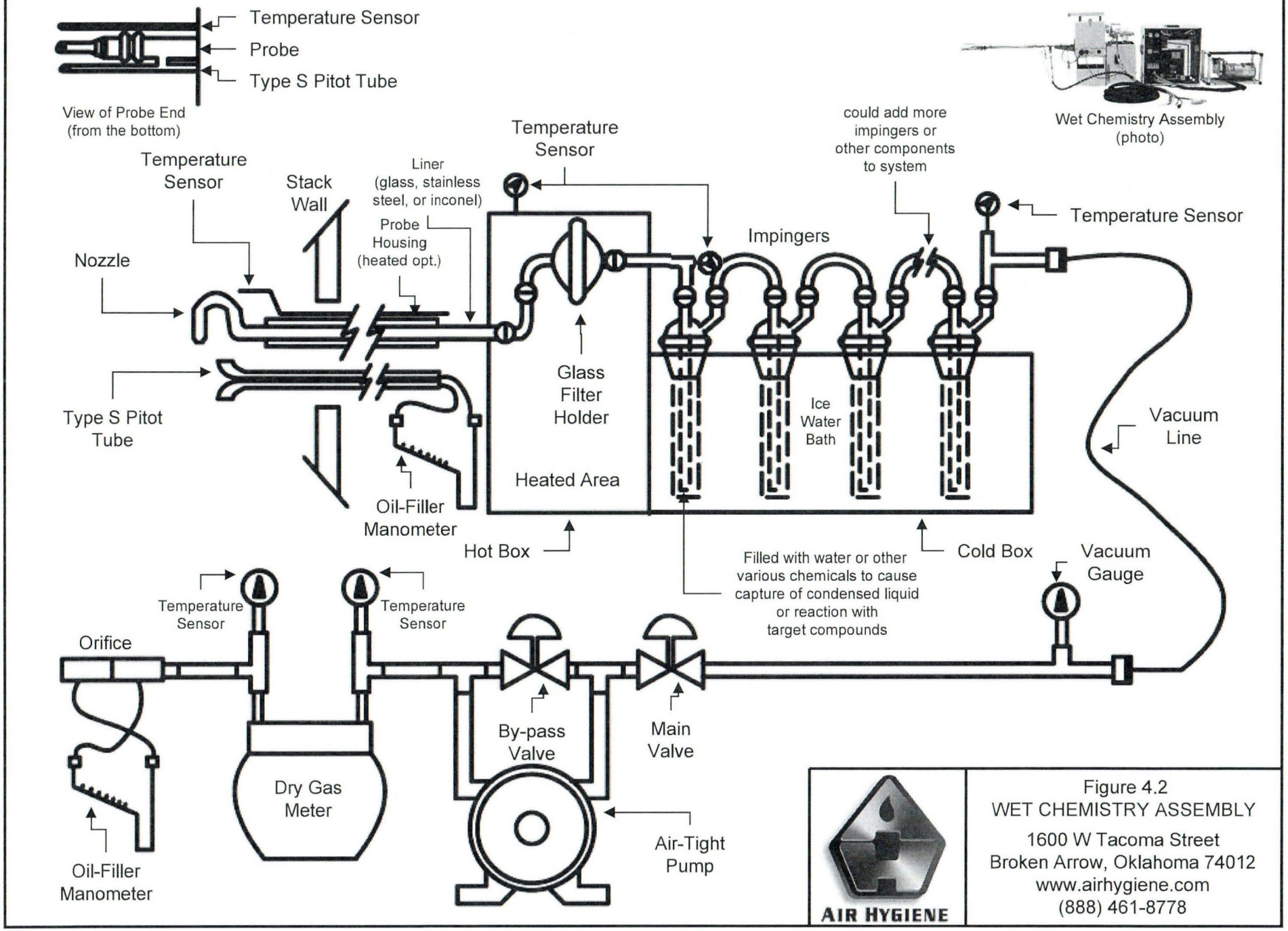


Shown fully equipped. Some labs may not contain these features and others may contain additional features specific to certain scopes.

AIR HYGIENE

Figure 1
EMISSIONS TESTING LAB

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



AIR HYGIENE

Figure 4.2
WET CHEMISTRY ASSEMBLY

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