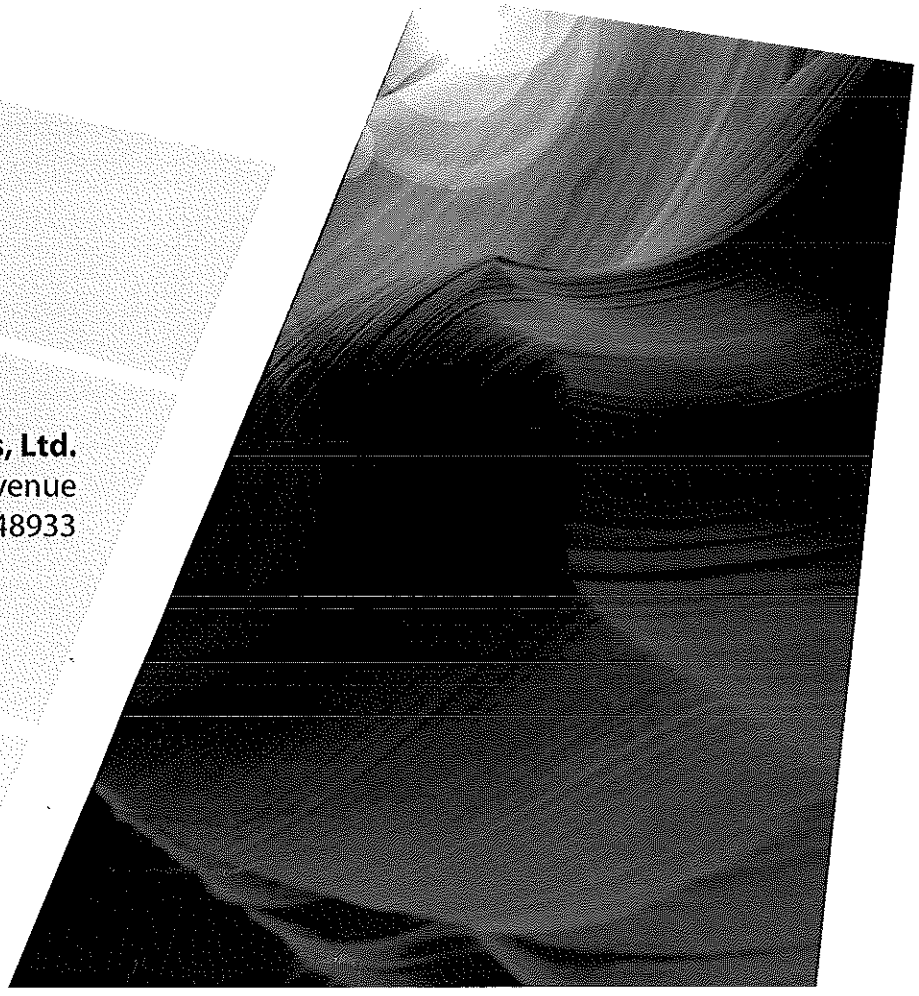
Report

Emissions Test
Lansing Asphalt Plant
Test Date: November 14, 2012

Superior Asphalt Inc.
3888 South Canal Road
Lansing, MI

NTH Project No. 73-130519-01
January 9, 2014



NTH Consultants, Ltd.
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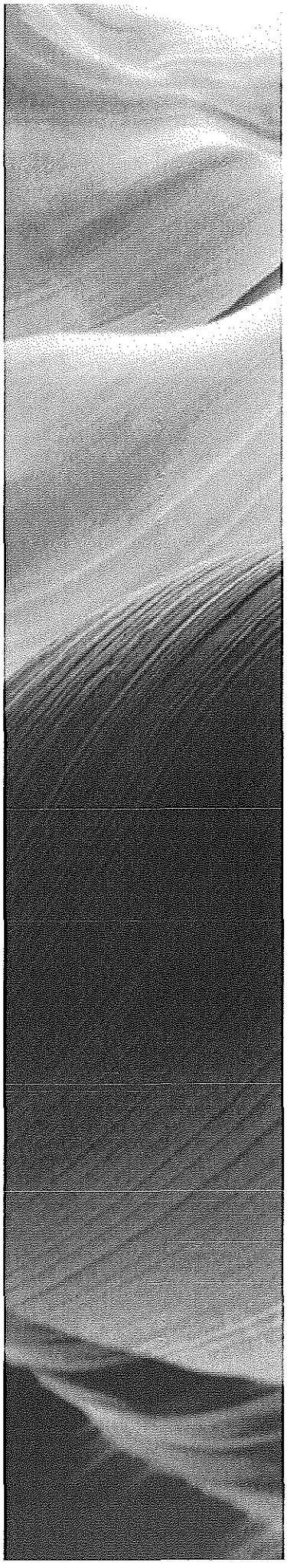

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1.0 INTRODUCTION

NTH Consultants, Ltd. (NTH) was retained by Superior Asphalt Inc. (Superior) to provide compliance emissions testing for particulate matter (PM), sulfur dioxide, (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO) and lead (Pb) at the hot mix asphalt plant, identified as EUHMAPLANT in the Michigan Department of Environmental Quality (MDEQ) Permit to Install (PTI) No. 12-11A. EUHMAPLANT is located in Lansing, Michigan

1.1 Purpose of Test

The purpose of this emissions program is to verify compliance with PTI No. 12-11A and the New Source Performance Standards (NSPS) for hot mix asphalt facilities, 40 CFR Part 60, Subpart I.

1.2 Test Date Requirement

This test program was performed on November 14, 2013.

1.3 Project Contact Information

The names and affiliations for personnel associated with the test program are presented below.

Location	Address	Contact
Test Facility	Superior Asphalt Inc. 3888 South Canal Road Lansing, Michigan 48917	Mr. Rahn Bentley 616-292-1536
Testing Company Representative	NTH Consultants, Ltd. 1430 Monroe Avenue NW, Suite 180 Grand Rapids, Michigan 49505	Ms. Rhiana Dornbos 616-451-6263 rdornbos@nthconsultants.com
State Agency Representative	MDEQ - Air Quality Division Constitution Hall, 4th Floor 525 W. Allegan Lansing, Michigan 48909	Mr. Tom Gasloli 517-335-4861 gaslolit@michigan.gov
State Agency District Representative	MDEQ - Air Quality Division Constitution Hall, 4th Floor 525 W. Allegan Lansing, Michigan 48909	Mr. Brad Myott 517-373-7084 myottb@michigan.gov

Messers. Graziano Gozzi, Kyle Daneff and Tyler Hanna of NTH conducted the testing. Mr. Rahn Bentley of Superior provided assistance and coordinated plant operating conditions. Messers. Tom Gasloli and Brad Myott of the MDEQ observed the testing.

1.4 Summary of Results

A summary of results is presented in Table 1-1. Detailed results can be found appended to this report.

Table 1-1

Summary of Test Results and Permit Limits

Pollutant	Average Tested Emission Rate	Permit Limit	Units
PM	0.0019	0.04	gr/dscf
PM	0.0017	0.05	lb/ton
SO_2	0.01	0.18	lb/ton
NO_x	0.03	0.20	lb/ton
CO	0.09	0.20	lb/ton
Lead	7.41E -06	1.5E -05	lb/ton
Opacity	0	20	Percent

gr/dscf: grains per dry standard cubic foot

lb/hr: pounds per hour

lb/ton: pounds of particulate per ton of hot mix asphalt (HMA) produced

2.0 PROCESS DESCRIPTION

Superior Asphalt operates a counterflow drum hot mix asphalt (HMA) plant in Lansing, Michigan. In the mix process, aggregate exits the 400 ton per hour drying drum, is dropped into a slat conveyor, transferred to a vibrating screen, separated into different grades, and unloaded into elevated "hot" bins according to size. Additionally, reclaimed asphalt pavement (RAP) is conveyed to an elevated storage bin, as needed, based on desired product specifications. Simultaneously liquid asphalt cement is pumped to an elevated asphalt bucket. The aggregate, RAP, and liquid asphalt cement are weighed to achieve the desired mix ratio and are added to the counterflow drum. To control the aggregate size and distribution, operators transfer the materials from the hot bins to a weigh hopper until the desired mix and weight is achieved. The HMA product is loaded directly into trucks and hauled offsite for use in the transportation industry. The particulate emissions from the batch operations are pulled by an exhaust fan through a primary knockout box collector, and then to the baghouse, where the captured aggregate dust is returned to the mixing drum via screw conveyor for use in the final product.

3.0 REFERENCE METHODS AND PROCEDURES

Triplicate test runs were conducted for all pollutants and visual emissions observations. The drum burner was fueled with natural gas for all testing. Sample duration and volumes varied depending on the method in use. The following United States Environmental Protection Agency (U.S. EPA) reference Test Methods were utilized for emissions testing .

- **Method 1:** Sampling and Velocity Traverses for Stationary Sources
- **Method 2:** Determination of Stack Gas Velocity and Volumetric Flow Rate (Type "S" Pitot Tube)
- **Method 3:** Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources and ultimately establish the dry molecular weight and amount of excess air
- **Method 4:** Determination of Moisture Content in Stack Gases
- **Method 5:** Determination of Particulate Matter Emissions from Stationary Sources
- **Method 6C:** Determination of Sulfur Dioxide Emissions from Stationary Sources
- **Method 7E:** Determination of Nitrogen Oxides Emissions from Stationary

- **Method 9:** Determination of Opacity from Stationary Sources.
- **Method 10:** Determination of Carbon Monoxide Emissions from Stationary Sources
- **Method 29:** Determination of Metals Emissions (lead) from Stationary Sources

3.1 Traverse Points

The number of traverse points for exhaust gas velocity and cyclonic air flow was determined in accordance with U.S. EPA Method 1. The HMA process exhaust duct measured 55 inches at the test location. A total of 12 measurement points were selected utilizing two ports which resulted in 24 traverse points per test port. A diagram depicting the sampling points and port location are presented in Figure 1.

3.2 Velocity and Temperature

The exhaust stack gas velocity and temperature measurements were conducted in accordance with U.S. EPA Method 2. The exhaust stack pressure differential (delta P) was measured at each traverse point using a calibrated S-type Pitot tube connected to an appropriately sized inclined water column manometer. Temperatures were recorded in conjunction with delta P determinations using a calibrated Type "K" thermocouple attached directly to the pitot tube.

3.3 Molecular Weight

The exhaust gas composition was determined using U.S. EPA Reference Method 3A. The oxygen and carbon dioxide concentrations were used to determine exhaust gas composition and molecular weight.

3.4 Moisture

The exhaust gas moisture content was determined in accordance with U.S. EPA Reference Method 4. The sample was passed through a series of four impingers, with the first two containing deionized water, the third empty, and the fourth containing silica gel. The impingers were immersed in an ice bath to ensure condensation of the flue gas stream moisture. The amount of water collected was measured gravimetrically to determine moisture content.

3.5 Filterable Particulate Matter

Filterable particulate matter (PM) concentrations were determined following the guidelines of U.S. EPA Method 5. The sample apparatus consisted of a glass nozzle, a heated glass lined probe, a heated 83 mm glass fiber filter, four chilled impingers, and a metering console. The PM sample was collected in the nozzle, probe, and filter. At the conclusion of each test run, the filter was removed from the filter holder, visually inspected and placed into a petri dish. The front half of the filter holder was rinsed with acetone into a separate sample bottle. Acetone blanks were collected during the PM testing. Three (3) test runs were conducted at a minimum of 60 minutes and collected a minimum of 31.8 dscf, as required by NSPS Subpart I.

At the laboratory, Method 5 analytical procedures were used to analyze the samples for PM. The acetone rinses were evaporated and desiccated to dryness and the residue weighed to determine the amount of PM collected. The filters were also desiccated to remove uncombined water and then weighed. A diagram of the PM sampling apparatus is presented in Figure 3.

3.6 Sulfur Dioxide

Sulfur dioxide (SO_2) was measured following the guidelines of U.S. EPA Reference Method 6C. The SO_2 analyzer was calibrated at three points: low-level gas (0-20% of calibration span), mid-level gas (40-60% of calibration span) and high-level gas (concentration equal to the calibration span) for the testing.

3.7 Nitrogen Oxides

A chemiluminescence analyzer was used to measure concentrations of nitrogen oxides (NO_x) in the dry sample gas following the guidelines of U.S. EPA Method 7E. The analyzer measures the concentration of NO_x by converting NO_2 to NO and then measuring the light emitted by the reaction of NO with ozone. The NO_x sampling system was calibrated at three points: zero gas, mid-level gas (40-60 percent of span), and high range (90 – 100 percent of span) for the testing.

3.8 Carbon Monoxide

The CO concentrations were measured using a non-dispersive infrared analyzer (NDIR) following the guidelines of U.S. EPA Reference Method 10. The analyzer was calibrated at points: zero gas, mid-level gas (40-60 percent of calibration span), and high-level gas (90 – 100 percent of span) for the testing.

3.9 Metals (Lead)

Lead concentrations were determined in accordance with U.S. EPA Method 29 in conjunction with method 5. The sampling train consisted of a glass nozzle, a heated glass lined probe, a heated 83 mm quartz fiber filter, seven chilled impingers, and a metering console. The samples were collected in the nozzle, probe, filter and impinger contents. The seven (7) impingers were placed in an insulated ice water bath for the purpose of removing any uncondensed moisture. Three (3) test runs were performed while the process and control device were operating under representative conditions.

The contents of the impingers consisted of a modified impinger containing 100 ml of 5 percent Nitric Acid / 10 percent Hydrogen Peroxide (5% HNO_3/10% H_2O_2) solution; a Greenburg-Smith impinger containing 100 ml 5% HNO_3/10% H_2O_2 solution; a modified impinger dry; two Greenburg-Smith impingers containing 100 ml H_2O and a modified impinger containing approximately 200 to 300 grams of pre-dried indicating silica gel. All glassware used in the sample apparatus was cleaned prior to testing according to Method 29 specifications.

Immediately following each test run, the probe, nozzle, and front-half of the filter holder were rinsed with 100 ml of 0.1N HNO_3 and placed into a labeled sample container. The filter was then recovered and placed into a labeled glass petri dish. The contents of impingers 1-3 were then weighed and recovered into a third labeled sample container. Impingers 1 - 3, filter support, back half of the filter housing, and all connecting glassware were rinsed with 100 ml of 0.1N HNO_3 and added to the impinger contents container. Impingers 4 and 5 were weighed to calculate moisture gain. The weight gain from each impinger was recorded to calculate the total moisture (expressed as %) associated with each test run. Field quality assurance/quality control procedures included one field blank for the filter, 0.1N HNO_3 solution, 5% HNO_3/10% H_2O_2 solution, Acetone, Filter and deionized water. An illustration of the sampling train is shown in Figure 3, located at the end of this report.

3.10 Opacity

Opacity observations were performed in accordance with the specifications stipulated in U.S. EPA Reference Method 9, and the latest revisions thereof. The opacity observations were recorded to the nearest 5 percent (%) at 15-second intervals. Ten (10) sets of 24 observations (four (4) per minute, at 15-second intervals;

6-minute test durations) were conducted. The 6-minute average opacity was calculated by summing each set of 24 observations and dividing by the total number of observations made in that time period. The 6-minute average opacity data is included in the field data in Appendix D.

4.0 QUALITY ASSURANCE

Each promulgated U.S. EPA reference method described above is accompanied by a statement indicating that to obtain reliable results, persons using these methods should have a thorough knowledge of the techniques associated with each. To that end, NTH attempts to minimize any factors in the field that could increase error by implementing our quality assurance program into every testing activity segment.

The pitot tubes and thermocouples used to measure the exhaust gas during this test program were calibrated according to the procedures outlined in the *Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III, Stationary Source-Specific Methods,* Method 2, *Type S Pitot Tube Inspection,* and Calibration Procedure 2E *Temperature Sensor.*

U.S. EPA Protocol No. 1 gas standards were used to calibrate the analyzers during the test program. These gases are certified according to the U.S. EPA Traceability Protocol for Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997, and are certified to have a total relative uncertainty of ±1 percent. All calibration gases used for this emission test program were supplied by Praxair from their Toledo, Ohio center. Praxair participates in U.S. EPA's Protocol Gas Verification Program (PGVP) for stationary source monitoring and their vendor identification number is C12013.

5.0 SUMMARY OF RESULTS

Data obtained during the test program indicate that emission rates are within the applicable limits stated in the MDEQ PTI No. 12-11A. SO2 emissions for Runs 1 and 3 were calculated using zero ppm value as the average result was slightly negative.

Plant operations appeared normal throughout the testing event with no problems encountered with the test equipment during the test program. Operating data was collected by Superior Asphalt and can be found in Appendix C.

TABLES

Table 1

Superior Asphalt

EUHMAPLANT

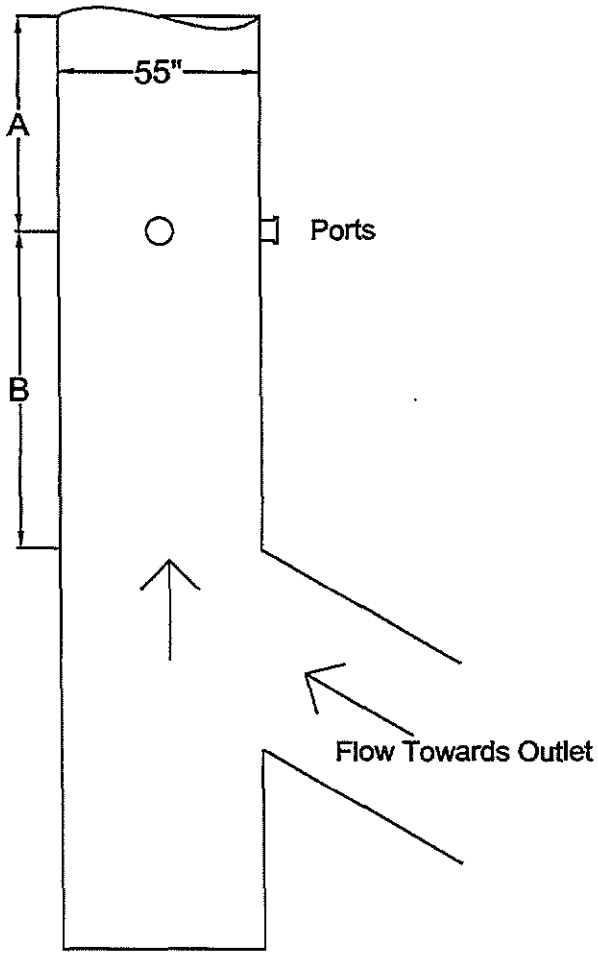
Summary of Emissions Results

November 14, 2013

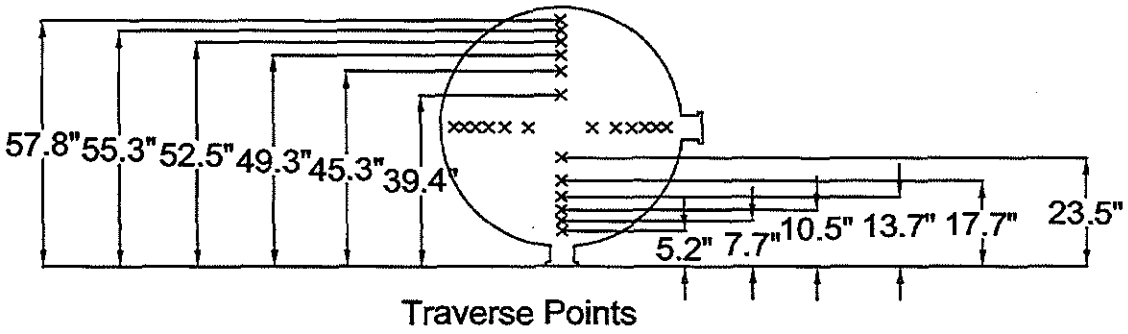
Pollutant	Run 1	Run 2	Run 3
Date	11/14/2013	11/14/2013	11/14/2013
Time	1015-1138	1342-1501	1620-1747
ACFM	61,391	60,958	55,800
SCFM	41,838	41,920	40,045
SCFH	2,510,271	2,515,198	2,404,701
	Run 1 (gr/dscf)	Run 2 (gr/dscf)	Run 3 (gr/dscf)
PM	0.0021	0.0021	0.0014
	Run 1 (lb/ton)	Run 2(lb/ton)	Run 3 (lb/ton)
PM	0.0019	0.0019	0.0013
SO2	0.00	0.02	0.00
CO	0.04	0.15	0.07
Nox	0.03	0.03	0.02
Lead	6.9E-06	1.8E-05	3.7E-06

FIGURES

Profile View



Plan View



Notes

1. Flow and moisture traverse points mirrored for both ports
2. X denotes a traverse point
3. Standard port length 4 inches
4. Traverse point locations shown to the nearest inch

NTH	Drafted by: KD	Job Number: 73-130519	Client: Superior Asphalt
	NTH Consultants, Ltd.	Approximate Duct Diameters Upstream (A): 1 Approximate Duct Diameters Downstream (B): 4	Figure 1

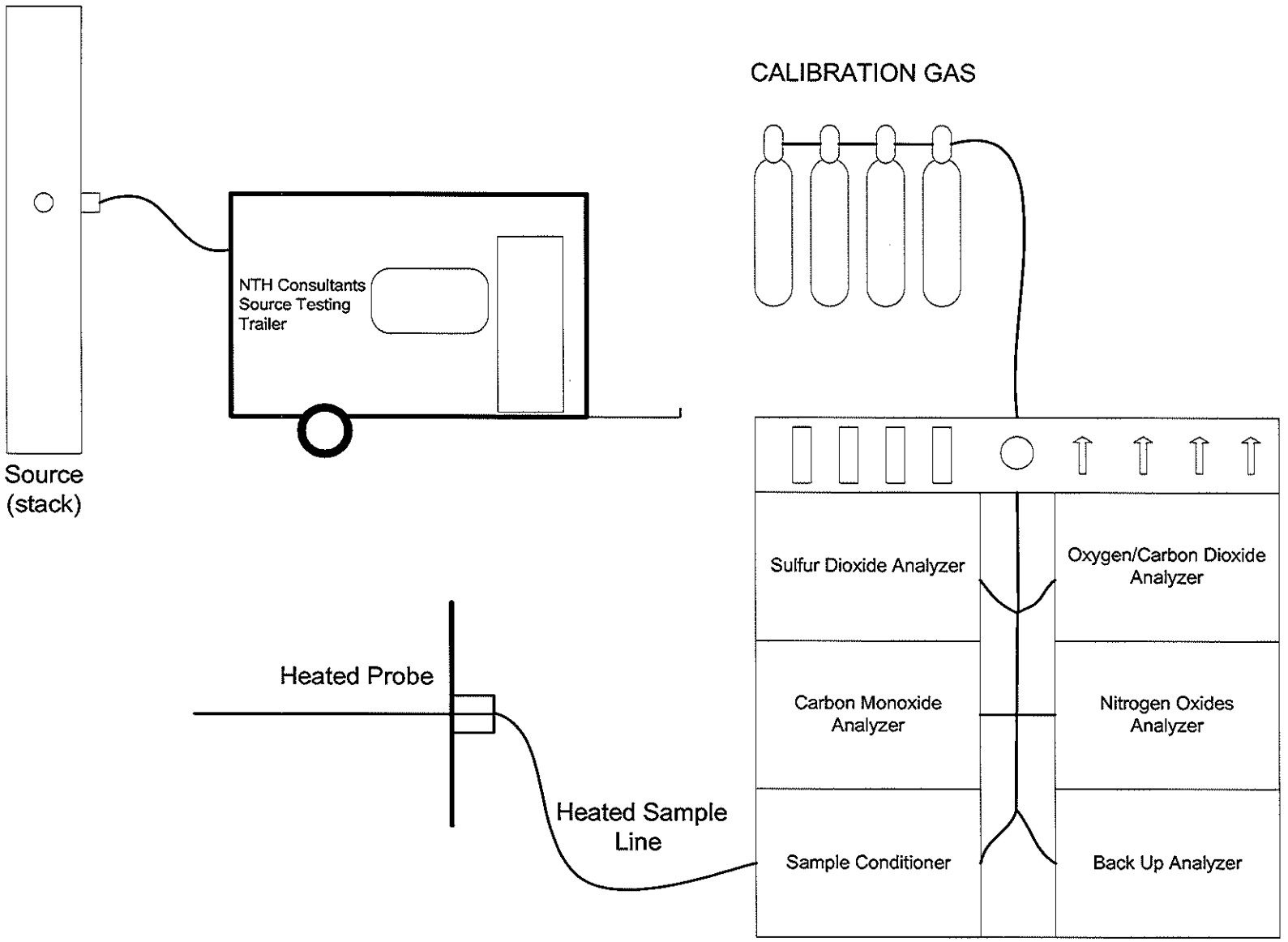


FIGURE 2

NTH Consultants, Ltd.
NTH CEMS/Reference Method
Analyzers

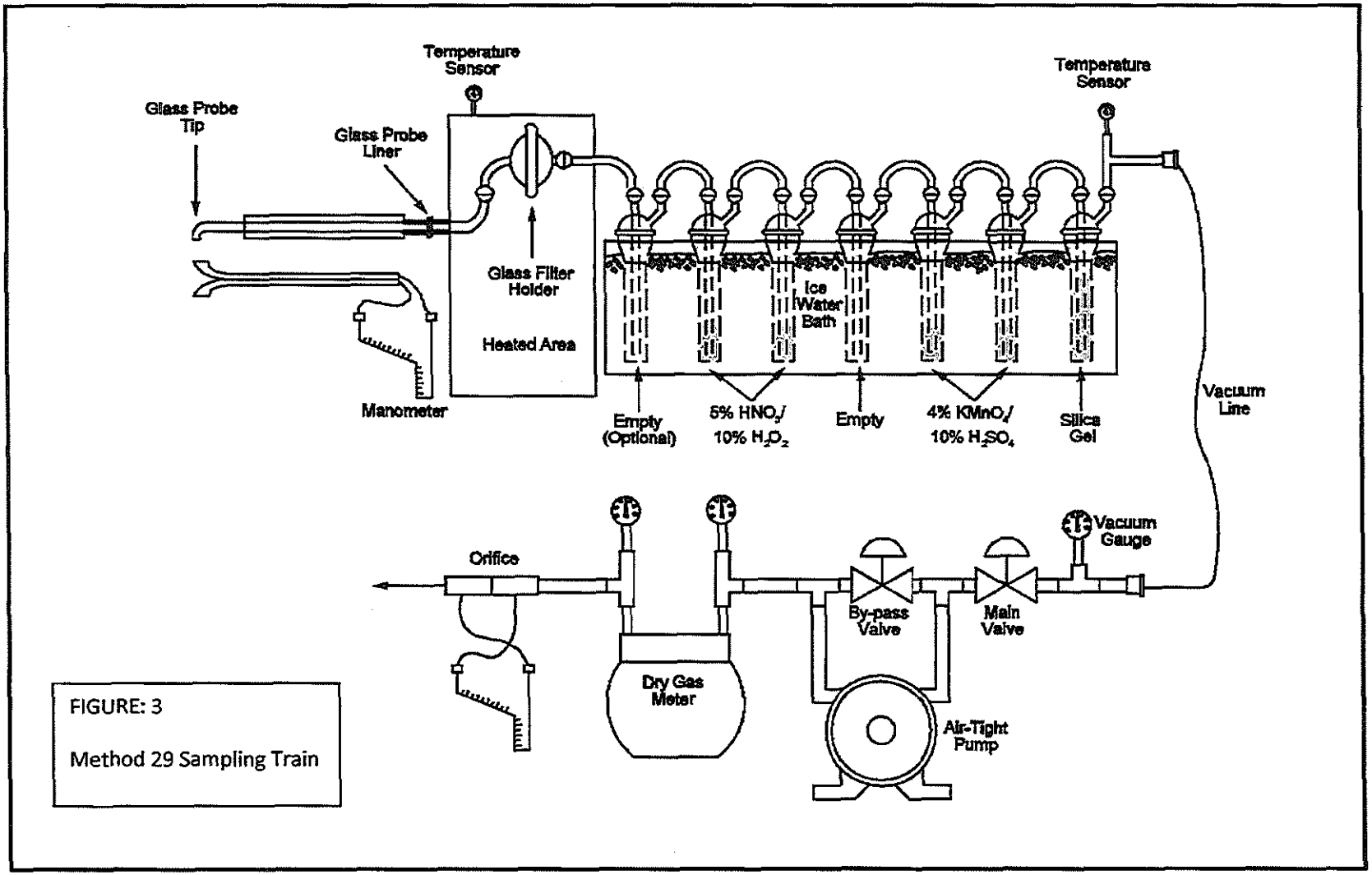


FIGURE: 3

Method 29 Sampling Train