Custom

Stack Analysis, LLC.

1-800-824-4274

RECEIVED

OCT 23 2018

AIR QUALITY DIVISION

FIAT Chrysler Automobiles US, LLC.
Sterling Heights Assembly Plant (SHAP)
38111 Van Dyke
Sterling Heights, Michigan 48312

Report

Performed Moisture, Oxygen, Volatile Organic Compounds, Nitrogen Oxide and Carbon Monoxide Emissions Testing

Sampling performed on the Cummins Model GTA28
North & West Generator Outlets

Sterling Heights, MI

Test Date: 8/28/18 & 8/29/18

FIAT Chrysler Automobiles US, LLC.
Sterling Heights Assembly Plant (SHAP)
38111 Van Dyke
Sterling Heights, Michigan 48312

Report

Performed Moisture, Oxygen, Volatile Organic Compounds, Nitrogen Oxide and Carbon Monoxide Emissions Testing

Sampling performed on the Cummins Model GTA28
North & West Generator Outlets

Sterling Heights, MI

Test Date: 8/28/18 & 8/29/18

10/5/2018

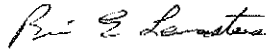
X _____

Signed by: Custom Stack Analysis, LLC.
Brian E. Lemasters
Custom Stack Analysis, LLC.

REPORT CERTIFICATION

Custom Stack Analysis, LLC. has used its professional experience and best professional efforts in performing this compliance test. I have reviewed the results of these tests and to the best of my knowledge and belief they are true and correct.

10/5/2018

X 

Signed by: Custom Stack Analysis, LLC.
Brian E. Lemasters

Custom Stack Analysis, LLC. P. O. Box 3750 14614 Cenfield St NE Alliance, Ohio 44601 Phone: 330-525-5119 Fax: 330-525-7908 E-mail: stacks@customstackanalysis.com

EXECUTIVE SUMMARY

Custom Stack Analysis, LLC. conducted emissions sampling using USEPA Methods 1, 4, 3A, 7E, 10 and 25A. Testing was conducted on the Cummins Model GTA28 North #1 & West #2 Generator Outlets on August 28th & 29th, 2018. The testing was conducted at FIAT Chrysler Automobiles US, LLC. at Sterling Heights Assembly Plant (SHAP) on the Cummins Model GTA28 North #1 & West #2 Generator Outlets at Sterling Heights Assembly Plant (SHAP) to determine compliance status with the applicable emission limit standards, 40 CFR 60. Subpart JJJJ (see Table 1.2).

The Custom Stack Analysis, LLC. test crew consisted of Mr. Jonathan Marx and Mr. Brian Lemasters. The testing procedures were coordinated by Mr. Rohit Patel and Mr. Adekunie Sanni of FIAT Chrysler Automobiles US, LLC. at Sterling Heights Assembly Plant (SHAP) and Mr. Andy Michaluk of Cummins Bridgeway, LLC. All testing procedures were witnessed by Mr. Mark Dziadosz of the State of Michigan Department of Environmental Quality Air Quality Division Southeast District Office (see Table 1.1).

Table 1.1: Emissions Testing Program Contact Personnel

Name	Company Address	Phone, Fax
Mr. Mark Dziadosz	State of Michigan Department of Environmental Quality Air Quality Division Southeast District Office 27700 Donald Court Warren, Michigan 48092-2793	(586) 753-3745 (Phone) (586) 753-3740 (Fax)
Mr. Rohit Patel Ms. Adekunie Sanni	FIAT Chrysler Automobiles US, LLC. Sterling Heights Assembly Plant (SHAP) 38111 Van Dyke Sterling Heights, MI 48312	(248) 370-4413 (Phone) (248) 370-4427 (Phone)
Mr. Andy Michaluk	Cummins Bridgeway, LLC. 54250 Grand River Avenue New Hudson, MI 48165	(248) 573-1978 (Phone) (248) 573-1538 (Fax)
Mr. Brian Lemasters Project Manager Mr. Jonathan Marx Project Technician	Custom Stack Analysis,LLC. 14614 Cenfield St. N.E. Alliance, OH 44601	(330) 525-5119 (Phone) (330) 525-7908 (Fax)

Test results are located on pages 3-4. A description of the testing protocol is included on pages 5-9. All testing calculations are located on pages 16-25. Appendix 1 includes field test data. Appendix 2 contains laboratory data from Custom Stack Analysis, LLC. Appendix 3 contains calibration data for the equipment used on test day. Appendix 4 contains monitoring data. Appendix 5 contains production data.

The MDEQ advised us that we should test each exhaust port for 30 minutes and then average the values for the CEMS results.

Table 1.2 demonstrates how FIAT Chrysler Automobiles US, LLC. at Sterling Heights Assembly Plant (SHAP) in Sterling Heights, MI is operating in compliance with the applicable emission standards at the correct operating parameters for the testing conducted (see Appendix 5).

Table 1.2: Emission Limits and Test Results Summary

Pollutant	Emission Limitations	Test Result Average	Compliance Demonstrated
Carbon Monoxide	270 ppm @ 15% O^2	**North #1** 100.10 ppm @ 15% O^2 **West #2** 107.74 ppm @ 15% O^2	Yes Yes
Nitrogen Oxide	82 ppm @ 15% O^2	**North #1** 38.35 ppm @ 15% O^2 **West #2** 22.38 ppm @ 15% O^2	Yes Yes
Volatile Organic Compounds	60 ppm @ 15% O^2	**North #1** 3.54 ppm @ 15% O^2 **West #2** 6.40 ppm @ 15% O^2	Yes Yes

Test Results

FIAT Chrysler Automobiles US, LLC. - North #1 Generator Outlet
8/28/2018
Methods 1, 4, 3A, 7E, 10 & 25A

		Run #1	Run #2	Run #3	Avg.	Limit
Moisture %		20.72%	21.15%	22.61%	21.50%	
Oxygen %		0.62%	0.75%	0.82%	0.73%	
CO	**(ppm)**	390.71	347.20	289.30	342.40	
CO	**(ppm @ 15%)**	113.65	101.65	85.02	100.10	270
Nox	**(ppm)**	129.52	129.02	134.72	131.08	
Nox	**(ppm @ 15%)**	37.67	37.77	39.59	38.35	82
VOC*	**(total ppm)**	78.79	72.84	59.87	70.50	
VOC*	**(methane ppm)**	74.48	56.37	44.39	58.41	
VOC**	**(ppm)**	4.31	16.47	15.48	12.08	
VOC**	**(ppm @ 15%)**	1.25	4.82	4.55	3.54	60
Operating Engine Horsepower		697	697	697	697	
Max Engine Horsepower		701	701	701	701	
Load %		99.40%	99.40%	99.40%	99.40%	
Megawatt		0.4970	0.4970	0.4970	0.4970	

* VOC concentration dry

** VOC concentration with the Methane removed and Dry.

Test Results

FIAT Chrysler Automobiles US, LLC. - West #2 Generator Outlet
8/29/2018
Methods 1, 4, 3A, 7E, 10 & 25A

		Run #1	Run #2	Run #3	Avg.	Limit
Moisture %		20.63%	19.25%	20.86%	20.25%	
Oxygen %		0.53%	0.71%	0.51%	0.58%	
CO	**(ppm)**	406.83	363.53	342.66	371.01	
CO	**(ppm @ 15%)**	117.85	106.24	99.14	107.74	270
Nox	**(ppm)**	82.30	75.85	73.04	77.06	
Nox	**(ppm @ 15%)**	23.84	22.17	21.13	22.38	82
VOC*	**(total ppm)**	113.30	118.70	120.95	117.65	
VOC*	**(methane ppm)**	91.31	103.86	91.62	95.60	
VOC**	**(ppm)**	21.99	14.84	29.33	22.05	
VOC**	**(ppm @ 15%)**	6.37	4.34	8.49	6.40	60
Operating Engine Horsepower		694	694	695	694	
Max Engine Horsepower		701	701	701	701	
Load %		99.04%	99.00%	99.08%	99.04%	
Megawatt		0.4952	0.4950	0.4954	0.4952	

* VOC concentration dry

** VOC concentration with the Methane removed and Dry.

METHOD 1

Sample and velocity traverses for stationary sources.

To aid in the representative measurement of pollutant emissions and/ or total volumetric flow rate from a stationary source, a measurement site where the effluent stream is flowing in a known direction is selected, and the cross-section of the stack is divided into a number of equal areas. A traverse point is then located within each of these equal areas.

METHOD 4

Determination of moisture content in stack gases.

A gas sample is extracted at a constant rate from the source. It is determined either volumetrically or gravimetrically.

METHOD 3A TESTING DESCRIPTION

A gas sample is continuously extracted from the stack, and a portion of the sample is conveyed to an instrumental analyzer for determination of O2 gas concentration. The gases pass through a heated sampling probe and filter to prevent condensation. The gases then pass through a calibration valve to a heated sampling line. After the heated sampling line is a Universal Analyzers Model 530 air cooled single sample thermoelectric water condenser with a perostolic pump for moisture removal. The sample is then passed through to a California Analytical Instruments Model 100F for O2 concentrations. Before the testing procedures commence the analyzer is left to warm up for a 90 minute period. It is then calibrated according to Method 7E specifications. To the extent practicable, the measured emissions should be between 20 to 100 percent of the selected calibration span. Three calibration gases are selected. The High-Level gas concentrations shall be equivalent to 20 to 100 percent of the calibration span. Mid-Level concentrations shall be equivalent to 40 to 60 percent of the calibration span. The Low-Level Gas concentrations of less than 20 percent of the span. Before the first run an analyzer calibration error check is conducted. If the low-level, mid, or high cal gases expected concentrations differ by more than +-2% of the span then the procedure needs to be repeated until an acceptable 3 point calibration is obtained. After the analyzer calibration check the upscale and low level calibration gases are introduced to the sampling calibration valve and recorded. System bias calibration must be within 5.0% of the analyzer calibration span for low-scale and upscale calibration gases. At the conclusion of each of the test runs the low-level gas and an upscale gas closest to the concentrations are introduced to the calibration valve assembly. If either the low-level or upscale value exceeds +-3% of the span, then the run is considered invalid.

METHOD 7E TESTING DESCRIPTION

A gas sample is continuously extracted from the stack, and a portion of the sample is conveyed to an instrumental analyzer for determination of NOx gas concentration using a chemiluminescence analyzer. The gases pass through a heated sampling probe and filter to prevent condensation. The gases then pass through a calibration valve to a heated sampling line. After the heated sampling line is a condenser for moisture removal. The sample is then passed through to a Thermo Environmental Instruments Model 42 chemiluminescence analyzer where the gases are analyzed for NOx concentrations. Before the testing procedures commence the analyzer is left to warm up for a 90 minute period. It is then calibrated according to Method 7E specifications. To the extent practicable, the measured emissions should be between 20 to 100 percent of the selected calibration span. Three calibration gases are selected. The High-Level gas concentrations shall be equivalent to 20 to 100 percent of the calibration span. Mid-Level concentrations shall be equivalent to 40 to 60 percent of the calibration span. The Low-Level Gas concentrations of less than 20 percent of the span. Before the first run an analyzer calibration error check is conducted. If the low-level, mid, or high cal gases expected concentrations differ by more than +-2% of the span then the procedure needs to be repeated until an acceptable 3 point calibration is obtained. After the analyzer calibration check the upscale and low level calibration gases are introduced to the sampling calibration valve and recorded. System bias calibration must be within 5.0% of the analyzer calibration span for low-scale and upscale calibration gases. At the conclusion of each of the test runs the low-level gas and an upscale gas closest to the concentrations are introduced to the calibration valve assembly. If either the low-level or upscale value exceeds +-3% of the span, then the run is considered invalid.

METHOD 10 TESTING DESCRIPTION

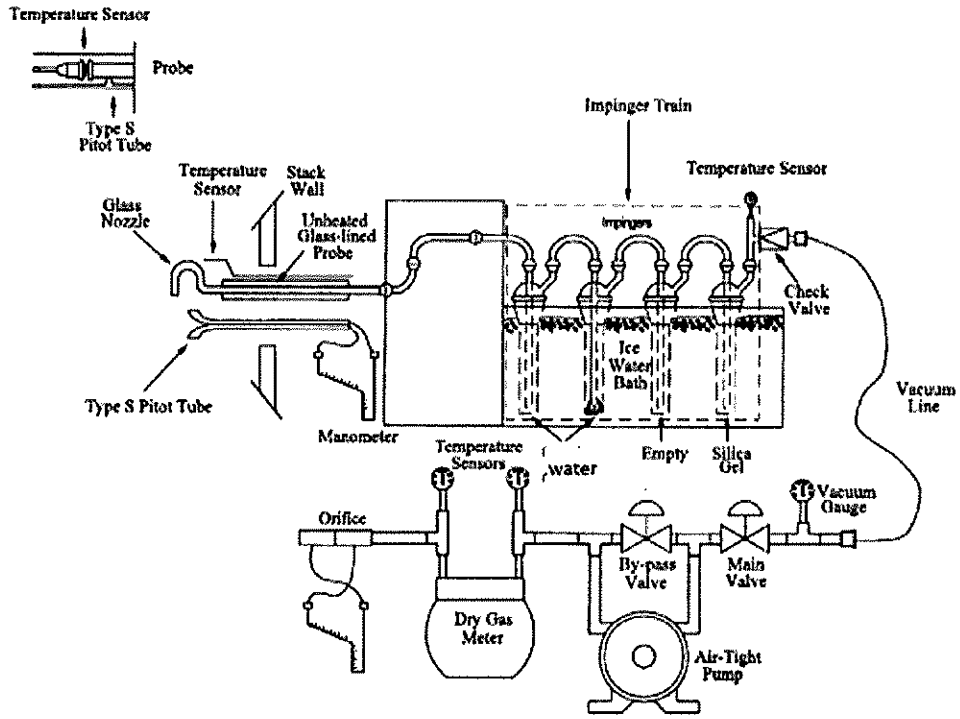
A gas sample is continuously extracted from the stack, and a portion of the sample is conveyed to an instrumental analyzer for determination of CO gas concentration using a Luft-type nondispersive infrared analyzer. The gases pass through a heated sampling probe and filter to prevent condensation. The gases then pass through a calibration valve to a heated sampling line. After the heated sampling line is a Universal Analyzers Model 530 air cooled single sample thermoelectric water condenser with a perostolic pump for moisture removal. The sample is then passed through an ascarite tube to a Thermo Environmental Instruments Model 48 Luft-type analyzer where the gases are analyzed for CO concentrations. Before the testing procedures commence the analyzer is left to warm up for a 90 minute period. It is then calibrated according to Method 7E specifications. To the extent practicable, the measured emissions should be between 20 to 100 percent of the selected calibration span. Three calibration gases are selected. The High-Level gas concentrations shall be equivalent to 20 to 100 percent of the calibration span. Mid-Level concentrations shall be equivalent to 40 to 60 percent of the calibration span. The Low-Level Gas concentrations of less than 20 percent of the span. Before the first run an analyzer calibration error check is conducted. If the low-level, mid, or high cal gases expected concentrations differ by more than +-2% of the span then the procedure needs to be repeated until an acceptable 3 point calibration is obtained. After the analyzer calibration check the upscale and low level calibration gases are introduced to the sampling calibration valve and recorded. System bias calibration must be within 5.0% of the analyzer calibration span for low-scale and upscale calibration gases. At the conclusion of each of the test runs the low-level gas and an upscale gas closest to the concentrations are introduced to the calibration valve assembly. If either the low-level or upscale value exceeds +-3% of the span, then the run is considered invalid.

METHOD 25A TESTING DESCRIPTION

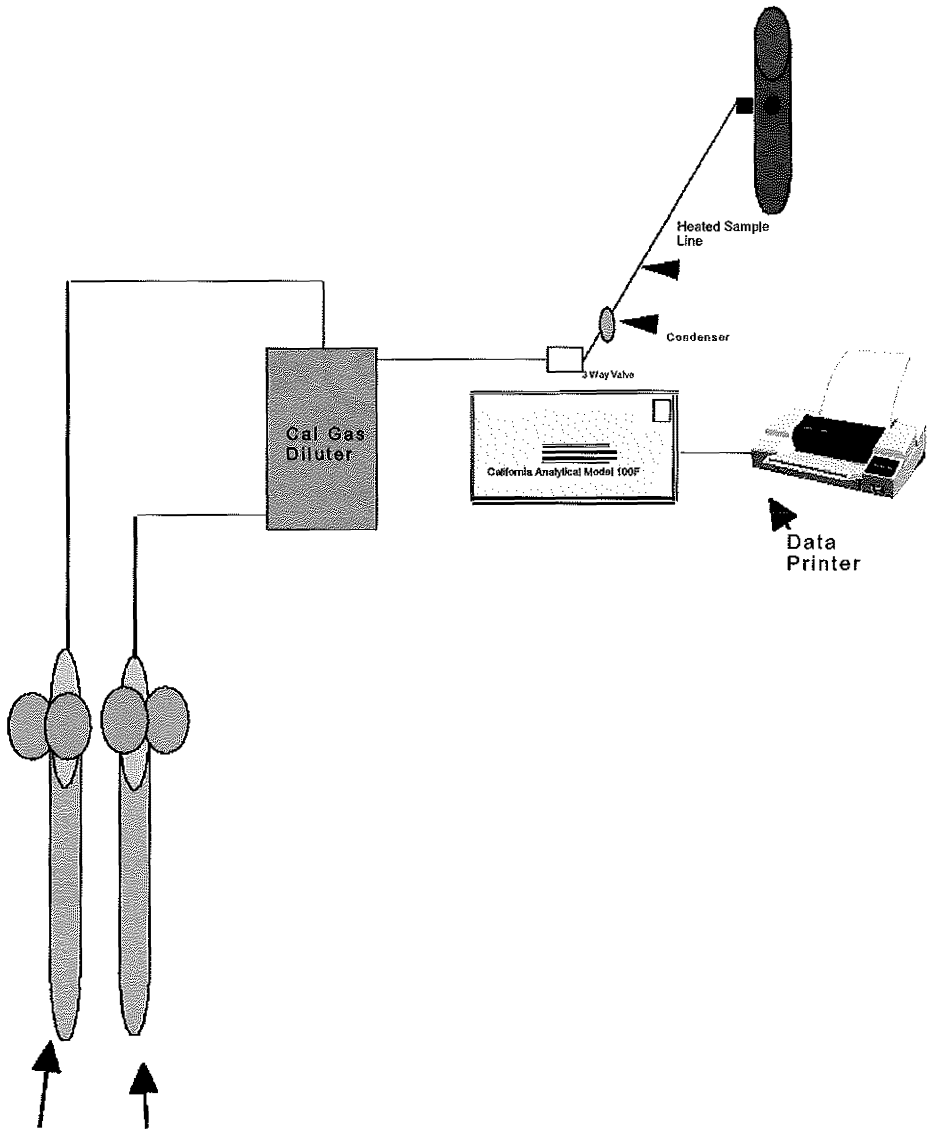
This method will be used to measure the total VOC concentration expressed in terms of ppm propane. A gas sample is extracted from the source through a stainless steel probe, through a heated sample line (teflon), to a flame ionization analyzer. The main components of Method 25A are the same as Method 204B with the exception of a non heated sample probe.

The sampling system is heated up to the proper operating temperature. Within two hours of the start of the test the FIA is calibrated. The calibration range or span is selected to be from 1.5 to 2.5 times the expected concentration. Three calibration ranges are then selected as follows: Low level 25-35% of the span, Mid level 45-55% of the span, and a High level 80-90% of the span. A zero and a high level calibration gas is then injected a the valve assembly and the FIA is adjusted to these levels. Then all four gases are introduced into the analyzer and recorded. If the responses are within 5% of the expected values then the analyzer is responding correctly. The sample probe is located in the center of the stack and sealed in place and the test is started. The test lasts for 60 minutes. At the end of the test run a drift check is ran. The zero gas and the mid level calibration gas is injected at the valve assembly. The analyzer responses are then recorded. The drift check is acceptable if the results are within 3% of the span value. These checks are performed before and after each test run.

Method 4 Diagram

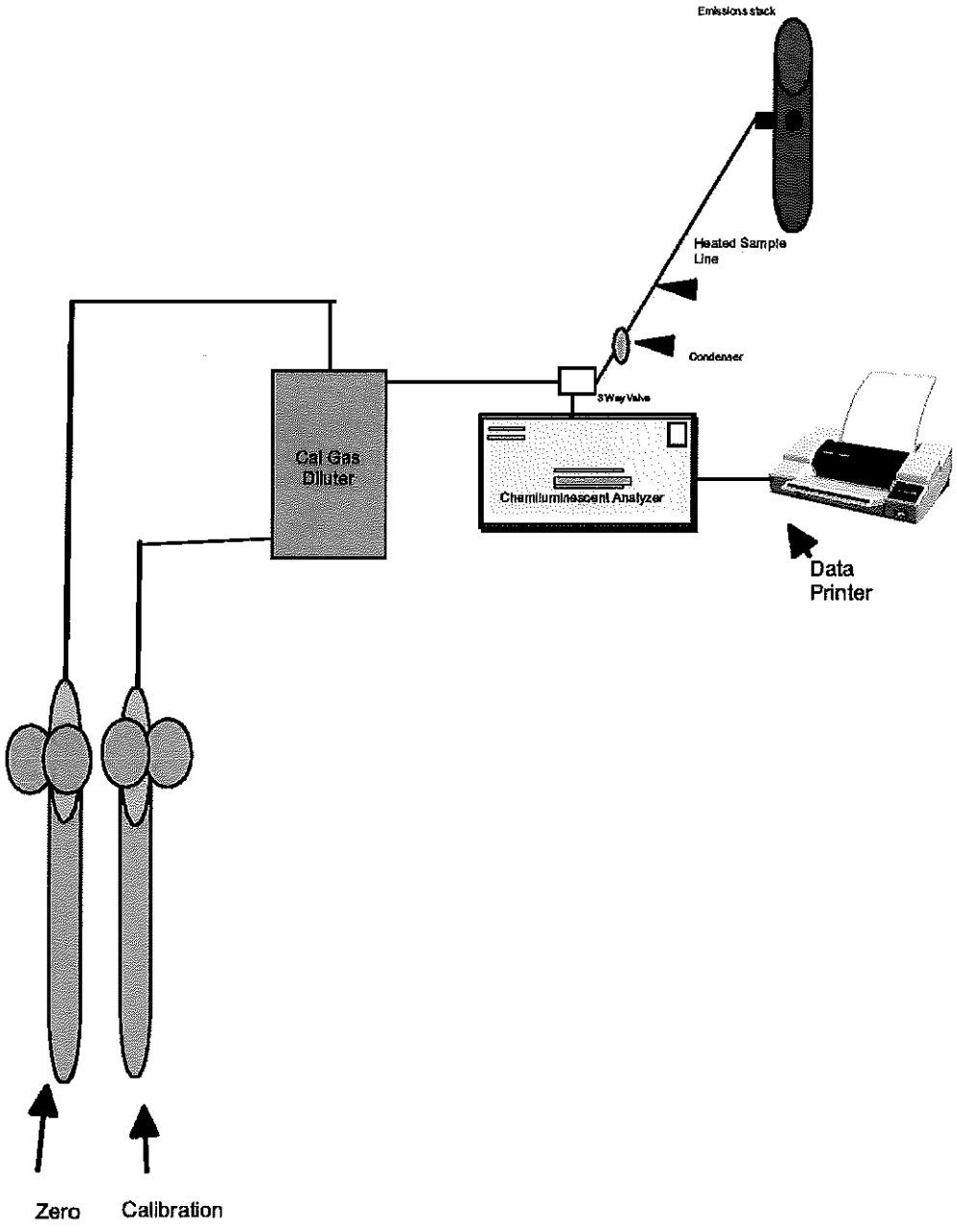


3A Sampling System

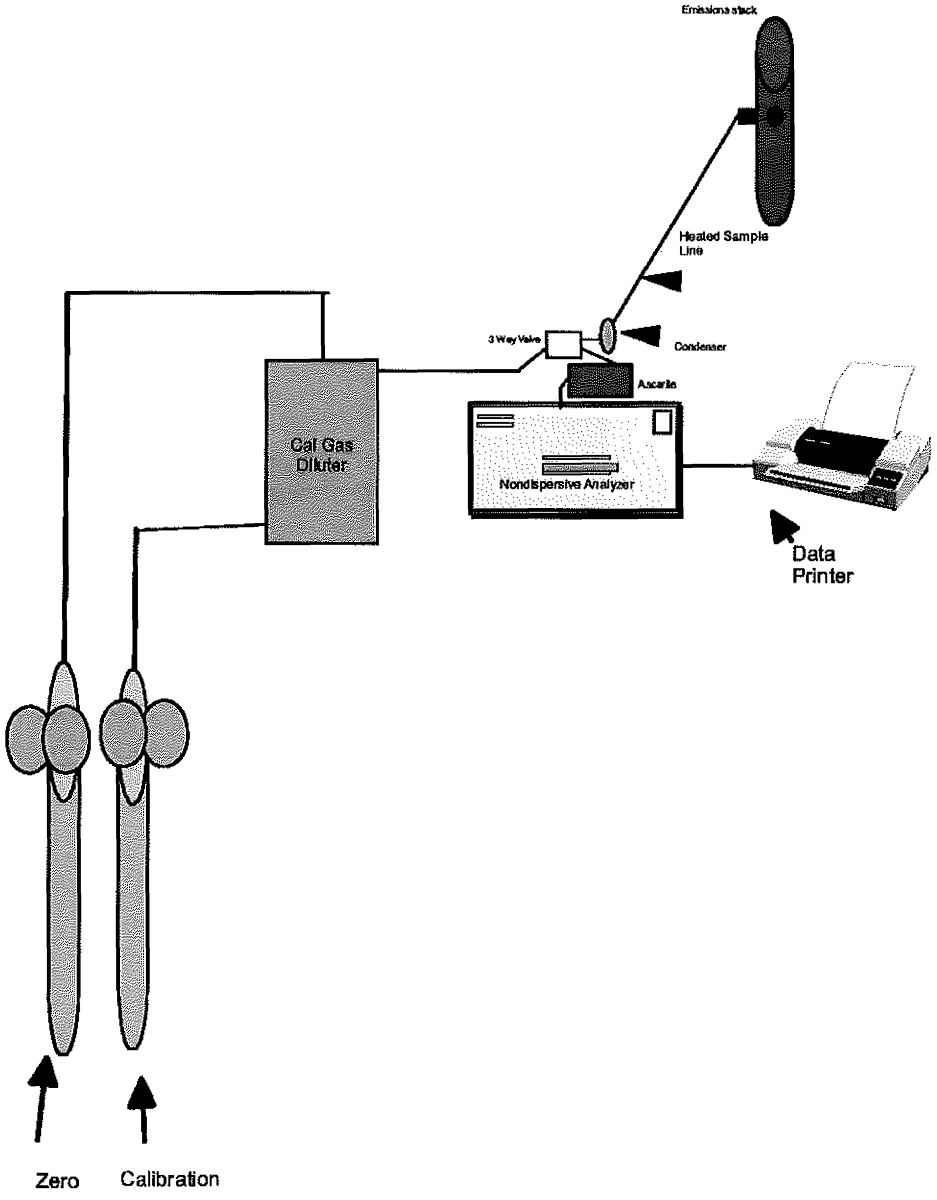


Custom Stack Analysis, LLC. P. O. Box 3750 14614 Cenfield St NE Alliance, Ohio 44601 Phone: 330-525-5119 Fax: 330-525-7908 E-mail: stacks@customstackanalysis.com

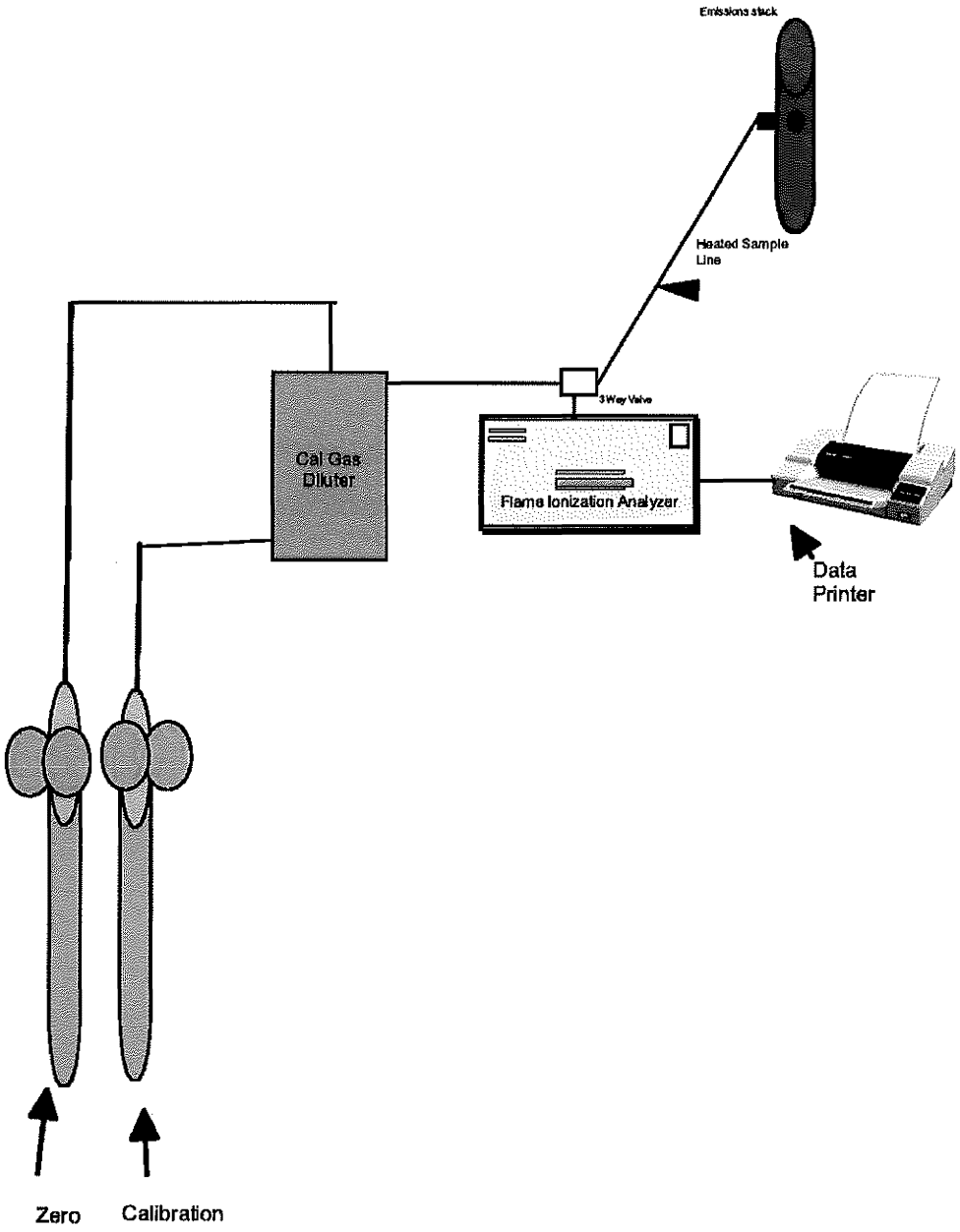
7E Sampling System



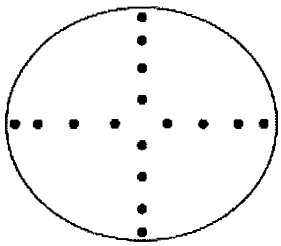
10 Sampling System

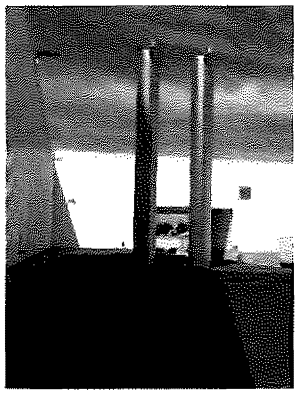


25A Sampling System



Location of Sampling Points





Location	North #1 & West #2 Generator Outlets	
Upstream	> .5 Dia.	
Downstream	> 2 Dia.	
Stack Diameter	18	Inches
Sample Point #		
1	0.6	Inches
2	1.9	
3	3.5	
4	5.8	
5	12.2	
6	14.5	
7	16.1	
8	17.4	