



The University of Michigan
3600 Varsity Drive
Ann Arbor, Michigan 48109

Report

**Performed Velocity, Moisture, Temperature, Volumetric Flow Rate,
Oxygen, Carbon Dioxide, Volatile Organic Compounds, Nitrogen Oxide
and Carbon Monoxide Emissions Testing**

Sampling performed on the Cummins Model GTA38 CC Generator Outlet

Ann Arbor, MI

Test Date: 11/19/15

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12/17/2015

X *Brian E. Lemasters*

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.

12/17/2015

X *Brian E. Lemasters*

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

TABLE OF CONTENTS

Executive Summary	1-2
Test Results	3
Methods Description	4-8
Sampling Train Diagrams	9-13
Sampling Point Description.....	14
Calculations	15-21

APPENDIX

Test Data	1
Laboratory Data	2
Calibration Data	3
Monitoring Data	4
Production Data	5

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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 GTA38 CC Generator Outlet on November 19th, 2015. The testing was conducted at The University of Michigan (SRN # - M0675) on the Cummins Model GTA38 CC Generator Outlet to determine compliance status with the applicable state and federal limits (see Table 1.2).

The Custom Stack Analysis, LLC. test crew consisted of Mr. Dave Sihock and Mr. Brian Lemasters. The testing procedures were coordinated by Mr. Stephen O’Rielly and Ms. Brandi Campbell of The University of Michigan and Mr. Steve Polloni of Cummins Bridgeway, LLC. (see Table 1.1). 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. Stephen O’Rielly Ms. Brandi Campbell	The University of Michigan 1239 Kipke Drive Ann Arbor, Michigan 48109	(734) 763-4642 (Phone)
Mr. Steve Polloni	Cummins Bridgeway, LLC. 54250 Grand River Ave. New Hudson, MI 48165	(248) 573-1978 (Phone) (248) 573-1538 (Fax)
Mr. James Gray	Custom Stack Analysis, LLC. 14614 Cenfield St. N.E. Alliance, OH 44601	(330) 525-5119 (Phone) (330) 525-7908 (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)

A description of the testing protocol is included on pages 4-8. All testing calculations are located on pages 15-21. 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. Test results are located on page 3.

The MDEQ advised us after the first run was completed and accepted, that we should test each exhaust port for 30 minutes for the CEMS and continue to get our flows from the exhaust port with the stack extension attached for the remainder of the test.

Table 1.2 demonstrates how The University of Michigan in Ann Arbor, MI is operating in compliance with the applicable state and federal emission standards.

Table 1.2: Emission Limits and Test Results Summary (State)

Pollutant	Emission Limitations	Test Result Average	Compliance Demonstrated
Carbon Monoxide	540 ppm @ 15% O ²	11.87 ppm @ 15% O ²	Yes
	or 4.0 g/hp-hr	0.07 g/hp-hr	Yes
Nitrogen Oxide	160 ppm @ 15% O ²	61.35 ppm @ 15% O ²	Yes
	or 2.0 g/hp-hr	0.56 g/hp-hr	Yes
Volatile Organic Compounds	86 ppm @ 15% O ²	36.62 ppm @ 15% O ²	Yes
	or 1.0 g/hp-hr	0.34 g/hp-hr	Yes

Test Results

The University of Michigan - Cummins Model GTA38 CC Generator Outlet

11/19/2015

Methods 1-4, 3A, 7E, 10 & 25A

	<u>Run #1</u>	<u>Run #2</u>	<u>Run #3</u>	<u>Avg.</u>	<u>Limit</u>
Stack Gas Velocity (ft/sec)	148.75	148.66	145.32	147.58	
Standard Cubic Feet an Hour	65,535	65,519	62,806	64,620	
Actual Cubic Feet per Minute	3,115	3,114	3,044	3,091	
Moisture %	13.73%	13.30%	13.50%	13.51%	
Carbon Dioxide %	10.67%	8.17%	6.83%	8.56%	
Oxygen %	9.11%	9.09%	10.11%	9.44%	
Nitrogen %	80.22%	82.74%	83.06%	82.01%	
CO (ppm)	34.74	19.29	15.69	23.24	
CO (ppm @ 15%)	17.38	9.64	8.58	11.87	540
CO (lbs/hr)	0.17	0.09	0.07	0.11	
CO (tons/yr)	0.72	0.40	0.31	0.48	
CO (g/hp-hr)	0.10	0.06	0.04	0.07	4
CO (lbs/Meg-hr)	0.30	0.17	0.13	0.20	
Nox (ppm)	48.33	136.59	167.52	117.48	
Nox (ppm @ 15%)	24.18	68.26	91.60	61.35	160
Nox (lbs/hr)	0.38	1.07	1.26	0.90	
Nox (tons/yr)	1.66	4.68	5.50	3.95	
Nox (g/hp-hr)	0.24	0.67	0.79	0.56	2
Nox (lbs/Meg-hr)	0.70	1.97	2.32	1.66	
VOC* (total ppm)	651.36	151.54	129.00	310.63	
VOC* (methane ppm)	466.00	134.60	113.20	237.93	
VOC** (ppm)	185.36	16.94	15.80	72.70	
VOC** (ppm @ 15%)	92.75	8.46	8.64	36.62	86
VOC** (lbs/hr Carbon)	1.14	0.10	0.09	0.44	
VOC** (tons/yr)	4.98	0.45	0.41	1.95	
VOC** (g/hp-hr)	0.87	0.08	0.07	0.34	1
VOC** (lbs/Meg-hr)	2.10	0.19	0.17	0.82	
Operating Engine Horsepower	727	725	725	726	
Max Engine Horsepower	737	737	737	737	
Load %	98.62%	98.40%	98.44%	98.48%	
Megawatt	0.5424	0.5412	0.5414	0.5417	

* VOC concentration dry

** VOC concentration with the Methane removed and Dry.