GAS-FIRED COMPRESSOR ENGINE
PORTABLE EMISSION TEST REPORT
EQM GATHERING OPCO, LLC
MCINTOSH COMPRESSOR STATION
ENGINE 4 - SOURCE ID 104
FACILITY ID 805715
PERMIT PA-63-01003A
UNION TOWNSHIP, WASHINGTON COUNTY, PA

Test Date: August 27, 2019

Report Date: September 4, 2019

Prepared by:

Equitrans Midstream
544 Copley Road
Weston, WV 26452
724-852-7417

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1. TEST RESULTS SUMMARY

Pennsylvania Department of Environmental Protection (PADEP)
Permit # PA-63-01003A

Caterpillar G3616LE – Source ID 104

Pollutant	Average Result*	Permit Limits	Compliant/Non-Compliant
Oxides of Nitrogen	2.59 lb./hr	-	-
	11.32 tpy	-	-
	0.24 g/bhp-hr	0.30	Compliant
	18.82 ppmvd @15% O_2	-	-
Carbon Monoxide	0.24 lb./hr	-	-
	1.07 tpy	-	-
	0.02 g/bhp-hr	0.17	Compliant
	2.91 ppmvd @15% O_2	-	-

*tpy based on 8,760 operating hours per year

2. INTRODUCTION

Testing was conducted in accordance with the Equitrans Portable Performance Test Protocol. The source tested was one (1) Caterpillar Gas-fired compressor engine. The engine has a rating of 5,350 brake horsepower (BHP) at 1000 revolutions per minute (rpm). Testing was conducted for oxygen (O2), oxides of nitrogen (NOx – NO and NO2) and carbon monoxide (CO). Testing was conducted in accordance with United States Environmental Protection Agency (USEPA) Methods 18 and 19 as detailed in 40 Code of Federal Regulations (CFR), Part 60, Appendix A and ASTM D6522. Testing was conducted to demonstrate compliance with the emission limits of PADEP Permit # PA-63-01003A.

CONTACT INFORMATION

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Equitrans Midstream
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Waynesburg, PA 15370
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cent@equitransmidstream.com

3. TEST DATE AND PERSONNEL INFORMATION

The testing occurred on August 27, 2019 at the McIntosh Compressor Station and was performed according to USEPA Methodology. The following table details the contact information regarding this test program:

Organization	Personnel	Responsibility
Equitrans	Mr. Carl Ent	Operator, RMs 18, 19, and ASTMD6522
Equitrans	Mr. Willoughby Hill	Supervisor

4. SOURCE DESCRIPTION AND PROCESS DATA

4.1 Source Description

The internal combustion engine is used to drive a compressor to pressurize natural gas for delivery to market. The engine tested at this location was (1) 5,350 brake horsepower Caterpillar Model G3616LE reciprocating internal combustion natural gas-fired compressor engine.

4.2 Process Data

Equitrans recorded the following process parameters during the time of the testing:

- Engine speed
- Intake Manifold Pressure (IMAP)
- Ignition Timing
- Fuel Flow Rate
- Engine Load
- BHP (calculated)

Appendix F contains the process data.

5. TESTING PROCEDURES

Testing was conducted in accordance with USEPA, Title 40, Code of Federal Regulations (CFR), Part 60, Appendix A, Methods 18 and 19. Additionally, testing was conducted using ASTM D6522.

5.1 Field Work

All field and Excel data sheets for the test procedures are included in the Appendices.

5.2 Determination of Gaseous Emissions

5.2.1 Sampling System Setup

The sampling system consisted of a sample probe, heated sample line, sample conditioner, and emission analyzer. A stainless steel "tee" in the sample probe facilitated system calibration. A heated Teflon sample line delivered the sample gas to the sample conditioning system and instrumentation system, which was located at ground level. The emission analyzer is complete with a self-contained pump that draws the sample from the exhaust stack at approximately 1.1 L/min for analysis. Prior to the analyzer, a sample condition reduces the temperature of the sample in order to condense and remove water vapor from the sample stream. The sample then passes through a filter to remove any contaminates in the sample stream. A peristaltic pump is attached to the outlet of the conditioner in order to reject any moisture condensed from the system. A calibration manifold is available in order to inject calibration gases for pre- and post- analysis instrument verification.

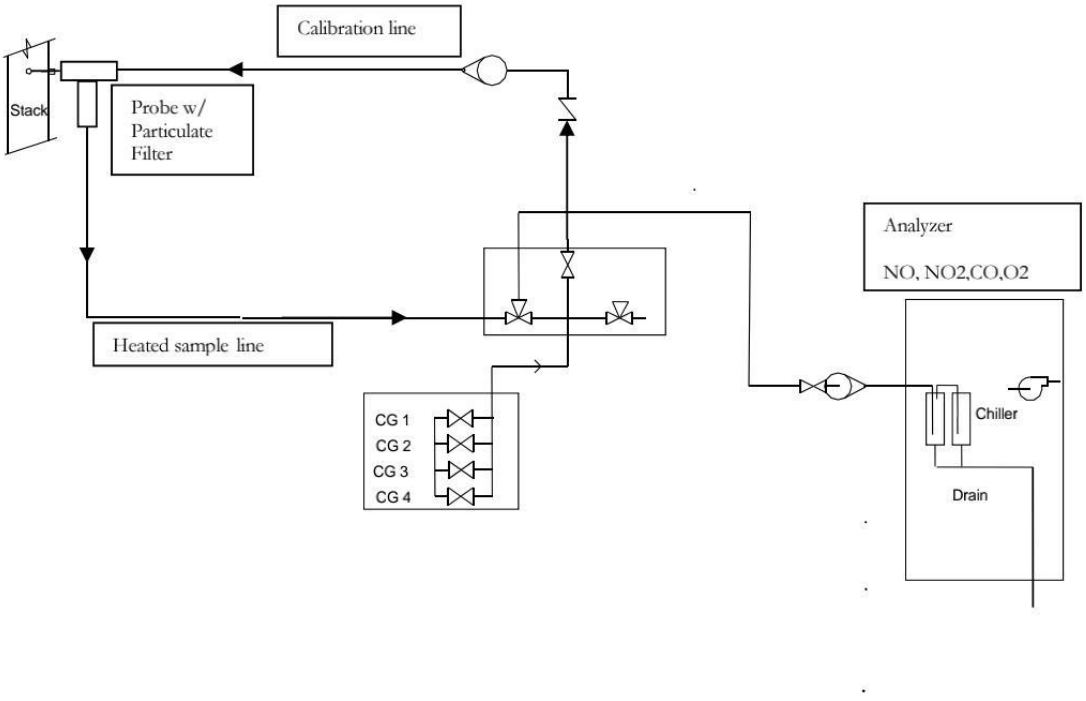

Figure 6-1 Sampling Schematic

5.2.2 Measurement by ASTM D6522

Prior to testing, the sample system was allowed to achieve steady state operating temperature. Calibration gases of NO, NO_2, CO, and O_2 were introduced to the sample system inlet at values representative of exhaust stack concentrations. Instrument response was recorded and was within 5% of prescribed calibration gas values. After pre-run verification, the sample probe was inserted into the exhaust system and exhaust gas was drawn through the sample system, into the analyzer for a period of 1-hour. Measurements were taken at 30 second intervals and averaged to achieve test results. Following the test run, calibration gases were sent to the sample probe once more for post-run verification and instrument response. The instrument response was within the 5%

tolerance of prescribed calibration value. Pre- and post- run responses were used to correct the test run average for system bias and drift.

6. CONCLUSION

An emission evaluation test program has been conducted on one 5,350 bhp compressor engine at the McIntosh Compressor Station located in Washington County, Pennsylvania. Testing was conducted for O2, CO, and NOx. Test results are considered to be representative of the emission rates at the prevailing operating conditions.

Section I.

Certificate of Accuracy

Certification of Data Accuracy

I, the undersigned, hereby certify that, based on information and belief formed after reasonable inquiry, all information contained in the attached ___*McIntosh Engine #4 Source ID:104 - Portable Emission Test Report*___, and any supporting documents appended hereto, is true, accurate, and complete.

Signature DocuSigned by: F9B7E04C3E3345D... Date 9/17/2019

Responsible of Authorized Representative

Name __William Sybert (WJS)_____ Title Vice President Engineering

Telephone # _____412-395-7041_____

Certification of Compliance Status

I, the undersigned, hereby certify that, based on the finding(s) of the test(s) conducted on the date(s), beginning ____August 27, 2019_____ and ending ___August 27, 2019__, show that the facility _____*McIntosh Compressor Station Engine #4 Source ID: 104*_____, is in compliance ____X____, or is not in compliance _____, with Rule/Condition # __Section E.I. #001 of Permit __PA-63-01003A_____.

Signature DocuSigned by: F9B7E04C3E3345D... Date 9/17/2019

Responsible of Authorized Representative

Name __William Sybert (WJS)_____ Title Vice President Engineering

Telephone # _____412-395-7041_____

E-Mail Address __wsybert@equitransmidstream.com_____

Section II.

Results Summary

Equitrans Midstream	Emission Summary for	McIntosh	Engine #	4	
Station:	McIntosh	Manfct:	Caterpillar	Engine Serial Number:	ZZY00735
Engine #:	4	Model:	3616 A4	Engine Hrs	6,924
HP:	5350	Rated Speed:	1000		
Data Collected by:	C.Ent	Date:	8/27/2019		

Date	8/27/2019
Time	11:08:08 AM
Ambient Conditions	
Rel Hum %	94.0%
Ambient Air Temp	68.0
Barametric Pressure ("Hg)	29.95
Engine Operating Conditions	
RPM	999.6
% Load	90%
Ignition Timing	17.9
Air Man. Temp.	108.4
AMP (Trailer Inst)	33.3
Air Man Pressure ("Hg)	33.28
BTU Content HHV	1042.0
BTU Content LHV	948.2
Fuel Flow (MillionBTU/hr)	37.37
BHP	4825.7
Exhaust Gas Conditions (Corrected for drift)	
O2 %	11.03
CO ppmvd	4.87
NO ppmvd	22.19
NO2 ppmvd	9.30
NOx ppmvd	31.49
CO ppmvd @15%	2.91
NO ppmvd @15%	13.26
NO2 ppmvd @ 15%	5.56
NOx ppmvd @15%	18.82
Exhaust Emission	
NOx Lb/Hr	2.59
CO Lb/Hr	0.24
NOx g/BHP/ Hr	0.24
CO g/BHP/ Hr	0.02
NOx TPY	11.32
CO TPY	1.07

Emission Summary	Measured	Permit levels	
NOx TPY	**11.32**		
NOx Lb/Hr	**2.59**		
NOx g/BHP/Hr	**0.24**	**0.30**	**Compliant**
CO TPY	**1.07**		
CO Lb/hr	**0.24**		
CO g/BHP/Hr	**0.02**	**0.17**	**Compliant**

CC515961	NO2
CC1205	NO
CC515961	O2
Zero Gas	UHP Nitrogen

Section III.

Calibrations

		Cal Gas	Min ppm	Max ppm	Max Error ppm	% error	Allowable %	Bottle s/n
Stability Check	**NO2**	**101.30**	100.10	101.50	**1.20**	**0.39**	3 or 5	**CC507258**
	NO	**199.90**	198.00	204.00	**4.10**	**0.68**	3 or 5	**SG91017577ALD1**
	O2	**15.05**	15.02	15.08	**0.03**	**0.07**	1% O2	**CC507258**
	CO	**200.70**	191.00	197.00	**9.70**	**1.61**	3 or 5	**CC6889**

Date/ Time	sec Runtime	ppm NO2	ppm NO	ppm NOx	% O2	ppm CO
3/20/2019 3:28:52 PM	0	39.8	4	43.8	15.02	*0*
3/20/2019 3:29:22 PM	30	49.8	3	52.8	15.02	*0*
3/20/2019 3:29:52 PM	60	49.9	3	52.9	15.02	*0*
3/20/2019 3:30:22 PM	90	49.9	3	52.9	15.03	*0*
3/20/2019 3:30:52 PM	120	50.0	3	53.0	15.03	*0*
3/20/2019 3:31:22 PM	150	49.9	3	52.9	15.02	*0*
3/20/2019 3:31:52 PM	180	49.9	3	52.9	15.02	*0*
3/20/2019 3:32:22 PM	210	50.0	3	53.0	15.03	*0*
3/20/2019 3:32:52 PM	240	50.0	3	53.0	15.02	*0*
3/20/2019 3:33:22 PM	270	50.0	3	53.0	15.02	*0*
3/20/2019 3:33:52 PM	300	50.0	3	53.0	15.03	*0*
3/20/2019 3:34:22 PM	330	50.0	3	53.0	15.03	*0*
3/20/2019 3:34:52 PM	360	50.0	3	53.0	15.02	*0*
3/20/2019 3:35:22 PM	390	50.0	3	53.0	15.03	*0*
3/20/2019 3:35:52 PM	420	50.0	3	53.0	15.02	*0*
3/20/2019 3:36:22 PM	450	94.9	1	95.9	15.08	*0*
3/20/2019 3:36:52 PM	480	99.3	4	103.3	15.05	*0*
3/20/2019 3:37:22 PM	510	99.9	4	103.9	15.05	*0*
3/20/2019 3:37:52 PM	540	100.1	5	105.1	15.05	*0*
3/20/2019 3:38:22 PM	570	100.4	5	105.4	15.05	*0*
3/20/2019 3:38:52 PM	600	100.6	5	105.6	15.05	*0*
3/20/2019 3:39:22 PM	630	100.6	5	105.6	15.05	*0*
3/20/2019 3:39:52 PM	660	100.8	5	105.8	15.05	*0*
3/20/2019 3:40:22 PM	690	100.9	5	105.9	15.05	*0*
3/20/2019 3:40:52 PM	720	100.8	5	105.8	15.05	*0*
3/20/2019 3:41:22 PM	750	101.0	5	106.0	15.05	*0*
3/20/2019 3:41:52 PM	780	101.0	5	106.0	15.05	*0*
3/20/2019 3:42:22 PM	810	101.2	5	106.2	15.05	*0*
3/20/2019 3:42:52 PM	840	101.1	6	107.1	15.05	*0*
3/20/2019 3:43:22 PM	870	101.1	5	106.1	15.05	*0*
3/20/2019 3:43:52 PM	900	101.1	6	107.1	15.05	*0*
3/20/2019 3:44:22 PM	930	101.2	6	107.2	15.05	*0*
3/20/2019 3:44:52 PM	960	101.2	6	107.2	15.05	*0*
3/20/2019 3:45:22 PM	990	101.2	6	107.2	15.05	*0*
3/20/2019 3:45:52 PM	1020	101.3	6	107.3	15.05	*0*
3/20/2019 3:46:22 PM	1050	101.2	6	107.2	15.05	*0*
3/20/2019 3:46:52 PM	1080	101.2	6	107.2	15.05	*0*
3/20/2019 3:47:22 PM	1110	101.3	6	107.3	15.05	*0*
3/20/2019 3:47:52 PM	1140	101.3	6	107.3	15.05	*0*
3/20/2019 3:48:22 PM	1170	101.3	6	107.3	15.05	*0*
3/20/2019 3:48:52 PM	1200	101.3	6	107.3	15.05	*0*
3/20/2019 3:49:22 PM	1230	101.4	6	107.4	15.05	*0*
3/20/2019 3:49:52 PM	1260	101.3	6	107.3	15.05	*0*
3/20/2019 3:50:22 PM	1290	101.3	6	107.3	15.05	*0*
3/20/2019 3:50:52 PM	1320	101.3	6	107.3	15.05	*0*
3/20/2019 3:51:22 PM	1350	101.4	6	107.4	15.05	*0*
3/20/2019 3:51:52 PM	1380	101.4	6	107.4	15.05	*0*
3/20/2019 3:52:22 PM	1410	101.5	6	107.5	15.05	*0*

3/20/2019 3:52:52 PM	1440	101.4	6	107.4	15.05	*0*
3/20/2019 3:53:22 PM	1470	101.5	6	107.5	15.05	*0*
3/20/2019 3:53:52 PM	1500	101.4	6	107.4	15.05	*0*
3/20/2019 3:54:22 PM	1530	74.0	7	81.0	8.62	*0*
3/20/2019 3:54:52 PM	1560	3.2	18	21.2	0.07	*0*
3/20/2019 3:55:22 PM	1590	2.0	18	20.0	0.03	*0*
3/20/2019 3:55:52 PM	1620	1.5	17	18.5	0.00	*0*
3/20/2019 3:56:22 PM	1650	1.3	17	18.3	0.00	*0*
3/20/2019 3:56:52 PM	1680	1.1	17	18.1	0.00	*0*
3/20/2019 3:57:22 PM	1710	1.0	17	18.0	0.00	*0*
3/20/2019 3:57:52 PM	1740	0.9	17	17.9	0.00	*0*
3/20/2019 3:58:22 PM	1770	0.8	17	17.8	0.00	*0*
3/20/2019 3:58:52 PM	1800	0.7	16	16.7	0.00	*0*
3/20/2019 3:59:22 PM	1830	0.7	16	16.7	0.00	*0*
3/20/2019 3:59:52 PM	1860	0.6	16	16.6	0.00	*0*
3/20/2019 4:00:22 PM	1890	0.6	16	16.6	0.00	*0*
3/20/2019 4:00:52 PM	1920	0.6	16	16.6	0.00	*0*
3/20/2019 4:01:22 PM	1950	0.6	16	16.6	0.00	*0*
3/20/2019 4:01:52 PM	1980	0.6	16	16.6	0.00	*0*
3/20/2019 4:02:22 PM	2010	0.5	16	16.5	0.00	*0*
3/20/2019 4:02:52 PM	2040	0.6	16	16.6	0.00	*0*
3/20/2019 4:03:22 PM	2070	0.5	16	16.5	0.00	*0*
3/20/2019 4:03:52 PM	2100	0.5	16	16.5	0.00	*0*
3/20/2019 4:04:22 PM	2130	0.5	16	16.5	0.00	*0*
3/20/2019 4:04:52 PM	2160	0.5	16	16.5	0.00	*0*
3/20/2019 4:05:22 PM	2190	0.2	3	3.2	0.00	*122*
3/20/2019 4:05:52 PM	2220	0.2	1	1.2	0.00	*190*
3/20/2019 4:06:22 PM	2250	0.2	1	1.2	0.00	*192*
3/20/2019 4:06:52 PM	2280	0.1	1	1.1	0.00	*193*
3/20/2019 4:07:22 PM	2310	0.1	1	1.1	0.00	*194*
3/20/2019 4:07:52 PM	2340	0.1	1	1.1	0.00	*195*
3/20/2019 4:08:22 PM	2370	0.1	1	1.1	0.00	*193*
3/20/2019 4:08:52 PM	2400	0.1	1	1.1	0.00	*194*
3/20/2019 4:09:22 PM	2430	0.1	1	1.1	0.00	*196*
3/20/2019 4:09:52 PM	2460	0.1	0	0.1	0.00	*191*
3/20/2019 4:10:22 PM	2490	0.1	0	0.1	0.00	*194*
3/20/2019 4:10:52 PM	2520	0.1	0	0.1	0.00	*196*
3/20/2019 4:11:22 PM	2550	0.1	0	0.1	0.00	*194*
3/20/2019 4:11:52 PM	2580	0.1	0	0.1	0.00	*194*
3/20/2019 4:12:22 PM	2610	0.1	0	0.1	0.00	*195*
3/20/2019 4:12:52 PM	2640	0.1	0	0.1	0.00	*195*
3/20/2019 4:13:22 PM	2670	0.1	0	0.1	0.00	*195*
3/20/2019 4:13:52 PM	2700	0.1	0	0.1	0.00	*194*
3/20/2019 4:14:22 PM	2730	0.1	0	0.1	0.00	*194*
3/20/2019 4:14:52 PM	2760	0.1	0	0.1	0.00	*196*
3/20/2019 4:15:22 PM	2790	0.1	0	0.1	0.00	*194*
3/20/2019 4:15:52 PM	2820	0.1	0	0.1	0.00	*195*
3/20/2019 4:16:22 PM	2850	0.1	0	0.1	0.00	*195*
3/20/2019 4:16:52 PM	2880	0.1	0	0.1	0.00	*195*
3/20/2019 4:17:22 PM	2910	0.1	0	0.1	0.00	*192*
3/20/2019 4:17:52 PM	2940	0.1	0	0.1	0.00	*195*
3/20/2019 4:18:22 PM	2970	0.1	0	0.1	0.00	*194*
3/20/2019 4:18:52 PM	3000	0.1	0	0.1	0.00	*194*
3/20/2019 4:19:22 PM	3030	0.1	0	0.1	0.00	*193*
3/20/2019 4:19:52 PM	3060	0.1	0	0.1	0.00	*195*
3/20/2019 4:20:22 PM	3090	0.1	0	0.1	0.00	*195*
3/20/2019 4:20:52 PM	3120	0.1	0	0.1	0.00	*193*
3/20/2019 4:21:22 PM	3150	0.1	0	0.1	0.00	*197*
3/20/2019 4:21:52 PM	3180	0.1	0	0.1	0.00	*195*
3/20/2019 4:22:22 PM	3210	0.1	0	0.1	0.00	*195*
3/20/2019 4:22:52 PM	3240	0.1	0	0.1	0.00	*195*
3/20/2019 4:23:22 PM	3270	0.1	0	0.1	0.00	*200*

3/20/2019 4:23:52 PM	3300	0.1	0	0.1	0.00	*195*
3/20/2019 4:24:22 PM	3330	0.1	0	0.1	0.00	*197*
3/20/2019 4:24:52 PM	3360	0.1	0	0.1	0.42	*90*
3/20/2019 4:25:22 PM	3390	0.1	0	0.1	0.00	*15*
3/20/2019 4:25:52 PM	3420	0.1	0	0.1	0.00	*11*
3/20/2019 4:26:22 PM	3450	0.1	0	0.1	0.00	*11*
3/20/2019 4:26:52 PM	3480	0.1	0	0.1	0.00	*11*
3/20/2019 4:27:22 PM	3510	0.1	0	0.1	0.00	*10*
3/20/2019 4:27:52 PM	3540	0.1	0	0.1	0.00	*11*
3/20/2019 4:28:22 PM	3570	0.1	0	0.1	0.00	*9*
3/20/2019 4:28:52 PM	3600	0.1	0	0.1	0.00	*10*
3/20/2019 4:29:22 PM	3630	0.1	0	0.1	0.00	*10*
3/20/2019 4:29:52 PM	3660	0.1	0	0.1	0.00	*9*
3/20/2019 4:30:22 PM	3690	0.1	0	0.1	0.00	*8*
3/20/2019 4:30:52 PM	3720	0.1	0	0.1	0.00	*9*
3/20/2019 4:31:22 PM	3750	0.1	0	0.1	0.00	*10*
3/20/2019 4:31:52 PM	3780	0.1	0	0.1	0.00	*9*
3/20/2019 4:32:22 PM	3810	0.1	0	0.1	0.00	*9*
3/20/2019 4:32:52 PM	3840	0.1	0	0.1	0.00	*10*
3/20/2019 4:33:22 PM	3870	0.1	0	0.1	0.00	*10*
3/20/2019 4:33:52 PM	3900	0.1	0	0.1	0.00	*8*
3/20/2019 4:34:22 PM	3930	5.7	134	139.7	0.00	*5*
3/20/2019 4:34:52 PM	3960	1.5	188	189.5	0.00	*0*
3/20/2019 4:35:22 PM	3990	1.2	194	195.2	0.00	*0*
3/20/2019 4:35:52 PM	4020	1.1	196	197.1	0.00	*0*
3/20/2019 4:36:22 PM	4050	1.0	197	198.0	0.00	*0*
3/20/2019 4:36:52 PM	4080	0.9	198	198.9	0.00	*0*
3/20/2019 4:37:22 PM	4110	0.9	199	199.9	0.00	*0*
3/20/2019 4:37:52 PM	4140	0.8	199	199.8	0.00	*0*
3/20/2019 4:38:22 PM	4170	0.8	200	200.8	0.00	*0*
3/20/2019 4:38:52 PM	4200	0.7	200	200.7	0.00	*0*
3/20/2019 4:39:22 PM	4230	0.7	200	200.7	0.00	*0*
3/20/2019 4:39:52 PM	4260	0.6	201	201.6	0.00	*0*
3/20/2019 4:40:22 PM	4290	0.7	201	201.7	0.00	*0*
3/20/2019 4:40:52 PM	4320	0.6	201	201.6	0.00	*0*
3/20/2019 4:41:22 PM	4350	0.6	202	202.6	0.00	*0*
3/20/2019 4:41:52 PM	4380	0.5	202	202.5	0.00	*0*
3/20/2019 4:42:22 PM	4410	0.5	202	202.5	0.00	*0*
3/20/2019 4:42:52 PM	4440	0.6	202	202.6	0.00	*0*
3/20/2019 4:43:22 PM	4470	0.5	202	202.5	0.00	*0*
3/20/2019 4:43:52 PM	4500	0.5	202	202.5	0.00	*0*
3/20/2019 4:44:22 PM	4530	0.5	202	202.5	0.00	*0*
3/20/2019 4:44:52 PM	4560	0.5	202	202.5	0.00	*0*
3/20/2019 4:45:22 PM	4590	0.5	203	203.5	0.00	*0*
3/20/2019 4:45:52 PM	4620	0.4	203	203.4	0.00	*0*
3/20/2019 4:46:22 PM	4650	0.4	203	203.4	0.00	*0*
3/20/2019 4:46:52 PM	4680	0.5	203	203.5	0.00	*0*
3/20/2019 4:47:22 PM	4710	0.4	203	203.4	0.00	*0*
3/20/2019 4:47:52 PM	4740	0.4	203	203.4	0.00	*0*
3/20/2019 4:48:22 PM	4770	0.4	203	203.4	0.00	*0*
3/20/2019 4:48:52 PM	4800	0.4	203	203.4	0.00	*0*
3/20/2019 4:49:22 PM	4830	0.4	203	203.4	0.00	*0*
3/20/2019 4:49:52 PM	4860	0.4	203	203.4	0.00	*0*
3/20/2019 4:50:22 PM	4890	0.4	203	203.4	0.00	*0*
3/20/2019 4:50:52 PM	4920	0.4	204	204.4	0.00	*0*
3/20/2019 4:51:22 PM	4950	0.3	204	204.3	0.00	*0*
3/20/2019 4:51:52 PM	4980	0.4	204	204.4	0.00	*0*
3/20/2019 4:52:22 PM	5010	0.3	204	204.3	0.00	*0*
3/20/2019 4:52:52 PM	5040	0.3	204	204.3	0.00	*0*
3/20/2019 4:53:22 PM	5070	6.4	203	209.4	0.00	*0*
3/20/2019 4:53:52 PM	5100	0.5	29	29.5	3.80	*0*
3/20/2019 4:54:22 PM	5130	0.0	9	9.0	3.85	*0*

3/20/2019 4:54:52 PM	5160	0.0	6	6.0	3.86	*0*
3/20/2019 4:55:22 PM	5190	0.0	5	5.0	3.86	*0*
3/20/2019 4:55:52 PM	5220	0.0	5	5.0	3.87	*0*
3/20/2019 4:56:22 PM	5250	0.0	4	4.0	3.87	*0*
3/20/2019 4:56:52 PM	5280	0.0	4	4.0	3.87	*0*
3/20/2019 4:57:22 PM	5310	0.0	3	3.0	3.87	*0*
3/20/2019 4:57:52 PM	5340	0.0	3	3.0	3.87	*0*
3/20/2019 4:58:22 PM	5370	0.0	3	3.0	3.87	*0*
3/20/2019 4:58:52 PM	5400	0.0	3	3.0	3.88	*0*
3/20/2019 4:59:22 PM	5430	0.0	3	3.0	3.88	*0*
3/20/2019 4:59:52 PM	5460	0.0	3	3.0	3.88	*0*
3/20/2019 5:00:22 PM	5490	0.0	2	2.0	3.88	*0*
3/20/2019 5:00:52 PM	5520	0.0	2	2.0	3.88	*0*
3/20/2019 5:01:22 PM	5550	0.0	2	2.0	3.88	*0*
3/20/2019 5:01:52 PM	5580	0.0	2	2.0	3.88	*0*
3/20/2019 5:02:22 PM	5610	0.0	2	2.0	3.88	*0*
3/20/2019 5:02:52 PM	5640	0.0	2	2.0	3.88	*0*
3/20/2019 5:03:22 PM	5670	0.0	2	2.0	3.88	*0*
3/20/2019 5:03:52 PM	5700	0.0	2	2.0	3.88	*0*
3/20/2019 5:04:22 PM	5730	0.0	2	2.0	3.88	*0*
3/20/2019 5:04:52 PM	5760	0.0	2	2.0	3.88	*0*
3/20/2019 5:05:22 PM	5790	0.0	2	2.0	3.88	*0*

NO2

3/20/2019 3:37:52 PM	540	100.1	5	105.1	15.05	*0*
3/20/2019 3:38:22 PM	570	100.4	5	105.4	15.05	*0*
3/20/2019 3:38:52 PM	600	100.6	5	105.6	15.05	*0*
3/20/2019 3:39:22 PM	630	100.6	5	105.6	15.05	*0*
3/20/2019 3:39:52 PM	660	100.8	5	105.8	15.05	*0*
3/20/2019 3:40:22 PM	690	100.9	5	105.9	15.05	*0*
3/20/2019 3:40:52 PM	720	100.8	5	105.8	15.05	*0*
3/20/2019 3:41:22 PM	750	101.0	5	106.0	15.05	*0*
3/20/2019 3:41:52 PM	780	101.0	5	106.0	15.05	*0*
3/20/2019 3:42:22 PM	810	101.2	5	106.2	15.05	*0*
3/20/2019 3:42:52 PM	840	101.1	6	107.1	15.05	*0*
3/20/2019 3:43:22 PM	870	101.1	5	106.1	15.05	*0*
3/20/2019 3:43:52 PM	900	101.1	6	107.1	15.05	*0*
3/20/2019 3:44:22 PM	930	101.2	6	107.2	15.05	*0*
3/20/2019 3:44:52 PM	960	101.2	6	107.2	15.05	*0*
3/20/2019 3:45:22 PM	990	101.2	6	107.2	15.05	*0*
3/20/2019 3:45:52 PM	1020	101.3	6	107.3	15.05	*0*
3/20/2019 3:46:22 PM	1050	101.2	6	107.2	15.05	*0*
3/20/2019 3:46:52 PM	1080	101.2	6	107.2	15.05	*0*
3/20/2019 3:47:22 PM	1110	101.3	6	107.3	15.05	*0*
3/20/2019 3:47:52 PM	1140	101.3	6	107.3	15.05	*0*
3/20/2019 3:48:22 PM	1170	101.3	6	107.3	15.05	*0*
3/20/2019 3:48:52 PM	1200	101.3	6	107.3	15.05	*0*
3/20/2019 3:49:22 PM	1230	101.4	6	107.4	15.05	*0*
3/20/2019 3:49:52 PM	1260	101.3	6	107.3	15.05	*0*
3/20/2019 3:50:22 PM	1290	101.3	6	107.3	15.05	*0*
3/20/2019 3:50:52 PM	1320	101.3	6	107.3	15.05	*0*
3/20/2019 3:51:22 PM	1350	101.4	6	107.4	15.05	*0*
3/20/2019 3:51:52 PM	1380	101.4	6	107.4	15.05	*0*
3/20/2019 3:52:22 PM	1410	101.5	6	107.5	15.05	*0*

NO

3/20/2019 4:36:52 PM	4080	0.9	198	198.9	0.00	*0*
3/20/2019 4:37:22 PM	4110	0.9	199	199.9	0.00	*0*
3/20/2019 4:37:52 PM	4140	0.8	199	199.8	0.00	*0*
3/20/2019 4:38:22 PM	4170	0.8	200	200.8	0.00	*0*
3/20/2019 4:38:52 PM	4200	0.7	200	200.7	0.00	*0*
3/20/2019 4:39:22 PM	4230	0.7	200	200.7	0.00	*0*

3/20/2019 4:39:52 PM	4260	0.6	201	201.6	0.00	*0*
3/20/2019 4:40:22 PM	4290	0.7	201	201.7	0.00	*0*
3/20/2019 4:40:52 PM	4320	0.6	201	201.6	0.00	*0*
3/20/2019 4:41:22 PM	4350	0.6	202	202.6	0.00	*0*
3/20/2019 4:41:52 PM	4380	0.5	202	202.5	0.00	*0*
3/20/2019 4:42:22 PM	4410	0.5	202	202.5	0.00	*0*
3/20/2019 4:42:52 PM	4440	0.6	202	202.6	0.00	*0*
3/20/2019 4:43:22 PM	4470	0.5	202	202.5	0.00	*0*
3/20/2019 4:43:52 PM	4500	0.5	202	202.5	0.00	*0*
3/20/2019 4:44:22 PM	4530	0.5	202	202.5	0.00	*0*
3/20/2019 4:44:52 PM	4560	0.5	202	202.5	0.00	*0*
3/20/2019 4:45:22 PM	4590	0.5	203	203.5	0.00	*0*
3/20/2019 4:45:52 PM	4620	0.4	203	203.4	0.00	*0*
3/20/2019 4:46:22 PM	4650	0.4	203	203.4	0.00	*0*
3/20/2019 4:46:52 PM	4680	0.5	203	203.5	0.00	*0*
3/20/2019 4:47:22 PM	4710	0.4	203	203.4	0.00	*0*
3/20/2019 4:47:52 PM	4740	0.4	203	203.4	0.00	*0*
3/20/2019 4:48:22 PM	4770	0.4	203	203.4	0.00	*0*
3/20/2019 4:48:52 PM	4800	0.4	203	203.4	0.00	*0*
3/20/2019 4:49:22 PM	4830	0.4	203	203.4	0.00	*0*
3/20/2019 4:49:52 PM	4860	0.4	203	203.4	0.00	*0*
3/20/2019 4:50:22 PM	4890	0.4	203	203.4	0.00	*0*
3/20/2019 4:50:52 PM	4920	0.4	204	204.4	0.00	*0*
3/20/2019 4:51:22 PM	4950	0.3	204	204.3	0.00	*0*

O2

3/20/2019 3:28:52 PM	0	39.8	4	43.8	15.02	*0*
3/20/2019 3:29:22 PM	30	49.8	3	52.8	15.02	*0*
3/20/2019 3:29:52 PM	60	49.9	3	52.9	15.02	*0*
3/20/2019 3:30:22 PM	90	49.9	3	52.9	15.03	*0*
3/20/2019 3:30:52 PM	120	50.0	3	53.0	15.03	*0*
3/20/2019 3:31:22 PM	150	49.9	3	52.9	15.02	*0*
3/20/2019 3:31:52 PM	180	49.9	3	52.9	15.02	*0*
3/20/2019 3:32:22 PM	210	50.0	3	53.0	15.03	*0*
3/20/2019 3:32:52 PM	240	50.0	3	53.0	15.02	*0*
3/20/2019 3:33:22 PM	270	50.0	3	53.0	15.02	*0*
3/20/2019 3:33:52 PM	300	50.0	3	53.0	15.03	*0*
3/20/2019 3:34:22 PM	330	50.0	3	53.0	15.03	*0*
3/20/2019 3:34:52 PM	360	50.0	3	53.0	15.02	*0*
3/20/2019 3:35:22 PM	390	50.0	3	53.0	15.03	*0*
3/20/2019 3:35:52 PM	420	50.0	3	53.0	15.02	*0*
3/20/2019 3:36:22 PM	450	94.9	1	95.9	15.08	*0*
3/20/2019 3:36:52 PM	480	99.3	4	103.3	15.05	*0*
3/20/2019 3:37:22 PM	510	99.9	4	103.9	15.05	*0*
3/20/2019 3:37:52 PM	540	100.1	5	105.1	15.05	*0*
3/20/2019 3:38:22 PM	570	100.4	5	105.4	15.05	*0*
3/20/2019 3:38:52 PM	600	100.6	5	105.6	15.05	*0*
3/20/2019 3:39:22 PM	630	100.6	5	105.6	15.05	*0*
3/20/2019 3:39:52 PM	660	100.8	5	105.8	15.05	*0*
3/20/2019 3:40:22 PM	690	100.9	5	105.9	15.05	*0*
3/20/2019 3:40:52 PM	720	100.8	5	105.8	15.05	*0*
3/20/2019 3:41:22 PM	750	101.0	5	106.0	15.05	*0*
3/20/2019 3:41:52 PM	780	101.0	5	106.0	15.05	*0*
3/20/2019 3:42:22 PM	810	101.2	5	106.2	15.05	*0*
3/20/2019 3:42:52 PM	840	101.1	6	107.1	15.05	*0*
3/20/2019 3:43:22 PM	870	101.1	5	106.1	15.05	*0*

CO

3/20/2019 4:07:22 PM	2310	0.1	1	1.1	0.00	*194*
3/20/2019 4:07:52 PM	2340	0.1	1	1.1	0.00	*195*

3/20/2019 4:08:22 PM	2370	0.1	1	1.1	0.00	*193*
3/20/2019 4:08:52 PM	2400	0.1	1	1.1	0.00	*194*
3/20/2019 4:09:22 PM	2430	0.1	1	1.1	0.00	*196*
3/20/2019 4:09:52 PM	2460	0.1	0	0.1	0.00	*191*
3/20/2019 4:10:22 PM	2490	0.1	0	0.1	0.00	*194*
3/20/2019 4:10:52 PM	2520	0.1	0	0.1	0.00	*196*
3/20/2019 4:11:22 PM	2550	0.1	0	0.1	0.00	*194*
3/20/2019 4:11:52 PM	2580	0.1	0	0.1	0.00	*194*
3/20/2019 4:12:22 PM	2610	0.1	0	0.1	0.00	*195*
3/20/2019 4:12:52 PM	2640	0.1	0	0.1	0.00	*195*
3/20/2019 4:13:22 PM	2670	0.1	0	0.1	0.00	*195*
3/20/2019 4:13:52 PM	2700	0.1	0	0.1	0.00	*194*
3/20/2019 4:14:22 PM	2730	0.1	0	0.1	0.00	*194*
3/20/2019 4:14:52 PM	2760	0.1	0	0.1	0.00	*196*
3/20/2019 4:15:22 PM	2790	0.1	0	0.1	0.00	*194*
3/20/2019 4:15:52 PM	2820	0.1	0	0.1	0.00	*195*
3/20/2019 4:16:22 PM	2850	0.1	0	0.1	0.00	*195*
3/20/2019 4:16:52 PM	2880	0.1	0	0.1	0.00	*195*
3/20/2019 4:17:22 PM	2910	0.1	0	0.1	0.00	*192*
3/20/2019 4:17:52 PM	2940	0.1	0	0.1	0.00	*195*
3/20/2019 4:18:22 PM	2970	0.1	0	0.1	0.00	*194*
3/20/2019 4:18:52 PM	3000	0.1	0	0.1	0.00	*194*
3/20/2019 4:19:22 PM	3030	0.1	0	0.1	0.00	*193*
3/20/2019 4:19:52 PM	3060	0.1	0	0.1	0.00	*195*
3/20/2019 4:20:22 PM	3090	0.1	0	0.1	0.00	*195*
3/20/2019 4:20:52 PM	3120	0.1	0	0.1	0.00	*193*
3/20/2019 4:21:22 PM	3150	0.1	0	0.1	0.00	*197*
3/20/2019 4:21:52 PM	3180	0.1	0	0.1	0.00	*195*

		Cal Gas	Min ppm	Max ppm	Max Error ppm	% error	Allowable %	Bottle s/n
Linearity	NO2	51.15	50.00	50.20	1.15	0.75	3 or 5	CC515961
		95.73	94.60	97.10	1.37	0.48	3 or 5	D496834
	NO	50.76	52.00	52.00	1.24	0.81	3 or 5	CC1205
		197.60	198.00	200.00	2.40	0.40	3 or 5	FF48921
	O2	15.04	14.99	15.00	0.05	0.11	1% O2	CC515961
	in %	3.99	3.88	3.90	0.11	0.92	1% O2	EB0022380
	CO	51.19	51.00	52.00	0.81	0.53	3 or 5	CC186134
		203.30	206.00	206.00	2.70	0.44	3 or 5	EA0011073

Date / time	sec Runtim	ppm NO2	ppm NO	ppm NOx	% O2	ppm CO
8/8/2019 2:41:49 PM	0	0.1	4	4.1	21.31	0
8/8/2019 2:42:19 PM	30	42.6	0	42.6	15.27	1
8/8/2019 2:42:49 PM	60	47.7	0	47.7	15.03	0
8/8/2019 2:43:19 PM	90	48.7	1	49.7	15.01	0
8/8/2019 2:43:49 PM	120	49.2	1	50.2	15.01	0
8/8/2019 2:44:19 PM	150	49.3	1	50.3	15.02	0
8/8/2019 2:44:49 PM	180	49.6	1	50.6	15.00	0
8/8/2019 2:45:19 PM	210	49.8	1	50.8	15.00	0
8/8/2019 2:45:49 PM	240	49.7	1	50.7	15.00	0
8/8/2019 2:46:19 PM	270	49.8	2	51.8	14.98	0
8/8/2019 2:46:49 PM	300	49.9	2	51.9	14.99	0
8/8/2019 2:47:19 PM	330	50.0	2	52.0	15.00	0
8/8/2019 2:47:49 PM	360	50.0	2	52.0	15.00	0
8/8/2019 2:48:19 PM	390	50.0	2	52.0	14.99	0
8/8/2019 2:48:49 PM	420	50.1	2	52.1	14.99	0
8/8/2019 2:49:19 PM	450	50.0	2	52.0	15.00	0
8/8/2019 2:49:49 PM	480	50.1	2	52.1	14.99	0
8/8/2019 2:50:19 PM	510	50.0	2	52.0	14.99	0
8/8/2019 2:50:49 PM	540	50.1	2	52.1	15.00	0
8/8/2019 2:51:19 PM	570	50.1	2	52.1	15.00	0
8/8/2019 2:51:49 PM	600	50.2	2	52.2	14.99	0
8/8/2019 2:52:19 PM	630	50.2	2	52.2	15.00	0
8/8/2019 2:52:49 PM	660	50.2	2	52.2	14.99	0
8/8/2019 2:53:19 PM	690	50.2	2	52.2	15.00	0
8/8/2019 2:53:49 PM	720	50.3	2	52.3	14.99	0
8/8/2019 2:54:19 PM	750	28.3	4	32.3	18.09	0
8/8/2019 2:54:49 PM	780	85.8	1	86.8	14.99	1
8/8/2019 2:55:19 PM	810	94.6	2	96.6	15.00	0
8/8/2019 2:55:49 PM	840	95.1	2	97.1	15.00	0
8/8/2019 2:56:19 PM	870	95.4	3	98.4	15.01	0
8/8/2019 2:56:49 PM	900	95.8	3	98.8	15.01	0
8/8/2019 2:57:19 PM	930	96.0	3	99.0	15.01	0
8/8/2019 2:57:49 PM	960	96.3	3	99.3	15.01	0
8/8/2019 2:58:19 PM	990	96.5	4	100.5	15.01	0
8/8/2019 2:58:49 PM	1020	96.8	4	100.8	15.01	0
8/8/2019 2:59:19 PM	1050	96.9	4	100.9	15.01	0
8/8/2019 2:59:49 PM	1080	97.1	4	101.1	15.01	0
8/8/2019 3:00:19 PM	1110	97.2	4	101.2	15.01	0
8/8/2019 3:00:49 PM	1140	97.2	4	101.2	15.01	0
8/8/2019 3:01:19 PM	1170	97.2	4	101.2	15.01	0
8/8/2019 3:01:49 PM	1200	46.9	16	62.9	4.20	0

8/8/2019 3:02:19 PM	1230	9.7	39	48.7	0.10	0
8/8/2019 3:02:49 PM	1260	3.7	51	54.7	0.05	0
8/8/2019 3:03:19 PM	1290	2.6	52	54.6	0.03	0
8/8/2019 3:03:49 PM	1320	2.0	52	54.0	0.02	0
8/8/2019 3:04:19 PM	1350	1.8	52	53.8	0.00	0
8/8/2019 3:04:49 PM	1380	1.5	52	53.5	0.00	0
8/8/2019 3:05:19 PM	1410	1.3	52	53.3	0.00	0
8/8/2019 3:05:49 PM	1440	1.2	52	53.2	0.00	0
8/8/2019 3:06:19 PM	1470	1.1	52	53.1	0.00	0
8/8/2019 3:06:49 PM	1500	1.0	52	53.0	0.00	0
8/8/2019 3:07:19 PM	1530	1.0	52	53.0	0.00	0
8/8/2019 3:07:49 PM	1560	0.9	52	52.9	0.00	0
8/8/2019 3:08:19 PM	1590	0.8	52	52.8	0.00	0
8/8/2019 3:08:49 PM	1620	0.8	52	52.8	0.00	0
8/8/2019 3:09:19 PM	1650	0.7	53	53.7	0.00	0
8/8/2019 3:09:49 PM	1680	0.9	32	32.9	10.16	0
8/8/2019 3:10:19 PM	1710	40.0	85	125.0	10.06	1
8/8/2019 3:10:49 PM	1740	1.6	9	10.6	20.79	0
8/8/2019 3:11:19 PM	1770	0.9	5	5.9	21.04	0
8/8/2019 3:11:49 PM	1800	4.7	133	137.7	1.76	0
8/8/2019 3:12:19 PM	1830	1.5	189	190.5	0.08	0
8/8/2019 3:12:49 PM	1860	1.3	193	194.3	0.04	0
8/8/2019 3:13:19 PM	1890	1.1	195	196.1	0.02	0
8/8/2019 3:13:49 PM	1920	0.9	196	196.9	0.00	0
8/8/2019 3:14:19 PM	1950	0.8	197	197.8	0.00	0
8/8/2019 3:14:49 PM	1980	0.6	198	198.6	0.00	0
8/8/2019 3:15:19 PM	2010	0.6	198	198.6	0.00	0
8/8/2019 3:15:49 PM	2040	0.5	198	198.5	0.00	0
8/8/2019 3:16:19 PM	2070	0.4	199	199.4	0.00	0
8/8/2019 3:16:49 PM	2100	0.4	199	199.4	0.00	0
8/8/2019 3:17:19 PM	2130	0.3	199	199.3	0.00	0
8/8/2019 3:17:49 PM	2160	0.3	199	199.3	0.00	0
8/8/2019 3:18:19 PM	2190	0.3	199	199.3	0.00	0
8/8/2019 3:18:49 PM	2220	0.2	200	200.2	0.00	0
8/8/2019 3:19:19 PM	2250	0.2	200	200.2	0.00	0
8/8/2019 3:19:49 PM	2280	0.6	144	144.6	1.11	0
8/8/2019 3:20:19 PM	2310	0.0	18	18.0	3.88	0
8/8/2019 3:20:49 PM	2340	0.0	9	9.0	3.88	0
8/8/2019 3:21:19 PM	2370	0.0	7	7.0	3.88	0
8/8/2019 3:21:49 PM	2400	0.0	6	6.0	3.88	0
8/8/2019 3:22:19 PM	2430	0.0	5	5.0	3.88	0
8/8/2019 3:22:49 PM	2460	0.0	5	5.0	3.88	0
8/8/2019 3:23:19 PM	2490	0.0	4	4.0	3.88	0
8/8/2019 3:23:49 PM	2520	0.0	4	4.0	3.88	0
8/8/2019 3:24:19 PM	2550	0.0	3	3.0	3.88	0
8/8/2019 3:24:49 PM	2580	0.0	3	3.0	3.88	0
8/8/2019 3:25:19 PM	2610	0.0	3	3.0	3.88	0
8/8/2019 3:25:49 PM	2640	0.0	3	3.0	3.89	0
8/8/2019 3:26:19 PM	2670	0.1	3	3.1	3.88	0
8/8/2019 3:26:49 PM	2700	0.0	2	2.0	3.88	0
8/8/2019 3:27:19 PM	2730	0.0	2	2.0	3.88	0
8/8/2019 3:27:49 PM	2760	0.0	2	2.0	3.88	0
8/8/2019 3:28:19 PM	2790	0.1	2	2.1	3.88	0
8/8/2019 3:28:49 PM	2820	0.1	2	2.1	3.90	0
8/8/2019 3:29:19 PM	2850	0.0	2	2.0	0.04	48
8/8/2019 3:29:49 PM	2880	0.1	1	1.1	0.00	51
8/8/2019 3:30:19 PM	2910	0.1	1	1.1	0.00	51
8/8/2019 3:30:49 PM	2940	0.1	1	1.1	0.00	51
8/8/2019 3:31:19 PM	2970	0.1	1	1.1	0.00	51
8/8/2019 3:31:49 PM	3000	0.0	1	1.0	0.00	51
8/8/2019 3:32:19 PM	3030	0.1	1	1.1	0.00	51
8/8/2019 3:32:49 PM	3060	0.1	1	1.1	0.00	51
8/8/2019 3:33:19 PM	3090	0.1	1	1.1	0.00	51

	8/8/2019 3:33:49 PM	3120	0.1	1	1.1	0.00	52
	8/8/2019 3:34:19 PM	3150	0.1	1	1.1	0.00	51
	8/8/2019 3:34:49 PM	3180	0.1	1	1.1	0.00	51
	8/8/2019 3:35:19 PM	3210	0.1	1	1.1	0.00	52
	8/8/2019 3:35:49 PM	3240	0.1	1	1.1	0.00	51
	8/8/2019 3:36:19 PM	3270	0.1	1	1.1	0.00	51
	8/8/2019 3:36:49 PM	3300	9.5	0	9.5	0.33	31
	8/8/2019 3:37:19 PM	3330	0.4	1	1.4	0.02	174
	8/8/2019 3:37:49 PM	3360	0.2	1	1.2	0.00	199
	8/8/2019 3:38:19 PM	3390	0.2	1	1.2	0.00	203
	8/8/2019 3:38:49 PM	3420	0.1	1	1.1	0.00	204
	8/8/2019 3:39:19 PM	3450	0.1	1	1.1	0.00	204
	8/8/2019 3:39:49 PM	3480	0.1	1	1.1	0.00	205
	8/8/2019 3:40:19 PM	3510	0.1	1	1.1	0.00	205
	8/8/2019 3:40:49 PM	3540	0.1	1	1.1	0.00	205
	8/8/2019 3:41:19 PM	3570	0.1	1	1.1	0.00	206
	8/8/2019 3:41:49 PM	3600	0.1	1	1.1	0.00	206
	8/8/2019 3:42:19 PM	3630	0.1	1	1.1	0.00	206
	8/8/2019 3:42:49 PM	3660	0.1	0	0.1	0.00	206
	8/8/2019 3:43:19 PM	3690	0.1	1	1.1	0.00	206
	8/8/2019 3:43:49 PM	3720	0.1	0	0.1	0.00	206
	8/8/2019 3:44:19 PM	3750	0.1	1	1.1	0.00	206
	8/8/2019 3:44:49 PM	3780	0.1	1	1.1	0.00	206
	8/8/2019 3:45:19 PM	3810	0.1	1	1.1	0.00	206
	8/8/2019 3:45:49 PM	3840	0.1	0	0.1	0.00	206
	8/8/2019 3:46:19 PM	3870	0.1	0	0.1	0.00	206
	8/8/2019 3:46:49 PM	3900	0.1	1	1.1	0.00	206
	8/8/2019 3:47:19 PM	3930	0.1	0	0.1	0.00	206
	8/8/2019 3:47:49 PM	3960	0.1	1	1.1	0.00	206
	8/8/2019 3:48:19 PM	3990	0.1	0	0.1	0.00	206
NO2 Line 1							
	8/8/2019 2:47:49 PM	360	50.0	2	52.0	15.00	0
	8/8/2019 2:48:19 PM	390	50.0	2	52.0	14.99	0
	8/8/2019 2:48:49 PM	420	50.1	2	52.1	14.99	0
	8/8/2019 2:49:19 PM	450	50.0	2	52.0	15.00	0
	8/8/2019 2:49:49 PM	480	50.1	2	52.1	14.99	0
	8/8/2019 2:50:19 PM	510	50.0	2	52.0	14.99	0
	8/8/2019 2:50:49 PM	540	50.1	2	52.1	15.00	0
	8/8/2019 2:51:19 PM	570	50.1	2	52.1	15.00	0
	8/8/2019 2:51:49 PM	600	50.2	2	52.2	14.99	0
	8/8/2019 2:52:19 PM	630	50.2	2	52.2	15.00	0
NO2 Line 2							
	8/8/2019 2:55:19 PM	810	94.6	2	96.6	15.00	0
	8/8/2019 2:55:49 PM	840	95.1	2	97.1	15.00	0
	8/8/2019 2:56:19 PM	870	95.4	3	98.4	15.01	0
	8/8/2019 2:56:49 PM	900	95.8	3	98.8	15.01	0
	8/8/2019 2:57:19 PM	930	96.0	3	99.0	15.01	0
	8/8/2019 2:57:49 PM	960	96.3	3	99.3	15.01	0
	8/8/2019 2:58:19 PM	990	96.5	4	100.5	15.01	0
	8/8/2019 2:58:49 PM	1020	96.8	4	100.8	15.01	0
	8/8/2019 2:59:19 PM	1050	96.9	4	100.9	15.01	0
	8/8/2019 2:59:49 PM	1080	97.1	4	101.1	15.01	0
NO Line 1							
	8/8/2019 3:03:19 PM	1290	2.6	52	54.6	0.03	0
	8/8/2019 3:03:49 PM	1320	2.0	52	54.0	0.02	0
	8/8/2019 3:04:19 PM	1350	1.8	52	53.8	0.00	0
	8/8/2019 3:04:49 PM	1380	1.5	52	53.5	0.00	0
	8/8/2019 3:05:19 PM	1410	1.3	52	53.3	0.00	0
	8/8/2019 3:05:49 PM	1440	1.2	52	53.2	0.00	0
	8/8/2019 3:06:19 PM	1470	1.1	52	53.1	0.00	0

	8/8/2019 3:06:49 PM	1500	1.0	52	53.0	0.00	0
	8/8/2019 3:07:19 PM	1530	1.0	52	53.0	0.00	0
NO Line 2							
	8/8/2019 3:14:49 PM	1980	0.6	198	198.6	0.00	0
	8/8/2019 3:15:19 PM	2010	0.6	198	198.6	0.00	0
	8/8/2019 3:15:49 PM	2040	0.5	198	198.5	0.00	0
	8/8/2019 3:16:19 PM	2070	0.4	199	199.4	0.00	0
	8/8/2019 3:16:49 PM	2100	0.4	199	199.4	0.00	0
	8/8/2019 3:17:19 PM	2130	0.3	199	199.3	0.00	0
	8/8/2019 3:17:49 PM	2160	0.3	199	199.3	0.00	0
	8/8/2019 3:18:19 PM	2190	0.3	199	199.3	0.00	0
	8/8/2019 3:18:49 PM	2220	0.2	200	200.2	0.00	0
	8/8/2019 3:19:19 PM	2250	0.2	200	200.2	0.00	0
O2 Line 1							
	8/8/2019 2:47:49 PM	360	50.0	2	52.0	15.00	0
	8/8/2019 2:48:19 PM	390	50.0	2	52.0	14.99	0
	8/8/2019 2:48:49 PM	420	50.1	2	52.1	14.99	0
	8/8/2019 2:49:19 PM	450	50.0	2	52.0	15.00	0
	8/8/2019 2:49:49 PM	480	50.1	2	52.1	14.99	0
	8/8/2019 2:50:19 PM	510	50.0	2	52.0	14.99	0
	8/8/2019 2:50:49 PM	540	50.1	2	52.1	15.00	0
	8/8/2019 2:51:19 PM	570	50.1	2	52.1	15.00	0
	8/8/2019 2:51:49 PM	600	50.2	2	52.2	14.99	0
	8/8/2019 2:52:19 PM	630	50.2	2	52.2	15.00	0
O2 Line 2							
	8/8/2019 3:24:19 PM	2550	0.0	3	3.0	3.88	0
	8/8/2019 3:24:49 PM	2580	0.0	3	3.0	3.88	0
	8/8/2019 3:25:19 PM	2610	0.0	3	3.0	3.88	0
	8/8/2019 3:25:49 PM	2640	0.0	3	3.0	3.89	0
	8/8/2019 3:26:19 PM	2670	0.1	3	3.1	3.88	0
	8/8/2019 3:26:49 PM	2700	0.0	2	2.0	3.88	0
	8/8/2019 3:27:19 PM	2730	0.0	2	2.0	3.88	0
	8/8/2019 3:27:49 PM	2760	0.0	2	2.0	3.88	0
	8/8/2019 3:28:19 PM	2790	0.1	2	2.1	3.88	0
	8/8/2019 3:28:49 PM	2820	0.1	2	2.1	3.90	0
CO Line 1							
	8/8/2019 3:29:49 PM	2880	0.1	1	1.1	0.00	51
	8/8/2019 3:30:19 PM	2910	0.1	1	1.1	0.00	51
	8/8/2019 3:30:49 PM	2940	0.1	1	1.1	0.00	51
	8/8/2019 3:31:19 PM	2970	0.1	1	1.1	0.00	51
	8/8/2019 3:31:49 PM	3000	0.0	1	1.0	0.00	51
	8/8/2019 3:32:19 PM	3030	0.1	1	1.1	0.00	51
	8/8/2019 3:32:49 PM	3060	0.1	1	1.1	0.00	51
	8/8/2019 3:33:19 PM	3090	0.1	1	1.1	0.00	51
	8/8/2019 3:33:49 PM	3120	0.1	1	1.1	0.00	52
	8/8/2019 3:34:19 PM	3150	0.1	1	1.1	0.00	51
CO Line 2							
	8/8/2019 3:42:49 PM	3660	0.1	0	0.1	0.00	206
	8/8/2019 3:43:19 PM	3690	0.1	1	1.1	0.00	206
	8/8/2019 3:43:49 PM	3720	0.1	0	0.1	0.00	206
	8/8/2019 3:44:19 PM	3750	0.1	1	1.1	0.00	206
	8/8/2019 3:44:49 PM	3780	0.1	1	1.1	0.00	206
	8/8/2019 3:45:19 PM	3810	0.1	1	1.1	0.00	206
	8/8/2019 3:45:49 PM	3840	0.1	0	0.1	0.00	206
	8/8/2019 3:46:19 PM	3870	0.1	0	0.1	0.00	206
	8/8/2019 3:46:49 PM	3900	0.1	1	1.1	0.00	206
	8/8/2019 3:47:19 PM	3930	0.1	0	0.1	0.00	206

Company:	Equitrans Midstream	Span:	15.04
Station:	McIntosh	Technician:	C.Ent
Unit:	4	Analyzer:	Testo 350
Date:	8/27/2019	Anal. Ser. No:	60427447
		Method:	3A
Cal Gas S/N	**CC515961**		

O2

	Gas Conc. ppm	Anal. Cal Response	Cal. Error % Span	System Cal Response	System Cal. bias(%span)	Drift%
Pre Run						
Zero	**0.00**	0.00	0.0	0.0	0.0	-
High	15.04	14.85	-1.3	14.8	0.0	-
Post Run 1						
Zero	0.00	0.00	N/A	0.00	0.0	0.00
Upscale	15.04	14.83	N/A	14.83	**0.0**	-0.15

Calibration error =((Anal. Cal Response - Gas Conc.)/Instrument span) x 100
Line Bias = ((System Cal Response - Anal. Cal Response)/Instrument span) x 100
Drift = ((Current System Observed Response-Initial System Cal Response)/Span) x 100

Corrections

Run #	Average	Co	Cm	Cma	Corrected
1	10.88	0.00	14.84	15.04	**11.03**

Corrected = (Run Ave.-Co) x (Cma/Cm-Co)
Run Ave. = Average of the test run
Co = Ave. of initial & current zero system response
Cm = Ave. of initial & current upscale system response
Cma = Actual upscale gas concentration

Company:	Equitrans Midstream	Span:	51.15
Station:	McIntosh	Technician:	C.Ent
Unit:	4	Analyzer:	Testo 350
Date:	8/27/2019	Anal. Ser. No:	60427447
		Method:	7E
Cal Gas S/N	**CC515961**		

NO2

	Gas Conc. ppm	Anal. Cal Response	Cal. Error % Span	System Cal Response	System Cal. bias(%span)	Drift%
Pre Run						
Zero	0.00	0.0	0.0	0.0	0.0	-
High	51.15	50.2	-2.0	50.2	0.0	-
Post Run 1						
Zero	0.0	0.0	N/A	0.0	0.0	0.0
Upscale	51.15	49.8	N/A	49.8	0.0	-0.7

Calibration error =((Anal. Cal Response - Gas Conc.)/Instrument span) x 100
Line Bias = ((System Cal Response - Anal. Cal Response)/Instrument span) x 100
Drift = ((Current System Observed Response-Initial System Cal Response)/Span) x 100

Corrections

Run #	Average	Co	Cm	Cma	Corrected
1	9.1	0.0	50.0	51.2	**9.30**

Corrected = (Run Ave.-Co) x (Cma/Cm-Co)
Run Ave. = Average of the test run
Co = Ave. of initial & current zero system response
Cm = Ave. of initial & current upscale system response
Cma = Actual upscale gas concentration

Company:	Equitrans Midstream	Span:	50.76
Station:	McIntosh	Technician:	C.Ent
Unit:	4	Analyzer:	Testo 350
Date:	8/27/2019	Anal. Ser. No:	60427447
		Method:	7E
Cal Gas S/N	CC1205		

NO interference Response %	
Must be ≤ 5%	0.1

NO

	Gas Conc. ppm	Anal. Cal Response	Cal. Error % Span	System Cal Response	System Cal. bias(%span)	Drift%
Pre Run						
Zero	0.00	0.00	0.0	0.0	0.0	-
High	50.76	50.00	-1.5	50.0	0.0	-
Post Run 1						
Zero	0.00	0.00	N/A	0.00	0.0	0.00
Upscale	50.76	49.00	N/A	49.00	0.0	-1.97

Calibration error =((Anal. Cal Response - Gas Conc.)/Instrument span) x 100
Line Bias = ((System Cal Response - Anal. Cal Response)/Instrument span) x 100
Drift = ((Current System Observed Response-Initial System Cal Response)/Span) x 100

Corrections

Run #	Average	Co	Cm	Cma	Corrected
1	21.6	0.0	49.5	50.8	**22.19**

Corrected = (Run Ave.-Co) x (Cma/Cm-Co)
Run Ave. = Average of the test run
Co = Ave. of initial & current zero system response
Cm = Ave. of initial & current upscale system response
Cma = Actual upscale gas concentration

Company:	Equitrans Midstream	Span:	51.19
Station:	McIntosh	Technician:	C.Ent
Unit:	4	Analyzer:	Testo 350
Date:	8/27/2019	Anal. Ser. No:	60427447
		Method:	10
Cal Gas S/N	CC186134		

CO interference Response %	
Must be ≤ 5%	0.0

CO

	Gas Conc. ppm	Anal. Cal Response	Cal. Error % Span	System Cal Response	System Cal. bias(%span)	Drift%
Pre Run						
Zero	0.00	1.00	2.0	1.0	0.0	-
High	51.19	52.00	1.6	52.00	0.0	-
Post Run 1						
Zero	0.00	1.00	N/A	1.00	0.0	0.00
Upscale	51.19	51.25	N/A	51.25	0.0	-1.47

Calibration error =((Anal. Cal Response - Gas Conc.)/Instrument span) x 100
Line Bias = ((System Cal Response - Anal. Cal Response)/Instrument span) x 100
Drift = ((Current System Observed Response-Initial System Cal Response)/Span) x 100

Corrections

Run #	Average	Co	Cm	Cma	Corrected
1	5.8	1.00	51.63	51.19	**4.87**

Corrected = (Run Ave.-Co) x (Cma/Cm-Co)
Run Ave. = Average of the test run
Co = Ave. of initial & current zero system response
Cm = Ave. of initial & current upscale system response
Cma = Actual upscale gas concentration

Section IV.

Site Data

Data input

Station:	McIntosh		**Manfct:**	Caterpillar		Enter Field data in all cells that are blue					
Engine #:	4		**Model:**	3616 A4							
HP:	5350		**Rated Speed:**	1000							
Run #:	1		**Date:**	8/27/2019				Analyzer	Testo 350		
			Permit hours	8760				S/N	60427447		
Data Collected by:	C.Ent	**Cylinder ID**	**Calibration Data**	**Cal.Bottle**	**Pre-test**	**Post-test**	**Pre-test zero**	**Post-test zero**	R_{NO-NO2}	R_{CO-NO2}	R_{CO-NO}
2 or 4 Stroke	4	CC515961	O2 span (%)	15.04	14.85	14.83	0.00	0.00			
Bore (in)	11.8	CC1205	NO span (ppm)	50.76	50.00	49.00	0.00	0.00	0.10		
Stroke (in)	11.8	CC515961	NO2 span (ppm)	51.15	50.15	49.80	0.00	0.00			
# Cylinders	16	CC186134	CO span (ppm)	51.2	52.0	51.3	1.00	1.00		0.00	0.00
Exh Port Close BTDC	291								Post test interference verf.		
Rod Length (in)	23.622										

Engine Data

Date	Time	SAMPLE #	RPM	HP	Ign. Timing	AMT degF	AMP "Hg	FFR (mscfh)	FFR (scfm)	% Load
8/27/2019	11:08 AM	1	1000	4975.5	18.1	108	35	36.700	611.667	93.0%
8/27/2019	11:23 AM	2	1000	4815.0	17.9	108	33	35.800	596.667	90.0%
8/27/2019	11:38 AM	3	998	4761.5	17.9	108	33	35.600	593.333	89.0%
8/27/2019	11:53 AM	4	1000	4815.0	17.9	109	33	35.600	593.333	90.0%
8/27/2019	12:08 PM	5	1000	4761.5	17.9	109	33	35.600	593.333	89.0%
		AVERAGES	**999.6**	**4825.7**	**17.9**	**108.4**	**33.3**	**35.860**	**597.67**	**90.2%**

Run Averages	NO2 ppm	NO ppm	NOx ppm	O2 %	CO ppm	Pump L/m
	9.1	**22**	**31**	**10.88**	**6**	**0.97**

Baramatric pressure **29.95** in **Amb Temp** **68.00** F
Humidity **0.94** %

GAS COMPOSITION

Constituent	Mole%			
NITROGEN	0.2879	Upper Dry Heat Value	1042.0	btu/dscf/14.73psia
CARBON DIOX.	0.4846	Low Dry Heat Value	948.2	btu/dscf
METHANE	94.6868	Specific Gravity	0.5842	
ETHANE	4.154	Oxygen	0.0001	
PROPANE	0.3038	Carbon Monoxide	0.0000	
I-BUTANE	0.0191	Hydrogen	0.0000	
N-BUTANE	0.0386	Heptane	0.0000	
I-PENTANE	0	H2S	0.0000	
N-PENTANE	0.0251	SO2	0.0000	
HEXANE +	0	He	0.0000	
	100.0000	F Factor calc	8633.8	
		F Factor Method 19	8710.0	

Section V.

Run Data

Date / time	sec Runtime	ppm NO2	ppm NO	ppm NOx	% O2	ppm CO
8/27/2019 11:08:08 AM	0	7.4	20	27.4	10.94	6
8/27/2019 11:08:38 AM	30	9.2	25	34.2	10.77	6
8/27/2019 11:09:08 AM	60	9.1	24	33.1	10.83	6
8/27/2019 11:09:38 AM	90	9.2	24	33.2	10.81	6
8/27/2019 11:10:08 AM	120	9.0	23	32.0	10.88	6
8/27/2019 11:10:38 AM	150	8.7	23	31.7	10.86	6
8/27/2019 11:11:08 AM	180	8.5	23	31.5	10.99	6
8/27/2019 11:11:38 AM	210	9.0	24	33.0	10.85	6
8/27/2019 11:12:08 AM	240	9.0	24	33.0	10.86	6
8/27/2019 11:12:38 AM	270	8.9	23	31.9	10.98	6
8/27/2019 11:13:08 AM	300	9.1	23	32.1	10.87	6
8/27/2019 11:13:38 AM	330	9.0	23	32.0	10.85	6
8/27/2019 11:14:08 AM	360	9.0	22	31.0	10.77	6
8/27/2019 11:14:38 AM	390	9.3	23	32.3	10.84	6
8/27/2019 11:15:08 AM	420	9.3	23	32.3	11.09	6
8/27/2019 11:15:38 AM	450	9.3	24	33.3	10.77	6
8/27/2019 11:16:08 AM	480	9.3	23	32.3	10.85	6
8/27/2019 11:16:38 AM	510	9.5	24	33.5	10.84	6
8/27/2019 11:17:08 AM	540	9.7	24	33.7	10.82	6
8/27/2019 11:17:38 AM	570	9.7	24	33.7	10.83	6
8/27/2019 11:18:08 AM	600	8.6	21	29.6	10.87	6
8/27/2019 11:18:38 AM	630	8.1	19	27.1	11.01	6
8/27/2019 11:19:08 AM	660	10.1	26	36.1	10.85	6
8/27/2019 11:19:38 AM	690	9.7	24	33.7	10.83	6
8/27/2019 11:20:08 AM	720	10.0	25	35.0	10.82	6
8/27/2019 11:20:38 AM	750	9.4	23	32.4	10.82	6
8/27/2019 11:21:08 AM	780	9.5	23	32.5	10.85	6
8/27/2019 11:21:38 AM	810	9.3	23	32.3	10.87	5
8/27/2019 11:22:08 AM	840	9.3	23	32.3	10.85	5
8/27/2019 11:22:38 AM	870	9.3	22	31.3	10.86	5
8/27/2019 11:23:08 AM	900	9.4	22	31.4	10.88	6
8/27/2019 11:23:38 AM	930	9.1	22	31.1	10.89	6
8/27/2019 11:24:08 AM	960	9.0	21	30.0	10.91	5
8/27/2019 11:24:38 AM	990	8.9	21	29.9	10.88	6
8/27/2019 11:25:08 AM	1020	8.9	21	29.9	10.90	6
8/27/2019 11:25:38 AM	1050	9.3	22	31.3	10.85	6
8/27/2019 11:26:08 AM	1080	9.3	22	31.3	10.87	6
8/27/2019 11:26:38 AM	1110	9.3	22	31.3	10.86	6
8/27/2019 11:27:08 AM	1140	9.5	22	31.5	10.70	5
8/27/2019 11:27:38 AM	1170	9.6	23	32.6	10.83	5
8/27/2019 11:28:08 AM	1200	9.8	23	32.8	10.82	6
8/27/2019 11:28:38 AM	1230	9.5	23	32.5	10.79	6
8/27/2019 11:29:08 AM	1260	9.3	22	31.3	10.88	6
8/27/2019 11:29:38 AM	1290	9.3	22	31.3	10.83	6
8/27/2019 11:30:08 AM	1320	9.6	23	32.6	10.78	6
8/27/2019 11:30:38 AM	1350	9.3	22	31.3	10.90	6
8/27/2019 11:31:08 AM	1380	9.5	22	31.5	10.86	6
8/27/2019 11:31:38 AM	1410	9.5	23	32.5	10.97	6
8/27/2019 11:32:08 AM	1440	9.9	24	33.9	10.81	5
8/27/2019 11:32:38 AM	1470	9.9	24	33.9	10.87	5

8/27/2019 11:33:08 AM	1500	9.6	23	32.6	10.79	6
8/27/2019 11:33:38 AM	1530	9.0	21	30.0	10.88	6
8/27/2019 11:34:08 AM	1560	8.9	21	29.9	10.88	6
8/27/2019 11:34:38 AM	1590	8.3	20	28.3	10.94	6
8/27/2019 11:35:08 AM	1620	9.1	21	30.1	10.83	6
8/27/2019 11:35:38 AM	1650	9.7	25	34.7	10.79	5
8/27/2019 11:36:08 AM	1680	7.9	19	26.9	10.96	6
8/27/2019 11:36:38 AM	1710	8.8	24	32.8	10.90	6
8/27/2019 11:37:08 AM	1740	9.3	24	33.3	10.84	6
8/27/2019 11:37:38 AM	1770	8.8	24	32.8	10.84	6
8/27/2019 11:38:08 AM	1800	7.9	18	25.9	10.94	6
8/27/2019 11:38:38 AM	1830	8.1	18	26.1	10.91	6
8/27/2019 11:39:08 AM	1860	8.0	18	26.0	10.97	6
8/27/2019 11:39:38 AM	1890	8.3	20	28.3	10.97	6
8/27/2019 11:40:08 AM	1920	8.4	19	27.4	10.98	6
8/27/2019 11:40:38 AM	1950	9.8	25	34.8	10.75	5
8/27/2019 11:41:08 AM	1980	9.8	25	34.8	10.74	5
8/27/2019 11:41:38 AM	2010	10.0	26	36.0	10.91	6
8/27/2019 11:42:08 AM	2040	9.0	24	33.0	10.81	6
8/27/2019 11:42:38 AM	2070	7.9	18	25.9	10.98	6
8/27/2019 11:43:08 AM	2100	8.0	18	26.0	11.09	6
8/27/2019 11:43:38 AM	2130	9.5	23	32.5	10.80	6
8/27/2019 11:44:08 AM	2160	9.8	24	33.8	10.85	6
8/27/2019 11:44:38 AM	2190	8.2	19	27.2	10.92	6
8/27/2019 11:45:08 AM	2220	7.9	17	24.9	11.03	6
8/27/2019 11:45:38 AM	2250	9.3	24	33.3	10.83	6
8/27/2019 11:46:08 AM	2280	8.4	18	26.4	10.95	6
8/27/2019 11:46:38 AM	2310	9.0	21	30.0	10.87	6
8/27/2019 11:47:08 AM	2340	8.7	20	28.7	10.90	6
8/27/2019 11:47:38 AM	2370	8.8	20	28.8	10.88	6
8/27/2019 11:48:08 AM	2400	8.7	20	28.7	10.89	5
8/27/2019 11:48:38 AM	2430	8.8	20	28.8	10.90	6
8/27/2019 11:49:08 AM	2460	8.7	19	27.7	10.91	6
8/27/2019 11:49:38 AM	2490	8.7	20	28.7	10.91	6
8/27/2019 11:50:08 AM	2520	8.7	19	27.7	10.91	6
8/27/2019 11:50:38 AM	2550	9.0	20	29.0	10.88	6
8/27/2019 11:51:08 AM	2580	8.9	20	28.9	10.89	6
8/27/2019 11:51:38 AM	2610	9.1	21	30.1	10.89	5
8/27/2019 11:52:08 AM	2640	8.9	20	28.9	10.90	6
8/27/2019 11:52:38 AM	2670	8.8	20	28.8	10.88	5
8/27/2019 11:53:08 AM	2700	8.4	19	27.4	10.92	6
8/27/2019 11:53:38 AM	2730	8.6	17	25.6	10.92	6
8/27/2019 11:54:08 AM	2760	9.8	23	32.8	10.82	6
8/27/2019 11:54:38 AM	2790	8.1	18	26.1	10.97	6
8/27/2019 11:55:08 AM	2820	8.8	21	29.8	10.96	6
8/27/2019 11:55:38 AM	2850	8.6	19	27.6	10.98	6
8/27/2019 11:56:08 AM	2880	8.4	18	26.4	10.97	6
8/27/2019 11:56:38 AM	2910	9.4	20	29.4	10.83	6
8/27/2019 11:57:08 AM	2940	10.1	24	34.1	10.79	5
8/27/2019 11:57:38 AM	2970	8.6	21	29.6	10.98	6
8/27/2019 11:58:08 AM	3000	9.6	22	31.6	10.88	6

8/27/2019 11:58:38 AM	3030	9.9	24	33.9	10.79	5
8/27/2019 11:59:08 AM	3060	9.9	23	32.9	10.85	5
8/27/2019 11:59:38 AM	3090	9.5	23	32.5	10.82	6
8/27/2019 12:00:08 PM	3120	9.3	21	30.3	10.89	6
8/27/2019 12:00:38 PM	3150	9.2	21	30.2	10.90	6
8/27/2019 12:01:08 PM	3180	9.1	21	30.1	10.90	6
8/27/2019 12:01:38 PM	3210	8.8	20	28.8	10.90	6
8/27/2019 12:02:08 PM	3240	8.9	20	28.9	10.92	6
8/27/2019 12:02:38 PM	3270	8.8	19	27.8	10.91	6
8/27/2019 12:03:08 PM	3300	9.0	20	29.0	10.90	6
8/27/2019 12:03:38 PM	3330	9.0	20	29.0	10.89	5
8/27/2019 12:04:08 PM	3360	9.0	20	29.0	10.89	6
8/27/2019 12:04:38 PM	3390	9.1	20	29.1	10.90	5
8/27/2019 12:05:08 PM	3420	9.0	20	29.0	10.89	6
8/27/2019 12:05:38 PM	3450	9.1	20	29.1	10.88	5
8/27/2019 12:06:08 PM	3480	8.8	20	28.8	10.90	6
8/27/2019 12:06:38 PM	3510	8.2	19	27.2	11.00	6
8/27/2019 12:07:08 PM	3540	8.4	18	26.4	10.94	6
8/27/2019 12:07:38 PM	3570	9.9	23	32.9	10.84	5
8/27/2019 12:08:08 PM	3600	8.7	18	26.7	10.94	6
8/27/2019 12:08:38 PM	3630	9.7	23	32.7	10.80	5
8/27/2019 12:09:08 PM	3660	10.1	24	34.1	10.83	6
8/27/2019 12:09:38 PM	3690	10.2	24	34.2	10.85	6
8/27/2019 12:10:08 PM	3720	9.8	24	33.8	10.76	5
8/27/2019 12:10:38 PM	3750	9.6	22	31.6	10.86	6
8/27/2019 12:11:08 PM	3780	10.0	23	33.0	10.82	6
8/27/2019 12:11:38 PM	3810	8.4	21	29.4	11.08	6
		9.1	**22**	**31**	**10.88**	**6**

Section VI.

Fuel Gas Analysis

equitrans Midstream
EQT Midstream
555 Dishong Mountain Road
Johnstown Pa. 15906

Run Date 8/28/2019
Run Time 3:12 PM

Fractional Analysis

Station	McIntosh	**Sample Date**	8/27/19
		Sample Time	1:20 PM
Meter	McIntosh	**Sample Collected B**	C.Ent

Component	MOL %	GPM
Methane	94.6868	
Ethane	4.1540	1.11
Propane	0.3038	0.08
I-Butane	0.0191	0.01
N-Butane	0.0386	0.01
I-Pentane	0.0000	0.00
N-Pentane	0.0251	0.01
Nitrogen	0.2879	
CO2	0.4846	
Oxygen	0.0001	
Hexanes+	0.0000	0.00
Total:	100.0000	

Analytical Results At Base Conditions (Real)	
BTU/SCF (Dry)	1041.9999
BTU/SCF (Saturated)	1023.8322
PSIA	14.73
Temperature (F)	60.00

Calculated Specific Gravities	
Real Gravity	0.5842
Molecular Weight	16.9188

Section VII.

Calibration Gas Certificates

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
12722 S. Wentworth Ave.
Chicago, IL 60628
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E33A0284	Reference Number:	54-124451484-1
Cylinder Number:	SG9101757ALD1	Cylinder Volume:	31.6 CF
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2217 PSIG
PGVP Number:	B12014	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Sep 19, 2014

Expiration Date: Sep 19, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	200.0 PPM	199.9 PPM	G1	+/- 0.8% NIST Traceable	09/12/2014, 09/19/2014
NITRIC OXIDE	200.0 PPM	199.9 PPM	G1	+/- 0.8% NIST Traceable	09/12/2014, 09/19/2014
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061936	CC367646	250.8 PPM NITRIC OXIDE/NITROGEN	+/- 0.5%	May 04, 2018
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Oct 15, 2014
GMIS	124206889102	CC320508	4.979 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	May 04, 2015

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration

Triad Data Available Upon Request

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
12722 S. Wentworth Ave.
Chicago, IL 60628
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E33A0284	Reference Number:	54-124445125-1
Cylinder Number:	FF48921	Cylinder Volume:	31.6 CF
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2217 PSIG
PGVP Number:	B12014	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Aug 01, 2014

Expiration Date: Aug 01, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	200.0 PPM	197.6 PPM	G1	+/- 0.7% NIST Traceable	07/25/2014, 08/01/2014
NITRIC OXIDE	200.0 PPM	197.6 PPM	G1	+/- 0.7% NIST Traceable	07/25/2014, 08/01/2014
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	12061936	CC367646	250.8 PPM NITRIC OXIDE/NITROGEN	+/- 0.5%	May 04, 2018
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Oct 15, 2014
GMIS	124206889102	CC320508	4.979 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	May 04, 2015

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration

Triad Data Available Upon Request

Signature on file
Approved for Release

Airgas
an Air Liquide company

Airgas Great Lakes region
Airgas USA, LLC
1290 Combermere Dr.
Troy, MI 48083
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	EQT MIDSTREAM - LANE JOBE		
Part Number:	E02NI99E33A0919	Reference Number:	32-401426337-1
Cylinder Number:	FF14201	Cylinder Volume:	31.6 CF
Laboratory:	112 - Troy-32 (SAP) - MI	Cylinder Pressure:	2217 PSIG
PGVP Number:	B62019	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Mar 07, 2019

Expiration Date: Mar 07, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.
Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	500.0 PPM	501.8 PPM	G1	+/- 0.7% NIST Traceable	02/28/2019, 03/07/2019
NITRIC OXIDE	500.0 PPM	501.0 PPM	G1	+/- 0.7% NIST Traceable	02/28/2019, 03/07/2019
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	15010102	KAL003004	494.6 PPM NITRIC OXIDE/NITROGEN	+/-0.5%	Sep 01, 2021

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 NO	FTIR	Feb 12, 2019
E/N 54 Nicolet 6700 NO2	FTIR	Feb 12, 2019

Triad Data Available Upon Request

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	EQT MIDSTREAM		
Part Number:	E02NI99E33A0551	Reference Number:	32-400636061-1
Cylinder Number:	EA0011073	Cylinder Volume:	28.5 CF
Laboratory:	112 - Royal Oak-32 (SAP) - MI	Cylinder Pressure:	1984 PSIG
PGVP Number:	B62015	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Dec 07, 2015

Expiration Date: Dec 07, 2023

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	200.0 PPM	203.3 PPM	G1	+/- 0.5% NIST Traceable	12/07/2015
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060316	CC432081	252.5 PPM CARBON MONOXIDE/NITROGEN	+/-0.3%	Feb 21, 2020

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 CO	FTIR	Nov 18, 2015

Triad Data Available Upon Request

PERMANENT NOTES: Produced at: 2009 Bellaire Ave, Royal Oak, MI 48067

Signature on file

Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
630 United Drive
Durham, NC 27713
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI84E33W0000	Reference Number:	122-401034280-1
Cylinder Number:	D496834	Cylinder Volume:	31.9 Cubic Feet
Laboratory:	124 - Durham (SAP) - NC	Cylinder Pressure:	2216 PSIG
PGVP Number:	B22017	Valve Outlet:	660
Gas Code:	NO2,O2,BALN	Certification Date:	Oct 20, 2017

Expiration Date: Oct 20, 2020

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	100.0 PPM	95.73 PPM	G1	+/- 1.2% NIST Traceable	10/13/2017, 10/20/2017
OXYGEN	15.00 %	15.06 %	G1	+/- 0.3% NIST Traceable	10/17/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	124542144102	CC507257	197.1 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.1%	Mar 13, 2020
PRM	12370	FF27640	200.2 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.0%	Oct 13, 2017

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
THERMO 48I CO 1308857346	Nondispersive Infrared (NDIR)	Oct 04, 2017
Horiba MPA510 O2 41499150042	Paramagnetic	Oct 05, 2017

Triad Data Available Upon Request

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Approved for Release

Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
12722 S. Wentworth Ave.
Chicago, IL 60628
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI84E15W0000	Reference Number:	54-401406062-1
Cylinder Number:	CC515961	Cylinder Volume:	145.7 CF
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12019	Valve Outlet:	660
Gas Code:	NO2,O2,BALN	Certification Date:	Feb 11, 2019

Expiration Date: Feb 11, 2022

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	50.00 PPM	51.15 PPM	G1	+/- 2.0% NIST Traceable	01/28/2019, 02/11/2019
OXYGEN	15.00 %	15.04 %	G1	+/- 0.8% NIST Traceable	01/29/2019
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	7282017108	CC511467	60.62 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.6%	Sep 03, 2021
PRM	12378	D562913	100.1 PPM NITROGEN DIOXIDE/AIR	+/- 1.0%	Sep 04, 2018
NTRM	15010409	K013750	22.454 % OXYGEN/NITROGEN	+/- 0.2%	Aug 05, 2021

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS FTIR NO2 017707558	FTIR	Feb 05, 2019
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Jan 21, 2019

Triad Data Available Upon Request

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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
12722 S. Wentworth Ave.
Chicago, IL 60628
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E03NI84E15W0007	Reference Number:	54-401029259-1
Cylinder Number:	CC507258	Cylinder Volume:	145.7 Cubic Feet
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12017	Valve Outlet:	660
Gas Code:	NO2,O2,BALN	Certification Date:	Oct 30, 2017

Expiration Date: Oct 30, 2020

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NITROGEN DIOXIDE	100.0 PPM	101.3 PPM	G1	+/- 2% NIST Traceable	10/23/2017, 10/30/2017
OXYGEN	15.00 %	15.05 %	G1	+/- 0.5% NIST Traceable	10/23/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
GMIS	0120201702	CC503906	101.3 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.1%	Jan 20, 2020
PRM	MS7323	MS7323	100.1 PPM NITROGEN DIOXIDE/NITROGEN	+/- 1.0%	May 19, 2016
NTRM	09061418	CC273593	22.53 % OXYGEN/NITROGEN	+/- 0.4%	Mar 08, 2019

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
MKS Multigas 017707558	FTIR	Oct 04, 2017
O2-1 HORIBA MPA-510 3VUYL9NR	Paramagnetic	Sep 29, 2017

Triad Data Available Upon Request

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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
12722 S. Wentworth Ave.
Chicago, IL 60628
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0302	Reference Number:	54-124299381-1
Cylinder Number:	CC186134	Cylinder Volume:	144.3 Cubic Feet
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12012	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Jan 24, 2012

Expiration Date: Jan 24, 2020

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	50.00 PPM	51.19 PPM	G1	+/- 1% NIST Traceable	01/13/2012, 01/24/2012
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM/CO	05120309	CC179906	49.33 PPM CARBON MONOXIDE/NITROGEN	+/- 0.7%	Feb 02, 2013

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
CO-1 SIEMENS ULTRAMAT 6E N1J5700	NDIR	Dec 26, 2011

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Airgas
an Air Liquide company

Airgas Great Lakes region
Airgas USA, LLC
1290 Combermere Dr.
Troy, MI 48083
Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	EQT MIDSTREAM		
Part Number:	E02NI96E15A3095	Reference Number:	32-401041391-1
Cylinder Number:	CC136761	Cylinder Volume:	144.7 CF
Laboratory:	112 - Troy-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG
PGVP Number:	B62017	Valve Outlet:	580
Gas Code:	O2,BALN	Certification Date:	Nov 14, 2017

Expiration Date: Nov 14, 2025

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
OXYGEN	4.000 %	4.007 %	G1	+/- 0.5% NIST Traceable	11/14/2017
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	140606-02	CC431989	4.794 % OXYGEN/NITROGEN	+/-0.4%	Nov 29, 2019

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
O2 FS, SIEMENS OXYMAT 6 E/N 182	Paramagnetic	Oct 19, 2017

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CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Customer:	EQT MIDSTREAM		
Part Number:	E02NI99E15A0404	Reference Number:	32-400752406-1
Cylinder Number:	CC6889	Cylinder Volume:	144.3 CF
Laboratory:	112 - Royal Oak-32 (SAP) - MI	Cylinder Pressure:	2015 PSIG
PGVP Number:	B62016	Valve Outlet:	350
Gas Code:	CO,BALN	Certification Date:	Aug 04, 2016

Expiration Date: Aug 04, 2024

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
CARBON MONOXIDE	200.0 PPM	200.7 PPM	G1	+/- 0.5% NIST Traceable	08/04/2016
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	14060316	CC432081	252.5 PPM CARBON MONOXIDE/NITROGEN	+/-0.3%	Feb 21, 2020

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
E/N 54 Nicolet 6700 CO	FTIR	Aug 01, 2016

Triad Data Available Upon Request

PERMANENT NOTES: Produced at: 2009 Bellaire Ave, Royal Oak, MI 48067

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Airgas
an Air Liquide company

Airgas Specialty Gases
Airgas USA, LLC
12722 S. Wentworth Ave.
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Airgas.com

CERTIFICATE OF ANALYSIS

Grade of Product: EPA Protocol

Part Number:	E02NI99E15A0147	Reference Number:	54-401409450-1
Cylinder Number:	CC1205	Cylinder Volume:	144.3 CF
Laboratory:	124 - Chicago (SAP) - IL	Cylinder Pressure:	2015 PSIG
PGVP Number:	B12019	Valve Outlet:	660
Gas Code:	NO,NOX,BALN	Certification Date:	Feb 08, 2019

Expiration Date: Feb 08, 2027

Certification performed in accordance with "EPA Traceability Protocol for Assay and Certification of Gaseous Calibration Standards (May 2012)" document EPA 600/R-12/531, using the assay procedures listed. Analytical Methodology does not require correction for analytical interference. This cylinder has a total analytical uncertainty as stated below with a confidence level of 95%. There are no significant impurities which affect the use of this calibration mixture. All concentrations are on a volume/volume basis unless otherwise noted.

Do Not Use This Cylinder below 100 psig, i.e. 0.7 megapascals.

ANALYTICAL RESULTS

Component	Requested Concentration	Actual Concentration	Protocol Method	Total Relative Uncertainty	Assay Dates
NOX	50.00 PPM	50.76 PPM	G1	+/- 1.4% NIST Traceable	02/01/2019, 02/08/2019
NITRIC OXIDE	50.00 PPM	50.76 PPM	G1	+/- 1.4% NIST Traceable	02/01/2019, 02/08/2019
NITROGEN	Balance			-	

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRM	1606608	CC442565	50.42 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Jun 27, 2020
PRM	12367	APEX1099237	10.0 PPM NITROGEN DIOXIDE/AIR	+/- 1.5%	Jun 02, 2017
GMIS	1114201605	CC506716	4.995 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Nov 14, 2019

The SRM, PRM or RGM noted above is only in reference to the GMIS used in the assay and not part of the analysis.

ANALYTICAL EQUIPMENT

Instrument/Make/Model	Analytical Principle	Last Multipoint Calibration
Nicolet 6700 AMP0900100	FTIR	Jan 28, 2019
Nicolet 6700 AMP0900100	FTIR	Jan 28, 2019

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