APPENDIX A

Calibration and Certification Data

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
MULTIMEDIA PLANNING and PERMITTING DIVISION
AIR QUALITY ANALYSIS SECTION, 6PD-Q(Houston)
10625 FALLSTONE RD.
HOUSTON, TEXAS 77099

REPORT OF ANALYSIS

Verification

The accuracy of the EPA Systems Environics 6103 photometer (Ser. # 4880) was compared to the EPA Standard Reference Photometer (SRP # 5)* on Sept. 4, 2013 by John Lay, Region 6 SRP Operator. The photometer was checked by using a protocol developed by EPA and NIST as outlined in the publication *Standard Reference Photometer for Verification and Certification of Ozone Standards*, AREAL, USEPA, RTP, NC (March, 1989).

The linear regression relationship obtained from the comparison with the EPA Region 6 SRP # 5 is given below:

Environics 6103 = 1.0000x SRP # 5 +0.62 ppb

A review of the comparison data indicates the tested photometer passes the verification criteria as outlined in the US EPA guidance document referenced above. Acceptable range for the slope is 0.970 to 1.030 for primary standards and 0.950 to 1.050 for transfer standards. Acceptable range for the intercept is +/- 1-3 ppb. **Note: this data is not to be used as a correction factor for primary standard data.** It is only used as a pass or fail verification of the primary standard.

*SRP # 5 is classified as a NIST Standard Reference Material (SRM) which NIST manufactured and certified.

John Lay
Region 6 SRP Operator,

Sept. 4, 2013

Standard Reference Photometer
Calibration Report

Calibrating Institute:	US EPA Region 6	**Date:**	04-Sep-13
Operator:	John Lay	**Start Time:**	13:53
Instrument:	SRP # 5 Cell Length=89.65	**End Time:**	15:14
Comment:	O3 gen by SRP	**Filename:**	c0904003.xls
	Readings from front pannel		

Calibrated Instrument:	6103
Owner:	EPA Systems
Contact:	Eric Anderson
Make:	Environics
Model:	6103
Serial Number:	4880

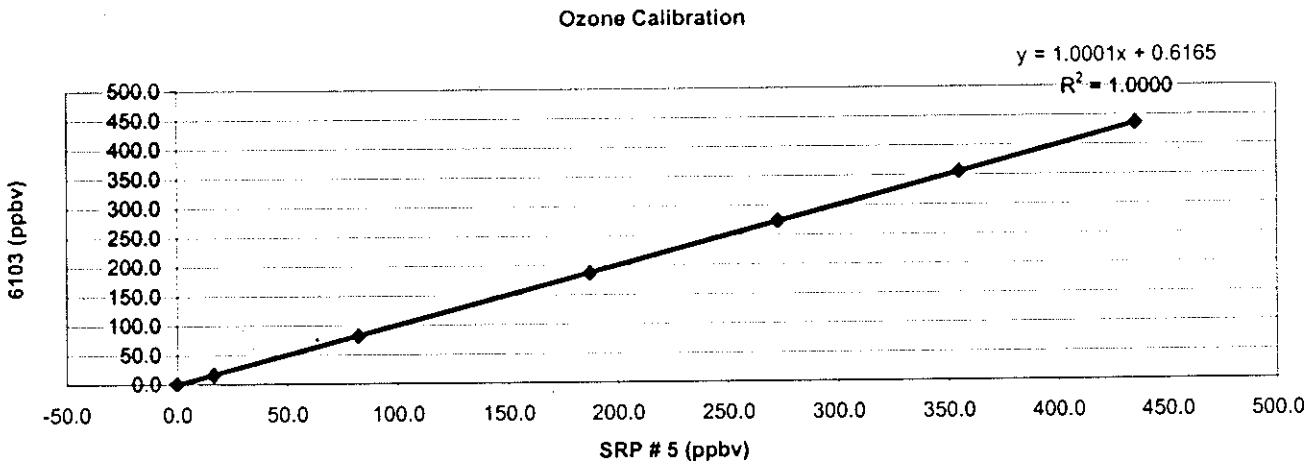
Calibration Results	Value	Standard Uncertainty
Slope	1.00009	0.00133
Intercept	0.61648	0.31013
Covariance		-4.0323E-07
Res Std Dev	0.55892	

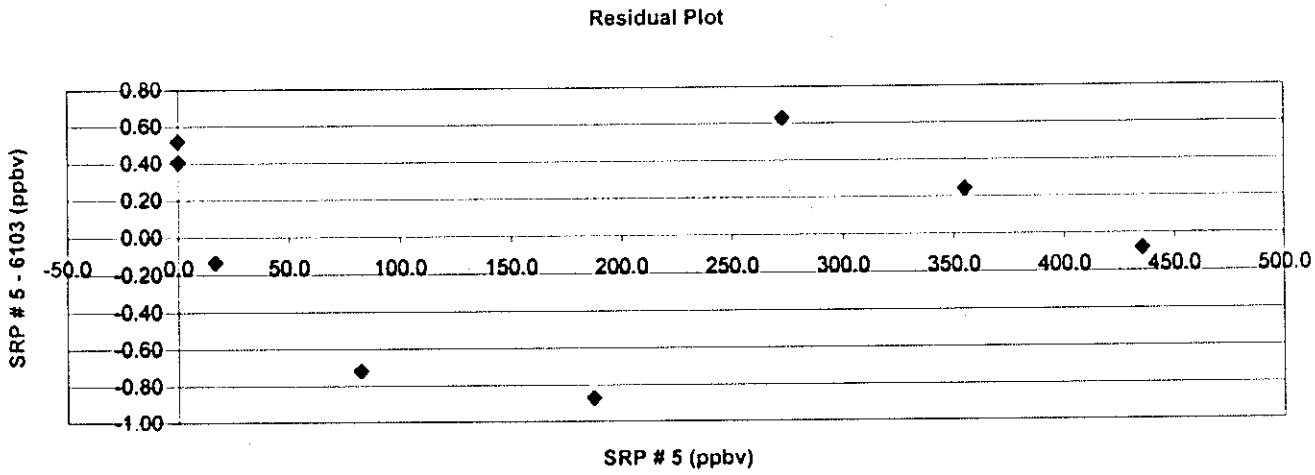
Calibration Parameters: Zero Start&End;Randomized;Raw Saved;Dark Count On (4)

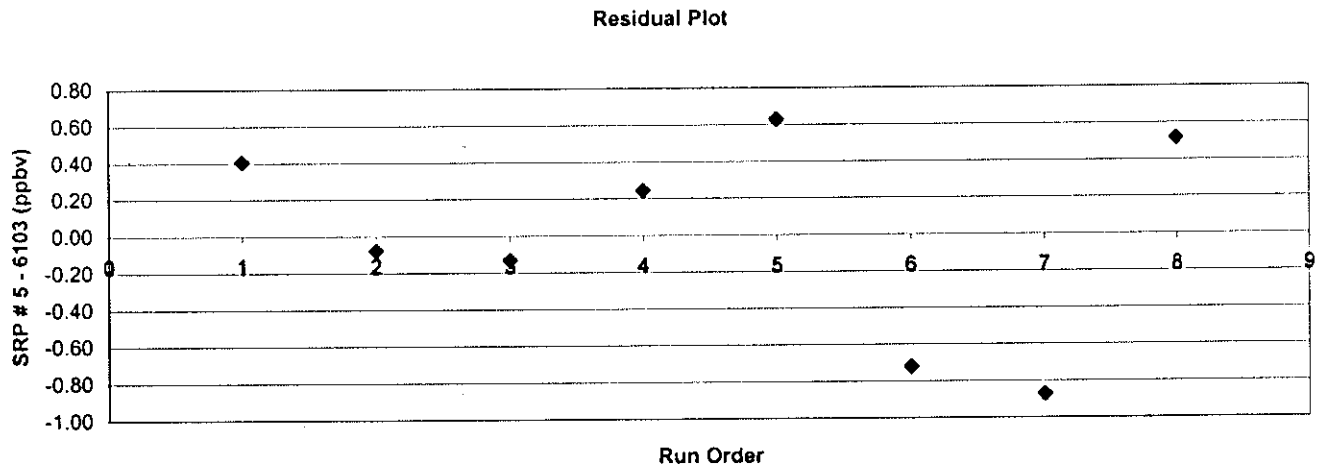
Air Flow Rate:	6.5 l/min				
Lamp Intensity Range:	0.0	to	58.0 %		
Number Conc. Points:	8		**Points/Concentration:**	8	
Conditioning:	none				

Calibration	SRP # 5		6103		6103	
Data Points	Result	Std. Dev	Result	Std. Dev	Predicted	Residual
Dark Count 1	9					
Dark Count 2	6					
1	0.0	0.4	1.0	0.8	0.59	0.41
2	435.4	0.2	436.0	1.3	436.08	-0.08
3	16.5	0.1	17.0	0.1	17.13	-0.13
4	355.1	0.3	356.0	0.1	355.76	0.24
5	272.7	0.3	274.0	0.1	273.37	0.63
6	82.1	0.3	82.0	0.2	82.72	-0.72
7	187.2	0.1	187.0	0.2	187.87	-0.87
8	-0.1	0.2	1.0	0.1	0.48	0.52

Date: 4-Sep-13
Filename: c0904003.xls





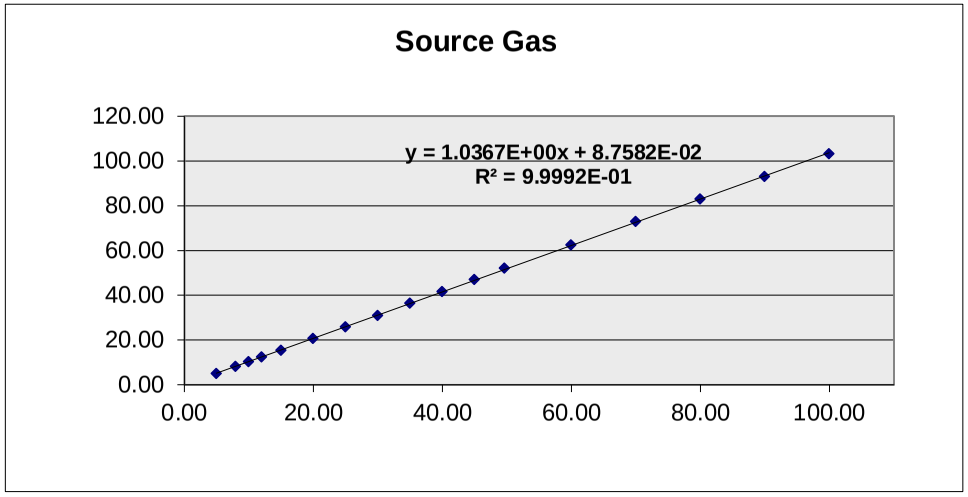


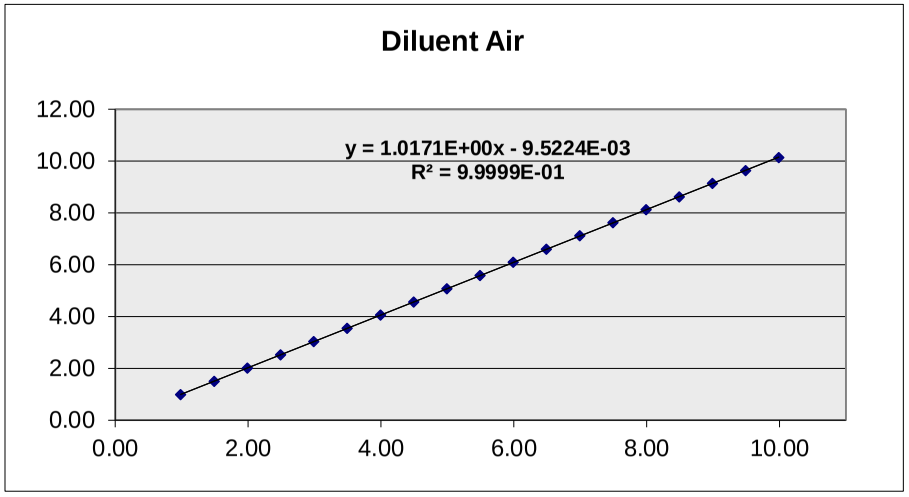
Environics Calibrator Audit Flow Rate Check (As Found)

Calibrator Model :	Environics 6103	**Date :**	August 26, 2013
Serial No :	4880	**Conducted By :**	EPA Systems
Pressure (mm Hg)	762	**Flow Rate Calibrator :**	Bios 520 L and Bios 520 H
Temperature (F)	75	**Serial # :**	128971, 128658
Temperature (K)	296.89	**Cert. Exp. Date :**	7/30/2013, 9/19/2013
STP Correction Factor	1.00638		

Source Gas Coefficients	
m	***b***
1.0367E+00	8.7582E-02
Dilution Air Coefficients	
m	***b***
1.0171E+00	-9.5224E-03

Source Gas				Diluent Air			
Set Point (cc/min)	**Display Reading**	**(cc/min Actual)**	**(cc/min STP)**	**Set Point (L/min)**	**Display Reading**	**(L/min Actual)**	**(L/min STP)**
5.00	4.94	5.03	5.06	1.000	0.984	0.986	0.992
8.00	7.92	8.20	8.25	1.500	1.489	1.499	1.508
10.0	10.0	10.3	10.4	2.000	1.991	2.007	2.020
12.0	12.0	12.4	12.5	2.500	2.491	2.521	2.537
15.0	15.0	15.4	15.5	3.000	2.990	3.031	3.050
20.0	20.0	20.7	20.8	3.500	3.490	3.543	3.565
25.0	25.0	25.9	26.1	4.000	3.994	4.054	4.079
30.0	30.0	30.9	31.1	4.500	4.493	4.562	4.591
35.0	35.0	36.5	36.7	5.000	4.994	5.075	5.107
40.0	39.9	41.6	41.8	5.500	5.493	5.586	5.622
45.0	45.0	47.1	47.4	6.000	5.994	6.095	6.134
50.0	49.6	52.1	52.4	6.500	6.493	6.600	6.642
60.0	59.9	62.4	62.8	7.000	6.994	7.118	7.163
70.0	69.9	73.0	73.4	7.500	7.493	7.620	7.669
80.0	79.9	83.0	83.5	8.000	7.992	8.120	8.172
90.0	89.9	93.0	93.6	8.500	8.493	8.614	8.669
100.0	99.9	103.2	103.8	9.000	8.992	9.143	9.201
				9.500	9.492	9.631	9.693
				10.000	9.991	10.139	10.204



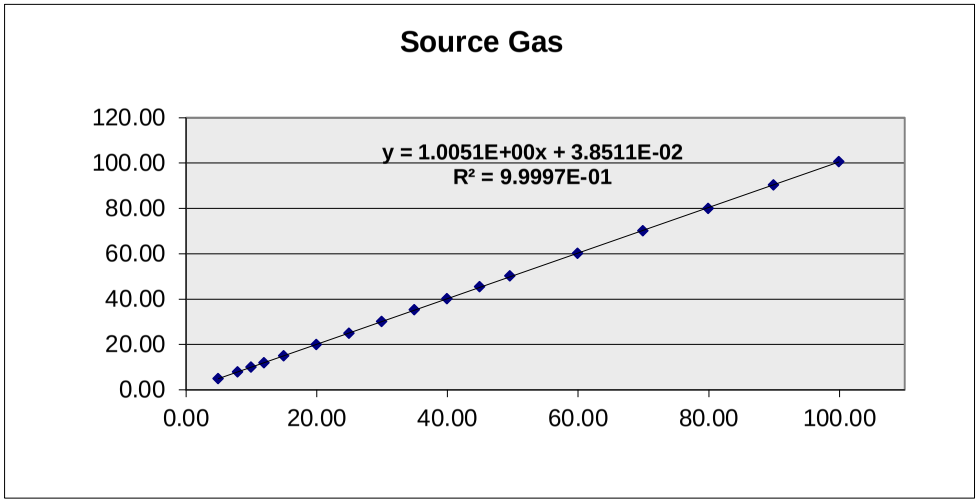


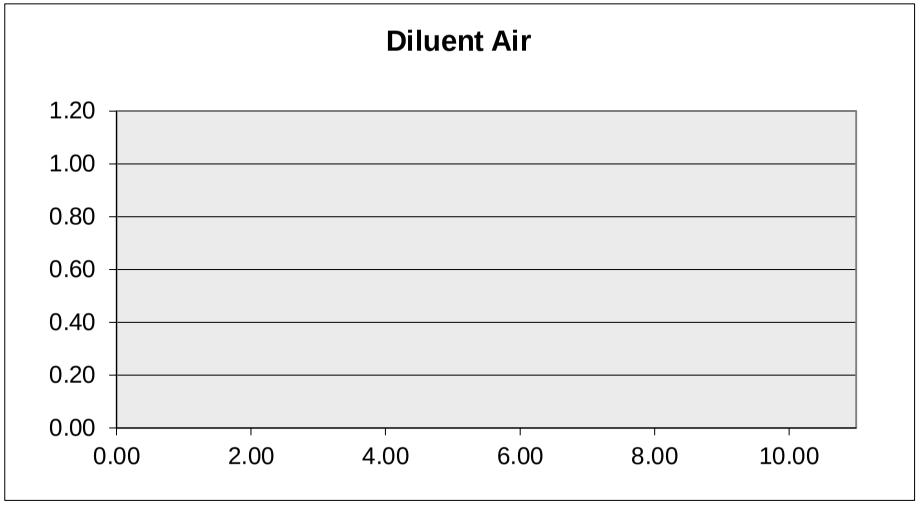
Environics Calibrator Source Gas Recalibration Flow Rate Check

Calibrator Model :	Environics 6103	**Date :**	August 27, 2013
Serial No :	4880	**Conducted By :**	EPA Systems
Pressure (mm Hg)	762	**Flow Rate Calibrator :**	Bios 520 L and Bios 520 H
Temperature (F)	75	**Serial # :**	128971, 128658
Temperature (K)	296.89	**Cert. Exp. Date :**	7/30/2013, 9/19/2013
STP Correction Factor	1.00638		

Source Gas Coefficients	
m	***b***
1.0051E+00	3.8511E-02
Dilution Air Coefficients	
m	***b***

Source Gas				Diluent Air			
Set Point (cc/min)	**Display Reading**	**(cc/min Actual)**	**(cc/min STP)**	**Set Point (L/min)**	**Display Reading**	**(L/min Actual)**	**(L/min STP)**
5.00	4.94	5.00	5.04				
8.00	7.92	7.95	8.00				
10.0	10.0	10.0	10.1				
12.0	12.0	12.0	12.0				
15.0	15.0	15.0	15.1				
20.0	20.0	20.0	20.1				
25.0	25.0	25.0	25.2				
30.0	30.0	30.1	30.3				
35.0	35.0	35.4	35.6				
40.0	39.9	40.2	40.5				
45.0	45.0	45.5	45.8				
50.0	49.6	50.2	50.6				
60.0	59.9	60.2	60.6				
70.0	69.9	70.2	70.6				
80.0	79.9	80.0	80.5				
90.0	89.9	90.4	90.9				
100.0	99.9	100.7	101.3				





Airgas

Airgas Specialty Gases
600 Union Landing Road
Cinnaminson, NJ 08077
(856) 829-7878 Fax: (856) 829-6576
www.airgas.com

CERTIFICATE OF ANALYSIS
Grade of Product: EPA Protocol

Part Number:	E04NI99E15A0G9C	Reference Number:	82-124388384-1
Cylinder Number:	CC436563	Cylinder Volume:	144.4 CF
Laboratory:	ASG - Riverton - NJ	Cylinder Pressure:	2015 PSIG
PGVP Number:	B52013	Valve Outlet:	660
Gas Code:	CO,NO,NOX,SO2,BALN	Certification Date:	Sep 03, 2013

Expiration Date: Sep 03, 2016

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	30.00 PPM	31.50 PPM	G1	+/- 1.4% NIST Traceable	08/26/2013, 09/03/2013
NITRIC OXIDE	30.00 PPM	31.44 PPM	G1	+/- 1.4% NIST Traceable	08/26/2013, 09/03/2013
SULFUR DIOXIDE	30.00 PPM	29.85 PPM	G1	+/- 1.1% NIST Traceable	08/26/2013, 09/03/2013
CARBON MONOXIDE	3000 PPM	3001 PPM	G1	+/- 1.0% NIST Traceable	08/29/2013
NITROGEN	Balance				

CALIBRATION STANDARDS

Type	Lot ID	Cylinder No	Concentration	Uncertainty	Expiration Date
NTRMplus	12061636	CC344928	20.23 PPM NITRIC OXIDE/NITROGEN	+/- 0.9%	Apr 11, 2015
PRM	12312	680179	10.01 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Feb 14, 2012
NTRMplus	12060809	CC281027	49.95 PPM NITRIC OXIDE/NITROGEN	+/- 0.8%	Dec 16, 2017
GMIS	124206889106	CC322664	4.879 PPM NITROGEN DIOXIDE/NITROGEN	+/- 2.0%	Apr 08, 2016
NTRM	12061832	CC352180	50.10 PPM SULFUR DIOXIDE/NITROGEN	+/- 1.0%	Apr 24, 2018
NTRM	000525	SG9152275BAL	1985 PPM CARBON MONOXIDE/NITROGEN	+/- 0.6%	Aug 17, 2016

The SRM or PRM 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
Siemens Ultramat 6 N1C8180 COHIGH	NDIR	Aug 09, 2013
Nicolet 6700 APW1100391 NO	FTIR	Aug 23, 2013
Nicolet 6700 APW1100391 NO2	FTIR	Aug 23, 2013
Nicolet 6700 APW1100391 SO2	FTIR	Aug 10, 2013

Triad Data Available Upon

Airgas

Request

Notes:

Approved for Release

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