



# U.S. EPA Ambient Air Monitoring Protocol Gas Verification Program

Annual Report  
CY 2015



U. S. EPA Ambient Air Protocol Gas Verification Program  
Annual Report for Calendar Year 2015

U.S. Environmental Protection Agency  
Office of Air Quality Planning and Standards  
Air Quality Assessment Division  
Research Triangle Park, NC

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## **Acronyms and Abbreviations**

AA-PGVP	Ambient Air Protocol Gas Verification Program
AQS	Air Quality System
CAMD	Clean Air Markets Division
CFR	Code of Federal Regulations
COC	chain-of-custody
EPA	Environmental Protection Agency
EPRI	Electric Power Research Institute
GMIS	Gas Manufacturer's Internal Standard
ICAC	Institute of Clean Air Companies
NACAA	National Association of Clean Air Agencies
NBS	National Bureau of Standards
NERL	National Exposure Research Laboratory
NIST	National Institute of Standards and Technology
NMi	Netherlands Measurement Institute
NPAP	National Performance Audit Program
NTRM	NIST Traceable Reference Material
OAQPS	Office of Air Quality Planning and Standards
OAP	Office of Atmospheric Programs
ORD	Office of Research and Development
PQAO	Primary Quality Assurance Organization
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RAVL	Regional Analytical Verification Laboratory
RO	Reporting Organization (subcomponent of PQAO)
SOP	standard operating procedure
SRM	standard reference material

# 1.0 Introduction

## **Background and Program Goals**

The basic principles of the U.S. Environmental Protection Agency's (EPA) *Traceability Protocol for the Assay and Certification of Gaseous Calibration Standards* (EPA, 1997)<sup>1</sup> were developed jointly by EPA, the National Bureau of Standards (now National Institute of Standards and Technology [NIST]), and specialty gas producers over 30 years ago. At the time, commercially-prepared calibration gases were perceived as being too inaccurate and too unstable for use in calibrations and audits of continuous source emission monitors and ambient air quality monitors<sup>2</sup>. The protocol was developed to improve their quality by establishing their traceability to NIST Standard Reference Materials (SRMs) and to provide reasonably priced products. This protocol established the gas metrological procedures for measurement and certification of these calibration gases for EPA's Acid Rain Program under 40 Code of Federal Regulations (CFR) Part 75, for the Ambient Air Quality Monitoring Program under 40 CFR Part 58, and for the Source Testing Program under 40 CFR Parts 60, 61, and 68. EPA required monitoring organizations implementing these programs ("the regulated community") to use EPA Protocol Gases as their calibration gases. EPA revised the protocol to establish detailed statistical procedures for estimating the total uncertainty of these gases. EPA's Acid Rain Program developed acceptance criteria for the uncertainty estimate<sup>3</sup>.

Specialty gas producers prepare and analyze EPA Protocol Gases without direct governmental oversight. In the 1980s and 1990s, EPA conducted a series of EPA-funded accuracy assessments of EPA Protocol Gases sold by producers. The intent of these audits was to:

- increase the acceptance and use of EPA Protocol Gases as calibration gases;
- provide a quality assurance (QA) check for the producers of these gases; and
- help users identify producers who can consistently provide accurately certified gases.

Either directly or through third parties, EPA procured EPA Protocol Gases from the producers, assessed the accuracy of the gases' certified concentrations through independent analyses, and inspected the accompanying certificates of analysis for completeness and accuracy. The producers were not aware that EPA had procured the gases for these audits.

The accuracy of the EPA Protocol Gases' certified concentrations was assessed using SRMs as the analytical reference standards. If the difference between the audit's measured concentration and the producer's certified concentration was more than +/- 2.0 percent or if the documentation was incomplete or inaccurate, EPA notified the producer to resolve and correct the problem.

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<sup>1</sup> EPA-600/4-77-027b

<sup>2</sup> Decker, C.E. et al., 1981. "Analysis of Commercial Cylinder Gases of Nitric Oxide, Sulfur Dioxide, and Carbon Monoxide at Source Concentrations," *Proceedings of the APCA Specialty Conference on Continuous Emission Monitoring-Design, Operation, and Experience*, APCA Publication No. SP-43.

<sup>3</sup> "Continuous Emission Monitoring," *Code of Federal Regulations*, Title 40, Part 75.

The results of the accuracy assessments were published in peer-reviewed journals and were posted on EPA's Technology Transfer Network website. The accuracy assessments were discontinued in 1998.

In 2009, the Office of the Inspector General (OIG) published the report *EPA Needs an Oversight Program for Protocol Gases*<sup>4</sup>. One of the report's findings suggested that EPA "does not have reasonable assurance that the gases that are used to calibrate emissions monitors for the Acid Rain Program and continuous ambient monitors for the nation's air monitoring network are accurate". OIG recommended that OAR implement oversight programs to assure the quality of the EPA Protocol Gases that are used to calibrate these monitors. It also recommended that EPA's ORD update and maintain the document *Traceability Protocol for Assay and Certification of Gaseous Calibration Standards* to ensure that the monitoring programs' objectives are met.

In order to address the OIG findings for ambient air monitoring, OAQPS, in cooperation with EPA Region 2 and 7 developed an Ambient Air Protocol Gas Verification Program (AA-PGVP). The program establishes gas metrology laboratories in Regions 2 and 7 to verify the certified concentrations of EPA Protocol Gases used to calibrate ambient air quality monitors. The program is expected to ensure that producers selling EPA Protocol Gases participate in the AA-PGVP, and provide end users with information about participating producers and verification results.

The EPA Ambient Air Quality Monitoring Program's QA requirements 40 CFR Part 58, Appendix A require:

*2.6 Gaseous and Flow Rate Audit Standards. Gaseous pollutant concentration standards (permeation devices or cylinders of compressed gas) used to obtain test concentrations for CO, SO<sub>2</sub>, NO, and NO<sub>2</sub> must be traceable to either a National Institute of Standards and Technology (NIST) Traceable Reference Material (NTRM), NIST Standard Reference Materials (SRM) and Netherlands Measurement Institute (NMI) Primary Reference Materials (valid as covered by Joint Declaration of Equivalence) or a NIST-certified Gas Manufacturer's Internal Standard (GMIS), certified in accordance with one of the procedures given in reference 4 of this appendix. Vendors advertising certification with the procedures provided in reference 4 of this appendix and distributing gases as "EPA Protocol Gas" must participate in the EPA Protocol Gas Verification Program or not use "EPA" in any form of advertising.*

This program is considered a verification program because its current level of evaluation does not allow for a large enough sample of EPA Protocol Gases from any one specialty gas producer to yield a statistically rigorous assessment of the accuracy of the producer's gases. It will not provide end users with a scientifically defensible estimate of whether gases of acceptable quality can be purchased from a specific producer. Rather, the results provide information to end users that the specialty gas producer is participating in the program and with information that may be helpful when selecting a producer.

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<sup>4</sup> <http://www.epa.gov/oig/reports/2009/20090916-09-P-0235.pdf>



## **Purpose of This Document**

The purpose of this document is to report the activities that occurred in 2013, and provide the results of the verifications performed.

This document will not explain the implementation of the AA-PGVP, the quality system or the verification procedure. That information has been documented in the Implementation Plan, QAPP and SOPs that can be found on the AA-PGVP Web Page on AMTIC<sup>5</sup>.

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<sup>5</sup> <http://www.epa.gov/ttn/amtic/aapgvp.html>

## 2.0 Implementation Summary

Since program implementation started in 2010, when most of the initial preparation work took place, there were no major “new” implementation activities in 2014. The following provides a brief explanation of the 2014 implementation process.

**Producer Information Data Collection** – In 2010 EPA sent out an Excel spreadsheet to each monitoring organization in order to obtain information on the gas standard producers being used by the monitoring organization and to determine their interest in participating in the program. In 2011, EPA worked with Research Triangle Institute to develop a web-based survey that one point of contact for each monitoring organization could access. This made recording and evaluation of the survey information much easier for the monitoring organizations and EPA. Based on the information obtained from monitoring organization surveys, EPA developed a list of the specialty gas producers being used by the monitoring organizations. From this list, EPA identified at least one point of contact for each producer. The producers in 2014 were the same as listed in 2013.

**AA-PGVP Verification Dates** – OAQPS worked with the Region 2 and 7 Regional Analytical Verification Laboratories (RAVLs) to establish verification dates as indicated in Table 1. The dates were posted on the AMTIC website<sup>6</sup>. Monitoring organizations would contact the Regions to schedule cylinder verifications.

**Table 1 – RAVL Verification Dates**

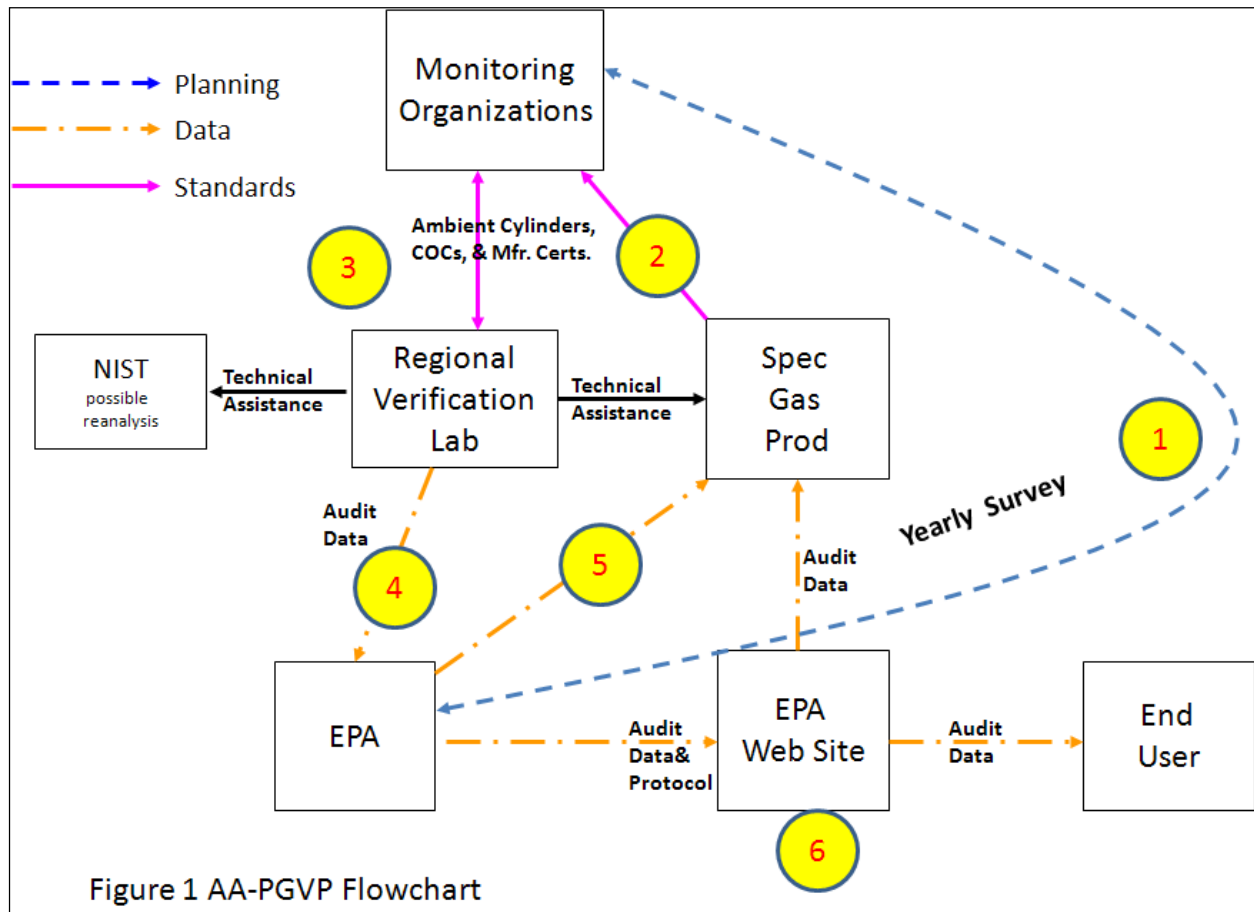
Quarter	Region 2		Region 7	
	Cylinder Receipt	Analysis	Cylinder Receipt	Analysis
1	No later than Feb 27	Mar 2 – Mar 13	No later than Feb 13	Feb 23 – Mar 6
2	No later than Jun 12	June 15 – June 26	No later than May 29	June 8 – June 19
3	No later than Aug 7	Aug 10 – Aug 24	No later than Aug 14	Aug 24 – Sept 4
4	No later than Dec 4	Dec 7 – Dec 18	No later than Oct 30	Nov 9 – Nov 20
Open House	December 15, 2015		December 1 – 3, 2015	

**RAVL Open House** – Based on the information gained from monitoring organization surveys, EPA contacted the producers by email to invite them to visit the RAVLs. The Region 2 open house was December 15, 2015; the Region 7 open house was December 1 – 3, 2015. Neither open house received any visitors for 2015.

<sup>6</sup> <http://www.epa.gov/ttn/amtic/aapgvp.html>

## Flow of the AA-PGVP

Figure 1 provides a flow of the implementation activities of the AA-PGVP. The major activities in these steps are explained below. More details of these steps are found in the AA-PGVP Implementation Plan, QAPP and SOPs.



1. EPA sends emails to the monitoring organization's points of contact to complete the AA-PGVP Survey. EPA compiles information on specialty gas producers and the monitoring organizations that plan to participate. EPA tries to schedule the monitoring organization in an appropriate verification quarter based on delivery of standards from the specialty gas producer.
2. The monitoring organizations order gas standards from specialty gas producers during the normal course of business. If EPA cannot get a cylinder from the monitoring organization, and that producer is being used, EPA will invite the producer to send a cylinder directly to an RAVL.
3. The monitoring organizations send a new/unused standard, specialty gas certification and chain of custody form to the RAVLs.

4. The RAVLS analyze the cylinders and provide the validated results to OAQPS and the monitoring organizations.
5. OAQPS reviews the data and sends verification results to the specialty gas vendors.
6. At the end of the year, OAQPS compiles final results into a report, sends the report out to the specialty gas vendors and posts it on the AA-PGVP AMTIC web page.

### **3.0 Survey and Verification Results**

#### **Monitoring Organization Survey**

Based upon the maximum capability of 40 gas cylinders per RAVL per year, the AA-PGVP selection goal, in the following order, is:

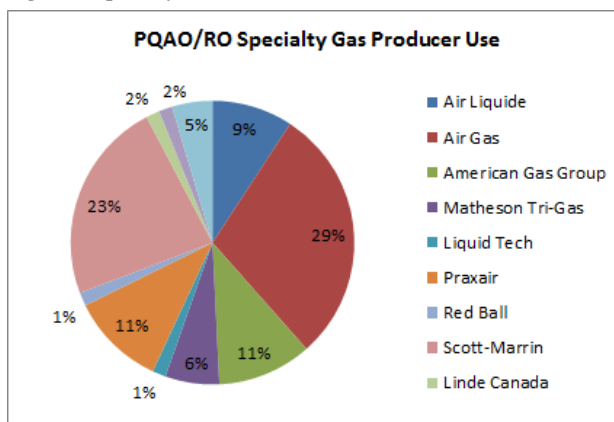
- 1) One gas standard from every specialty gas producer being used by the monitoring community
- 2) Three standards per specialty gas producer
- 3) Weight additional standards by producer market share in ambient air monitoring community

In order to determine what specialty gas producers were being used by monitoring organizations, EPA asked each monitoring organization to complete a web-based survey. Participation in 2015 dropped in comparison to 2014 – EPA received surveys from 42 out of a possible 120 monitoring organizations. Although 42 organizations participated in the web-based survey, only 2 submitted cylinders for verification in 2015. As a result, similar to the previous few years, the majority of the cylinders submitted for verification in 2015 came from the gas producers.

#### **Survey Results**

Figure 2 identifies, as a percentage of the total responses, how often the monitoring organizations listed a particular specialty gas producer. As mentioned above, 42 of the monitoring organizations responded, so this cannot be considered a complete survey.

**Figure 2. Specialty Gas Producer Use**



Nine specialty gas producers were identified in the survey. However, some gas producers have more than one production facility and it is the intent of the AA-PGVP to try and receive one gas cylinder from every production facility being used by monitoring organizations (see Table 3).

Participation in the AA-PGVP is voluntary. The survey asked whether a monitoring organization was receiving new gas standards during the year and, also, whether they would like to participate by sending a cylinder to one of the RAVLS. Of the 42 respondents, only 2 sent cylinders to EPA. Table 2 lists the cylinders

verified in CY2015. Some of these cylinders contained multiple pollutants so, although 60 cylinders were sent to the RAVLs, 68 verifications were performed.

Table 2. Gas Standards Sent to RAVLs in CY 2015						
Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Participant
3/10/2015	2	Praxair	Los Angeles, CA	F22015	DT0008666	Producer shipped
3/10/2015	2	Praxair	Toledo, OH	F42015	CC273006	Producer shipped
3/10/2015	2	Praxair	Morrisville, PA	F32015	SA9457	Producer shipped
3/11/2015	2	Praxair	Morrisville, PA	F32015	FF15282	NJ DEP
7/9/2015	2	Coastal	Beaumont, TX	O12015	EB0005543	Producer shipped
7/9/2015	2	AirGas	Los Angeles, CA	B32015	SG919658BAL	Producer shipped
7/9/2015	2	AirGas	Chicago, IL	B12015	SG911227BAL	Producer shipped
7/9/2015	2	Matheson	Twinsburg, OH	D42015	SX56875	Producer shipped
8/31/2015	2	AirGas	Durham, NC	B22015	XCO14596	Producer shipped
8/31/2015	2	AirGas	Royal Oak, MI	B62015	CC50694	Producer shipped
8/31/2015	2	AirGas	Tooele, UT	B72015	CC258177	Producer shipped
8/31/2015	2	AirGas	Riverton, NJ	B42015	CC166106	Producer shipped
12/17/2015	2	Linde (USA)	Alpha, NJ	I12015	CC303963	Producer shipped
12/17/2015	2	Liquid Technology	Apopka, FL	E12015	EB0019896	Producer shipped
12/17/2015	2	Global	Sarasota, FL	N22015	EB0068037	Producer shipped
12/21/2015	2	AirGas	Los Angeles, CA	B32015	CC416987	Producer shipped
12/21/2015	2	AirGas	Tooele, UT	B72015	CC240737	Producer shipped
12/21/2015	2	AirGas	Chicago, IL	B12015	CC26327	Producer shipped
12/21/2015	2	Praxair	Morrisville, PA	F32015	FF26872	NJ DEP
7/8/2015	2	Coastal	Beaumont, TX	O12015	CC7808	Producer shipped
7/8/2015	2	AirGas	Los Angeles, CA	B32015	EB0063695	Producer shipped
7/8/2015	2	AirGas	Chicago, IL	B12015	CC192533	Producer shipped
7/8/2015	2	Matheson	Twinsburg, OH	D42015	SX51788	Producer shipped
9/3/2015	2	AirGas	Riverton, NJ	B42015	CC466790	Producer shipped
9/3/2015	2	AirGas	Tooele, UT	B72015	CC471208	Producer shipped
9/8/2015	2	AirGas	Royal Oak, MI	B62015	CC471246	Producer shipped
9/8/2015	2	AirGas	Durham, NC	B22015	CC471131	Producer shipped
9/8/2015	2	Praxair	Morrisville, PA	F32015	FF33216	NJ DEP; One-point check assay
12/10/2015	2	Linde (USA)	Alpha, NJ	I12015	CC303963	Producer shipped
12/10/2015	2	Praxair	Morrisville, PA	F32015	DT0008486	Producer shipped
12/10/2015	2	Liquid Technology	Apopka, FL	E12015	EB0047273	Producer shipped
12/10/2015	2	Global	Sarasota, FL	N22015	EB0028920	Producer shipped
12/14/2015	2	AirGas	Los Angeles, CA	B32015	CC423511	Producer shipped
12/14/2015	2	AirGas	Tooele, UT	B72015	SG9115374BAL	Producer shipped
12/14/2015	2	AirGas	Chicago, IL	B12015	CC422943	Producer shipped
12/14/2015	2	Praxair	Morrisville, PA	F32015	FF37030	NJ DEP
11/9/2015	7	Specialty Air	Long Beach, CA	J12015	EB0067992	Producer shipped
6/9/2015	7	Praxair	Los Angeles, CA	F22015	CC187438	Producer shipped
6/9/2015	7	Praxair	Morrisville, PA	F32015	CC192666	Producer shipped
11/10/2015	7	Specialty Air	Long Beach, CA	J12015	EB0067992	Producer shipped
11/10/2015	7	Praxair	Los Angeles, CA	F22015	DT0009253	Producer shipped
11/10/2015	7	Praxair	Morrisville, PA	F32015	SA18531	Producer shipped
7/13/2015	2	Coastal	Beaumont, TX	O12015	CC441732	Producer shipped
7/13/2015	2	Matheson	Twinsburg, OH	D42015	SX45398	Producer shipped
7/13/2015	2	Praxair	Toledo, OH	F42015	CC457248	Producer shipped
7/15/2015	2	AirGas	Los Angeles, CA	B32015	EB0063640	Producer shipped
7/15/2015	2	AirGas	Chicago, IL	B12015	CC409735	Producer shipped
7/15/2015	2	Praxair	Morrisville, PA	F32015	CLM-003059	NJ DEP, Stock
9/1/2015	2	AirGas	Durham, NC	B22015	CC471263	Producer shipped
9/1/2015	2	AirGas	Royal Oak, MI	B62015	CC471312	Producer shipped
9/1/2015	2	AirGas	Tooele, UT	B72015	CC471318	Producer shipped
9/1/2015	2	AirGas	Riverton, NJ	B52015	CC471364	Producer shipped
9/2/2015	2	Praxair	Morrisville, PA	F32015	FF48622	NJ DEP
9/2/2015	2	Praxair	Los Angeles, CA	F22015	SA9625	Producer shipped
12/15/2015	2	Linde (USA)	Alpha, NJ	I12015	CC303963	Producer shipped
12/15/2015	2	Praxair	Toledo, OH	F42015	DT0008486	Producer shipped
12/15/2015	2	Liquid Technology	Apopka, FL	E12015	EB0047273	Producer shipped
12/15/2015	2	Global	Sarasota, FL	N22015	EB0052185	Producer shipped
12/16/2015	2	AirGas	Los Angeles, CA	B32015	CC423551	Producer shipped
12/16/2015	2	AirGas	Tooele, UT	B72015	CC406732	Producer shipped
12/16/2015	2	AirGas	Chicago, IL	B12015	CC251751	Producer shipped
6/11/2015	7	Praxair	Los Angeles, CA	F22015	SA9625	Producer shipped
6/11/2015	7	Praxair	Morrisville, PA	F32015	CC310772	Producer shipped
11/13/2015	7	Specialty Air	Long Beach, CA	J12015	EB0067992	Producer shipped
11/13/2015	7	Praxair	Los Angeles, CA	F22015	CC42970	Producer shipped
11/16/2015	7	Praxair	Los Angeles, CA	F22015	SA17182	Producer shipped
11/16/2015	7	Praxair	Morrisville, PA	F32015	CC105281	Producer shipped
11/16/2015	7	AirGas	Chicago, IL	B12015	FF43468	Missouri DNR

## Specialty Gas Producers

EPA contacted all the specialty gas producers in the survey to:

- make them aware that EPA was starting the AA-PGVP,
- describe the details of the program and the website where they could find additional information,
- ask them to identify all of their production facilities so we could determine how to select cylinders from each production facility used, and
- make them aware that EPA would be scheduling an open house toward the end of the year.

Table 3 provides the information gathered in surveys from 2010 through 2015. Since the Emissions Monitoring Protocol Gas Verification Program<sup>7</sup> and the AA-PGVP share the same producer listing and coding scheme, Table 3 identifies the producers on both lists. The producers shaded in green were identified on the AA-PGVP surveys. The facilities shaded in yellow were the facilities that the RAVLs received a cylinder for verification from monitoring organization while those shaded in blue were provided directly from producers. The facilities shaded in red were identified on the monitoring organization surveys, but a standard from that facility was not provided in the RAVLs in 2015. For 2015, of the nine producers identified on the surveys, Red Ball and Air Liquide were not verified (such was the case in 2014).

**Table 3. Production Facilities Verified in 2015**

Code	Producer	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5	Facility 6	Facility 7
A	Air Liquide	Plumsteadville, PA	Troy, MI	Laporte, TX	Longmont, CO	Santa Fe Springs, CA		
B	Air Gas	Chicago, IL	Durham NC	Los Angeles, CA	Port Allen, LA	Riverton NJ	Royal Oak MI	Tooele, UT
C	American Gas Group*	Toledo, OH						
D	Matheson Tri-Gas	Joliet, IL Only H <sub>2</sub> S	<del>Morrow, GA</del> Closed	<del>Pasadena, Texas</del> Closed	Twinsburg, Ohio	<del>Waverly, TN</del>	New Johnsonville, TN	
E	Liquid Technology	Apopka, FL						
F	Praxair	Bethlehem, PA	Los Angeles, CA	Morrisville, PA	Toledo, OH (AGG)			
G	Red Ball	Shreveport, LA						
H	Scott-Marrin	Riverside, CA						
I	Linde	Alpha NJ						
J	Specialty Air Technologies	Long Beach, CA						
K	IWS Gas and Supply	Belle Chasse, LA						
L	Linde Canada Limited	Whitby, Ontario						
M	Applied Gas	Danbury, TX						
N	Global Calibration Gases LLC	Palmetto, FL	Sarasota, FL					
O	Coastal Specialty Gas	Beaumont, TX						
P	Norco	Boise, ID						
Q	ILMO specialty Gases	Jacksonville, IL						
R	Tier 5 labs, LLC	Naperville, IL						

<sup>7</sup> <http://www.epa.gov/airmarkets/emissions/>

## Verification Results

As indicated in 40 CFR Part 75 Appendix A, EPA Protocol Gases must have a certified uncertainty (95 percent confidence interval) that must not be greater than plus or minus ( $\pm$ ) 2.0 percent of the certified concentration (tag value) of the gas mixture. This acceptance criterion is for the Acid Rain Program. The AA-PGVP adopted the criteria as its data quality objective and developed a quality system to allow the RAVLs to determine whether or not an individual protocol gas standard concentration was within  $\pm 2\%$  of the certified value. The Ambient Air Program has never identified an acceptance criterion for the protocol gases. Since the AA-PGVP has not been established to provide a statistically rigorous assessment of any specialty gas producer, the RAVLs report all valid results as analyzed but it is suggested that any difference greater than 4-5% is cause for concern. Information related to the analytical reference standards, analytical instruments and methods used, the data reduction procedures and the data assessment procedures are all found in the AA-PGVP QAPP and SOP and are not repeated in this report<sup>8</sup>. Table 4 is the measurement quality objectives table that is included in the AA-PGVP QAPP (Table 7-1 in QAPP). The acceptance criteria in Table 4 were met for each day of verification. In addition, conformance to these requirements can be found in the measurement data worksheets (MDW) that are generated for each comparison run and are available upon request. Appendix A provides a report of the quality control (QC) checks associated with each verification run. Table 5 provides the verification results for CO and SO<sub>2</sub>, and Table 6 provides the NO<sub>x</sub> results.

**Table 4 Measurement Quality Objectives for the AA-PGVP**

Requirement	Frequency	Acceptance Criteria	Protocol Gas Doc. Reference	Comments
Completeness	All standards analyzed	95%		Based on an anticipated 40 cylinders per lab per year.
Quarterly Flow Calibration	Quarterly -no more than 1 mo. before verification	Calibration flow accuracy within $\pm 1\%$	2.3.7	Using flow primary standard
Calibrator Dilution Check	Quarterly -within 2 weeks of assay	$\pm 1\%$ RD	2.3.5.1	Second SRM. Three or more discrete measurements
Analyzer Calibration	Quarterly - within 2 weeks of assay	$\pm 1\%$ RPD (each point) Slope 0.89 – 1.02	2.1.7.2	5 points between 50-90% of upper range limit of analyzer + zero point
Zero & Span Verifications	Each day of verification	SE mean $\leq 1\%$ and accuracy $\pm 5\%$ RD	2.1.7.3 , 2.3.5.4	Drift accountability. 3 discrete measurements of zero and span
Precision Test <sup>1</sup>	Day of Verification	$\pm 1\%$ RD standard error of the mean	2.3.5.4	SRM at conc. >80% of analyzer URL
Routine Data Check	Any Standard with Value >2% Tag Value	NA		Sample run three times to verify value.
Lab Comparability	2/year	$\pm 2\%$ RPD	NA	Sample run three average value used.
<b>Standards Certification</b>				
Primary flow standard	Annually-Certified by NVLAP certified lab	1.0 %	NA	Compared to NIST Traceable
NIST SRMs	Expiration date SRM pressure > 150 psig			Will follow NIST recertification requirements

<sup>1</sup> The precision test does not need to be accomplished if analyzer calibrated on same day as analysis

<sup>8</sup> <http://www.epa.gov/ttn/amtic/aapgvp.html>



**Table 5. Ambient Air Protocol Gas Verification Program 2015 CO and SO2 Verifications**

Highlighted facilities indicate direct shipment of cylinder from producer to Regional Laboratory

Region 2 CO										
Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Pollutant	Assay Conc	Producer Conc	% Bias	95% Uncertainty (%)
3/10/2015	2	Praxair	Los Angeles, CA	F22015	DT0008666	CO	2713.67	2711	0.10	0.46
3/10/2015	2	Praxair	Toledo, OH	F42015	CC273006	CO	2469.25	2459	0.42	0.49
3/10/2015	2	Praxair	Morrisville, PA	F32015	SA9457	CO	2456.27	2467	-0.43	0.49
3/11/2015	2	Praxair	Morrisville, PA	F32015	FF15282	CO	995.96	1004	-0.80	0.22
7/9/2015	2	Coastal	Beaumont, TX	O12015	EB0005543	CO	2521.72	2510	0.47	0.60
7/9/2015	2	AirGas	Los Angeles, CA	B32015	SG919658BAL	CO	4935.70	4950	-0.29	0.52
7/9/2015	2	AirGas	Chicago, IL	B12015	SG911227BAL	CO	5071.35	5071	0.01	0.52
7/9/2015	2	Matheson	Twinsburg, OH	D42015	SX56875	CO	4502.88	4484	0.42	0.55
8/31/2015	2	AirGas	Durham, NC	B22015	XCO14596	CO	4951.63	4943	0.17	0.45
8/31/2015	2	AirGas	Royal Oak, MI	B62015	CC50694	CO	4949.27	4956	-0.14	0.45
8/31/2015	2	AirGas	Tooele, UT	B72015	CC258177	CO	4957.40	4955	0.05	0.45
8/31/2015	2	AirGas	Riverton, NJ	B42015	CC166106	CO	4958.48	4946	0.25	0.45
8/31/2015	2	Scott Marrin**	Riverside, CA	H12015	CB11278	CO	5095.08	5090	0.10	0.45
12/17/2015	2	Linde (USA)	Alpha, NJ	I12015	CC303963	CO	5026.96	5034	-0.14	0.50
12/17/2015	2	Liquid Technology	Apopka, FL	E12015	EB0019896	CO	4888.66	4926	-0.76	0.51
12/17/2015	2	Global	Sarasota, FL	N22015	EB0068037	CO	2965.08	2975	-0.33	0.51
12/21/2015	2	AirGas	Los Angeles, CA	B32015	CC416987	CO	4999.49	5008	-0.17	0.39
12/21/2015	2	AirGas	Tooele, UT	B72015	CC240737	CO	5031.79	5026	0.12	0.39
12/21/2015	2	AirGas	Chicago, IL	B12015	CC26327	CO	5061.01	5034	0.54	0.39
12/21/2015	2	Praxair	Morrisville, PA	F32015	FF26872	CO	39.78	40.3	-1.28	0.41
Region 2 SO2										
7/8/2015	2	Coastal	Beaumont, TX	O12015	CC7808	SO2	108.32	105.60	2.58	0.44
7/8/2015	2	AirGas	Los Angeles, CA	B32015	EB0063695	SO2	50.53	50.57	-0.07	0.45
7/8/2015	2	AirGas	Chicago, IL	B12015	CC192533	SO2	50.07	50.46	-0.77	0.45
7/8/2015	2	Matheson	Twinsburg, OH	D42015	SX51788	SO2	76.82	75.60	1.61	0.45
9/3/2015	2	AirGas	Riverton, NJ	B42015	CC466790	SO2	50.44	50.32	0.24	0.26
9/3/2015	2	AirGas	Tooele, UT	B72015	CC471208	SO2	50.30	50.37	-0.14	0.26
9/3/2015	2	Scott Marrin**	Riverside, CA	H12015	CB11278	SO2	51.86	51.60	0.51	0.26
9/8/2015	2	AirGas	Royal Oak, MI	B62015	CC471246	SO2	50.74	50.19	1.09	0.42
9/8/2015	2	AirGas	Durham, NC	B22015	CC471131	SO2	50.63	50.36	0.53	0.42
9/8/2015	2	Praxair	Morrisville, PA	F32015	FF33216	SO2	50.94	50.50	-0.86	N/A
12/10/2015	2	Linde (USA)	Alpha, NJ	I12015	CC303963	SO2	50.15	49.85	0.60	0.25
12/10/2015	2	Praxair	Morrisville, PA	F32015	DT0008486	SO2	59.25	59.10	0.25	0.25
12/10/2015	2	Liquid Technology	Apopka, FL	E12015	EB0047273	SO2	49.91	50.20	-0.58	0.25
12/10/2015	2	Global	Sarasota, FL	N22015	EB0028920	SO2	50.47	50.50	-0.06	0.25
12/14/2015	2	AirGas	Los Angeles, CA	B32015	CC423511	SO2	50.11	49.91	0.39	0.19
12/14/2015	2	AirGas	Tooele, UT	B72015	SG9115374BAL	SO2	50.41	50.18	0.46	0.19
12/14/2015	2	AirGas	Chicago, IL	B12015	CC422943	SO2	50.66	50.30	0.72	0.19
12/14/2015	2	Praxair	Morrisville, PA	F32015	FF37030	SO2	50.80	50.60	0.40	0.19
Region 7 CO										
6/8/2015	7	Scott-Marrin**	Riverside, CA	H12015	CB11278	CO	5098.00	5090	0.16	0.07
11/9/2015	7	Specialty Gas	Long Beach, CA	J12015	EB0067992	CO	2560.00	2539	0.85	0.07
Region 7 SO2										
6/9/2015	7	Scott-Marrin**	Riverside, CA	H12015	CB11278	SO2	51.72	51.60	0.22	0.43
6/9/2015	7	Praxair	Los Angeles, CA	F22015	CC187438	SO2	54.67	55.10	-0.78	0.44
6/9/2015	7	Praxair	Morrisville, PA	F32015	CC192666	SO2	49.28	49.80	-1.05	0.44
11/10/2015	7	Specialty Air	Long Beach, CA	J12015	EB0067992	SO2	50.52	49.72	1.62	0.43
11/10/2015	7	Praxair	Los Angeles, CA	F22015	DT0009253	SO2	60.70	60.90	-0.33	0.44
11/10/2015	7	Praxair	Morrisville, PA	F32015	SA18531	SO2	59.34	59.80	-0.77	0.44
** QC Cylinder										



**Table 6. Ambient Air Protocol Gas Verification Program 2015 NO<sub>x</sub> Verifications**

Highlighted facilities indicate direct shipment of cylinder from producer to Regional Laboratory

Region 2 NO <sub>x</sub>															
Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Producer Ref Standard	Pollutant	NO Assay Conc	NO Producer Conc	% Bias	95% Uncertainty	NO <sub>x</sub> Assay Conc.	NO <sub>x</sub> Prod. Conc.	% Bias	95% Uncertainty
7/13/2015	2	Coastal	Beaumont, TX	O12015	CC441732	GMIS	NO <sub>x</sub>	97.50	97.10	0.42	0.42	101.21	101.70	-0.48	0.79
7/13/2015	2	Matheson	Twinsburg, OH	D42015	SX45398	SRM	NO <sub>x</sub>	74.82	74.60	0.30	0.42	74.97	74.60	0.50	0.80
7/13/2015	2	Praxair	Toledo, OH	F42015	CC457248	GMIS	NO <sub>x</sub>	49.48	48.00	3.08	0.42	49.47	48.30	2.41	0.80
7/15/2015	2	AirGas	Los Angeles, CA	B32015	EB0063640	GMIS	NO <sub>x</sub>	49.17	49.16	0.01	0.36	49.40	49.45	-0.10	0.21
7/15/2015	2	AirGas	Chicago, IL	B12015	CC409735	GMIS	NO <sub>x</sub>	50.86	50.61	0.49	0.36	50.70	50.62	0.16	0.20
7/15/2015	2	Praxair	Morrisville, PA	F32015	CLM-003056	GMIS	NO <sub>x</sub>	51.04	50.70	0.67	0.36	51.33	50.90	0.84	0.20
9/1/2015	2	AirGas	Durham, NC	B22015	CC471263	NTRM	NO <sub>x</sub>	49.98	50.16	-0.37	0.05	50.15	50.30	-0.29	0.22
9/1/2015	2	AirGas	Royal Oak, MI	B62015	CC471312	NTRM	NO <sub>x</sub>	50.12	50.50	-0.75	0.05	50.54	50.50	0.09	0.22
9/1/2015	2	AirGas	Tooele, UT	B72015	CC471318	NTRM	NO <sub>x</sub>	50.22	50.40	-0.36	0.05	50.40	50.41	-0.01	0.22
9/1/2015	2	AirGas	Riverton, NJ	B52015	CC471364	NTRM	NO <sub>x</sub>	50.16	50.54	-0.76	0.05	50.55	50.55	0.00	0.22
9/2/2015	2	Praxair	Morrisville, PA	F32015	FF48622	NTRM	NO <sub>x</sub>	51.11	50.70	0.81	0.25	51.42	50.70	1.42	0.16
9/2/2015	2	Praxair	Los Angeles, CA	F22015	SA9625	GMIS	NO <sub>x</sub>	55.52	55.80	-0.51	0.28	56.37	56.10	0.48	0.18
9/2/2015	2	Scott Marrin**	Riverside, CA	H12015	CB11278	GMIS	NO <sub>x</sub>	52.51	52.00	0.97	0.25	52.60	52.00	1.15	0.16
12/15/2015	2	Linde	Alpha, NJ	I12015	CC303963	NTRM	NO <sub>x</sub>	51.15	50.02	2.25	0.77	50.55	50.02	1.07	0.68
12/15/2015	2	Praxair	Toledo, OH	F42015	DT0008486	GMIS	NO <sub>x</sub>	32.03	31.10	3.00	0.76	31.57	31.30	0.85	0.67
12/15/2015	2	Liquid Technology	Apopka, FL	E12015	EB0047273	GMIS	NO <sub>x</sub>	51.36	51.20	0.32	0.76	50.69	51.20	-1.00	0.67
12/15/2015	2	Global	Sarasota, FL	N22015	EB0052185	GMIS	NO <sub>x</sub>	50.80	50.10	1.41	0.77	50.15	50.40	-0.49	0.68
12/16/2015	2	AirGas	Los Angeles, CA	B32015	CC423551	NTRM	NO <sub>x</sub>	51.17	51.41	-0.47	0.38	51.10	51.83	-1.41	0.20
12/16/2015	2	AirGas	Tooele, UT	B72015	CC406732	NTRM	NO <sub>x</sub>	50.03	50.08	-0.11	0.38	50.00	50.11	-0.21	0.20
12/16/2015	2	AirGas	Chicago, IL	B12015	CC251751	NTRM	NO <sub>x</sub>	49.70	49.38	0.64	0.38	49.74	49.39	0.71	0.20
Region 7 NO <sub>x</sub>															
6/11/2015	7	Scott-Marrin**	Riverside, CA	H12015	CB11278	GMIS	NO <sub>x</sub>	51.96	52.00	-0.08	0.45	51.91	52.00	-0.17	0.59
6/11/2015	7	Praxair	Los Angeles, CA	F22015	SA9625	GMIS	NO <sub>x</sub>	54.47	55.80	-2.39	0.47	54.96	56.10	-2.04	0.62
6/11/2015	7	Praxair	Morrisville, PA	F32015	CC310772	GMIS	NO <sub>x</sub>	51.38	51.00	0.75	0.45	51.56	51.30	0.51	0.59
11/13/2015	7	Specialty Air	Long Beach, CA	J12015	EB0067992	GMIS	NO <sub>x</sub>	50.20	49.88	0.45	50.17	50.08	0.17	0.59	
11/13/2015	7	Praxair	Los Angeles, CA	F22015	CC42970	GMIS	NO <sub>x</sub>	97.75	98.20	-0.46	0.47	97.66	98.40	-0.75	0.62
11/16/2015	7	Praxair	Los Angeles, CA	F22015	SA17182	GMIS	NO <sub>x</sub>	30.00	29.60	1.36	0.45	30.46	29.80	2.22	0.59
11/16/2015	7	Praxair	Morrisville, PA	F32015	CC105281	GMIS	NO <sub>x</sub>	30.41	29.90	1.71	0.47	30.42	29.90	1.75	0.62
11/16/2015	7	AirGas	Chicago, IL	B12015	FF43468	NTRM	NO <sub>x</sub>	20.08	20.00	0.38	0.45	20.28	20.11	0.87	0.59

\*\*QC Cylinder

**Table 7. Relative Percent Difference of QC Cylinder**

Pollutant	R2	R7	RPD (%)
CO	5095.08	5098.00	-0.057
SO <sub>2</sub>	51.86	51.72	0.270
NO	52.51	51.96	1.053
NO <sub>x</sub>	52.60	51.91	1.320

Scott-Marrin cylinder CB11278 (a tri-blend mixture of CO, SO<sub>2</sub>, and NO<sub>x</sub> – identified with the double-asterisk (\*\*)) – was the internal QC cylinder verified by both laboratories. Although shown here, the QC cylinder was not part of the totals given in Table 2. The internal QC results for the QC cylinder showed very good agreement, and all were within the 2%

RPD measurement quality objective. As important as the agreement of the QC sample to the certified concentration, equally important is the comparability of the concentrations of the two RAVLs. Table 7 provides the relative percent differences ( $d_i$ ) of the paired QA sample concentrations, and is defined as:

$$d_i = \frac{X_i - Y_i}{(X_i + Y_i)/2} \cdot 100$$

Where  $X_i$  = Region 2 RAVL concentration, and  
 $Y_i$  = Region 7 RAVL concentration

Selecting which lab was  $X_i$  and  $Y_i$  was arbitrary.

Out of the 68 verification results, seven were greater than the  $\pm 2\%$  Acid Rain Program criteria; this is the highest number since the verification program has begun. However, no value was greater than AA-PGVP 4-5% criteria.

## Summary and Conclusions

In general, the AA-PGVP 2015 verifications were successful. The quality system, standard operating procedures, analytical equipment and standards maintained the data quality of the program. Results show that of the 68 verifications, all 68 (100%) were within the  $\pm 4-5\%$  AA-PGVP criteria; and 61 of the 68 (90%) were within the  $\pm 2\%$  Acid Rain Program criteria.

The following lists some areas of the program that need improvement:

**Survey Improvement** – Despite email reminders sent to the participating agencies throughout 2015, there was a drop off in participation in the annual survey. As a result of this inconsistent participation in the survey, changes were made to the ambient monitoring rule (published on March 28, 2016, and effective April 27, 2016) which makes it a requirement for states using protocol gases to complete the survey every year.

**Participation Improvement** – Since the program's inception, participation was voluntary. Over the course of its existence, the original purpose of the program (blind verification of gas cylinders provided by monitoring organizations) has been compromised. As a result, the ambient monitoring rule was revised (referenced above) to require monitoring organizations to submit an unused cylinder at least once every five years for verification. As mentioned earlier in this report, only two monitoring organizations provided cylinders for verification in 2015; the remainder came from the gas producers themselves. It was not the purpose of the program to serve as a verification program for gas producers. EPA expects to see a slight increase in participation in 2016, but expect greater participation in the future.

**Quarterly Interlaboratory QC Checks** - The analysis of the same standard by both RAVLs proved to be a useful tool for checking the quality of the AA-PGVP results. Although historically the plan was to conduct the QC checks in two quarters, the RAVLs were not able to conduct the check in two quarters the past couple years. Part of the difficulty with achieving this goal was the ongoing concern with Region 7's manpower issue. However, Region 7's manpower concerns seem to have been resolved, so maybe this will enable the QC checks to be done in two quarters in future years.

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## **Appendix A**

### **Ambient Air Protocol Gas Verification Program QA Reports from Measurement Data Worksheets for 2014**

During the verification process, the Regional Air Verification Laboratories perform a number of quality control checks that are recorded on the Measurement Data Worksheets. This information is reported and saved along with the verification reports. The following sheets represent the quality control for all verifications that were implemented in 2014.

Region 2: Quarters 1 – 4, pages 16 – 30

Region 7: Quarters 1 – 4, pages 31 – 37

All quality control checks passed during verifications.

## Region 2 QA Data

### CO QA Requirements Summary, Region 2 - 1st Quarter of 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	900	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	3-Mar-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999957	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999996	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	10-Mar-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.41%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.43%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.46%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.50%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.73%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0011	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	4-Mar-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.324%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.10%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.42%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-0.43%	Challenge Std. #3 vendor certificate bias < 2%

### CO QA Requirements Summary, Region 2 - 1st Quarter of 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	900	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	3-Mar-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999957	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999996	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	11-Mar-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.21%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.21%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.22%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.22%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.23%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0006	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	4-Mar-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.164%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.80%	Challenge Std. #1 vendor certificate bias < 2%

## CO QA Requirements Summary, Region 2 - 2nd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	700	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Jul-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999991	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999978	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	7-Jul-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.28%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.29%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.31%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.34%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.48%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0006	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Jul-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.210%	Dilution Check RSD is OK

## CO QA Requirements Summary, Region 2 - 2nd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	700	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Jul-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999991	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999978	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	9-Jul-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.50%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.52%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.56%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.61%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.87%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9994	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Jul-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.207%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.47%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.29%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.01%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	0.42%	Challenge Std. #4 vendor certificate bias < 2%

## SO2 QA Requirements Summary, Region 2 - 2nd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	11-Dec-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	850	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Jul-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999991	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999978	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	8-Jul-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.44%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.45%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.50%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.58%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.75%	Assay may be conducted at this concentration
	Analyzer slope is within 0.99-1.02	1.0051	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Jul-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.210%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay.
	Challenge Standard #1 vendor certificate bias	2.58%	Challenge Std. #1 vendor certificate bias between 2-4%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay.
	Challenge Standard #2 vendor certificate bias	-0.07%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay.
	Challenge Standard #3 vendor certificate bias	-0.77%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay.
	Challenge Standard #4 vendor certificate bias	1.61%	Challenge Std. #4 vendor certificate bias < 2%

## NOx QA Requirements Summary, Region 2 - 2nd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Jul-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999991	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999978	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	13-Jul-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.41%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.42%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.46%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.54%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.70%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0001	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	13-Jul-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.77%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.81%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.88%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	1.03%	Assay is invalid at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	1.33%	Assay is invalid at this concentration
	Analyzer slope is within 0.98-1.02	1.0014	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Jul-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.210%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.42%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.48%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.30%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.50%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	3.08%	Challenge Std. #3 vendor certificate bias between 2-4%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	2.41%	Challenge Std. #3 vendor certificate bias between 2-4%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NO Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NOx Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!



## NO/NOx QA Requirements Summary, Region 2 - 2nd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Jul-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999991	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999978	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	15-Jul-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.35%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.37%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.40%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.47%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.60%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0094	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	15-Jul-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.20%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.21%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.23%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.27%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.34%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0109	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Jul-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.210%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.01%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.10%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.49%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.16%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.67%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.84%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NO Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NOx Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!

## CO QA Requirements Summary, Region 2 - 3rd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	700	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	26-Aug-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	26-Aug-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.47%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.50%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.53%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.57%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.82%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9966	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	27-Aug-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.247%	Dilution Check RSD is OK

## CO QA Requirements Summary, Region 2 - 3rd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	700	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	26-Aug-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	31-Aug-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.44%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.46%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.49%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.53%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.76%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9984	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	27-Aug-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.423%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference < 5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.17%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.14%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.05%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	0.25%	Challenge Std. #4 vendor certificate bias < 2%
<b>Challenge Standard #5 Assay</b>	Challenge Standard #5 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	0.10%	Challenge Std. #5 vendor certificate bias < 2%

## SO2 QA Requirements Summary, Region 2 - 3rd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	11-Dec-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	850	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	26-Aug-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	3-Sep-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.25%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.26%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.29%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.34%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.43%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0013	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	27-Aug-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.247%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay
	Challenge Standard #1 vendor certificate bias	0.24%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay
	Challenge Standard #2 vendor certificate bias	-0.14%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay
	Challenge Standard #3 vendor certificate bias	0.51%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!

## SO2 QA Requirements Summary, Region 2 - 3rd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	11-Dec-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	850	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	26-Aug-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	8-Sep-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.41%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.42%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.46%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.54%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.69%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9992	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	27-Aug-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.247%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay
	Challenge Standard #1 vendor certificate bias	1.09%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay
	Challenge Standard #2 vendor certificate bias	0.53%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!

## NO/NOx QA Requirements Summary, Region 2 - 3rd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	26-Aug-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	1-Sep-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.06%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.05%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.05%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.07%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.10%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0052	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	1-Sep-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.25%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.22%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.25%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.32%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.43%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0054	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	27-Aug-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.247%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.37%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.29%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.75%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.09%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-0.36%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-0.01%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	-0.76%	Challenge Std. #4 vendor certificate bias < 2%
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	0.00%	Challenge Std. #4 vendor certificate bias < 2%
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NO Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NOx Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!

## NO/NOx QA Requirements Summary, Region 2 - 3rd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	26-Aug-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	1-Sep-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.28%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.24%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.27%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.36%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.48%	Assay may be conducted at this concentration
Analyzer slope is within 0.98-1.02	1.0059	Analyzer Slope is acceptable	
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	1-Sep-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.18%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.16%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.18%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.23%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.31%	Assay may be conducted at this concentration
Analyzer slope is within 0.98-1.02	1.0040	Analyzer Slope is acceptable	
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	27-Aug-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.247%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.81%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.42%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.51%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.48%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.97%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	1.15%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NO Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NOx Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!



## CO QA Requirements Summary, Region 2 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	700	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999950	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	9-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.00%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0048	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	9-Dec-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.019%	Dilution Check RSD is OK

## CO QA Requirements Summary, Region 2 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	700	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999950	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	17-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.48%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.51%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.54%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.59%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.84%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0008	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	9-Dec-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.323%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.14%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.76%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-0.33%	Challenge Std. #3 vendor certificate bias < 2%

## CO QA Requirements Summary, Region 2 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	700	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.999950	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	21-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.38%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.39%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.42%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.45%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.67%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0033	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	9-Dec-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.160%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.17%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.12%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.54%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	-1.28%	Challenge Std. #4 vendor certificate bias < 2%

## SO2 QA Requirements Summary, Region 2 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	11-Dec-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	850	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999950	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	10-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.00%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.00%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9981	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	9-Dec-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.019%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay.
	Challenge Standard #1 vendor certificate bias	0.60%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay.
	Challenge Standard #2 vendor certificate bias	0.25%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay.
	Challenge Standard #3 vendor certificate bias	-0.58%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay.
	Challenge Standard #4 vendor certificate bias	-0.06%	Challenge Std. #4 vendor certificate bias < 2%



## SO2 QA Requirements Summary, Region 2 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date*	11-Dec-15	Primary SRM Gas Standard Expired
	Primary SRM Cylinder Pressure >150 psi	500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	850	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999950	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	14-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.19%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.19%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.21%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.25%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.32%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0032	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	9-Dec-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.019%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay.
	Challenge Standard #1 vendor certificate bias	0.39%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay.
	Challenge Standard #2 vendor certificate bias	0.46%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay.
	Challenge Standard #3 vendor certificate bias	0.72%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay.
	Challenge Standard #4 vendor certificate bias	0.40%	Challenge Std. #4 vendor certificate bias < 2%

\*NOTE: Primary SRM was not used for assay

## NO/NOx QA Requirements Summary, Region 2 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999950	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	15-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.63%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.66%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.72%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.84%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	1.08%	Assay is invalid at this concentration
	Analyzer slope is within 0.98-1.02	1.0007	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	15-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.12%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.10%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.11%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.15%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.20%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0001	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	9-Dec-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.019%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	2.25%	Challenge Std. #1 vendor certificate bias between 2-4%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.07%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	3.00%	Challenge Std. #2 vendor certificate bias between 2-4%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.85%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.32%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-1.00%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	1.41%	Challenge Std. #4 vendor certificate bias < 2%
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	-0.49%	Challenge Std. #4 vendor certificate bias < 2%
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NO Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NOx Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!

## NO/NOx QA Requirements Summary, Region 2 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	27-May-16	Standard OK
	Low Flow Standard Expiration Date	27-May-16	Standard OK
	Flow Standard Base Unit Expiration Date	27-May-16	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999993	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999950	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	16-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.37%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.39%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.42%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.49%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.63%	Assay may be conducted at this concentration
Analyzer slope is within 0.98-1.02	1.0022	Analyzer Slope is acceptable	
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	16-Dec-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.30%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.31%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.34%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.40%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.51%	Assay may be conducted at this concentration
Analyzer slope is within 0.98-1.02	0.9987	Analyzer Slope is acceptable	
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	9-Dec-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.019%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.47%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-1.41%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.11%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.21%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.64%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.71%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NO Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #6 NOx Assay</b>	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	#VALUE!	#VALUE!

## Region 7 QA Data

CO QA Requirements Summary, Region 7 - 2nd Quarter, 2015			
	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	7-Apr-18	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	2100	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	9-Nov-15	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1575	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	13-Feb-16	Standard OK
	Low Flow Standard Expiration Date	13-Feb-16	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	3-Jun-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999978	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999693	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	3-Jun-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.07%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.07%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.07%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.07%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.08%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9987	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	4-Jun-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.483%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.16%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

## SO2 QA Requirements Summary, Region 7 - 2nd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	600	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	11-Dec-15	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1625	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	13-Feb-16	Standard OK
	Low Flow Standard Expiration Date	13-Feb-16	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	3-Jun-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999978	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999693	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	8-Jun-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.63%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.64%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.67%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.70%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.75%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0029	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	4-Jun-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.483%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.22%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.78%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-1.05%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

## NO/NOx QA Requirements Summary, Region 7 - 2nd Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	800	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1750	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	13-Feb-16	Standard OK
	Low Flow Standard Expiration Date	13-Feb-16	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	3-Jun-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999978	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999693	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	10-Jun-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.66%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.67%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.70%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.74%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.79%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9991	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	10-Jun-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.80%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.82%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.85%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.89%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.96%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0014	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	4-Jun-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.483%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.08%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.17%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-2.39%	Challenge Std. #2 vendor certificate bias between 2-4%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-2.04%	Challenge Std. #2 vendor certificate bias between 2-4%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.75%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.51%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

## CO QA Requirements Summary, Region 7 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	7-Apr-18	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	2000	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Jul-22	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1525	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	13-Feb-16	Standard OK
	Low Flow Standard Expiration Date	13-Feb-16	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Nov-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999833	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999565	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	6-Nov-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.14%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.14%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.15%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.16%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.17%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9987	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	6-Nov-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.432%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.85%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!



## SO2 QA Requirements Summary, Region 7 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	600	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	11-Dec-15	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1625	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	13-Feb-16	Standard OK
	Low Flow Standard Expiration Date	13-Feb-16	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Nov-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999833	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999565	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	9-Nov-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.44%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.44%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.46%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.49%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.52%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0013	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	6-Nov-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.432%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference < 5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.62%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.33%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-0.77%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!



## NO/NOx QA Requirements Summary, Region 7 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	800	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1750	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	13-Feb-16	Standard OK
	Low Flow Standard Expiration Date	13-Feb-16	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Nov-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999833	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999565	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	12-Nov-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.32%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.32%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.34%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.35%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.38%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0008	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	12-Nov-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.25%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.26%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.27%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.28%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.30%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9995	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	6-Nov-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.431%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.63%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.17%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.46%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.75%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

## NO/NOx QA Requirements Summary, Region 7 - 4th Quarter, 2015

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	800	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1750	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	13-Feb-16	Standard OK
	Low Flow Standard Expiration Date	13-Feb-16	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	6-Nov-15	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999833	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999565	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	12-Nov-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.32%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.32%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.34%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.35%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.38%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0008	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	12-Nov-15	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.25%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.26%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.27%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.28%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.30%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9995	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	6-Nov-15	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.431%	Dilution Check RSD is OK
<b>Day of Assay Zero/Span Check NO Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Day of Assay Zero/Span Check NOx Portion</b>	Day of Assay Zero Check - Std. Error < 1%	Std. Error is okay.	Zero Gas Std. Error is OK
	Day of Assay Zero Check - Relative Difference < 5%	RD is okay.	Zero Gas RD is OK
	Day of Assay Span Check - Std. Error < 1%	Std. Error is okay.	Span Gas Std. Error is OK
	Day of Assay Span Check - Relative Difference <5%	RD is okay.	Span Gas RD is OK
<b>Challenge Standard #1 NO Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.36%	Challenge Std. #1 vendor certificate bias < 2%
<b>Challenge Standard #1 NOx Assay</b>	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	2.22%	Challenge Std. #1 vendor certificate bias between 2-4%
<b>Challenge Standard #2 NO Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	1.71%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #2 NOx Assay</b>	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	1.75%	Challenge Std. #2 vendor certificate bias < 2%
<b>Challenge Standard #3 NO Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.38%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #3 NOx Assay</b>	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.87%	Challenge Std. #3 vendor certificate bias < 2%
<b>Challenge Standard #4 NO Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #4 NOx Assay</b>	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NO Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
<b>Challenge Standard #5 NOx Assay</b>	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

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