



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

Annual Report  
CY 2011



U. S. EPA Ambient Air Protocol Gas Verification Program  
Annual Report for Calendar Year 2011

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

AA-PGVP 2011 Report 4/2012

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## **Acknowledgements**

The following individuals and organizations are acknowledged for their contributions to this project:

### **US EPA, Office of Air Quality Planning and Standards**

Richard Wayland      Bill Lamason      Lewis Weinstock      Joe Elkins      Mark Shanis

### **US EPA, Office of Research and Development**

Bob Wright

### **US EPA Region 2**

Deb Szaro              John Kushwara      Avi Teitz              Mustafa Mustafa

### **US EPA Region 7**

Michael Davis      Lorenzo Sena      Thien Bui              James Regehr

### **Monitoring Organizations**

EPA acknowledges the monitoring organizations that sent gas standards to the EPA Regional Analytical Verification Laboratories. They include:

Arizona Dept. of Environmental Quality  
City of Philadelphia  
Mecklenburg County North Carolina  
Maricopa County Air Quality Dept  
Minnesota Pollution Control Agency  
New Jersey Dept. of Environmental Protection  
North Carolina Dept. of Natural Resources  
Ohio EPA (Portsmouth)  
Southern Ute Indian Tribe  
State of Delaware  
State of Florida  
Texas Commission of Environmental Quality  
University of Iowa State Hygienic Lab  
Virginia Dept. of Environmental Quality  
West Virginia Dept. of Environmental Protection

## **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 2011, the second year of the program, 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 2011. The following provides a brief explanation of the 2011 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. Most of the producers were the same as listed the previous year but a few new producers were added.

**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	Feb 14 – Feb 18	Feb 22 – Mar 4	Mar 14 - 18	Mar 21- Apr 1
2	June 6 – June 10	June 13- June 24	May 30 – June 3	June 6- June 17
3	Aug 29 – Sept 2	Sept 6 – Sept 16	Sept 12 – Sept 16	Sept 19 – Sept 30
4	Oct 31 – Nov 4	Nov 7- Nov 18	Nov 28– Dec 2	Dec 5- Dec 16
Open House	December 6-8		December 19-21	

**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 Dec 6-8, 2011 and received two specialty producers. The Region 7 open house was Dec 19-21 and received three specialty gas producers.

### 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.

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

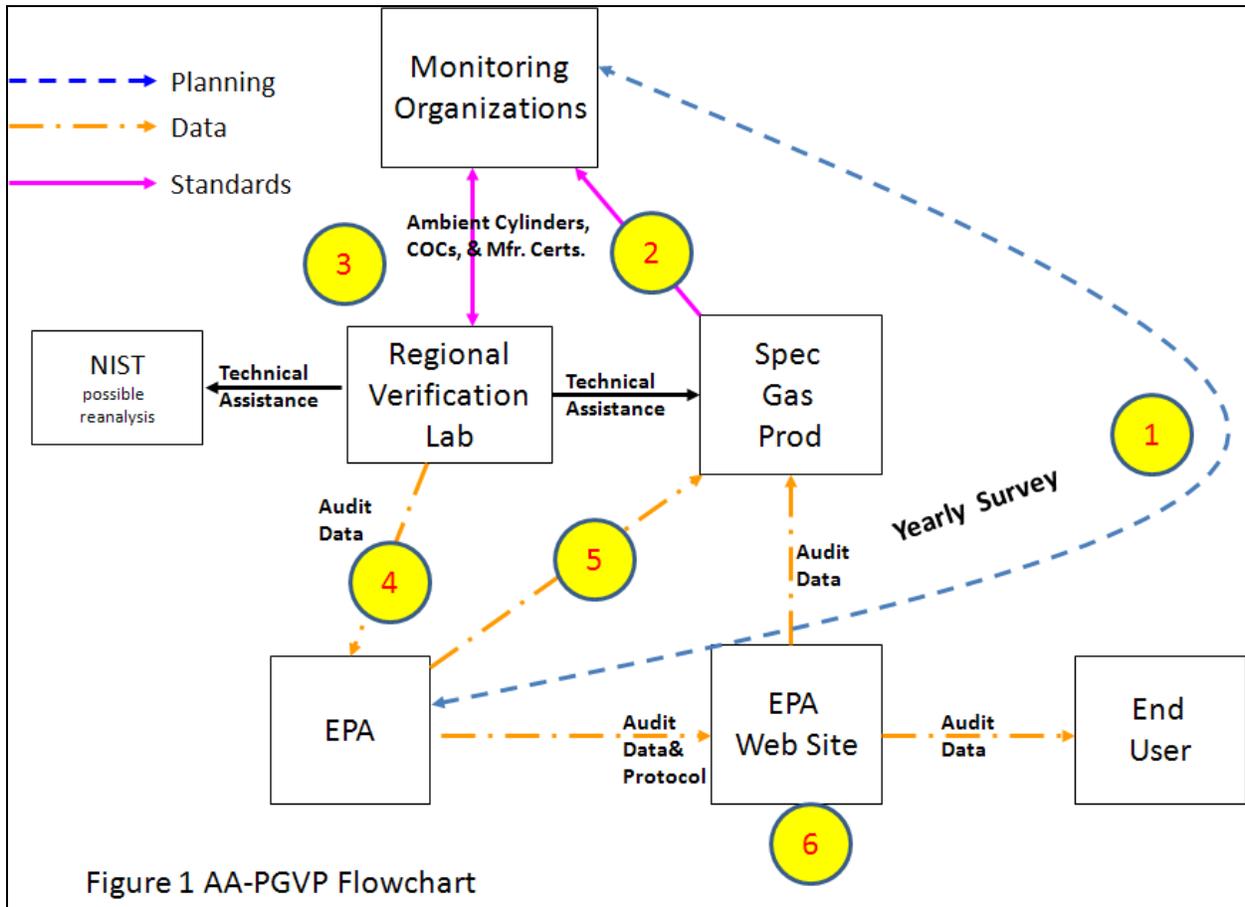


Figure 1 AA-PGVP Flowchart

1. EPA sends emails to the monitoring organization's point 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. For the 2011 AA-PGVP, EPA received surveys from 82 of a possible 122 monitoring organizations, which is about a 67% response rate. This was lower than the input received from 2010 which was around 75%.

### Survey Results

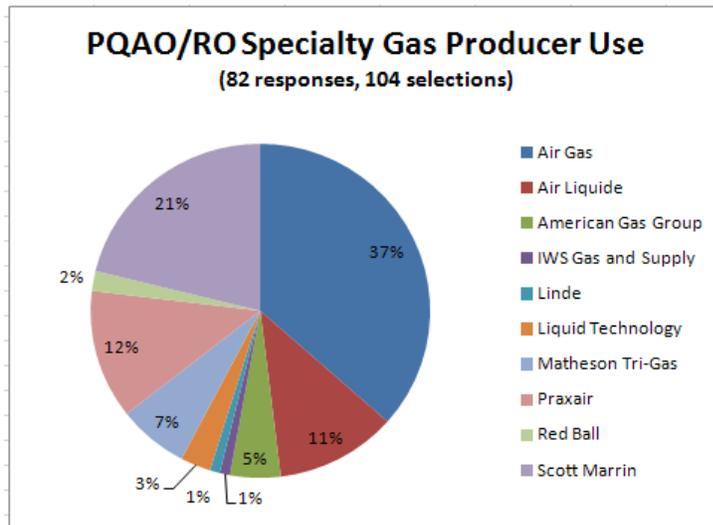


Figure 2. Specialty Gas Producer Use

The 82 monitoring organizations identified 104 specialty gas producers since some monitoring organizations used multiple specialty gas producers. Figure 2 identifies, as a percentage of the total responses, how often the monitoring organizations listed a particular specialty gas producer. As mentioned above, only about 67% of the monitoring organizations responded so this cannot be considered a complete survey.

Eight 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 82 respondents, 33 either did not want to participate or were not receiving a cylinder during the year. This narrowed the participants down to 49. Of the possible participants, 15 monitoring organizations sent cylinders

to EPA. EPA did not have a monitoring organization volunteer submit a cylinder from Linde, IWS, Red Ball, or Liquid Technology. EPA invited those participants to send a cylinder to EPA. In addition, although the monitoring organization surveys did not list, Global, Coastal or ILMO as a producer currently being used, they inquired about the program and submitted cylinders for verification. Table 2 lists the cylinders verified in CY2011. Some of these cylinders contained multiple pollutants so although 37 cylinders were sent to the RAVLs, 65 verifications were performed.

Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Participant
9/20/2011	7	Praxair	Los Angeles, CA	F22011	CC59261	Arizona Dept. of Environmental Quality
9/8/2011	2	Praxair	Bethlehem PA	F12011	FF33164	City of Philadelphia
9/6/2011	2	Praxair	Bethlehem, PA	F12011	FF33213	City of Philadelphia
11/15/2011	2	Scott-Marrin	Riverside, CA	H12011	CC12477	Mecklenburg County North Carolina
3/22/2011	7	Scott-Marrin	Riverside, CA	H12011	CC10191	Maricopa County Air Quality Dept
3/29/2011	7	Matheson	Twinsburg, OH	D42011	SV18699	Minnesota Pollution Control Agency
11/10/2011	2	Praxair	Bethlehem PA	F12011	CLM010344	New Jersey Dept. of Environmental Protection
6/7/2011	2	Praxair	Bethlehem, PA	F12011	FF28443	New Jersey Dept. of Environmental Protection
11/9/2011	2	Praxair	Bethlehem, PA	F12011	FF33837	New Jersey Dept. of Environmental Protection
11/16/2011	2	Praxair	Bethlehem, PA	F12011	FF37697	New Jersey Dept. of Environmental Protection
9/12/2011	2	American Gas Group	Toledo, OH	C12011	EB0024958	North Carolina Dept. of Natural Resources
9/8/2011	2	American Gas Group	Toledo, OH	C12011	EB0027945	North Carolina Dept. of Natural Resources
6/15/2011	2	Praxair	Toledo, OH	F32011	CLM000306	Ohio EPA (Portsmouth)
12/7/2011	7	Scott-Marrin	Riverside, CA	H12011	JJ21176	Southern Ute Indian Tribe
11/9/2011	2	Praxair	Bethlehem, PA	F12011	FF33237	State of Delaware
11/10/2011	2	Praxair	Bethlehem PA	F12011	FF6052	State of Delaware
6/7/2011	2	AirGas	Durham NC	B22011	CC349796	State of Florida
12/7/2011	7	AirGas	Chicago, IL	B12011	FF2742-B	Texas Commission of Environmental Quality
12/13/2011	7	Air Gas	Port Allen, LA	B42011	FF54255	Texas Commission of Environmental Quality
12/8/2011	7	AirGas	Port Allen, LA	B42011	FF7776	Texas Commission of Environmental Quality
9/20/2011	7	Air Liquide	Troy, MI	A22011	BAL1263	U of Iowa State Hygienic Lab
3/24/2011	7	Air Liquide	Troy, MI	A22011	BAL4054	U of Iowa State Hygienic Lab
12/8/2011	7	Air Liquide	Troy, MI	A22011	BLM003582	U of Iowa State Hygienic Lab
6/7/2011	2	AirGas	Durham NC	B22011	LL33617	Virginia, Dept. of Environmental Quality
6/7/2011	2	Air Liquide	Plumsteadville, PA	A12011	CLM006761	West Virginia Dept. of Environmental Protection
6/10/2011	2	Coastal	Beaumont, TX	O12011	CC300210	Producer shipped
6/12/2011	2	Coastal	Beaumont, TX	O12011	CC329107	Producer shipped
9/7/2011	2	Global	Palmetto, FL	N12011	EB0030422	Producer shipped
12/8/2011	7	ILMO	Jacksonville, IL	Q12011	CC198518	Producer shipped
12/13/2011	7	ILMO	Jacksonville, IL	Q12011	CC48435	Producer shipped
12/6/2011	7	ILMO	Jacksonville, IL	Q12011	CC48435	Producer shipped
12/6/2011	7	IWS	Belle Chase, LA	K12011	CC216328	Producer shipped
12/13/2011	7	IWS	Belle Chase, LA	K12011	EB0032551	Producer shipped
2/23/2011	2	Linde	Alpha, NJ	I12011	CC344529	Producer shipped
12/7/2011	7	Liquid Tech	Apopka, FL	E12011	CC233279	Producer shipped
3/22/2011	7	Red Ball	Shreveport, LA	G12011	EB0005733	Producer shipped
3/22/2011	7	Red Ball	Shreveport, LA	G12011	EB0027713	Producer shipped

## 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 2010 and 2011 surveys. 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 highlighted in green were identified on the AA-PGVP surveys. The facilities highlighted in yellow were the facilities that the RAVLs received a cylinder for verification. The facilities highlighted in green were identified on the AA-PGVP survey but did not have a cylinder verified from the RAVLs. For 2011, the AA-PGVP performed verifications on all producers identified but did not provide verifications on standards from four production facilities. In addition, EPA performed verifications on three producers that were not identified in the surveys as being used in 2011.

**Table 3. Production Facilities Verified in 2011**

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

<b>Table 5. Ambient Air Protocol Gas Verification Program 2011 CO and SO2 Verifications</b>									
Highlighted facilities indicate direct shipment of cylinder from producer to Regional Laboratory									
<b>Region 2 CO</b>									
Date	Lab	Producer	Facility	Cylinder ID	Pollutant	Assay Conc	Producer Conc	% Bias	95% Uncertainty (%)
2/23/2011	2	Linde	Alpha, NJ	CC344529	CO	5005	4980	0.52	0.26
6/10/2011	2	Coastal	Beaumont, TX	CC300210	CO	2399.18	2410	-0.45	0.08
9/7/2011	2	Global	Palmetto, FL	EB0030422	CO	9003.45	8954	0.55	0.63
9/12/2011	2	American Gas Group	Toledo, OH	EB0024958	CO	194.91	195	-0.04	0.11
11/15/2011	2	Scott-Marrin	Riverside, CA	CC12477	CO	209.1	212	-1.27	0.06
11/16/2011	2	Praxair	Bethlehem, PA	FF37697	CO	38.49	38.9	-1.05	0.34
11/16/2011	2	Praxair**	QC Sample	SA6140	CO	5002.82	5007	-0.08	0.34
<b>Region 2 SO2</b>									
2/23/2011	2	Linde	Alpha, NJ	CC344529	SO2	51.06	51.1	-0.08	0.27
6/7/2011	2	AirGas	Durham NC	LL33617	SO2	44.62	43.91	1.61	0.24
6/7/2011	2	AirGas	Durham NC	CC349796	SO2	45.18	45.28	-0.23	0.24
6/7/2011	2	Air Liquide	Plumsteadville, PA	CLM006761	SO2	54.5	55.4	-1.62	0.25
6/7/2011	2	Praxair	Bethlehem, PA	FF28443	SO2	48.71	48.9	-0.39	0.23
6/15/2011	2	Praxair	Toledo, OH	CLM000306	SO2	40.88	41.1	-0.52	0.25
9/6/2011	2	Praxair	Bethlehem, PA	FF33213	SO2	40.82	41.2	-0.92	0.3
9/6/2011	2	Global	Palmetto, FL	EB0030422	SO2	44.93	45.9	-2.12	0.29
11/9/2011	2	Praxair	Bethlehem, PA	FF33837	SO2	48.56	49.3	-1.51	0.36
11/9/2011	2	Praxair**	QC Sample	SA6140	SO2	45.87	46.73	-1.83	0.37
11/9/2011	2	Praxair	Bethlehem, PA	FF33237	SO2	14.29	14.8	-3.43	0.38
11/9/2011	2	Scott-Marrin	Riverside, CA	CC12477	SO2	12.87	12.99	-0.9	0.4
<b>Region 7 CO</b>									
3/22/2011	7	Red Ball	Shreveport, LA	EB0005733	CO	3907.33	3899	0.21	0.21
3/24/2011	7	Scott-Marrin	Riverside, CA	CC10191	CO	40.46	40.09	-1.07	0.22
12/6/2011	7	Praxair**	QC Sample	SA6140	CO	5003.16	5007	-0.08	0.25
12/6/2011	7	IWS	Belle Chase, LA	CC216328	CO	2532.40	2518	0.57	0.25
12/6/2011	7	ILMO	ILMO	Q12011	CO	3513.52	3520	-0.18	0.26
12/7/2011	7	Liquid Tech	Apopka, FL	CC233279	CO	4960.00	4947	0.25	0.32
12/7/2011	7	AirGas	Chicago, IL	FF2742-B	CO	5019.00	5047	-0.55	0.31
12/7/2011	7	Scott-Marrin	Riverside, CA	JJ21176	CO	3053.00	3050	0.08	0.33
<b>Region 7 SO2</b>									
3/24/2011	7	Air Liquide	Troy, MI	BAL4054	SO2	39.37	39.7	-0.84	0.17
3/22/2011	7	Red Ball	Shreveport, LA	EB0027713	SO2	62.18	62.6	-0.67	0.18
12/8/2011	7	Praxair**	QC Sample	SA6140	SO2	46.48	46.73	-0.54	0.25
12/8/2011	7	IWS	Belle Chase, LA	EB0032551	SO2	50.01	50.12	-0.23	0.24
12/8/2011	7	ILMO	Jacksonville, IL	CC198518	SO2	72.21	72.8	-0.81	0.25
12/8/2011	7	Liquid Tech	Apopka, FL	CC233279	SO2	50.42	50	0.83	0.2
12/8/2011	7	AirGas	Port Allen, LA	FF7776	SO2	50.85	51.05	-0.38	0.2
12/8/2011	7	Air Liquide	Troy, MI	BLM003582	SO2	28.7	29	-1.02	0.21
** QC Sample									

**Table 6. Ambient Air Protocol Gas Verification Program 2011 NOx Verifications**

Highlighted facilities indicate direct shipment of cylinder from producer to Regional Laboratory															
Region 2 NOx															
Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Producer Ref Standard	Pollutant	NO Assay Conc	NO Producer Conc	% Bias	95% Uncertainty	NOx Assay Conc.	NOx Prod. Conc	% Bias	95% Uncertainty
2/14/2011	2	Linde	Alpha, NJ	I12011	CC344529	GMIS	NOx	49.7	49.7	-0.01	0.1	49.96	49.7	0.52	0.07
6/12/2011	2	Coastal	Beaumont, TX	O12011	CC329107	GMIS	NOx	97.42	97.7	-0.29	0.16	98.86	98.9	-0.04	0.16
9/8/2011	2	American Gas Group	Toledo, OH	C12011	EB0027945	GMIS	NOx	20.32	20.4	-0.39	0.11	20.47	20.6	-0.64	0.14
9/8/2011	2	Global	Palmetto, FL	N12011	EB0030422	SRM	NOx	47.25	51.6	-8.43	0.1	50.68	52	-2.55	0.12
4/13/2012	2	Global*	Palmetto, FL	N12011	EB0030422	SRM	NOx	50.4	51.6	-2.33		52.9	52	1.73	
9/8/2011	2	Praxair	Bethlehem PA	F12011	FF33164	GMIS	NOx	40.83	40.5	0.81	0.11	41.22	40.5	1.77	0.14
11/10/2011	2	Praxair	Bethlehem PA	F12011	CLM010344	GMIS	NOx	49.39	48.4	2.04	0.12	50.33	48.4	3.98	0.09
11/10/2011	2	Praxair	Bethlehem PA	F12011	FF6052	GMIS	NOx	12.88	12.9	-0.12	0.13	12.96	12.9	0.46	0.1
11/10/2011	2	Scott-Marrin	Riverside, CA	H12011	CC12477	GMIS	NOx	9.94	9.91	0.35	0.15	9.94	9.91	0.35	0
11/10/2011	2	Praxair**	QC Sample		SA6140		NOx	51.72	51.98	-0.51	0.12	51.75	51.68	0.13	0.09
Region 7 NOx															
3/29/2011	7	Matheson	Twinsburg, OH	D42011	SV18699	NTRM	NOx	48.81	48.5	0.64	0.09	49.04	48.5	1.12	0.07
3/29/2011	7	Red Ball	Shreveport, LA	G12011	EB0027713	SRM/NTRM	NOx	62.34	62.3	0.07	0.09	62.16	62.3	-0.23	0.07
9/20/2011	7	Praxair	Los Angeles, CA	F22011	CC59261	GMIS	NOx	49.44	49.7	-0.53	0.35	49.83	50.2	-0.73	0.38
9/20/2011	7	Air Liquide	Troy, MI	A22011	BAL1263	NTRM	NOx	40.34	41.1	-1.84	0.37	40.35	41.3	-2.31	0.4
12/13/2011	7	Praxair**	QC Sample		SA6140		NOx	51.66	51.98	-0.61	0.2	51.54	51.68	-0.26	0.19
12/13/2011	7	IWS	Belle Chase, LA	K12011	EB0032551	GMIS	NOx	51.75	51	1.47	0.2	51.67	51	1.32	0.19
12/13/2011	7	ILMO	Jacksonville, IL	Q12011	CC48435	SRM	NOx	70.25	73	-3.77	0.21	72.81	73	-0.26	0.2
12/13/2011	7	Scott-Marrin	Riverside, CA	H12011	JJ21176	GMIS	NOx	29.93	29.42	1.72	0.11	29.87	29.42	1.53	0.13
12/13/2011	7	Air Gas	Port Allen, LA	B42011	FF54255	NTRM	NOx	50	50.13	-0.25	0.1	50.22	50.13	0.18	0.13
12/13/2011	7	Liquid Tech	Apopka, FL	E12011	CC233279	GMIS	NOx	51.44	51.1	0.66	0.1	51.33	51.2	0.25	0.12

\* Third party analysis of cylinder provided by producer

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

Pollutant	R2	R7	RPD (%)
CO	5002.82	5003.16	-0.007
SO2	45.87	46.84	-2.093
NO	51.72	51.66	0.116
NOx	51.75	51.54	0.407

Praxair Cylinder SA6140 (with asterisk \*\*) was an internal QC cylinder that was verified by both laboratories. Although it is shown here, it is not part of the totals in Table 2. The internal QC results for CO, SO2 and NOx showed very good agreement. 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 65 verification results, seven were greater than the  $\pm 2\%$  Acid Rain Program criteria and only one value was greater than AA-PGVP 4-5% criteria. The cylinder that failed for NO was from a multi-pollutant standard that passed verification for CO, SO2 and NOx. Initial results were sent to the producer by the Region 2 RAVL. On 01/06/2011, EPA sent the results of the verification out again to the specialty gas producer and stated they had an opportunity to send a second standard to EPA for verification. The second verification values could be added to the

2011 results but it would not eliminate the original cylinder verification results. In addition, the original cylinder could be analyzed by an independent third party and those results also sent to EPA who would report them along with the Region 2 results. The producer decided to have the original cylinder analyzed by a third party. On 3/27/2012 EPA did receive a certificate of third party analysis but the certificate had discrepancies that included different cylinder expiration dates and concentrations from the original certification received by Region 2. The third party analyzer did not receive original certification paper work from the producer. On 4/13/2012, EPA received a revised third party analysis with corrected information. This second certificate of third party analysis is reported Table 6. Based on this experience EPA, will propose some new guidelines for cylinders that are reanalyzed for submission to EPA.

## **Summary and Conclusions**

In general, the AA-PGVP 2011 verifications have been successful. The quality system, standard operating procedures, analytical equipment and standards maintained the data quality of the program. Results show that of the 65 verifications, 64 were within the  $\pm 4-5\%$  AA-PGVP criteria, and 58 (89%) were within the  $\pm 2\%$  Acid Rain Program criteria.

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

**Survey Improvement-** In 2010, EPA had difficulties with monitoring organizations naming production facilities. Sometimes names were misspelled or locations misrepresented. For example, a number of distribution facilities were identified that were not actually producing standards. In 2011, EPA implemented a web-based survey that allowed monitoring organizations to select (based on final 2010 data) the producers they were purchasing standards from. If the survey list did not have a producer, the monitoring organization could supply a new name and location. The contractor who maintains the survey would provide the new producer information to EPA and if it was determined that it was a legitimate producer, the contractor would update the software so that the new producer would be included on the selection list. The new system has reduced entry errors considerably.

One issue that is somewhat problematic in the survey is that it only allows one point of contact (POC) from each monitoring organization to complete the survey for their organization. Since the survey is completed annually, monitoring organizations may have turnover or changes in duties that cause some problems getting information to the correct POC each year the survey starts. In addition, new POCs for a monitoring agency need to report this information to EPA before attempting to enter data in order to have the POC name changed in the survey software.

EPA did not achieve 100% completeness on surveys in 2011. Despite repeated email messages to delinquent monitoring organizations, EPA was not able to get all monitoring organizations to respond. EPA plans on being slightly more aggressive in getting out email messages every two weeks to those monitoring organization not responding. EPA may have to resort to individual phone calls at some point to meet the completeness goals.

**Participation Improvement-** Since the program is voluntary, EPA can not force participation. Due to the budget/resource issues, many monitoring organization are more resource constrained

and since the AA-PGVP is optional, it is treated as a lower priority. Since the only added expense to monitoring organization is the shipping cylinders to the RAVL, in 2011 EPA started helping monitoring organizations pay for the shipping cost. EPA plans to continue this in 2012 in the hopes of getting more organizations to participate.

**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. In 2011, the RAVLS performed one check each. In 2012 the Regions will conduct the check in two quarters along with the routine QC activities associated with each verification run.

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## **Appendix A**

### **Ambient Air Protocol Gas Verification Program QA Reports from Measurement Data Worksheets for 2011**

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 2011.

Region 2 - Quarters 1-4, pages 14-24

Region 7 - Quarters 1, 3 and 4 pages 25-31 (Region 7 did not perform verification in Quarter 2)

All quality control checks passed during verifications

## Region 2 QA Data

CO QA Requirements Summary Region 2-Quarter 1, 2011			
	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	1750	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	18-Jan-12	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1275	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	7-May-11	Standard OK
	Low Flow Standard Expiration Date	7-May-11	Standard OK
	Flow Standard Base Unit Expiration Date	7-May-11	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	22-Feb-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999935	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999980	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	23-Feb-11	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	0.68%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.69%	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)	0.72%	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	23-Feb-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.201%	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	0.52%	Challenge Std. #1 vendor certificate bias < 2%

SO2 QA Requirements Summary Region 2-Quarter 1, 2011			
	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	1425	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	1725	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	7-May-11	Standard OK
	Low Flow Standard Expiration Date	7-May-11	Standard OK
	Flow Standard Base Unit Expiration Date	7-May-11	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	22-Feb-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999935	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999980	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	28-Feb-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.31%	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	0.35%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.41%	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	0.9954	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	23-Feb-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.201%	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	-0.08%	Challenge Std. #1 vendor certificate bias < 2%

## NOx QA Requirements Summary Region 2-Quarter 1, 2011

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Sep-11	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1250	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	2000	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	7-May-11	Standard OK
	Low Flow Standard Expiration Date	7-May-11	Standard OK
	Flow Standard Base Unit Expiration Date	7-May-11	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	22-Feb-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999935	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999980	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	24-Feb-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.11%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.11%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.12%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.14%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.18%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0024	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	24-Feb-11	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	0.11%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.12%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.14%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.18%	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	23-Feb-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.201%	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	0.52%	Challenge Std. #1 vendor certificate bias < 2%

## CO QA Requirements Summary Region 2-Quarter 2, 2011

	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	1750	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	18-Jan-12	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1275	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	2-Jun-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999920	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	3-Jun-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.68%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.69%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.71%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.72%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.74%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9999	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	3-Jun-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.028%	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	-0.45%	Challenge Std. #1 vendor certificate bias < 2%

## SO2 QA Requirements Summary Region 2-Quarter 2 Sheet 1, 2011

	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	1425	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	1725	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	2-Jun-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999920	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999996	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	7-Jun-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.22%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.23%	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	0.29%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.37%	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	3-Jun-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.028%	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	1.61%	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	-0.23%	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	-1.62%	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	-0.39%	Challenge Std. #4 vendor certificate bias < 2%

## SO2 QA Requirements Summary Region 2-Quarter 2 Sheet 2, 2011

	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	1425	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	1725	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	2-Jun-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999920	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999996	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	7-Jun-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.22%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.23%	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	0.29%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.37%	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	3-Jun-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.028%	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	-0.52%	Challenge Std. #1 vendor certificate bias < 2%

## NOx QA Requirements Summary Region 2-Quarter 2, 2011

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Sep-11	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1175	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	1890	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	2-Jun-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999920	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999996	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	12-Jun-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.16%	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	0.17%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.20%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.26%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0018	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	12-Jun-11	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	0.12%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.13%	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)	0.20%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0002	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	3-Jun-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.028%	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	-0.29%	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	-0.04%	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	0.22%	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	-0.38%	Challenge Std. #2 vendor certificate bias < 2%

## CO QA Requirements Summary Region 2-Quarter 3 Sheet 1, 2011

	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	1750	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	18-Jan-12	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1275	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	31-Aug-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999883	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999991	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	1-Sep-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.71%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.72%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.73%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.75%	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	0.9991	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	1-Sep-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.091%	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	0.55%	Challenge Std. #1 vendor certificate bias < 2%

## CO QA Requirements Summary Region 2-Quarter 3 Sheet 2, 2011

	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	1750	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	18-Jan-12	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1275	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	31-Aug-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999883	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999682	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	12-Sep-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.11%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.11%	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	0.11%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.12%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9935	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	1-Sep-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.681%	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	-0.04%	Challenge Std. #1 vendor certificate bias < 2%

## SO2 QA Requirements Summary Region 2-Quarter 3, 2011

	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	1425	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	1570	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	31-Aug-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999883	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999991	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	6-Sep-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.26%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.27%	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)	0.00%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0020	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	1-Sep-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.091%	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	-0.92%	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	-2.12%	Challenge Std. #2 vendor certificate bias between 2-4%

## NOx QA Requirements Summary Region 2-Quarter 3, 2011

	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	2100	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	1890	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	31-Aug-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999883	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999991	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	8-Sep-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.09%	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	0.12%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.16%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9998	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	8-Sep-11	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	0.13%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.14%	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)	0.21%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9991	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	1-Sep-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.091%	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	-0.39%	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	-0.64%	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	-8.43%	Challenge Std. #2 vendor certificate bias is 4% or greater
<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	-2.55%	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	0.81%	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	1.77%	Challenge Std. #3 vendor certificate bias < 2%

## CO QA Requirements Summary Region 2-Quarter 4 Sheet 1, 2011

	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	1675	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	18-Jan-12	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1150	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	7-Nov-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999760	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	16-Nov-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.33%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.33%	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	0.34%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.35%	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	8-Nov-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.548%	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	-0.08%	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	-3.28%	Challenge Std. #2 vendor certificate bias between 2-4%

## CO QA Requirements Summary Region 2-Quarter 4 Sheet 2, 2011

	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	1675	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	18-Jan-12	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1150	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	7-Nov-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999760	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	15-Nov-11	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	0.06%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.06%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.06%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.06%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0178	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Nov-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.548%	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	-1.27%	Challenge Std. #1 vendor certificate bias < 2%

## SO2 QA Requirements Summary Region 2-Quarter 4, 2011

	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	1425	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	1570	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	7-Nov-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999760	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999996	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	9-Nov-11	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	0.36%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.39%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.46%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.58%	Assay may be conducted at this concentration
	Analyzer slope is within 0.99-1.02	0.9972	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Nov-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.548%	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	-1.83%	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	-1.51%	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	-3.43%	Challenge Std. #3 vendor certificate bias between 2-4%
<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	-0.90%	Challenge Std. #4 vendor certificate bias < 2%

## NOx QA Requirements Summary Region 2-Quarter 4, 2011

	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	2100	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	1830	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	20-May-12	Standard OK
	Low Flow Standard Expiration Date	20-May-12	Standard OK
	Flow Standard Base Unit Expiration Date	20-May-12	Standard OK
<b>Calibrator (mass flow controllers)</b>	Calibrator Flow Calibration within 2 weeks of assay	7-Nov-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999760	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999996	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	10-Nov-11	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	0.12%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.13%	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)	0.20%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9997	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	10-Nov-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.09%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.09%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.10%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.12%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.15%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0010	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	8-Nov-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.548%	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	-0.51%	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	0.13%	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	2.04%	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	3.98%	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	-0.12%	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	0.46%	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	0.35%	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	0.35%	Challenge Std. #4 vendor certificate bias < 2%

## Region 7 QA Data

CO QA Requirements Summary Region 7-Quarter 1, 2011			
	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-17	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1050	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	1950	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-11	Standard OK
	Low Flow Standard Expiration Date	8-Nov-11	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	21-Mar-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999929	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999967	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	21-Mar-11	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	0.33%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.36%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.42%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.54%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9991	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	21-Mar-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.126%	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	-1.07%	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	0.21%	Challenge Std. #2 vendor certificate bias < 2%

SO2 QA Requirements Summary Region 7-Quarter 1, 2011			
	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	1625	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	1700	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-11	Standard OK
	Low Flow Standard Expiration Date	8-Nov-11	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	21-Mar-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999929	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999967	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	23-Mar-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.22%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.23%	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	0.29%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.37%	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	21-Mar-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.126%	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	-0.84%	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	-0.67%	Challenge Std. #2 vendor certificate bias < 2%

## NOx QA Requirements Summary Region 7-Quarter 1, 2011

	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	1825	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	1925	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-11	Standard OK
	Low Flow Standard Expiration Date	8-Nov-11	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	21-Mar-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999929	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999967	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	28-Mar-11	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	0.08%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.08%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.10%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.13%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0003	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	28-Mar-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.08%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.08%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.09%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.11%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #5 (~50% URL)	0.14%	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	21-Mar-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.126%	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	0.07%	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	-0.23%	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	0.64%	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	1.12%	Challenge Std. #2 vendor certificate bias < 2%

## NOx QA Requirements Summary Region 7-Quarter 3, 2011

	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	1750	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	1925	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-11	Standard OK
	Low Flow Standard Expiration Date	8-Nov-11	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	19-Sep-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999992	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999940	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	19-Sep-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.53%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.55%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.60%	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)	0.89%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0006	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	19-Sep-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.57%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.59%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.64%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.75%	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	1.0017	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	19-Sep-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.118%	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	-0.53%	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	-0.73%	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	-1.84%	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	-2.31%	Challenge Std. #2 vendor certificate bias between 2-4%

### CO QA Requirements Summary Region 7-Quarter 4 Sheet 1, 2011

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-17	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	975	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	1925	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-12	Standard OK
	Low Flow Standard Expiration Date	11-Nov-12	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	5-Dec-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999851	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	5-Dec-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.40%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.41%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.45%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.52%	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	1.0006	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	5-Dec-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.262%	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	-0.08%	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	0.57%	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	-0.18%	Challenge Std. #3 vendor certificate bias < 2%

### CO QA Requirements Summary Region 7-Quarter 4 Sheet 2, 2011

	QA Requirement	Result	Status
<b>SRM Gas Standards</b>	Primary SRM Cylinder Expiration Date	1-Jun-17	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	975	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	1925	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-12	Standard OK
	Low Flow Standard Expiration Date	11-Nov-12	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	5-Dec-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999851	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
<b>Carbon Monoxide Gas Analyzer</b>	Analyzer Calibration within 2 week of assay	5-Dec-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.40%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.41%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.45%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.52%	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	1.0006	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	5-Dec-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.262%	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	0.25%	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	-0.55%	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	0.08%	Challenge Std. #3 vendor certificate bias < 2%

## SO2 QA Requirements Summary Region 7-Quarter 4 Sheet 1, 2011

	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	1525	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	1700	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-12	Standard OK
	Low Flow Standard Expiration Date	11-Nov-12	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	5-Dec-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999851	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	7-Dec-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.26%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.27%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.30%	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)	0.44%	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	5-Dec-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.262%	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	-0.54%	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	-0.23%	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	-0.81%	Challenge Std. #3 vendor certificate bias < 2%

## SO2 QA Requirements Summary Region 7-Quarter 4 Sheet 2, 2011

	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	1525	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	1700	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-12	Standard OK
	Low Flow Standard Expiration Date	11-Nov-12	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	5-Dec-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999851	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
<b>Sulfur Dioxide Gas Analyzer</b>	Analyzer Calibration within 2 weeks of assay	7-Dec-11	Analyzer calibration within 2 weeks of assay
	Estimate of Uncertainty < 1% at point #1 (>80% URL)	0.26%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #2	0.27%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.30%	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)	0.44%	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	5-Dec-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.262%	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	0.83%	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	-0.38%	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	-1.02%	Challenge Std. #3 vendor certificate bias < 2%

## NOx QA Requirements Summary Region 7-Quarter 4 Sheet 1, 2011

	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	1750	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	1925	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-12	Standard OK
	Low Flow Standard Expiration Date	11-Nov-12	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	5-Dec-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999851	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	12-Dec-11	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	0.18%	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	0.9999	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	12-Dec-11	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	0.19%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.20%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.24%	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	0.9998	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	5-Dec-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.262%	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	-0.61%	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	-0.26%	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	1.47%	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	1.32%	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	-3.77%	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	-0.26%	Challenge Std. #3 vendor certificate bias < 2%

## NOx QA Requirements Summary Region 7-Quarter 4 Sheet 2, 2011

	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	1750	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	1925	Dilution check SRM cylinder pressure is OK
<b>Laboratory Flow Standard</b>	High Flow Standard Expiration Date	11-Nov-12	Standard OK
	Low Flow Standard Expiration Date	11-Nov-12	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	5-Dec-11	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999851	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
<b>Oxides of Nitrogen Gas Analyzer NO Portion</b>	Analyzer Calibration within 2 weeks of assay	12-Dec-11	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	0.18%	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	0.9999	Analyzer Slope is acceptable
<b>Oxides of Nitrogen Gas Analyzer NOx Portion</b>	Analyzer Calibration within 2 week of assay	12-Dec-11	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	0.19%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #3	0.20%	Assay may be conducted at this concentration
	Estimate of Uncertainty < 1% at point #4	0.24%	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	0.9998	Analyzer Slope is acceptable
<b>Dilution Check</b>	Dilution Check Date within 2 weeks of assay	5-Dec-11	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.262%	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	0.66%	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	0.25%	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	-0.25%	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	0.18%	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	1.72%	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	1.53%	Challenge Std. #3 vendor certificate bias < 2%

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United States  
Environmental Protection  
Agency

Office of Air Quality Planning and Standards  
Air Quality Analysis Division  
Research Triangle Park, NC

Publication No. EPA-454/R-12-002  
April , 2012

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