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

Annual Report
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U. S. EPA Ambient Air Protocol Gas Verification Program
Annual Report for Calendar Year 2013

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Air Quality Assessment Division
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AA-PGVP 2013 Report 4/2014

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Acronyms and Abbreviations

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

1.0 Introduction

Background and Program Goals

The basic principles of the U.S. Environmental Protection Agency's (EPA) *Traceability Protocol for the Assay and Certification of Gaseous Calibration Standards* (EPA, 1997)[1] 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[2]. 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[3].

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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[1] EPA-600/4-77-027b

[2] 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.

[3] "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*[4]. 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_2, NO, and NO_2 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.

[4] http://www.epa.gov/oig/reports/2009/20090916-09-P-0235.pdf

Purpose of This Document

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

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

[5] 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 2013. The following provides a brief explanation of the 2013 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[6]. 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 18 – Feb 22	Mar 4 – Mar 15	Mar 11 – Mar 15	Mar 25 – Apr 5
2	June 3 – June 7	June 17 – June 28	May 20 – May 24	June 3 – June 14
3	Aug 5 – Aug 9	Aug 19 – Aug 30	July 29 – Aug 2	Aug 12 – Aug 23
4	Oct 28 – Nov 1	Nov 11 – Nov 22	Oct 21 – Oct 25	Nov 4 – Nov 16
Open House	December 3 – 5, 2013		November 19 – 21, 2013	

RAVL Open House – Based on the information gained from monitoring organization surveys, EPA contacted the producers by email to invite them to visit the RAVLs. The Region 2 open house was December 3 – 5, 2013; the Region 7 open house was November 19 – 21, 2013. Neither open house received any visitors for 2013.

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.

[6] http://www.epa.gov/ttn/amtic/aapgvp.html

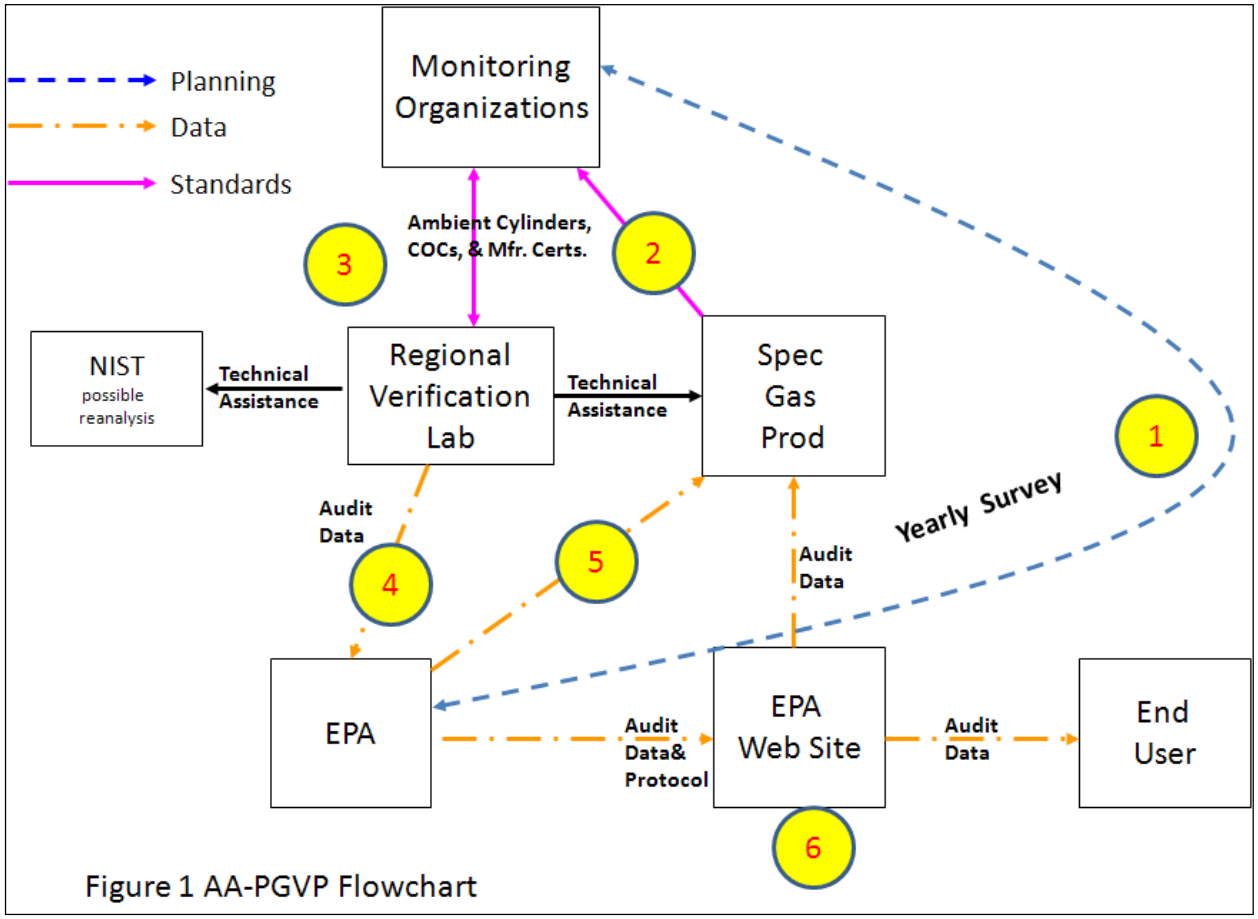


Figure 1 AA-PGVP Flowchart

1. EPA sends emails to the monitoring organization's points of contact to complete the AA-PGVG 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:

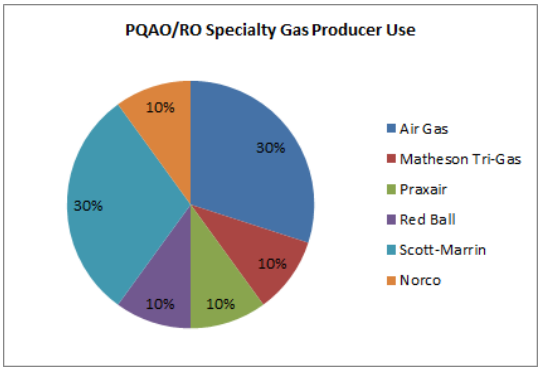
1) One gas standard from every specialty gas producer being used by the monitoring community
2) Three standards per specialty gas producer
3) Weight additional standards by producer market share in ambient air monitoring community

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. Unfortunately, due to the transition from RTI as the support contractor to Battelle as the support contractor for the program, in 2013, EPA received surveys from only 9 of a possible 120 monitoring organizations. This low response was the result of training Battelle on the program, and transitioning control of the website over to them. As a result, the majority of the cylinders submitted for verification in 2013 came from the gas producers.

Survey Results

Figure 2 identifies, as a percentage of the total responses, how often the monitoring organizations listed a particular specialty gas producer. As mentioned above, only 9 of the monitoring organizations responded, so this cannot be considered a complete survey.

Figure 2. Specialty Gas Producer Use



Six 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 9 respondents, 5 sent cylinders to EPA. Table 2 lists the cylinders verified in CY2013. Some of these cylinders contained multiple pollutants so, although 50 cylinders were sent to the RAVLs, 59 verifications were performed.

Table 2. Gas Standards Sent to RAVLS in CY 2013

Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Participant
3/7/2013	2	AirGas	Port Allen, LA	B42013	CC416649	Producer shipped
3/7/2013	2	AirGas	Chicago, IL	B12013	CC416986	Producer shipped
3/7/2013	2	AirGas	Los Angeles, CA	B32013	CC416990	Producer shipped
3/7/2013	2	Global	Palmetto, FL	N12013	EB0040482	Producer shipped
3/11/2013	2	AirGas	Los Angeles, CA	B32013	CC415624	Producer shipped
3/11/2013	2	AirGas	Chicago, IL	B12013	CC413619	Producer shipped
3/11/2013	2	AirGas	Port Allen, LA	B42013	CC413650	Producer shipped
3/11/2013	2	Global	Palmetto, FL	N12013	B0041656	Producer shipped
12/11/2013	2	AirGas	Durham, NC	B22013	CC439198	Producer shipped
12/11/2013	2	AirGas	Riverton, NJ	B52013	CC439200	Producer shipped
12/11/2013	2	AirGas	Royal Oak, MI	B62013	CC439199	Producer shipped
12/12/2013	2	American Gas Group	Toledo, OH	F42013	EB0013799	Producer shipped
12/12/2013	2	Coastal Specialty Gas	Beaumont, TX	O12013	EB0001845	Producer shipped
12/12/2013	2	Global	Sarasota, FL	N22013	EB0050758	Producer shipped
12/12/2013	2	Linde (Canada)	Whitby, Ontario	L12013	SX25675	Producer shipped
12/11/2013	2	Linde (USA)	Alpha, NJ	I12013	CC344533	Producer shipped
12/11/2013	2	Liquid Technology	Apopka, FL	E12013	EB0051066	Producer shipped
12/11/2013	2	Scott-Marrin	Riverside, CA	H12013	LL111557	Producer shipped
12/4/2013	2	AirGas	Durham, NC	B22013	CC436611	Producer shipped
12/4/2013	2	AirGas	Riverton, NJ	B52013	CC436980	Producer shipped
12/4/2013	2	AirGas	Royal Oak, MI	B62013	CC437026	Producer shipped
12/5/2013	2	Coastal	Beaumont, TX	O12013	EB0024801	Producer shipped
12/5/2013	2	Global	Sarasota, FL	N22013	EB0050567	Producer shipped
12/4/2013	2	Linde	Whitby, Ontario	L12013	SX25675	Producer shipped
12/4/2013	2	Linde	Alpha, NJ	I12013	CC344533	Producer shipped
12/4/2013	2	Liquid Technology	Apopka, FL	E12013	EB0051066	Producer shipped
12/5/2013	2	Praxair	Los Angeles, CA	F22013	CC117245	Producer shipped
12/5/2013	2	Praxair	Morrisville, PA	F32013	CC350341	Producer shipped
12/5/2013	2	Scott-Marrin	Riverside, CA	H12013	LL111557	Producer shipped
3/27/2013	7	AirGas	Chicago, IL	B12013	LL64568	KS Dept. of Health and Environment
3/28/2013	7	AirGas	Durham, NC	B22013	LL164801	KS Dept. of Health and Environment
6/4/2013	7	American Gas Group	Toledo, OH	F42013	EA0006976	Minnesota Pollution Control Agency
6/5/2013	7	AirGas	Chicago, IL	B12013	LL9925	Missouri DNR
6/6/2013	7	AirGas	Durham, NC	B22013	CC167742	EPC of Hillsborough County
3/6/2013	2	AirGas	Port Allen, LA	B42013	CC413646	Producer shipped
3/6/2013	2	AirGas	Chicago, IL	B12013	CC413625	Producer shipped
3/6/2013	2	AirGas	Los Angeles, CA	B32013	CC415918	Producer shipped
3/6/2013	2	Global	Palmetto, FL	N12013	EB0041641	Producer shipped
3/6/2013	2	Praxair	Bethlehem, PA	F12013	FF33109	NJ DEP
12/9/2013	2	AirGas	Durham, NC	B22013	CC436612	Producer shipped
12/9/2013	2	AirGas	Riverton, NJ	B52013	CC437205	Producer shipped
12/9/2013	2	AirGas	Royal Oak, MI	B62013	CC436613	Producer shipped
12/10/2013	2	Coastal	Beaumont, TX	O12013	EB0003581	Producer shipped
12/10/2013	2	Global	Sarasota, FL	N12013	EB0050578	Producer shipped
12/9/2013	2	Linde	Whitby, Ontario	L12013	SX25675	Producer shipped
12/9/2013	2	Linde	Alpha, NJ	I12013	CC344533	Producer shipped
12/9/2013	2	Liquid Technology	Apopka, FL	E12013	EB0051066	Producer shipped
12/10/2013	2	Praxair	Los Angeles, CA	F22013	CC327424	Producer shipped
12/10/2013	2	Praxair	Morrisville, PA	F32013	CC75895	Producer shipped
12/10/2013	2	Scott-Marrin	Riverside, CA	H12013	LL111557	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 surveys from 2010 through 2013. Since the Emissions Monitoring Protocol Gas Verification Program[7] and the AA-PGVP share the same producer listing and coding scheme, Table 3 identifies the producers on both lists. The producers shaded in green were identified on the AA-PGVP surveys. The facilities shaded in yellow were the facilities that the RAVLs received a cylinder for verification from monitoring organization while those shaded in blue were provided directly from producers. The facilities shaded in red were identified on the monitoring organization surveys, but a standard from that facility was not provided in the RAVLs in 2013. For 2013, of the six producers identified on the surveys, only Norco was not verified. In addition, EPA performed verifications on five producers that were not identified in the surveys as being used in 2013.

Table 3. Production Facilities Verified in 2013

Code	Producer	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5	Facility 6
A	Air Liquide	Plumsteadville, PA	Troy, MI	Laporte, TX	Longmont, CO	Santa Fe Springs, CA	
B	Air Gas	Chicago, IL	Durham NC	Los Angeles, CA	Port Allen, LA	Riverton NJ	Royal Oak MI
C	~~American Gas Group*~~	~~Toledo, OH~~					
D	Matheson Tri-Gas	Joliet, IL Only H_2S	~~Morrow, GA~~ closed	~~Pasadena, Texas~~ closed	**Twinsburg, Ohio**	~~**Waverly, TN**~~	New Johnsonville, TN
E	Liquid Technology	Apopka, FL					
F	Praxair	Bethlehem, PA	Los Angeles, CA	Morrisville, PA	Toledo, OH (AGG)		
G	Red Ball	Shreveport, LA.					
H	Scott-Marrin	Riverside, CA					
I	Linde	Alpha NJ					
J	Specialty Air Technologies	Long Beach, CA					
K	IWS Gas and Supply	Belle Chasse, LA					
L	Linde Canada Limited	Whitby, Ontario					
M	Applied Gas	Danbury Texas					
N	Global Calibration Gases LLC	Palmetto, FL	Sarasota, FL				
O	Coastal Specialty Gas	Beaumont, TX					
P	Norco	Boise, ID					
Q	ILMO specialty Gases	Jacksonville IL					
R	Tier 5 labs, LLC	Naperville, IL					

[7] 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 (±) 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 ± 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[8]. 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_2, and Table 6 provides the NO_x 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 ± 1%	2.3.7	Using flow primary standard
Calibrator Dilution Check	Quarterly -within 2 weeks of assay	± 1% RD	2.3.5.1	Second SRM. Three or more discrete measurements
Analyzer Calibration	Quarterly - within 2 weeks of assay	± 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 ≤ 1% and accuracy ± 5% RD	2.1.7.3 , 2.3.5.4	Drift accountability. 3 discrete measurements of zero and span
Precision Test [1]	Day of Verification	± 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	± 2 % RPD	NA	Sample run three average value used.
Standards Certification				
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

[1] The precision test does not need to accomplished if analyzer calibrated on same day as analysis

[8] http://www.epa.gov/ttn/amtic/aapgvp.html

Table 5. Ambient Air Protocol Gas Verification Program 2013 CO and SO2 Verifications

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

Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Pollutant	Assay Conc	Producer Conc	% Bias	95% Uncertainty (%)
Region 2 CO										
3/7/2013	2	AirGas	Port Allen, LA	B42013	CC416649	CO	4775.82	4770	0.12	0.16
3/7/2013	2	AirGas	Chicago, IL	B12013	CC416986	CO	4777.749	4754	0.5	0.16
3/7/2013	2	AirGas	Los Angeles, CA	B32013	CC416990	CO	4774.431	4769	0.11	0.16
3/7/2013	2	Global	Palmetto, FL	N12013	EB0040482	CO	2986.121	2977	0.31	0.16
8/21/2013	2	Scott-Marrin**	Riverside, CA	H12013	CA08660	CO	5053.51	5065	-0.23	0.43
8/21/2013	2	Scott-Marrin	Riverside, CA	H12013	LL101544	CO	7057.98	7090	-0.45	0.45
12/11/2013	2	AirGas	Durham, NC	B22013	CC439198	CO	5011.31	4997	0.29	0.34
12/11/2013	2	AirGas	Riverton, NJ	B52013	CC439200	CO	5001.70	4995	0.13	0.34
12/11/2013	2	AirGas	Royal Oak, MI	B62013	CC439199	CO	5005.40	4993	0.25	0.34
12/12/2013	2	American Gas Group	Toledo, OH	F42013	EB0013799	CO	2426.64	2433	-0.26	0.31
12/12/2013	2	Coastal Specialty Gas	Beaumont, TX	O12013	EB0001845	CO	2503.21	2500	0.13	0.31
12/12/2013	2	Global	Sarasota, FL	N22013	EB0050758	CO	2997.29	2955	1.43	0.3
12/12/2013	2	Linde (Canada)	Whitby, Ontario	L12013	SX25675	CO	4875.75	4812	1.32	0.3
12/11/2013	2	Linde (USA)	Alpha, NJ	I12013	CC344533	CO	5018.67	5018	0.01	0.34
12/11/2013	2	Liquid Technology	Apopka, FL	E12013	EB0051066	CO	4973.41	4973	0.01	0.34
12/11/2013	2	Scott-Marrin	Riverside, CA	H12013	LL111557	CO	7086.08	7120	-0.48	0.35
Region 2 SO2										
3/11/2013	2	AirGas	Los Angeles, CA	B32013	CC415624	SO2	41.79	41.89	-0.24	0.009
3/11/2013	2	AirGas	Chicago, IL	B12013	CC413619	SO2	41.82	41.66	0.39	0.09
3/11/2013	2	AirGas	Port Allen, LA	B42013	CC413650	SO2	41.85	41.91	-0.15	0.09
3/11/2013	2	Global	Palmetto, FL	N12013	B0041656	SO2	76.07	76.2	-0.17	0.08
8/26/2013	2	Scott-Marrin**	Riverside, CA	H12013	CC327237	SO2	49.82	50.32	-0.99	0.23
8/26/2013	2	Scott-Marrin	Riverside, CA	H12013	CLL101544	SO2	70.72	71.1	-0.53	0.24
12/4/2013	2	AirGas	Durham, NC	B22013	CC436611	SO2	497.17	501.8	-0.92	0.12
12/4/2013	2	AirGas	Riverton, NJ	B52013	CC436980	SO2	501.74	502.7	-0.19	0.11
12/4/2013	2	AirGas	Royal Oak, MI	B62013	CC437026	SO2	498.5	501.7	-0.64	0.12
12/5/2013	2	Coastal	Beaumont, TX	O12013	EB0024801	SO2	103.05	101.9	1.13	0.04
12/5/2013	2	Global	Sarasota, FL	N22013	EB0050567	SO2	73.29	75.2	-2.54	0.04
12/4/2013	2	Linde	Whitby, Ontario	L12013	SX25675	SO2	47.82	48.22	-0.83	0.12
12/4/2013	2	Linde	Alpha, NJ	I12013	CC344533	SO2	50.82	51.41	-1.14	0.11
12/4/2013	2	Liquid Technology	Apopka, FL	E12013	EB0051066	SO2	50.12	50.6	-0.94	0.12
12/5/2013	2	Praxair	Los Angeles, CA	F22013	CC117245	SO2	25.47	25.7	-0.89	0.05
12/5/2013	2	Praxair	Morrisville, PA	F32013	CC350341	SO2	25.15	25.5	-1.37	0.05
12/5/2013	2	Scott-Marrin	Riverside, CA	H12013	LL111557	SO2	72.1	72.1	0.01	0.04
Region 7 CO										
3/27/2013	7	AirGas	Chicago, IL	B12013	LL64568	CO	40.88	40.43	1.11	0.15
3/28/2013	7	AirGas	Durham, NC	B22013	LL164801	CO	5.02	4.983	0.72	0.29
3/28/2013	7	Praxair			CC2564	CO	4.03	4	0.77	0.33
6/4/2013	7	American Gas Group	Toledo, OH	F42013	EA0006976	CO	1517.00	1492	1.71	0.12
6/5/2013	7	AirGas	Chicago, IL	B12013	LL9925	CO	69.95	69.34	0.88	0.1
6/4/2013	7	Scott-Marrin**	Riverside, CA	H12013	CA08660	CO	5050.00	5065	-0.31	0.12
Region 7 SO2										
6/6/2013	7	Scott-Marrin**	Riverside, CA	H12013	CC327237	SO2	50.26	50.32	-0.11	0.32
6/6/2013	7	AirGas	Durham, NC	B22013	CC167742	SO2	40.16	39.92	0.6	0.35

** QC Sample

Table 6. Ambient Air Protocol Gas Verification Program 2013 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
3/6/2013	2	AirGas	Port Allen, LA	B42013	CC413646	NTRM	NOx	48.46	49.1	-1.31	0.31	48.84	49.12	-0.57	0.34
3/6/2013	2	AirGas	Chicago, IL	B12013	CC413625	NTRM	NOx	48.62	48.65	-0.07	0.31	48.93	48.68	0.52	0.34
3/6/2013	2	AirGas	Los Angeles, CA	B32013	CC415918	None ider	NOx	48.68	49.05	-0.76	0.31	49.18	49.13	0.09	0.34
3/6/2013	2	Global	Palmetto, FL	N12013	EB0041641	GMIS	NOx	74.24	74.8	-0.75	0.31	75.5	75.5	0	0.34
3/6/2013	2	Praxair	Bethlehem, PA	F12013	FF33109	GMIS	NOx	50.55	51.9	-2.60	0.31	50.91	51.9	-1.91	0.34
8/22/2013	2	Scott-Marrin**	Riverside, CA	H12013	CC327233	NTRM	NOx	49.27	49.7	-0.87	0.13	49.49	49.74	-0.49	0.1
8/22/2013	2	Scott-Marrin	Riverside, CA	H12013	LL101544	NTRM	NOx	69.58	69.6	-0.03	0.13	69.31	69.6	-0.42	0.1
12/9/2013	2	AirGas	Durham, NC	B22013	CC436612	GMIS	NOx	49.02	48.7	0.66	0.35	48.75	48.74	0.02	0.17
12/9/2013	2	AirGas	Riverton, NJ	B52013	CC437205	GMIS	NOx	49.39	48.8	1.22	0.35	49.21	48.75	0.94	0.17
12/9/2013	2	AirGas	Royal Oak, MI	B62013	CC436613	GMIS	NOx	49.51	49.26	0.51	0.34	49.2	49.2	-0.01	0.17
12/10/2013	2	Coastal	Beaumont, TX	O12013	EB0003581	GMIS	NOx	107.31	107.4	-0.08	0.1	107.28	107.7	-0.39	0.27
12/10/2013	2	Global	Sarasota, FL	N12013	EB0050578	GMIS	NOx	75.67	75.1	0.76	0.1	76.01	75.85	0.21	0.27
12/9/2013	2	Linde	Whitby, Ontario	L12013	SX25675	GMIS	NOx	50.34	49.55	1.59	0.34	49.86	49.55	0.63	0.16
12/9/2013	2	Linde	Alpha, NJ	I12013	CC344533	NTRM	NOx	51.53	50.5	2.05	0.34	50.87	50.5	0.72	0.16
12/9/2013	2	Liquid Technology	Apopka, FL	E12013	EB0051066	GMIS	NOx	51.84	50.4	2.87	0.34	51.18	50.4	1.55	0.16
12/10/2013	2	Praxair	Los Angeles, CA	F22013	CC327424	GMIS	NOx	25.98	25.7	1.09	0.1	25.97	25.8	0.67	0.28
12/10/2013	2	Praxair	Morrisville, PA	F32013	CC75895	GMIS	NOx	82.73	83.8	-1.27	0.11	82.83	84.3	-1.75	0.28
12/10/2013	2	Scott-Marrin	Riverside, CA	H12013	LL111557	GMIS	NOx	73.98	73.2	1.06	0.1	73.92	73.2	0.98	0.28

Region 7 NOx

Region 7 did not have any NOx verifications during 2013.

Table 7. Relative Percent Difference of QC Cylinder

Pollutant	R2	R7	RPD (%)
CO	5053.51	5050	0.069
SO2	49.82	50.26	-0.879

Scott-Marrin cylinders CA08860 (CO) and CC327237 (SO_2) – both identified with the double-asterisk (**) – were the internal QC cylinders verified by both laboratories. Region 7 did not perform any NO/NOx verifications for AA-PGVP in 2013. Although shown here, the QC cylinders were not part of the totals given in Table 2. The internal QC results for CO and SO_2 showed very good agreement, and all were well within the 2% RPD measurement quality objective. As important as the agreement of the QC sample to the certified concentration, equally important is the comparability of the concentrations of the two RAVLs. Table 7 provides the relative percent differences (d_i) of the paired QA sample concentrations, and is defined as:

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

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

Selecting which lab was X_i and Y_i was arbitrary.

Out of the 59 verification results, only three were greater than the ±2% Acid Rain Program criteria and no value was greater than AA-PGVP 4-5% criteria.

Summary and Conclusions

In general, the AA-PGVP 2013 verifications were successful. The quality system, standard operating procedures, analytical equipment and standards maintained the data quality of the program. Results show that of the 59 verifications, 59 (100%) were within the ± 4-5% AA-PGVP criteria, and 56 (95%) were within the ± 2% Acid Rain Program criteria.

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

Survey Improvement – As mentioned earlier in the report, support contractor transition significantly impacted survey completness in 2013. Now that the transition is completed, EPA hopes to acheive 100% completeness on surveys in 2014. Repeated reminder email messages on a two-week basis will be started once again and, if necessary, phone calls may be required 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 of cylinders to the RAVL, in 2014 will offer monitoring organizations struggling with shipping costs a way to use EPA as a third-party payer. This option will hopefully encourage greater participation from the various organizations.

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. Up until now, the RAVLS performed one check each. Due to the interruption in 2013, the Regions were not able to conduct the check in two quarters as previously planned. Also, Region 7 is experiencing a manpower issue, and may not be available for every quarter in 2014. Efforts will be made to ensure their continued contribution to the program in the future.

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Appendix A

Ambient Air Protocol Gas Verification Program
QA Reports from Measurement Data Worksheets for 2013

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 2013.

Region 2: Quarters 1 – 4, pages 15 – 24
Region 7: Quarters 1 – 4, pages 25 – 29

All quality control checks passed during verifications.

Region 2 QA Data

CO QA Requirements Summary, Region 2 - 1st Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	2100	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	22-May-13	Standard OK
	Low Flow Standard Expiration Date	22-May-13	Standard OK
	Flow Standard Base Unit Expiration Date	22-May-13	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	4-Mar-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999973	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	5-Mar-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.36%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.37%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.38%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.40%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.46%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9992	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	5-Mar-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.099%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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

CO QA Requirements Summary, Region 2 - 1st Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	2100	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	22-May-13	Standard OK
	Low Flow Standard Expiration Date	22-May-13	Standard OK
	Flow Standard Base Unit Expiration Date	22-May-13	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	4-Mar-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999973	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	7-Mar-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.15%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.15%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.17%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.17%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9994	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	5-Mar-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.146%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.12%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.50%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.11%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	0.31%	Challenge Std. #4 vendor certificate bias < 2%

SO2 QA Requirements Summary, Region 2 - 1st Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	11-Dec-15	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	1350	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	22-May-13	Standard OK
	Low Flow Standard Expiration Date	22-May-13	Standard OK
	Flow Standard Base Unit Expiration Date	22-May-13	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	4-Mar-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999973	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	11-Mar-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.08%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.08%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.09%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.11%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.14%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9991	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	5-Mar-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.099%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay.
	Challenge Standard #1 vendor certificate bias	-0.24%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay.
	Challenge Standard #2 vendor certificate bias	0.39%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay.
	Challenge Standard #3 vendor certificate bias	-0.15%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay.
	Challenge Standard #4 vendor certificate bias	-0.17%	Challenge Std. #4 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 2 - 1st Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	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	1375	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	22-May-13	Standard OK
	Low Flow Standard Expiration Date	22-May-13	Standard OK
	Flow Standard Base Unit Expiration Date	22-May-13	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	4-Mar-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999973	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999965	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	6-Mar-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.30%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.31%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.34%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.40%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.51%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9959	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	6-Mar-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.33%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.34%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.37%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.44%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.56%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9945	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	5-Mar-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.099%	Dilution Check RSD is OK
Day of Assay Zero/Span Check NO Portion	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
Day of Assay Zero/Span Check NOx Portion	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
Challenge Standard #1 NO Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-1.31%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #1 NOx Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.57%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 NO Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.07%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #2 NOx Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.52%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 NO Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-0.76%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #3 NOx Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.09%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 NO Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	-2.60%	Challenge Std. #4 vendor certificate bias between 2-4%
Challenge Standard #4 NOx Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	-1.91%	Challenge Std. #4 vendor certificate bias < 2%
Challenge Standard #5 NO Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	-0.75%	Challenge Std. #5 vendor certificate bias < 2%
Challenge Standard #5 NOx Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	0.00%	Challenge Std. #5 vendor certificate bias < 2%

CO QA Requirements Summary, Region 2 - 3rd Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	2100	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	19-Aug-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999985	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999987	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	20-Aug-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.29%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.27%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.29%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.30%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.31%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0029	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	20-Aug-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.390%	Dilution Check RSD is OK

CO QA Requirements Summary, Region 2 - 3rd Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1300	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1900	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	19-Aug-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999985	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999987	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	21-Aug-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.41%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.42%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.44%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.46%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.48%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9997	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	20-Aug-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.179%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	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%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.45%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

SO2 QA Requirements Summary, Region 2 - 3rd Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	11-Dec-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1180	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	1350	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	19-Aug-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999985	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999987	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	26-Aug-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.23%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.23%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.25%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.30%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.38%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0072	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	20-Aug-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.390%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay.
	Challenge Standard #1 vendor certificate bias	-0.99%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay.
	Challenge Standard #2 vendor certificate bias	-0.53%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay.
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay.
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 standard error is okay.
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

NOx QA Requirements Summary, Region 2 - 3rd Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	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	1375	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	19-Aug-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999985	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999987	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	22-Aug-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.12%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.13%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.14%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.21%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9899	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	22-Aug-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.09%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.10%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.10%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.12%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.16%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9878	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	20-Aug-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.179%	Dilution Check RSD is OK
Day of Assay Zero/Span Check NO Portion	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
Day of Assay Zero/Span Check NOx Portion	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
Challenge Standard #1 NO Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.87%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #1 NOx Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.49%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 NO Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.03%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #2 NOx Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.42%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 NO Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #3 NOx Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #4 NO Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #4 NOx Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #5 NO Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #5 NOx Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

CO QA Requirements Summary, Region 2 - 4th Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1100	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	2100	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	2-Dec-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999983	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999994	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	11-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.33%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.34%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.37%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.40%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.58%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0097	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Dec-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.516%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.48%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	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%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.29%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	0.13%	Challenge Std. #4 vendor certificate bias < 2%
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	0.01%	Challenge Std. #5 vendor certificate bias < 2%
Challenge Standard #6 Assay	Challenge Standard #5 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	0.01%	Challenge Std. #6 vendor certificate bias < 2%

CO QA Requirements Summary, Region 2 - 4th Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	18-Jan-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	2100	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	2-Dec-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999983	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999994	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	12-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.29%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.30%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.32%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.35%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.50%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0090	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Dec-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.624%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.32%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	1.43%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.13%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The Standard Error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	-0.26%	Challenge Std. #4 vendor certificate bias < 2%

SO2 QA Requirements Summary, Region 2 - 4th Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	11-Dec-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1180	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	1350	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	12-Jun-14	Standard OK
	Low Flow Standard Expiration Date	12-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	12-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	2-Dec-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999983	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999994	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	4-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.11%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.12%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.13%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.15%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.19%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0011	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Dec-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.430%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay.
	Challenge Standard #1 vendor certificate bias	-0.64%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay.
	Challenge Standard #2 vendor certificate bias	-0.92%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay.
	Challenge Standard #3 vendor certificate bias	-0.19%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay.
	Challenge Standard #4 vendor certificate bias	-1.14%	Challenge Std. #4 vendor certificate bias < 2%
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 standard error is okay.
	Challenge Standard #5 vendor certificate bias	-0.83%	Challenge Std. #5 vendor certificate bias < 2%
Challenge Standard #6 Assay	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 standard error is okay.
	Challenge Standard #6 vendor certificate bias	-0.94%	Challenge Std. #6 vendor certificate bias < 2%

SO2 QA Requirements Summary, Region 2 - 4th Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	11-Dec-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1180	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	1350	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	12-Jun-14	Standard OK
	Low Flow Standard Expiration Date	12-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	12-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	2-Dec-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999983	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999994	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	5-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.04%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.04%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.05%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.06%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.07%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9985	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Dec-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.430%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 standard error is okay.
	Challenge Standard #1 vendor certificate bias	0.01%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 standard error is okay.
	Challenge Standard #2 vendor certificate bias	-2.54%	Challenge Std. #2 vendor certificate bias between 2-4%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 standard error is okay.
	Challenge Standard #3 vendor certificate bias	1.13%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 standard error is okay.
	Challenge Standard #4 vendor certificate bias	-0.89%	Challenge Std. #4 vendor certificate bias < 2%
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 standard error is okay.
	Challenge Standard #5 vendor certificate bias	-1.37%	Challenge Std. #5 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 2 - 4th Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1880	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	2-Dec-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999983	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999994	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	9-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.33%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.35%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.38%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.44%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.57%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9995	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	9-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.17%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.18%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.21%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.27%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9969	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Dec-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.430%	Dilution Check RSD is OK
Day of Assay Zero/Span Check NO Portion	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
Day of Assay Zero/Span Check NOx Portion	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
Challenge Standard #1 NO Assay	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%
Challenge Standard #1 NOx Assay	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%
Challenge Standard #2 NO Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.66%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #2 NOx Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.02%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 NO Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	1.22%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #3 NOx Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	0.94%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 NO Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	2.05%	Challenge Std. #4 vendor certificate bias between 2-4%
Challenge Standard #4 NOx Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	0.72%	Challenge Std. #4 vendor certificate bias < 2%
Challenge Standard #5 NO Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	1.59%	Challenge Std. #5 vendor certificate bias < 2%
Challenge Standard #5 NOx Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	0.63%	Challenge Std. #5 vendor certificate bias < 2%
Challenge Standard #6 NO Assay	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	2.87%	Challenge Std. #5 vendor certificate bias between 2-4%
Challenge Standard #6 NOx Assay	Challenge Standard #6 Std. Error < 1%	The standard error is okay.	Challenge Standard #6 Std. Error is OK
	Challenge Standard #6 vendor certificate bias	1.55%	Challenge Std. #5 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 2 - 4th Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1880	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	1-Jun-14	Standard OK
	Low Flow Standard Expiration Date	1-Jun-14	Standard OK
	Flow Standard Base Unit Expiration Date	1-Jun-14	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	2-Dec-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999983	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999994	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	10-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.10%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.10%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.11%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.13%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.17%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9994	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	10-Dec-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.27%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.28%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.30%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.36%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.46%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9997	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Dec-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.430%	Dilution Check RSD is OK
Day of Assay Zero/Span Check NO Portion	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
Day of Assay Zero/Span Check NOx Portion	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
Challenge Standard #1 NO Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.06%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #1 NOx Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.98%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 NO Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.76%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #2 NOx Assay	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%
Challenge Standard #3 NO Assay	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%
Challenge Standard #3 NOx Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	-0.39%	Challenge Std. #3 vendor certificate bias < 2%
Challenge Standard #4 NO Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	1.09%	Challenge Std. #4 vendor certificate bias < 2%
Challenge Standard #4 NOx Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	0.67%	Challenge Std. #4 vendor certificate bias < 2%
Challenge Standard #5 NO Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	-1.27%	Challenge Std. #5 vendor certificate bias < 2%
Challenge Standard #5 NOx Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	-1.75%	Challenge Std. #5 vendor certificate bias < 2%

Region 7 QA Data

CO QA Requirements Summary, Region 7 - 1st Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	1-Jun-17	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	600	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	1800	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	18-Jan-14	Standard OK
	Low Flow Standard Expiration Date	21-Jan-14	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	26-Mar-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999956	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999121	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	26-Mar-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.20%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.21%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.22%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.23%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.24%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9981	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	26-Mar-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.068%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.11%	Challenge Std. #1 vendor certificate bias < 2%

CO QA Requirements Summary, Region 7 - 1st Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	20-Feb-17	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	2100	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	9-Nov-15	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1800	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	18-Jan-14	Standard OK
	Low Flow Standard Expiration Date	21-Jan-14	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	26-Mar-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999956	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999121	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	27-Mar-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.39%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.40%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.42%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.44%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.47%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9975	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	26-Mar-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.068%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.72%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.77%	Challenge Std. #2 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 7 - 1st Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	1150	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1750	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	18-Jan-14	Standard OK
	Low Flow Standard Expiration Date	21-Jan-14	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	26-Mar-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999956	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999121	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	1-Apr-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.15%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.15%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.17%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.18%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0012	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	1-Apr-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.17%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.19%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0006	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	26-Mar-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.068%	Dilution Check RSD is OK
Day of Assay Zero/Span Check NO Portion	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
Day of Assay Zero/Span Check NOx Portion	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
Challenge Standard #1 NO Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.28%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #1 NOx Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	-0.67%	Challenge Std. #1 vendor certificate bias < 2%

CO QA Requirements Summary, Region 7 - 2nd Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	9-Nov-15	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-17	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	500	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	18-Jan-14	Standard OK
	Low Flow Standard Expiration Date	21-Jan-14	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	3-Jun-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999959	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999747	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	3-Jun-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.16%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.17%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.18%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.19%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9990	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Jun-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.184%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	1.71%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.31%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

CO QA Requirements Summary, Region 7 - 2nd Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	9-Nov-15	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	500	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-17	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1750	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	18-Jan-14	Standard OK
	Low Flow Standard Expiration Date	21-Jan-14	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	3-Jun-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999959	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999747	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	4-Jun-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.12%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.12%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.13%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.14%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.15%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0006	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Jun-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.184%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.88%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

SO2 QA Requirements Summary, Region 7 - 2nd Quarter of 2013

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	1-Jun-16	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	900	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	11-Dec-15	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1625	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	18-Jan-14	Standard OK
	Low Flow Standard Expiration Date	21-Jan-14	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	3-Jun-13	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999959	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999747	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	5-Jun-13	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.46%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.47%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.49%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.52%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.57%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0025	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	3-Jun-13	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.184%	Dilution Check RSD is OK
Day of Assay Zero/Span Check	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
Challenge Standard #1 Assay	Challenge Standard #1 Std. Error < 1%	The standard error is okay.	Challenge Standard #1 Std. Error is OK
	Challenge Standard #1 vendor certificate bias	0.60%	Challenge Std. #1 vendor certificate bias < 2%
Challenge Standard #2 Assay	Challenge Standard #2 Std. Error < 1%	The standard error is okay.	Challenge Standard #2 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	-0.11%	Challenge Std. #2 vendor certificate bias < 2%
Challenge Standard #3 Assay	Challenge Standard #3 Std. Error < 1%	The standard error is okay.	Challenge Standard #3 Std. Error is OK
	Challenge Standard #3 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #4 Assay	Challenge Standard #4 Std. Error < 1%	The standard error is okay.	Challenge Standard #4 Std. Error is OK
	Challenge Standard #4 vendor certificate bias	#VALUE!	#VALUE!
Challenge Standard #5 Assay	Challenge Standard #5 Std. Error < 1%	The standard error is okay.	Challenge Standard #5 Std. Error is OK
	Challenge Standard #5 vendor certificate bias	#VALUE!	#VALUE!

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