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

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U. S. EPA Ambient Air Protocol Gas Verification Program
Annual Report for Calendar Year 2014

U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
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AA-PGVP 2014 Report 5/2015

Table of Contents

Acknowledgements	v
Acronyms and Abbreviations	vi
1.0 Introduction	1
2.0 Implementation Summary	4
3.0 Survey and Verification Results	6

Tables

1	RAVL Verification Dates	5
2	Gas Standards sent to RAVLs in CY2014	7
3	Production Facilities Verified in 2014	8
4	Measurement Quality Objectives for the AA-PGVP	9
5	Ambient Air Protocol Gas Verification Program 2014 CO/SO_2 Verifications	10
6	Ambient Air Protocol Gas Verification Program 2014 NO_x Verifications	11
7	Relative Percent Difference of QC Cylinder	11

Figures

1	AA-PGVP Flow Chart	5
2	Specialty Gas Producer Use	6

Appendices

A	QA Reports from Measurement Data Worksheets for 2014	14

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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 2014. The following provides a brief explanation of the 2014 implementation process.

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

AA-PGVP Verification Dates – OAQPS worked with the Region 2 and 7 Regional Analytical Verification Laboratories (RAVLs) to establish verification dates as indicated in Table 1. The dates were posted on the AMTIC website[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	No later than Feb 28	Mar 3 – Mar 14	Feb 10 – Feb 14	Feb 24 – Mar 7
2	No later than June 6	June 9 – June 20	No later than June 6	June 16 – June 27
3	No later than Aug 22	Aug 25 – Sept 5	No later than Aug 8	Aug 18 – Aug 29
4	No later than Nov 30	Dec 1 – Dec 12	No later than Oct 24	Nov 3 – Nov 14
Open House	December 16, 2014		December 2 – 4, 2014	

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 16, 2014; the Region 7 open house was December 2 – 4, 2014. Neither open house received any visitors for 2014.

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

Flow of the AA-PGVP

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

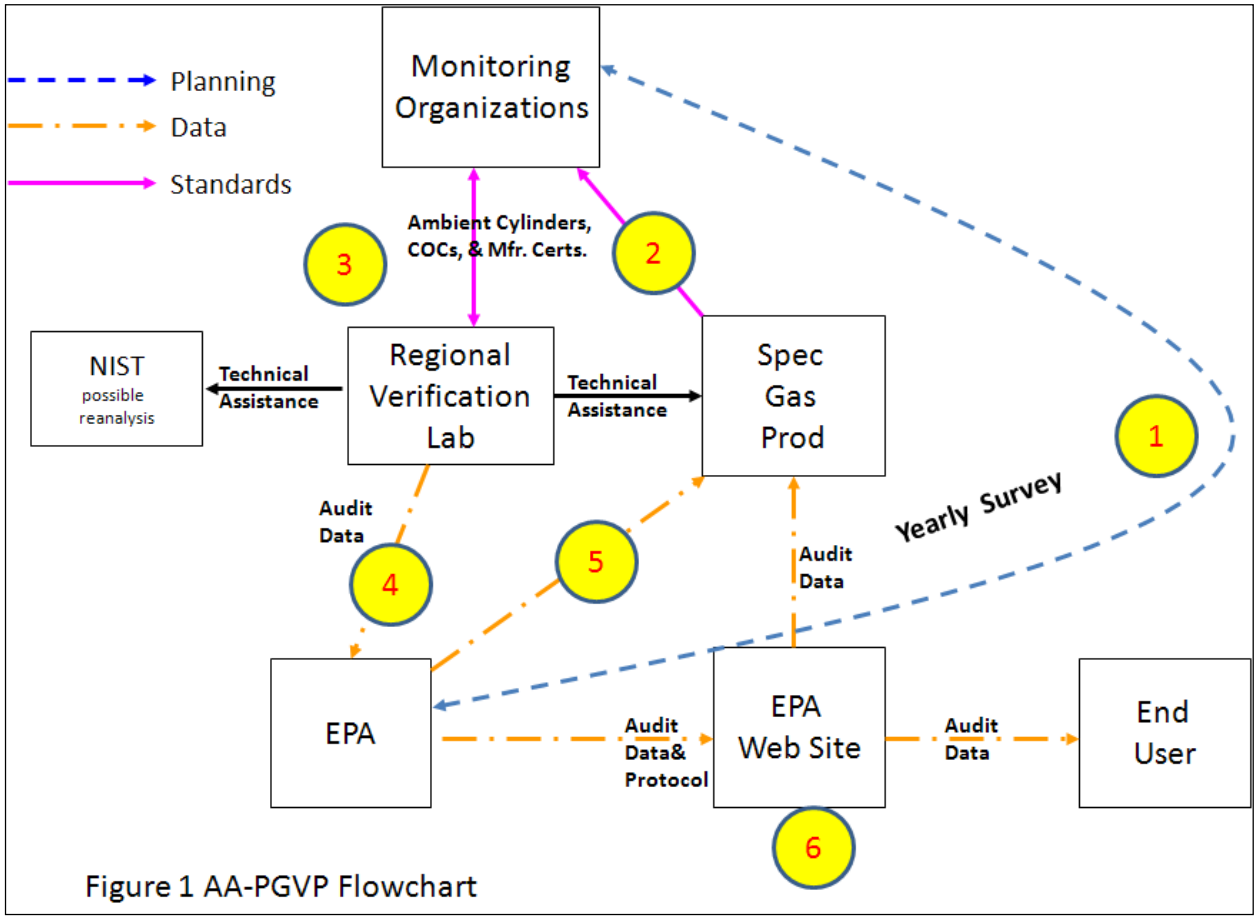


Figure 1 AA-PGVP Flowchart

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:

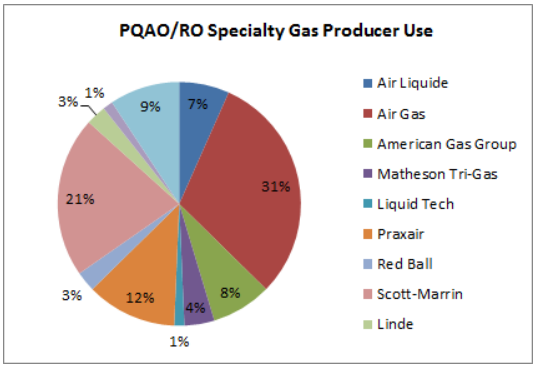
1) One gas standard from every specialty gas producer being used by the monitoring community
2) Three standards per specialty gas producer
3) Weight additional standards by producer market share in ambient air monitoring community

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. Participation in 2014 was much better than in 2013 – EPA received surveys from 60 out of a possible 120 monitoring organizations. Although 60 organizations participated in the web-based survey, only 5 submitted cylinders for verification in 2014. As a result, similar to 2013, the majority of the cylinders submitted for verification in 2014 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, 60 of the monitoring organizations responded, so this cannot be considered a complete survey.

Figure 2. Specialty Gas Producer Use



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

Participation in the AA-PGVP is voluntary. The survey asked whether a monitoring organization was receiving new gas standards during the year and, also, whether they would like to participate by sending a cylinder to one of the RAVLs. Of the 60 respondents, 5 sent cylinders to EPA. Table 2 lists the cylinders verified in CY2014. Some of

these cylinders contained multiple pollutants so, although 46 cylinders were sent to the RAVLs, 52 verifications were performed.

Table 2. Gas Standards Sent to RAVLS in CY 2014

Date	Lab	Producer	Facility	Facility Code	Cylinder ID	Participant
3/18/2014	2	AirGas	Port Allen, LA	B42014	CC423125	Producer shipped
3/18/2014	2	AirGas	Chicago, IL	B12014	CC423564	Producer shipped
3/18/2014	2	AirGas	Los Angeles, CA	B32014	CC330789	Producer shipped
6/23/2014	2	American Gas Group	Toledo, OH	F42014	CC16087	Producer shipped
6/23/2014	2	CARB			CA03690	CARB
6/23/2014	2	Linde (Canada)	Whitby, Ontario	L12014	CC137714	Producer shipped
6/23/2014	2	Linde (USA)	Alpha, NJ	I12014	CC130999	Producer shipped
6/23/2014	2	Praxair	Los Angeles, CA	F22014	CC404837	Producer shipped
9/9/2014	2	Scott-Marrin	Riverside, CA	H12014	JB03517	Southern Ute Tribe
12/16/2014	2	AirGas	Durham, NC	B22014	CC216379	Producer shipped
12/16/2014	2	AirGas	Riverton, NJ	B42014	CC287764	Producer shipped
12/16/2014	2	AirGas	Royal Oak, MI	B62014	SG9114756BA	Producer shipped
12/16/2014	2	Global	Sarasota, FL	N22014	EB0028036	Producer shipped
12/16/2014	2	Liquid Technology	Apopka, FL	E12014	EB0026158	Producer shipped
12/16/2014	2	Praxair	Morrisville, PA	F32014	FF37014	NJ DEP
3/12/2014	2	AirGas	Los Angeles, CA	B32014	CC219870	Producer shipped
3/12/2014	2	AirGas	Chicago, IL	B12014	CC255986	Producer shipped
3/12/2014	2	AirGas	Port Allen, LA	B42014	CC209017	Producer shipped
7/1/2014	2	CARB			CA01201	CARB
7/1/2014	2	Linde (Canada)	Whitby, Ontario	L12014	CC137714	Producer shipped
7/1/2014	2	Linde (USA)	Alpha, NJ	I12014	CC130999	Producer shipped
7/1/2014	2	Praxair	Los Angeles, CA	F22014	CC244424	Producer shipped
12/11/2014	2	Global	Sarasota, FL	N22014	EB0057732	Producer shipped
2/25/2014	7	ILMO	Jacksonville, IL	Q12014	CC40635	Producer shipped
3/5/2014	7	AirGas	Chicago, IL	B12014	CC239882	Missouri DNR
3/5/2014	7	Scott-Marrin	Riverside, CA	H12014	CB10472	EPA Region 7
3/5/2014	7	Scott-Marrin	Riverside, CA	H12014	CB10600	EPA Region 7
8/19/2014	7	ILMO	Jacksonville, IL	Q12014	CC192037	Producer shipped
2/27/2014	7	ILMO	Jacksonville, IL	Q12014	CC198518	Producer shipped
8/20/2014	7	ILMO	Jacksonville, IL	Q12014	SX36394	Producer shipped
3/13/2014	2	AirGas	Port Allen, LA	B42014	CC1388	Producer shipped
3/13/2014	2	AirGas	Chicago, IL	B12014	CC269049	Producer shipped
3/13/2014	2	AirGas	Los Angeles, CA	B32014	CC331791	Producer shipped
6/19/2014	2	CARB			CC89594	Producer shipped
6/19/2014	2	Linde (Canada)	Whitby, Ontario	L12014	CC173714	Producer shipped
6/19/2014	2	Linde (USA)	Alpha, NJ	I12014	CC130999	Producer shipped
6/19/2014	2	Praxair	Los Angeles, CA	F22014	CC324476	Producer shipped
6/19/2014	2	Praxair	Morrisville, PA	F32014	SA13689	Producer shipped
9/11/2014	2	Scott-Marrin	Riverside, CA	H12014	JB03517	Producer shipped
12/15/2014	2	AirGas	Riverton, NJ	B52014	CC454625	Producer shipped
12/15/2014	2	AirGas	Royal Oak, MI	B62014	CC454016	Producer shipped
12/15/2014	2	Global	Sarasota, FL	N22014	EB0057743	Producer shipped
12/15/2014	2	Liquid Technology	Apopka, FL	E12014	EB0026158	Producer shipped
12/15/2014	2	Praxair	Morrisville, PA	F32014	FF33227	NJ DEP
2/28/2014	7	ILMO	Jacksonville, IL	Q12014	CC48435	Producer shipped
8/21/2014	7	ILMO	Jacksonville, IL	Q12014	XC0155958	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 2014. 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 2014. For 2014, of the nine producers identified on the surveys, Red Ball and Air Liquide were not verified. In addition, EPA performed verifications on two producers that were not identified in the surveys as being used in 2014.

Table 3. Production Facilities Verified in 2014

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 2014 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										
3/18/2014	2	AirGas	Port Allen, LA	B42014	CC423125	CO	5042.121	5017	0.5	0.19
3/18/2014	2	AirGas	Chicago, IL	B12014	CC423564	CO	5038.44	5017	0.43	0.19
3/18/2014	2	AirGas	Los Angeles, CA	B32014	CC330789	CO	5043.041	5007	0.72	0.19
6/23/2014	2	American Gas Group	Toledo, OH	F42014	CC16087	CO	2521.287	2544	-0.89	0.34
6/23/2014	2	CARB			CA03690	CO	44.87	45.23	-0.81	0.33
6/23/2014	2	Linde (Canada)	Whitby, Ontario	L12014	CC137714	CO	4981.77	4981	0.02	0.33
6/23/2014	2	Linde (USA)	Alpha, NJ	I12014	CC130999	CO	4979.38	4998	-0.37	0.33
6/23/2014	2	Praxair	Los Angeles, CA	F22014	CC404837	CO	2448.65	2460	-0.46	0.34
9/9/2014	2	Scott-Marrin	Riverside, CA	H12014	CA08660	CO	5050.74	5050	0.01	0.6
9/9/2014	2	Scott-Marrin	Riverside, CA	H12014	JB03517	CO	2987.70	2985	0.09	0.6
12/16/2014	2	AirGas	Durham, NC	B22014	CC216379	CO	4851.63	4850	0.03	0.36
12/16/2014	2	AirGas	Riverton, NJ	B42014	CC287764	CO	4844.03	4859	-0.31	0.36
12/16/2014	2	AirGas	Royal Oak, MI	B62014	SG9114756BAL	CO	4847.31	4857	-0.2	0.36
12/16/2014	2	Global	Sarasota, FL	N22014	EB0028036	CO	2981.24	2993	-0.39	0.38
12/16/2014	2	Liquid Technology	Apopka, FL	E12014	EB0026158	CO	4919.39	4935	-0.32	0.35
12/16/2014	2	Praxair	Morrisville, PA	F32014	FF37014	CO	44.14	45.3	-2.56	0.35
Region 2 SO2										
3/12/2014	2	AirGas	Los Angeles, CA	B32014	CC219870	SO2	48.57	48.9	-0.67	0.27
3/12/2014	2	AirGas	Chicago, IL	B12014	CC255986	SO2	48.67	49.13	-0.94	0.27
3/12/2014	2	AirGas	Port Allen, LA	B42014	CC209017	SO2	48.62	48.9	-0.57	0.27
7/1/2014	2	CARB			CA01201	SO2	101.06	102.8	-1.69	0.06
7/1/2014	2	Linde (Canada)	Whitby, Ontario	L12014	CC137714	SO2	48.61	49.89	-2.56	0.06
7/1/2014	2	Linde (USA)	Alpha, NJ	I12014	CC130999	SO2	49.75	50.7	-1.87	0.06
7/1/2014	2	Praxair	Los Angeles, CA	F22014	CC244424	SO2	47.93	48.4	-0.97	0.06
9/10/2014	2	Scott-Marrin**	Riverside, CA	H12014	CC327237	SO2	49.92	50.26	-0.68	0.68
12/11/2014	2	Global	Sarasota, FL	N22014	EB0057732	SO2	50.41	50.3	0.22	0.2
Region 7 CO										
2/25/2014	7	ILMO	Jacksonville, IL	Q12014	CC40635	CO	3497.00	3490	0.19	0.17
3/5/2014	7	AirGas	Chicago, IL	B12014	CC239882	CO	249.00	249.3	-0.12	0.5
3/5/2014	7	Scott-Marrin	Riverside, CA	H12014	CB10472	CO	461.00	456	1.09	0.48
3/5/2014	7	Scott-Marrin	Riverside, CA	H12014	CB10600	CO	4.08	4.06	0.54	0.5
8/19/2014	7	ILMO	Jacksonville, IL	Q12014	CC192037	CO	4055.00	4046	0.22	0.08
8/19/2014	7	Scott-Marrin**	Riverside, CA	H12014	CA08660	CO	5060.00	5050	0.2	0.08
Region 7 SO2										
2/27/2014	7	ILMO	Jacksonville, IL	Q12014	CC198518	SO2	72.18	72.5	-0.44	0.24
8/20/2014	7	Scott-Marrin**	Riverside, CA	H12014	CC327237	SO2	50.14	50.26	-0.23	0.39
8/20/2014	7	ILMO	Jacksonville, IL	Q12014	SX36394	SO2	76.18	76.3	-0.16	0.38

** QC Cylinder

Table 6. Ambient Air Protocol Gas Verification Program 2014 NOx Verifications

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

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
Region 2 NOx															
3/13/2014	2	AirGas	Port Allen, LA	B42014	CC1388	NTRM	NOx	48.74	49.12	-0.77	0.35	49.17	49.4	-0.46	0.18
3/13/2014	2	AirGas	Chicago, IL	B12014	CC269049	NTRM	NOx	48.58	48.4	0.37	0.35	48.89	48.53	0.73	0.18
3/13/2014	2	AirGas	Los Angeles, CA	B32014	CC331791	NTRM	NOx	49.18	49.23	-0.09	0.35	49.65	49.68	-0.09	0.35
6/19/2014	2	CARB			CC89594	N/A	NOx	99.04	97.73	1.34	0.26	98.98	97.73	1.28	0.21
6/19/2014	2	Linde (Canada)	Whitby, Ontario	L12014	CC173714	GMIS	NOx	50.18	49.64	1.08	0.26	49.8	49.64	0.33	0.21
6/19/2014	2	Linde (USA)	Alpha, NJ	I12014	CC130999	NTRM	NOx	51.47	50.68	1.57	0.26	51.15	50.73	0.83	0.21
6/19/2014	2	Praxair	Los Angeles, CA	F22014	CC324476	GMIS	NOx	48.41	48.2	0.43	0.27	48.14	48.6	-0.95	0.21
6/19/2014	2	Praxair	Morrisville, PA	F32014	SA13689	GMIS	NOx	83.34	83.54	-0.24	0.27	83.16	83.6	-0.52	0.21
9/11/2014	2	Scott-Marrin**	Riverside, CA	H12014	CC327233	GMIS	NOx	49.76	49.7	0.12	0.2	49.96	49.74	0.43	0.2
9/11/2014	2	Scott-Marrin	Riverside, CA	H12014	JB03517	GMIS	NOx	30.85	31.1	-0.81	0.2	30.99	31.1	-0.35	0.2
12/15/2014	2	AirGas	Riverton, NJ	B52014	CC454625	NTRM	NOx	50.44	50.51	-0.15	0.27	50.52	50.54	-0.04	0.13
12/15/2014	2	AirGas	Royal Oak, MI	B62014	CC454016	NTRM	NOx	50.45	50.58	-0.25	0.27	50.44	50.64	-0.39	0.13
12/15/2014	2	Global	Sarasota, FL	N22014	EB0057743	GMIS	NOx	50.37	50.21	0.31	0.27	50.44	50.59	-0.29	0.13
12/15/2014	2	Liquid Technology	Apopka, FL	E12014	EB0026158	SRM	NOx	51.22	52.3	-2.06	0.26	51.25	52.4	-2.2	0.12
12/15/2014	2	Praxair	Morrisville, PA	F32014	FF33227	Unknown	NOx	50.48	49.8	1.36	0.27	50.92	49.8	2.26	0.12
Region 7 NOx															
2/28/2014	7	ILMO	Jacksonville, IL	Q12014	CC48435	SRM	NOx	72.53	72	0.74	0.08	74.83	74	1.12	0.15
8/21/2014	7	ILMO	Jacksonville, IL	Q12014	XC0155958	SRM	NOx	73.37	73.3	0.09	0.29	73.71	73.4	0.43	0.32
8/21/2014	7	Scott-Marrin**	Riverside, CA	H12014	CC327233		NOx	49.77	49.7	0.13	0.29	49.83	49.74	0.18	0.32

**QC Cylinder

Table 7. Relative Percent Difference of QC Cylinder

Pollutant	R2	R7	RPD (%)
CO	5050.74	5060	-0.183
SO2	49.42	50.14	-1.446
NO	49.76	49.77	-0.020
NOx	49.96	49.83	0.261

Scott-Marrin cylinders CA08860 (CO), CC327237 (SO_2), and CC327233 (NO_x) – identified with the double-asterisk (**) – were the internal QC cylinders verified by both laboratories. Although shown here, the QC cylinders were not part of the totals given in Table 2. The internal QC results for QC cylinders showed very good agreement, and all were within the 2% RPD measurement quality objective. As important as the agreement of the QC sample to the certified concentration, equally important is the comparability of the concentrations of the two RAVLs. Table 7 provides the relative percent differences (d_i) of the paired QA sample concentrations, and is defined as:

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

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

Selecting which lab was X_i and Y_i was arbitrary.

Out of the 52 verification results, only two 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 2014 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 52 verifications, 52 (100%) were within the ± 4-5% AA-PGVP criteria, and 50 (96%) were within the ± 2% Acid Rain Program criteria.

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

Survey Improvement – Although 100% completeness was not achieved in 2014, there was significant improvement from 2013 (as mentioned in the 2013 report, support contractor transition significantly impacted survey completness in 2013). Repeated reminder email messages on a two-week basis were re-started once again, which helped to improve the completeness value. Higher completeness is expected in 2015.

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 EPA offered monitoring organizations struggling with shipping costs a way to use EPA as a third-party payer. Unfortunately, even with this option, participation from the various organizations did not improve much.

Quarterly Interlaboratory QC Checks - The analysis of the same standard by both RAVLs proved to be a useful tool for checking the quality of the AA-PGVP results. Although it was planned to conduct the QC checks in two quarters in 2014, the RAVLs were not able to conduct the check in two quarters as previously planned. Part of the difficulty with achieving this goal is the ongoing concern with Region 7's manpower issue. However, Region 7 has already committed to participating in the program for the entirety of 2015; maybe this will enable the QC checks to be done in two quarters. Again, this will be determined by Region 7's overall availability.

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Appendix A

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

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

Region 2: Quarters 1 – 4, pages 15 – 29
Region 7: Quarters 1 – 4, pages 30 – 36

All quality control checks passed during verifications.

Region 2 QA Data

CO QA Requirements Summary, Region 2 - 1st Quarter of 2014

	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	10-Mar-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999990	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999988	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	18-Mar-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.18%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.19%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.21%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.22%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.32%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0031	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	11-Mar-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.069%	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	0.43%	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	0.72%	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	0.50%	Challenge Std. #3 vendor certificate bias < 2%

SO2 QA Requirements Summary, Region 2 - 1st Quarter 2014

	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	10-Mar-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999990	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999988	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	12-Mar-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.22%	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	0.29%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.37%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9971	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	11-Mar-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.607%	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	-0.94%	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	-0.67%	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	-0.57%	Challenge Std. #3 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 2 - 1st Quarter 2014

	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	Calibrator Information	#VALUE!
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999990	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999988	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	13-Mar-14	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	0.45%	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	0.9969	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	13-Mar-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.17%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.18%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.20%	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)	0.30%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9966	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	11-Mar-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.607%	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	0.37%	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	0.73%	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	-0.09%	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	-0.07%	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	-0.77%	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	-0.46%	Challenge Std. #3 vendor certificate bias < 2%

CO QA Requirements Summary, Region 2 - 2nd Quarter of 2014

	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	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	11-Jun-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999988	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999981	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	18-Jun-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.31%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.32%	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	0.37%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.54%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0047	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	18-Jun-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.357%	Dilution Check RSD is OK

CO QA Requirements Summary, Region 2 - 2nd Quarter of 2014

	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	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	11-Jun-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999988	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999981	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	23-Jun-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.32%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.33%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.36%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.39%	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	0.9976	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	18-Jun-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.166%	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	-0.46%	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	-0.89%	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	0.02%	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	-0.37%	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	-0.81%	Challenge Std. #5 vendor certificate bias < 2%

CO QA Requirements Summary, Region 2 - 2nd Quarter of 2014

	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	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	29-Jun-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999990	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999997	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	30-Jun-14	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	1.0000	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	30-Jun-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.409%	Dilution Check RSD is OK

SO2 QA Requirements Summary, Region 2 - 2nd Quarter of 2014

	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	900	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	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	29-Jun-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999990	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999997	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	1-Jul-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.06%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.06%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.07%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.08%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.10%	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	30-Jun-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.409%	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	-1.69%	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	-0.97%	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	-2.56%	Challenge Std. #3 vendor certificate bias between 2-4%
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	-1.87%	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	-1.16%	Challenge Std. #5 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 2 - 2nd Quarter of 2014

	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	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	11-Jun-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999988	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999981	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	19-Jun-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.26%	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	0.34%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.44%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0050	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	19-Jun-14	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	0.23%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.27%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.35%	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	18-Jun-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.357%	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	0.43%	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	-0.95%	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	-0.24%	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	1.34%	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	1.28%	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	1.08%	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	0.33%	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	1.57%	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	0.83%	Challenge Std. #5 vendor certificate bias < 2%

CO QA Requirements Summary, Region 2 - 3rd Quarter of 2014

	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	900	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	8-Sep-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999984	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	9-Sep-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.58%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.61%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.65%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.70%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	1.00%	Assay is invalid 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	9-Sep-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.166%	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	0.01%	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 Std. Error is OK
	Challenge Standard #2 vendor certificate bias	0.09%	Challenge Std. #2 vendor certificate bias < 2%

SO2 QA Requirements Summary, Region 2 - 3rd Quarter of 2014

	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	900	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	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	8-Sep-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999984	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	10-Sep-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.65%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.68%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.73%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.87%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	1.10%	Assay is invalid at this concentration
	Analyzer slope is within 0.98-1.02	1.0044	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	9-Sep-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.166%	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	-0.68%	Challenge Std. #1 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 2 - 3rd Quarter of 2014

	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	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	8-Sep-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999984	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999995	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	11-Sep-14	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	0.23%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.26%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.34%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9982	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	11-Sep-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.00%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.00%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.00%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.00%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.00%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9996	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	9-Sep-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.166%	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	0.12%	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	0.43%	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	-0.81%	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	-0.35%	Challenge Std. #2 vendor certificate bias < 2%

CO QA Requirements Summary, Region 2 - 4th Quarter of 2014

	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	900	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999997	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999992	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	9-Dec-14	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	0.25%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.26%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.28%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.41%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0010	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	9-Dec-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.050%	Dilution Check RSD is OK

CO QA Requirements Summary, Region 2 - 4th Quarter of 2014

	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	900	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	7-Apr-18	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1780	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999997	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999992	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	16-Dec-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.34%	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	0.45%	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	1.0021	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	9-Dec-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.221%	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	-0.39%	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	-0.32%	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	0.03%	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%
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	-0.20%	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	-2.56%	Challenge Std. #6 vendor certificate bias between 2-4%

SO2 QA Requirements Summary, Region 2 - 4th Quarter of 2014

	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	750	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	900	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999997	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999992	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	11-Dec-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.19%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.20%	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	0.26%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.33%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0012	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	9-Dec-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.050%	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	0.22%	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	-0.18%	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	-0.04%	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	0.48%	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	0.04%	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	0.02%	Challenge Std. #6 vendor certificate bias < 2%

NOx QA Requirements Summary, Region 2 - 4th Quarter of 2014

	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	1580	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	1-Jun-16	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1375	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	4-Jun-15	Standard OK
	Low Flow Standard Expiration Date	4-Jun-15	Standard OK
	Flow Standard Base Unit Expiration Date	4-Jun-15	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	8-Dec-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999997	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999992	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	15-Dec-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.26%	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	0.35%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.44%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9972	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	15-Dec-14	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	0.9993	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	9-Dec-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.050%	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	0.31%	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	-0.29%	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	-2.06%	Challenge Std. #2 vendor certificate bias between 2-4%
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	-2.20%	Challenge Std. #2 vendor certificate bias between 2-4%
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	1.36%	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	2.26%	Challenge Std. #3 vendor certificate bias between 2-4%
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	0.29%	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	0.23%	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	-0.15%	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	-0.04%	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	-0.25%	Challenge Std. #5 vendor certificate bias < 2%
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	-0.39%	Challenge Std. #5 vendor certificate bias < 2%

Region 7 QA Data

CO QA Requirements Summary, Region 7 - 1st Quarter of 2014

	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	475	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	1700	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	24-Jan-15	Standard OK
	Low Flow Standard Expiration Date	24-Jan-15	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	24-Feb-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	1.0000000	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999269	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	25-Feb-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.22%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.22%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.23%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.24%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.26%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0012	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	25-Feb-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.082%	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	0.19%	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!

CO QA Requirements Summary, Region 7 - 1st Quarter of 2014

	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	25-Jan-15	Standard OK
	Low Flow Standard Expiration Date	25-Jan-15	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	24-Feb-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	1.0000000	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999269	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	4-Mar-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.60%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.61%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.63%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.66%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.71%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	0.9881	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	25-Feb-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.082%	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	1.09%	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	0.54%	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	#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 - 1st Quarter of 2014

	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	850	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	25-Jan-15	Standard OK
	Low Flow Standard Expiration Date	25-Jan-15	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	24-Feb-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	1.0000000	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999269	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	26-Feb-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.18%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.18%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.19%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.20%	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	1.0009	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	25-Feb-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.082%	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	-0.44%	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!

NOx QA Requirements Summary, Region 7 - 1st Quarter of 2014

	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	1000	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	25-Jan-15	Standard OK
	Low Flow Standard Expiration Date	25-Jan-15	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	24-Feb-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	1.0000000	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999269	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	27-Feb-14	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	0.08%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.09%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.09%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0029	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	27-Feb-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.17%	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	0.19%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.20%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0008	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	25-Feb-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	0.082%	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	0.74%	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	1.12%	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	#VALUE!	#VALUE!
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	#VALUE!	#VALUE!
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 7 - 3rd Quarter of 2014

	QA Requirement	Result	Status
SRM Gas Standards	Primary SRM Cylinder Expiration Date	7-Apr-18	Primary SRM Gas Standard OK
	Primary SRM Cylinder Pressure >150 psi	2150	Primary SRM cylinder pressure is OK
	SRM Dilution Check Cylinder Expiration Date	9-Nov-15	Dilution Check SRM Gas Standard OK
	Dilution Check SRM Cylinder Pressure >150 psi	1575	Dilution check SRM cylinder pressure is OK
Laboratory Flow Standard	High Flow Standard Expiration Date	24-Jan-15	Standard OK
	Low Flow Standard Expiration Date	24-Jan-15	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	18-Aug-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999998	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999954	Low MFC OK
Carbon Monoxide Gas Analyzer	Analyzer Calibration within 2 week of assay	18-Aug-14	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	0.9977	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	18-Aug-14	Dilution check within 2 weeks of assay
	Dilution Check Relative % Difference < 1%	-0.051%	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	0.22%	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	0.20%	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 7 - 3rd Quarter of 2014

	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	725	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	25-Jan-15	Standard OK
	Low Flow Standard Expiration Date	25-Jan-15	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	18-Aug-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999998	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999954	Low MFC OK
Sulfur Dioxide Gas Analyzer	Analyzer Calibration within 2 weeks of assay	19-Aug-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.53%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.54%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.56%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.59%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.64%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0013	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	Date of Dilution Check	#VALUE!
	Dilution Check Relative % Difference < 1%	0.000%	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	-0.16%	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	-0.23%	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!

NOx QA Requirements Summary, Region 7 - 3rd Quarter of 2014

	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	1000	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	25-Jan-15	Standard OK
	Low Flow Standard Expiration Date	25-Jan-15	Standard OK
	Flow Standard Base Unit Expiration Date	N/A	Standard OK
Calibrator (mass flow controllers)	Calibrator Flow Calibration within 2 weeks of assay	18-Aug-14	Calibrator flow calibration within 2 weeks of assay
	Calibrated High Flow MFC Slope Range = 0.99 - 1.01	0.9999998	High MFC OK
	Calibrated Low Flow MFC Slope Range = 0.99 - 1.01	0.9999954	Low MFC OK
Oxides of Nitrogen Gas Analyzer NO Portion	Analyzer Calibration within 2 weeks of assay	20-Aug-14	Analyzer calibration within 2 weeks of assay
	Estimate of Uncetainty < 1% at point #1 (>80% URL)	0.24%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #2	0.25%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #3	0.26%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #4	0.27%	Assay may be conducted at this concentration
	Estimate of Uncetainty < 1% at point #5 (~50% URL)	0.29%	Assay may be conducted at this concentration
	Analyzer slope is within 0.98-1.02	1.0019	Analyzer Slope is acceptable
Oxides of Nitrogen Gas Analyzer NOx Portion	Analyzer Calibration within 2 week of assay	20-Aug-14	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	0.17%	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	1.0031	Analyzer Slope is acceptable
Dilution Check	Dilution Check Date within 2 weeks of assay	Date of Dilution Check	#VALUE!
	Dilution Check Relative % Difference < 1%	0.000%	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	0.09%	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	0.43%	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	0.13%	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	0.18%	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!

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