Quality Assurance Project Plan for the Federal National Performance Audit Program (NPAP) for Criteria Pollutant Gases

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EPA-454/B-19-012
June 2021

Quality Assurance Project Plan for the Federal National Performance Audit Program (NPAP) for Criteria Pollutant Gases

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

Foreword

U.S. Environmental Protection Agency (EPA) policy per EPA Order CIO 2105 requires that all projects involving the generation, acquisition, and use of environmental data be planned and documented and have an Agency-approved Quality Assurance Project Plan (QAPP) before the start of data collection. The primary purpose of the QAPP is to provide a project overview, describe the need for the measurements, plan, and define quality assurance/quality control (QA/QC) activities to be applied to the project, all within a single document.

This document represents the QAPP for the environmental data operations involved in EPA's National Performance Evaluation Program (NPEP) for the National Ambient Air Quality Standards (NAAQS) gas monitoring network: the National Performance Audit Program (NPAP) for through the probe (TTP) audit methods. This QAPP was developed by incorporating the following EPA monitoring and QA regulations and guidance:

- 40 Code of Federal Regulations (CFR) Part 50, Appendices A, C, D, and F
- 40 CFR Part 58, Appendices A, C, and E.9
- *EPA QA/R-5, EPA Requirements for Quality Assurance Project Plans*
- *EPA QA/G-5, Guidance for Quality Assurance Project Plans*
- *EPA QA/G-9, QA00 update, Guidance for Data Quality Assessment: Practical Methods for Data Analysis*.

Pertinent elements of the EPA's QAPP guidance (EPA QA/G-5) are incorporated into this QAPP.

This QAPP and related NPAP standard operating procedures (SOPs) are accessible via the EPA's Ambient Monitoring Technology Information Center (AMTIC) website (available at https://www.epa.gov/amtic/national-performance-audit-program-npap-gaseous-monitoring). The documents may be read and printed using Adobe Acrobat™ Reader software, freeware that is available on many Internet sites, including the EPA's web site.

This QAPP may be revised as program objectives and implementation procedures evolve. Comments may be sent to:

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The document mentions trade names and/or brand names. Any mention of corporation names, trade names, or commercial products does not constitute endorsement or recommendation for use.

A. PROJECT MANAGEMENT

A1 QA Project Plan Approval

Title: Quality Assurance Project Plan for the Federal National Performance Audit Program (NPAP) for Criteria Pollutant Gases

The attached Quality Assurance Project Plan (QAPP) for the Federal National Performance Audit Program for Criteria Pollutant Gases is hereby recommended for approval and commits the participants of the program to follow the elements described within.

OAQPS	Signature: Noah, Greg Name:	Digitally signed by Noah, Greg Date: 2021.09.14 08:59:22 -04'00'	Date:	
Region 1	Signature: CHRISTOPHER ST. GERMAIN Name:	Digitally signed by CHRISTOPHER ST. GERMAIN Date: 2021.07.22 07:34:38 -04'00'	Date:	
Region 2	Signature: Mustafa, Mustafa Name:	Digitally signed by Mustafa, Mustafa Date: 2021.08.13 10:35:18 -04'00'	Date:	
Region 3	Signature: LORETTA HYDEN Name:	Digitally signed by LORETTA HYDEN Date: 2021.08.13 11:57:11 -04'00'	Date:	
Region 4	Signature: Harris, Keith Name:	Digitally signed by Harris, Keith Date: 2021.08.17 17:03:16 -04'00'	Date:	
Region 5	Signature: Hamilton, Scott Name:	Digitally signed by Hamilton, Scott Date: 2021.08.18 07:26:21 -05'00'	Date:	
Region 6	Signature: CLARENCE JACKSON Name:	Digitally signed by CLARENCE JACKSON DN: c=US, o=U.S. Government, ou=Environmental Protection Agency, cn=CLARENCE.JACKSON, 0.9.2342.19200300.100.1.1=68001003655920 Date: 2021.08.18 15:28:49 -05'00'	Date:	
Region 7	Signature: THIEN BUI Name:	Digitally signed by THIEN BUI Date: 2021.08.19 11:25:08 -05'00'	Date:	
Region 8	Signature: JOSHUA RICKARD Name:	Digitally signed by JOSHUA RICKARD Date: 2021.08.19 12:23:04 -06'00'	Date:	
Region 9	Signature: Audrey L Johnson Name:	Digitally signed by Audrey L Johnson Date: 2021.08.31 11:41:38 -07'00'	Date:	
Region 10	Signature: Wallace, Henry Name:	Digitally signed by Wallace, Henry Date: 2021.09.10 08:18:16 -07'00'	Date:	

Acknowledgments

This QAPP is the product of the combined efforts of EPA's Office of Air Quality Planning and Standards (OAQPS); EPA Regional offices; and State, Local, and Tribal (SLT) organizations. Greg Noah of OAQPS led the effort to revise this QAPP. The following individuals are acknowledged for their contributions:

EPA Regions

Region:	
1	Chris St. Germain
2	Avraham Teitz
3	Loretta Hyden
4	Mike Crowe
5	Scott Hamilton
6	Clarence Jackson
7	Thien Bui
8	Joshua Rickard
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Battelle under EPA Contract EP-D-13-005

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A1.1 Document Control List

Revision Changes

1. Converted to R-5 format
   (A) See Table of Contents

2. Change from National Environmental Research Laboratory (NERL) to OAQPS in 1998
   (A) Coordinator to Manager
      (1) Shifted some coordinator's duties to contractor
         (a) Moved procedures from the QA Plan and SOP 001 to the contractor
      (2) NERL laboratory to EPA Region 7 laboratory

3. Modified to include National Air Toxics Trends Stations (NATTS) Proficiency Testing Program in 2005

4. Modified in 2006 to include through the probe (TTP) and eliminating the mailed NPAP Audit Delivery for Gaseous Criteria Pollutants program

5. Document revised to include details of audit conduct and recording of data through the Performance Evaluation AQS Tool (PEAT) process.

6. Additional changes following review/comment by the NPAP community. Inclusion of details for the following: flow-based audit quality procedures, palladium scrubber zero air assessments, and audit system verification acceptance criteria. Additionally, removed EPA Region 2 as an interlaboratory comparison laboratory and added EPA Region 4 as a verification laboratory.

ACRONYMS

AAMG	Ambient Air Monitoring Group
AA-PGVP	Ambient Air Protocol Gas Verification Program
AMTIC	Ambient Monitoring Technology Information Center, Website on the EPA TTN (Technology Transfer Network)
API	Advanced Pollution Instruments
AQAD	Air Quality Analysis Division
AQS	Air Quality System
BLM	Bureau of Land Management
BOA	back of the analyzer
CAMD	Clean Air Markets Division
CAP	corrective action plan
CASTNET	Clean Air Status and Trends Network
CAT	corrective action tracking
CFR	Code of Federal Regulations
CO	carbon monoxide
COA	certificate of analysis
COR	Contracting Officer Representative
DAS	data acquisition system
EPA	Environmental Protection Agency
FBA	flow-based audit
FEM	Federal Equivalent Method
FEP	fluorinated ethylene propylene
FS	field scientist
GPT	gas phase titration
ID	identification
IT	information technology
MFC	mass flow controller
MVA	measured verification audit
NAAQS	National Ambient Air Quality Standards
NERL	National Environmental Research Laboratory (Part of EPA Office of Research and Development)
NIST	National Institute of Standards and Technology
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen (sum of nitic oxide and nitrogen dioxide)
NPAP	National Performance Audit Program
NPEP	National Performance Evaluation Program
NPS	National Park Service
O_3	ozone
OAQPS	Office of Air Quality Planning and Standards
PAMS	Photochemical Assessment Monitoring Stations
Pb	lead
Pd	palladium

PE	performance evaluation
PEAT	Performance Evaluation AQS Tool
PEP	Performance Evaluation Program
ppb	part(s) per billion
ppm	part(s) per million
PQAO	primary quality assurance organization
PTFE	polytetrafluoroethylene
QA	quality assurance
QAPP	quality assurance project plan
QC	quality control
RTP	Research Triangle Park, North Carolina
SIP	State Implementation Plan
SLAMS	State and Local Air Monitoring Station
SLT	State, Local, and Tribal
SO_2	sulfur dioxide
SOP	standard operating procedure
SPM	Special Purpose Monitor
SRP	standard reference photometer
STAG	state and tribal assistance grants
THC	total hydrocarbons
TOPO	Task Order Project Officer
TSA	technical systems audit
TTP	through the probe
ZAG	zero air generator

A1.2 Table of Contents

Tables

Figures

A2 Distribution List

Role	Organization
Audit Support Contractor(s)	Contractor
Support Contractor's Program Manager	Contractor
Contract Project Officer	EPA, OAQPS-OD, COR Contracts
OAQPS NPAP Lead	EPA, OAQPS
Regional NPAP Leads	EPA, Regional Offices
AAMG QA Team Leader	EPA, OAQPS
QA Manager	EPA
Self-Implementing PQAO NPAP Leads	State, Local, and Tribal Monitoring Organizations
EPA Region 4 and 7 Verification Laboratories	EPA

A3 Project/Task Organization

The NPAP is conducted in the 10 EPA Regions by EPA Regional staff, government contractors, or independent employees (for self-implementing primary quality assurance organizations [PQAOs]) who are trained and certified by EPA for NPAP through the probe (TTP) audits. Third-party support for verification of gaseous audit standard materials is provided as needed from EPA Region 7. Audit support is provided by EPA OAQPS in concert with a quality assurance (QA) support contractor responsible for audit testing, training, and, as available, certification.

The EPA NPAP Research Triangle Park (RTP) Task Order Project Officer (TOPO), who serves as the "OAQPS NPAP Lead," reports to the OAQPS/Air Quality Analysis Division (AQAD)/Ambient Air Monitoring Group (AAMG) Group Leader. The OAQPS NPAP Lead is responsible for overseeing all program activities. The OAQPS NPAP Lead works with the 10 EPA NPAP Regional Leads to ensure the participation of the state, local, private, and tribal agency participants within their respective Regions. An organization chart detailing the current roles within the NPAP is maintained by the OAQPS NPAP Lead.

The EPA Region 4 and Region 7 verification laboratories conduct performance evaluations of the Regional NPAP audit equipment systems and verifications of concentrations of standard gas cylinders on behalf of OAQPS.

A3.1 NPAP Roles and Responsibilities

A3.1.1 OAQPS NPAP Lead

The OAQPS NPAP Lead's role is to implement and manage the NPAP at the national level. This individual has the responsibility of creating, implementing, and maintaining the quality systems documents for the program including the NPAP QAPP, supporting standard operating procedure(s) (SOPs), and providing technical direction that the program requires. An ancillary responsibility of the OAQPS NPAP Lead is to manage the QA support contractor who serves the NPAP. To promote and maintain consistency across the NPAP, the OAQPS NPAP Lead serves

as a point of contact for the Regional NPAP Leads and NPAP Field Scientists (FSs). The OAQPS NPAP Lead also plays a role by interacting with the Regions to obtain funding for the NPAP audits and organizes training activities for the NPAP to ensure experienced and new NPAP FSs as well as Regional NPAP Leads acquire and maintain appropriate skills. The OAQPS NPAP Lead is also responsible for assessing the NPAP data and communicating the results to the NPAP community and the EPA Regions. The OAQPS NPAP Lead is responsible for maintaining a small complement of backup instruments and equipment employed in the NPAP which are available for loan to Regions on a short-term basis to cover equipment failures.

A3.1.2 Regional NPAP Lead

Regional NPAP Leads implement the NPAP at the Regional level. There is a Regional NPAP Lead for each of the 10 EPA Regions. The specific details of the Regional NPAP Lead depend on the configuration of the NPAP in each Region. Minimally, the Regional NPAP Lead is responsible for ensuring that the required NPAP TTP audits for monitoring sites within the Region are performed and reported to the Air Quality System (AQS) according to the schedule prescribed in this QAPP and 40 CFR Part 58, Appendix A and that developments to the NPAP within the Region are communicated to the OAQPS NPAP Lead. Such developments may include details for staffing or training needs, financial needs, equipment and supplies needs, and/or other technical or administrative developments that impact implementation of the NPAP. Regional NPAP Leads are to maintain expertise with the conduct of the NPAP and are to stay current on the status of monitoring site audit performance and resulting necessary corrective actions. Once a TTP audit is completed and is staged for entry into AQS, the NPAP Regional Lead is to review the data collected for the NPAP TTP audit(s) conducted in their Region and approve or reject the audits within AQS.

Regional NPAP Leads in some Regions also serve as FSs and conduct TTP audits (e.g., Regions 1, 2, and 7), and as such also maintain the responsibilities for FSs listed in Section A3.3. Regions for which the Regional NPAP Lead does not also serve as a FS typically utilize a contractor to conduct the NPAP TTP audits. In such cases where a contractor FS conducts the TTP audits, the Regional NPAP Lead is responsible for managing the contractor performance unless there is an alternate arrangement. In all cases, the Regional NPAP Lead serves as a technical resource for conducting NPAP TTP audits and maintains technical expertise in the equipment and procedures for TTP audits.

The Regional NPAP Lead is also responsible for overseeing the conduct of audits for self-implementing PQAOs within their Region. In this role, they are responsible for ensuring that the required number of audits is scheduled and performed annually, as well as ensuring technical support and training are available for PQAO staff as needed for maintaining a properly functioning NPAP-equivalent program.

A3.1.3 PQAO NPAP Lead

The PQAO NPAP Lead is the individual with overall responsibility for managing the NPAP for a PQAO self-implementing the NPAP. The PQAO NPAP Lead is analogous to the Regional NPAP Lead described in Section A3.1.2; however, the PQAO NPAP Lead reports developments with the PQAO NPAP to the Regional NPAP Lead. Developments in the PQAO TTP audit program may include equipment or supplies failures or problems, staffing issues, or other similar issues that may involve risk to completion of the required NPAP audits for the calendar year for

the PQAO. The PQAO NPAP Lead is independent of the routine monitoring processes within the PQAO, including the annual performance evaluation (PE) TTP audits the monitoring organization is required to perform per Section 3.1.2 of 40 CFR Part 58, Appendix A. The PQAO NPAP Lead is responsible for ensuring the PQAO self-implementing program meets the requirements in this QAPP such that the PQAO program demonstrates equivalent performance to the Federal NPAP in accordance with the NPAP Adequacy/Independence Criteria Memo dated July 2008 (available at: https://www.epa.gov/sites/production/files/2020-10/documents/npapadequacy072408.pdf) and the *National Performance Audit Program, $PM_{2.5}$, $PM_{10-2.5}$, and Lead Performance Evaluation Program Implementation Decision Memorandum* for each calendar year. The PQAO NPAP Lead is responsible for managing the PQAO independent FSs and ensuring that the TTP audits are conducted according to the annual established schedule and are reported to AQS within the specified timeframe.

A3.1.4 Field Scientist

The FS is the individual conducting the NPAP TTP audit in the field – in this QAPP, the term "auditor" and "FS" are used interchangeably. The FS may be a Regional EPA staff member (such as a Regional NPAP Lead), contractor auditor, or a monitoring agency staff member (for self-implementing PQAOs) and they report to the Regional NPAP Lead or the PQAO NPAP Lead, as appropriate. The FS responsibilities are to conduct the NPAP TTP audits and report the results to AQS according to the specifications and schedule prescribed in this QAPP. Contractor FSs may also be required to abide by contractual specifications as defined by contracts with the EPA Region(s) which they support. FSs are responsible for ensuring: sufficient supplies (including standard gases) are available, equipment and instruments are calibrated and maintained, and that problems or issues that may impact successful completion of the scheduled audits are communicated promptly to the Regional NPAP Lead or PQAO NPAP Lead, as appropriate.

A3.1.5 QA Support Contractor

The QA Support Contractor provides technical support to the OAQPS NPAP Lead. Such technical support may include development and revision of quality systems documents, development and presentation of training materials and/or conducting training seminars, conducting various audits of NPAP processes and collected data, and compilation of QA data and preparation of reports to organize and summarize information important to the conduct and administration of the NPAP as defined in the appropriate contract. The QA Support Contractor should maintain expertise in policies, procedures, and equipment needed to accomplish the NPAP goals.

A3.1.6 State, Local, and Tribal Monitoring Organizations

The SLT monitoring organizations are responsible for ensuring their monitor status and monitoring site data within AQS are current for sites reporting criteria pollutant gas data for determining design values for regulatory purposes. Monitoring organizations are also responsible for coordinating with Regional NPAP Leads, PQAO NPAP Leads, and/or FSs to schedule TTP audits, to ensure monitoring organization staff are available to provide measurements during conduct of TTP audits, and to ensure that FSs can safely access monitoring sites.

A3.1.7 EPA Region 4 and Region 7 Verification Laboratories

The EPA Region 4 and Region 7 Verification Laboratories are responsible for certifying calibration gases and calibrating a portion of the ozone analyzers (Level 2 ozone standards) employed in the NPAP. Their role is to serve as calibration verification laboratories for the third-party verification of vendor-prepared standard gases that are diluted as challenge gases during TTP audits and gases employed to calibrate NPAP instruments when conducting TTP audits. These verification laboratories also serve to verify NPAP audit equipment systems. This independent verification step assures the performance of the entire TTP instrument system and connection configuration. In this role, these verification laboratories certify equipment and serve as comparison laboratories for verification of NPAP audit equipment systems that are in use in each Region or self-implementing PQAO.

A3.1.8 Clean Air Status and Trends Network (CASTNET) Lead

The Clean Air Status and Trends Network (CASTNET) Lead is responsible for managing the monitoring sites organized in the National Park Service (NPS), Clean Air Markets Division (CAMD), and Bureau of Land Management (BLM) networks. The CASTNET Lead communicates with the EPA NPAP Regional Leads to assign the monitoring sites within their respective Region to be audited within the calendar year. The respective NPAP Regional Lead is then responsible for ensuring the NPAP audits are scheduled and are conducted. The CASTNET Lead is also responsible for overseeing corrective actions resulting from failed NPAP audits.

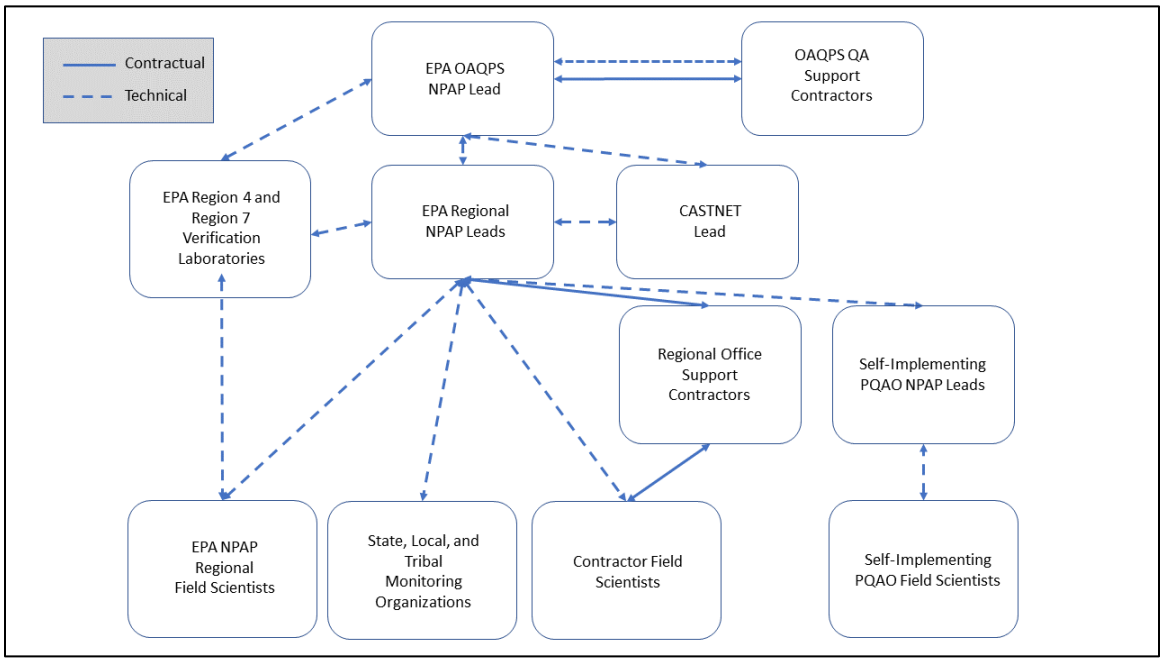

Figure A3-1. NPAP Communication and Responsibility Structure

A4 Problem Definition/Background

The NPAP is the means by which EPA independently assesses the proficiency of monitoring agencies to operate National Ambient Air Quality Standards (NAAQS) criteria pollutant gas monitors that are employed in determining design values for assessing attainment of NAAQS.

These monitoring agencies comprise several monitoring networks, including: State and Local Air Monitoring System (SLAMS), Tribal networks, the CASTNET program, Special Purpose Monitor (SPM) sites, and NPS sites. The NPAP QA audit program is required under Sections 2.4 and 3.1.3 of 40 CFR Part 58, Appendix A. The monitoring data from these networks are of critical importance in gathering information for making decisions to protect public health. The monitoring data are necessary to determine if an area is in attainment or non-attainment of the NAAQS for O_3, carbon monoxide (CO), oxides of nitrogen ($NO/NO_x/NO_2$), and sulfur dioxide (SO_2), and to assess trends and to model projections of these pollutants. If, in reviewing the data, an area is found to be in non-attainment status, the responsible state or local monitoring organization must develop a control strategy in a State Implementation Plan (SIP) to come into attainment with the NAAQS. Significant funds may be required to come into attainment, therefore the integrity of the data employed to determine attainment/non-attainment is essential.

The primary purpose of the NPAP is to ensure imprecision and bias of the monitoring data are acceptably low so that concentrations of criteria pollutant gases reported by monitoring programs across cities, states, airsheds, regions, and the nation are representative of the actual ambient concentrations. Secondary goals of the NPAP are to assist monitoring organizations in identifying and correcting problems and to drive data consistency and comparability across monitoring sites in the networks.

The NPAP evaluates the bias and variability of criteria pollutant gas monitors via delivery of PE/audit gas samples to the ambient air monitors. To best evaluate the entire sampling and analysis system, audit gas samples are delivered to the analyzer TTP, which introduces the challenge gas directly to the inlet probe, mimicking the sampling and analysis of ambient air. Providing the test gas to the sample inlet enables evaluation of the entire sampling flow path, from the sampling station inlet, through the manifold (if so equipped), and to the back of the analyzer (BOA).

Each EPA Region operates an NPAP TTP program. The TTP audit program in each Region is either conducted by EPA Region staff or contractors. PQAOs may elect to self-implement the NPAP program for sites in their PQAO; in such cases independent FS auditors within their PQAO will conduct the TTP audit program.

For annual PEs, which are conducted by the monitoring agencies, in general, the auditor generates challenge gas concentrations of the criteria pollutant gases within the ranges agencies are required to monitor for attainment and related decision-making as required in 40 CFR Part 58, Appendix A, Section 3.1.2.1. The CFR excerpt is below:

> ***3.1.2.1*** *The evaluation is made by challenging the monitor with audit gas standards of known concentration from at least* ***three audit levels.*** *One point must be within two to three times the method detection limit of the instruments within the PQAOs network, the second point will be less than or equal to the 99th percentile of the data at the site or the network of sites in the PQAO or the next highest audit concentration level. The third point can be around the primary NAAQS or the highest 3-year concentration at the site or the network of sites in the PQAO. An additional 4th level is encouraged for those agencies that would like to confirm the monitors' linearity at the higher end of the operational range. In rare circumstances, there may be sites measuring concentrations above audit level 10. Notify the appropriate EPA region and the AQS program in order to make accommodations for auditing at levels above level 10.*

	Concentration range, ppm			
Audit Level	O_3	SO_2	NO_2	CO
1	0.0040 - 0.0059	0.0003 - 0.0029	0.0003 - 0.0029	0.020 - 0.059
2	0.0060 - 0.019	0.0030 - 0.0049	0.0030 - 0.0049	0.060 - 0.199
3	0.020 - 0.039	0.0050 - 0.0079	0.0050 - 0.0079	0.200 - 0.899
4	0.040 - 0.069	0.0080 - 0.0199	0.0080 - 0.0199	0.900 - 2.999
5	0.070 - 0.089	0.0200 - 0.0499	0.0200 - 0.0499	3.000 - 7.999
6	0.090 - 0.119	0.0500 - 0.0999	0.0500 - 0.0999	8.000 - 15.999
7	0.120 - 0.139	0.1000 - 0.1499	0.1000 - 0.2999	16.000 - 30.999
8	0.140 - 0.169	0.1500 - 0.2599	0.3000 - 0.4999	31.000 - 39.999
9	0.170 - 0.189	0.2600 - 0.7999	0.5000 - 0.7999	40.000 - 49.999
10	0.190 - 0.259	0.8000 - 1.000	0.8000 - 1.000	50.000 - 60.000

To determine NPAP audit levels, EPA compiled national ambient concentrations and averages to determine appropriate audit levels. Note that with the reduction in measured ambient concentrations of criteria pollutant gases, monitoring sites are replacing legacy “regular range” analyzers with instruments capable of “trace level” measurements, which have been widely adopted across the nation. Specific details for selecting audit levels are further described in Section B1.1. These updated audit levels have been incorporated into the Performance Evaluation AQS Tool (PEAT) with which FSs select and conduct NPAP TTP audits.

The mobile NPAP audit laboratories are designed to verify and deliver audit gases TTP to the inlet of ambient air monitoring stations. Specific and detailed instructions can be found in the associated NPAP SOPs. A brief summary of the field activities follows:

- The NPAP Regional Lead will select the sites to be audited during the upcoming calendar year using the AQS audit feature. All sites within a given PQAO are to be audited minimally every six years.
- One fully trained FS will use NPAP PEAT to help manage and prepare for the audit.
- The FS will verify the operation of the audit gas generation and delivery system.
- The FS will transport/drive the audit laboratory to a pre-selected monitoring station.
- The FS will coordinate the delivery of the audit gas through the station inlet probe, verify the concentration delivered, and obtain the station reading from the station operator for each parameter for each challenged audit level.
- The FS will use the PEAT application to record pertinent information during the audit for measured verification audits (MVAs). If performing a flow-based audit (FBA), the FS will record the audit information in a hard copy record or electronic log/spreadsheet.
- A draft audit report (typically a hard-copy) will be provided to the station operator, or the monitoring organization’s representative, prior to the FS departure from the monitoring station. The report recipient will sign the draft audit report or will otherwise document attesting to the veracity of the site reported concentrations.
- Upon completion of the audit, the FS will use PEAT to upload the audit results to a pre-production area within AQS (for MVA) or will manually enter the results into AQS (for FBA).

- The NPAP Regional Lead (or appropriate designee) is responsible for reviewing the validity of the NPAP audit using the AQS audit review feature and approving/rejecting the audit, for which approval will move the audit data into AQS. If no approval/rejection action is taken, the audit will automatically move into AQS after a pre-determined time period (7 days for a passing audit and 30 days for a failing audit). If the review and approval/rejection is not completed prior to the automatic movement of the audit into AQS, the NPAP Regional Lead (or appropriate designee) is still responsible for reviewing the validity of the NPAP audit.
- The FS will properly maintain and operate the audit laboratory following manufacturer recommended procedures for gas analyzers, gas dilution systems, zero-air generators (ZAGs), on-board electric generators, vehicles, and other equipment as described in the NPAP TTP SOP.

A5 Project Description and Schedule

The NPAP prescribes audits for the gaseous pollutants for which there are NAAQS, i.e., the criteria pollutant gases: SO_2, $NO/NO_x/NO_2$, CO, and O_3. The SLAMS are operated by approximately 170 SLT agencies, all of which are required to be periodically audited in the NPAP. NPAP audits at each non-excluded regulatory site must be conducted no less frequently than every six years. These NPAP audits are independent from the PE audit for which each PQAO is annually required to perform on their monitoring sites as per 40 CFR Part 58, Appendix A, Section 3.1.2. FSs should attempt to schedule the NPAP audits at least a week apart, and preferably several months, from the PE audits, if possible, to avoid overlap thereby increasing the coverage of audits over time.

A5.1 NPAP TTP Description

FSs conduct TTP audits via mobile laboratories, providing gaseous criteria pollutants (O_3, CO, SO_2, and NO_2) utilizing accurate and reliable resources and instrumentation.

EPA Regional staff, contractors, or self-implementing PQAO auditors (refer to Section A7.1) are independent of the monitoring organizations that are undergoing the audit and utilize standard materials and instruments that are likewise independent. Concentrations of the pollutants in the challenge gas are blind to the monitoring station operators undergoing the audit.

To conduct NPAP TTP audits, auditors utilize mobile laboratories containing a carefully assembled system of high quality and high capacity (volume/flow) audit gas metering, generation, and analysis equipment. The mobile laboratories, gas generation systems, and analyzers have been selected and approved by EPA and are designed to be durable, rugged, and capable of frequent transport. The concentrations of the delivered challenge gases are metered and blended from National Institute of Standards and Technology (NIST)-traceable certified stock gases employing calibrated NIST-traceable equipment. Challenge gas concentrations are determined by either verification with the independent on-board CO analyzer or ozone analyzer when performing a MVA or are calculated based on the calibrated generation or dilution of the standard gas with the gas calibrator when performing a FBA. The MVA is performed unless the full complement of analyzers cannot be transported to the site, such as for remote sites (e.g., those in Alaska and Puerto Rico), in which case the FBA may be substituted.

For the MVAs, the concentrations of other gases in the blended gas challenge (i.e., SO_2 and $NO/NO_x/NO_2$) are calculated based on their known concentration ratios relative to CO. The generated challenge gas is supplied to the station via a polytetrafluorethylene (PTFE) Teflon® hose, which directly feeds the inlet probe of the monitoring station. The introduction of the audit challenge gases into the inlet probe of the monitoring station's sampling system, TTP, is a critical step in the process such that it takes into account the entire flow path from the inlet to the station analyzers. Previous versions of this QAPP included discussion of devices that were shipped to sites and were employed to perform NPAP audits. This "mailed" program involved shipping audit devices with settings blind to the monitoring station operators such that the station operator would perform the audit. As each Region now operates or contracts operation of an NPAP audit system, the EPA no longer performs audits via the "mailed" program; therefore, this QAPP focuses solely on TTP audit systems.

EPA has recently developed PEAT, a software application that runs on either a laptop computer or a tablet computer accompanying the FS and audit system to the monitoring site. Briefly, the PEAT application allows auditors to document the preparation and verification of the audit equipment and certified standard gases, select sites for audit, schedule audits, identify monitoring site metadata inconsistencies in AQS, record data generated when conducting audits, perform calculations, and record the values reported by the monitoring site for the audit. At the conclusion of an audit, auditors generate a preliminary report for the station operator. Once the auditor's laptop personal computer or tablet is connected to the internet, the audit results are automatically pushed to the pre-production area within AQS from which the results are then entered into the AQS production database.

EPA developed PEAT through the Lean process, which identified several aspects of the NPAP that were inefficient and/or not performing as required. Starting in March 2016, the previous spreadsheet workbooks employed for documenting and reporting NPAP TTP audits were retired and EPA began using PEAT to prepare for, conduct, and report NPAP TTP audits. PEAT has streamlined the entire NPAP audit process: selection of sites for audit, ensuring monitoring site details are correct in AQS, evaluating audit performance (calculations), and facilitating input of NPAP audits to AQS. PEAT has reduced the time required to conduct and report NPAP audits to AQS and has eliminated many opportunities for errors. This provides monitoring site PQAOs and EPA Regions with both more reliable audit data and more timely information to better evaluate and monitor performance of monitoring stations. The previous system utilizing the spreadsheet workbook required many manual steps and a large investment of staff time to upload the audit information into AQS. Additionally, audit results for monitoring sites for which there were discrepancies in the site information (particularly method codes) were rejected for input into AQS. Auditors, Regional NPAP Leads, and the OAQPS NPAP Lead were required to maintain audit data in databases and perform quality control (QC) checks to ensure the audit data were of acceptable quality to upload to AQS. The PEAT process has been designed to combine many of these steps to minimize data handling and to minimize or eliminate those discrepancies and barriers to promote regular and timely entry of audit data into AQS.

EPA OAQPS in RTP, NC is responsible for updating the PEAT and ensuring that it is current for auditors to utilize. EPA encourages auditors to report problems, comments, or suggestions to

OAQPS in order to improve the functionality of PEAT. Enhancements and updates to PEAT are pushed periodically to users' computers to ensure the most recent version of PEAT is available.

Unless FSs are EPA employees, FSs do not have direct access to AQS, rather the interactions with AQS occur through PEAT. As such, it is critical that auditors are using the most current version of PEAT. PEAT utilizes prompts when the user logs into the application to ensure that only the most current version of the application is available. When the auditor has completed entry of information into PEAT and has completed an audit, the audit result data transfer to AQS is handled within PEAT. The auditor must archive the data acquisition system (DAS) data to ensure that both the mobile laboratory temperature and DAS instrument traces from the CO and ozone analyzers are maintained. The data from the DAS are not handled within PEAT and must be archived separately.

A5.2 NPAP Site Selection and Schedule

Each non-excluded regulatory (eligible) monitoring site within each PQAO of each EPA Region is to be audited minimally every six years. These eligible sites include all monitoring sites that are not marked in AQS with a NAAQS exclusion code, i.e., their monitors are non-regulatory. Each calendar year, at least 20% of the eligible monitoring sites within each PQAO are selected for audit such that 100% of the monitoring sites within the PQAO (and therefore within the Region) are audited within the six-year period. Following the 20% requirement, all sites could be covered in a five-year period, but the six-year period allows for sites with special interest to be audited as needed during the six-year period.

A5.2.1 Site Selection

Audit selection is performed at the Regional level. EPA Regional NPAP Leads may select the sites to be audited in the coming calendar year, may delegate selection of the year's audits to the auditor(s) or PQAO NPAP Lead, or may work closely with the auditor(s) to select the sites for the year's audits. Regardless of the convention chosen for selecting sites, the EPA Regional NPAP Lead must approve the list of selected sites for audit.

During the autumn of each year, the Regional NPAP Leads and/or FSs generate the list of candidate sites to be audited in the next calendar year in their Region within AQS via the AQS audit feature. Site lists generated in AQS include the most recent date of audit such that auditors can sort the list of eligible monitoring sites by most recent audit date. Any site that does not have a NAAQS exclusion code in AQS and is designated as "regulatory" will be included in the list generated, and can be selected for an audit. For each Region, 20% of the sites in each PQAO are to be audited annually, with the stipulation that all sites within the PQAO are to be audited within a six-year period. The AQS audit feature permits sorting and filtering by PQAO and includes a feature to calculate the number of sites required to be audited (≥ 20% of the total in the PQAO). If a monitoring organization has not been audited for a pollutant for four years, an audit for that monitoring organization should be prioritized. Priority should also be given to sites that report measured concentrations near the NAAQS, sites in non-attainment areas, and sites for which PE audits conducted by PQAOs are found to exceed the PQAO's own acceptance limits. Repeat audits for sites failing TTP audits can be scheduled as resources permit. Note that audits of CASTNET sites are in addition to, and not included in, the annually required 20% of sites within a PQAO.

Once the list of candidate sites is finalized and approved by the Regional NPAP Lead, the list is distributed to the OAQPS NPAP Lead and to the FSs. OAQPS annually withholds appropriate amounts of state and tribal assistance grants (STAG) 105 funds based on this list; therefore, the audit selection list must be completed and submitted to the OAQPS NPAP Lead by October 1 of the preceding year to ensure funding deadlines are met.

The Regional NPAP Lead or FS then generates a site validation report within AQS for each parameter to be audited for each site selected for audit. These site validation reports include the site metadata specific to each parameter subject to audit, including:

- AQS identification (ID)
- site name
- address
- latitude and longitude
- date site established
- site owner
- monitor ID including parameter measured and dates of last data collection and data upload to AQS
- agency contact information
- PQAO
- probe height
- parameter method and associated instrument manufacturer, model, and associated comments.

These site validation reports are provided to FSs and to the PQAO monitoring organization managers to verify the information. Monitoring organization managers are responsible for updating outdated or incorrect information within AQS before the audit. Regional NPAP Leads should contact the monitoring organization managers within two weeks of distributing the site validation reports to ensure needed changes have been made in AQS. Before each audit, PEAT polls the current site information from AQS, therefore, it is imperative that the information be correct and current. If the information is not correct, the auditor may experience difficulty uploading the audit results to AQS.

A5.2.2 NPAP Equipment Preparation Schedule

Auditors must assemble the necessary materials and equipment and ensure that standard materials (gases and ozone generators) are verified and devices (gas blending calibrator, gas analyzers, ZAGs, and data loggers) are calibrated and operating properly. These verifications must be performed sufficiently in advance (recommended to be minimally one month) of beginning of a year's audits to ensure corrective actions (replacing parts, components, recalibration, etc.) can be taken before scheduled audit dates. *Note: Several of these calibrations or calibration verifications must be performed quarterly (consult Table A6-1).*

Specifically, the following verification steps must be completed prior to conducting NPAP TTP audits:

- O_3 line loss test

- O_3 standard generator calibrated against a Level 1 (standard reference photometer [SRP]) or Level 2 ozone standard
- O_3 analyzer (Level 2 ozone standard) calibration verification
- CO cylinders concentration verification: Low CO and High CO (for MVAs)
- Multiblend cylinder concentration verification for NO, SO_2, and CO

The specific QC guidelines are located in Section A6.

A5.2.3 TTP Audit Scheduling

FSs, separately or in concert with the EPA Regional NPAP Lead (and PQAO NPAP Lead, as appropriate), shall develop an audit schedule based on the list of sites selected to be audited in the coming calendar year. Development of the schedule should include consideration of conducting technical systems audits (TSAs) and/or Performance Evaluation Program (PEP) audits concurrently with the NPAP audits. These considerations are discussed below:

> **TSAs:** Conducting TSAs of the monitoring sites concurrently with an NPAP audit may be time and resource efficient, particularly for the EPA Regions that conduct their own NPAP TTP audits (in lieu of having a contractor audit team). For EPA Regions that rely on contractors to conduct NPAP TTP audits, a concurrent TSA may still be time and resource efficient. Per 40 CFR Part 58, Appendix A, Section 2.5, TSAs are required to be conducted every three years for each PQAO unless the PQAO consists of more than one monitoring agency, in which case, each monitoring agency must be subject to a TSA every six years such that all monitoring agencies within the PQAO are audited within six years. TSAs are outside the scope of the NPAP and will not be further discussed within this QAPP.
>
> **PEP for $PM_{2.5}$ and Lead (Pb):** In addition to NPAP TTP audits, EPA Regional and contractor FSs typically conduct audits for the EPA PEP for particulate matter with a diameter less than or equal to 2.5 micrometers ($PM_{2.5}$) and Pb at monitoring sites that are required to monitor for the NAAQS. EPA Regional Leads and FSs may consider the need to conduct these PEP audits concurrently, at the same or nearby site, when planning NPAP audits.

The final audit schedule is to be approved by the EPA Regional NPAP Lead. Once the audit schedule has been approved by the Regional NPAP Lead, auditors should contact the sites chosen for the audits to fine tune adjustments to the schedule, as practical. Changes in the schedule are to be communicated to the Regional NPAP Lead.

A5.2.4 Pre-Audit Communication Schedule

The FS and/or Regional NPAP Lead shall contact the monitoring site operator minimally one month prior to the audit and again approximately one week prior to the scheduled audit date to confirm the audit. These communications should include discussion of connections to the site instruments, electrical power needs (if any), logistical concerns, procedures and roles for the audit, equipment or site changes, and personnel expected to be present during the audit. It is helpful to exchange cellular phone numbers and email addresses to ensure problems or issues with arrival at the monitoring site are properly communicated. If problems arise, monitoring site operators should be contacted as soon as possible.

A5.2.5 Schedule for Audit Reporting to AQS

Audit results are to be submitted to AQS within 3 months of the audit. In practice, audit data are routinely submitted to AQS within less than three months as PEAT incorporates automatic submission of audit data to the pre-production area within AQS. Depending on whether the audit evaluation was acceptable or unacceptable, data are subsequently automatically submitted to the production database within AQS within 7 days or 30 days, respectively, after the data are uploaded to the pre-production database. Regional NPAP Leads are to review and validate the audit data while the audits are in the AQS pre-production environment. Regional NPAP Lead approval of an audit during these timeframes will move the audit to the production database within AQS. If the Regional NPAP Leads do not review, validate, and approve the audit within the required timeframe, the audit will automatically move to AQS.

A5.3 Field Scientist Responsibilities

The EPA Regional, contractor, or PQAO FS shall prepare and calibrate the audit systems as described below and in the NPAP TTP SOP.

The auditor(s) will acquire the necessary equipment and materials for conducting the audit as described in the NPAP TTP SOP. Standard gases must be NIST-traceable and within the certification expiration. Equipment for generating and blending challenge gases must be demonstrated to be in proper operable condition and calibrated per the NPAP TTP SOP.

The auditor shall prepare/calibrate the audit systems/materials according to the NPAP TTP SOP. The auditor shall check each audit system, component device, and standard for cleanliness, operational fitness and calibration, as appropriate, prior to use in the NPAP, and shall document/record in PEAT the date these checks/verifications were performed.

The auditor shall ensure that standard gases that have been previously purchased and certified, and of which sufficient quantity remains to appropriately conduct audits, are verified minimally every 12 months. Verification may be performed by the verification laboratories in EPA Regions 4 and 7, by the gas vendor, or by a certified gas analysis laboratory compliant with EPA's Ambient Air Protocol Gas Verification Program (AA-PGVP).

A6 Quality Objectives and Criteria for Measurement

The primary objective of the NPAP is to assess the bias and imprecision of the measured ambient concentrations of criteria pollutant gases reported by monitoring sites. To meet this objective, the quality objectives and criteria for the NPAP relate to:

- characterizing the bias of the audit materials and devices utilized in generating audit gases, and
- the completeness of the audits scheduled for a given calendar year.

These objectives and criteria must be met in order to properly assess the bias of concentrations of criteria gases reported by the audited monitoring sites.

The PEAT application is designed to guide the auditor through the NPAP process and to provide status reports and warnings. PEAT is constructed of modules that guide the auditor in completing specific tasks and in recording associated information within PEAT prior to conducting an NPAP

audit with PEAT. For example, auditors must have completed calibration and certification of standard materials or equipment and recorded these via the "Prepare and Certify Equipment" module in PEAT before the "Audit Tasks" module within PEAT is enabled, which permits the auditor to schedule and conduct audits within PEAT.

A6.1 Audit Devices and Materials

Devices and materials utilized in generating, metering, or measuring standard gases are to be certified or its bias determined against a NIST-traceable standard or device prior to use unless such is not available or applicable. For such components for which there is no traceable standard (e.g., the TTP gas delivery line), the performance (bias) of the component must be characterized by measurement with an instrument calibrated against a NIST-traceable standard. Each device and material has a prescribed certification timeframe during which the device or material may be utilized, after which the device or material will require verification, redetermination of the bias, or replacement with a comparable device or material such that only devices or materials that are within their certification period are employed for conducting NPAP audits. These timeframes are specified in Table A6-1.

Audit devices include gas dilution blending calibrators with an ozone generator, zero (acceptably pollutant-free) air generators, and gas analyzers (CO analyzer and ozone photometer). The NPAP TTP SOP describes the calibration (standardization and verification of calibration) of instruments, devices, and the analysis of performance audit/proficiency test samples as well as performance specifications for each device or material.

Section 9 of 40 CFR Part 58, Appendix E stipulates that all materials in contact with reactive gases (SO_2, NO_2, and O_3) must be non-reactive. Such materials include fluorinated ethylene propylene (FEP) or PTFE Teflon® and borosilicate glass. Contact of these gases with stainless steel should be minimized as even chromatographic grade (e.g., 316 stainless or silicon-ceramic lined stainless steel) can have surface defects or active sites that serve as destructive catalysts for these gases.

Table A6-1. Certification and Verification Specifications for Audit Devices and Materials

Device or Material	Certification or Verification Frequency	Certification or Verification Standard	Specification
Multiblend certified gas cylinder (CO, NO, and SO_2)	Verification not to exceed 12 months	Against first generation NIST standard gases by gas manufacturer or verification labs in Regions 4 or 7, or other certified gas analysis laboratory compliant with EPA AA-PGVP	Within ±3% of the original certified concentration from manufacturer and within ±2% of the previous verification value
High CO gas cylinder (3.5 – 6.5 parts per million [ppm])	Verification not to exceed 12 months	Against first generation NIST standard gases by gas manufacturer or verification labs in Regions 4 or 7, or other certified gas analysis laboratory compliant with EPA AA-PGVP	Within ±3% of the original certified concentration from manufacturer and within ±2% of the previous verification value
Low CO gas cylinder (0.3 – 1.2 ppm)	Verification not to exceed 12 months	Against first generation NIST standard gases by gas manufacturer or verification labs in Regions 4 or 7, in RTP, or other certified gas analysis laboratory compliant with EPA AA-PGVP	Within ±3% of the original certified concentration from manufacturer and within ±2% of the previous verification value

Table A6-1. Certification and Verification Specifications for Audit Devices and Materials (continued)

Device or Material	Certification or Verification Frequency	Certification or Verification Standard	Specification
Ultra-pure zero air (high pressure cylinder)	Expiration or retest date not specified	Examination of certificate of analysis (COA)	COA must show: total hydrocarbons (THC) ≤ 0.01 ppm, CO ≤ 0.01 ppm, oxides of nitrogen ≤ 0.001 ppm, and SO_2 ≤ 0.001 ppm
ZAG output	Performance verified with each audit performed	Compared to the zero air source scrubbed by an external palladium scrubber or to ultra-pure zero air from a high-pressure cylinder	CO response in the zero air from the ZAG must not be ≥ 0.02 ppm greater than the ultra-pure zero air or zero air scrubbed through an external palladium scrubber
Ozone primary standard (Level 2 ozone standard)	Calibration established or verified within the previous three months	Against a Level 1 ozone standard (SRP)	Within ±3% of slope and within ±3 parts per billion (ppb) of the intercept of the SRP
CO analyzer	Calibration established each day of use for TTP audits Calibration verified prior to and immediately following each audit	Calibration established with High CO gas cylinder and zero air Calibration verified against the Low CO gas cylinder	Calibration verification against Low CO must be within ±3% of Low CO certified concentration
Calibrator: gas dilution system, gas phase titrator, and ozone generator	Ozone generator calibration established or verified quarterly	Against a Level 1 (SRP) or Level 2 ozone standard	Within ±5% of the selected standard at each concentration representing Levels 2 through 6
	Mass flow controller (MFC) calibration established (adjusted) within the previous three months and verified immediately after calibration and the day of each audit (strongly recommended). **Note: this is required for performing flow-based audits.**	Against a certified reference flow transfer standard Calibration is performed at 10 flow rates spanning 10 to 90% of the flow rate range Verification is performed at 3 flow rates spanning 10 to 90% of the flow rate range	Calibration verification must show indicated flow rate is within ±2% of the flow transfer standard reading for each tested flow rate
Flow transfer standard	Annually by a qualified NIST-traceable metrology laboratory	Calibration verified or established against a NIST-traceably certified flow standard	Within ±1% of the NIST-traceably certified standard across the flow range
Ozone line loss test	Quarterly challenge the following concentration points: 0.200, 0.125, 0.050, and 0.010 ppm	Ozone evaluated upstream of and from effluent of PTFE delivery line	Ozone loss at each concentration level must be ≤ 2.5 ppb
Environmental conditions temperature probe	Temperature probe calibration verified within the previous 12 months	Readings verified against a NIST-traceably certified thermometer at minimally one temperature between 20 to 30°C	Within ±2°C of the certified thermometer reading(s). If outside this criterion, adjust probe response to match certified thermometer

A6.2 Bias of Audit Stock Standard Gases

Stock standard gases employed by auditors for generating challenge gases and for verifying instrument calibration for measuring/confirming challenge gas concentrations in conducting NPAP audits must have been certified or the concentration verified within the previous 12 months. Such verification demonstrates that the concentration of standard gases from which challenge gases are diluted are demonstrated to be within ±3% of the originally certified value and within ±2% of the most recent verified concentration by comparison to a first generation NIST-certified standard.

Since O_3 cannot be maintained in a cylinder, it must be generated when needed by an ozone generator. Ozone generators integrated into the gas phase titration (GPT) calibrators are to be calibrated (calibration established or verified) quarterly against an SRP (Level 1 standard) or recently certified Level 2 standard, such as an NPAP ozone analyzer. The ozone generator calibration must be within ±5% of the standard at representative concentrations in audit Levels 2 through 6. Level 2 ozone analyzer standards are typically calibrated against the SRP owned by the EPA Region. If the Region does not operate an SRP, the Level 2 ozone standard calibration for such Regions can be performed by a Region operating an SRP.

A6.3 Confirming Challenge Gas Concentrations

It is strongly recommended that, for MVAs, the MFCs within the GPT gas dilution calibrators employed for diluting gases for conducting NPAP audits be calibrated (the calibration established) in the previous three months and the calibration verified on the day of each conducted audit.

> *NOTE: When performing FBAs, the MFCs in the gas dilution calibrator must have been calibrated in the previous three months and verified each day of audit conduct.*

The MFC calibration verification lessens the likelihood of a gross error in preparing dilutions of the stock standard gases; however, it does not account for deviations in challenge gas concentration from the expected theoretical nominal concentration due to leaks, reactions, or contamination within the gas generation and dilution system. As a result, for MVAs, challenge gas concentrations are verified through analysis by gas analyzers calibrated against NIST-traceable certified standards. The calibration of the CO analyzer is established with each multiblend MVA and the Low CO standard is analyzed immediately following the calibration to verify the calibration. The ozone analyzer calibration must have been established or verified within the past three months and verifications must show the response to be within ±3% of the certified Level 1 standard (SRP) and the intercept of the linear regression within ±3 ppb. Additionally, losses of ozone through the delivery line are characterized quarterly as described in Table A6-1 and in the NPAP TTP SOP and this bias incorporated in the determination of the ozone challenge concentrations measured with the ozone analyzer.

A6.4 Completeness

The data completeness measurement quality objectives for the NPAP are to conduct an NPAP audit at all NAAQS monitoring sites over a six-year period, conduct audits at 20% of the sites in each PQAO annually, have ≥ 95% of all NPAP audits scheduled for the calendar year completed, and report all audit results to AQS within three months from completion of the audit.

A6.5 Characterizing Monitoring Station Bias

Monitoring sites must meet the acceptance criteria specified in Table A6-2 for the criteria pollutant gases for each provided audit challenge concentration (level). The comparison is completed by using the measurement reported by the site and the certified challenge gas concentrations measured by the FS and determining either a percent difference or concentration difference. The percent difference is calculated per the following formula:

$$\% \text{ difference} = \frac{(\text{station reported concentration} - \text{challenge concentration})}{\text{challenge concentration}} \times 100$$

The concentration difference is calculated by subtracting the challenge concentration from the station reported concentration.

If the specified criteria listed in Table A6-2 are not met for any audit level of 3 through 10, the audit is deemed unacceptable (failed) and the PQAO/monitoring site must take corrective action to rectify the problem. The Regional NPAP Lead will coordinate with the audited agency's QA group to address the problem and demonstrate that it has been resolved. At the discretion of the Regional NPAP Lead, a re-audit may be scheduled if time and funding allow; however, there is no requirement for a re-audit.

Table A6-2. Acceptance Criteria for NPAP TTP Audits

Audit Parameter	Audit Levels	Acceptance Criteria
SO_2	1 and 2	± 1.5 ppb or ± 15%, whichever is greater, of the challenge gas concentration at each level
	3 through 10	± 15% of the challenge gas concentration at each level
NO_2	1 and 2	± 1.5 ppb or ± 15%, whichever is greater, of the challenge gas concentration at each level
	3 through 10	± 15% of the challenge gas concentration at each level
O_3	1 and 2	± 1.5 ppb or ± 10%, whichever is greater, of the challenge gas concentration at each level
	3 through 10	± 10% of the challenge gas concentration at each level
CO	1 through 10	± 15% of the challenge gas concentration at each level

Note that, although auditors may observe obvious problems with configuration, housekeeping, or other aspects that may impact the ability to report acceptable results, under no circumstances should an auditor suggest or allow alteration to the monitoring site prior to or during performance of the audit. The audit must be performed on the site in an "as-is" condition and the auditor may not allow the station operator to make changes to the audited system until the audit is complete. Auditors who are contractors may not perform troubleshooting or aid in corrective action at the audited site during the process of or following an audit unless specifically authorized to do so by the Regional NPAP Lead. Independent PQAO auditors may offer corrective technical assistance in keeping with their governing QAPP and/or policies.

If corrective action is authorized, typical post-audit troubleshooting may involve inspection of the intake manifold or disconnecting the station analyzer from the inlet and performing an audit through the BOA. If the problem is resolved before the EPA auditor has left the site, the auditor may be granted the authorization by the Regional NPAP Lead or PQAO NPAP Lead to conduct a repeat audit on the same day or may schedule a repeat audit at a later date per direction of the Regional NPAP Lead or PQAO NPAP Lead.

A7 Training Requirements and Certification

FSs, whether EPA employees, contractors, or PQAO staff, must be properly trained and certified to conduct TTP audits. Formal training is required for new personnel and is typically conducted at the EPA Headquarters office in RTP, North Carolina, the EPA Regional offices, or at another appropriate site. The trainer must hold a current training certification to conduct NPAP audits and have been involved in conducting at least 10 NPAP audits in the last three years.

This initial FS training will include a hands-on practical and a written examination. Following the initial certification, new auditors must work with an experienced auditor to conduct at least four separate audits at four separate monitoring sites to learn the processes and procedures for operating the equipment. Of these four audits, two must be ozone and two must be blended gas audits. In some cases, four audits may not be sufficient, and the trainee may need more time conducting audits. The Regional NPAP Lead or OAQPS NPAP Lead must approve the initial training and readiness before new auditors can conduct NPAP audits independently. Once an auditor is approved to conduct audits independently, recertification is required annually thereafter.

Each calendar year, as time and resources allow, an annual recertification course will be offered by the EPA Headquarters office in RTP, North Carolina. All FSs are required and Regional NPAP Leads are encouraged to attend these training sessions, which include a combination of classroom lecture and hands-on instruction, followed by a written examination. Trainees will attend lectures/demonstrations of experienced auditors and will work directly with auditing equipment under the supervision of experienced trained auditors, as practical. New and experienced auditors must demonstrate proficiency with operating audit equipment and achieve a passing score ($\geq$ 90%) on a written exam to receive initial or ongoing certification. These formal training sessions provide an opportunity for auditing staff from the various Regions/PQAOs to share their knowledge and present real-world experiences. Individuals new to conducting audits are introduced

to experienced auditors and have opportunities to ask questions and network with experienced staff. When resources do not permit auditor travel to RTP, efforts will be made to re-certify and train staff at other Regions or through webinars.

Other training opportunities are provided as resources allow and may include training sessions held at Regional offices for smaller groups or conducted as webinars for classroom instruction. Auditors are encouraged to take advantage of and participate in as many of the training sessions as possible.

A7.1 Self-Implementing PQAOs

PQAOs wishing to implement their own TTP audit programs may do so and must comply with the requirements listed in Section 3.1.3.4 of 40 CFR Part 58, Appendix A, the NPAP Program Adequacy/Independence Criteria Memo (July 2008 - available at https://www.epa.gov/sites/production/files/2020-10/documents/npapadequacy072408.pdf), and the National Performance Audit Program, $PM_{2.5}$, $PM_{10-2.5}$, and Lead PEP Implementation Decision Memorandum prepared each calendar year. Few agencies have elected to operate their own NPAP TTP program since the personnel and equipment resources required to operate an independent NPAP TTP are significant. Such agencies have been provided with guidance and independent certification support.

The following criteria listed in 40 CFR Part 58, Appendix A, Section 3.1.3.4 must be met for self-implementing PQAOs:

1. PQAO audit systems and personnel must be separate from the audit system employed to conduct the annual PQAO internal TTP PE audit and must be equivalent to a federal EPA NPAP audit system.
2. The PQAO audit system must be checked (verified) annually against an independent EPA-certified laboratory, or equivalent.
3. The PQAO audit system must conduct a collocated audit with an EPA-certified NPAP audit system annually:
    a. One collocated audit is required for agency networks with ≤ 5 sites
    b. Two collocated audits are required for agency networks with > 5 sites
4. The NPAP must be incorporated into the PQAO criteria monitoring QAPP.
5. The audit system and data generated must be subject to review by qualified independent EPA personnel.
6. PQAO FSs must participate in initial and ongoing training and certifications.

A memo describing the requirements and associated costs for self-implementation, *National Performance Audit Program, $PM_{2.5}$, $PM_{10-2.5}$, and Lead Performance Evaluation Program Implementation Decision Memorandum,* has been developed for agencies seeking self-implementation to better define the requirements in CFR. This memo is to be updated annually and covers the subsequent calendar year. The annual memo can be acquired by contacting the OAQPS NPAP Lead. The 2017 annual memo is

available at the following URL:
https://www3.epa.gov/ttn/amtic/files/ambient/pm25/qa/Final%202017_07-27-074109.pdf

For agencies that elect to operate their own program, the program must be approved by EPA. As cited in 40 CFR Part 58, Appendix A, Section 3.1.3.5, "OAQPS, in consultation with the relevant EPA Regional Office, may approve the PQAO's plan to self-implement NPAP if the OAQPS determines that the PQAO's self-implementation plan is equivalent to the federal programs and adequate to meet the objectives of national consistency and data quality." Approval of the program is necessary to ensure that the PQAO TTP audit data are equivalent to the data obtained by a Regional or contractor TTP auditor. The approval process includes a side-by-side performance audit at one or more sites by both the PQAO and Regional or contractor TTP auditors and TTP systems. Critical elements of the comparison audit are then reviewed to ensure the results are essentially equivalent such that the difference between the two sets of results are within ±5% for each concentration point for ozone and within ±7% for each concentration point for SO_2, CO, and NO_2, as specified in the most recent annual adequacy memo. EPA may also conduct TSAs of the PQAO FSs, audit systems, and audit documentation records to ensure the NPAP TTP audits conducted by the PQAO meet the necessary requirements and are conducted equivalently to the EPA's NPAP program.

A8 Documentation and Records

A8.1 Equipment and Standards Certification Records

Records are to be kept on acceptance testing of audit materials and calibration of audit devices. These records allow the tracking of an audit material/device from its initial acceptance through to the storage of the audit results in AQS. Certification and calibration records for devices and materials utilized in NPAP are maintained by the auditor or cognizant Regional office for minimally one year after which they are transferred to EPA OAQPS where they are maintained until archived by EPA. These records can be hard copy printouts or electronic files such as pdfs. Each Regional office must have a designated area where these records are appropriately stored.

Self-implementing PQAOs will maintain and archive records required to reconstruct acceptance testing, calibration, and verification of audit materials and devices according to their governing QAPP, which will comply with the cognizant EPA Region requirements.

EPA AA-PGVP certification laboratories perform verification, certification, and calibration of devices and materials and must maintain documentation and records for these activities. The AA-PGVP certification laboratories are to archive calibration documentation and records per the 2010 QAPP for the AA-PGVP.

A8.2 Challenge Gas Generation and Verification Records

Records of instrument outputs (e.g., output from dataloggers) for verifying challenge gas concentrations and demonstrating stability as well as logged instrument environmental temperature data must be maintained. Outputs from dataloggers or DAS within which

auditors annotate the demonstration of challenge gas stability or assignment of challenge gas concentration must be likewise maintained in order to reconstruct audit activities. These records, whether electronic and/or hard copy, are to be maintained by the auditor for minimally three years after which they are transferred to the Region where they are maintained until archived by EPA OAQPS.

A8.3 PEAT Records

The PEAT application requires auditors to have username and password credentials for accessing the system. The username and password are unique to the individual and are not shared with other individuals. All data recorded within PEAT are attributable to an individual user, and date and time are recorded for all entries, maintaining the identification of each individual associated with each record. PEAT is an application which polls and writes data to the AQS database. PEAT also stores analyzer calibration data and dates, certified audit gas concentrations and expiration dates, and other quality control records for the audits; however, this information is not transmitted to AQS. PEAT maintains this calibration and certification information within the tablet or laptop PC memory for the convenience of the auditor such that PEAT pre-populates the audit form and the auditor does not need to enter the information for each audit. Since this supplemental information only resides in the PEAT application, the auditor must use the backup function in PEAT to make a copy of the database and store it in a secure location following each audit trip.

The current version of the PEAT application and all previous versions are maintained on a server at EPA's RTP location. Maintenance, redundancy, and access control to the PEAT application files comply with EPA information technology (IT) policies and procedures and will not be addressed within this QAPP.

A8.4 Audit Results Report

Once the audit is completed and prior to the auditor departing the audited monitoring site, the auditor provides the draft audit report to the station operator or monitoring agency representative who documents receipt and attests to the veracity of the site reported measurements in the report. This will typically be accomplished by the FS printing two copies of the audit report, which are then signed by both the auditor and the station operator or monitoring agency representative. The FS maintains one copy and the other remains with the audited monitoring site staff. However, the FS may also electronically transfer the audit report (e.g., via e-mail) and the site operator or monitoring agency representative can respond indicating concurrence.

The audit report is generated within PEAT (for MVAs) and details the results of the audit, indicating the challenge concentrations for each parameter, the concentrations reported by the site, the percent differences or concentration differences for each criteria gas at each challenge concentration, and whether the results were acceptable (passing) or indicated failure. Once the report is generated within PEAT the FS cannot edit the audit data. If there were problems or issues that impact the validity of the audit conducted, the FS will contact the Regional NPAP Lead so the audit can be marked invalid within AQS. Audit reports for FBAs cannot be prepared within PEAT and will be prepared within the

spreadsheet workbook for distribution to the monitoring site staff (which may be hard copy or electronic).

Once the audit report has been generated for MVAs, the data are stored electronically within the tablet or laptop computer and staged for posting to the pre-production area within AQS. When the laptop or tablet computer is connected to the internet, PEAT will automatically upload the audit data to the pre-production area within AQS. FSs must manually upload FBA audit results to AQS; typically this is accomplished by functions within the spreadsheet workbook that generate an-AQS ready transaction file for uploading.

For evaluations that were acceptable (passing) for the challenged criteria pollutant gas concentrations, the auditor need take no further action and the audit results will be uploaded from the pre-production area in AQS to the production database in AQS automatically within seven days, provided the NPAP Regional Lead has not validated and approved the audit (in which case it would be uploaded immediately following approval). Audits for which there were failures for any of the concentration levels of the challenged gases are staged in the pre-production area within AQS for 30 days after which they are loaded to production database within AQS, provided that the NPAP Regional Lead has not invalidated (rejected) or validated and approved the audit. This 30-day period permits review of the audit data by the FS, EPA Regional Lead, and monitoring organization manager and permits changes to be made to the audit record, if such are deemed appropriate, prior to the audit record upload to the AQS production database. Once uploaded to the AQS production database, the audit is locked and cannot be altered.

B. MEASUREMENT/DATA ACQUISITION

B1 Sampling Process Design – Concentration Selection, Generation, Verification, and Delivery of Challenge Gases

The objective of the design of the NPAP TTP process is to ensure that generated challenge gas concentrations are stable, accurate, and representative of sampled air analyzed by criteria pollutant gaseous monitoring stations. This objective drives the equipment chosen and procedures developed for the TTP audit program. Gases and devices employed in the generation and delivery of the challenge gas are of a known high quality as demonstrated by comparison to NIST standards. The auditor has the responsibility of ensuring that the materials and devices are appropriately certified, calibrated, and/or characterized and within the certification date as specified in Table A6-1.

The equipment for generating, verifying, and delivering the audit challenge gases are transported to the audit sites in one of three mobile configurations:

- a case-based system with the audit equipment mounted within racks, is transported to the site in an enclosed truck or van, and may be moved by attached wheels or a hand truck;
- a large self-contained van/enclosed truck in which the instruments are permanently installed,
- or a vehicle with a tow-behind trailer in which the equipment is permanently installed.

Audit equipment includes gas blending instruments, ZAGs, ozone generation instruments, and analysis instruments to verify challenge gas concentrations. Audit materials include NIST-traceable certified stock standard gases for generating blended challenge gases and NIST-traceable certified calibration gases to calibrate gas analyzers with which challenge gas concentrations may be verified.

There are four or five main steps to conducting the NPAP TTP audit: selecting challenge gas concentrations, generating the challenge gas, verifying the concentration of the challenge gas through independent measurement (note the concentrations are not confirmed by independent analysis when performing FBAs), delivering the verified concentration challenge gas to the monitoring station undergoing audit, and recording the reported concentrations measured by the monitoring station.

B1.1 Selecting Challenge Gas Concentrations

For MVAs, the auditor measures concentrations of the generated challenge gas with instruments, independent from the gas generation system, calibrated against NIST-traceable certified standards to ensure that the challenge gas concentrations delivered to the monitoring station inlet for analysis are accurate with respect to the intended concentrations. For FBAs, the concentrations of the challenge gas are not independently verified by analysis and are determined by the calibrated dilution of the standard multiblend gas or calibrated generation of ozone. Generated concentrations of ozone are corrected for demonstrated loss through the delivery line for both MVAs and FBAs. The

delivery of the challenge gas to the monitoring station is complicated by the fact that several of the gases employed in the generation or delivered to the monitoring station are reactive and prone to losses before they can be measured by the station analyzer. For this reason, procedures have been established for warm up and conditioning of the instruments and gas transfer and delivery lines before the challenge gas can be measured by the monitoring station. Specific procedures for instrument warm up and conditioning are detailed within the NPAP TTP SOP.

When conducting an NPAP audit, the auditor provides minimally four different concentration levels of each required criteria pollutant gas to the station. The concentration range of the selected levels must cover the 99th percentile concentration of ambient concentrations reported by the site for each of the required criteria pollutant gases; thus, the selected concentrations will vary by audited site. EPA OAQPS has reviewed the ambient measured concentrations of the criteria pollutant gases and has determined that this 99th percentile concentration criterion is met by auditing concentrations in Levels 2, 3, 4, and 5 for each pollutant gas. EPA has effectively eliminated the need to have different audit levels needed for monitoring sites operating different equipment; e.g., “full scale “or “trace level” instruments.

FSs (whether EPA Regional staff, contractors, or self-implementing PQAO auditors) are to minimally select concentrations within Levels 2, 3, 4, and 5 for each of the pollutant gases to be audited at each monitoring site undergoing audit. If time and monitoring site instrument sensitivity allow, the FS should audit at a concentration in Level 1 as well. The monitoring stations are formally evaluated for pass/fail on their measured concentrations for gas concentrations provided in Levels 3, 4, and 5 (highlighted yellow in Table B1-1) and additionally for any audit including concentrations in Levels 6 through 10. Audit concentrations in Levels 1 and 2 (highlighted pink in Table B1-1) are being collected to evaluate bias at these “trace” levels. Monitoring site pass/fail is not evaluated on the results of the Levels 1 and 2 measurements in PEAT or AQS; however, NPAP Regional Leads may prescribe that monitoring sites need to meet the Levels 1 and 2 acceptance criteria to successfully pass the audit.

The audited concentrations in Levels 3, 4, and 5 represent typical national ambient air concentrations for the criteria pollutant gases. NPAP TTP audits will not typically involve challenging monitoring stations at concentrations above Level 5; however, FSs may provide additional audit points in Levels 6 through 10 if the monitoring site measures ambient concentrations of pollutant gases commensurate with these Levels (as may be the case for SPM or industrial monitoring sites).

Table B1-1. Expanded NPAP Audit Levels and Associated Concentrations

	ppm			
Audit Level	O_3	SO_2	NO_2	CO
1	0.0040 - 0.0059	0.0003 - 0.0029	0.0003 - 0.0029	0.020 - 0.059
2	0.0060 - 0.019	0.0030 - 0.0049	0.0030 - 0.0049	0.060 - 0.199
3	0.020 - 0.039	0.0050 - 0.0079	0.0050 - 0.0079	0.200 - 0.899
4	0.040 - 0.069	0.0080 - 0.0199	0.0080 - 0.0199	0.900 - 2.999
5	0.070 - 0.089	0.0200 - 0.0499	0.0200 - 0.0499	3.000 - 7.999
6	0.090 - 0.119	0.0500 - 0.0999	0.0500 - 0.0999	8.000 - 15.999
7	0.120 - 0.139	0.1000 - 0.1499	0.1000 - 0.2999	16.000 - 30.999
8	0.140 - 0.169	0.1500 - 0.2599	0.3000 - 0.4999	31.000 - 39.999
9	0.170 - 0.189	0.2600 - 0.7999	0.5000 - 0.7999	40.000 - 49.999
10	0.190 - 0.259	0.8000 - 1.000	0.8000 - 1.000	50.000 - 60.000

B1.2 Generating Challenge Gases

Two types of NPAP TTP audits are conducted, the ozone audit for which only ozone is delivered to the monitoring station, and the blended gas audit, which includes one or more of CO, SO_2, and NO_2.

B1.2.1 Ozone Audit

When conducting an ozone audit, auditors generate the desired ozone concentrations with the ozone generator in the GPT calibrator. For MVAs, the ozone-generated gases are subsequently measured with a Level 2 ozone standard analyzer to verify the delivered concentration. For FBAs, the calibrated ozone generator output is delivered to the monitoring station without measured verification. Ozone concentrations for both MVAs and FBAs are adjusted for the line-loss of ozone as described in Section B1.4.

B1.2.2 Blended Gas Audit

For the blended gas audit, auditors generate known concentrations of SO_2, CO, and/or NO_2 to challenge the monitoring station gas analyzers. To do this, the auditor uses a gas calibrator to dilute a standard gas from a high pressure cylinder containing known concentrations of pollutant gases to generate the audit concentrations. For MVAs, auditors employ a calibrated CO analyzer to directly measure and verify the CO concentrations and determine the concentrations of the other gases using the known relative concentrations of gases to CO. For FBAs, the challenge gas concentrations are read directly from the display of the gas calibrator (whose MFCs have been properly calibrated within the past three months and verified the day of audit conduct). To generate NO_2, a known amount of NO is provided by the gas calibrator in excess of the desired NO_2 concentration. The NO is then titrated to NO_2 with a known amount of ozone provided by the ozone generator in the GPT gas dilution calibrator. For MVAs, the generated ozone concentration may be measured with the Level 2 ozone standard analyzer for confirmation prior to performing GPT.

B1.2.2.1 Direct Read Nitrogen Dioxide Monitors

Direct-read NO_2 monitors, or "true NO_2" instruments are increasingly deployed at monitoring stations, particularly at Photochemical Assessment Monitoring Stations (PAMS) sites, where they are required. The current MVA process for auditing NOx analyzers requires the monitoring station analyzer to have a calibrated NO-channel, which is not incorporated in most of the currently available true NO_2 instruments. EPA is in the process of determining a robust method for conducting NPAP audits on these instruments.

The NPAP does not currently prescribe TTP audit procedures for the following Federal Equivalent Methods (FEMs) for true NO_2 (current as of publication of this QAPP):

- FEM EQNA-0514-212 - Teledyne Advanced Pollution Instruments (API) Model T500U CAPS NO_2 Analyzer
- FEM EQNA-1013-210 - Environnement S.A. AS32M CAPS NO_2 Analyzer
- FEM EQNA-0217-242 - Ecotech Serinus 60 CAPS NO_2 Analyzer
- FEM designation available from supplier - Aerodyne Research, Inc. CAPS NO_2 Monitor
- FEM EQNA-0512-200 - Teledyne API Model T200UP Photolytic Conversion NO_2 Analyzer
- FEM EQNA-0320-256 – Teledyne API Model N500 CAPS NOx Analyzer

B1.3 Verifying Challenge Gas Concentrations for Measured Verification Audits

When performing MVAs, once challenge gases of the desired concentration have been generated, the gas concentrations are verified for accuracy and stability by onboard gas analyzers calibrated against NIST-traceable certified standards. Stability of gas concentrations is evaluated as described in the NPAP TTP SOP by examination of consecutive one-minute concentration averages.

The O_3 analyzer (Level 2 ozone standard) calibration is verified and/or adjusted quarterly against an SRP (Level 1 ozone standard). During the audit, a line loss factor is applied to the ozone concentration to adjust for ozone loss through the PTFE delivery hose as determined previously with the ozone line loss test. The ozone line loss test must have been performed in the previous three months (quarterly).

For the blended gas audits, both CO and SO_2 concentrations are verified by analysis of CO concentration in the challenge stream. As both CO and SO_2 are contained in the NIST-traceable certified multiblend cylinder, the concentration of SO_2 can be determined from measuring the CO concentration in the challenge gas and calculating the SO_2 concentration from the known relative certified concentrations of CO and SO_2 in the cylinder. Concentrations of CO are verified by analysis with the CO analyzer which is calibrated each day of use with a NIST-traceable certified standard prior to the audit. The calibration is established with a CO concentration in the range of 3.5 to 6.5 ppm (High CO) and a known zero air matrix with CO < 0.01 ppm. The calibration is then verified immediately after establishment, prior to beginning the audit by analysis of an independent undiluted CO standard (Low CO) with a concentration in the range of 0.3 to 1.2 ppm.

The concentration of NO_2 in the blended gas challenge is determined by calculation of the theoretical nominal concentration from the relative NO/CO concentration measured by the CO verification analyzer and taking the ratio of the NO/CO in the blended gas before GPT of NO with O_3 in the gas calibrator and subtracting the NO remaining after GPT as measured by the monitoring site NO/NOx monitor.

B1.4 Delivery of Challenge Gas

Once the challenge gas concentrations have been selected and generated (and verified for MVAs), they are delivered to the station inlet probe. Challenge gases are delivered to the station inlet probe via a single length (typically 150 feet) of (3/8-inch inner diameter) FEP or PTFE Teflon® hose. As the hose is subjected to numerous cycles of winding and unwinding as well as rough handling through transport and use, it is covered in a protective stainless steel braid.

The delivery line and sample delivery flow path may only be constructed with materials consisting of FEP Teflon®, borosilicate glass, and/or equivalent (per QA Handbook Volume II, January 2017, PTFE Teflon® is an acceptable equivalent material) as required in 40 CFR Part 58, Appendix E, Section 9(a). This allows for a consistent and concentration stable gas delivery by minimizing scavenging of test pollutants during the audit.

Several of the gases delivered for TTP audits are reactive and subject to losses within the delivery hose: O_3, SO_2, and NO_2. Particularly reactive is O_3, which is subject to unrecoverable losses within the delivery hose. The amount of loss can be measured via an ozone line loss test (as described in the TTP SOP). Results from the ozone line loss test are incorporated in the calculation of the ozone challenge gas concentration. SO_2 and NO_2 typically are temporarily lost due to adsorption onto the interior surface of the delivery hose, and require extensive time with each use with the gas flowing through the hose to condition the hose for accurate concentration delivery. To ensure minimal scrubbing of ozone when conducting audits, the delivery hose will need to be conditioned with a low level of ozone if the audit system has been out of routine use or service for several days or weeks. This may include generation of a low level concentration (e.g., 15 ppb) for several days if the system has been idle for up to one week, or a higher concentration (e.g., 150 ppb) for several days if the system has been idle for over a approximately one week. Regardless of frequency of use, the delivery hose must also be conditioned for at least an hour prior to each audit with minimally 75 ppb ozone, and higher concentrations (e.g., up to 500 ppb) are recommended prior to performing ozone audits. The purpose of this conditioning is to deactivate any active sites within the delivery hose, which can react with O_3, NO/NO_2, and/or SO_2.

The connection of the delivery hose to the monitoring site inlet probe must be secure and airtight to avoid unwanted dilution of the challenge gas with ambient air. Flow of the challenge gas through the delivery hose must be sufficiently high to minimize residence time (and the resulting desorption, adsorption, or reaction resulting in change of concentration) within the hose, but a high flow rate can overpressurize the inlet of station gas analyzers undergoing audit. For this reason, a vent tee is typically connected at the extreme downstream end of the delivery hose to allow excess flow and pressure to vent to

the atmosphere instead of pressurizing the monitoring station's gas analyzers. Alternatively, a Teflon® bag may be tightly secured to the station inlet and will allow sufficient venting to avoid overpressurizing the station analyzers. For sites operating blower fans to pull in a constant supply of ambient air to a manifold, the blower fan will be turned off and the fan exit may serve as the vent to ensure overpressurization does not occur.

B2 Sampling Methods Requirements

For each NPAP TTP audit conducted, the auditor will document the concentrations and associated concentration stability of the challenge gas. For MVAs, the measured concentrations and their stability will be established and documented prior to notifying the station operator to report a measurement. For FBAs, the auditor will document the challenge gas concentration from the gas calibrator display and will document stability when indicated by the monitoring station operator. The provided audit concentration values and associated stability are required to complete the traceability of the test gas provided to the monitoring site. For MVAs, these aspects are accomplished by annotating the DAS output. For FBAs, the FS documents the concentration and concentration stability within a hard copy form or electronic spreadsheet. The provided gas concentrations are critical measurements and require measurement with calibrated instruments traceable to certified standards. For MVAs, the measured concentration values of the challenge gas are read from the CO analyzer (multiblend audit) or ozone analyzer (ozone audit) response recorded by the DAS and documented within PEAT and the stability of the challenge gas concentration is recorded as the CO analyzer or ozone analyzer response in the DAS; however, these stability records are not documented within PEAT. For FBAs, PEAT is not currently configured to record the pertinent values, therefore auditors must document these critical measurements on hard copy forms or within electronic spreadsheets.

The test gas generation and analysis sampling requirements for flow path materials, flow rates, residence times, temperature, pressure, etc., are addressed in 40 CFR Part 50 in the method appendices and in 40 CFR Part 58 in Appendices A and E and in appropriate parts of the TTP SOP.

B2.1 Stability of Challenge Gas Concentrations

Determining stability is accomplished differently for MVAs and FBAs.

B2.1.1 Measurement Verification Audit Gas Concentration Stability

For MVAs, stability is determined by observing the one-minute average concentration data from the analyzer as recorded on the DAS. For ozone, when at least the most recent 5 one-minute averages are within 1 ppb of the most recent five-minute average concentration the concentration point is considered stable. For CO, when at least the most recent 5 one-minute averages are within 10 ppb of the most recent five-minute average concentration the point is considered stable. Also, the one-minute averages assessed should not show a consistent positive or negative trend. If there are excursions outside of the ranges described above or a consistent positive or negative trend is observed, the

audit concentration is not stable. The auditor may need to allow a longer duration for the system to demonstrate acceptable stability. If stability cannot be achieved, the FS will troubleshoot, clean or repair the system as necessary, and repeat the process to ensure that a stable audit concentration point can be achieved. Note that if the NPAP audit gas generation system is altered during troubleshooting (i.e., cleaning, fixing a leak, etc.), the CO analyzer or ozone analyzer must be re-calibrated and the audit repeated in entirety.

B2.1.2 Flow-Based Audit Gas Concentration Stability

For FBAs, stability is determined by observing the one-minute average concentration data from the monitoring station undergoing audit. The auditor will begin generating the desired concentration of the pollutant gas and will wait approximately 10 to 20 minutes to notify the station operator to assess the concentration stability. The FS will advise the station operator to evaluate the stability based on the comparison of the five most recent one-minute average concentrations to be within 1 ppb (ozone, SO_2, and $NO/NO_x/NO_2$) or 10 ppb (CO) of the most recent five-minute average concentration. Extended periods (e.g., 30 minutes or more) may be required for the station operator to achieve a stable concentration measurement. If stability cannot be achieved, the FS will troubleshoot, clean or repair the system as necessary, and repeat the process to ensure that a stable audit concentration point can be achieved.

B2.2 Environmental Conditions Measurements

The environmental temperature of the gas generation and delivery equipment must be maintained within specifications (20 to 30ºC) to ensure proper operation. Fluctuations within the temperature range can also have an effect on the concentration stability of audit concentrations, especially at lower concentration levels. Therefore, the temperature must be held as constant as possible with minimal variation. FSs will log the environmental temperatures (recommended to be 1-minute averages; however, the averaging period should not exceed 5 minutes) for the gas generation and measurement equipment (as applicable) to demonstrate the instruments were maintained within the proper environmental conditions.

B2.3 Challenge Gas Flows

It is not critical that the flow of the challenge gas to the monitoring station or audit system verification analyzers is measured accurately. However, it is important that there is excess flow to the monitoring site probe, of which any excess will be released through a vent, to ensure the challenge gas is not diluted with ambient air. This is ensured by setting the output flow to approximately 16 L/minute. Similarly, for MVAs, there should be excess flow to the verification gas analyzers as indicated by the manifold exit vent flow rotameter; however, the magnitude of the flow is not critical and does not require the manifold exit vent flow rotameter to be calibrated.

B3 Sample Handling and Custody

Since NPAP audits are conducted by generating and delivering gases onsite dynamically, the process does not involve collecting and storing samples, therefore custody and handling aspects do not apply to these audits as they would for processes for which samples are collected. Auditors must ensure that equipment and standard materials are

maintained in a secure environment under their control while away from the home base. Policies and procedures for maintaining custody/control of equipment and materials are described in the NPAP TTP SOP.

B4 Analytical Methods

Analytical methods involved in the NPAP TTP audit consist of those performed by the auditor onsite when conducting an MVA to ensure the gas concentrations are accurate and to determine the gas concentrations provided to the monitoring station.

Other analytical methods utilized in the NPAP relate to calibration (either adjustment of verification) of an instrument or certification/verification of a standard material. Calibration of an instrument involves comparison of the response from the instrument undergoing calibration when analyzing a sample of known standard gas. For establishing calibration, the instrument response is adjusted (standardized) to the theoretical nominal concentration of the standard gas. Verification of a standard material involves analyzing the material on an instrument calibrated with a certified material and assessing the standard material's concentration (verification does not assign a new certified value). If a standard material is shown to be out of tolerance, the material may be certified by a properly-accredited laboratory (e.g., AA-PGVP compliant laboratory) and the material assigned a new certified value. Certification is outside the scope of this QAPP.

B5 Quality Control Requirements

QC checks for the NPAP are limited to the periodic calibration verifications of the audit devices and materials as described in Section A6. The CO analyzer employed for concentration verification for MVAs is calibrated each day of use and the calibration is verified by analysis of a NIST-traceable standard. The calibration verification analysis of the Low CO standard must show the measured concentration is within ±3% of the certified concentration. At the conclusion of the audit, the CO analyzer is challenged with a NIST-traceable standard to characterize the analyzer calibration drift over the course of the audit. Gas analyzers are not otherwise subjected to ongoing daily QC checks such as typical periodic (e.g., nightly) span checks and zero checks for gas analyzers at monitoring stations. Produced gases for challenging monitoring stations are checked for quality by analyzing the CO concentration with the calibrated analyzer when performing MVAs. Further, challenge gas concentrations measured by the CO analyzer are compared to the gas calibrator programmed concentrations to ensure they are reasonable with expectations; however, such reasonableness check comparisons are intended to be gross error checks and do not have associated prescribed criteria. For FBAs, FSs will verify the flow rate calibration of each dilution calibrator MFC at three flow rates across 10 to 90% of the full-scale range. Each measured flow rate must be within ±2% of the flow transfer standard reading.

B6 Instrument/Equipment Testing, Inspection, And Maintenance Requirements

All instrumentation used to calibrate or analyze audit devices or materials will be maintained in accordance with the manufacturer's guidelines for routine maintenance of

that instrument. Instrument/equipment testing, inspection, and other maintenance checks and procedures for each TTP audit system component are listed in the NPAP TTP SOP.

B7 Instrument Calibration and Frequency

Instruments and devices employed in NPAP TTP audits for making critical measurements will be calibrated (calibration adjusted to comport with the standard or verified to have met criteria through calibration verification) prior to use in NPAP audits and will meet the criteria and be performed at the frequency specified in Table A6-1. Critical measurements are those measurements which are required for determining the challenge gas concentration.

B8 Inspection/Acceptance Requirements for Supplies and Consumables

To minimize sources of variability within each audit system and between audit systems, the equipment and materials are sourced from reliable vendors. Certified gases and audit equipment are specified in the NPAP SOP. When purchasing gas standards for NPAP, standard gases will be evaluated in the AA-PGVP.

Items purchased will be inspected to ensure they meet the acceptance requirements for supplies and consumables. These specifications are detailed in the purchase documents, which are maintained as a reference to ensure that items of the proper quality and specification are received.

B9 Data Acquisition Requirements (Non-Direct Measurements)

Measured concentration data are polled from AQS annually, to encompass the most recent 3 years of certified data from previous calendar years, to determine the NPAP audit levels that all auditors will follow. These data are maintained within AQS and no manipulations are performed on these data except to determine the maximum and minimum concentrations reported during the calendar year.

AQS monitor and site metadata are retrieved from AQS using PEAT so that the auditor can confirm the record in AQS against the actual observations on site. The metadata are maintained within AQS and the auditor does not have the authority to manipulate or change the data. However, the role of the auditor is to enter the correct information into PEAT where it generates a report to assist the agency in correcting the data.

The OAQPS NPAP Lead may query or instruct a designee (e.g., EPA employee or support contractor) to query NPAP TTP audit data from AQS to assess the data for completeness, data quality, and/or other metrics of interest to the NPAP. Such queries of AQS are performed using standard AQS query reports (AMP reports) and the process does not permit alteration of data maintained within AQS.

B10 Data Management

B10.1 Overview of Data Management

Data generated within the NPAP are categorized in four ways:

1. Monitoring site-specific data regarding the details of each site including historic concentrations measured by the primary monitors for each of the parameters to be audited: These data are maintained within AQS.
2. Certification, calibration, and verification data and records for audit devices and materials employed to generate challenge gases and verify their concentrations: Such records would include certificates of analysis for standard gases, calibration and calibration verification records for gas calibrators, ozone generators, CO gas analyzers, ozone analyzers, and ozone line loss tests. These records are maintained by the FS for three years until transferred to the Regional office for archival.
3. Records of settings and measurements made to generate and verify concentrations of challenge gases and to verify environmental conditions of the audit laboratory during the audit: Such records would include gas calibrator instrument settings and readings from gas analyzers indicating concentrations and demonstrating concentrations were stable when delivered to the monitoring station inlet, as well as the temperature of the laboratory housing the audit equipment during the audit. Such records may be hard copy forms (such as DAS outputs of graphs and annotations or hand-recorded notes or observations) or electronic as recorded within a DAS, electronic spreadsheet, or recorded in PEAT.
4. Results of audits: Such records would include the concentrations reported by the monitoring site operator during an NPAP TTP audit and the resulting evaluation report generated at the conclusion of the audit. Audit reports are typically generated by PEAT (or in spreadsheet workbooks for FBAs), then uploaded and maintained within AQS. The preliminary audit reports (hard copy or electronic) are provided to the station operator and the Regional NPAP Lead.

B10.2 Data Processing and Reporting

Audit records are compiled on an annual basis covering the calendar year. Once completed within PEAT (or uploaded to AQS separately for FBAs), audit results are uploaded to the pre-production area within AQS and subsequently automatically loaded to the AQS production database within a 7-day or 30-day period depending on whether audit acceptance criteria were met. Regional NPAP Leads can intervene on the automatic loading of NPAP TTP data to AQS by approving or rejecting the audit prior to the 7-day or 30-day period.

B10.3 Unacceptable Results

Audit data results that fail to meet the EPA acceptance criteria listed in Table A6-2 for Levels 3 through 10 are considered unacceptable (failing). For such unacceptable evaluations, follow-up measures must be taken by the responsible monitoring organization. The FS will notify the Regional EPA NPAP Lead of the failed audit and the Regional EPA NPAP Lead will be responsible for communicating with the responsible PQAO. Ideally, the SLT QA group would quickly perform a follow-up TTP audit (equivalent to the annual PE) to confirm the NPAP result. If the NPAP TTP failure is confirmed, the monitoring organization will be expected to take corrective actions which

may involve drafting a corrective action plan (CAP), documenting the steps taken to address the noncompliance, and conducting a follow-up audit to demonstrate acceptable performance. If the SLT QA TTP audit does not confirm the NPAP TTP failure, the Regional EPA NPAP Lead will coordinate with the FS to evaluate the TTP audit system (e.g., assess the system performance at a certification laboratory) and may review previous recent NPAP TTP audits for indications of drift, component failure (e.g., leaks), or performance changes impacting audit system accuracy.

Timelines for preparing a CAP, rectifying the nonconformance, and performing a follow-up PE will be determined by the Regional EPA NPAP Lead. The Regional EPA NPAP Leads and the OAQPS NPAP Lead will, as appropriate and necessary, work with SLT QA groups to investigate monitoring sites that fail audits to provide technical assistance to identify and correct problems. In some cases, data invalidation could be a result, but this action would be the result of the process and investigation between the SLT QA group and the EPA Regional Office. Monitoring organizations that fail NPAP audits should take corrective action as soon as possible to address issues to minimize the amount of data impacted. Currently, the EPA Regional NPAP Leads are responsible for reviewing the monthly audit results and corrective action summaries for their Region and following up on potential problems identified during audits. As needed, the OAQPS NPAP Lead may follow-up with Regional NPAP Leads to discuss problems at monitoring sites that are indicated to be unresolved past 30 days in the corrective action summary report.

B10.4 Data Reports

As indicated previously, the auditor distributes the audit results report to the monitoring station operator and to the Regional NPAP Lead. Audit results that are unacceptable (failing) are handled as described in Section B10.3 of this QAPP.

The Regional NPAP Leads provide an individual final audit results report to the audited monitoring agency. Regional requests for follow up and corrective action accompany the final report. Regions will provide follow up responses to the OAQPS NPAP Lead from the audited monitoring agency for failed audits.

EPA OAQPS prepares summary tables of the Regional and National Completeness Results for the NPAP TTP audit program annually which are typically communicated during annual training events and may be posted to the EPA AMTIC website. The summary tables are prepared by compiling bias and completeness data by querying data from standard AQS reports including: AMP500, AMP504, and AMP470.

C. ASSESSMENT/OVERSIGHT

C1 Assessments and Response Actions

C1.1 Performance Audits

C1.1.1 Performance Audit of NPAP Audit Systems

The objective of performing an audit on the FSs and audit systems is to provide an independent assessment of the quality of the performance of the TTP mobile audit systems and the support contractor, EPA, or PQAO staff FSs performing TTP audits.

The OAQPS NPAP Lead may request (and provide funding for the cost of) an unannounced/unscheduled assessment of the performance of the Regional NPAP TTP mobile audit systems and FS personnel by an NPAP Verification Laboratory (i.e., EPA Region 4 or Region 7). The EPA NPAP Verification Laboratory will notify the OAQPS NPAP Lead of the audit and will provide the OAQPS NPAP Lead the qualification results when the audit has been completed. The concentrations of the pollutant gases generated by the FS and Regional audit system will be compared to the verification laboratory measurements to assess accuracy. The audit must minimally challenge Levels 2, 3, 4, and 5 (to mimic a routine TTP audit), and the tested FSs and audit systems must show results within ±1.5 ppb or ±7%, whichever is greater, of the verification laboratory results for each audit concentration level for each parameter. The NPAP Verification Laboratory will send a summary report of results including the condition of the mobile audit lab to the OAQPS NPAP Lead. If the results are unacceptable, the NPAP Regional Verification Laboratory may repeat the qualification audit to confirm the initial results. If confirmed, the unacceptably performing system will require repair, maintenance, and/or recalibration and cannot be employed to conduct TTP audits until the performance is demonstrated to be acceptable.

C1.1.2 Verification of Audit Systems

The Region 7 mobile NPAP TTP laboratory, in addition to gas standards and equipment from the Region 4 and Region 7 Criteria Pollutant NPAP support laboratories, will be employed, as practical and as resources permit, for hands-on training of personnel and verification of the Regional TTP audit systems and/or associated equipment or standards. Each Regional TTP audit system is to be verified annually in addition to the individual audit equipment and materials calibrations and verifications shown in Table A6-1.

Each Regional and self-implementing PQAO NPAP mobile audit system will be independently evaluated preferably annually, but not to exceed a two-year period, by measuring the provided pollutant gas concentrations from the Regional NPAP TTP audit system undergoing verification with the Region 4 or Region 7 support laboratory or AA-PGVP verification laboratory. The frequency of TTP mobile laboratory verification is resource dependent and has allowed most labs to be verified at least once in two years. To achieve verification, the tested FSs and audit systems must show results within ±1.5 ppb or ±7%, whichever is greater, of the verification laboratory results for each audit concentration level for each parameter. The verification test must minimally challenge Levels 2, 3, 4, and 5 (to mimic a routine TTP audit).

C1.1.3 Technical Systems Audits of NPAP Regional Field Scientist Contractors

A TSA will be performed of each Regional contractor every three years by the OAQPS NPAP Lead or a contractor (e.g., NPAP QA Support Contractor) on behalf of the OAQPS NPAP Lead, who may be accompanied by an appropriate EPA technical staff member to ensure that the contractor FS is adhering to this QAPP and the SOPs that cover conducting audits, entering data, distributing data, and maintaining files. The TSA will follow a set format based on the information contained in a checklist based on the NPAP SOP. The TSA will be coordinated with the contractor FS manager. A report of the results of the TSA will be sent in writing within 30 days of the conclusion of the audit to the contractor manager for review. The contractor will determine the root cause of any deficiencies and report the cause(s) and associated corrective action(s) taken to the Regional NPAP Lead within 15 working days. The corrective actions will be approved by the Regional NPAP Lead. All such TSA reports and corrective actions will be sent to the OAQPS NPAP Lead upon completion and approval of the final corrective action response.

C1.1.4 Independent Assessment of EPA Gas Certification Laboratories

The OAQPS NPAP Lead may periodically conduct or delegate an audit of the AA-PGVP verification laboratories supporting the NPAP. The scope of such a TSA may include, but not be limited to: observation of certification processes and procedures, examination of calibration records, review of standard certifications, review of training records, and review of governing QAPPs and/or SOPs.

C1.1.5 Independent Assessment of EPA Field Scientists

In EPA Regions for which EPA staff perform NPAP TTP audits, the EPA FSs and the verification activities they perform for the program will be reviewed every three years in a TSA by the OAQPS NPAP Lead, by a contractor on their behalf, or other appropriately qualified auditor as designated by the OAQPS NPAP Lead.

The program element documentation that should be reviewed in these audits includes the documentation of QA and QC checks and the associated acceptance criteria that are listed in the NPAP TTP SOP:

1. The comparison of the Regional TTP O_3 analyzer (Level 2 ozone standard) to the Regional SRP must have been performed within the previous three months for any conducted audits;
2. Delivery line ozone loss tests, performed quarterly;
3. Cylinder standard verifications, not to exceed 12 months from certification or most recent verification;
4. Personnel training certifications (initial or re-certifications) completed annually;
5. Certification of the Regional TTP audit system (by the Region 4 or Region 7 verification system, or a system that has recently been certified by the Region 4 or Region 7 verification system), completed within the past 12 months (not to exceed 24 months).

C1.2 Corrective Action

C1.2.1 Monitoring Agency Corrective Actions

Monitoring agencies that receive unacceptable (failing) audit evaluations must take corrective action to rectify the problem(s). Such corrective action is to be coordinated with the Regional NPAP Lead as described in Section B10.3. Follow up and corrective action will be documented in the annual summary reports and/or annual tables.

C1.2.2 NPAP Field Scientist and Support Laboratory Corrective Actions

When results of the internal QC checks or external QA audits (e.g., TSAs) demonstrate nonconformances that impact data quality/traceability or exceed the limits specified in this QAPP or in the supporting SOP(s), appropriate action will be instituted by the OAQPS NPAP Lead, EPA Regional NPAP Lead, PQAO NPAP Lead, and/or the contractor FS manager for problems that are determined to be in the implementation of the NPAP TTP Program.

NPAP Regional Leads will provide reports of TSAs conducted on FSs to the FS manager, who will work with the FS (whether an EPA Region staff member, PQAO staff member, or a contractor auditor) to prepare a CAP. The CAP is to be completed within 30 days and submitted to the NPAP Regional Lead. The CAP should include a corrective action tracking (CAT) form included in Appendix A for each finding detailed in the TSA report to ensure that the Regional NPAP Lead can monitor corrective actions and follow up to ensure they are comprehensive, effective (address the problem and prevent recurrence), and completed in a timely manner.

C1.3 Assessment (TSA) Reports

The Regional NPAP Lead managers will receive copies of reports for conducted systems and performance audits and follow-up activities. The OAQPS NPAP Lead will receive copies of all TSA reports and corrective action documentation.

NPAP FS contractors will submit monthly progress reports to the Regional Contract Officer and Regional NPAP Lead on support activities for the NPAP.

C2 Reports to Management

Various reports of activities within the NPAP are to be completed so those responsible for overseeing activities can direct resources appropriately. These various reports are listed in Table C2-1 and further details are described below, as applicable.

Table C2-1. List of Reports Required for NPAP

Type of Reports	Frequency	Author / Recipient	Due Date
Progress Report	Monthly	Contractor auditor/EPA Regional Lead	within 30 days of month end
QA Summary Report	Annually	QA support contractor/OAQPS NPAP Lead	March 15 of subsequent year
NPAP Data Summary	Annually	OAQPS/EPA Regional NPAP Leads	May 31 of subsequent year
Technical Systems Audit Reports	Annually (each Region audited every three years)	OAQPS NPAP Lead or contractor on their behalf /Field Scientist	Within 30 days of TSA conduct
Technical Systems Audit Corrective Action Report	Annually	Field Scientist/EPA Regional Lead and OAQPS NPAP Lead	15 days following receipt of TSA report

At the direction of the OAQPS NPAP Lead, the QA support contractor will prepare a comprehensive annual QA summary report by March 15 for the previous calendar year. The report will include the internal QC reviews and assessments and will incorporate results from the latest independent quality audits of the NPAP, as directed by the OAQPS NPAP Lead.

If requested, the QA support contractor will prepare the following reports:

- Written recommendations to the OAQPS NPAP Lead to incorporate into a TSA report, and comments on the OAQPS NPAP Lead's draft report for a TSA, particularly noting recommendations for modifications to the TSA checklist prior to the trip, within one week following the trip.
- Three copies of the combined monthly technical and financial progress report on or before the 15th of each month, following the first complete reporting period of the contract. These should be sent to the EPA Administrative Contract Specialist, EPA Project Officer, and the OAQPS NPAP Lead.

The NPAP QA support contractor may be tasked to support the following work by the OAQPS NPAP Lead:

- An annual update of the AQS Site Report for EPA's NPAP for the preceding year. The contractor shall prepare and distribute this report to all NPAP participants, EPA Regional NPAP points of contact, and the OAQPS NPAP Lead.

- An annual NPAP Data Summary Report or Table(s) of all the NPAP data to all NPAP participants, EPA Regional NPAP points of contact, and the NPAP Lead by May 31 of each year. The contractor may be asked to support presentation of the NPAP Data Summary Report at the National Air (Management) Meetings.

In addition, the QA support contractor and the EPA NPAP Lead shall also communicate by phone, e-mail, and/or in person on an as-needed basis.

D. DATA VALIDATION AND USABILITY

D1 Data Review, Verification, and Validation Requirements

The criteria used to validate the data entered in AQS are listed in Table D1-1. These criteria have mostly been addressed and enforced within PEAT for MVAs. For FBAs, the audit is conducted outside of PEAT and some of these criteria do not apply (as indicated in Table D1-1), and those that do must be verified manually. Items listed as critical must be met or the TTP audit is invalid. Items listed as operational are important and required, but do not result in invalidation of the audit.

Table D1-1. NPAP TTP Audit Validation Criteria

Category	Parameter	Acceptance Criteria	Importance
Standards Certification or Verification	CO analyzer calibration gases: High CO (3.5 to 6.5 ppm) and Low CO (0.3 to 1.2 ppm)	Certification or concentration verified within the previous 12 months (does not apply to FBA)	Critical. PEAT will not allow audit to occur if the certification or most recent verification date exceeds 12 months.
	Multiblend audit stock gas	Certification or concentrations verified within the previous 12 months	Critical. PEAT will not allow audit to occur if the certification or most recent verification date exceeds 12 months.
	Ozone analyzer calibration	Calibration (established or verified) within the previous three months against a Level 1 ozone standard (SRP)	Critical. PEAT will not allow audit to occur if the calibration or most recent verification date exceeds 3 months.
Equipment Standardization	CO analyzer	Calibration established each audit at zero with ZAG output and High CO standard. Calibration verification with low CO standard must be ±3%. (does not apply to FBA)	Critical. PEAT will not allow audit to continue.
	Zero air generator	CO concentration not to exceed 20 ppb greater than that of ultra-pure zero air or zero air scrubbed through an external palladium (Pd) scrubber (does not apply to FBA)	Operational. If ZAG is not scrubbing CO sufficiently, place Pd scrubber in line for all audit procedures. If no external Pd scrubber is available, the audit is aborted.
	Ozone line loss test	Conducted within the previous 3 months covering four concentrations from 10 to 200 ppb. Loss must be ≤ 2.5 ppb at each level.	Critical. PEAT will not allow audit to occur if the test date exceeds 3 months or exceeds acceptance criteria.

Table D1-1. NPAP TTP Audit Validation Criteria (continued)

Category	Parameter	Acceptance Criteria	Importance
Equipment Standardization (continued)	Gas dilution calibrator MFC calibration/calibration verification	Strongly recommended within the past 3 months and on the day of each audit with flow at each flow rate within ±2% of a certified flow transfer standard (minimum of 3 flows covering 10-90% of flow range for verification) This is required for performing FBAs.	Operational, not critical to audit conduct for MVAs. Critical when conducting FBAs.
	Gas dilution calibrator ozone generator calibration	Concentrations representing audit Levels 2 through 6 are within ±5% of the Level 1 (SRP) or Level 2 ozone standard	Operational, not critical to audit conduct for MVAs. Critical when conducting FBAs.
Audit Concentrations	Gas concentration challenge Levels	Must challenge concentrations in Levels 2, 3, 4, and 5 in Table B1-1	Critical. Audit incomplete and cannot be evaluated without concentrations in Levels 3, 4, and 5.
Audit Concentrations	Concentration stability at each concentration Level point	Consecutive one-minute average concentrations must be within ±1 ppb for ozone and ±10 ppb for CO of the five-minute average. Stability annotated on DAS output for MVAs. For FBAs, FS must document stability.	Critical. PEAT does not evaluate stability and will not abort an audit for exceedance.
Audit Instrumentation	Environmental conditions	Temperature where audit instruments are operated must be maintained within 20 to 30°C (excursions permitted but must be < 30 minutes total)	Critical. PEAT does not evaluate temperature and will not abort an audit for exceedance.

D2 Validation and Verification Methods

The PEAT application employed for preparing for, conducting and documenting, and reporting NPAP audits includes built-in checks to advise auditors when certifications and verifications are due for the standards and equipment. EPA has validated PEAT which will accept only certain values and types of entries. Additionally, prior to completing an audit in PEAT, automatic validation checks are performed to ensure that all required

information has been recorded. PEAT will prompt the auditor to enter the missing information and will not finalize the audit for reporting until the information is recorded.

Even with the advent of PEAT, Regional NPAP Leads are still tasked with validating and approving TTP audits; however, if no validation efforts are taken, audit results are automatically loaded into the production database of AQS within 7 days for acceptable audits and 30 days for failing audits. Regional NPAP Lead approval of an audit pushes the audit data into the AQS production database.

PEAT is not currently configured for conducting FBAs, therefore EPA Regional Leads will verify data entries and calculations and validate FBAs prior to input into AQS, which is performed manually by creating appropriate data files configured with AQS-ready pipe-delimited data strings.

D3 Reconciliation with User Requirements

The FS will examine all data prior to submission to AQS and EPA data reviewers and managers will ensure that the requirements are met as defined.

REFERENCES

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APPENDIX A

Technical Systems Audit (TSA) Corrective Action Tracking (CAT) Form for the Through the Probe (TTP) National Performance Audit Program (NPAP)

NPAP Corrective Action Tracking (CAT) Form

Audited Entity: *(Contractor, Region, Laboratory, etc.)*:	
Date of Audit:	
Finding # *(cited in audit report/corrective action plan)*:	
Description of Finding *(description from the audit report)*:	
Describe action(s) taken to correct finding including date(s) corrective action(s) completed:	
Identify or list documentation (photos, copies of certificates or documents) of corrective action taken and completed *(please attach to this form)*.	
Verified/Prepared by:	Date:
THIS SECTION TO BE COMPLETED BY EPA STAFF	
Reviewer's Comments:	
Reviewed by:	Date:

United States Environmental Protection Agency	Office of Air Quality Planning and Standards Air Quality Assessment Division Research Triangle Park, NC	Publication No. EPA-454/B-19-012 June 2021