



U.S. Environmental Protection Agency Region 8

Southern Ute Indian Tribe Environmental Programs

Department Air Quality Division

P.O. Box 737, MS# 84

Ignacio, Colorado 81137

Quality Assurance Project Plan (QAPP) for

Ambient Air Monitoring Program

Fiscal Year 2026

CAA §105 Grant

BG-97872922

Prepared August 2025

Version 0

A. Project Management and Information/Data Quality Objectives

A1. Title

Quality Assurance Project Plan (QAPP) for Ambient Air Monitoring Program Fiscal Year 2026

Prepared August 2025 by
Southern Ute Indian Tribe
Environmental Programs Department
Air Quality Division

Applicable from October 1, 2025 to September 30, 2026

Revision Number: NA

CAA §105 Grant

BG-97872922

A2. Approval

Southern Ute Indian Tribe Environmental Programs Department Approvals:

Danny
Powers

Digitally signed by Danny
Powers
Date: 2026.09.22
11:00:21 -06'00'

9/22/26

Daniel Powers

Date

Air Quality Division Head

Southern Ute Indian Tribe

Luke Kline

Digitally signed by Luke
Kline
Date: 2026.09.22
14:01:27 -06'00'

9/22/26

Lucas Kline

Date

QA Officer

Southern Ute Indian Tribe

EPA Approvals:

JASON
DEARDORFF

Digitally signed by JASON
DEARDORFF
Date: 2026.09.22
16:00:08 -05'00'

Jason Deardorff

Date

Tribal Program Manager

and Project Officer

EPA Region VIII

KYLE
OLSON

Digitally signed by KYLE
OLSON
Date: 2026.09.22
15:08:57 -06'00'

Mary Goldade

Date

Regional QA Manager (RQAM) and QA Branch Manager

or Delegated Approving Official (DAO)

EPA Region VIII

** Final Tribal approval authority for the FY2026 QAPP is delegated to the Tribal QA Manager, The EPD Remediation Manager and the Air Quality Division Head. Final EPA approval for the FY2026 QAPP is by the EPA Region VII Regional Quality Assurance Manager - Mary Goldade and/or a delegated approval official (DAO).*

**The effective date of this QAPP is the date the EPA Region 8 RQAM or DAO signs the QAPP.*

Contents

A. Project Management and Information/Data Quality Objectives	2
A1. Title	2
A2. Approval	3
A4. Project Purpose, Problem Definition, and Background	8
A5. Project Task Description	9
A6. Information/Data Quality Objectives and Performance/Acceptance Criteria	12
A7. Distribution List	18
A8. Project Organization	19
A9. Project Quality Assurance Officer Independence	20
A10. Project Organization Chart and Communications	20
A11. Personnel Training/Certification	23
A12. Documents and Records	24
B. Implementing Environmental Information Operations	26
B1. Identification of Project Environmental Information Operations	26
B2. Methods for Environmental Information Acquisition	28
<i>B2.1 – Field Activities Environmental Measurements, Observations and Surveys</i>	<i>28</i>
<i>B2.2 – Laboratory Analysis</i>	<i>31</i>
<i>B2.3 – Existing Information</i>	<i>31</i>
<i>B2.4 – Environmental Technology</i>	<i>31</i>
B3. Integrity of Environmental Information	31
B4. Quality Control	32
B5. Instruments/Equipment Calibration, Testing, Inspection, and Maintenance	38
B6. Inspection/Acceptance of Supplies and Services	45
B7. Environmental Information Management	48
C. Assessment, Response Actions, and Oversight	52
C1. Assessments and Response Actions	52
C2. Oversight and Reports to Management	55
D. Elements For Environmental Information Review and Usability Determination	57
D1. Environmental Information Review	57
D2. Usability Determination	60
References	61
Appendices	62
APPENDIX A	63

LIST OF FIGURES

Figure 1. Sampling Site Locations	10
Figure 2. Administrative Organization of the SUIT Air Quality Monitoring Program	21

Figure 3. Sampling Inlets at Ute 3 Monitoring Station.....	28
--	----

LIST OF TABLES

Table 1. Ambient Air Quality and Meteorological Instrumentation	11
Table 2. SUIT AQD Framework	12
Table 3. AQD Data Quality Indicators	14
Table 4. Gas Species Measurement Quality Objectives.....	16
Table 5. Aurora-1000 Environmental Sensors Precision and Accuracy Objectives.....	16
Table 6. Meteorological Data Precision and Accuracy Objectives.....	17
Table 7. PM ₁₀ & PM _{2.5} Continuous Measurement Quality Objectives.....	17
Table 8. QAPP Distribution List.....	18
Table 9. The SUIT Air Quality Project Staff Roles and Responsibilities	19
Table 10. Project Communication Procedures	22
Table 11. Air Quality Monitoring Staff Minimum Training Requirements	23
Table 12. List of Documentation and Records.....	24
Table 13. SOPs Used to Maintain Operations for Each Site.....	27
Table 14. Zero and Span Checks for Continuous Visibility Monitor	37
Table 15. T640 Maintenance Schedule	39
Table 16. T400 Maintenance Schedule	40
Table 17. T200 Maintenance Schedule	40
Table 18. SOPs for Field Sampling Equipment and Laboratory Analytical Instruments	44
Table 19. Critical Supplies and Consumables	45
Table 20. Vendor Responsibility Statements for Consumables.....	47
Table 21. Requirements for Continuous Gas Monitor Standards	53
Table 22. Assessments and Corrective Action	54
Table 23. QA Reports to Management.....	55

LIST OF APPENDICES

APPENDIX A Standard Operating Procedures

1. Instrument Log and AirVision
2. Probe and Sitting Criteria
3. Gas Monitoring SOP's
 - 3.1. API T700 MCF Verification Calibration
 - 3.2. Calibration and Multi-Point Checks
 - 3.3. Gas Regulator Installation Purge and Leak Check
 - 3.4. Manual Zero Span Precision Checks
 - 3.5. Photometer Verification Calibration
 - 3.6. Routine Operations
 - 3.7. Sample Residence Time
4. Meteorological SOP's
 - 4.1. Monthly Meteorological Maintenance
 - 4.2. Quarterly Meteorological Calibration

- 4.3. Quarterly Verification Sheets*
- 5. Data Collection and AQS Submittal SOP's
 - 5.1. AirVision Station Manual Polling SOP*
 - 5.2. AirVision Data Verification SOP*
 - 5.3. AQS Data Submittal SOP*
 - 5.4. AQS Data Certification SOP*
 - 5.5. Continuous Data Weekly Trend Check SOP*
 - 5.6. Continuous Data Monthly QA-QC SOP*
 - 5.7. Quarterly QA Review SOP*
 - 5.8. AQS Data Changes Memo*
 - 5.9. Corrective Action Form Template*
- 6. Nephelometer SOP's
 - 6.1. Ute 3 Nephelometer Maintenance*
 - 6.2. Ute 3 Nephelometer Calibration*
- 7. Filing Protocol
- 8. Data Validation Chart Templates
 - 8.1. Data Validation Flow Chart*
 - 8.2. Data Validation Templates*
- 9. ARS External Audit SOP's
- 10. T640 SOP's and Manual
 - 10.1. T640 Training Manual*
 - 10.2. T640 Manual*
 - 10.3. Monthly T640 Verification*
 - 10.4. T640 Maintenance*
 - 10.5. T640 Field Checklist*
- 11. T200 SOP's
 - 11.1. T200 Manual*
 - 11.2. T200 Maintenance Procedures*
- 12. T400 SOP's
 - 12.1. T200 Manual*
 - 12.2. T200 Maintenance Procedures*
- 13. T700 and T701H SOPs
 - 13.1. T700 Manual*
 - 13.2. T701H Manual*

ACRONYMS AND ABBREVIATIONS

AIRS	Aerometric Information Retrieval System
AQD	Air Quality Division
AQS	Air Quality System

CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COC	Chain of Custody
CV	Coefficient of Variation
DAO	Delegated Approving Official
DCN	Document Control Number
DQI	Data Quality Indicator
DQA	Data Quality Assessment
DQOs	Data Quality Objectives
EPA	Environmental Protection Agency
EIR	Environmental Information Review
ESC	Environmental Systems Corporation
FEM	Federal Equivalent Methods
FRM	Federal Reference Method
LPM	Liters per Minute
MFC	Mass Flow Controller
MQOs	Measurement Quality Objectives
NAAQS	National Ambient Air Quality Standards
NIST	National Institute of Standards and Technology
NO	Nitrogen Oxide
NO ₂	Nitrogen Dioxide
NO _x	Nitrogen Oxides
O ₃	Ozone
OAQPS	Office of Air Quality Planning and Standards
PAL	Project Action Level
PD	Percent Difference
PM _{2.5}	Particulate Matter less than or equal to 2.5 microns
PM ₁₀	Particulate Matter less than or equal to 10.0 microns
Q _a	Sampler flow rate at ambient (actual) conditions of temperature and pressure
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
SLAMS	State and Local Air Monitoring Stations
SOP	Standard Operating Procedure
SPM	Special Purpose Monitor
SRM	Standard Reference Method
SUIT	Southern Ute Indian Tribe
T _a	Temperature, at ambient or actual conditions
V _a	Air volume, at ambient or actual conditions
ZSP	Zero/Span/ Precision

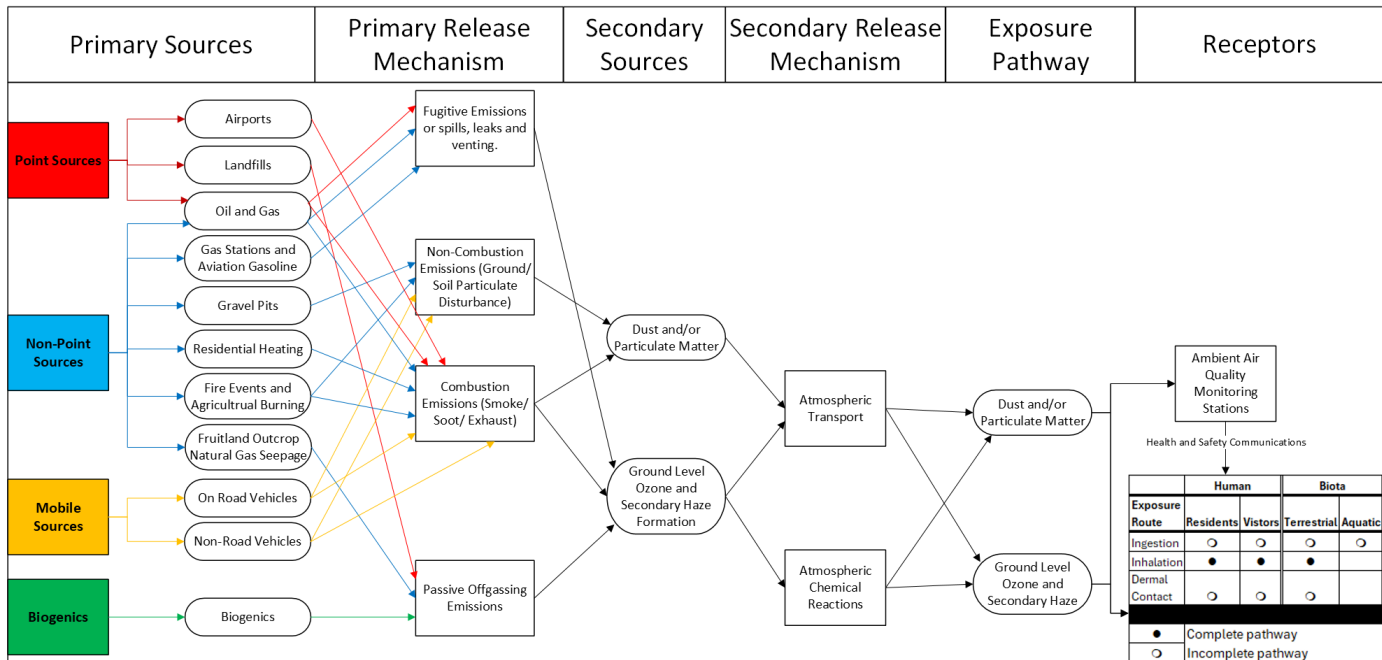
A4. Project Purpose, Problem Definition, and Background

The prime considerations of the AQD are (1) the determination of the general background pollutant concentration levels on the Southern Ute Indian Reservation (Reservation) and (2) issuance in real-time of pollutant concentrations and EPA Air Quality Index (AQI) health alerts. Because of current and projected energy development in the region, the program is concerned with monitoring areas of the Reservation that could potentially be impacted by significant sources of air pollution. Additionally, the Reservation is frequently impacted by high concentration of particulate matter resulting from local and regional forest fires and dust storms. Informing Tribal members and the public of the health impacts of these events in real-time using EPA AQI alerts, is a primary goal of the monitoring program.

It is the AQD's goal to:

- Protect the health and welfare of all residents within the exterior boundaries of the Southern Ute Indian Reservation
- Determine if criteria pollutants of interest are in compliance with the National Ambient Air Quality Standards
- Maintain a reliable continuous ambient air monitoring network, and/or special studies that meet the requirements of the Code of Federal Regulations, particularly, but not limited, to appendix A in 40 CFR Part 58

If it is determined that criteria pollutants recorded by regulatory monitors within the SUIT monitoring network indicate potential non-compliance with a National Ambient Air Quality Standard (NAAQS), the AQD will work with the EPA and State of Colorado to determine if exceptional events contributed to or caused exceedances and will pursue the appropriate pathway for either (1) development of an exceptional event justification in accordance with the EPA Exceptional Events rule or (2) if the Reservation were designated as non-attainment by the EPA, development and EPA approval of a Tribal Implementation Plan by the applicable deadlines to bring the air shed back in to compliance. Below is the conceptual site model for the AQDs pathways to ensure that the goals of the program are met.

AQD Conceptual Site Model**A5. Project Task Description**

The Southern Ute Indian Tribe Air Quality Division is responsible for maintaining the quality of ambient air to protect the health and welfare of residents living within the exterior boundaries of the Reservation. To facilitate the protection of public health and welfare from the effects of air pollution, the AQD maintains three State and Local Air Monitoring Stations (SLAMS) to monitor air quality on the Reservation (Figure 1). The air monitoring station Ute 1 is located just north of Ignacio, Colorado while the second station, Ute 3, is located off Colorado State Highway 550 north of Bondad, Colorado. The third station, a mobile monitoring station, is located at Lake Capote on the east side of the Reservation. All stations adhere to Environmental Protection Agency (EPA) SLAMS quality assurance guidelines and data is reported to the EPA Air Quality System for National Ambient Air Quality Standard comparison and EPA's AirNow website.

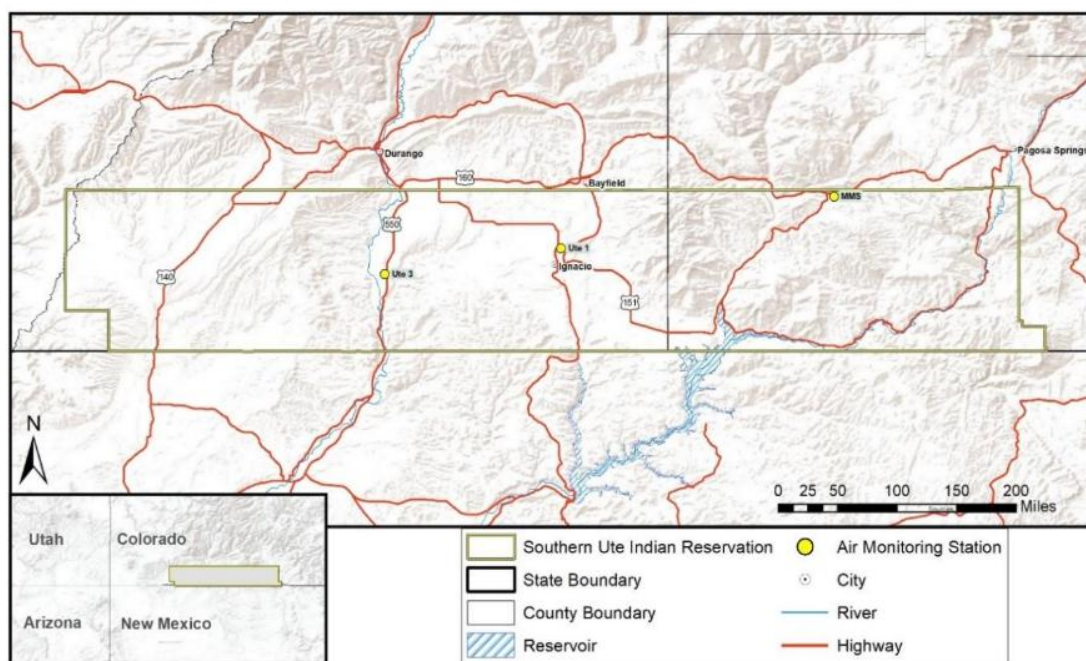


Figure 1. Sampling Site Locations

The Ute 1 monitoring station is located approximately one mile north of Ignacio, Colorado. The station is situated in the Pine River Valley, the most densely populated area of the Reservation. The Ute 1 station meets all siting criteria for urban SLAMS. This station is in a secured area within the Southern Ute Indian Tribe Forestry complex and is thought to be representative of the air quality around the Ignacio community. The AQS ID for Ute 1 is 7001.

The Ute 3 station is located approximately twenty miles west of Ignacio, near Bondad, Colorado. The station is situated along the eastern rim of the Animas River Valley near Highway 550, a major roadway that connects southwestern Colorado with northwestern New Mexico. The area surrounding this monitoring site is comprised of dispersed homes, agricultural activities, and oil and gas production sites, so the site is influenced by both stationary and mobile sources of air pollution. The station meets all siting criteria for urban SLAMS. The Ute 3 monitoring station is located on Tribal land within a locked perimeter fence, and the area is regularly patrolled by Tribal Rangers. The AQS ID for Ute 3 is 7003.

The Mobile Monitoring Station (MMS) is located on the eastern portion of the Reservation near Lake Capote. This location is further removed from the oil and gas development than the Ute 1 and Ute 3 stations on the western portion of the Reservation and is well suited to assess ambient background concentrations prior to proposed development of shale gas resources on the eastern portion of the Reservation. The current location of the MMS meets all siting criteria for urban SLAMS; however, it has been operated as a Special Purpose Monitor (SPM). Due to the length of time the MMS was designated a SPM, the EPA recommended the AQD designate the site as Tribal or SLAMS. The MMS is located within a locked perimeter fence, and the area is regularly patrolled by Tribal Rangers, and visited weekly

by ambient air quality monitoring program staff. The AQS ID for the MMS is 7004.

In addition to the three air monitoring stations the AQD has added two low-cost PurpleAir particulate matter sensors to the monitoring network. The sensors will be located at two different locations, one in the town of Ignacio, Colorado and one at the Lake Capote campground. The AQD is also considering a location for a third PurpleAir sensor on the far west side of the Reservation. There are many Purple Air sensors being operated by civilians in Southwest Colorado, however, there are very few located on the west side of the Reservation. The additional PurpleAir monitoring will be used to help inform the public of health risks associated with fire smoke. Data from the sensors will be polled in real-time to the PurpleAir map layer and linked to the AQD's ambient monitoring website to provide EPA AQI air quality health risk information to the public.

The specific monitors in operation at each site within the AQD monitoring network will be determined by criteria listed in 40 CFR Part 58. Monitors in current possession of the program, their sampling schedules and their locations of operation are listed in Table 1.

Table 1. Ambient Air Quality and Meteorological Instrumentation

Parameter	Number of Instruments	Sampling Schedule	Location	Initial Start Date
				Ute 1 / Ute 3 / MMS
NO, NO ₂ , NO _x	3	Continuous	Ute 1	10/18/2005
			Ute 3	01/01/2001
			MMS	06/01/2017
O ₃	3	Continuous	Ute 1	06/01/1982
			Ute 3	04/01/1997
			MMS	06/01/2017
Wind Direction	3	Continuous	Ute 1	01/01/2001
			Ute 3	01/01/2001
			MMS	06/01/2017
Wind Speed	3	Continuous	Ute 1	01/01/2001
			Ute 3	01/01/2001
			MMS	06/01/2017
Temperature	3	Continuous	Ute 1	01/01/2000
			Ute 3	01/01/2000
			MMS	06/01/2017
Relative Humidity	3	Continuous	Ute 1	01/01/2000
			Ute 3	01/01/2000

			MMS	06/01/2017
Solar Radiation	2	Continuous	Ute 1	01/01/2000
			Ute 3	09/13/2007
Precipitation	2	Continuous	Ute 1	01/01/2000
			Ute 3	02/26/2008
Visibility (nephelometer)	1	Continuous	Ute 3	07/01/2010
PM _{2.5}	2	Continuous	Ute 3	03/01/2013
			Ute 1	10/01/2021
PM ₁₀	2	Continuous	Ute 3	03/01/2013
			Ute 1	10/01/2021

A6. Information/Data Quality Objectives and Performance/Acceptance Criteria

The primary objective of the ambient air quality monitoring network is to determine the ambient concentrations of air pollutants and to measure criteria pollutants of interest within the Reservation's airshed. The AQD aims to protect the health and welfare of residents on the Southern Ute Indian Reservation by ensuring compliance with National Ambient Air Quality Standards (NAAQS), while maintaining a reliable monitoring network and conducting special studies in accordance with federal regulations. The specific pollutants of interest are NO, NO₂, NO_x, O₃, PM_{2.5} and PM₁₀. The AQD may utilize AQS certified data from the region to explore air quality issues connected to industrial activities through spatial and temporal analysis of measured parameters. If high/unhealthy levels of these pollutants are detected or NAAQS are exceeded then AQD will be able to alert the public, direct the public toward appropriate public health resources, and if necessary, develop a Tribal Implementation Plan (TIP) to regain compliance with the NAAQS. The TIP is a comprehensive strategy that details how the Tribe will reduce pollution and bring the area back into compliance with the federal standards.

Table 2. SUIT AQD Framework

Step	Description
1. State the Problem	The Southern Ute Indian Reservation can experience elevated concentrations of ground level ozone associated with regional industrial pollution sources and particulate matter from wildfire smoke and blowing dust. These pollutants can cause unhealthy air quality which at times may near or exceed the National Ambient Air Quality Standards (NAAQS), putting community health at risk.

2. Identify the Goals of the Study	Protect the health and safety of residents of the Reservation by (1) maintaining a reliable monitoring network and providing timely public alerts, real-time monitoring data and EPA Air Quality Index alerts to Tribal members and the public, (2) evaluation air pollutant trends and NAAQS compliance, and (3) development and implementation of air quality programs and regulations to ensure the NAAQS are maintained.
3. Identify Information Inputs	Data collected from the AQD's continuous air monitors, visibility monitor and meteorological sensors. Pollutant data includes NO, NO ₂ , NO _x , O ₃ , PM _{2.5} , and PM ₁₀ and meteorological data includes temperature, windspeed and direction, relative humidity and solar radiation. Other data that could be referenced or used include AQS-certified data from AQD or other regional monitors, weather pattern data, fire activity reports, and federal NAAQS thresholds.
4. Define the Boundaries of the Study	The airshed within the SUIT Reservation boundary and the Four Corners Region. Continuous year-round monitoring with special focus on the summer ozone and wildfire season, and during high pollution events. Practical constraints may include instrument downtime due to instrument malfunctions and repair and staffing turnover.
5. Develop the Analytic Approach	Adherence with all federal quality QA/QC requirements outlined in 40 CFR Part 58, the EPA approved QAPP, internal standard operating procedures (SOPs) and instrument operation manuals. Submit all QA/QC compliant data to the EPA Air Quality Systems (AQS) database. Collect and analyze pollutant data to compare with NAAQS. Pay special attention to episodes of elevated ozone or wildfire smoke and communicate risks quickly to the public. Study long-term trends and short-term events. Compare ozone data to other regional monitors.
6. Specify Performance or Acceptance Criteria	All data submitted to the EPA AQS database must meet federal QA/QC standards as outlined in 40 CFR Part 58, and be accurate, precise, and reliable. The monitoring system must detect pollutant levels that could affect health, especially during episodes of elevated ozone, smoke particulate or during NAAQS exceedances of either pollutant.
7. Develop the Plan for Obtaining Data	Operate and maintain a continuous monitoring network, use AQS-certified regional data, and track fire activity. Provide public health alerts during unhealthy conditions and, if needed, develop a Tribal Implementation Plan (TIP) to maintain or restore compliance with NAAQS.

Data Quality Objectives (DQO) are qualitative and quantitative statements that clarify monitoring objectives, define the appropriate type of data and specify tolerable levels of decision errors for the monitoring program. Data Quality Objectives help to determine whether a particular location meets the NAAQS. The DQO are evaluated and controlled with Data Quality Indicators (DQIs). Data Quality Indicators can be defined in terms of precision, bias, accuracy, representativeness, comparability, completeness, and sensitivity and the AQD DQI goals can be found in Table 3.

Table 3. AQD Data Quality Indicators

Data Quality Indicators (DQIs)	Quality Control (QC) Activities and Checks	DQI goals
Precision	Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions, or how well side-by-side measurements of the same thing agree with each other. Automated and manual periodic span and precision checks for gas species will be run. Periodic Performance audits will provide another estimate of precision.	See Table 4 and Table 7 below.
Bias	Bias is the systematic or persistent distortion of a measurement process that causes uncertainty in one direction (e.g., results are either higher than or lower than they should be). Manual quality control (QC) checks with a known concentration done at least every two weeks for gaseous pollutants, or monthly for particulate pollutants, will be the major estimate of bias. Periodic performance audits will provide another estimate of bias.	See Table 4 and Table 7 below.
Accuracy	Accuracy has been a term frequently used to represent closeness to truth and includes a combination of precision and bias uncertainty components. Calibration standards, control standards, and independent auditing are used to determine accuracy.	See Table 5, Table 6, section B2, and Appendix 1 below.
Representativeness	Representativeness is defined as a measure of the degree to which data represents some characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. The representativeness of measurements made in this program is ensured by following EPA siting guidelines.	Meet SLAMS Siting and Network Design Requirements, See Section A5 above.

Comparability	Comparability is a measure of confidence with which one set of data can be compared to another. This is important so that data sets in different locations or timeframes can be compared.	Data collected is sufficiently similar in methodology to permit a meaningful analysis.
Completeness	Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. Data completeness requirements are included in the reference methods 40 CFR Part 50 and 40 CFR Part 58.	B7. Environmental Information Management and D1. Environmental Information Review below.
Sensitivity	Sensitivity is defined as the lowest value that a method's procedure can reliably discern a measured response above background noise. The capability of a method or instrument to discriminate the parameter of interest at the level of interest. Terms sometimes used to describe sensitivity include Resolution, Method Detection Limit (MDL), Limit of Detection (LOD), and Limit of Quantitation (LOQ).	Detection limits for AQD air quality instruments are consistent with the requirements listed in 40 CFR 53. For Federal Reference Methods (FRM) and Federal Equivalent Methods (FEM), the detection limits are specified with the respective EPA FRM/FEM designation. See Table 3 and Table 4 below for measurement resolution of visibility and meteorological instruments.

All data generated from the AQD monitoring network will be subject to the quality assurance practices summarized in Table 4, 5, 6 and 7.

Automated Span and Precision Checks for Gas Species

The precision and accuracy objectives during automated checks for instruments that measure gas phase species, using EPA designated methods, are summarized in Table 4. As an example, the measurement precision goal for automated ozone check events is defined by a coefficient of variation (CV) of less than or equal to 7% at the upper 90% confidence limit (CL). The measurement bias goal for automated ozone checks is defined as $\leq 7\%$ of the CV at the upper 95% CL (see Appendix A, section 2.3.1.2 to 40 CFR Part 58). Precision warning levels have been established for each gas species to alert to potential issues prior to exceeding the requirements in Appendix A, section 2.3.1.2 to 40 CFR Part 58.

Table 4. Gas Species Measurement Quality Objectives

Parameter	Reference Method	Conditions	Precision Level	Span level	Precision	Bias	Precision Warning
NO	Teledyne T200 Chemiluminescence RFNA-1194-099	Synthetic Atmosphere	40ppb	180ppb	90% CL CV≤15%	95% CL ≤ ±15%	PD ≤7%
NO ₂			40ppb	120ppb			
NO _x			40ppb	180ppb			
O ₃	Teledyne T400 Photometric EQOA-0992-087	Synthetic Atmosphere	40ppb	160ppb	90% CL CV≤7%	95% CL ≤ ±7%	PD≤5%
NO	Thermo Model 42i RFNA-1289-074	Synthetic Atmosphere	40ppb	180ppb	90% CL CV≤15%	95% CL ≤ ±15%	PD ≤7%
NO ₂			40ppb	120ppb			
NO _x			40ppb	180ppb			
O ₃	Thermo Model 49i EQQA-0880-047	Synthetic Atmosphere	40ppb	160ppb	90% CL CV≤7%	95% CL ≤ ±7%	PD≤5%

- Precision Warnings are used to determine when the instruments need to be evaluated for instrument drift. The Precision warnings are set below the Precision listed in the Appendix D QA handbook to ensure that the data is valid.

Continuous Light Scatter/Visibility Data

The AQD employs an Ecotech Aurora Single Wavelength Integrating Nephelometer to measure light scatter and to estimate visibility. Uncertainty in the measurement of the nephelometer light scatter and influential environmental parameters are summarized below in Table 5. Nephelometer and meteorological measurements are an important indicator of air quality during the increasing prevalence of smoke from fires across the western United States and regional emission reductions required by the State of New Mexico and State of Colorado State Implementation Plans for meeting Regional Haze Rule objectives.

Table 5. Aurora-1000 Environmental Sensors Precision and Accuracy Objectives

Parameter	Measurement Resolution	System Accuracy
Barometric Pressure	0.1 mmHg	±10 mmHg of observed

Temperature	0.1°C	±2°C
Relative Humidity	0.1%	±10% of observed
Measurement	< 0.25 – 2000 Mm ⁻¹	< 0.3Mm ⁻¹

Meteorological Data

The measurement precision and accuracy objectives for meteorological parameters are summarized in Table 6. Meteorological data may be used to assist the AQD in better understanding atmospheric transport of pollution within the Reservation's airshed, by constraining models like NOAA Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLIT).

Table 6. Meteorological Data Precision and Accuracy Objectives

Parameter	Measurement Resolution	System Accuracy	Completeness
Wind Speed	0.1 mph	± 5% of observed	75%
Wind Direction	1.0°	± 5.0°	75%
Temperature	0.1°C	± 0.3° C	75%
Precipitation	0.01inches	± 10% of observed	75%
Solar Radiation	0.01 L/M	± 5% of observed	75%
Relative Humidity	0.1%	± 10% of observed	75%

Particulate Data

The continuous non-regulatory measurements of PM_{2.5} and PM₁₀ at Ute 1 and Ute 3 is conducted for the purpose of helping inform individual decision making that will lead to reduced PM exposure in the region from wildfire smoke and dust events. The continuous measurements for PM₁₀ and PM_{2.5} may be used to help inform the relationships between PM concentrations, visibility, and atmospheric transport within the Reservation's airshed. The precision and bias objectives for continuous measurements of fine particulate (PM_{2.5}) are summarized in Table 5.

Table 7. PM₁₀ & PM_{2.5} Continuous Measurement Quality Objectives

Parameter	Reference Method	Precision	Bias	Precision Warning
PM ₁₀	Teledyne APIT640 (5.0 L/min) EQPM-0516-239	≤15% CV	± 15%	PD ≤10%
PM _{2.5}	Teledyne APIT640 (5.0 L/min) EQPM-0516-236	≤10% CV	± 10%	PD ≤7%

A7. Distribution List

Key individuals and their organizations are listed on page 3, the signature page. These individuals will receive copies of the approved FY26 SUIT AQD Quality Assurance Project Plan (QAPP) and any subsequent revisions. Approved QAPPs will be stored on the password protected SUIT AQD hard drive. Below is a general list of the organizations receiving a copy of this QAPP (Table 8).

Table 8. QAPP Distribution List and Approval Authorities

Name	Title	Organization	Phone Number and Email Address
Mark Hutson	Environmental Programs Department Director	Southern Ute Indian Tribe	970-563-2206 mhutson@southernute-nsn.gov
Danny Powers	Air Quality Division Head	Southern Ute Indian Tribe	970-563-2265 dpowers@southernute-nsn.gov
Andrew Switzer	Air Quality Program Manager	Southern Ute Indian Tribe	970-563-2214 aswitzer@southernute-nsn.gov
Patricia Peña	Air Quality Specialist	Southern Ute Indian Tribe	970-563-2221 ppena@southernute-nsn.gov
Lucas Kline	QA Officer	Southern Ute Indian Tribe	970-563-2256 lkline@southernute-nsn.gov
Jason Deardorff	Tribal Program Manager and Project Officer	EPA Region VIII	303-312-6583 Deardorff.Jason@epa.gov
Kyle Olson	Air Program Officer	EPA Region VIII	303-312-6002 olson.kyle@epa.gov
Mary Goldade	RQAM & QA Branch Manager	EPA Region VIII	303- 312-7024 Goldade.Mary@epa.gov

** Final Tribal approval authority for the FY2026 QAPP is delegated to the Tribal QA Manager, The EPD Remediation Manager and the Air Quality Division Head. Final EPA approval for the FY2026 QAPP is by the EPA Region VII Regional Quality Assurance Manager - Mary Goldade and/or a delegated approval official (DAO).*

**The effective date of this QAPP is the date the EPA Region 8 RQAM or DAO signs the QAPP.*

A8. Project Organization

Overall project responsibility for the SUIT AQD rests with the Southern Ute Indian Tribe as represented by the Tribal Council and its designated representatives.

Program management and administration is the responsibility of the Air Quality Division Head. The Division Head reports directly to the Environmental Programs Department Director. The Department Director's responsibility is to review work performed and to provide Division direction. The Environmental Programs Director reports to the Tribal Executive Officer, who then reports to the Tribal Chairman and Tribal Council. The AQD Staff responsibilities are summarized in Table 9 below.

Final Tribal approval authority for the FY2026 QAPP is delegated to the Tribal QA Officer, the EPD Remediation Manager, Lukas Kline and the Air Quality Division Head, Danny Powers. Final EPA approval for the FY2026 QAPP is by the EPA Region VIII Regional Quality Assurance Manager - Mary Goldade and/or a delegated approval official (DAO).

Table 9. The SUIT Air Quality Project Staff Roles and Responsibilities

Name	Title	Organization	Responsibilities
Danny Powers	Air Quality Division Head	Southern Ute Indian Tribe	Program management and administration is the responsibility of the Air Quality Division Head.
Andrew Switzer	Air Quality Program Manager	Southern Ute Indian Tribe	The Air Quality Program Manager duties include all network reviews/modifications, AQS ambient data submittals/certifications, QAPP revisions, maintenance, and distribution. Additionally, the Air Quality Program Manager shall ensure that the QAPP is implemented as approved; and that all personnel involved in the work have direct access to a current version of the QAPP (electronically on the tribal network server) and all other necessary planning, implementation, and assessment documents. All personnel involved in ambient air monitoring will be appropriately trained in the requirements prior to the start of data generation activities. The Air Quality Program Manager also reviews all the duties conducted by the Air Quality Specialist. The Program Manager reports to the Air Quality Division Head.
Patricia Peña	Air Quality Specialist	Southern Ute Indian Tribe	Routine operation of the monitoring sites, including data collection and data reduction, is the responsibility of the Air Quality Specialist who reports directly to the Program Manager.

Lucas Kline	EPD Remediation Manager/ QA Officer	Southern Ute Indian Tribe	Serves as the Quality Assurance Officer (QAO) and provides a full review of all air quality data quarterly. The QAO does not participate in the data gathering process or is within the AQD.
Ambilabs	Consultant: Technical Oversight	Ambilabs LLC	Consultants are retained by the AQD to conduct performance quality assurance reviews, technical assistance, data oversight, and provide general assistance and training as necessary for AQD personnel. Ambilabs staff are responsible for reporting to the Air Quality Specialist and Air Quality Program Manager who oversee work that their tasked.
Air Resource Specialists	Consultant: Quarterly performance evaluations	Air Resource Specialists	Consultants are retained by the AQD to conduct performance audits.

** QAO data review responsibilities are delegated to other EPD Water Quality and Remediation Division staff when Remediation Program Manager position is vacant.*

** Final Tribal approval authority for the FY2026 QAPP is delegated to the Tribal QA Manager, The EPD Remediation Manager and the Air Quality Division Head. Final EPA approval for the FY2026 QAPP is by the EPA Region VII Regional Quality Assurance Manager - Mary Goldade and/or a delegated approval official (DAO).*

**The effective date of this QAPP is the date the EPA Region 8 RQAM or DAO signs the QAPP.*

A9. Project Quality Assurance Officer Independence

The Quality Assurance Officer (QAO), Lucas Kline, the Remediation Program Manager for the EPD Water Quality and Remediation Division, maintains independence from the Air Quality Division. The QAO has no supervisory or programmatic responsibilities within AQD and does not participate in the generation of environmental ambient monitoring data. This organizational separation ensures that the QAO can objectively oversee, review, and approve quality assurance activities without conflict of interest, thereby maintaining the integrity of the quality system.

A10. Project Organization Chart and Communications

The Southern Ute Indian Tribe is led by the Tribal Council and the Tribal departments are overseen by the Tribal Executive Officer. Figure 2 illustrates the administrative organization of the Southern Ute Ambient Air Quality Program. The QAO and quality assurance personnel are independent of all Air Quality monitoring operations, as shown by lines of communication (dashed lines), rather than lines of reporting (solid lines).

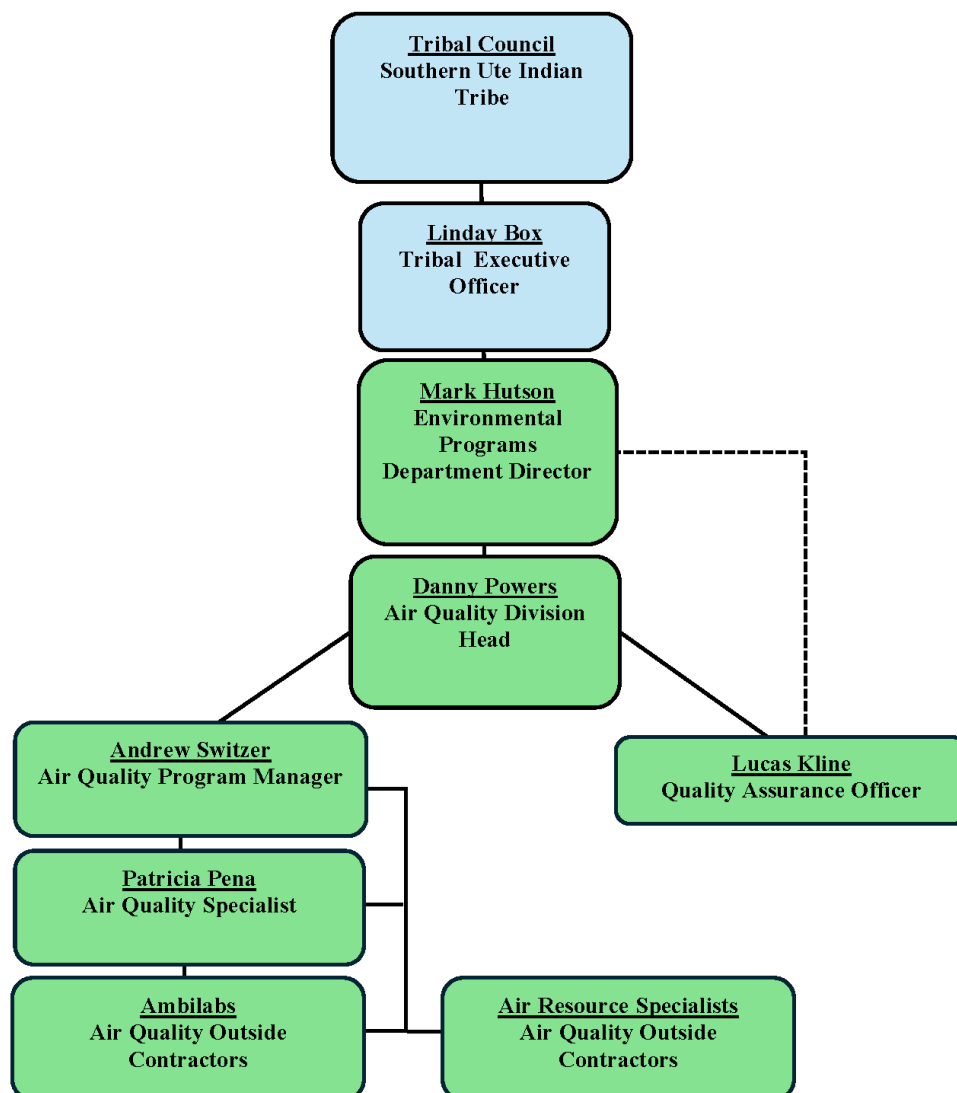


Figure 2. Administrative Organization of the SUIT Air Quality Monitoring Program

Effective communication is a critical component of the AQD, ensuring that data, alerts, and information are shared in ways that protect public health, meet regulatory obligations, and build trust with the community. Communication efforts are shaped by several key drivers, including the need to safeguard vulnerable populations during poor air quality events, provide accurate and timely reporting to federal agencies, and maintain transparency with residents and stakeholders. In addition, the program's communications support emergency response, promote education and awareness, and inform Tribal leadership in policy and planning decisions. Together, these drivers guide how, when, and why the AQD communicates with the public, regulatory agencies, and decision-makers. The

Project Officer and Regional QA Manager are responsible for final decisions on data if there are any non-conformances or discrepancies with the QAPP and the workplan.

Table 10. Project Communication Procedures

Communication Driver	Send Communication to (Name and Organization)	Contact Information	Procedure (timing, pathway, documentation, etc.)
Ambient Air Monitor Regulatory Compliance & Reporting	EPA Tribal Air Monitoring Lead	Kyle Olson, EPA Region VIII Air Program Officer	AQD will send required reports and data to oversight agencies via AQS database, email, etc. (prior to due date). All dispute resolutions lie with the EPA Project Officer and the EPA Regional QA Manager.
Policy & Planning Support	SUIT Tribal Council	Sunshine M. Whyte Tribal Council Affairs Office Manager	AQD will communicate data and findings to Tribal leadership, and stakeholders to guide decisions (as needed).
Ambient Air Monitor QA/QC	Air Resource Specialists / Ambilabs	Brian Orth and Christian Kirk/ Mike Thompson and Tom Randolph	AQD will contact contractors to schedule audits and routine maintenance as well as when suspect data is identified to ensure monitoring site compliance (as required/needed).
Data Sharing and Collaboration	Per Request	Per Request	AQD will evaluate the request and if appropriate share air monitoring results with partner agencies, researchers, or regional networks (as needed). Tribal Data sovereignty will be evaluated prior to data distribution.
Discrepancies or QAPP non-conformances and process improvements	EPA Tribal Air Monitoring Lead	Kyle Olson, EPA Region VIII Air Program Officer	AQD will communicate QAPP non-conformances and process improvements with EPA and upon approval will update appropriate documents and processes.

A11. Personnel Training/Certification

All personnel involved in ambient air monitoring will be appropriately trained in the requirements prior to the start of data generation activities. AQD personnel will attend courses and workgroups offered by EPA's Air Knowledge, Western Regional Air Partnership, Western States Air Resources Council, Northern Arizona University (NAU) Institute for Tribal Environmental Professionals, equipment manufacturers, and other environmental training providers that offer the necessary training to effectively implement the Southern Ute Air Quality Monitoring Program. Personnel who attend training will store a copy of their training report and certification in a training file on the internal server. Training reports will include training dates, topics covered, and certificate of completion. The Air Quality Division Head will document all trainings in annual EPA grants report. Copies of training certifications will be maintained in personnel files. The annual report will be submitted to the EPA Region VIII.

New employees will be given an AQD orientation and evaluated after a 90-day probationary period. Employees will be evaluated annually thereafter to identify deficiencies that can be addressed through additional training. The Air Quality Division Head will be responsible for the personnel performance evaluation of the Air Quality Program Manager and identification of areas in which training is necessary to support performance of appointed tasks. The Air Quality Program Manager will perform the personnel evaluation for the Air Quality Specialist.

The orientation and training of new employees will be conducted by AQD managers and staff and the training institutions mentioned above. Employees will at minimum be required to have sufficient knowledge in areas detailed in Table 11 for each position, or attend trainings listed. These trainings will be completed in the first 12 months of employment or as scheduling allows. The Air Quality Division Head and Program Manager will be responsible for determining if an employee has sufficient knowledge or requires further training.

Table 11. Air Quality Monitoring Staff Minimum Training Requirements

Position	Minimum Trainings (or sufficient knowledge)
AQD Division Head	Management of Tribal Air Programs and Grants Clean Air Act and Permitting Air Pollution Compliance & Enforcement Quality Assurance Project Plans (QAPP) Basic Budgets
Air Quality Program Manager	Air Quality Computations Air Pollution Technology Air Quality System (AQS) Quality Assurance Project Plans (QAPP) Quality Assurance/Control for Air Monitoring Basic Budgets
Air Quality Specialist	Air Quality Computations Air Pollution Technology

	Air Quality System (AQS) Meteorological Monitoring Gaseous Pollutant/PM _{2.5} Monitoring
--	---

A12. Documents and Records

The AQD will establish and maintain procedures for the timely preparation, review, approval, issue, use, control, revision and maintenance of documents and records. Documentation and records maintained by the AQD are listed below in Table 12. Records will be documented either electronically, in bound notebooks, and/or in forms designated for specific applications. Air quality and meteorological data will be transmitted from Agilaire Dataloggers at each station to a central AirVision sever, where it will be backed up and archived. All records will be stored on the Tribe's internal drive or at the Environmental Programs Department office and retained according to the AQD's Record Retention and Filing Protocol (Appendix A7). All relevant air monitoring information will be documented and retained electronically on the tribal network server where it will be accessible to AQD staff for future use and reference. Examples of relevant information include, but are not limited to, instrument manuals, field data sheets, electronic logbooks, calibration/verification records, NIST certifications, audit reports, as well as hourly and minute data.

Table 12. List of Documentation and Records

Categories	Record/Document Type	Employee Responsibility	File Location
Site Information	Network Description, Site checklists, Site maps & pictures, and any proposed monitoring changes	AQ Specialist/Program Manager	Onsite/In Office
Environmental Data Operations	Approved QAPP, Standard Operating Procedures (SOP's), Field notebooks/Site logs, Inspection records, Chain of custody forms, Maintenance/Repair records	AQ Specialist/Program Manager	Onsite/In Office
Raw Data	Any original data (routine and QC data) including data entry forms	AQ Specialist	Onsite/In Office
Data Reporting	Data/summary reports, Annual reports, AQS data submittal	AQ Specialist / Program Manager	In Office

Data Management	Data management plans/flowcharts, Validated air monitoring data, Data management systems	AQ Program Manager	In Office
Quality Assurance	QA/QC Data, QC Checks, Data Precision and Accuracy records, Calibration values and tolerances, Audits, Annual AQS Ambient Data Certification, Network Reviews	AQ Program Manager / Division Head	In Office

The schedules for document development and revisions are as follows: Performance Audit Reports are completed quarterly; Network Reviews, Data Quality Assessments and Certifications, Annual Reports, and QAPPs are completed annually; Technical Systems Audit Reports are completed every three years; and SOPs are updated every three years or as needed. All other documents and reports are prepared on an as-needed basis.

B. Implementing Environmental Information Operations

The FY2026 QAPP was developed using in-house resources including manuals, SOPs, and technical writing guidance. The EPA Region 8 S2 QAPP graded approach template and crosswalk were used for assistance in the final assembly of this QAPP.

B1. Identification of Project Environmental Information Operations

Probe siting information for all monitoring stations is included in Appendix A2 of this QAPP. The site configurations of all stations are in accordance with Appendix E to 40 CFR Part 58. The AQD submitted the current Annual Network Review to EPA in September 2025 after the required 30 days public comment period from August 22, 2025, to September 21, 2025.

The pollutants and meteorological parameters measured within the AQD network assist the program in developing accurate atmospheric representation of the air quality within the Reservation airshed. This representation allows for detailed interpretations of the potential impacts of stationary, area, and mobile sources operating in and around the Reservation. The oil and natural gas exploration and production activities and the Ignacio community within the Reservation were key considerations in establishing air monitoring locations. Stations were sited to represent regional background air quality conditions as well as the air quality community members experience in Ignacio. Additionally, the location of each monitoring station was selected based on the AQD's best understanding of regional transport patterns for pollution throughout the Four Corners area and the resulting potential for exposure to air pollution on the Reservation.

The Ute 1 station is located directly northeast of the town of Ignacio, CO. This location is the best available site for an air quality monitoring station to inform exposure to air pollution in the town of Ignacio, while meeting the siting requirements in 40 CFR Part 58. The Ute 3 station is situated on the eastern ridge of the Animas River valley near Bondad, CO. This river valley is believed to be a main corridor for the transport for pollutants from the Farmington, New Mexico area into the Reservation. The MMS station is currently located at Lake Capote on the eastern portion of the Reservation in an area that is not as heavily influenced by nearby natural gas production activities as the stations on the western portion of the Reservation. The specific site location is a quarter mile south of Highway 160, two miles east of Chimney Rock National Monument. The station is secured by a locked perimeter fence and within the main Lake Capote access gate.

Continuous measurements of all gaseous and meteorological parameters are reported to AQS in hourly averages.

The AQD will measure visibility as a proxy of light scatter, employing a nephelometer at the Ute 3 site. Visibility data is collected on a continuous basis and reported in hourly averages to AQS. This data will be used to inform trends in visibility on the Reservation.

The AQD will employ continuous particulate mass monitors at the Ute 1 and Ute 3 sites. Data will be collected from these instruments on a continuous basis and hourly averages will be reported to AQS. All

continuous PM data will be considered informational and will assist the AQD by informing visibility trends, in documentation of exceptional events, and to provide real-time PM data to the public, enabling informed action during dust storms or forest fires.

Ambient air quality data and meteorological parameters will be collected at all three sites on the reservation. Each site measures specific parameters and follows different combinations of SOPs. The table below, Table 13, outlines the parameters collected at each site, the SOPs used, and the rationale behind maintaining each site to these standards.

Table 13. SOPs Used to Maintain Operations for Each Site

Sample Location	Type of Data Collected	Analytical Parameter/ Group	Sampling SOPs	Rationale
Ute 1 (Ignacio)	Ambient Air	Meteorological (wind speed/direction, relative humidity, ambient temperature, solar radiation, precipitation) and Air Pollutants (Ozone, NO ₂ , PM ₁₀ , PM _{2.5})	Appendix A3, A4, A10, A11, A12	Must meet SLAMs requirements. Determine pollutant levels of criteria pollutants in ambient air to monitor compliance with NAAQS.
Ute 3 (Bondad)	Ambient Air	Meteorological (visibility, wind speed/direction, relative humidity, ambient temperature, solar radiation, precipitation) and Air Pollutants (Ozone, NO ₂ , PM ₁₀ , PM _{2.5})	Appendix A3, A4, A6, A10, A11, A12	Must meet SLAMs requirements. Determine pollutant levels of criteria pollutants in ambient air to monitor compliance with NAAQS.
Ute 4/ MMS (Lake Capote)	Ambient Air	Meteorological (wind speed/direction, relative humidity, ambient temperature) and Air Pollutants (Ozone and NO ₂)	Appendix A3, A4, A11, A12	Does not need to meet SLAMs requirements. Monitor ambient air in a remote location more removed from oil and gas operations than Ute 1 or 2.

B2. Methods for Environmental Information Acquisition

B2.1 – Field Activities Environmental Measurements, Observations and Surveys

Sampling Methods

A.) Environmental Control

The monitoring stations are designed for functionality for both the operator and measurement instruments. Environmental factors are considered to ensure that the AQD methods and sampling are following 40 CFR Part 58. The primary environmental factors for the monitoring sites include temperature and security. The monitoring sites are equipped with continuous temperature control, internal shelter temperature sensors, and shelter security. Wall mount air conditioning/heating units ensure continuous temperature control for the shelters, the current models in use are from Bard and Friedrich. Internal temperature probes help ensure that the instruments operate in the ideal temperature range of 68-86 degrees Fahrenheit. For shelter security, Ute 3 and the MMS have chain link fencing surrounding them with a pad locked gate. Ute 1 is located in the fenced perimeter of the Southern Ute Indian Tribe Forestry complex.

B.) Sampling Probes and Manifolds

All sampling probes are located on the roofs of the monitoring shelters. There are no physical obstructions or air outlets in the vicinity of the sampling probes and inlets allowing unrestricted air flow. Sampling inlets are located 6 ft above the roof of the enclosures and 14ft above ground level. All sampling lines and manifold material are composed of Teflon tubing. The calibration gas sampling line uses 1/8 in outer diameter stainless steel tubing.



Figure 3. Sampling Inlets at Ute 3 Monitoring Station.

C.) Monitoring Methods

For the first four months of the year the AQD used the EPA FRM RFNA-1289-074 for O₃ monitoring and EPA FRM EQOA-0880-047 for NO/NO₂/NO_x monitoring. In May of 2025 the AQD switched to Teledyne instruments. The new instruments use EPA FRM EAOA-0992-087 for O₃ monitoring and NA-1194-099 for NO/NO₂/NO_x monitoring. Non-regulatory Particulate Matter monitoring is conducted following EPA FRM EQPM-05116-240.

Meteorological data is recorded at all monitoring stations. Ute 1 and Ute 3 have meteorological towers equipped with sensors for continuous recording of temperature, wind speed, wind direction, solar radiation, precipitation and relative humidity. The meteorological equipment for the MMS site is located on the roof of the shelter and continuously records wind speed, wind direction, temperature, and relative humidity.

Ute 3 also continuously measures visibility as a function of the scattering coefficient (resulting from the absorption and scattering of light due to particles and/or molecules in the atmosphere). A 520nm wavelength is used for nephelometer measurements.

Field/Sampling Equipment and Materials

In May of CY2025 the Thermo Scientific 49i O₃ and 42i NO_x analyzers were replaced with Teledyne Model T400 Photometric O₃ and Model T200 NO/NO₂/NO_x Analyzers at all monitoring sites.

Teledyne API T700 dynamic dilution calibrators will be used to perform ZSP checks and calibrations of the nitrogen oxides monitors using NIST-certified gas cylinders containing known concentrations of nitric oxide. During normal operation, automated ZSP check events will be performed on a weekly basis or more frequently. Calibration and certification of MFCs will be performed every six months using NIST-traceable Bios 220H and 220L Standardized Mass Flow meters. Method, frequency, and equipment that will be used to certify the Bios 220H and 220L flow meters are detailed in Table 21 of this QAPP.

A blend of NO_x is used for the calibration gas for the T700. Calibration gas purchased through a third-party supplier will possess documentation supplied by the manufacturer containing a description of contents and traceability to a NIST-SRM in accordance with EPA's QA Handbook Volume II (19). Calibration gas cylinders will be verified and inspected by the manufacturer on a bi-annual basis and/or before the cylinder pressure drops below 300PSI. All shipping performed by the AQD will be conducted in accordance with Department of Transportation regulations included in Title 49 CFR. Known concentrations of gas from the multi-blend gas cylinders will be diluted with zero air with mass flow controllers (MFCs) in the T700 calibrators. Zero air for calibrations is sourced by a Teledyne API T701H Zero Air Generator.

Particulate Matter measurements for PM_{2.5} and PM₁₀ are collected using a Teledyne T640 PM Mass Monitor. The Teledyne API T640 PM Mass Monitor is specifically designed to comply with the FEM requirements of 40 CFR Part 50. and to facilitate sampling as specified in that document. The AQD

selected the T640 instrument to measure PM on a continuous basis in compliance with the EPA Class III PM_{2.5} and PM₁₀ FEM certifications. The T640 will operate with a single flow rate at 5.0 L/min. The T640 instruments monitor the operational parameters continually during the sampling cycle. Sample line heaters for the T640 are set to activate at 40% RH and deactivate at 30% RH. The logged information is available to the field operator during and at the end of each sample cycle in electronic data format and stored on the master CPU. The TCP/IP Modbus (digital data output) port provides the capability for T640 instrument communication with the in-station Agilaire 8832 data logger.

The T640 flow rate, thermocouples, RH sensors, and pressure sensors will be verified and/or calibrated every four weeks using these transfer standards:

- a. FP-25 Portable Flow Calibrator, Manufacturer: Alicat
- b. Leak check filter assembly designed for the T640 inlet from Teledyne API

Additional guidance regarding the formal sampler specifications is available in Appendix K of 40 CFR Part 50. Additional guidance regarding operational aspects and quality assurance is available in US EPA QA Guidance Document Section 2.12 and the Operator's Manual for the T640.

The Ecotech Aurora-1000 single wavelength integrating nephelometer measures visibility continuously. The Aurora-1000 also has environmental sensors for barometric pressure, sample temperature and relative humidity. A calibration of the Aurora-1000 should be performed quarterly with CO₂ as the calibration gas. Environmental sensors should be calibrated with the Alicat FP-25. A detailed calibration SOP can be found in Appendix A.6.

Meteorological Equipment used in the field is listed below:

- Internal temperature: Thermistor temperature sensor, Model 4481, manufactured by RM Young.
- External temperature: Thermistor temperature sensor, Response One Model 92500, RM Young.
- Solar Radiation: Silicon Cell Pyranometer, Model LI-200RSMV-15, LI-COR.
- Precipitation: Tipping Bucket Rain Gauge, Model 52202, R.M. Young.
- Humidity: Capacitive Relative Humidity Sensor, Model HUMICAP 180, manufactured by Vaisala.

SOPs for the equipment mentioned above can be found in Appendix A. A more detailed description of the Air Quality specialist maintenance and calibration responsibilities can be found in section B5 of this QAPP.

Decontamination

When new equipment is moved, operated on, or replaced steps are taken to ensure that sample lines are not contaminated. All new Teflon tubing is replaced on an annual basis with Swagelok compression fittings to minimize leaks at connection points. The monitoring stations and sites are continuously cleaned on a routine basis and all potential contaminants removed.

B2.2 – Laboratory Analysis

The AQD does not work with an external laboratory for the analysis of ambient air samples. As a result, the AQD does not have Sample Container, Volume, Preservation, or Holding Time Requirements.

AQD process in selection of labs/ reference table in B4 Tables 19 and 21.

The AQD ships one level two bench standard T700 calibrator to the Region VIII EPA lab for recertification every year. This level two calibrator is then returned to the site where the other 2 bench standards and one field standard are brought to that station to be verified or calibrated to ensure data quality objectives meet QAPP standards.

B2.3 – Existing Information

External data is not regularly collected, however there may be instances where it would be beneficial to the AQD. The data used for public information or trend analysis, which is not obtained from direct measurement, will be obtained from reputable, quality assured sources such as the National Weather Service, EPA, the National Oceanic and Atmospheric Administration, the National Institute of Standards and Technology, or other similar sources. The data will consist of physical constants, weather data, housing information, and other such data. The collection of this data would be from public data information sites or through direct communication and approvals.

If the NAAQS limits are thought to be exceeded, then the AQD may utilize AQS certified data from the region to explore air quality pollutant contributors through spatial and temporal analysis of measured parameters. The data will be extracted from the EPA AQS database for the pollutants and timeframe of interest. Regulated AQS data will be used to determine NAAQS compliance for projects such as instrument comparability or TIP development. Data collected by AQD is converted into the format required for AQS so the two data sets would be compatible.

B2.4 – Environmental Technology

The AQD does not implement any environmental technology for the purpose of pollution prevention, contamination containment, storage, or remediation. Measurements of ambient air are taken to quantify criteria pollutants within the Reservation's airshed to protect the health and welfare of all residents. These measurements are quality assured as described below in B3-B7 of this QAPP.

B3. Integrity of Environmental Information

The AQD does not utilize any laboratories or does any air pollutant collection for laboratory testing. Laboratory elements of this QAPP do not apply to the AQDs air monitoring network. All parameters are measured on a continuous basis. These include all gas species, PM₁₀ and PM_{2.5}, visibility, and metrological measurements. Hourly average data that are representative of ambient conditions will be reported to the EPA AQS database and will be subject to QC operations associated with section 5 of the

Ambient Air Quality Assurance Handbook for Pollution Measurement Systems Volume II, detailed operations pertaining to the instrument operations manual, and the AQD SOP's. Minute averages of all continuous parameters are stored on the Agilaire 8832 datalogger locally for three months and on the central Air Vision server for two years. Hourly averages of gaseous, meteorological, particulate, and visibility are stored locally and on the central Air Vision server indefinitely, eliminating the need for manual sample tracking or chain of custody documentation.

The AQD has initiated an automated routine in the Air Vision software to poll data from each site to the central server every hour to ensure maximum data capture during unexpected events that can contribute to significant data loss. Significant data loss can arise from shelter temperatures exceeding limits, power failures, and electronic instrument communication failure. Measurements from continuous parameters are also shared on the AQD monitoring webpage each time the central server polls data from the three stations, in close to real time. Sample labeling consists of data that has been flagged by AirVision. Flagged data is then analyzed during the quality assurance process. Based off of the flag and the reason for the flag data is then coded accordingly. Physical transportation, handling, and custody are not applicable to AQD data, and laboratory accreditation or selection are not relevant.

To maintain the integrity of data collected through the Ambient Monitoring Program, the Air Quality Specialist conducts routine preventive maintenance and operational checks. Monitoring sites are designed with consideration for atmospheric conditions and are constructed in accordance with current SLAMS protocols to ensure that the data accurately reflects ambient air concentrations. All parameters will be investigated in a station trend analysis in AirVision every month prior to data validation procedures and submittal to AQS by the Air Quality Program Manager and Air Quality Specialist. Detailed procedures for maintenance, calibration, and performance testing are provided in Section B5 of this QAPP. In addition, annual evaluations are conducted by independent third-party entities to avoid potential conflicts of interest. These long-term assessments are described in Section C1 of the QAPP.

B4. Quality Control

Gas analyzers and the T640 PM Mass Monitor must be operated in climate-controlled environments. The monitoring shelter temperatures must always remain between 20° - 30°C (68-86°F). Air conditioners and heaters will be used to maintain this tight temperature range inside the monitoring shelters. The monitoring shelters will be maintained in such a way as to minimize dust contamination and external vibrations from the instruments. Each monitoring shelter will be visited at a minimum of one time per week. During each site visit the operator will inspect the shelter temperature; check that the gas analyzers are operational and produce concentrations typical of the region. The operator will verify that data from each instrument and sensor are being recorded accurately by the data acquisition system. The operator will check the sample lines for any contamination, such as water or dust, and will ensure that the inlet to the sample line is positioned correctly to accomplish ambient monitoring. Gas analyzers and meteorological instruments will be monitored daily remotely as well as data analyzed for reasonableness. The AQD does not use models or modeling to validate ambient air monitoring data.

Nephelometer detection limits and operation

The nephelometer operates inside the Ute 3 air quality monitoring station. During each site visit, the operator will verify that the light scattering coefficient on the nephelometer display is being recorded accurately by the data acquisition system. The operator will examine the nephelometer for any contamination and perform maintenance checks in accordance with the Nephelometer Maintenance SOP (Appendix A6).

Calibration Systems

The dilution systems, reference photometers, zero air generators, and gas cylinders that will be used for gas analyzer calibration are detailed in section B5. Zero air delivered to gas analyzers will additionally pass through a filter in order to remove any PM which could potentially contaminate reflecting surfaces or react with measured gas species. Known concentrations of each measured gas species will pass through as much of the sampling line as is practical toward equivalent treatment of calibration mixtures and ambient air sampled. Furthermore, all QC requirements pertaining to continuous gas monitor accuracy and precision measurements will comply with section 3.2.2 part 58. Zero/span and precision check descriptions herein are listed separately and are referred to as either zero/span, precision, or level 1 weekly checks. Procedures for zero and span check procedures can be found in Appendix A.3.

Zero and Span Checks

Continuous gas monitors will be subject to level 1 zero/span checks weekly. The upper range limit (URL) for the T200, T400, 49i, and 42i instruments is set to 200 ppb. URLs are specified by the instrument manufacturer (Thermo Scientific and Teledyne API) and can be adjusted. Level 1 span checks will be performed using an artificial test atmosphere at concentrations between eighty and ninety percent of the instrument URL, approximately 120–180 ppb for the T200, T400, 49i, and 42i instruments. The exact concentration for each level 1 span check conducted at all three monitoring stations on a weekly basis are as follows: 180 ppb. The frequency of zero/span checks will be based on instrument drift rates associated with interference occurring from the accumulation of particulates on inline filters and various chemical interference originating from the continuous operation of the sampling assembly at each station. Automated zero/span checks will be performed using calibration gas of a known concentration. For NO₂ measurement verification and converter efficiency assessment, gas phase titration using 200 ppb nitric oxide and set points between 30 and 180 ppb O₃ will be used to establish percent converter efficiency on a monthly basis. Additionally, gas phase titration using 200 ppb NO and 40 ppb O₃ will be used to assess NO₂ GPT precision values and estimate converter efficiency on a weekly basis (Appendix A.3). O₃ zero/span checks will be conducted using automated events at concentration levels of 0 ppb and 160 ppb. All zero/span values will be documented. If a zero or span tolerance are exceeded for an analyzer, a calibration followed by a multi-point calibration check will be performed. Procedures for zero and span checks can be found in Appendix A.3.

Zero and Span Check Procedure:

1. Allow sufficient time for the calibration system and the analyzer (if applicable) to warm-up and stabilize.
2. Deliver zero air to instrument and allow sufficient time for analyzer stabilization, by reviewing the AV-Trend real time data trending time series. Record the observed zero reading (Z).
3. Deliver span gas test concentration and allow sufficient time for analyzer stabilization, by reviewing the AV-Trend real time data trending time series. Record the observed span reading (S₁).
4. Calculate zero deviation (D_z):
 $D_z = (Z - b)$, b = intercept of recent multipoint calibration curve, ideally should be zero ppb.
(Definition of zero drift is an adaptation of the definition given in Section 12 of the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II 1998.)
5. Calculate span drift (D_s):
 - a. $D_s = ((S_1 - S) / S) \times 100$ where: D_s = span drift (%)
 - b. S₁ = unadjusted span reading S = actual span gas concentration
(Definition of span drift is an adaptation of the definition given in Section 12 of the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II 1998.)
6. Calculate quarterly average percent zero drift.
7. Zero and span drift values as calculated above are to be analyzed in AirVision. If the following zero or span tolerances are exceeded for an analyzer, a calibration followed by a multi-point calibration check will be performed.

O₃/NO_x/ Analyzer Acceptance Criteria:

O₃ zero drift: $\leq \pm 3.1$ ppb. Span drift: $\leq \pm 7$ %

NO_x zero drift: $\leq \pm 3.1$ ppb. Span drift: $\leq \pm 10$ %

Precision Checks

Continuous gas analyzers will be subject to a precision check at least once per week. The precision checks inform instrument linearity. The frequency of precision checks will be based on possible drift rates associated with interference occurring from the accumulation of particulates on inline filters and various chemical interference originating from continuous measurements. Precision checks will be accomplished through automated events and will use calibration gas of known concentration. For O₃ and NO_x, precision checks will be performed at 40 ppb. All precision check values will be documented. Precision checks, if performed in conjunction with zero/span adjustments, will be performed prior to any such adjustments. If precision tolerance is exceeded for any analyzer, a calibration followed by a multi-point calibration check will be performed. Procedures for precision checks can be found in Appendix A.3.

Precision Check Procedure:

1. Allow sufficient time for the calibration system and analyzer (if applicable) to warm-up and stabilize.

2. Connect the calibration delivery system to the analyzer's sample inlet line. Be sure delivery system is properly vented and sufficient flow exists.
3. Deliver zero air and allow sufficient time for analyzer stabilization by reviewing the AV-Trend real time data trending time series. Record the observed zero reading.
4. Deliver a precision gas concentration (x_i) to analyzer and allow sufficient time for analyzer stabilization by reviewing the AV-Trend real time data trending time series. Record the observed precision reading (y_i).
5. Calculate percent precision (d_i): $d_i = ((y_i - x_i)/x_i) \times 100$.
6. Calculate quarterly average percent deviation (d_{avg}): $d_{avg} = (d_i)_x / n$
 - a. n = number of percent precision (d_i) values which are valid.
 - b. $(d_i)_x$ = sum of all valid percent precision values for the quarter
7. If quality control charts indicate an out-of-control situation, the percent precision value for that period will be considered invalid.
8. Calculate the standard deviation (s_j) of percent precision.
 - a. (d_i) : $s_j = [(\sum (d_i)^2 - (\sum d_i)^2/n)/(n-1)]^{1/2}$. The precision goal of $\pm 15\%$ should be reflected in d_{avg} and s_j , both being $\pm 15\%$.

Performance Audits

Continuous gas monitors will be externally audited on a quarterly basis to ensure that the ozone and oxides of nitrogen analyzers will be within the acceptance criteria of 15% or 1.5 ppb. Audits will be conducted by an outside contractor and in accordance with reference methods documented in the EPA Quality Assurance Handbook for Air Pollution Measurements, Volume II. Audit levels will be representative of typical atmospheric conditions measured at each monitoring station and consistent with section 3.2.2 to 40 CFR part 58. Audit equipment will be independently supplied by the contractor. The contractor will provide gas standards traceability documentation in the audit report and maintain a file of all calibration data in relation to the span gas test source used in an audit (Appendix A.9). The report will include accuracy probability intervals as described in 40 CFR Part 58 and in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II (19). If an external performance audit fails for any analyzer, a calibration followed by a multi-point calibration check will be performed by AQD. Audit result reports are kept in AQDs electronic filing system and stored for 5 years minimum.

Particulate Samplers

T640 Particulate Continuous Sampler Precision and Accuracy

The precision of the T640 PM measurements will be subject to four-week verification checks for each sensor (e.g., barometric pressure, temperature, relative humidity, and flow rate) in the sampler. The T640 will be challenged with span dust every four weeks or when span dust alerts arise. The accuracy of T640 will be estimated by routine verification checks, calibrations, and audits. Flow rate audit results should be within 14% as compared to the recent calibration and within 4% of the design flow rate 5.0 l/m. If the sampler does not meet these requirements, then calibration, repair, and/or data invalidation will be performed as required after the issue for the deviation has been inspected by the external auditor, Air

Quality Specialist, and the Air Quality Manager. If the final recommendation pertains to data validation, this will be determined by the QA Manager (AQ Program Manager or delegate),

T640 PM Mass Monitor Performance Audits

The T640 audits will be conducted by a third-party auditing contractor on a quarterly basis and will be performed using equipment other than that routinely used for station QC by the AQD. The third-party contractor will conduct audits on all auxiliary parameters and the flow rate on a quarterly basis. The audit will consist of the auditors using certified transfer standards to verify that the flow rate, temperature, and barometric pressure are within acceptance criteria. Audit result reports are kept in AQDs electronic filing system and stored for 5 years minimum.

Meteorological Instruments

All meteorological monitoring equipment (with the exception of precipitation) will be mounted to a 10-meter tilt-over crank down tower. Quarterly verification will be performed along with maintenance of meteorological equipment (including changing bearings and other parts as needed) every three months. The precipitation gauge will be cleaned monthly. All dust and debris will be removed from the funnel, screen, and bucket assembly.

Meteorological Instruments Precision and Accuracy

Routine maintenance checks and calibrations are specified in SOPs (Appendix A.4) and in instrument manuals to ensure good accuracy and precision. The calibration equipment, which will be used for meteorological instrument/sensor calibration and verification are listed below.

Meteorological verification equipment:

- Temperature/ Relative Humidity/ Barometric Pressure:
 - ALICAT Portable Mass Flow Standard, Model FP-25
- Wind Speed:
 - Anemometer Drive, Model 18801
 - Torque Disc, Model 18310
- Wind Direction:
 - Vane Angle Fixture, Model 18212
 - Vane Torque Gauge, Model 18331
 - Vane Angle Bench Stand, Model 18112
 - Vane Alignment Rod, Model 18301
- Solar Radiation:
 - Solar Radiation Silicon Pyranometer, Apogee Instruments, Model MP-200
- Precipitation:
 - Calibration bottle, Nova Lynx, Model 260-2595

Calibration and/or verification of the site's meteorological equipment will be performed at least every three months using the meteorological verification equipment listed above. Certification and calibration

of the meteorological verification equipment will be performed annually against NIST-traceable standards. The Meteorological standard operating procedures are available in Appendix A.4.

Equipment used for all meteorological parameter verifications/calibrations are annually verified by the manufacturer and returned with a calibration certificate. Meteorological sensors in the AQD network are verified on a quarterly basis by the AQD. If any meteorological instrument or sensor is reporting outside of the accuracy and precision goals detailed in Table 6, or outside of manufacturer specifications, calibration will be performed by the AQD and/or the manufacturer.

Performance Audits

Meteorological instruments and sensors will be externally audited every six months. Instruments and sensors will be verified by an artificial field or by the co-location with transfer standards. An outside contractor will conduct the audits. The audit report will include audit methods/procedures, equipment used to conduct the audit, and audit results. Audit result reports are kept in AQDs electronic filing system and stored for 5 years minimum.(Appendix A.9).

Continuous Visibility Monitor

The calibration equipment and gas standards, which will be used for nephelometer calibration and quality assurance, are listed in section B2.1 of this QAPP. Routine maintenance checks and calibrations procedures are specified in the SOPs (Appendix A.6) and in the nephelometer user manual.

a) Aurora-1000 Environmental Sensors Precision and Accuracy

Verification equipment used for the Aurora-1000 environmental sensors are annually verified by the manufacturer and returned with a calibration certificate. Aurora-1000 environmental sensors' precision and accuracy objectives are presented in Table 5. The Aurora-1000 environmental sensors are verified every three months by the AQD. If any of the environmental sensors report outside of the guidelines specified Tables 4-6, corrective action will be initiated. Calibration of these environmental sensors will be performed by the AQD and/or the manufacturer.

b) Aurora-1000 Zero and Span Checks

The nephelometer uses internal filters for generating particle free air while performing zero checks. A NIST-traceable gas cylinder containing CO₂ will be used for auto span calibration conducted once every 24 hours for a duration of 15 minutes. The zero air is generated in the instrument internally using a zero-air pump and an internal fine particulate filter providing particle free air. The automated zero calibration will be conducted once every 24 hours for the duration of 15 minutes. Each zero/span auto calibration will have a stability setting of 95%. If this stability reading is not obtained within the 15-minute interval allotted by the programmed sequence the, the Aurora-1000 will not apply an updated calibration coefficient. Table 14 details the zero/span check procedure and action for the continuous visibility monitor.

Table 14. Zero and Span Checks for Continuous Visibility Monitor

Quarterly check	Calibration Tolerance	Action required
-----------------	-----------------------	-----------------

Zero Check	$\pm 2 \text{ Mm}^{-1}$	Do zero adjust
	$\pm 4 \text{ Mm}^{-1}$	Invalidate data Do zero adjust
Span Check	$\pm 5\%$ of span point*	Do full calibration
	$\pm 10\%$ of span point*	Invalidate data Do full calibration

c) Aurora-1000 Environmental Sensors Check

Calibration of the nephelometer's environmental sensors will be performed at least every three months using the ALICAT Portable Mass Flow Standard, Model FP-25. Certification and calibration of the verification equipment is performed by the manufacturer annually.

d) Aurora-1000 Precision Checks

The nephelometer will be subject to a precision check at least every 24 hours. Precision checks will be performed manually using NIST-traceable gas cylinder containing CO₂ (100% purity), which includes zero and span checks detailed in section B5 of this QAPP.

e) Aurora-1000 Performance Audits

The visibility monitor will be externally audited quarterly. Audits will be conducted in accordance with reference methods used for continuous gas monitors. Audit equipment will be independently supplied by the auditor. The auditor will provide gas standards traceability documentation in the audit report and maintain a file of all calibration data in relation to the span gas test source used in an audit (Appendix A9).

System Audits

The U.S. EPA Region VIII has performed a systems audit on the Southern Ute Indian Tribe's Air Monitoring Network and will conduct systems audits every three years. The Southern Ute Air Quality Program will conduct an internal systems audit every year, including the verifications of all T700 Calibrators, and verifications of all instruments and instrument parts on site. The internal systems audit is performed by AQD staff and AQD contracted work with Ambilabs. The internal audits are conducted to ensure all analyzers and sensors are properly operating and that all sampling procedures regulatory satisfactory.

B5. Instruments/Equipment Calibration, Testing, Inspection, and Maintenance

Preventative maintenance schedules recommended by all instrument manufacturers will be followed along with some additional procedures added by the AQD (Appendix A). Maintenance schedules are included on each analyzer maintenance log sheet (Tables 15-17). All maintenance performed on air monitoring instruments that could affect the instrument's calibration will be followed by a multipoint calibration check. Maintenance performed on calibration equipment will be followed by a re-certification of the device if the manufacturer regards the maintenance as affecting the calibration. All preventative

maintenances performed will be documented. Additionally, the following station checks (routine operating procedures) will be performed by the Air Quality Specialist per station visit, ensuring that:

1. That the analyzers are drawing in ambient air at their appropriate flow rates;
2. Sample lines are returned to the manifold after any lines are disconnected for flow checks or other purposes;
3. Fittings are snug but not over-swaged;
4. Analyzers, data acquisition systems, computers, calibrators, valves, and other equipment are in their normal operating modes;
5. Air conditioning and heating systems are working properly;
6. Power cords and adaptors are connected properly and the electrical power supply is stable;
7. The indicated time according to the data acquisition system or other system clocks is accurate, local standard time; and all other items in the Routine Operations SOP are carried out (Appendix A3.6).

Any issues identified will be documented and resolved.

There is no specified maintenance schedule for the Agilaire Dataloggers, issues are troubleshooted and solved as they arise. Software updates for the datalogger PC are conducted periodically when needed. Maintenance for the other equipment including the Zero Air Generator (ZAG) and the T700 Calibrator is completed by the Air Quality Specialist and Ambilabs contractors during the Annual and Semi-Annual Site maintenance. The maintenance tasks are listed below:

T700 Calibrator Maintenance

- Photometer Verification
- MFC Verification
- Leak Check

Zero Air Generator Maintenance

- Internal Pump Rebuild
- Change the Purafil Media
- Change the Charcoal Media
- Change the Air Intake Filter
- Visual Inspection of the Heat Exchanger Coil

Table 15. T640 Maintenance Schedule

<i>Item</i>	<i>Action</i>	<i>Frequency</i>	<i>Calibration Check Required</i>
Particulate Matter 10 Well	Clean	Monthly	No
Inlet	Clean	Quarterly	No

Optical chamber	Inspect and Clean	Every six months or as needed	Yes
Relative humidity/temperature (RH/T) sensors	Inspect and Clean	Every six months or as needed	Yes
Disposable Filter Unit (DFU) for 5-LPM sample flow and 11.67 LPM bypass flow (if installed)	Change	Annually or when Pump PVM value approaches 80%.	Yes

Table 16. T400 Maintenance Schedule

Item	Action	Frequency	Calibration Check Required
Particulate Filter	Change	Monthly or as necessary	Yes
Pump Diaphragm	Change	As necessary	Yes
O ₃ Reference Scrubber	Change	Every 2-5 years, as necessary	Yes
IZS Zero Air Scrubber	Change	Annually	No
Desiccant	Change	Regularly as Needed	No
Absorption Tube	Inspect ----- Clean	Annually ----- As necessary	Yes
Flow Check	Perform Flow Check	Every 6 months	No
Leak Check	Perform Leak Check	Annually or after any Maintenance or Repair	Yes
Pneumatic Lines	Examine and Clean	As necessary	Yes if Cleaned

Table 17. T200 Maintenance Schedule

Item	Action	Frequency	Calibration Check Required
Zero/Span Check	Evaluate Offset and slope	Weekly	No

Particulate Filter	Change	Monthly or as necessary	No
Zero/Span Calibration	Zero and Span Calibration	Every 3 months	Yes
External Zero Air Scrubber Option	Exchange Chemical	Every 3 Months	No
External Dryer Option	Replace Chemical	When indicator color changes	No
Software/Firmware	Check for Updates	Every 6 months of when services	Yes
Ozone Cleanser	Change Chemical	Annually	Yes
Reaction Cell Window “Optical Filter”	Clean	Annually or when necessary	Yes
DFU Filters	Change	Annual or as needed for highly polluted sample air	No
Pneumatic Subsystem	Check for Leaks in Gas Flow Paths	Annually or after repairs involving pneumatics	Yes, if a leak is repaired
Reaction Cell O-rings & Sintered Filters	Replace	Annually	Yes
PMT Sensor Hardware Calibration	Low-level Hardware Calibration	When PMT/ Preamp Changes or if Slow is Outside $1.0 \pm .3$	Yes
Pump	Rebuild Head	When Rx Cell pressure exceeds 10 in-Hg-A (at sea level)	Yes
Inline Exhaust Scrubber	Replace	Annually	No
NO ₂ Converter	Replace Converter	Every 3 years or if conversion efficiency drops below 96%	Yes
Desiccant Bags	Replace	Anytime PMT Housing is Opened for Maintenance	N/A

Configuration Control for Logbooks

A standardized format will be utilized to ensure that all necessary information is obtained in the digital site logbook, located on the AirVision software. This information determines credibility of the data and should not be erased or altered. Recording of the data should be concise and include all relevant information. The format should clearly identify the effected parameters, the date and time, circumstance, purpose of any significant change in the configuration of the air monitoring station, and operating personnel. Logbook entries will be made during any site visit detailing the actions taken by the Air Quality Specialist.

Instrument Repair

In the event of an instrument malfunction or failure, a calibrated replacement shall be installed, if available, while the downed unit is repaired. Spare parts shall be kept in stock to cover predictable failures as determined by the instrument maintenance and repair logs. Troubleshooting procedures provided in the instrument operations manual will be followed to diagnose the problem. When a problem cannot be resolved by these methods, the manufacturer's technical personnel will be consulted for further guidance. Once the problem is isolated, corrective action will be taken immediately to minimize data loss. All resultant information from troubleshooting checks and technical personnel shall be recorded in the site logbook. The maintenance and repair logs will be used to signal the need for more frequent maintenance activities to reduce the occurrence of failure resulting in lost data.

Calibration Procedures and Multipoint Calibration Check Procedure for Gaseous Analyzers

The calibration procedure for the T200 and T400 gaseous analyzers is outlined below:

1. Allow sufficient time for the calibration system and analyzer (if applicable), to warm-up and stabilize.
2. Connect calibration gas delivery system to the monitor's sample inlet line. Be sure delivery system is properly vented and that sufficient flow exists.
3. Increase analyzer averaging time to 300 seconds.
4. Deliver zero air to analyzer, allowing sufficient time for analyzer to stabilize by reviewing AV-trend real-time data trending time series. Record the unadjusted zero reading.
5. Adjust the monitor output to zero. Allow sufficient time for monitor to stabilize as indicated on the AV-trend real-time data trending time series.
6. Ensure analyzer has a nice steady zero response, centered on zero.
7. Record the zero adjustment.
8. Deliver span gas test concentrations to analyzer, allowing sufficient time for the monitor to stabilize as indicated on the AV-trend real-time data trending time series. Record the observed span reading.
9. Adjust monitor span output to the span gas test concentration value, if necessary. Allow sufficient time for monitor to stabilize as indicated on the AV-trend real-time data trending time series.
10. Ensure the instrument has a steady response centered on the span value.
11. Record the adjusted span reading and the span adjustment.

12. Generate five targeted concentration points which cause a monitor response of twenty, thirty, forty, sixty, and eighty percent of the operating range, and record calibrator delivery and analyzer response for each.
13. Plot the calibrator delivery concentrations (y-axis) against the analyzer response values (x-axis) and apply a simple linear regression.
14. The correlation coefficient® for the linear equation listed in step 8, r should be ≥ 0.998 .
15. Return analyzer averaging time to 30 seconds.

A calibration and multi-point calibration check will be performed on the T200 or the T400 gaseous analyzers whenever any of the following conditions occur.

- Quality control charts illustrate excessive drift and or instrumental noise exceeding or equal to zero and/or span drifts of the targeted QC concentration.
- A monitor is initially installed or re-installed.
- A monitor is relocated.
- A monitor undergoes maintenance or repairs.
- Monitor operation is interrupted for more than a few days.
- Upon any indication of monitor malfunction or change in calibration.

Continuous Visibility Monitor

The continuous visibility monitor will be subject to auto zero/span calibration every 24 hours for a duration of 15 minutes. The calibration equipment and gas standards used are discussed in Section B2.1. Standards used to calibrate the visibility monitor require calibration against NIST-traceable standards and its calibration frequency are summarized in Section B2.1. NIST-traceable compressed CO₂ gas will be re-certified when the cylinder pressure drops below 200PSI. The zero-air used for setting the zero will be free of particulate matter as it passes through the instrument and measured as a reference. A full calibration procedure is accomplished through an automatic sequenced event and is accessed from the calibration menu. Refer to Appendix A6 for the Aurora-1000 single wavelength integrating nephelometer user manual for further menu operations.

The Aurora-1000 environmental sensor calibrations will be conducted in the field using a co-location method, employing the AQD's NIST-traceable verification equipment listed in Section B4. A record of verification results will be maintained in the site logbook and documented on the appropriate instrument maintenance log sheet. If any of the environmental sensors fail the verification check, the sensor will be returned to the manufacturer to be recalibrated and certified. The Aurora-1000 environmental sensors will meet the following criteria:

1. Barometric Pressure: Accuracy of $\pm 10\%$ of observed.
2. Temperature: Accuracy of $\pm 2^{\circ}\text{C}$.
3. Relative Humidity: Accuracy of $\pm 10\%$ of observed.

Certification and calibration of the verification equipment will be performed annually against NIST-traceable standards.

Meteorological Instruments

All meteorological instruments at each monitoring site will be verified at least quarterly using the AQD's meteorological verification equipment listed in Section B4 and/or equipment used during an external audit. All meteorological verification will be conducted in the field using a co-location method between the AQD's NIST-traceable verification equipment and the site's meteorological instruments/sensors. A record of verification results will be maintained in the AirVision digital logbook and documented on the appropriate verification forms (Appendix A.4). If any of the site's meteorological instruments fail the verification check, the instrument will be returned to the manufacturer to be recalibrated and certified. Meteorological instruments at each site will meet the following criteria:

- Wind Direction:
 - Ensure that wind direction monitor is properly aligned towards north.
- Wind Speed:
 - Zero reading must be less than 0.5 mph.
 - Accuracy of $\pm [0.4 \text{ mph } (0.2\text{m/s}) + 0.5\% \text{ of observed}]$.
- Ambient Air Temperature:
 - Accuracy of $\pm 0.5 \text{ }^{\circ}\text{C}$.
- Precipitation:
 - Resolution of 0.01 inches (0.3mm) at precipitation rates up to 7.6 cm/hr (3 in/hr).
 - Heating system to assure accurate measurement of frozen precipitation.
 - Suitable windscreen.
- Solar Radiation:
 - Accuracy of $\pm 5\%$ of observed.
- Relative Humidity:
 - Accuracy of $\pm 2\%$ between 0 and 90% RH.

Certification and calibration of the meteorological verification equipment will be performed annually against NIST-traceable standards.

T640 Particulate Continuous Samplers

The sensors and pneumatics of the T640 will be verified every four weeks. Calibrations will be completed on an annual basis or after an unsatisfactory verification is conducted by the Air Quality Program Manager or Air Quality Specialist. Leak tests will be performed every four weeks as part of the verification process.

Table 18. SOPs for Field Sampling Equipment and Laboratory Analytical Instruments

Equipment/ Instrument	SOP Reference
NO, NO ₂ , NO _x	Appendix A.3., A.11
O ₃	Appendix A.3, A.11

PM _{2.5}	Appendix A.10.
PM ₁₀	Appendix A.10.
Wind Direction	Appendix A.4.
Wind Speed	Appendix A.4.
Temperature	Appendix A.4.
Relative Humidity	Appendix A.4.
Solar Radiation	Appendix A.4.
Precipitation	Appendix A.4.
Visibility (nephelometer)	Appendix A6

B6. Inspection/Acceptance of Supplies and Services

The Air Quality Program Manager is responsible for ordering and maintaining supplies. Acceptance criteria must be consistent with overall project technical and quality criteria. Some of the acceptance criteria are specifically detailed in 40 CFR Part 50. Other acceptance criteria, such as observation of damage due to shipping, can only be performed once the equipment has arrived on site. Critical supplies will be purchased as needed from the specific instrument manufacturer or other acceptable suppliers. Table 19 shows the supplies that are considered critical and are associated with the AQD monitoring network, along with established vendors.

Table 19. Critical Supplies and Consumables

Point of Use	Item	Spares Kept In House	Description	Minimum Acceptance Criteria	Vendor
Documentation	Site logbook	3	AirVision digital logbook	3	Agilaire
Analyzer/sampler	Fuses	0	In analyzers & PM _{2.5} samplers	10 fuses	Teledyne API, local electronic store

Data retrieval	Flash drive	2	USB	1	Electronics store
Analyzer/Calibrator	Replacement parts	Yes	In analyzer	3 sites	Teledyne API
Meteorological instruments	Replacement parts	Yes	In instrument	3 sites	Campbell Scientific, RM Young, Vaisala, Nova Lynx, LI-COR, Ecotech
Zero Air Supplies	Purafil or Charcoal columns	3 bottles	Refillable cartridges in the front of the machine	3 bottles	Teledyne API/Ambilabs
Instrument Plumbing	*Stainless Steel Fittings and tubing	± 30	For plumbing upstream of calibrator and downstream of instruments	±20	Swagelok/Ambilabs
Instrument Plumbing	*Teflon tubing and fittings	3 sites	For plumbing downstream of the calibrator and upstream of instruments	3 sites	Savillex/Ambilabs
Analyzer	Teflon particulate filters	5 packs	Analyzer/sample line filters	3 packs	Savillex /Ambilabs
Field operation use	Low-lint wipes	2 boxes	Cleaning wipes	1 box	Local hardware store
T640	Filters	12 filters	47 mm 5 micron filter	8 filters	Teledyne API/Ambilabs
T640	Vacuum pump kit	Yes	Rotary vane rebuild kit	1 site	Teledyne API
Calibration	*Calibration Gas	3 Cal tanks & 1 CO2 tank	Nitrogen Mixture CO2	4 tanks	AirGas
Flow Verification	Flow Meters	2	BIOS Definers	2	Mesa Labs
Temp/RH Verification	*Temperature, Pressure, and RH Transfer Standards	1	Alicat FP-25	1	Alicat Scientific

Manifold	*Teflon tubing manifold and supporting fittings and items	3 sites	Teflon tubing, gaskets, fittings	3 sites	Savillex /Ambilabs
----------	---	---------	----------------------------------	---------	--------------------

Yes – The AQD has spare parts available which could include pumps, propellers, etc.

* Items listed as Critical supplies

Responsibility procedures and practices are linked below in Table 20 for each of the vendors used by AQD for consumables.

Table 20. Vendor Responsibility Statements for Supplies and Services

Vendor	Link Quality Assurance Statement or Certification
Agilaire	<i>Agilaire Quality & Hosted Solutions, Agilaire AirVision Manual</i>
Teledyne API	<i>Teledyne Quality Assurance statement</i>
Campbell Scientific	<i>Campbell Scientific ISO Certifications & Quality Policy</i>
RM Young	<i>RM Young ISO 9001 Certification</i>
Vaisala	<i>Vaisala ISO 9001 Certificate</i>
Swagelok	<i>Swagelok Quality Assurance</i>
Savillex	<i>Savillex Quality Statement</i>
Ambilabs	<i>Ambilabs Overview</i>
LI-COR	<i>Legal & Quality Documents, LI-COR ISO 9001 Certificate</i>
Nova Lynx	<i>Capability Statement</i>
Ecotech (now Acoem)	<i>Accreditation and certification - Acoem , Nephelometer Manual</i>
AirGas	<i>EPA Protocol Gases COA Info</i>
Mesa Labs	<i>Mesa Labs Certificate of Accreditation</i>

Alicat Scientific	Certifications & Quality Policy
Apogee Instruments	ISO 9001:2015 Certification

B7. Environmental Information Management

Due to the potential use of all data collected for comparison to the NAAQS, extreme care in handling the raw data will be followed.

Data Entry/Formatting

All data will be transferred to the EPA Air Quality System (AQS) database. Formatting data for submission to AQS will be performed promptly and carefully. All gaseous and meteorological data are automatically polled from each Agilaire 8872 datalogger to a central Air Vision server via a wireless router/ modem with serial numbers and IP address information controlled by the Air Quality Program Manager and the Air Quality Specialist.

Any data manually entered by the AQD staff will be subjected to additional quality assurance procedures. Manually entered data is defined as data that is manually polled for discrete parameters. Precision and accuracy data resulting from four-week verifications and quarterly audits are considered manually entered data and are submitted to AQS using the precision/accuracy setting in the transaction generator. All discrete data collected will be subjected to additional quality assurance practices ranging from double entry checks that calculate differences in values entered for the parameter values and third party “AQD Manager” review prior to AQS submittal. The AQD Division Head may choose to delegate the third-party review to a qualified SUIT Environmental Programs Division staff member.

Raw data

Raw data worksheets, records, memoranda, notes, or exact copies are the result of original observations and activities at the air monitoring stations. Raw data minute averages of multiple parameters will be stored onsite on each station’s logger. Raw data is transferred to office servers hourly for long term storage and data analysis. .

Data transfer

The gaseous, meteorological, particulate, and visibility instrument hourly average values are recorded by Agilaire dataloggers and stored locally and on the central Air Vision server indefinitely. Minute averages of all continuous parameters are stored on Agilaire datalogger locally for three months and on the central Air Vision server for two years. The AQD has initiated an automated routine in the Air Vision software to poll data from each site to the central server every few minutes to ensure maximum data capture during unexpected events that can contribute to significant data loss. Significant data loss can arise from shelter temperatures exceeding requirements, power failures, and electronic instrument communication failure.

Precision and accuracy data will be entered manually into an appropriate transaction generator for formatting or exported directly from Air Vision for AQS submittal and will be subjected to all data validation requirements (Sections D1). The AQD monitoring data is filed in chronological order and in accordance with the air quality record retention and filing protocol (Appendix A7). All data generated at each monitoring station is quality assured and formatted for submission to the AQS by the Air Quality Program Manager using Air Vision and/or transaction generators for all discrete parameters within the AQD monitoring network.

Data Validation

Data validation encompasses correct data processing operations stemming from field procedures conducted in a manner consistent with the AQD SOPs by the Air Quality Specialist and the Air Quality Program Manager. Proper data validation can identify problems in field operations and issues with instrument performance. Once problems are identified, the data can be corrected or invalidated with the appropriate corrective actions determined by the responsible laboratory facility and/or AQD monitoring staff. Data validation for the AQD field operations consists of internal audits conducted by the Air Quality Program Manager on all field operations performed by the Air Quality Specialist. The internal audit conducted will be held to the same quality assurance practices as external quarterly audits using the AQD internal transfer standards, SOPs, and instrumental operator manual performance procedures.

In the event of suspect data resulting from an internal audit, external audit and/or out of range instrumental response, the Air Quality Program Manager will be responsible for reviewing field notebooks, electronic AirVision logbook, previous modifications and general maintenance procedures conducted by the Air Quality Specialist and possibly invalidating data that correlates to changes and previous modification indicated by or directly noted in the field notebook or by the Air Quality Specialist. Data subject to possible invalidation will be reviewed up to or prior to, the most recent applicable precision and/or accuracy data that has been previously submitted to the EPA AQS database that meets minimal percent difference values indicated within the selected AMP reports and corresponds to the subjected data range in question. If the Air Quality Program Manager deems it necessary that the data within the suspected range is indeed out of instrumental manufacturer performance specifications and/or falls below the EPA Quality Assurance guidelines, indicated in the validation tables of the EPA Quality Assurance Handbook for Ambient Air Monitoring, the data range under question will be invalidated in AQS, following additional AQD discussions with the Air Quality Division Head, Air Quality Program Manager and detailed review of the suspected data by a Region VIII quality assurance representative.

The Air Quality Division Head will make the final decision on suspect data and corrective actions. Secondly, if data within the suspected range is not consistent with the validation criteria listed within the AQD QAPP based on instrumental communication error, data controller storage failure, shelter temperature requirements, or power failures caused by adverse weather conditions the suspect data will be reviewed by the respective parties listed above. All actions pertaining to relevant data invalidation documentation will be handled in accordance with the AQD record retention and filing protocol. The Air

Quality Division Head will be notified prior to the time data subject to invalidation is removed from or resubmitted to AQS. Additionally, station trend analyses will be conducted on the reported parameters in question to confirm if any significant differences among the Ute 1, Ute 3, and MMS stations are present.

Data transmittal

Data transmittal occurs when data is transferred from one person or location to another or when data is copied from one form to another. Some examples of data transmittal are copying raw data from a notebook onto a data entry form for keying into a computer file and electronic transfer of data over a telephone or computer network. Data transmittal from the station loggers to the in office server occurs hourly. The data is stored, analyzed, validated or invalidated with appropriate flags and null codes, then transmitted to AQS. The AQD will report all ambient air quality data and information in accordance with the AQS User Guide. The data will be coded in the AQS format. The AQD gaseous and metrological data will be validated as per section B7 of this QAPP and will be submitted directly to the AQS via electronic transmission, in the AQS format, and in accordance with the monthly schedule (Appendix A.5).

Data reduction

The data reduction process involves aggregating and summarizing results so that they can be understood and interpreted in different ways. 40 CFR 58.16 Data Submittal and Archiving Requirements require certain summary data to be computed and reported regularly to EPA.

Data analysis

The AQD will implement the data summary and analysis requirements contained in appendix A to 40 CFR Part 58. Single analyzer accuracy (based on performance audits), single analyzer precision (precision check data) and data completeness will be tracked and reported for the monitoring network.

Data flagging

The AQD will flag a data value that: (a) did not produce a numeric result, (b) produced a numeric result but is qualified in some respect related to the type or validity of the result, or (c) produced a numeric result but for administrative reasons is not to be reported. Qualifiers will be used to signify samples that may be suspect due to contamination, special events, or failure of QC limits. Qualifiers can also be used to determine if reported gaseous, meteorological and/or visibility reported values are of suspect due to contamination, special/exceptional events, or failure of QA/QC limits. In all cases, the sample or reported data values will be thoroughly reviewed prior to any invalidation. The AQD will keep a record of the flags on the appropriate forms and/or logbooks that result in data invalidation. Null data codes will be generated for invalid data as they are entered into the AQS database.

Data storage and retrieval and acquisition requirements

Duplicate data electronic copies are stored and backed up on the SUIT central server consistent with appendix A7. The data used, which are not obtained from direct measurement, will be obtained from reputable, quality assured sources such as the National Weather Service, National Oceanic and Atmospheric Administration, the National Institute of Standards and Technology, or other similar

sources. The data will consist of physical constants, weather data, housing information, and other such data.

C. Assessment, Response Actions, and Oversight

C1. Assessments and Response Actions

Network Review

A network review will be performed at least every year for the monitoring network. Based on the network review, adjustments to the monitoring network shall be made. The annual network review will be used to evaluate the performance of AQD field staff in maintaining the monitoring network within the quality control goals of the program. The annual monitoring network review is required to provide the framework for establishment and maintenance of an air quality surveillance system. The annual network review report must be made available for public review for at least 30 days prior to submission to EPA. This network review report is also required Under 40 CFR, Part 58, Subpart B to list any changes that are proposed to take place to the current network during the following year.

Listed below are the Tribe's expectations regarding the roles of the contracted auditors, AQD site operators (who is the Air Quality Specialist or representative) , and the QA Manager (who is the Air Quality Division Head or their delegate):

1. A performance audit should be conducted only if calibration data are available for the analyzers or samplers being audited.
2. A performance audit should be conducted only if an AQD site or operator or representative is present, unless written permission (i.e., email) is given to the auditor before the audit.
3. Before the audit, a general procedures protocol including the audit policy and special instructions from the contracted auditor should be provided to the Southern Ute Indian Tribe Air Quality Division.
4. The contracted auditor should discuss the audit results with the AQD site operator or representative at the conclusion of the audit. If the AQD site operator or representative is not on-site at the conclusion of the audit, the contracted auditor should contact the AQD before leaving the area or property when returning to the base of operations. A brief summary, which can be in an e-mail, should be provided listing the most important findings from the audit and should indicate that the results are not official until the final report is issued.
5. If the AQD has written comments or questions concerning the audit report, the contracted auditor should review and incorporate them as appropriate and subsequently prepare and resubmit a report in final form within thirty (30) days of receipt of the written comments. Copies of this report should be sent to the AQD for internal distribution. The transmittal letter for the amended report should indicate official distribution and again draw attention to the agreed-upon schedule for corrective action implementation.

All continuous gas monitors will be subject to a multi-point calibration at least quarterly. The calibration equipment and gas standards discussed in section B2 of this QAPP will be used. Requirements for continuous gas analyzer calibration standards are presented in Table 21.

Table 21. Requirements for Continuous Gas Monitor Standards

Equipment Used to Calibrate Monitoring Equipment	Acceptance Criteria	Frequency
Regional Standard Reference Photometer (Level One Ozone Transfer Standard)	Regression slope = 1.00 ± 0.01 ppb Intercept ≤ 1.00 ppb	1/yr
Level Two Ozone Transfer Standard (Ute 1 Teledyne API T700)	$\pm 4\%$ or ± 4 ppb (whichever is greater)	1/yr
Level Three Ozone Transfer Standard (Ute 3 and MMS Teledyne API T700)	$\pm 4\%$ or ± 4 ppb (whichever is greater)	1/yr
Cylinder of Compressed Gases Gas standard	NIST Traceable (e.g., EPA Protocol Gas)	EPA Protocol Gases have a 36-month certification period and must be recertified to extend the certification.
Standardized Mass Flow Calibrator BIOS Dry Cal220 H and 220 L	$\pm 2\%$ of NIST-traceable standard	1/yr Bios International Corporation

*Acceptance criteria of standards: A certificate or laboratory results from the organization providing additional quality assurance information pertaining to the traceability of the AQD monitoring standards will provide documentation containing the following information: verification results, date, operator initials, and whether these requirements were met.

Zero air used for zero checks and dilution of the calibration gas cylinders will be dry and free of contaminants that may cause a response from the monitor or which may react with the gases being monitored.

During calibration, span gas will pass through as much of the sampling train as is practical to ensure a high degree of similarity between treatment of ambient air and simulated atmosphere used for calibration and quality assurance purposes. For the nitrogen dioxide measurements, calibrations will be performed utilizing gas phase titrations and a cylinder containing a NIST gas standard that contains a known concentration of NO. The Ute 1, Ute 3, and MMS Teledyne API T700 calibrators will be cycled as the level two transfer standard for O₃ and will be used to calibrate the level three transfer standard (Teledyne API T700 calibrators). When available, an approved level 2 transfer standard from a verified third-party contractor will be used. The level two reference photometer will be annually calibrated/verified using EPA Region VIII's level one SRP and laboratory facilities. Each Teledyne API T700 calibrator contains an internal ozone generator and photometer which will be used to calibrate and verify the ozone analyzers at the corresponding stations. The appropriate gaseous calibration sheet (Appendix A3) will be completed during the calibration of the monitor.

A corrective action form (as seen in appendix A5.9) should be completed when a problem requires either immediate or long-term action to correct a safety defect, an operational problem, or a failure to comply with procedures. The form is initially completed to identify the date, the person reporting the issue, the person the resolution is assigned, the station/equipment impacted and a description of the issue. Upon

completion the form documents what was corrected, the impact to any data, the date completed and is signed by an approver verifying the resolution. The form is maintained on the SUIT network server.

Audits

The EPA may conduct an audit on the environmental data collection activities conducted by the AQD. All additional QA practices/activities associated with external auditing procedures and/or additional QA/QC procedures conducted by contractors or subcontractors will be the responsibility of the AQD.

40 CFR 58.15 requires the AQD to submit an annual air monitoring data certification letter to certify data each year that covers the previous calendar year. The certification letter shall be accompanied by AQS summary reports (AMP600 and AMP450NC) and addressed to the EPA Region 8 Air Division Director.

Table 22 below outlines the different types of assessments that must be completed on AQD monitoring stations. Both the audits and the network review are carried out by individuals outside of AQD who are free from conflict of interest.

Table 22. Assessments and Corrective Action

Assessment Type	Responsible for Conducting the Assessment	Number/Frequency	Assessment Deliverable	Responsible for Responding to Assessment Findings (priority level)	Responsible for Implementing Corrective Action	Responsible for Monitoring Corrective Action Effectiveness
Performance Audit	Air Resource Specialists	Quarterly	Audit Report	AQD (Urgent)	AQD (Air Quality Program Manager and Air Quality Specialist)	AQD/Air Resource Specialists
Technical Systems Audit (TSA)	EPA	3-Year	Final report of a TSA	AQD (Urgent)	AQD (Air Quality Program Manager and Air Quality Specialist)	EPA
Annual Network Review (ANR)	AQD	Annual	Final Annual network review report	AQD (Moderate)	AQD (Air Quality Program Manager and	EPA

					Air Quality Specialist)	
5-year Network Assessment	AQD	5-Year	Final 5-Year Assessment Report	AQD (Moderate)	AQD (Air Quality Program Manager and Air Quality Specialist)	EPA
Asset Management Plan	AQD	Annual	Asset Management Plan Report	AQD (Moderate)	AQD (Air Quality Program Manager and Air Quality Specialist)	AQD
NPAP Audits	EPA	Annual	NPAP Audit Report	AQD (Urgent)	AQD (Air Quality Program Manager and Air Quality Specialist)	AQD

C2. Oversight and Reports to Management

This section describes the quality-related reports and communications to management necessary to support network operations and the associated data acquisition, validation, assessment, and reporting. Periodic assessments of data quality are required to be reported to the EPA through grant commitments. This is done through semi-annual and annual reports. These reports will be submitted to the EPA Region VIII Tribal Program Manager as indicated in section A8 of this QAPP. The reports also provide for the review of the air quality surveillance system on an annual basis to determine if the system meets the monitoring objectives defined in appendix D to 40 CFR Part 58. Such review will identify needed modifications to the network such as termination or relocation of unnecessary stations or establishment of stations that are necessary.

The reports will include information for each ambient air pollutant in the Air Quality Division monitoring network. The table below, Table 23, outlines the reports that are completed each year.

Table 23. QA Reports to Management

Type of Report	Frequency (daily, weekly, monthly, quarterly, annually, etc.)	Person(s) Responsible for Report Preparation	Report Recipients
Performance Audit	Quarterly	Air Resource Specialists	AQD

Technical Systems Audit (TSA)	Three-Year	EPA	AQD and EPA
Network Review	Annually	AQD	AQD and EPA

D. Elements For Environmental Information Review and Usability Determination

D1. Environmental Information Review

Data review, verification, and validation are assessment techniques used to accept, reject or qualify data in an objective and consistent manner.

Data review – data review is the process that evaluates the overall data package to ensure procedures were followed and that reported data is reasonable and consistent with associated QA/QC results.

Data verification – data verification is the process of evaluating the completeness, correctness, and conformance/compliance of a specific data set against the method, procedural, or contractual requirements.

Data validation – data validation is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific data set to ensure that the reported data values meet the quality goals of the environmental data operations (method specific data validation criteria).

Data verification is conducted by checking that the SOPs were followed and that QC limits were met. One of the major objectives for the AQD is for comparison to the NAAQS and therefore, this is identified as the intended use. This section will describe the verification and validation activities that occur at a number of the important data collection phases. Earlier elements of this QAPP describe in detail how the activities in these data collection phases are implemented to meet the DQOs of the AQD. Review and approval of this QAPP by the personnel listed on the approval page provide initial agreement that the processes described in the QAPP, if implemented, will provide data of adequate quality. In order to verify and validate the phases of the data collection operation, the AQD uses qualitative assessments (e.g., technical systems audits, network reviews) to verify that this QAPP is being followed, and relies on the various quality control samples, inserted at various phases of the data collection operation, to validate that the data will meet the DQOs.

Continuous Gas Monitors

Continuous gas and particulate monitors will be calibrated as outlined in section B5 of this QAPP. Calibrations followed by multi-point calibration checks, flow rate, auxiliary parameters and audit data will be used to provide an accuracy assessment of the pollutant gas data collected.

Precision and accuracy criteria given in appendix A to 40 CFR Part 58 will be followed. The application and definitions of the program criteria are given in section A6 of this QAPP. Data collected during periods when system response indicates precision and bias goals have been achieved will be considered valid.

Continuous Visibility Monitor

The visibility monitor will be calibrated as outlined in Section B5 of this document. Full calibration procedures and audit data will be used to provide an accuracy assessment of the visibility data collected. The data collected during periods when the system response indicates precision and accuracy goals have been achieved will be considered valid.

Meteorological Instruments

All meteorological instruments will be calibrated as outlined in Section B5 of this document. The calibration procedures, parameters, and all associated information will be recorded in the site logbook and instrument maintenance log sheets shown in Appendix A to this QAPP.

Meteorological data that is collected during periods when the system response indicates precision and accuracy goals have been achieved will be considered valid.

Data Collection/Quality Control Procedures

The Air Quality Specialist will be the first to validate and verify the data. Visual review of raw data will be performed to identify atypical or suspect data values that warrant further investigations, and these values will be flagged. The review of QC data such as the precision/bias data, audits (accuracy data), and equipment verification checks that are described in Section B5 are used to verify that the data meets the objectives. The Air Quality Specialist will also use the data validation templates provided in the Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II (Final Draft-August 2008). These data validation templates contain the list of criteria pollutants that must be met to ensure the quality of the data and are found in appendix A8 of this QAPP. Also, the Air Quality Program Manager will review the appropriate logs/forms, AV-Trend, Air Vision, and quality control charts to determine the following:

- Is the suspect value due to instrument failure?
- Is the suspect value a result of atypical instrument response during QC checks, maintenance, or repair?
- Is the suspect value a result of improper data collection or handling?
- Is the suspect value a result of data transmittal error?
- Is the suspect value a result of an exceptional event?
- Does collected data meet precision, accuracy, and bias goals?

The Air Quality Specialist will document any evidence in support of or against the occurrence of any of the above using the station logbook, located in the AirVision software. The Air Quality Specialist will make a recommendation based on the evidence and present data to the Air Quality Program Manager for review.

The Air Quality Specialist will review all data values. Non-flagged values will be reviewed for suspect values that may have been overlooked. The Air Quality Specialist will flag these values for further investigation. Values passing the Air Quality Program Manager's review will be deemed valid. Flagged values will be reviewed and either invalidated or validated based upon the supporting evidence or flagged by the Air Quality Specialist for further investigation. The Air Quality Program Manager will investigate and review any new supporting evidence and make a validity determination. If a value

remains suspect, the Air Quality Program Manager will present the data and evidence to the Air Quality Division Head or their delegate, for review, recommendation, and final validity determination on the questionable data. The dates and reasons for data that is assigned an AQS Null Code, Flag, or Qualifier code will be documented monthly per the Continuous Monthly Data QA/QC SOP.

Data can be invalidated for the following reasons:

- Data value is due to instrument malfunction.
- Data value is due to Z/S/P or calibration procedures.
- Data value is lost or damaged during transmission from the Agilaire datalogger to the AQ laptop, in the event manual uploading of the data is required .
- Data value is due to maintenance/routine repairs.

Completion of QC procedures will also require a review of the documentation of the corrective actions that were taken when QC samples failed to meet the acceptance criteria, and the potential effect of the corrective actions on the validity of the routine data. Section B4 of this QAPP describes the techniques used to document QC review/corrective action activities.

Data Reduction and Processing

As part of the quality assurance practices associated with data quality, discussed in section B3 of this QAPP, all parameters will be investigated in a station trend analysis every month prior to data validation procedures and submittal to AQS using AirVision by the Air Quality Program Manager. An example of an investigation would include review of verifications/calibration records, QC documentation for the parameter or parameters in question, and instrument specific auxiliary parameters such as sample flow rate, analog output, converter efficiency, UV lamp voltage, and reaction cell temperature. All raw data files associated with these records, including the following are reviewed:

- Sampling information
- Calibration - the calibration information that is relevant to that sampling period
- Sample handling/custody
- Corrective action
- Data reduction

All raw data that is manually entered on data sheets will be independently verified by the Air Quality Program Manager and the Air Quality Division Head as discussed in Section B3, prior to final submittal to the AQS database. The entries are compared to reduce the possibility of entry and transcription errors. Once the data is entered into AQS, the system will review the data for routine data outliers and data outside of acceptance criteria. These data are flagged appropriately. All flagged data are re-verified that the values are entered correctly. Details of these activities are discussed in Section B3, B7 and the AQS Data Submittal SOP (Appendix A5.3). The following QC functions are incorporated into the Agilaire datalogger and AQS Database to ensure quality of data entry and data processing operations:

- Range Checks - all monitored parameters have simple range checks programmed either in Agilaire datalogger or the analyzers. For example, valid times must be between 00:00 and 23:59,

summer temperatures must be between 10°C and 50°C, etc. The data entry operator is responsible for noting when an entry is out of range. The operator has the option of correcting the entry or overriding the range limit. The specific values used for range checks may vary depending on season and other factors.

- **Completeness Checks** – during processing the Agilaire datalogger completeness certain criteria checks. For example, each data point must have a start time, an end time, an average flow rate, date and technician name(s). The person making the data entry is notified if an incomplete record has been entered before the record is considered valid and can be included in any report.
- **Internal Consistency and Other Reasonableness Checks** - Several other internal consistency checks are made by the Air Quality Specialist and Air Quality Program Manager reviewing the data. For example, the end time of a data set must be greater than the start time. Additional consistency and other checks are implemented as the result of problems encountered during data validation.
- **Data Retention** - Raw data sheets are retained on file in the AQD Office for a minimum of five years and are readily available for audits and data verification activities. After five years, the AQD staff will follow the record retention and filing protocol detailed in Appendix A7 of this QAPP.

Validated data surpassing all quality assurance criteria will be converted electronically into the AQS format. The data will then be submitted to the AQS database by the AQD.

D2. Usability Determination

Usability determination is made by the Air Quality Program Manager and Air Quality Division head after Environmental Information Review (EIR) is completed. EIR consists of reconciliation with Data Quality Objectives and the Measurement Quality Objectives that are listed in section A6 of this QAPP. If the data meets all of the QC limits listed in section D1 of this QAPP and the data was collected as outlined in section B of this QAPP then it is considered usable. If the data does not meet these collection standards, then the processes outlined in section B3 of this QAPP are completed and records of any data validation templates are kept in the AQD server for at least 5 years and noted in AQS submittal with data flagging.

Potential limitations for data collection and usability could include any substantial monitoring downtime due to unforeseen circumstances such as instrument failure, lack of staffing, or non-valid data collection periods. The AQD follows all SOPs and QAPP sections as close as possible to ensure any anticipated limitations occur minimally and to communicate and record limitations properly if they occur (as outlined in section D1).

References

1. *Air Resource Specialists, Inc. Audit Procedures (Standard Operating Procedures). 2022 version.*
2. *Ecotech Environmental Monitoring. Aurora-1000 Single Wavelength Integrating Nephelometer User Manual. Version 1.3. May 2009.*
3. *R.M. Young Meteorological Instruments. Wind System Calibration Instruction Manual. Model 18860-90 June 2009.*
4. *R.M. Young Meteorological Instruments. Tipping Bucket Rain Gauge Model 52202/ 52202H/ 52203 Instruction Sheet. Rev K042417 April 2017.*
5. *Teledyne Advanced Pollution Instrumentation Division. Model T700 Dynamic Dilution Calibrator P/N 05621B4. June 2015.*
6. *Teledyne Advanced Pollution Instrumentation. Model T640 PM Mass Monitor. April 2021*
7. *Teledyne Advanced Pollution Instrumentation Model T200 NO-NO₂-NO_x Analyzer Instruction Manual. August 2015.*
8. *Teledyne Advanced Pollution Instrumentation Model T400 O₃ Analyzer Instruction Manual. August 2022.*
9. *Thermo Electron Corporation. Model 42i Chemiluminescence NO-NO₂-NO_x Analyzer Instruction Manual P/N 101350. July 2015.*
10. *Thermo Electron Corporation. Model 48iQTL Gas Filter Correlation CO Analyzer Instruction Manual P/N 119014. September 2018.*
11. *Thermo Electron Corporation. Model 49i UV Photometric O₃ Analyzer Instruction Manual P/N 102434-00. September 2017.*
12. *AQS Data Coding Manual. Version 3.5. Date Revised: June 2, 2015.*
13. *U.S. EPA. Meteorological Monitoring Guidance for Regulatory Modeling Applications. February 2000.*
14. *U.S. EPA. National Ambient Air Quality Standards for Particulate Matter. Final Rule 40 CFR Parts 50, 53, and 58 Federal Register.*
15. *U.S. EPA. Office of Research and Development. List of Designated Reference and Equivalent Methods. December 2022.*
16. *U.S. EPA Quality Assurance Handbook for Air Pollution Measurement Systems Volume II January 2017.*
17. *U.S. EPA Quality Assurance Guidance Document 2.12: Monitoring PM_{2.5} in Ambient Air Using Designated Reference or Class I Equivalent Methods. January 2016.*
18. *U.S. EPA. Transfer Standards for Calibration of Air Monitoring Analyzers for Ozone technical assistance document. October 2013*
19. *Thermo Electron Corporation. Model 55i Direct Methane, Non-Methane Hydrocarbon Analyzer Instruction Manual P/N 103962. August 2012*
20. *Thermo Electron Corporation. Model 42i Chemiluminescence NO-NO₂-NO_x Analyzer Addendum. October 2022.*
21. *Thermo Electron Corporation. Model 49i Ozone Analyzer Addendum. October 2022.*
22. *Thermo Electron Corporation. Model 55i Direct Methane, Non-Methane Hydrocarbon Analyzer Addendum. October 2022.*

Appendices

APPENDIX A

Standard Operating Procedures**APPENDIX A Standard Operating Procedures**

1. Instrument Log and AirVision
2. Probe and Sitting Criteria
3. Gas Monitoring SOP's
 - 3.1. *API T700 MCF Verification Calibration*
 - 3.2. *Calibration and Multi-Point Checks*
 - 3.3. *Gas Regulator Installation Purge and Leak Check*
 - 3.4. *Manual Zero Span Precision Checks*
 - 3.5. *Photometer Verification Calibration*
 - 3.6. *Routine Operations*
 - 3.7. *Sample Residence Time*
4. Meteorological SOP's
 - 4.1. *Monthly Meteorological Maintenance*
 - 4.2. *Quarterly Meteorological Calibration*
 - 4.3. *Quarterly Verification Sheets*
5. Data Collection and AQS Submittal SOP's
 - 5.1. *AirVision Station Manual Polling SOP*
 - 5.2. *AirVision Data Verification SOP*
 - 5.3. *AQS Data Submittal SOP*
 - 5.4. *AQS Data Certification SOP*
 - 5.5. *Continuous Data Weekly Trend Check SOP*
 - 5.6. *Continuous Data Monthly QA-QC SOP*
 - 5.7. *Quarterly QA Review SOP*
 - 5.8. *AQS Data Changes Memo*
 - 5.9. *Corrective Action Form Template*
6. Nephelometer SOP's
 - 6.1. *Ute 3 Nephelometer Maintenance*
 - 6.2. *Ute 3 Nephelometer Calibration*
7. Filing Protocol
8. Data Validation Chart Templates
 - 8.1. *Data Validation Flow Chart*
 - 8.2. *Data Validation Templates*
9. ARS External Audit SOP's
10. T640 SOP's and Manual
 - 10.1. *T640 Training Manual*
 - 10.2. *T640 Manual*
 - 10.3. *Monthly T640 Verification*
 - 10.4. *T640 Maintenance*
 - 10.5. *T640 Field Checklist*
11. T200 SOP's
 - 11.1. *T200 Manual*
 - 11.2. *T200 Maintenance Procedures*

12. T400 SOP's

13. T700 and T701H SOPs

13.1. T700 Manual

13.2. T701H Manual

