Pueblo of Santa Ana Department of Natural Resources

Quality Assurance Project Plan (QAPP)
AQSync Sensor Monitoring
Environmental Division

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QAPP Revision History

Revision No.	*Description*	*Author*	*Date*
0	*Original version*	*Gordon Pierce & Tara Weston*	

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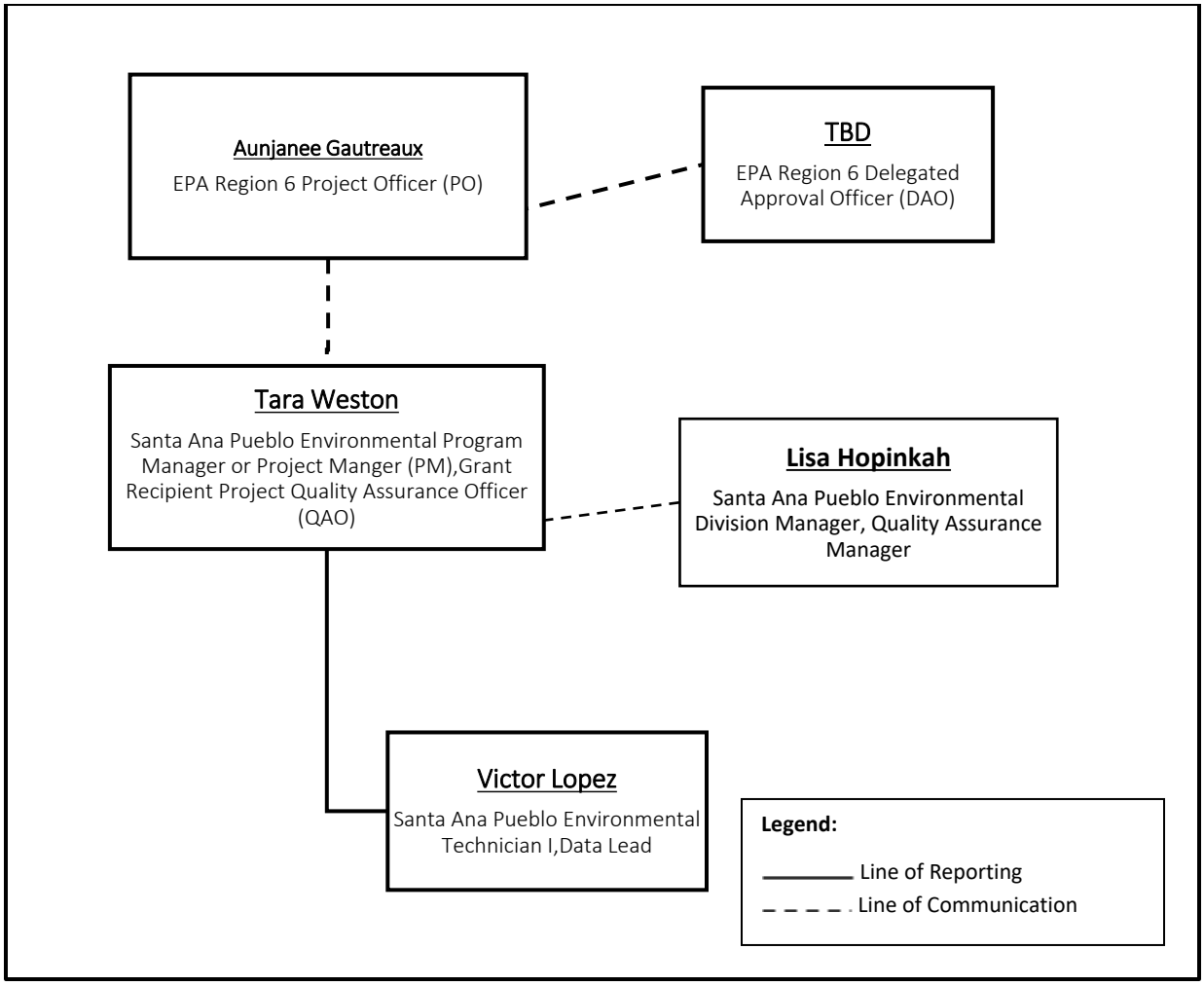
List of Acronyms

DQI – Data quality indicators
DQO – Data quality objective
EI – Environmental information
EIO – Environmental information operations
EPA – Environmental Protection Agency
FEM – Federal equivalent method
FRM – Federal reference method
MQO – Measurement quality objective
NO – Nitric oxide
NO2 – Nitrogen dioxide
NOx – Oxides of Nitrogen
O3 – Ozone
PARCCS – Precision, accuracy, representativeness, comparability, completeness, sensitivity
PM1 – Particulate matter 1 micron in diameter and smaller
PM2.5 – Particulate matter 2.5 microns in diameter and smaller
PM10 – Particulate matter 10 microns in diameter and smaller
PO – Project officer
QA – Quality assurance
QAO – Quality assurance officer
QAM – Quality assurance manager
QAPP – Quality assurance project plan
QC – Quality control
RPD – Relative percent difference
RSD – Relative standard deviation
SOP – Standard operating procedure

A. Project Management and Data Quality Objectives

1. Project Organization and Personnel (A7 - A10)



Roles and responsibilities:

- Aunjanee Gautreaux/EPA Region 6 Project Officer will be responsible for:
    - Reviewing and approving the workplan and associated project components.
    - Providing a schedule for submission of semiannual reports.
    - Approving (or denying) all changes to the workplan commitments or associated costs.

- Tara Weston/Project Manager/Project Quality Assurance Officer (QAO) will be responsible for:
    - Submitting an approvable application and workplan to EPA Region 6.
    - Addressing the quality assurance requirements of this grant as outlined in Section 4 of this workplan.
    - Providing timely reports to EPA Region 6 as outlined in Section 5 of this workplan.
    - Communicating any changes to the commitments or costs to Region 6 as soon as possible but no later than the subsequent semi-annual progress report.

  - Timely reporting of expenditures including supporting documents of costs of equipment.
  - Reviewing and verifying data.
  - Updating and submitting the QAPP for review by SADNR and USEPA project officers.

- Victor Lopez/Data Lead (DL) will be responsible for:
  - Collecting data from the AQSync following the requirements of this QAPP.
  - Creating reports to summarize results of internal audits performed annually on field operations as well as from external audits, if coordinated in the future.
  - Assisting with completing or ensuring that maintenance, calibration and testing is performed as needed by a qualified staff member, consultant or manufacturer.

- Lisa Hopinkah/Project Quality Assurance Manager (QAM) will be responsible for:
  - Reviewing AQSync data reports for accuracy and clarity.
  - Reviewing annual QAPP revisions that accurately capture any necessary updates.
  - The QAM is independent of data generation and collection.

There are no other contractors, subcontractors, or sub-grant recipients supporting this EIO, so there are no further roles and responsibilities applicable to this QAPP. Furthermore, there are no other principal EIO users within and outside of the organization that are applicable to this QAPP.

The plan to document communication of the data findings is through a semi-annual report issued in the Pueblo newsletter. The desire is for these data to be posted in near real-time on a website in the future. This will help the Santa Ana Pueblo public understand the Pueblo's air quality processes. If there are any deviations from the QAPP, the Project Manager will schedule a higher-level meeting to make sure this information is elevated up to Tribal managers. Then, the complications, errors, or QAPP non-conformances with the air monitoring sensors will be elevated to the monitoring instrument manufacturer, 2B Technologies, as well as to the EPA Region 6 Project Officer. If this happens, the problem will be notated and there will be an attempt to fix/repair or switch out the sensors.

2. Personnel Training and Certifications (A11)

Tara Weston is the Project Manager and Environmental Program Manager of the Santa Ana Pueblo. She is independent from the entity that will be gathering the data and she is the individual responsible for completing and documenting personnel training.

All Santa Ana Pueblo staff will have attended AQSync operation training sessions prior to conducting any project field work. This will ensure that staff are following the Standard Operating Procedures (SOPs) across installation, routine and corrective maintenance, and calibration tasks. Staff will also undergo basic field training related to minor maintenance tasks (limited to filter replacements/adjustments) to support field operations outside of calibration activities. Additional training may occur throughout monitoring to ensure that any changes to instrument SOPs are known and uniformly implemented, as well as to correct any non-uniform field operations if identified during assessments.

3. Project Purpose, Problem Definition, and Background (A4)

This grant provides funding under the Inflation Reduction Act (IRA) to the Santa Ana Pueblo's Environmental Division for the operation, expansion and enhancement of their air monitoring activities. Specifically, for the Santa Ana Pueblo to purchase and install a 2B Technologies "AQSync" multi-pollutant air quality station to provide access to real-time O3, NO2, NO, PM1, PM2.5, and PM10 data for the next 5 years (or until the equipment fails), as well as have the data be made available to the Tribal community in real-time. With ongoing development in the adjacent towns of Bernalillo and Rio Rancho, the major highways that border the Santa Ana Pueblo, nearby industrial facilities (including a gypsum wallboard plant), and the air quality impacts of extreme weather events, the Pueblo wants to begin ambient monitoring to track trends as they impact the community's air quality.

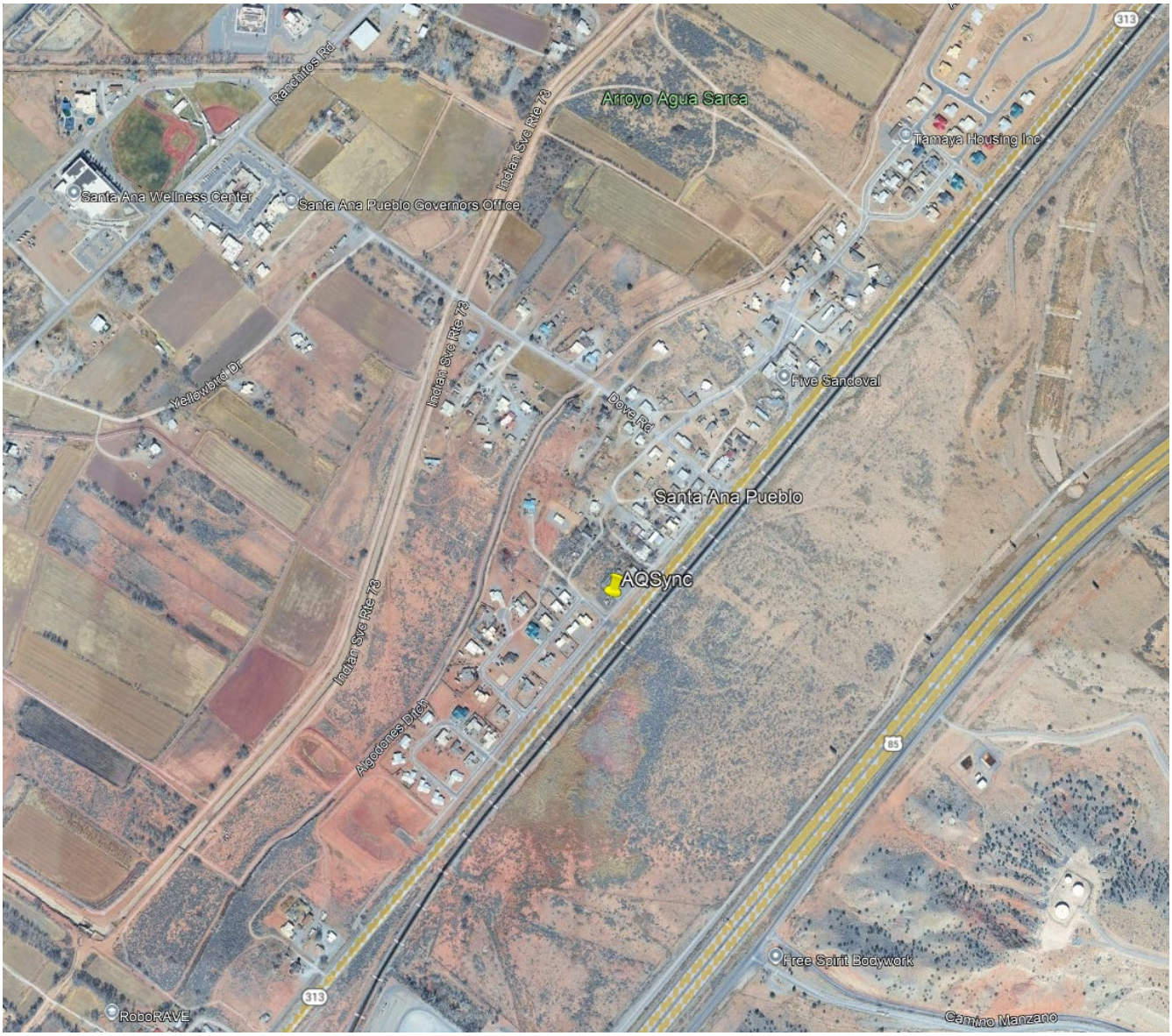


Figure 1: Location of the AQSync sensor station

The EPA announced the availability of approximately $81 million in non-competitive, direct award funding from the Inflation Reduction Act of 2022 (IRA) for eligible state, local, Tribal and territorial air agencies to

establish new ambient air monitoring sites, and maintain, operate, or upgrade existing ambient air monitoring networks. These funds provide critical resources to ensure the establishment and sustainability of the Santa Ana Pueblo's air quality monitoring network and to meet evolving ambient air quality monitoring needs. The network provides data to inform decision-making that protects human health and the environment.

The site was selected to be representative of the Pueblo's exposure to air pollution from nearby major highways, nearby development and industry, and extreme weather events, but also to be placed to avoid vandalism. This is important to obtain accurate results. The results, data, and reports of the EIO will be taken and posted to the Santa Ana Pueblo Air Quality Program's webpage and/or distributed in the Tribal newsletter. Regulatory programs and standards are not applicable to this project as the data generated will not be used for potential actions or decisions, only for public knowledge for now. Additionally, regulatory programs and standards, conceptual site models, and sources of existing information are not applicable to this project.

Relevant quality assurance (QA) planning documents that were utilized for the development of this QAPP also include the 2B Technologies user manual and Standard Operating Procedures, the graded approach method on Region 6's Quality Assurance website, the QAPP template provided by the Region 6 ARD Quality Assurance Coordinator, and others included later in the appendix.

4. Project Task Description (A5)

This project will increase the number of air monitors deployed in the Tribal area, help identify if the community is experiencing air quality issues where data was previously unavailable, and increase the number of Tribal members with access to local scale air quality data in the Santa Ana Pueblo area. The future goal is to have near real-time air quality data be routinely posted on a website accessible to Tribal members and to the Tribal newsletter for the Santa Ana Pueblo to reference, and annual reports to EPA Region 6.

5. Data Quality Objectives (A6)

The purpose of establishing data quality objectives (DQOs) and measurement quality objectives (MQOs) is to provide a systematic procedure for defining the criteria that a data collection design should satisfy, including when to collect measurements, where to collect measurements, the tolerable level of decision error for the study, and how many measurements to collect, balancing risk and cost in an acceptable manner.

This project is to purchase and install a 2B Technologies AQSync air quality monitoring station and deploy it in the Santa Ana Pueblo area to measure real-time ozone (O3), nitrogen dioxide (NO2), nitric oxide (NO), particulates 1 micron and smaller (PM1), particulates 2.5 microns and smaller (PM2.5), and particulates 10 microns and smaller (PM10) data for at least the next 5 years. In addition, the environmental data are to be made available to the Tribal community. As such, this project is not designed to provide regulatory data but is for Tribal members' information.

TABLE 1. PROJECT DATA QUALITY INDICATORS - DEFINITION

Data quality indicator	Definition	Examples
Precision	The degree of agreement among repeated measurements of the same property under identical, or substantially similar conditions, usually expressed as standard deviation, variance, percent difference, or range, in either absolute or relative terms	Overall project precision is measured by collecting data from collocated field duplicate (or replicate) samples
Bias	The systematic or persistent distortion of a measurement process resulting in error in one direction	Measurement of materials with a known concentration (e.g., performance evaluation or reference materials)
Accuracy	A measure of the closeness of an individual measurement to a known or reference value; includes a combination of random error (precision) and systematic error (bias) components of both sampling and analytical operations	Replicate analysis of a reference material or sample to which a material of known concentration or amount of pollutant has been added; usually expressed either as percent recovery or as a percent bias
Representativeness	A qualitative measure of the degree to which data accurately and precisely represent a characteristic of a population parameter	Evaluation of whether a sample that is collected is proportionately representative of some predefined population characteristic or property
Comparability	A qualitative term describing the degree of which different processes, methods, or data agree or can be represented as similar. It describes the confidence that two data sets can contribute to a common analysis and interpolation	A comparison of the sample collection methods, analytical procedures, holding times, stability issues and QA protocols
Completeness	The amount of data needed to be obtained from a measurement system, expressed as a percentage of the number of measurements that should have been collected or were planned to be collected	Evaluation of the number of measurements needed to make a determination of the project results and comparison of this to the number of samples planned to be collected
Sensitivity	The capability of a method or instrument to discriminate the parameter of interest at the level of interest, such as Method Detection Limit (DML), Limit of Detection (LOD), and Limit of Quantitation (LOQ)	The measurement responses representing different levels or amounts of the variable of interest
Measurement range	The analytical range over which an instrument will collect and report data	All data are within the defined instrument measurement ranges

TABLE 2. PROJECT DATA QUALITY INDICATORS – GOAL

Data quality indicator	Quality control activities	Acceptance Criteria
Precision	O3 – Standard deviation of span checks	O3 = Greater of $\pm$ 1.5 ppb or 2 % of measurement

Data quality indicator	Quality control activities	Acceptance Criteria
	NO2 – Standard deviation of span checks NO – Standard deviation of span checks PM10 – Annual 2-week collocation with FEM or FRM * PM2.5 – Annual 2-week collocation with FEM or FRM * PM1 – Annual 2-week collocation with FEM or FRM *	NO2 = Greater of ± 2.0 ppb or 10 % of measurement NO = Greater of ± 2.0 ppb or 10 % of measurement PM10 = ± 0.5 ug/m^3 of daily averaged data PM2.5 = ± 0.5 ug/m^3 of daily averaged data PM1 = ± 0.5 ug/m^3 of daily averaged data
Bias	Pre- and post-calibrations Zero checks	Less than 10% difference
Accuracy	Calibration standard Calibration gas Calibration gas Calibration aerosol Calibration aerosol Calibration aerosol	O3 = greater of 1.5 ppb or 2 % of reading NO2 = greater of 2.0 ppb or 10 % of reading NO = greater of 2.0 ppb or 2 % of reading PM10 = ± 10 % to calibration aerosol PM2.5 = ± 10 % to calibration aerosol PM1 = ± 10 % to calibration aerosol
Representativeness	Evaluate whether the data accurately represents the system, population, place, time and/or situation of interest	Annual review of the site location to ensure that it adequately represents the population of interest and is not unduly influenced by a localized source
Comparability	Compare to existing data or datasets	Compare data trends to nearby or collocated FEM or FRM analyzers and other networks such as PurpleAir to determine if there are localized sources * Compare data to other sites to look for outliers *
Completeness	Project goals for data collection	Meet EPA goal of ≥75% of data collected and validated per calendar quarter Meet project goal of ≥ 90% of data collected and validated
Sensitivity	Compare to reporting or detection limits from existing data or for decision-making	O3 = 3 ppb NO2 = < 1 ppb NO = < 1 ppb PM10 = 0.3 um PM2.5 = 0.3 um PM2.5 = 0.3 um
Measurement range	Covers the expected range of concentrations	All data within the instrument measurement ranges: O3 = 0 - 100,000 ppb NO2 = 0 – 10,000 ppb NO = 0 – 2,000 ppb PM10 = 0 – 320,000 particles/L PM2.5 = 320,000 particles/L PM1 = 320,000 particles/L

* Possible collocation/comparison sites include :

Albuquerque Environmental Health – North Valley site (35-001-1013)
Albuquerque Environmental Health – Tramway site (35-001-1012)
Albuquerque Environmental Health – Jefferson site (35-001-0026)
Albuquerque Environmental Health – Del Norte site (35-001-0023)

6. Documentation and Records Management (A12)

The following documents and records will be created:

- Field Log - a physical or digital logbook where the DL will be able to describe important field observations during routine or responsive field visits that could affect project data. The Field Log will be stored locally at the Santa Ana Pueblo office.
- Maintenance Notes - information related to equipment repairs or replacements are recorded and will be stored locally at the Santa Ana Pueblo office.
- Calibration Data - Calibration certificates from the manufacturer or other entity will be stored locally at the Santa Ana Pueblo office.
- Audit reports - reports created by the QAO summarizing results of internal audits performed annually on field operations. This report can be expanded to include results from external audits, if coordinated in the future.
- QAPP - the original plan and any revised/updated plans will be stored locally at the Santa Ana Pueblo office.
- QAPP Revision Log - a log maintained by the Project Manager that tracks the date of QAPP revisions and summarizes revisions details and updates.
- Raw data - stored on the 2B Technologies cloud data platform/portal.
- Data Flags and QA/QC - all data flags, notes, and supporting QA/QC related to air monitoring operations and data review.
- AQSync Operations Manual - digital operations manual created by 2B Technologies in support of AQSync Standard Operating Procedures, stored locally at the Santa Ana Pueblo DNR office.

Any documents or records stored locally at the Santa Ana Pueblo office will be accessible to all Santa Ana Pueblo project staff. All project data and documents will be reviewed before being disseminated to project stakeholders and end users. The process for management of documents and records, including the QAPP, is to download the raw air monitoring data from the 2B Technologies cloud data portal, then save and store the data on SD cards or USB drive once a month and place this in the Environmental Division office and keep on a computer drive. The Project Manager will manage this drive. In terms of final disposition of records and documents, Santa Ana Pueblo will store the data until it is no longer needed, at minimum for the length of the project period, and meeting the requirements of EPA's record retention schedule. In coordination with 2B Technologies, Santa Ana Pueblo prepares, reviews, issues, revises, and archives the data. Controlled documents approved by the Pueblo also need approval from the EPA QAO.

B. Environmental Information Operations

1. Project/Sampling Design and Rationale (B1)

The AQSync Air Quality Monitoring Station is a comprehensive air monitoring package that combines Environmental Protection Agency (EPA)-Federal Equivalent Method (FEM) instruments for measuring O3 and NO2, with a weather transmitter and other devices for high-quality yet affordable measurements of several other air pollutants. The suite of measurement choices is customizable and includes modules/sensors for O3,

NO2, NO, PM1, PM2.5, PM10, CO2, CO, tVOC, CH4, BTEX and meteorology. Data are uploaded and accessed via the cloud.

This project is to provide ambient air quality data on a real-time basis to the public for public health. Parameters to be measured for this project and frequency include:

- O3 (ppb) – continuous/5-minute averages
- NO2 (ppb) – continuous/5-minute averages
- NO (ppb) – continuous/5-minute averages
- PM1 (ug/m3) – continuous/5-minute averages
- PM2.5 (ug/m3) – continuous/5-minute averages
- PM10 (ug/m3) – continuous/5-minute averages

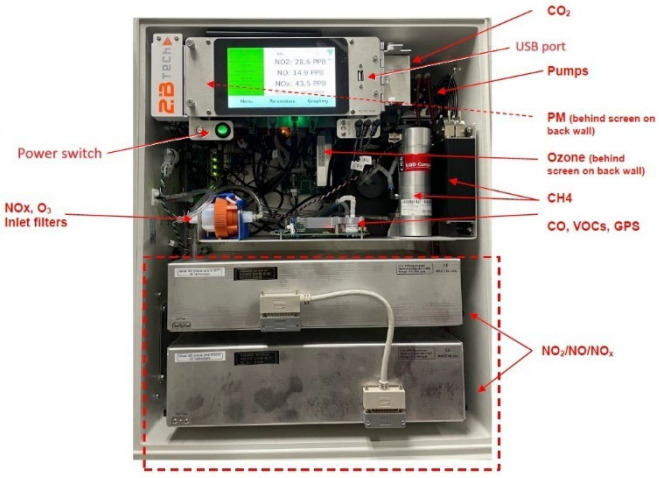
Sampling is automated/continuous with data being uploaded on a 5-minute basis to via cellular or WiFi communications to the 2B Technologies cloud data portal. No physical environmental samples will be collected.

One ambient air monitoring location is planned:

- Collocated with "Well 4" at the crossroads of Eagle Drive and Eagle Lane on Santa Ana Pueblo, NM; 35°20'18.02"N 106°31'27.49"W. (West of I-25, north of US 550)

Tasks required include at a minimum:

- Annual calibration of the O3 monitor
- Annual calibration of the NO2/NO/NOx monitor
- Annual collocation/comparison of the AQSync to determine PM10, PM2.5 and PM1 precision



Relevant quality assurance (QA) planning documents that were utilized for development of this QAPP also include the 2B Technologies user manual and Standard Operating Procedures, the graded approach method on EPA Region 6's Quality Assurance website, the QAPP template provided by the EPA Region 6 Quality Assurance Air Coordinator, and others included later in the appendix.

2. Methods (B2)

Collection of environmental data is performed using a 2B Technologies AQSync. The AQSync air monitoring station for this project includes:

- O3 – UV absorption at 254nm, 2B Technologies,, Model 108-L Ozone Monitor (EQOA-0914-218)
- NO2/NO – UV absorption at 405nm for NO2 and oxidation of NO, 2B Technologies Model 405nm NO2/NO/NOx Monitor (EQNA-0217-243)
- PM1/PM2.5/PM10 – laser light scattering particle counter, Met One, 83214 AQ Mass Profiler

TABLE 3. PROJECT FIELD SAMPLING STANDARD OPERATING PROCEDURES REFERENCE TABLE.

Title, Revision Date and/or Number	Organization
Standard Operating Procedure for the AQSync for Communities (Ver. 1)	2B Technologies
AQSync Operation Manual, rev. D-1, Dec. 2024	2B Technologies
Model 108-L Ozone Monitor Operation Manual, rev. D-8, Nov. 2023	2B Technologies
Model 405nm NO2/NO/NOx Monitor Operation Manual, rev. K-2, Mar. 2025	2B Technologies
83214 AQ Mass Profiler Operation Manual, ver. C, 2020	Met One Instruments

The maximum hold times for sample/extraction and/or analysis are not applicable to this project as the monitor is not collecting physical samples. Furthermore, custody processes, sample handling, laboratory analysis, existing information, and environmental technology are not applicable in this project either.

3. Integrity of Environmental Information (B3)

No physical environmental samples will be collected for this project. All environmental data will be from automated/continuous monitoring systems. Data collected from the AQSync are stored on-board the AQSync sampling system, and are also transmitted via cellular or WiFi to the 2B Technologies cloud data portal every 5-minutes (or other designated time period). These data are stored in perpetuity and can be downloaded from either the AQSync or the cloud portal. Procedures and chain of custody for data were described earlier in (A12).

The procedures and requirements for handling the equipment will be in field logs that keep a record for equipment maintenance. The attached SOP describes the maintenance procedures for the sensors.

Since physical samples are not being taken, certain specified procedures and requirements for sample handling, sample and chain of custody, sample labels, sample logs, identified laboratories and their respective accreditation and certification for applicable analytes and matrices are not applicable to this QAPP.

4. Environmental Information Management (B7)

This project focuses on the collection of air quality data for the Tribal community and leadership. In terms of the data to dashboard pathway, the environmental data are pulled from the 2B Technologies cloud data portal for viewing and exporting into Excel charts The goal is for the data to be able to viewed/downloaded by the Tribal community on the Air Quality Program website in the future so they have the information in real-time. The Santa Ana Pueblo will also generate an annual data report summarizing the air pollutant levels monitored and will identify any needs for additional future monitoring to protect public health.

For information on standard record-keeping procedures, document control system, and process for information storage and retrieval on electronic media, please see section A12 (Documentation and Records Management) above. A checklist for the sensor maintenance recommendations is attached in Appendix A.

5. Quality Control (B4)

Quality control will be maintained by routine checks and maintenance of the individual air pollutant sampling systems in the AQSync.

TABLE 4. QUALITY CONTROL SUMMARY

Matrix	Parameter	QC Sample Type	Acceptance Criteria	Corrective Actions
Ambient Air	O3	Audit	+/- 10%	Re-calibrate
Ambient Air	NO2/NO	Audit	+/- 10%	Re-calibrate
Ambient Air	PM1	Comparison to other site	+/- 20%	Clean/re-calibrate
Ambient Air	PM2.5	Comparison to other site	+/- 20%	Clean/re-calibrate
Ambient Air	PM2.5	Comparison to other site	+/- 20%	Clean/re-calibrate

QC activities for EIO using models or modeling (e.g., model calibration, model validation, sensitivity analyses) are not applicable to this QAPP.

6. Equipment/Instrument Calibration, Testing, Inspection, and Maintenance (B5)

The 2B Technologies Model 108-L ozone monitor is an EPA designated "Federal Equivalent Method" analyzer. Calibrations shall be performed at least annually by 2B Technologies or another contractor utilizing a NIST-traceable ozone generator/calibration system. Zero checks should be performed in the field at least quarterly to ensure that there is not a significant offset.

The 2B Technologies Model 405nm NO2/NO/NOx monitor is an EPA designated "Federal Equivalent Method" analyzer. Calibrations shall be performed at least annually by 2B Technologies or another contractor utilizing a NIST-traceable calibration system or certified gases. Zero checks should be performed in the field at least quarterly to ensure that there is not a significant offset.

The Met One Model 83214 is a near-reference right-angle laser scatter particle counter that provides particle sizing in different bins. Calibrations shall be performed at least annually by Met One Instruments or another contractor utilizing an aerosolizer with polyspheres. Alternatively, collocations with a FEM or FRM instrument shall be performed at least annually. Zero checks should be performed in the field at least quarterly to ensure that there is not a significant offset. Flow checks should be performed in the field at least quarterly to ensure that the sample flow and sheath flow are correct.

The Santa Ana Pueblo Project QAO is responsible for completing or ensuring that maintenance, calibration and testing is performed as needed by a qualified staff member, consultant or manufacturer.

TABLE 5. MAINTENANCE, CALIBRATION, AND TESTING OF FIELD AND LABORATORY EQUIPMENT AND INSTRUMENTATION.

Instrument	Activity	SOP Reference	Frequency	Acceptance Criteria	Corrective Action
O3 Monitor	Calibration	Model 108-L Operation Manual	Annually	<5% difference from NIST-traceable standard	Repair as needed and re-calibrate

Instrument	Activity	SOP Reference	Frequency	Acceptance Criteria	Corrective Action
O3 Monitor	Replace inlet filter	Model 108-L Operation Manual	Quarterly	Replaced	Replace
O3 Monitor	Zero/span check	Model 108-L Operation Manual	Quarterly	<3 ppb zero offset, <5% span error	Adjust as needed for offset
O3 Monitor	Clean cell	Model 108-L Operation Manual	As needed	Completed	As needed to correct offset and/or noisy readings
O3 Monitor	Replace ozone measurement scrubber/filter	Model 108-L Operation Manual	Every 6-months	Replaced	Replace
O3 Monitor	Replace DewLine	Model 108-L Operation Manual	Every 12-months	Replaced	Replace
O3 Monitor	Replace lamp and pump	Model 108-L Operation Manual	As needed	Completed	As needed if lamp or pump fails
NO2/NO Monitor	Calibration	Model 405nm Operation Manual	Annually	<5% difference from NIST-traceable standard	Repair as needed and re-calibrate
NO2/NO Monitor	Replace inlet filter	Model 405nm Operation Manual	Quarterly	Replaced	Replace
NO2/NO Monitor	Zero/span check	Model 405nm Operation Manual	Quarterly	<3 ppb zero offset, <5% span error	Adjust as needed for offset
NO2/NO Monitor	Replace heated NO2 scrubber	Model 405nm Operation Manual	Every 6-12 months	Replaced	Replace
NO2/NO Monitor	Replace DewLine	Model 405nm Operation Manual	Every 12-months	Replaced	Replace
NO2/NO Monitor	Replace LED	Model 405nm Operation Manual	Every 12-months	Completed	Replace
NO2/NO Monitor	Replace O3 generator lamp	Model 405nm Operation Manual	As needed	Completed	As needed if lamp fails
PM Module	Clean inlet head	Recommended	Quarterly	Completed	Blow/wipe out
PM Module	Rotate pump filter membrane	AQSync Operation Manual	Bi-Annual	Replaced	Replace

Instrument	Activity	SOP Reference	Frequency	Acceptance Criteria	Corrective Action
PM Module	Zero Check	AQSync Operation Manual	Quarterly	<1 ug/m^3 zero offset	Adjust as needed for offset
PM Module	Flow check	AQSync Operation Manual	Quarterly	1 lpm +/- 0.2 lpm	Adjust as needed
PM Module	Adjust calibration factor	AQSync Operation Manual	Every 6-months	Completed	Adjust as needed based on correlation with FEM/FRM monitor
PM Module	Calibration	AQSync Operation Manual	Annually	<5% difference from NIST-traceable standard	Repair as needed and re-calibrate

7. Inspection/Acceptance of Supplies and Services (B6)

Project supplies will consist of AQSync air quality monitors, tools, and consumables supporting monitor maintenance and calibration across the network's operation. The AQSync monitors are calibrated and tested by 2B Technologies prior to delivery to Santa Ana Pueblo. Upon receiving project equipment, the Project Manager will review in-house calibration reports provided by 2B Technologies, ensuring that all in-house testing results meet requirements.

Upon receiving all monitors, tools, and consumables, the shipments will be checked by Santa Ana Pueblo to ensure that all parts were received as stated in the packaging contents and that no damage occurred to project materials during shipment. The AQSync will also be turned on as a brief diagnostic check that monitors are in working order.

47mm diameter 5-6 micron pore size PTFE filters and green disc filters are included in 2B Technologies Base Field Kit which will be purchased on an annual basis. The AQS O3 Field Kit contains an internal ozone scrubber, DewLine, valve and UV lamp, and will be needed annually to bi-annually. The AQS NOx Field Kit contains a pump, Dewline, 2 LED assemblies, set of exhaust scrubbers, and an ozone generator inlet scrubber, and will be needed annually to bi-annually. Any additional calibration gases used as a part of this project must be traceable to National Institute of Standards and Technology (NIST) standards.

C. Assessment, Response Actions, and Oversight

1. Assessments, Oversight, and Response Actions (C1 & C2)

The Project Manager will lead their staff in conducting programmatic self-assessments at least once every year at the onset of project activities in the spring. These self-assessments will entail a knowledge check wherein the Technician(s) perform and explain all project activities to the Project Manager and QA Managers, including a demonstration of field procedures for instrument maintenance and checks, data download and data quality control checks, and the generation of air quality reports using project data. The self-assessment will also include a staff-led review and update of the project SOP and QAPP, to identify any detected errors, loss of information during data entry, and any need for clarity to ensure that the project and its documentation are in

complete agreement. Notes will be taken during these assessments, and outcomes will be summarized in the project's quarterly progress reports and discussed with the project's QA Managers. If issues arise that would benefit from EPA's technical input, those issues will be elevated by the Project Manager to their EPA Project Officer and Technical Lead.

If the project-level Quality Assurance Managers have concerns about project performance, they can request more information and recommend corrective actions to the Project Manager. If needed, they may initiate stop-work orders until corrective actions are implemented.

2. Reports to Management (C2)

Project Quality Assurance reporting will occur in all project progress reports. This reporting will summarize the project self-assessments, as well as any quality control information generated since the last QC data summary. The reports will be authored by the Project Manager, and communicated electronically to the Project QA Manager, the EPA Project Officer, and the EPA Technical Lead.

D. Data Review and Usability

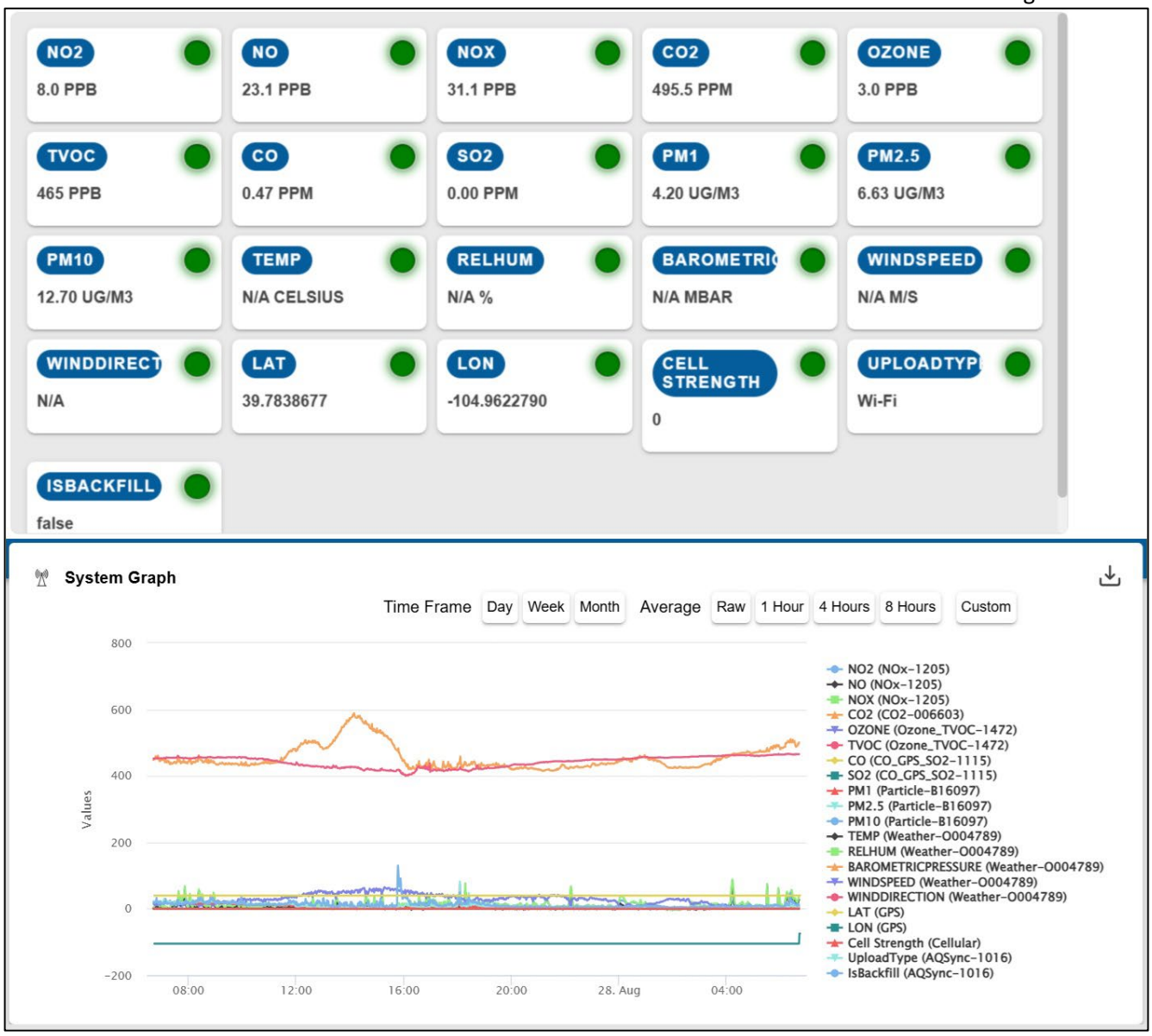
1. Data Review (D1)

Data from the AQSync will first flow through the 2B Technologies data portal via a cellular or WiFi connection. While this portal supports some data visualization, it is not designed for full data review requirements. Daily reviews of the data on the portal will be performed by the Project Manager, to include looking for abnormal spikes in the data, missing data, or periods where the data are fixed at one level. An example of the portal is shown below, with real-time values and a graph of all the data for 1-week. Individual sensors can be selected on the graph.

In the future, data will flow from the 2B Technologies portal to a web-based public data dashboard. This dashboard will contain basic data validation and correction algorithms to help ensure that data are valid prior to being viewed by the Tribal community.

The processes for information/data verification and validation begins with the data being checked quarterly to make sure they are following historical trends and are within statistical limits. Additionally, 2BTechnologies is available for questions if further detection/advice on invalidating data is needed. Diagnostic data from the sensors is also reviewed and evaluated to see if there are parameters out of specification or if there are status flags associated with the data. If the calibration specifications are out of limits or if flags are critical issues, data from that cycle are deemed invalid.

This explains how Santa Ana Pueblo's performance and acceptance criteria will be incorporated in the review process as the invalidated data will be flagged as erroneous data by the data quality indicators mentioned earlier. These are incorporated into the review process.



2. Project Evaluation – Usability Determination (D2)

The data review, verification, and validation processes will support determining the useability of the data for the project application. The ideal thresholds for acceptance criteria for accuracy, precision, completeness, representativeness, comparability, and sensitivity have been listed previously. As inaccurate, imprecise or unrepresentative data will be flagged as invalid during ongoing data review and validation and removed from analyses, the majority of useability determinations are based on the resulting data availability (completeness). The QA Officer and Project Manager always have the authority to additionally question the data, request and describe corrective actions to be taken (e.g., instrument replacements, re-siting), and ultimately determine whether data is fit for use. The data are usable if they meet all quality requirements outlined in this QAPP. The limitations of data use are related to each anticipated project analysis. As noted previously, this project is to provide ambient air quality data to the public, not to be a regulatory site.

References

2B Technologies: www.2btech.io

AQSync Operation Manual: https://2btech.io/downloads/?filter=true&docs_category=docs_aqsync

EPA Quality Assurance Project Plan Guidance: https://www.epa.gov/system/files/documents/2025-10/qapp-guidance_dtd_10012025_1.pdf

Model 108-L Operation Manual: https://2btech.io/downloads/?filter=true&docs_category=docs_108

Model 405nm Operation Manual: https://2btech.io/downloads/?filter=true&docs_category=docs_405_nm

83214 AQ Mass Profiler Operation Manual: https://2btech.io/wp-content/uploads/pdf/AQSyncInstruments/AQ-Mass-Profiler_MetOne_83214.pdf

Appendices

Appendix A: AQSync Maintenance Checklist

Appendix B: Standard Operating Procedure for the AQSync for Communities (Ver. 1)

Appendix C: AQSync Operation Manual (Rev. D-1, December 2024)

Appendix A

AQSync Maintenance Checklist

Air Quality Monitoring Station

Recommended Maintenance and Calibration Schedule

This schedule represents frequencies we recommend to meet the highest data quali objectives. However, the AQSync was designed to produce reliable data with minima intervention. Please contact us to discuss your specific situation and the minimum required maintenance for the AQSync in your monitoring location.

Task	3 Mo	6 Mo	9 Mo	12 Mo
GENERAL				
Change inlet filter membranes (every 3 months or up to every month if ***very*** dirty air)	•	•	•	•
OZONE				
Change internal scrubber and scrubber filter (minimum every 12 mo, preferably every 6 mo)		•		•
Check calibration in field with Model 714 Calibrator		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•
NOx				
Change LED				•
Check calibration in field with Model 714 Calibrator		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•
PM				
Rotate pump filter membrane (every 3 months for dirty air)	•	•	•	•
Field check zero and flow rate		•		•
Adjust calibration factor based on comparison with co-located or nearby FEM monitor		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•
CO/TVOC/CH_4				
Change CO sensor (if significant sensitivity drift has occurred)		•		•
Field check zero for CO and CH_4 (Requires tank of zero air)	•	•	•	•
CO_2				
Replace green inlet filter		•		•
Change soda lime zeroing scrubber		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•

Appendix B

Standard Operating Procedure
For the AQSync
For Communities
(Ver. 1, April 2025)

Standard Operating Procedure for the AQSync for Communities

2B Technologies
6800 W. 117th Avenue
Broomfield, CO 80020

Version 1
18 April 2025

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Introduction

Founded in 1998, 2B Technologies is an ambient air monitoring equipment manufacturer dedicated to the development of new analytical instruments for atmospheric and environmental measurements. Specializing in miniaturized instruments for measurements of ozone (O3), nitric oxide (NO), nitrogen dioxide (NO2), and mercury (Hg), they also manufacture packages built around these and other technologies. 2B Technologies maintains certification under the ISO 9001:2015 international quality standard.

2B Technologies AQSync

The AQSync Air Quality Monitoring Station is a comprehensive air monitoring package that combines Environmental Protection Agency (EPA) Federal Equivalent Method (FEM) instruments for measuring ozone (O3) and nitrogen dioxide (NO2), with a weather transmitter and other devices for high-quality yet affordable measurements of several other air pollutants. The suite of measurement choices is customizable and includes modules for O3, NO2, nitric oxide (NO), particulate matter in 3 size ranges (PM1, PM2.5, PM10), carbon monoxide (CO), carbon dioxide (CO2), total VOCs (tVOC) and weather (wind speed - WS, wind direction - WD, temperature - T, pressure - P, relative humidity - RH).

The AQSync can be installed at any location where line power is accessible, such as on a fence post or building or other pole. Alternatively, it can be installed on a solar trailer for more remote off-grid or short-term air monitoring applications.

Understanding the Pollutants

The AQSync incorporates a variety of different pieces of air monitoring equipment, utilizing different technologies. These include:

Parameter	Method	Device	Range	Accuracy
O3 (EQOA-0914-218)	UV absorption, 254 nm	2B Tech 108-L (FEM)	0–100,000 ppb	1.5 ppb / 2%
NO2 (EQNA-0217-243)	Direct absorbance, 405 nm	2B Tech 405 nm (FEM)	0–10,000 ppb	2 ppb / 10%
NO	Oxidation to NO2 with O3 followed by absorbance of NO2 at 405 nm	2B Tech 405 nm	0–2,000 ppb	2 ppb / 2%

Parameter	Method	Device	Range	Accuracy
PM1, PM2.5, PM10	Right angle light scatter particle detection using a laser diode	Met One 83214 AQ Mass Profiler	0–320,000 particles/L	±10%
CO	Amperometry	Alphasense CO-A4 sensor	0–500 ppm	1 ppm full scale
tVOC	Photoionization Detection	ION Science MiniPID2-HS sensor	0–3 ppm	0.5 ppb detection limit
WS	2-D Sonic anemometry	Gill Instruments MaxiMet GMX500 Weather Station	0.01–60 m/s (134 MPH)	±3% 0-40 m/s ±5% 40-60 m/s
WD	2-D Sonic anemometry	Gill Instruments MaxiMet GMX500 Weather Station	0-360 degrees azimuth	±3° 0-40 m/s ±5° 40-60 m/s
T	Solid state sensor	Gill Instruments MaxiMet GMX500 Weather Station	-40 to +70 °C	±0.3 °C @ 20 °C
P	Solid state sensor	Gill Instruments MaxiMet GMX500 Weather Station	300 – 1100 hPa	±0.5 hPa @ 25 °C
RH	Solid state sensor	Gill Instruments MaxiMet GMX500 Weather Station	0–100 %RH	±2 %RH @ 10-90 %RH

What You Will Need

For completing checks, maintenance and calibrations on the AQSync, the following will be needed:

- AQSync
- USB stick/drive
- Computer running Windows 10 or 11
- 2B Tech “Generic2BTouch” software
- Met One Swift 6.0 flowmeter
- O3 zero filter
- NOx zero filter
- Ozone and oxides of nitrogen calibration source (i.e. 2B Tech Model 714)
- Calibration gases (NO2, NO, CO, isobutylene)
- AQSync Operation Manual (found at https://2btech.io/downloads/)

Important Considerations and Safety

The AQSync comes calibrated from 2B Technologies. Full cleaning and recalibration by 2B Technologies is recommended annually. The unit is designed for long-term operation in a wide range of environmental conditions with minimal hands-on requirements.

The AQSync has a 120 VAC power line that connects to a power supply in the unit. All equipment within the AQSync operates on 12 VDC power, which reduces the likelihood of severe shocks and safety concerns.

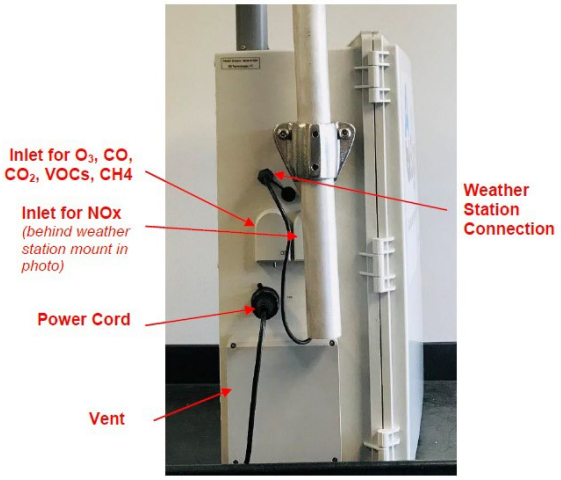
Preparing the Instrument

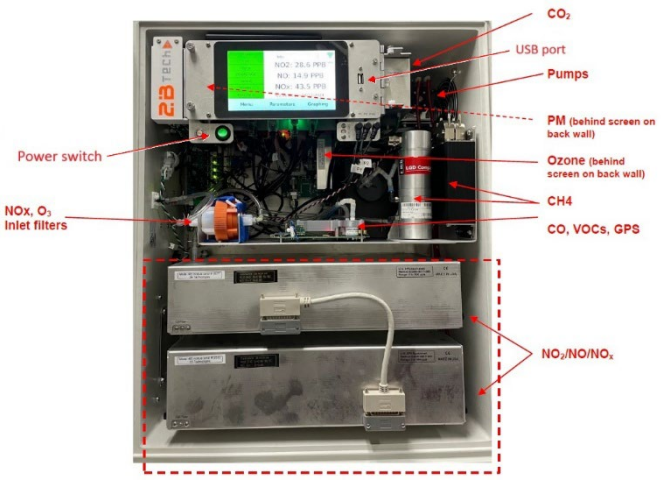
On receipt of the AQSync, unpack the main unit as well as supporting components. Install the particulate matter (PM) inlet and weather station:

- PM heated sampling inlet
    - Refer to Section B.1.1 of the AQSync Operation Manual for details
    - Disassemble the PM inlet
    - Plug the inlet heater wire connectors on the tube core to the wire connectors on the aluminum flange on top of the AQSync
    - Push the wires down the flange so they are inside the AQSync
    - Insert the tube core through the flange and into the hole (with o-rings) on the PM monitoring unit
    - Slide the outer shield over the tube core and twist to seal on the aluminum flange
    - Install the 3 thumbscrews to secure the shield and re-install the top gasket and nut
    - Place the inlet head on top of the inlet core tube
- Weather station
    - Refer to Section B.1.2 of the AQSync Operation Manual for details
    - Slide the metal down-tube into the bracket on the side of the AQSync and secure with 2 Allen-head set screws
    - Attach the sensor cable to the weather station
    - Drop the sensor cable through the down-tube and connect to the connector on the side of the AQSync
    - Attach the weather station to the top of the down-tube with 3 screws

Attach the 2 sections of Unistrut horizontally to the back of the AQSync. Install the AQSync at the desired location (pole/railing/other) using pole clamps, Unistrut clamps or other methods. Align the weather station to north. Refer to Section B.2 of the AQSync Operation Manual for details.

Plug the power cord into the connector on the side of the AQSync and to line power/solar trailer/other power source. Open the front cover (3 clamps) and turn on the AQSync using the green switch just below the lower left corner of the LCD touchscreen. Refer to Section C of the AQSync Operation Manual for additional details.





Verifying Proper Operation

Once the AQSync has been powered on, it will go through a boot-up sequence before displaying a menu screen and parameter values. Confirm that the AQSync's local Wi-Fi has been established, indicated by a green symbol in the upper right corner of the touchscreen. Ensure that the time and date are correct. (Note: the time is based on UTC.) Refer to Section C of the AQSync Operation Manual for additional details.

It will take all instruments up to 30 minutes to properly warm up. Ensure that all the boxes on the left side of the touchscreen are green, indicating a "connected" status.

Use the boxes on the left side of the touchscreen to view the different pollutant/parameter values. Touch the blue "Parameter" box on in the center bottom of the touchscreen to view detailed instrument parameters/settings. These can be compared to specification found in the respective instrument Operation Manuals, found at https://2btech.io/downloads/.

The AQSync can also be operated remotely via a Modbus TCP/IP interface. This can be set up on a laptop via Wifi and downloading the software to a USB drive. Follow the procedure found in Appendix 3 of the AQSync Operation Manual to install the Generic2BTouch software on the laptop.

Routine Data Collection

Data from the AQSync are uploaded to the 2B Technologies cloud-based Data Portal at a specified frequency (default is 5 minutes). Data are uploaded via a WiFi connection or cellular connection. Data, as well as graphs, are available on the cloud portal via a login. (Contact 2B Technologies to obtain access.) In addition, data may easily be set up to push to other data portals via API's.

If WiFi or cellular are not available, or if preferred, data can be downloaded directly from the AQSync to a USB drive. For direct downloads, insert a USB drive in the port to the right of the touchscreen. Using

the menu, data can be saved as raw data (i.e. 10-second data, varies by instrument) or 5-minute averages. Sections D.2 and E.8.5 of the AQSync operations manual provides more details.

Alternatively, data can be downloaded over a WiFi hotspot connection that can be established on the AQSync. Appendix 3 of the AQSync Operation Manual provides details on setting up a Modbus TCP/IP interface.

Routine Operation and Maintenance

Routine operations consist of data checks on the 2B Technologies Data Portal and occasional site visits to ensure the AQSync is kept clean, that the cooling fan is operational and that routine maintenance is performed. During on-site visits, visual checks of the LCD touchscreen can be made to ensure that all the boxes on the left side of the touchscreen are green. Checks of the individual pollutant/parameter data graphs can be performed to visually see if the data appear to be normal/typical or if there are unusual spikes or trends. Checks of the individual pollutant/parameter settings/diagnostics screens can be performed to ensure that all operational parameters are within specifications as indicated in the AQSync Operation Manual or individual pollutant operation manuals. See Section C.3 of the AQSync Operation Manual for additional details.

2B Technologies has a recommended maintenance schedule. Most of the routine maintenance consists of periodic inlet filter replacements to protect much of the equipment from being exposed to unwanted dirt and contamination. Other routine maintenance consists of flowrate and zero checks, and replacing scrubbers. Refer to the AQSync Operation Manual in Section H and Appendix 5 for details.

The 2 inlet filters that need replacement on a quarterly basis, or more frequently in dirty environments, are located on the shelf towards the left side of the unit, inside orange-ringed Teflon holders. After undoing the Velcro straps, the filter holders may be lifted up and open up using specially designed green wrenches. The used Teflon filters inside should be replaced with clean filters, the holders re-assembled and clamped, and re-installed in the Velcro straps.

Replacing scrubbers or DewLines for the O3 and NOx monitors can easily be performed as well by pulling the ¼” Teflon-lined Tygon lines from the components.

Air Quality Monitoring Station

Recommended Maintenance and Calibration Schedule

This schedule represents frequencies we recommend to meet the highest data quality objectives. However, the AQSync was designed to produce reliable data with minimal intervention. Please contact us to discuss your specific situation and the minimum required maintenance for the AQSync in your monitoring location.

Task	3 Mo	6 Mo	9 Mo	12 Mo
GENERAL				
Change inlet filter membranes (every 3 months or up to every month if ***very*** dirty air)	•	•	•	•
OZONE				
Change internal scrubber and scrubber filter (minimum every 12 mo, preferably every 6 mo)		•		•
Check calibration in field with Model 714 Calibrator		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•
NOx				
Change LED				•
Check calibration in field with Model 714 Calibrator		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•
PM				
Rotate pump filter membrane (every 3 months for dirty air)	•	•	•	•
Field check zero and flow rate		•		•
Adjust calibration factor based on comparison with co-located or nearby FEM monitor		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•
CO/TVOC/CH_4				
Change CO sensor (if significant sensitivity drift has occurred)		•		•
Field check zero for CO and CH_4 (Requires tank of zero air)	•	•	•	•
CO_2				
Replace green inlet filter		•		•
Change soda lime zeroing scrubber		•		•
Return module to 2B Tech/authorized distributor for calibration or replace with calibrated unit				•

Calibration and Checks

Full calibrations are recommended to be performed by 2B Technologies on an annual basis, or by trained personnel, as they require a calibration source and/or compressed gas bottles. Calibration procedures can be found in the AQSync Operation Manual in Appendix 2. The PM unit must be returned to the manufacturer (Met One) for re-calibration with size-specific aerosols.

Routine checks for the PM flow and O3/NOx zero's can easily be performed in the field.

- Particulate matter flow
    - Remove the white/black inlet cap from the PM down-tube
    - Turn on the Swift 6.0 flowmeter and place on the down-tube
    - Observe the flow reading on the Swift 6.0 flowmeter
    - If the flow is not 1.00 LPM (+/- 0.02 LPM), adjust the flow as needed using the touchscreen menu
    - Remove the Swift 6.0 flowmeter and replace the inlet cap
- Particulate Matter zero:
    - Refer to Section G.2.3 of the AQSync Operation Manual for details
    - Remove the white/black inlet cap from the PM down-tube
    - Attach the particulate scrubber filter to down-tube
    - Let the AQSync run for 15-25 minutes
    - Observe the PM values
    - If the PM values are not at or near zero, check for leaks and/or contact 2B Technologies
    - Disconnect the particulate scrubber filter and re-attach the inlet cap
- Ozone zero:
    - Refer to Section G.2.1 of the AQSync Operation Manual for details
    - Disconnect the O3 sample inlet tubing at the bulkhead fitting on the left inside of the AQSync
    - Attach the ozone scrubber to the inlet tubing
    - Let the AQSync run for 15-25 minutes
    - Observe the ozone values and make any corrections to the O3 zero offset as needed via the touchscreen menu
    - Disconnect the ozone scrubber and re-connect the sample inlet tubing to the bulkhead fitting
- NOx zero:
    - Refer to Section G.2.5 of the AQSync Operation Manual for details
    - Disconnect the NOx sample inlet tubing at the bulkhead fitting on the left inside of the AQSync
    - Attach the NOx scrubber to the inlet tubing
    - Let the AQSync run for 15-25 minutes
    - Observe the NO2 and NO values and make any corrections to the NO2 and NO3 zero offsets as needed via the touchscreen menu
    - Disconnect the NOx scrubber and re-connect the sample inlet tubing to the bulkhead fitting

Additional Help

2B Technologies: https://2btech.io/

2B Technologies Support/Downloads Page: https://2btech.io/downloads/

AQSync Operation Manual: https://2btech.io/wp-content/uploads/docs/manuals/model_AQSync_revD-1.pdf

Model 108-L Ozone Monitor Operation Manual: https://2btech.io/wp-content/uploads/docs/manuals/model_108-L_revD-9.pdf

Model 405nmNO2/No/NOx Monitor Operation Manual: https://2btech.io/wp-content/uploads/docs/manuals/model_405nm_revK-3.pdf

Appendix C

AQSync Operation Manual
(Rev. D-1, December 2024)