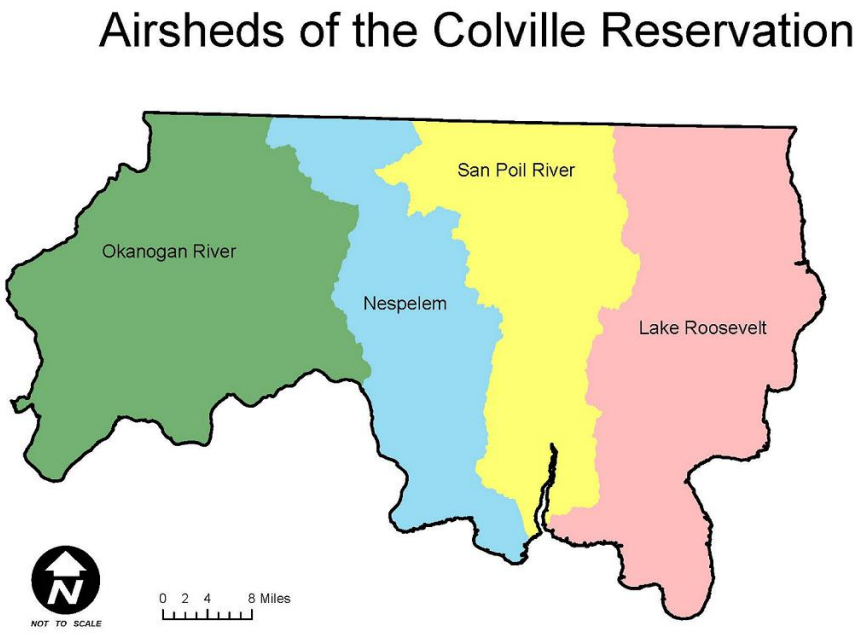
Air Quality Monitoring Network Quality Assurance Project Plan



Confederated Tribes of the Colville Reservation
Air Quality Program
Prepared by , Air Quality Program Manager
January 2012

Approval Sheet

The following individuates have reviewed and approved the final version dated _____ of the Quality Assurance Project Plan for a monitoring network within the exterior boundaries of the Colville Reservation. By signing each person verifies that the document meets the requirements of 40 CFR 30, 31 and 35 for assistance agreements.

_____ Date: 2-6-12

Air Quality Program Manager
Office of Environmental Trust
Confederated Tribes of the Colville Reservation

_____ Date: 2-7-12

Program Manager
Office of Environmental Trust
Confederated Tribes of the Colville Reservation

_____ Date: 2.14.2012

Justin Spenillo
Project Officer
Office of Air Waste and Toxics
Region 10, Environmental Protection Agency
206-553-6125; Spenillo.Justin@epamail.epa.gov

_____ Date: 2/15/12

Keith Rose
Air Monitoring Support
Office of Air Waste and Toxics
Region 10, Environmental Protection Agency
206-553-1949; rose.keith@epa.gov

_____ Date: 2/15/12

Chris Hall
Quality Assurance
Office of Environmental Assessment
Region 10, Environmental Protection Agency
206-553-0521; hall.christopher@epa.gov

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Distribution List A3

The final version and all subsequent revisions of the Quality Assurance Project Plan for an air monitoring network within the exterior boundaries of the Colville Reservation will be distributed to the following:

Confederated Tribes of the Colville Reservation
Office of Environmental Trust, Air Quality Program Manager
Email:
Phone;

Confederated Tribes of the Colville Reservation
Office of Environmental Trust, Program Director
Email:
Phone:

Justin Spenillo
Environmental Protection Agency
Project Officer, Office of Air, Waste and Toxics
Email: spenillo.justin@epamail.epa.gov
Phone: 206-553-6125

Keith Rose
Environmental Protection Agency
Air Monitoring Support, Office of Air, Waste and Toxics
Email: rose.keith@epa.gov
Phone: 206-553-1949;

Chris Hall
Environmental Protection Agency
Quality Assurance, Office of Environmental Assessment
Email: hall.christopher@epa.gov
Phone: 206-553-0521;

Melinda Ronca-Battista
Tribal Air Monitoring Support Center
Research Associate
Email: Melinda.Ronca-Battista@nau.edu
Phone: 480/759-1544

Glen Gehring
Tribal Air Monitoring Support Center
Technology Specialist
Glenn.Gehring@nau.edu
Phone: 541/612-0899

Institute for Tribal Environmental Professionals
Training Coordinator
Email
Phone:

Project Organization A4

The Confederated Tribes of the Colville Reservation (CTCR) air quality program (AQP) has complete responsibility for writing this Quality Assurance Project Plan (QAPP) and the implementation of the tasks outlined within. The AQP will revise the document when needed and make the new version available to the people on the distribution list. The AQP also assumes responsibility for designing, installing, operating, and analyzing data for the air monitoring network. Figure 1 depicts an organizational chart for the operation of the monitoring network and Table 1 provides a description of responsibilities. Figure 2 shows how work and information flows to the end point by providing the Tribal membership and general public with air quality information. References to a PM2.5 monitor in Omak are for informational purposes only. The Washington State Department of Ecology functions as the primary quality assurance organization and that operation follows their QAPP and Standard Operating Procedures (SOP).

EPA Region 10 staff will review, provide technical assistance and approve the QAPP for implementation. They will also provide updates on new policies; review monitoring reports; and provide assistance when needed.

Through the Institute for Tribal Environmental Professionals a professional assistance plan was implemented to provide the AQP expertise with the air monitor network design including QAPP preparation. ITEP will continue to provide reviews of any QAPP revisions and technical assistance with regard to monitoring equipment and audits.

This is a category two QAPP and requires most of the twenty four elements to be present. Category two statuses support investigation and data collected by the air monitoring network.

Ultimately Tribal members and reservation residences will have access to the data and be informed by the air quality index on a near real time basis.

All documents pertaining to this QAPP will be maintained on file in the Air Quality Program office. Contact the program manager for copies of the documents. This QAPP and subsequent revisions will be distributed electronically unless a paper copy is requested.

Figure 1: CTCR Air Monitoring Network Organizational Chart

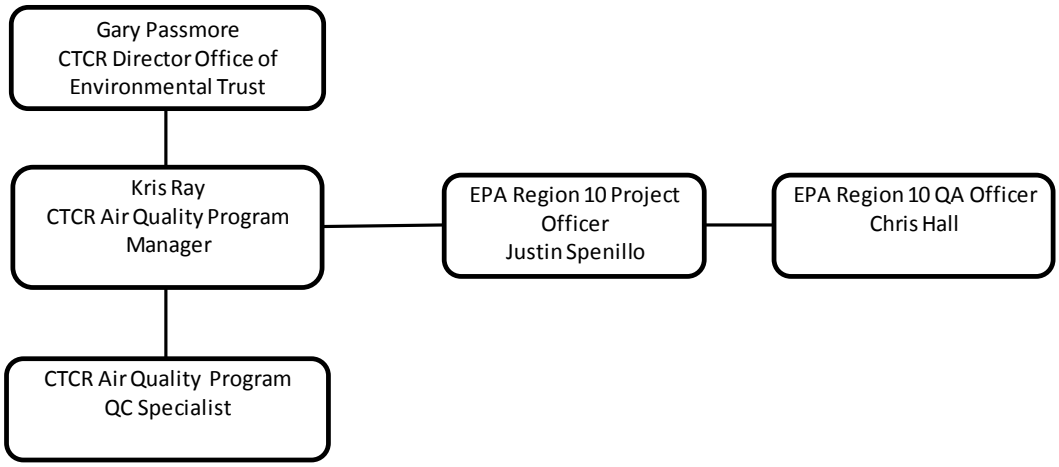
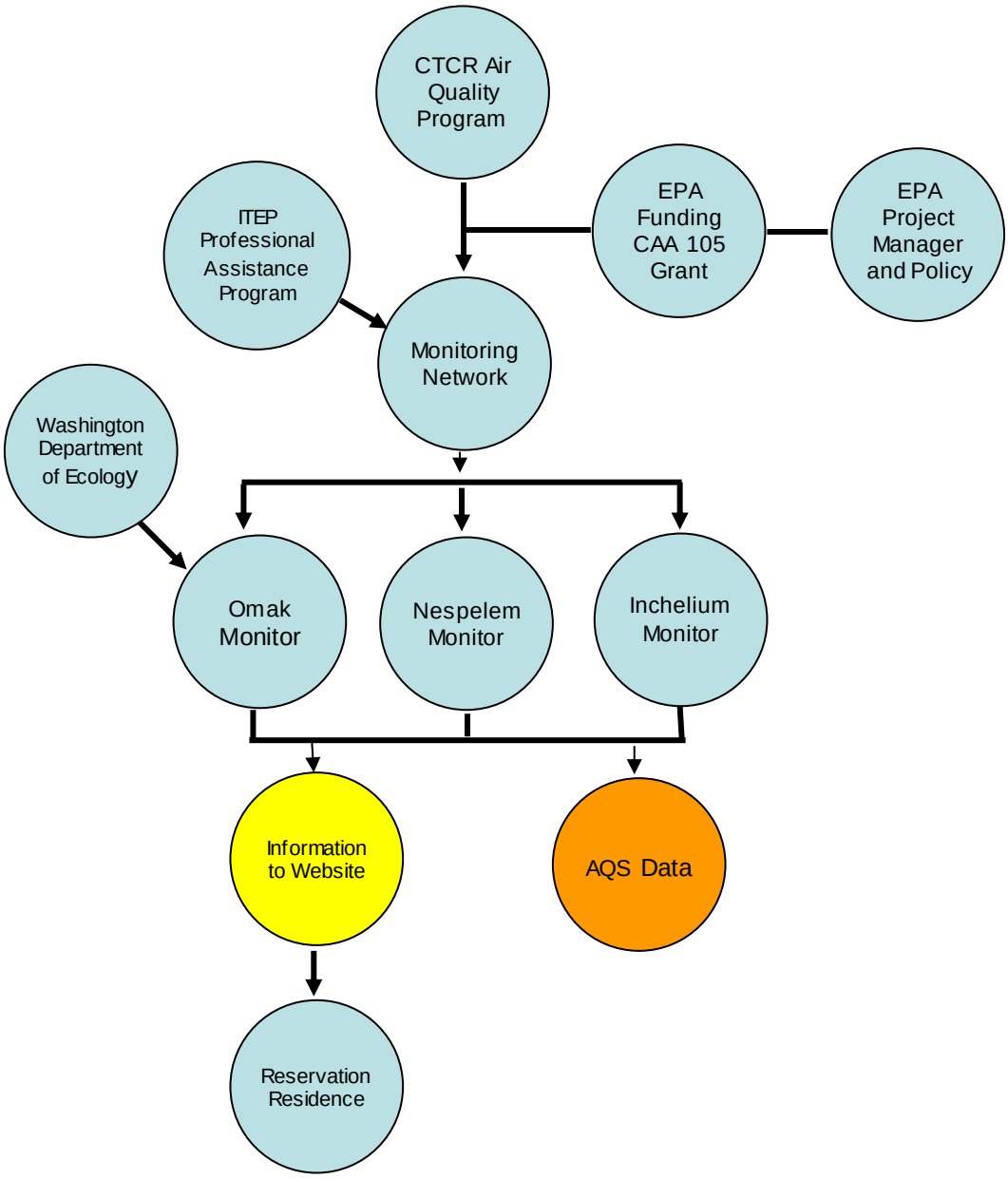


Table 1: Roles of Key Personnel

Position	Responsibility
Air Quality Program Manager	• Manages Air Quality Program • Station site selection • Station installation • Station maintenance and repair • Sample collection • Quality control checks • Instrument repair and calibration • Telemetry system operation and maintenance • Air monitoring data analysis • Air monitoring data reports
Office Of Environmental Trust Director	• Provides guidance and oversight for Air Quality Program
EDT Air Quality QC Manager	• Quality assurance activities
EPA region 10 Air Project Officer	• Manages Tribal CAA 105 Grants • Coordinates with EPA specialist
EPA region 10 QA coordinator	• Reviews Draft QAPP • Approves QAPP

Figure 2: CTCR Air Monitoring Network Flow Chart



Problem Definition A5

The Air Quality Program is initiating regular $PM_{2.5}$ - Continuous Local Conditions monitoring at two locations as part of an integrated, Reservation-wide network. The objectives of the AQP are to:

1. Determine if air quality affects the health of the communities by comparing with the National Ambient Air Quality Standards (NAAQS) for particulate matter 2.5 microns ($PM_{2.5}$) or smaller as a non-regulatory monitor. There are two NAAQS $PM_{2.5}$ standards: the annual primary standard and the daily standard. To meet the annual standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 $\mu g/m^3$. To attain the daily standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 $\mu g/m^3$. If it is determined that the air quality exceeds the NAAQS, the AQP will ascertain the source of the $PM_{2.5}$, on or off Reservation, and formulate a plan to address the problem. The Tribal Business Council will be informed and policy direction requested to determine actions needed. If $PM_{2.5}$ concentration levels are high, then other monitors maybe installed to measure additional criteria pollutants such as ozone or CO.

2. To serve as baseline data so that changes in air quality can be tracked. Long term data gathering and statistical analysis will allow the tracking of changes within the air sheds monitored. If changes are measurable and significant then the cause can be located and control methods instigated. With a changing economy and environmental conditions long term data will help inform management decisions.

3. To provide pollution levels when calling burn bans on the Reservation. Near real time $PM_{2.5}$ levels are critical when determining if a burn ban should be called on portions of the Reservation or the entire area. $PM_{2.5}$ concentrations and weather forecasts are combined to make the burn ban judgment and helps determining the length of the restrictions. $PM_{2.5}$ values will be converted to the air quality index categories of good, moderate, unhealthy for sensitive groups and unhealthy. Burn ban information will be distributed as shown in a notification plan which is updated yearly.

Ambient air monitoring data will be used to support the air monitoring program, fire management, forest management, smoke management and assess environmental health risks.

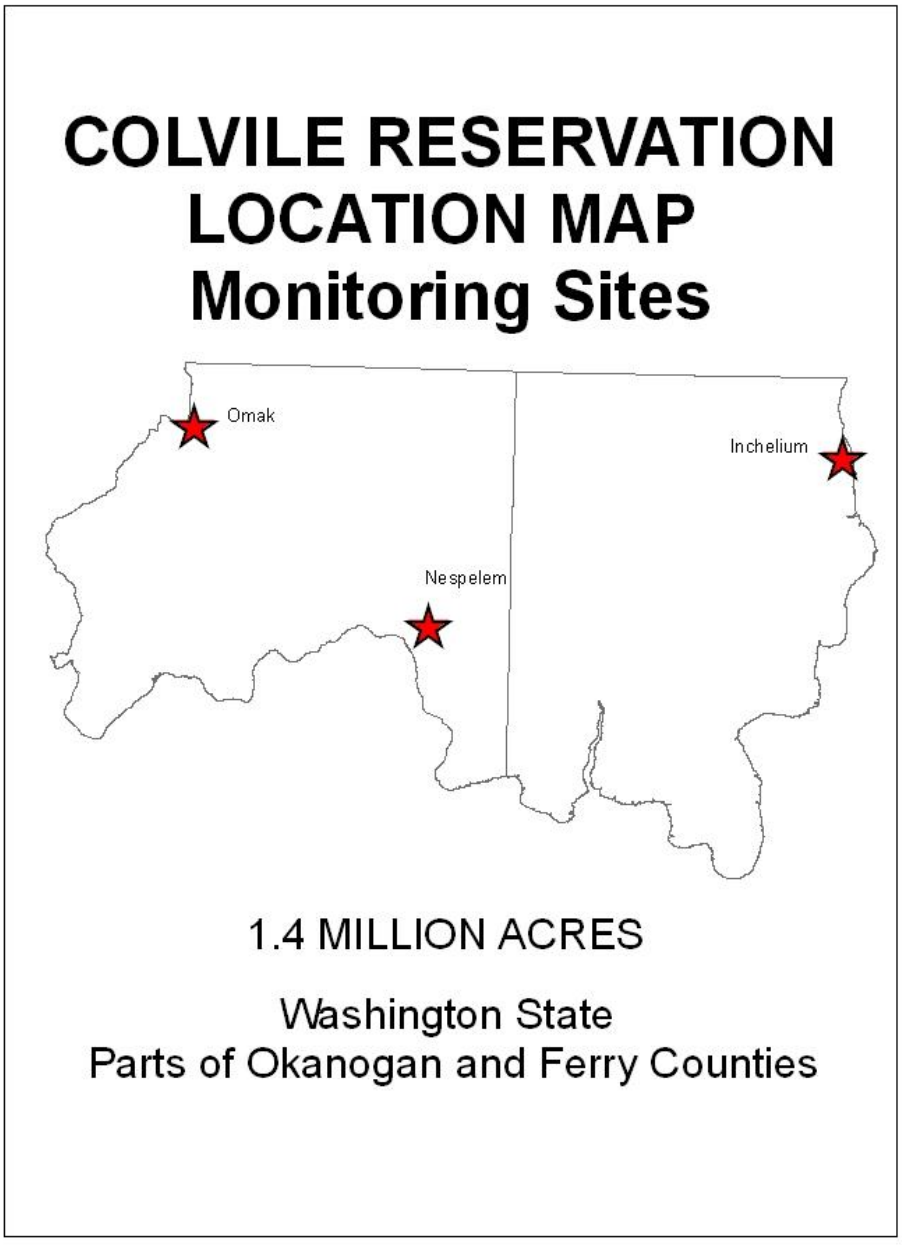
This QAPP describes project methods, refers to EPA established data quality objectives, and defines data quality assurance and control methods for air monitoring by the Air Quality Program. The QAPP was developed to ensure consistent, repeatable results and to improve the reliability and comparability of data collected. This project was established in response to growing concerns and unknown quality of the air in the two population centers.

Project Description A6

The measurement goal of this ambient air quality monitoring program is to estimate the concentration, in units of micrograms per cubic meter (µg/m3), of particulate matter with mean aerodynamic effective diameter less than 2.5 microns at two locations on the Reservation (Figure

3). A continuous method that automates the system and performs measurements 24 hours a day will be utilized. Quality Control (QC) checks will be made according to the SOP (Appendix 1), manufactures recommendation and the SOP related to the metrological equipment (Appendix 2).

Figure 3: Air Monitor Locations on the Colville Reservation



Quality Objectives and Criteria A7

Criteria to determine the quality of the information and data gained by operating a monitoring network are important to define and understand. Quality objectives work on two levels; the study and data level and will be discussed separately below. To evaluate objectives, data quality indicators (DQIs) are used to define acceptance or rejection criteria. The DQIs, precision, bias, representativeness, comparability and completeness are defined as:

- Precision is the degree of agreement among repeated measurements of the same characteristic, or parameter, and gives information about the consistency of methods. Precision will be expressed by calculating the standard deviation of the data.
- Bias is the systematic or persistent distortion of a measurement process that causes errors in one direction.
- Representativeness expresses the degree to which data accurately and precisely represents a variation of a sample
- Comparability expresses the measure of confidence that one data set can be compared to another and can be combined for decision making.
- Completeness is a measure of the amount of valid data compared to the amount that was expected to be obtained under correct, normal conditions, and can be calculated:

$$\% \text{ Completeness} = \frac{\text{\# of valid results}}{\text{\# of potential samples}} \times 100$$

The use of the DQIs given above will not be justified for all the quality objectives discussed below. When useful a discussion of the DQI for a quality objective will be presented.

Study Quality Objectives

To compare the data with NAAQS to help determine if health problems may occur on a annual and daily basis. To meet the annual standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations must not exceed 15.0 µg/m^3. To attain the daily standard, the 3-year average of the 98th percentile of 24-hour concentrations must not exceed 35 µg/m3. These are calculated based on 40 CFR Appendix N of Part 50—Interpretation of the National Ambient Air Quality Standards for $PM_{2.5}$.

Data completeness will be judged based on the total potential hourly concentrations compared to the number or valid samples recorded presented as a percentage. A year meets data completeness requirements when at least 75 percent of the scheduled sampling days for each quarter have valid data. A 24-hour average shall be considered valid if at least 75 percent (18) of the hourly averages for the 24-hour period are available. In the event that less than all 24 hourly averages are available (less than 24, but at least 18), the 24-hour average shall be computed using the number of available hours as the divisor.

Following the monitoring network SOP assures the data will be representative of each site. The SOP provides methods to operate and maintain the BAM 1020 in the best possible condition for optimal sample and data gathering.

Burn bans for health reasons are initiated if $PM_{2.5}$ concentration levels exceed 27 µg/m3 and are presumed to stay at or above that level. Bans are generally called during the early winter months when stagnant air masses are common.

Data Quality Objectives

The methods to measure the quality objectives and compare with the DQIs are well known for the BAM 1020. The Table 2 below provides criteria, frequency and tolerances that determine if the monitoring equipment is functioning at the proper level and data are acceptable.

Table 2: Critical and operational data validation criteria for the Met One BAM

Criteria		Frequency	Acceptable Range	Reference
Critical Criteria: These criteria represent a range when corrective action will be needed to reestablish optimal sampling attributes				
Sampling period	Hourly	Hourly	< 42 minutes	BAM-1020 Manual, Rev G
	24-hr	Daily	< 18 hours	40 CFR Part 50 App L, Sec 3.3
Flow statistics (in BAM-1020 file memory)	Average Flow Rate	Daily	≥ ±5% of 16.67 lpm ≤ 15.87 to ≥ 17.54 lpm	40 CFR Part 50 App L, Sec 7.4
	Flow Rate Variability	Daily	Coefficient of variation 2% or less	40 CFR Part 50 App L, Sec 7.4.3.2
Verification	Single point flow (Reference Std Reading)	Monthly	±5% of Design Flow	40 CFR Part 50 App L, Sec 7.4
	Single point flow (BAM-1020 Flow Reading)	Monthly	±4% of Reference Standard Reading	40 CFR Part 50 App L, Sec 9.2.5
	Leak Check	Monthly	>1.5 lpm	Agency specific
Operational Criteria: These criteria represent a range when corrective action may be needed to reestablish optimal sampling attributes				
Verification /Calibration	Leak Check	Monthly	>1.0 lpm	Part 50, App L, Sec 7.4
	Reference membrane	Hourly	±5% of ABS ("D" error)	BAM-1020 Manual, Rev G
	BX-596 Temp Verification	2 Months	±2°C	40 CFR Part 50 App L, Sec 9.3; Method 2.12, Sec 6.4

	BX-596 Temp Calibration	2 Months	±0.2°C	BAM-1020 Manual, Rev G
	BX-596 Barometric Pressure Verification	2 Months	±10 mm Hg	40 CFR Part 50 App L, Sec 9.3; Method 2.12, Sec 6.5
	BX-596 Barometric Pressure Calibration	2 Months	±1 mm Hg	BAM-1020 Manual, Rev G
	3-Point Flow Calibration	2 Months or on Failed Flow verification	±0.1 lpm	BAM-1020 Manual, Rev G
	Filter RH Calibration	6 Months	±4% RH	BAM-1020 Manual, Rev G
	Filter Temp Calibration	6 Months	±1°C	BAM-1020 Manual, Rev G
Cleaning	PM10 Inlet and VSCC™	Monthly	Cleaned	BAM-1020 Manual, Rev G; Method 2.12,Sec 9.3
	Nozzle, vane, pinch roller, capstan	Monthly	Cleaned	BAM-1020 Manual, Rev G
Other Mfg Recommended Maintenance	Clean pump muffler; test Smart heater	6 Months	Verified	BAM-1020 Manual, Rev G
	Zero filter test, Clean internal filter; Beta detector test; check span foil; clean inlet tube	12 Months	Verified	BAM-1020 Manual, Rev G

The meteorological equipment also needs DQIs that are well defined to assure the best data. Table 3 provides these criteria with additional detail in the meteorological SOP.

Table 3: Meteorological Sensor Quality Control and Assurance Measures

Sensor	Criteria	Action
BX-596 AT/BP Sensor	BP varies more than ±10 mm Hg from deltaCal Standard	BAM 1020 Calibration Following SOP
	Temperature varies more than ±2°C from deltaCal Standard	BAM 1020 Calibration Following SOP
	Sensor shield and/or probe damaged	Contact Met One for instructions
BX-592 Outside Temperature Sensor, Volumetric Flow	Temperature varies more than ±2°C from deltaCal Standard	BAM 1020 Calibration Following SOP
	Temperature shield and/or probe damaged	Contact Met One for instructions
Model 50.5 Wind Sensor	Yearly zero test reading 0.0 to 0.1 m/s wind speed.	Contact Met One for instructions if greater than these readings

	Yearly span test	Contact Met One for instructions if readings do not match those shown in Table 6
	Heater not functioning	Contact Met One for instructions
Relative Humidity/Temperature Sensor, 083D	Yearly check for reasonableness	Compare with local weather station,
	Yearly check for operation	Blow on sensor and confirm RH rise
Barometric Sensor 090D	Yearly inspection	Clean pressure inlet port for blockages when needed
	Compare to deltaCal Standard	Contact Met One for instructions if values do not compare reasonably
Rain Gauge 375 0.01 Inches	Yearly check for operation	Manually tip bucket and confirm reading
	Yearly check for level	Use adjustment legs to level
	Damage or bucket set screws loose	Follow instructions in operation manual for calibration

For additional processes that affect data quality please reference:
Air Quality Monitoring Network Standard Operating Procedures for BAM 1020 PM 2,5 Monitors (Appendix 1).
Air Quality Monitoring Network Standard Operating Procedures for Metrological Sensors (Appendix 2)

Special training and Certification A8

Adequate education and training are integral to any monitoring program that strives for reliable and comparable data. Training is aimed at increasing the effectiveness of employees and the Air Quality Program. Sufficient time will be provided by management to the personnel directly involved in this project to read and understand this QAPP and the referenced documents. Field training for each monitoring site will also be provided to establish competence to maintain and operate the equipment.

The Air Quality Program also monitors the availability of training courses offered by EPA's Air Pollution Training Institute, EPA Region 10, Northern Arizona University's Institute for Tribal Environmental Professionals (ITEP), California Air Resource Board (CARB) and private consulting firms. Such institutions conduct professional services and ensure certification of their courses offered. When circumstances warrant, staff members may be enrolled in one or more training courses offered by these institutions. Records on personnel qualifications and training are maintained in personnel files and are accessible for review during audit activities.

Documents and Records A9

The AQP air monitoring network is being established for non-regulatory and guidance purposes. The program is committed to fully documenting all activities relating to data collection, analysis, validation, and reporting. The custody documentation requirements outlined below (B3) will

ensure that the disposition and location of the data records are known, and that the data are defensible.

Each set of records is filed according to year, component and tasks listed in the current EPA CAA 105 approved work plan. Previous years files and archived files are kept in cabinets in the AQP office or in long term document storage in the building. Electronic records are kept on the main AQP desk computer and the Environmental Trust Department (ETD) server. Files are organized similarly to the paper versions.

Sampling Process Design B1

The Inchelium monitor site will be located at the Emergency Management facility adjacent to the Health Clinic. No restriction of air flow or minor sources of emissions exists within a distance that would affect the concentration readings. A permanent site for Nespelem has not been identified at this time; a description will be added to this QAPP when available. When picking monitoring site locations, 40 CFR Part 58 Appendix E was consulted.

Monitoring can be considered at different scales of area depending on the use of the data and site location. The monitors included in this QAPP are on the neighborhood scale and should represent conditions in and around the two communities where they are located. The $PM_{2.5}$ levels will be influenced from sources on an urban scale and sometimes on the regional scale. Figures 4 and 5 provide an approximate neighborhood scale boundary for the two sites.

All parameters measured at the sites will be on a continuous basis with one hour averages calculated then complied into 24 hour averages. The goal of sampling is to accumulate 8760 hourly and 365 daily averages. If more than 75% of the possible samples are valid then the day or year will be considered complete.

Sampling Methods B2

Both monitors will be operated as Non-regulatory for comparison to the National Ambient Air Quality Standards (NAAQS). Although the Inchelium monitor has the capability to function as a Federal Equivalent Method (FEM) monitor it will not be held to that standard. Every effort will be made to assure that data gained by both monitors are rigorously controlled by the procedures set in this SOP.

All monitoring sites will continuously sample $PM_{2.5}$, ambient temperature, wind speed and direction. Every parameter will be averaged by the hour and then on a 24 hour basis. Data will be stored on a data logger, downloaded to AQS and saved on the AQP computer. The Tribal Data Toolbox will be utilized to analyze all data and track quality control.

See the Standard Operating Procedure for the Continuous Measurement of Particulate Matter Monitoring Sites for greater detail on BAM 1020 operations, equipment, performance criteria and data acceptance standards. A separate SOP for the data acquisition system can be found in Appendix 5.

Sample Handling and Custody B3

After the installation of data loggers and telemetry system (not present at time of present QAPP version) data will be uploaded automatically to AQS and available for viewing on the internet. Because of the automatic nature of the electronic files no chain of custody record will be required. Until then data can be manually downloaded to a laptop computer on site utilizing the Met One Comet™ program. Data will be tracked utilizing the Chain of Custody for Records Form provided as Appendix 3. Data will also be stored on a departmental server and will be updated periodically.

Figure 4: Neighborhood Scale Monitoring Area, Nespelem

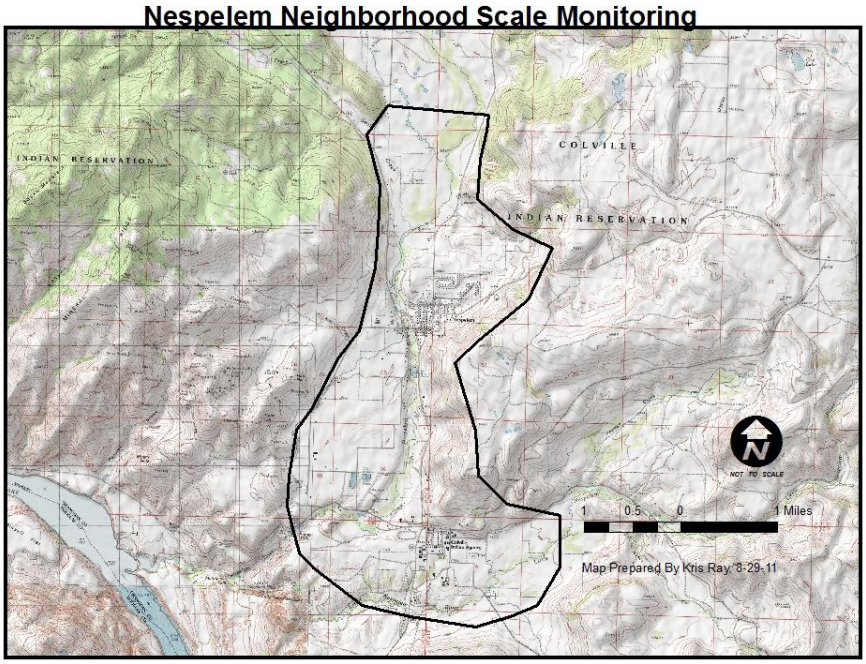
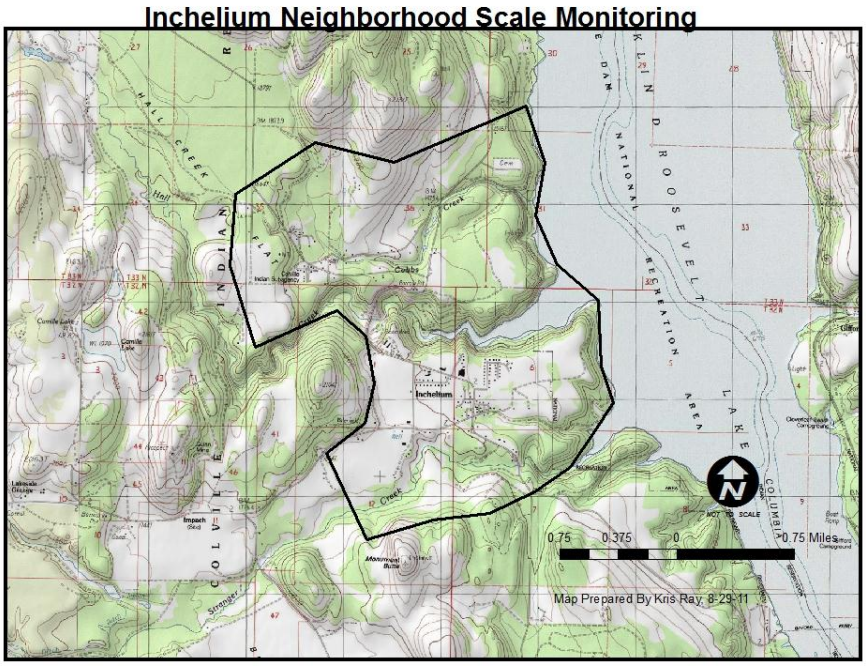


Figure 5: Neighborhood Scale Monitoring Area, Inchelium



Analytical Method B4

Follow the SOP for monitoring sites for DQI and acceptance criteria.
Follow the SOP for data management and analysis.

Quality Control B5

The monitoring site SOP provides many Quality Control (QC) opportunities to insure that data gained are superior and valid. The QC begins in the Acceptance section of the SOP by describing how monitors will be setup, programed, and tested prior to field deployment. Also provided in the SOP are operation and maintenance processes and standards that are designed to provide high quality data with minimal downtime. As shown in Table 2: Critical and operational data validation criteria for the Met One BAM, criteria, frequency and tolerances are provided with action recommendations, that when followed, would minimalize data invalidation.

The data management and analysis SOP provides all the information to validate data before final acceptance and submittal to AQS.

Instrument/Equipment Testing, Inspection, and Maintenance B6

All instructions covering inspections and acceptance testing provided in the monitoring and meteorological SOPs will be adhered to. See Appendix 1 and 2.

Instrument/Equipment Calibration and Frequency B7

All instructions covering equipment calibration provided in all network SOPs will be adhered to.
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Inspection/Acceptance of Supplies and Consumables B8

The air quality program manager will be responsible for ordering, inspecting, accepting and inventorying all supplies for the monitoring network.

Data Management B10

All components for this section of the QAPP are provided in the SOP for data analysis and management.

Assessments and Response Actions C1

The network SOPs provides guidance for monthly, 2 month, quarterly, 6 month and yearly maintenance and assessments.

Reports to Management C2

Quarterly or semi-annual reports will provide the results of performance evaluations and system audits; results of periodic data quality assessments; and significant quality assurance problems and recommended solutions.

The AQP will prepare these reports and provide them to EPA Region 10 and the Environmental Trust Director. Any feedback pertaining to data, analysis or improvements will be appraised and appropriate action taken. All reports, equipment manuals and documents are on file in the AQP office and can be requested as needed.

Data Review, Verification, and Validation D1

Data verification is the process for evaluating the completeness and correctness of the data set against the methods and procedures. Data validation is sample-specific process that extends the evaluation of data beyond method and provides procedures to determine the quality of the data set relative to the end use. It focuses on the project's specifications or needs, designed to meet the needs of the decision makers/data users and should note potentially unacceptable departures from the QA Project Plan. The potential effects of the deviation can be evaluated during the data quality assessment. Table 4 provides an example of verification tracking and the suggested maintenance of the network monitors over time. The date during the month that the activity was conducted is entered when completed. A full form providing a six month record can be printed and used at each site. Table 4 list sequential steps, components and procedures for validation of monitoring data based on criteria mentioned in several sections above and in-depth as part of the SOP. Similar procedures and data validation criteria are available in the meteorological SOP.

Table 4: Verification Tracking Sheet Example, BAM 1020

BAM1020 Verification Sheet		Date Maintenance Completed	
Item	Suggested period	October	November
Download Data Log	Weekly		
Download Error Log	Weekly		
Leak Check As Found	Monthly		
Nozzle and Vane Cleaning	Monthly		
Clean Capstan Shaft and Pinch Roller	Monthly		
Flow Check	Monthly		
Leak Check as Left	Monthly		
Clean Bam Shelter	Monthly		
Verify Settings - See Attached Listing	Monthly		
Set Clock and/or Date	Monthly		
Replace Filter Tape	2 Months		
Run Self-Test Function	2 Months		
Flow Calibration	2 Months		
Inspect and Clean PM10 PM2.5 Head and Trap	2 Months		
Perform 72 hour BKGD Test	6 Months		
Replace/Clean Pump Muffler Filter	6 Months		
Test Flow Controller	6 Months		
Test Pump	6 Months		
Test Filter RH and Temp Sensors	6 Months		
Test Smart Heater	6 Months		
Replace Nozzle O ring	12 Months		
Clean Internal Debris Filter	12 Months		
Beta Detector Count Rate Test	12 Months		
Beta Detector Dark Count Test	12 Months		
Test Analog Output	12 Months		
Rebuild Vacuum Pump	24 Months		
Clean Inlet Tube	24 Months		
Replace Pump tubing	24 Months		

Table 5: Data Validation Steps for BAM 1020

Validation Step	Component	Procedure
Verify Data Source	Direct Data Download	Download csv Data File
		Download Settings File
		Download Alarm File
Review BAM 1020 Attribute Data	Full scale concentration, Analog data	Sort records for full scale data (0.985 mg); look for errors causing FS output but digital CONC data are valid (e.g., errors P, R, N, E), if found, retrieve digital data.
	Full scale concentration, Digital data	Usually maintenance (M) or power fail (L) errors: invalidate
	Qtot	A good validation indicator. If Qtot varies, suggests a problem with temperature or pressure probe, or pump. Recommend rigid tolerance for Qtot
	Error flags	Review specific errors and invalidate accordingly
Review BAM-1020 Flow Statistics	Elapsed time	Nespelem 50 minutes Inchelium 42 minutes
	Average flow	±4% of 16.67 lpm
	Coefficient of variation	< 2%
	Sample volume	Recommend rigid tolerance for Qtot (0.700 ±0.003 m3)
	Temperature and Pressure Stats	Average, Max, Min for reasonableness
Review Field QC (Operator log sheets)	Flow checks	±4% of 16.67 lpm
	Leak checks	> 1.5 lpm, invalidate back to last passing leak check
	Calibration	At least annually, or on failed verification
Maintenance procedures	Inlet cleaning	Verify inlets cleaned (30 days for VSCC™)
	Periodic zero test	Verify and evaluate
Periodic component tests	Test: Filter T and RH, Smart Heater, Beta Count Rate, Analog DAC	Verify (Operator log sheets)

Verification and Validation Methods D2

Please see details for this section in the Data Analysis and Management SOP (Appendix 4).

Reconciliation with User Requirements D3

Three years after each monitoring site begins functioning; comparison to NAAQS by computing the annual primary standard and the daily standard can be accomplished. That will give an indication if health of community residences is adversely affected by air quality ($PM_{2.5}$). After the accumulation of many years of data a trend analysis will be conducted to determine if long-term changes are occurring. An effort to identify the source of change will be undertaken when needed. The number of instances when the monitoring information was utilized for calling burn bans will also be reported. A discussion of effective data use will be added to the monitoring reports.

References

Air Quality Monitoring Network Standard Operating Procedures for BAM 1020 PM 2,5 Monitors, Confederated Tribes of the Colville Reservation, 2012

Air Quality Monitoring Network Standard Operating Procedures for Metrological Sensors, Confederated Tribes of the Colville Reservation, 2012

Quality Assurance Handbook for Air Pollution Measurements Systems, Volume II, Ambient Air Quality Monitoring Program, EPA-454-08-003, December, 2008, 309 pages.

Quality Assurance project Plan (QAPP) Template and Guide, Native American fish and Wildlife Society, Final QAPP Template February 12, 2004, 24 pages

Guidance on Systematic Planning Using the Data Quality Objectives Process, EPA QA/G-4, Office of Environmental Information, February 2006, 121 pages.

EPA Quality Manual for Environmental Programs, DIO 2105-P-01-0, Office of Environmental Information Quality Staff, May 5, 2000, 63 pages.

EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, Office of Environmental Information, EPA/240/B-01/003, March 2001, 40 pages.

Guidance for Quality Assurance Project Plans, EPA QA/G-5, Office of Environmental Information, EPA/240/R-02/009, December 2002, 111 pages.

Systematic Planning: A case Study of Particulate Matter Ambient Air Monitoring, EPA QA/CS-2, Office of Environmental Information, EPA/240/B-07/001, March 2007, 51 pages.

EPA Technical Guidance for Development of Tribal Air Monitoring Programs, Community and Tribal Programs Group, Ambient Air Monitoring Group, Office of Air Quality Planning and Standards, RTP, NC 27711, EPA-456/B-07-002, August 2007, 177 pages.

The Volunteer Monitor's Guide to Quality Assurance Project Plans, Office of Wetlands, Oceans and Watersheds, EPA 841-B-96-003, September 1996, 67 pages.

Appendix

Appendix 1: Air Quality Monitoring Network Standard Operating Procedures for BAM 1020 PM 2.5 Monitors

(Separate File)

Appendix 2: Air Quality Monitoring Network Standard Operating Procedures for Metrological Sensors

(Separate File)

Appendix 4: Air Quality Monitoring Network Standard Operating Procedures for Data Management and Analysis

SOP will be added when completed

Appendix 5: Air Quality Monitoring Network Standard Operating Procedures for Data Acquisition and Telemetry System

SOP will be added when completed