QAPPs in a Nutshell

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SO MANY ACRONYMS!

- QAPP = Quality Assurance Project Plan
- QA/QC = quality assurance/quality control
- SOP = standard operating procedure
- DQO = data quality objectives
- MQO = measurement quality objectives
- ITEP = Institute for Tribal Environmental Professionals
- TAMS Center = Tribal Air Monitoring Service Center
- EPA = Environmental Protection Agency
- ANSI = American National Standards Institute
- NIST = National Institute of Standards and Technology
- NAAQS = National ambient air quality standards
- AQS = air quality system
- CFR = code of federal regulations
- FRM = federal reference method
- FEM = federal equivalent method
- NPEP = National Performance Evaluations Program

The QAPP format of 24 elements is used world wide

- QAPPs list the requirements
- The SOPs describe how those requirements are met
- Anyone receiving grant funds from a federal agency must have a quality system
- Even 1-person programs can have data that is legally and scientifically defensible

Polling question 1:

- Does your granting agency require a specific QAPP format?
  - Yes
  - No
  - (If yes, and you would like TAMS Professional Assistance, contact us!)

EPA Uses a Graded Approach

QA and QC requirements based on:

- Importance of work
- Available resources
- Unique needs of organization
- Consequences of making a wrong decision with the data

Element 1: Title Page with Approval Signatures

- Title of QAPP
- Name(s) of organizations implementing project
- Approval personnel
- Assistance agreement or contract number(s)

Element 2:
Table of Contents

- List of all required elements and their page numbers
- Appendices
- References

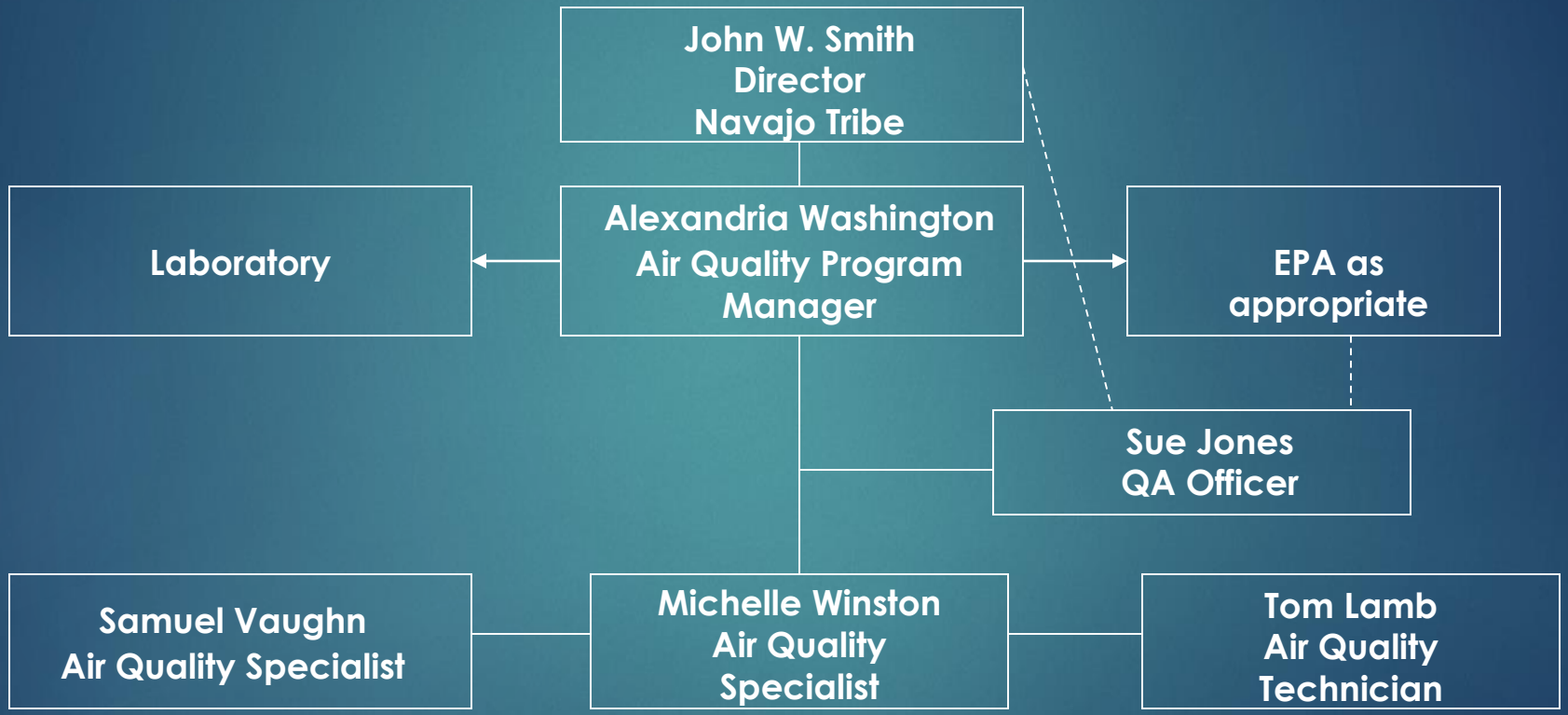
Element 3: Distribution List

- Lists people who will get original and revised QAPP
  - Everyone who does the work
  - Everyone who manages them
  - Funding agency

Element 4: Organization of Project

- Governmental Entities, Contractors, and Key Individuals.
- Roles and Responsibilities.
- How often will these be done?
- How will each person do their job?
- To whom will they report?

Example Project Organizational Chart



Element 5: Project Background

- Assume an "ignorant" reader
- Why is this work important?
- History: are there health effects in your community that may result from this problem?
- Reduced visibility?

Reference Existing Information

- Previous results from earlier studies?
- Results from nearby areas?
- Results from emissions inventory?
- Changing weather conditions and more people leading to more fires?

If your granting agency requires a certain format, have they provided guidance on that?

yes

no

Element 6: Project Description

Summarize Purpose of Project

- Why are we making these measurements?
- Project Schedule
- Project Summary
- Maps, tables, etc.

Do you now know which parameters and methods you will be using?

- Yes
- no

Element 7: Project Data Quality Objectives

Project Objectives

- What will we do with the results?
  - Compare with NAAQS
  - Report to community, EPA, health officials

DQOs are Systematic Planning

- How will we know how "good" our methods are? ->> equipment performance criteria
- How do these methods/instruments meet our needs? →>>>Spec sheets of instruments!
- Decision: "if the average daily concentration exceeds the standard, we will request additional monitoring and investigate how to reduce road dust"

- Data Quality Objectives (DQOs)
  - Based on Program Objectives
  - Qualitative and quantitative
- Measurement Quality Objectives (MQOs)
  - Specific criteria which will produce data of acceptable quality
  - Quantitative

Balancing Cost vs. Degree of Uncertainty

- Lots of samples and expensive equipment yields low uncertainty
- Few samples at low cost yields high decision errors
- Result—may have to change objectives

Are you:

- Writing a new QAPP?
- Updating an existing QAPP?

Are you:

- Working on just a few sections?
- Updating the entire QAPP?

Element 8: Special Training Requirements

- Be sure to keep training records
  - Manufacturer training
  - ITEP training
  - EPA APTI training
  - OTJ training

Element 9: Documentation and Records

The records that will be kept:

- Protects legal and financial rights of the agency and persons affected by agency's activities
- Ensures that data are legally defensible

List all documents:

- SOPs, QAPP (yours and that of any lab analyzing your samples)
- Site logbooks, personal logbooks
- Repair and maintenance records
- Reports drafted, final, sent out to tribal authorities, EPA
- Photos of sites
- Letters from community, EPA, etc. are kept and filed

Element 10: Network Design

Rationale for Measurement Location and Frequency

- Use the data quality objectives when you decide where/how often to monitor
  - Near where people live?
  - Overall community background?
  - Near sources?
- Discuss purpose of primary & collocated samplers

Your location and frequency is chosen so that you can meet your Monitoring Objectives such as:

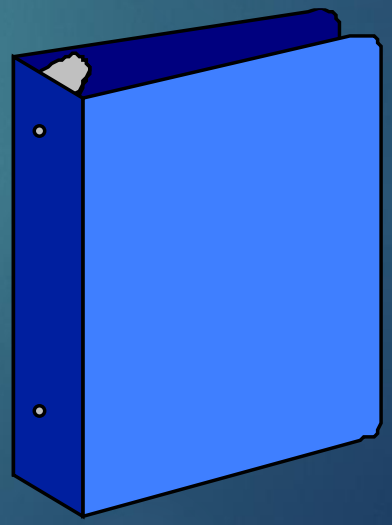
1. To determine representative concentrations in areas of high population density, and to measure changes in air quality over time
2. To determine welfare-related impacts in more rural & remote areas (i.e., visibility impairment, effects on vegetation)

Critical / Non-critical Measurements

- Critical measurements are required to achieve project objectives or limits on decision errors
  - I.e. ambient temperature, barometric pressure, etc.
  - -What you would include when submitting data to AQS
- Non critical measurements are those that are "nice to know"

Element 11: Sampling Method Requirements

- Use text from instrument manuals
- Attach your SOPs!



Sampling Equipment, Preservation, & Holding Time Requirements

Requirements for getting samples (data) to lab without losing what you are measuring or making it stink…

Prevention of Contamination

Requirements for

- Temperature
- Humidity
- Time
- Integrity
- Custody
- Data handling

Support Facilities for Sampling Methods

Office, trailer, truck, & cooler must be consistent with requirements for

- Temperature
- Humidity
- Integrity
- Custody
- Storage capacity

Field Safety:

- State that safety comes before getting the sample (data)
- Reference health and safety plan
- Provide training if appropriate

Field Corrective Action

- Who is responsible for fixing it? Verifying that it is fixed? Reporting the fix to?
- Where do they write how they fixed it?
- When do they have to fix it by?
- How do you make sure it does not happen again?
- Where is the documentation stored?

Element 12: Sample & Data Custody

Data Custody Procedure

- Data storage
- Data transfer
- Data security
- Data backup (network/external hard drives)
- Frequency, who is responsible

Element 13: Analytical Methods Requirements

HOW DOES THIS EQUIPMENT/THIS LAB ANALYSIS WORK?

This element is important for *comparability*:

- Requirements of all FRM monitors are the same, so that data from different sites can be compared
- Performance of all labs meeting these requirements is the same, so that data from different labs can be compared

Summarize method:

- How the lab or instrument conducts the measurement
- If FRM or FEM cite the method number
- List special components, modifications, inlets
- List requirements for equipment you are using

Element 14: Quality Control

QC: An Ongoing System

- Measuring
- Comparing with MQO
- Graphing it
- Fixing it when needed

Everything must be <u>documented</u> and, when significant, reported

Evaluate Where Things Can Go Wrong—and How To Check

- Preparing for the field
- Sampling in the field
- Analyzing the samples
- Entering the data
- Reporting the data

Example of Verification

- Perform a check of your equipment:
  - flow rate for PM
  - concentration for gas
  - This may be single-point or multi-point
- If this is within specifications, record this and continue

Element 15: Equipment Testing, Inspection, and Maintenance Requirements

Visual Inspections

DOCUMENT your inspections in site or instrument or personal logbooks—send yourself an email from your phone describing the check

Inspect for

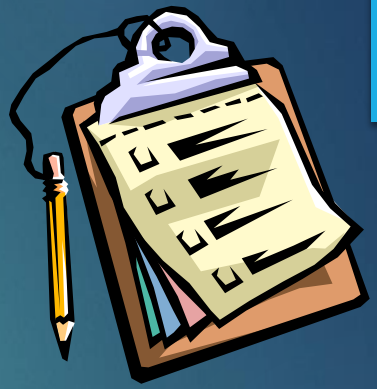
- Damage to monitor
- Condition of filter and surroundings
- Consistent power supply so that start/stop times are reliable
- O-rings in place and not torn
- Wires and tubes all attached

Element 16: Instrument Calibration

Calibration

- Calibration is defined as
  - Comparison of instrument response to a standard and
  - *Adjusting response* to fall within planned limits

List Equipment that Requires Calibration



- Identify all tools, gauges, instruments, and anything that produces values
- Make a table that lists the frequency of calibration, how it is to be conducted, and who is responsible for ensuring that it gets done

Reference Attached SOPs and…

- How calibration is done
- When to calibrate
- Summarize calibration records (logbooks, forms, reports)

Calibration Standards

- Primary standards—keep as the "gold standard"
- Field, transfer standards are used in the field
- These apply to flow rate, temp., pressure, etc.

Documents to you from the lab that certifies your calibration standards:

- Copy of calibration certificate
- Traceability of this standard to the National Institute of Standard and Technology (NIST)
- Agreement that they provide you a calibration certificate and detailed report on paper and whatever format you agree to
- Outline of calibration procedure


ACCREDITED LABORATORY

Element 17: Inspection and Acceptance for Supplies

Make a List

All supplies & consumables that may directly or indirectly affect the quality of the project

- Filters
- Hoses
- Oil
- Batteries
- Disks

Provide a Table Listing

- Description
- Vendor
- Specifications
- Model number
- Call the sales rep. and ask them to fax you a list of what parts will be needed

Element 18: Data Acquisition Requirements for Non-Direct Measurements

What is non-direct data?

Any data that you do not gather, such as

- Weather information
- Housing information
- Physical constants
- Instrument parameters

Element 19: Data Management

Brief description of

- Data management objectives
- How you will meet these objectives (no data erased, no files overwritten, use sharpies, date and initial)
- Your paper filing system
- Logbooks
- Electronic filing system, file naming system

Computer Backups

- Every two weeks or as data are gathered—add "back up today" to calendar
- Alternate between two sets of backup locations/hard drives
- Store backup disks in a relatively fireproof location
- Plan for the time and money it takes to save copies of files

Keep records organized in readiness for an audit

- Paper copies must be available to auditor to attach to their reports in the categories of:
  - Management and organization
  - Site information
  - Field operations
  - Raw data
  - Data reporting
  - QA

THE BEST WAY TO GET RID OF AN AUDITOR QUICKLY IS TO GIVE HER PAPER COPIES OF EVERYTHING SHE WANTS

Element 20: Assessments & Response

All Assessments:

- Basically compare
  - What is actually being done in the field and the office
  - Against what is stated in the QAPP and SOPs

Internal Assessments

- May be qualitative
- May be conducted by your tribal air organization or someone from another program
  - May consist of a DOCUMENTED review between you and your supervisor

External Assessments

- Performed by outsiders such as another tribe, EPA region, or consultant who is technically qualified

  and

- Understands project's QA requirements

Performance Evaluations:

- Internal
  - that you conduct as a "test" with a borrowed standard, during an inter-comparison with other agencies
- External
  - side-by-side on-site with another device independently calibrated
- Comparison of your results with equipment mailed to you or in an EPA van (NPEP)

Technical Systems Audits

- Compare what is happening with QAPP and SOPs
- Look at reports, computer files, logbooks, control charts
- Follow people around
- Every three years

Audit of Data Quality

- Evaluating your data before you report it
  - How data are handled
  - What judgments were made
  - Do your conclusions make sense?
- Annually and as part of a technical systems audit

Network Review

- 40 CFR Part 58 Appendices D and E
- How well is your network meeting its objectives?
- How should it be modified?
- Conducted formally annually, but you should be continually assessing your results

Describe in your QAPP

- Number, frequency, and types of assessments
- People or organizations doing the assessments
- Schedule
- Criteria for assessments
- Reporting and responsibility for follow-up

Responsibility for Follow-Up and Verification of Corrective Action

CLOSE THE LOOP

(fix problems and take action to make sure they do not happen again)

And make sure it is documented

Element 21: Reports to Management

List reports and brief descriptions:

- Tribal agency quarterly and annual reports
- Reports to EPA
- Reports (data upload) to EPA's AQS
- Reporting to community

Element 22: Data review, verification, and validation

- Verification = did you do what you said you were going to do
- Validation = does it meet your objectives? Is it suitable for use as you planned it to be used?

Element 23: Data Review Methods

- The methods you use depend on how you will manage your data
- Software, database, QREST,or Tribal Data Toolbox will have their own procedures that you can attach to the QAPP

RECONCILIATION WITH USER REQUIREMENTS - Element 24 (D3)

- Can the data be used for the purpose it is intended?
- Is the data invalid or can it be used with qualifications?
- Is the data generation process likely to produce invalid data in the future?

Air Data Validation Tables

- Critical – In CFR with acceptance requirements

Ozone Validation Template		
1) Requirement (O_3)	**2) Frequency**	**3) Acceptance Criteria**
		CRITICAL CRITERIA-OZONE
Monitor	NA	***Meets requirements listed in FRM/FEM designation***
One Point QC Check Single analyzer	***Every 14 days***	< ±7.1% (percent difference) or < ±1.5 ppb difference whichever is greater
Zero/span check	Every 14 days	Zero drift < ± 3.1 ppb (24 hr) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 7.1 %

Data Validation Tables

- Operational – In CFR without acceptance criteria or identified in guidance

OPERATIONAL CRITERIA -OZONE		
Shelter Temperature Range	Daily (hourly values)	20.0 to 30.0° C. (Hourly avg) or per manufacturers specifications if designated to a wider temperature range
Shelter Temperature Control	Daily (hourly values)	< 2.1° C SD over 24 hours
Shelter Temperature Device Check	Every 182 days and 2/ calendar year	<± 2.1° C of standard
Annual Performance Evaluation Single analyzer	***Every site every 365 days and 1/ calendar year within period of monitor operation,***	Percent difference of audit levels 3-10 < ±15.1% Audit levels 1&2 < ± 1.5 ppb difference or <± 15.1%

Data Validation Tables

- Systematic – important for correct interpretation of data but do not usually impact validity of sample or group of samples

SYSTEMATIC CRITERIA-OZONE		
Standard Reporting Units	*All data*	*ppm (final units in AQS)*
Rounding convention for design value calculation	*All routine concentration data*	*3 places after decimal with digits to right truncated*
Completeness (seasonal)	*3-Year Comparison*	*≥ 90% (avg) daily max available in ozone season with min of 75% in any one year.*
	8- hour average	*≥ if at least 6 of the hourly concentrations for the 8-hour period are available*
	Valid Daily Max	*≥ if valid 8-hour averages are available for at least 13 of the 17 consecutive 8-hour periods starting from 7:00 a.m. to 11:00 p.m*

Thank you!

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- Google "ITEP scholar lms" for our online courses including templates, videos, quizzes, and example text for different types of projects
- Youtube videos: http://bit.ly/QAPPvideos
- Each EPA regional website has QA guidance and resources—mandatory for a QAPP writer