Demystifying QAPPs

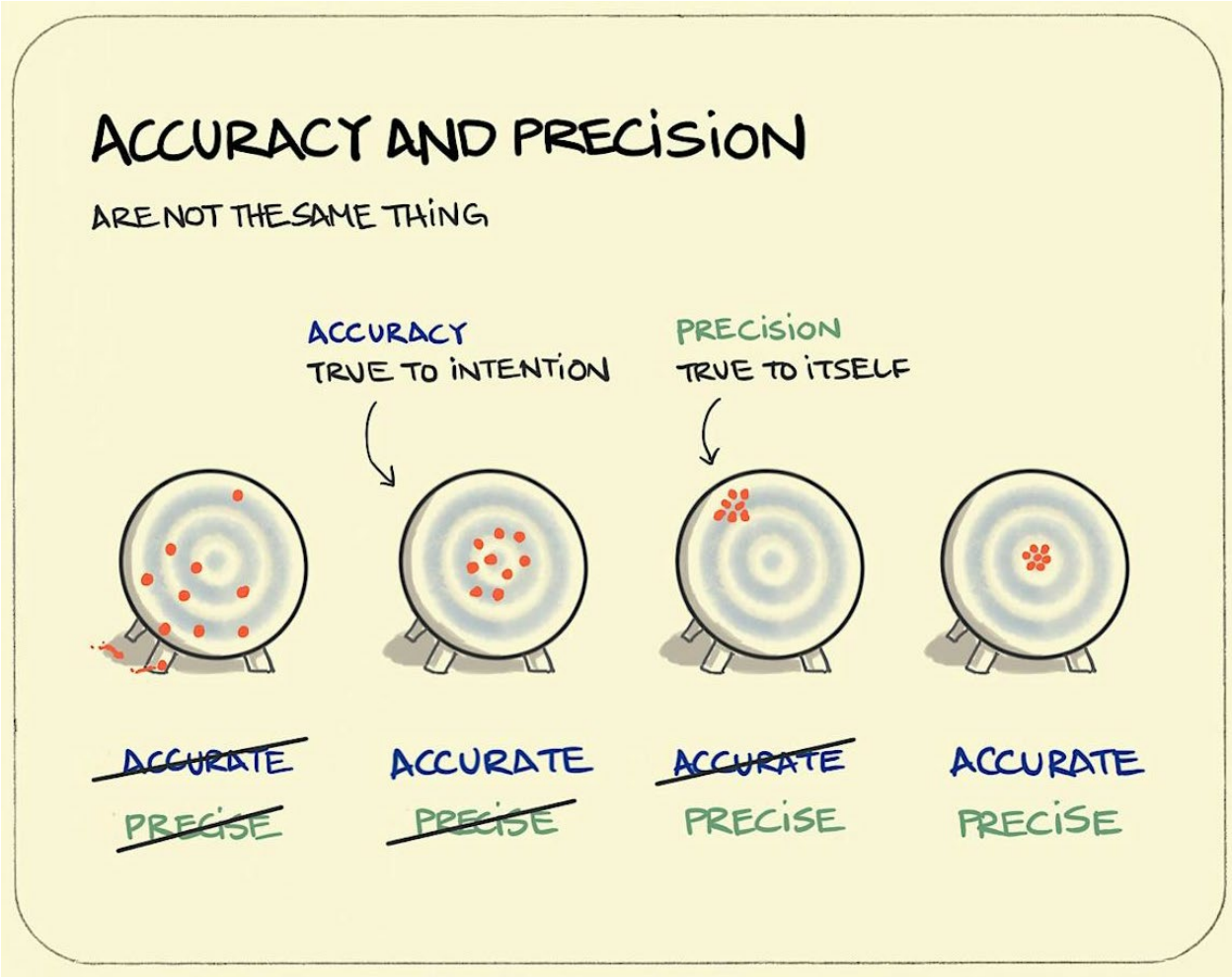
Developing a Quality Assurance Program Plan

Quick Tips

1. Don’t feel intimidated
2. Use templates or past QAPPs where possible
3. Start on the easy sections first
4. Some parts can be simple and refer to earlier sections
5. QAPPs are living documents

Terminology

- **Precision**
- **Accuracy**
- **Comparability**
- **Completeness**
- **Sensitivity**



Terminology

- **Comparability**
  - Two (or more) data sets can be considered equivalent
  - E.g. Surface water results collected during a storm likely are not comparable to groundwater results collected 100 ft below ground

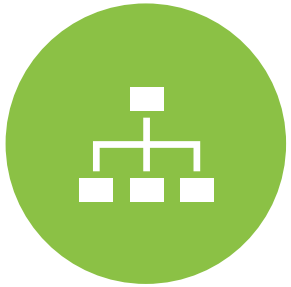
- **Completeness**
  - is all the data there that should be collected?

Terminology

- **Sensitivity**
  - Does the method or instrument used collect information at a fine enough scale?
  - E.g. Using a surface water lab method with detection limit of 0.1 mg/L, but using it for drinking water samples with concentrations of 1 µg/L (0.1 mg/L = 100 µg/L)

    => Not going to get meaningful data

QAPP Four Main Sections



1 – Project Management

2 – Data Generation and Acquisition

3 – Assessment and Oversight

4 – Data Review and Usability

1 – Project Management

- Who is responsible for what?
- What is the problem this project is trying to solve?
- What quality metrics are being used?
- Do staff need training? If so, what type of training?
- What documents will be produced from this project?

2 – Data Generation and Acquisition

- How is data going to be collected? How often? When? Where?
- How will collected data be uncontaminated?
- How will equipment be accurate?
- How will supplies be reliable?

…during sampling in the field

… while using equipment or supplies in the field

… in the laboratory

3 – Assessment and Oversight

How do you know the project is going as planned?

Who is checking this?

Who do you tell if things are going wrong?

4 – Data Review and Usability

How are you checking that data are accurate?

If data are not accurate or have issues, how are you identifying and removing that data?

How will you fix things so there is less inaccurate data?

Dive into the details

1.5.1 Objectives and Project Decisions

- List the objectives of the project
  - Example: Determine if water pollutants are exceeding a concentration
  - Example: Determine if water pollutant concentrations are higher in certain areas
- List what decisions will be made based on the data
  - Example: If there is a pollutant exceedance a field team will investigate possible sources
  - Example: A site will be resampled within 14 days after a pollutant exceedance

1.5.2 Action Limits/Levels

- Water sampling can be based on Tribal Water Quality Standards
- Can also be based off Federal standards
- Can be based off project goals (E.g. GHG emissions)
- Select values that are relevant to the project goals

Analyte	WQO	Units
Total Dissolved Solids	1,100	mg/L
Chlorides	300	mg/L
Sulfate	400	mg/L
Percent Sodium	60	mg/L
Nitrate	45	mg/L
Iron	0.3	mg/L
Manganese	0.05	mg/L
Methylene Blue-Activated Substances (MBAS)	0.5	mg/L
Boron	0.75	mg/L
Odor	none	mg/L
Turbidity	5	NTU
Color	15	Units
Fluoride	1.0	mg/L

Mg/L = milligrams per liter, NTU = nephelometric turbidity units, WQO = water quality objective

1.5.3 Measurement Performance Criteria/Acceptance Criteria

What steps will be taken to ensure accurate/precise data are collected?

For lab data, just refer to lab QA Manual

If data is collected using an EPA SOP (or other agency), then just refer to the SOP. Perhaps just paste in the relevant information.

Tables can save a lot of writing time

Field Analyte	Unit	Calibration Check Used	Acceptable Calibration Range[1]	Acceptable Stabilization Criteria (variability should be within range for 3 or more measurements)[1]
Dissolved Oxygen	mg/L	Tap water and dissolved oxygen table	±0.2	±0.2
pH	--	pH 4, 7, and 10 buffers	±0.1	±0.1
Conductivity	µS/cm	Conductivity calibrator 1,000 µmhos/cm, Deionized water 0 µmhos/cm	±0.2	±0.2
Turbidity	NTU	12.4 NTU turbidity standard, 0 NTU turbidity standard	If ≤100 NTU: ±0.5 or ±5%, whichever is smaller If >100 NTU: ±10%	If ≤100 NTU: ±0.5 or ±5%, whichever is smaller If >100 NTU: ±10%
Temperature	°C	Dry room temperature air reading check with a second thermometer	±0.2	±0.2

1 USGS 2023. If measurements fall outside of these ranges, the instrument should be recalibrated.

°C = degrees Celsius, µS/cm = micro-Siemens per centimeter, mg/L = milligrams per liter, NTU = nephelometric turbidity units

2.5 Sampling Design (Experimental Design)

- Goes over how many samples will be collected and when, and what tests will be done
- Also describes duplicates and blanks
  - Blank = used to check for any sample contamination
  - Duplicate = used to check precision or can indicate variable field conditions
- Section 2.9 goes into more detail on how blanks and duplicates are collected. Tell the reader to refer to Section 2.5 for frequency.

Type of Sampling	Sampling Frequency	Number of Sites/Samples Per Event[1]	Field Analytes	Sample Duplicates	Field Test Duplicates	Field Blanks[2]	Equipment Blank
Surface water	Quarterly	7	DO, pH, conductivity, turbidity, temperature	10% (1 duplicate per 10 samples) for each analytical parameter	5% (1 duplicate per 20 samples) for each field parameter or once per year, whichever is more frequent	5% (1 blank per 20 field samples) or once per year, whichever is more frequent	None
Groundwater	Quarterly	3					10% (1 blank per 10 samples) for VOCs on any reused, washed tubing prior to sampling
Algae	Monthly	1					None

DO = dissolved oxygen. [1]This is the maximum number of samples (not including duplicates or blanks) that can be collected per sampling event - dry or non-flowing site conditions will reduce the number of samples that can be collected. [2]Field blanks refer to a sample of deionized or lab pure water that is poured into sample bottles on site.

2.6 Sampling Methods

- How are you physically collecting samples?
- What supplies are you using?
- Are there site conditions that are required? E.g.
  - Not raining
  - Flowing water
  - Water deeper than 4 inches
- Can you refer to other documents? EPA Sampling Plans?

2.7 Analytical Methods

- List equipment and laboratory methods being used
- Methods = specifically approved by Federal government.
  - E.g. EPA 200.7 and EPA 200.8 for heavy metal analysis
- Handheld meters and sondes can have approved methods
- Can refer to an Appendix for longer analyte/method lists

4 Data Validation and Usability

- Describe how the data will be reviewed
- E.g. Project Manager will review lab reports as they are received and review duplicates, blanks, and lab control sample data.
- Labs are responsible for their own in-house review
- Consultants can be designated responsible for data review
- “Reconciliation with User Requirements” = go talk with staff if things are wrong, check data against QAPP requirements/goals, go fix things

Key Takeaways

- Use templates and example QAPPs
- Keep it clear, useful, and streamlined
- Put in enough detail so that someone unfamiliar with the project would know how to run the project, within reason
- Use straightforward and clear language
- Refer to previous sections rather than re-writing information
- Use tables to condense and simplify information
- Refer to other documents if you can (Lab QA Manuals, SOPs, etc.)
- Make it useful to you and your staff

Resources

- EPA QAPP Modules/Training:
  - https://www.epa.gov/quality/quality-assurance-project-plan-development-tool
- EPA Region 10 QAPP Guidance for Tribes =>
- Rincon Surface and Groundwater QAPP
- QAPP Form
- EPA grant project officers, QC staff

Questions?

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