



Practical Quality Control Training

QA Conference
San Antonio, TX
May 12, 2009



Purpose for Increased QC Training

- Florida has many agencies who supply air quality data
 - 6 state districts
 - 1 office
 - 8 local programs
 - A few private contractors





Purpose for Increased QC Training



- In each agency, there is someone responsible for the quality assurance/quality control of the data, the QA coordinator



3



Purpose for Increased QC Training

- Since many of the QA coordinators belong to the air monitoring AARP, they are retiring
- The average years experience for this group is over 20
- Often, there are not resources to allow cross-over training with their replacements



4



Purpose for Increased QC Training



- Without the cross over training, the new QA coordinator starts work without knowing what needs to be done starting on the first day
- Worse yet, they may start with a backlog of work



5



Purpose for Increased QC Training

- Results are often, disorganized system audits and potentially questionable data
- Particularly as the EPA has been changing the standards more frequently, and ambient data are being used more frequently for attainment determinations, we are trying to avoid this situation



6



QA for Newbies

- My first attempt to address the shortfall was a document titled QA for Newbies
- It is a document that is short and highlights the activities for which the QA coordinator is responsible
- It was written with input from experienced QA coordinators and shared with all agencies in Florida and throughout the SE



7



Format

- Introduction
- Daily Activities
- Weekly
- Monthly
- Quarterly
- Speciation
- Toxics
- Ongoing Work



8



Intention



- This booklet was primarily developed to assist the QA coordinators in Florida
- Some of the references are to Florida specific applications and practices



Introduction

- In a time when many of the experienced air monitoring staff, those that grew-up with the science, are retiring, this document is intended to provide some quick assistance in quality activities. Every new Quality Assurance (QA) Coordinator is expected to read the Code of Federal Regulations (CFR) which apply to air monitoring, specifically 40 CFR Parts 50 and 58, the EPA Red Book, Volumes I and II, all standard Operating Procedures (SOPs), state regulations and Quality Assurance Project Plans (QAPPs) and other monitoring documentation. There is much to understand and digest to connect the requirements and activities. To help the new folks to get started, this document will cover some of the highlights of the work.
- *For general scientific inquiry, to show valid data, the results must be repeatable and legally defensible. To accomplish that, the data must be validated, i.e. shown to be complete and correct.*
- There are four important things to remember:
- The calibration equipment and gas standards, gases of known concentration, must be traceable to National Institute of Standards and Technology (NIST) and the traceability must be valid at the time of the calibrations, and this includes the standard reference photometer (SRP) certification for ozone. If you are calibrating for NO₂ with NO_x gas and do not account for the impurities, you will never get the right answer.





Introduction

- Precision, i.e. repeatability, must be demonstrated. Whenever you calibrate, you want repeatability. The precision check is also called a one-point quality control check.
- Accuracy, i.e. to measure how close you are to reality. The accuracy determination is based upon the calibration and the annual performance evaluation as defined in 40 CFR, Part 58, Appendix A, 3.2.2.
- According to the Red Book, the validation of the data is made on the basis of the zero and span checks. (In Precision, Bias and Accuracy, the “known” is the calibration standard being used in the checks, while the “measured” is the monitor’s response.)
- The Florida Air Monitoring and Assessment System (FAMAS) makes examination of data for concurrency very easy with the site comparison graphing. It would be helpful for QA coordinators to graph their data by pollutant to see any outliers that may need additional investigation. Keep in mind, there must be a defensible reason to invalidate data, not just that is “doesn’t fit”.



11



Daily Activities

- The summary print-out starts with the operator. It has the previous day’s data for every parameter.
- The operator:
 - Documents calibration and site activity and adds any invalid flagging, (including TEOM data for unstable readings with high noise or more than 6 hours of negative values).
 - Annotates strip charts.
 - Polls for any missing data as soon as possible.
 - Files everything in the office.
 - Works to discover problems by priority as indicated on the daily sheets.
 - Polled data are reviewed daily and the following checks are recommended:
 - Consistency and completeness
 - Look for randomness – most pollution shows patterns
 - Look for atypical data that is not flagged – investigate for cause through minute data, concurrency checks, calibration and site logs, use investigative tools (i.e. direct query of the instrument for status information), call the site directly for recent data and document results
 - Flags
 - Investigate and document any flags found on the data
 - Specifications
 - Verify that specifications for quality control are met, e.g. check internal trailer temperatures (i.e. 20 – 30 oC), verified with max/min thermometer, noise for TEOMs as diagnostic for problems, etc
 - Calibration books are verified for data within specifications of nightly level one zero and span and bi-weekly (with concurrence check with one data logger where more than one is used).
 - QA will then review and sign off on this documentation.
 - Real-time data are corrected for erroneous data as soon as possible.



12



Weekly

- PM2.5 Field sheets are checked for completeness and quality assurance, (the data, dates and signatures).
- The QA coordinator signs off on them.
- Review for anything missed in the daily checks.
- Adjust Air Quality Index (AQI) and Clean Air Index Reporting (CLAIRE).



13



Monthly

- Monthly activities are due to be completed by the 30th of the month.
- Editing activities are conducted monthly.
- Invalidate anything that needs to be invalidated according to quality assurance documentation.
- Investigate any hours with more than 20 minutes missing.
- Recalculate any hours which were impacted by power failures, software errors, ramping, data not written to logger, etc.
- Best to validate someone else's work, i.e. double-check.
- Use monthly report to check against daily
- Load AQS data file
- Complete audit trail.
- Submit PM2.5 FRM F-files to the PM2.5 database.
- Check PM2.5 field sheets for the 10 parameters with data in the PM2.5 database and sign-off the sheets.
- Replace the collocated for designate when missing in the PM2.5 database



14



Monthly

- Make necessary changes in the PM2.5 database:
 - Concentration
 - Flow
 - Elapsed Time
 - Null codes
 - Qualifier flags
- Verify the AQS file - add validated flags or invalidate.
- Handle manual data when they are ready.
- Enter lead and PM10 data from laboratory forms into the database.
- Print monthly report and compare to the laboratory report.
- The AQS file is created and submitted.
- Complete the monthly missing data form and e-mail.
- Missing data reports containing "voided by operator" and miscellaneous void null codes should require additional comments to be linked to the missing data report.
- Complete file comparison of submitted data.



15



Quarterly

- Quarterly activities are due to be completed by 50 days after the close of the quarter.
- Run verification utility
- Precision and Bias
 - Create EPA spreadsheet
 - Submit AQS file



16



Speciation

- Website
 - save 4 or 5 files and use Speciation Data Validation Tool (SDVAT) to import
- Compare against field sheets:
 - dates
 - filters
 - flows
- Verify percentages of content
- Show all laboratory flags



17



Toxics

- Review field sheet review for:
 - Dates
 - Completeness
 - Anomalies to include problem resolution
 - Schedule observance



18



Ongoing Work

- Maintain and update SOPs
- Create an SOP for new equipment
 - a draft of the SOP should be submitted to DEP within 60 days of operating new equipment in the field
- Update the SOPs for changes in CFR and/or QAPP



19



Closing

- In all the work, keep in mind there are 5 measures in quality assurance:
- Comparability, being able to compare apples to apples, accomplished by using federal reference or equivalent equipment.
- Completeness, aiming for a minimum of 75% data completeness for most pollutants and 90% for ozone.
- Representativeness, accomplished by following the network design and siting guidelines in the CFR
- Precision, having repeatable results, accomplished through collocation, and precision level or one-point quality control checks. Bias, defined as the systemic or persistent distortion of a measurement in one direction is also determined through the precision level check.
- Accuracy, the closeness to reality, as determined by the degree of agreement between the observed value on the monitor and an acceptable reference value, determined through the use of traceable calibration gases and equipment
- Lastly, to try and keep straight the difference between quality assurance and quality control activities, remember that quality control activities are completed by the operator and quality assurance is the quality control of the quality control.



20



Moving from Stop-gap to System



- The challenge now is to create a system that ensure that current and future QA coordinators and operators, (who have the front-line QC duties) understand their pivotal role.



The Plan



- We are working to create at least two training modules
- The first aimed at FDEP employees with two goals:
 - to understand their operational responsibilities, such as clean probe lines
 - and to understand how to use the tools provided to capture complete documentation of operational activities such as power outages and instrument repairs





The Rest of the Story

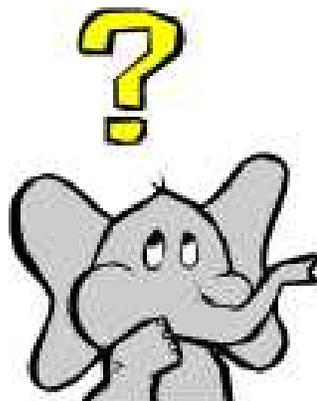
- The other training would be provided to all monitoring personnel who contribute to the regulatory data for Florida
- It would concentrate on issues largely with data handling and specifications, at least to start
- The really big plan is to have the training required annually and update it with any issues we see in the systems audits



23



Comments or Questions



- Tammy Eagan
- 850/921-9567
- SC 291-9567
- e-mail:
Tammy.Eagan@dep.state.fl.us



24