Florida Department of Environmental Protection

Office of Air Monitoring

Florida's Data Quality Report

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Overview

- Background on Quality Measurements and Objectives
- Importance of Assessing Data
- Benefits of Data Assessment
- Data Quality Report
- Florida's PQAO Challenges

Measurement Quality Objectives

MQOs are designed to evaluate and control various phases of the measurement process to ensure that total measurement uncertainty is within the range prescribed by the DQOs.

- One-point QC checks
- Flow rate verifications
- Performance audits

“Objectives” are acceptance criteria for quality attributes, usually dictated in the CFR, for rendering data for record to be of “good quality.”

40 CFR Part 58 Appendix A

- Quality Assurance Requirements for Monitors Used in Evaluations of National Ambient Air Quality Standards
  - General Information
  - Quality System Requirements
  - Measurement Quality Check Requirements
  - Calculations for Daily Quality Assessments
  - Reporting Requirements

Minimum Data Assessment Requirements

Table A-1 of Appendix A to Part 58 –

Minimum Data Assessment Requirements for NAAQS Related Criteria Pollutant Monitors

Method	Assessment method	Coverage	Minimum frequency	Parameters reported	AQS assessment type
Gaseous Methods (CO, NO_2, SO_2, O_3)					
One-Point QC for SO_2, NO_2, O3, CO	Response check at concentration 0.005-0.08 ppm SO_2, NO_2, O3, and 0.5 and 5 ppm CO	Each analyzer	Once per 2 weeks	Audit concentration[1] and measured concentration.[2]	One-Point QC.
Annual performance evaluation for SO_2, NO_2, O3, CO	See section 3.1.2 of this appendix	Each analyzer	Once per year	Audit concentration[1] and measured concentration[2] for each level	Annual PE.
NPAP for SO_2, NO_2, O3, CO	Independent Audit	20% of sites each year	Once per year	Audit concentration[1] and measured concentration[2] for each level	NPAP.

Minimum Data Assessment Requirements

Method	Assessment method	Coverage	Minimum frequency	Parameters reported	AQS assessment type
Performance Evaluation Program $PM_{2.5}$	Collocated samplers	(1) 5 valid audits for primary QA orgs, with ≤5 sites. (2) 8 valid audits for primary QA orgs, with >5 sites. (3) All samplers in 6 years	Distributed over all 4 quarters	Primary sampler concentration and performance evaluation sampler concentration	PEP.
Performance Evaluation Program Pb-TSP, Pb-PM_{10}	Collocated samplers	(1) 1 valid audit and 4 collocated samples for primary QA orgs, with ≤5 sites. (2) 2 valid audits and 6 collocated samples for primary QA orgs with >5 sites	Distributed over all 4 quarters	Primary sampler concentration and performance evaluation sampler concentration. Primary sampler concentration and duplicate sampler concentration	PEP.

Minimum Data Assessment Requirements

Method	Assessment method	Coverage	Minimum frequency	Parameters reported	AQS assessment type
Particulate Methods					
Continuous[4] method—collocated quality control sampling $PM_{2.5}$	Collocated samplers	15%	1-in-12 days	Primary sampler concentration and duplicate sampler concentration.[3]	No Transaction reported as raw data.
Manual method—collocated quality control sampling PM_{10}, $PM_{2.5}$, Pb-TSP, Pb-PM_{10}	Collocated samplers	15%	1-in-12 days	Primary sampler concentration and duplicate sampler concentration.[3]	No Transaction reported as raw data.
Flow rate verification PM_{10} (low Vol) $PM_{2.5}$, Pb-PM_{10}	Check of sampler flow rate	Each sampler	Once every month	Audit flow rate and measured flow rate indicated by the sampler	Flow Rate Verification.
Flow rate verification PM_{10} (High-Vol), Pb-TSP	Check of sampler flow rate	Each sampler	Once every quarter	Audit flow rate and measured flow rate indicated by the sampler	Flow Rate Verification.
Semi-annual flow rate audit PM_{10}, TSP, PM_{10}-2.5, $PM_{2.5}$, Pb-TSP, Pb-PM_{10}	Check of sampler flow rate using independent standard	Each sampler,	Once every 6 months	Audit flow rate and measured flow rate indicated by the sampler	Semi Annual Flow Rate Audit.
Pb analysis audits Pb-TSP, Pb-PM_{10}	Check of analytical system with Pb audit strips/filters	Analytical	Once each quarter	Measured value and audit value (ug Pb/filter) using AQS unit code 077	Pb Analysis Audits.

Why Assess Data Quality?

- Required for NAAQS standard
- Identifies and corrects deficiencies to prevent recurrence
- Strengthens defensibility of decisions
- Reviews required practices and policies
- Exemplifies an independent verification
- Determines data credibility
- Proves data integrity
- Confirms data completeness

Precision, Accuracy, and Bias

Precision Good
Accuracy Bad

Precision Bad
Accuracy Good

Precision Good
Accuracy Good

Bias distortion in one direction

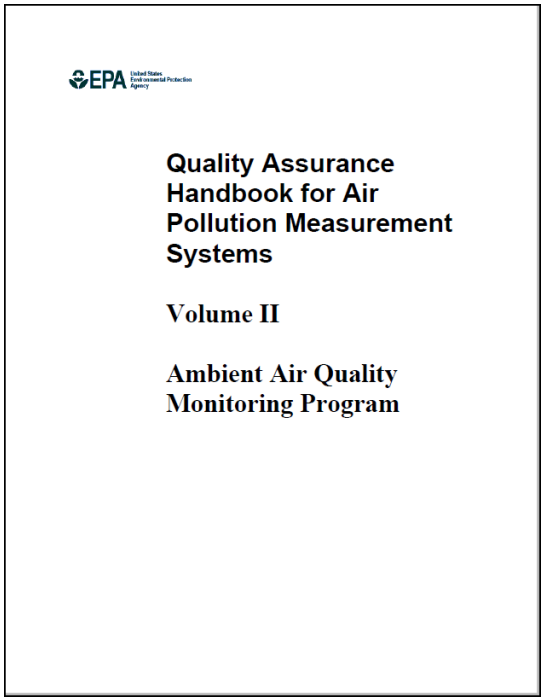
Tools for Assessing Precision

	Precision	
	1-Point QC Checks	**Collocated Measurements**
Gaseous		
CO, NO_2, O_3, SO_2	✓	
Continuous		
$PM_{2.5}$		✓
PM_{10}		
Manual		
$PM_{2.5}$		✓
PM_{10} (High-Volume)		✓
PM_{10} (Low-Volume)		✓

Tools for Assessing Accuracy/Bias

	Accuracy/Bias		
	1-Point QC Checks	**Flow Rate Verifications**	**Performance Audit**
Gaseous			
CO, NO_2, O_3, SO_2	✓		✓
Continuous			
$PM_{2.5}$		✓	✓
PM_{10}		✓	✓
Manual			
$PM_{2.5}$		✓	✓
PM_{10} (High-Volume)		✓	✓
PM_{10} (Low-Volume)		✓	✓

QA Handbook



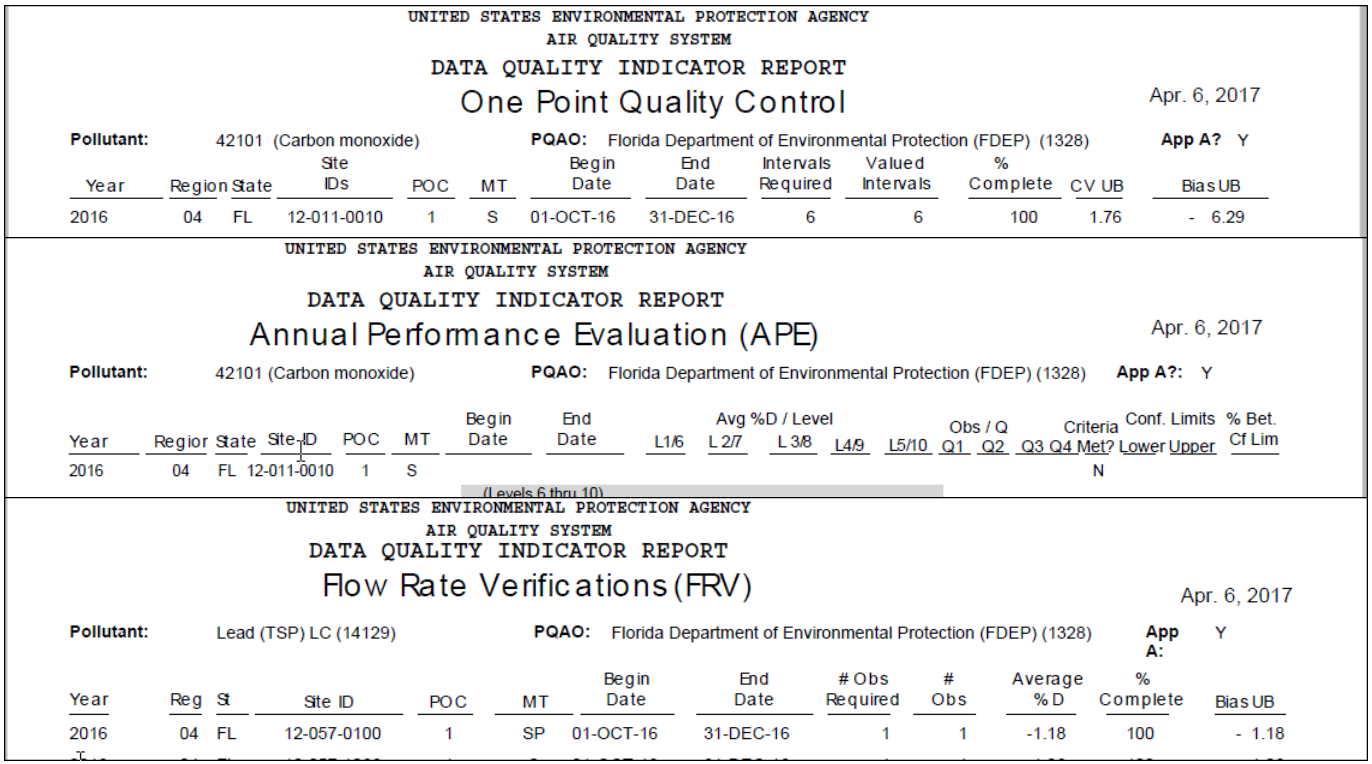
Ozone Validation Template

1) Requirement (O_3)	2) Frequency	3) Acceptance Criteria	Information /Action
CRITICAL CRITERIA-OZONE			
Monitor	NA	*Meets requirements listed in FRM/FEM designation*	1) 40 CFR Part 58 App C Sec. 2.1 2) NA 3) 40 CFR Part 53 & FRM/FEM method list
One Point QC Check Single analyzer	*Every 14 days*	< ±7.1% (percent difference) or < ±1.5 ppb difference whichever is greater	1 and 2) 40 CFR Part 58 App A Sec. 3.1 3) Recommendation based on DQO in 40 CFR Part 58 App A Sec. 2.3.1.2. QC Check Conc range 0.005 - 0.08 ppm and 05/05/2016 Technical Note on AMTIC
Zero/span check	Every 14 days	Zero drift < ± 3.1 ppb (24 hr) < ± 5.1 ppb (>24hr-14 day) Span drift < ± 7.1 %	1 and 2) QA Handbook Volume 2 Sec. 12.3 3) Recommendation and related to DQO
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	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2 Generally, the 20-30.0° C range will apply but the most restrictive operable range of the instruments in the shelter may also be used as guidance. FRM/FEM list found on AMTIC provides temp. range for given instrument. FRM/FEM monitor testing is required at 20-30° C range per 40 CFR Part 53.32
Shelter Temperature Control	Daily (hourly values)	< 2.1° C SD over 24 hours	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
Shelter Temperature Device Check	Every 182 days and 2/ calendar year	< ± 2.1° C of standard	1, 2 and 3) QA Handbook Volume 2 Sec. 7.2.2
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%	1 and 2) 40 CFR Part 58 App A Sec. 3.1.2 3) Recommendation- 3-audit concentrations not including zero. AMTIC guidance 2/17/2011 AMTIC Technical Memo
SYSTEMATIC CRITERIA-OZONE			
Standard Reporting Units	*All data*	*ppm (final units in AQS)*	1, 2 and 3) 40 CFR Part 50 App U Sec. 3(a)
Rounding convention for design value calculation	*All routine concentration data*	*3 places after decimal with digits to right truncated*	1, 2 and 3) 40 CFR Part 50 App U Sec. 3(a) The rounding convention is for averaging values for comparison to NAAQS not for reporting individual hourly values.
Completeness (seasonal)	*3-Year Comparison*	*> 90% (avg) daily max available in ozone season with min of 75% in any one year.*	1,2,3) 40 CFR Part 50 App U Sec 4(b)
	8- hour average	*≥ if at least 6 of the hourly concentrations for the 8-hour period are available*	1) 40 CFR Part 50 App U 2 and 3) 40 CFR Part 50 App U Sec. 3(b)
	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*	1) 40 CFR Part 50 App U 2,3) 40 CFR Part 50 App U Sec. 3(d)
Sample Residence Time Verification	Every 365 days and 1/calendar year	*≤ 20 Seconds*	1) 40 CFR Part 58 App E, Sec. 9 (c) 2) Recommendation

Pink - Critical Criteria
Yellow - Operational Criteria
Blue - Systematic Criteria

AMP256 – Data Quality Indicators Report

- AQS report that computes the statistics outlined in 40 CFR Part 58 Appendix A
  - o Generated and reviewed quarterly by the AQS Coordinator after each upload
  - o Generated and reviewed annually by the Quality Assurance



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA QUALITY INDICATOR REPORT
One Point Quality Control
Apr. 6, 2017

Pollutant: 42101 (Carbon monoxide) **PQAO:** Florida Department of Environmental Protection (FDEP) (1328) **App A?** Y

Year	Region	State	Site IDs	POC	MT	Begin Date	End Date	Intervals Required	Valued Intervals	% Complete	CV UB	Bias UB
2016	04	FL	12-011-0010	1	S	01-OCT-16	31-DEC-16	6	6	100	1.76	- 6.29

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA QUALITY INDICATOR REPORT
Annual Performance Evaluation (APE)
Apr. 6, 2017

Pollutant: 42101 (Carbon monoxide) **PQAO:** Florida Department of Environmental Protection (FDEP) (1328) **App A?:** Y

Year	Region	State	Site ID	POC	MT	Begin Date	End Date	Avg %D / Level L1/6	L 2/7	L 3/8	L4/9	L5/10	Obs / Q Q1	Q2	Q3	Q4	Criteria Met?	Conf. Limits Lower	Upper	% Bet. Cf Lim
2016	04	FL	12-011-0010	1	S												N			

(Levels 6 thru 10)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA QUALITY INDICATOR REPORT
Flow Rate Verifications (FRV)
Apr. 6, 2017

Pollutant: Lead (TSP) LC (14129) **PQAO:** Florida Department of Environmental Protection (FDEP) (1328) **App A:** Y

Year	Reg	St	Site ID	POC	MT	Begin Date	End Date	# Obs Required	# Obs	Average %D	% Complete	Bias UB
2016	04	FL	12-057-0100	1	SP	01-OCT-16	31-DEC-16	1	1	-1.18	100	- 1.18

Inconsistent Data Handling – PEs and QC Checks

- Timeliness of checks
- Failed QC checks
- Checks associated with invalid data
- Partial data entry
- Performance audit failures and rescheduling
- Repeat performance audits

Comparisons with the Primary and Secondary Ozone NAAQS

(4b) A design value greater than the level of the NAAQS is always considered to be valid. A design value less than or equal to the level of the NAAQS must meet minimum data completeness requirements in order to be considered valid. These requirements are met for a 3-year period at a site if valid daily maximum 8-hour average O_3 concentrations are available for at least 90% of the days within the O_3 monitoring season, on average, for the 3-year period, with a minimum of at least 75% of the days within the O_3 monitoring season in any one year.

(3d) A daily maximum 8-hour average O_3 concentration shall be considered valid 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.

-40 CFR Part 50, Appendix U

Florida Ozone Completeness Calendar Years 2014-2016*

- 2014
  - o Zero (0) monitors were below 75% completeness
  - o Two (2) monitors were equal to/greater than 75%, but less than 90% completeness
- 2015
  - o Five (5) monitors were below 75% completeness
  - o Three (3) monitors were equal to/greater than 75% , but less than 90% completeness
- 2016
  - o Zero (0) monitors were below 75% completeness
  - o Two (2) monitors were equal to/greater than 75%, but less than 90% completeness

*FAMAS Completeness Report (year-round ozone season)

Florida Ozone Completeness Issues CY2014-2016

- Lake City – Veteran's Domicile (023-002) – Florida DEP
  - 2014 – 89%
  - 2015 – 82%
  - 2016 – 93%

  3-year average 88%
- Cisco Drive (031-0106) – City of Jacksonville
  - 2014 – 93%
  - 2015 – 0%
  - 2016 – 83%

  3-year average 62%
- Mayo Clinic (031-0100) – City of Jacksonville
  - 2014 – 93%
  - 2015 – 78%
  - 2016 – 95%

  3-year average 89%
- GT Bray Park (081-4012) – Manatee County
  - 2014 – 90%
  - 2015 – 91%
  - 2016 – 86%

  3-year average 89%

Comparisons with the Primary and Secondary $PM_{2.5}$ NAAQS

(4.1b) Three years of valid annual means are required to produce a valid annual $PM_{2.5}$ NAAQS DV. A year meets data completeness requirements when quarterly data capture rates for all four quarters are at least 75 percent.

-40 CFR Part 50, Appendix N

Air Quality Designations 2012 Annual $PM_{2.5}$ NAAQS

- Two MSAs (five counties) with incomplete data for the 2013-15 timeframe.
  - Gainesville MSA (Alachua & Gilchrist counties)
  - Miami-Ft. Lauderdale-Pompano Beach MSA (Broward, Miami-Dade and Palm Beach counties)
- Lab issues, site shutdown, lightning strikes, etc.
- 2016 Data Set
  - Only one or two primary samplers <75% completeness in a quarter; however, completeness >50% (data substitution)

Benefits of Assessment

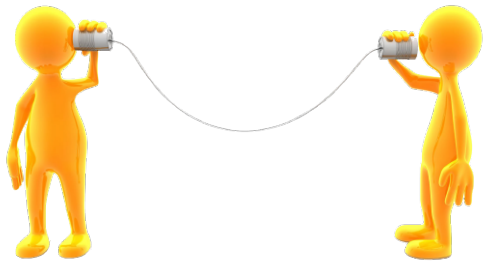
- Promotes consistency within the PQAO
- Increases attention to data quality and data collection process
- Helps all involved improve their understanding of their roles and responsibilities
- Reduces possibility of legal challenges

PQAO Challenges

- Ensuring data are an accurate reflection of network
- Correcting coding (i.e. parameter codes, method codes, etc.)
- Timely reporting of corrections to Florida DEP
- Ensuring field operators are following SOPs and associated data handling
- Confirming that SOPs, QAPPs, and other QA documents include the appropriate critical criteria
- Ensuring that data are handled consistently statewide

Take-Home Messages

- Data collector and validators should be in regular communication.
- Collector and assessor must not be the same person.
- Collectors and assessors must work as partners.
- The common goal is to provide data of appropriate and documented quality.



Questions?

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