Measurement Quality Objectives - Parameter NO_2 (Chemiluminescence)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Standard Reporting Units	All data	ppm	40 CFR, Pt 50.11	
Shelter Temperature				Instruments designated as reference or equivalent have been tested over this temperature range. Maintain shelter temperature above sample dewpoint. Shelter should have a 24- hour temperature recorder. Flag all data for which temperature range or fluctuations are outside acceptance criteria.
Temperature range	Daily	20 to 30° C	40 CFR, Pt. 53.20	
Temperature control	Daily	# ± 2° C	Vol II, S 7.1 [1/] Vol II, MS 2.3.2	
Equipment				
NO_2 analyzer	Purchase specification	Reference or equivalent method	40 CFR, Pt 53.9	
Air flow controllers		Flow rate regulated to ± 2 %	40 CFR, Pt 50, App F, S 2.2	
Flowmeters		Accuracy ± 2 %	EPA-600/4-75-003	
Detection				
Noise	Purchase specification	0.005 ppm	40 CFR, Pt 53.20 & 23	Instruments designated as reference or equivalent have been determined to meet these acceptance criteria
Lower detectable level		0.01 ppm	"	
Completeness				
Hourly Data	Quarterly	75 %	40 CFR, Pt 50.11	
Compressed Gases				
Dilution gas (zero air)	Purchase specification	Free of contaminants	EPA-600/4-75-003	Return cylinder to supplier.
Gaseous standards	Purchase specification	NIST Traceable (e.g., EPA Protocol Gas)	40 CFR, Pt 50, App F, S 1.3 EPA-600/R-97/121	Nitric oxide in nitrogen EPA Protocol Gases have a 24-month certification period and must be recertified to extend the certification.
Calibration				
Multipoint calibration (at least 5 points)	≥ 1/6 months., after failure of QC check or after maintenance	Residence time ≤ 2 min Dynam. parameter ≥ 2.75 ppm-min All points within ± 2 % of full scale of best-fit straight line	40 CFR, Pt 50, App F, S 1 Vol II, S 12.6 Vol II, MS 2.3.2	Zero gas and at least four upscale calibration points. Points outside acceptance criterion are repeated. If still outside consult manufacturers manual and invalidate data to last acceptable multipoint calibration or zero/span check .
Convertor efficiency	During multipoint calibrations	$ 96 %	40 CFR, Pt. 50, App F	Replace or service converter.
Zero/span check- level 1	1/ 2 weeks	Zero drift # ± 20 to 30 ppb Span drift # ± 20 to 25 %	Vol II, MS.2.3.2 Vol II, S 12.6 Vol II, MS 2.3.2	**If calibration factors are updated after each zero/span**, invalidate data to last acceptable zero/span check, adjust analyzer, and perform multipoint calibration.
		Zero drift # ± 10 to 15 ppb Span drift # ± 15 %	Vol II, S 12.6 Vol II, MS 2.3.2	**If fixed calibration factors are used to calculate data**, invalidate data to last acceptable zero/span check, adjust analyzer, and perform multipoint calibration.
Flowmeters	1/3 months	Accuracy ± 2 %	Vol II, App 12	Flowmeter calibration should be traceable to NIST standards.

Measurement Quality Objectives - Parameter NO_2 (Chemiluminescence)				
Requirement	**Frequency**	**Acceptance Criteria**	**Reference**	**Information/Action**
Performance Evaluation (NPAP) State audits	1/year at selected sites 1/year	Mean absolute difference # 15 % State requirements	NPAP QAPP Vol II, App 15, S 3	Use information to inform reporting agency for corrective action and technical systems audits.
Precision Single analyzer Reporting organization	1/ 2 weeks 1/3 months	None 95 % Confidence Interval # ± 15 %	40 CFR, Pt 58, App A EPA-600/4-83-023 Vol II, App 15, S 6	Concentration. = 0.08-0.10 ppm.
Accuracy Single analyzer Reporting organization	25 % of sites quarterly (all sites yearly)	None 95% Confidence Interval # ± 20%	40 CFR, Pt 58, App A EPA-600/4-83-023 Vol II, App 15, S 3	Four concentration ranges. If failure, recalibrate analyzer and reanalyze samples. Repeated failure requires corrective action.

[1/] - reference refers to the QA Handbook for Air Pollution Measurement Systems, Volume II . The use of "S" refers to sections within Part 1 of Volume II. The use of "MS" refers to meth specific sections in Volume II.

Measurement Quality Objectives - Parameter O_3 (Ultraviolet Photometric)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Standard Reporting Units	All data	ppm	40 CFR, Pt 50.9	
Shelter Temperature Temperature range Temperature control	 Daily Daily	 20 to 30° C. # ± 2° C	 40 CFR, Pt. 53.20 Vol II, S 7.1 [1/] *Determination of Ozone by Ultraviolet Analysis (draft)*	Instruments designated as reference or equivalent have been tested over this temperature range. Maintain shelter temperature above sample dewpoint. Shelter should have a 24- hour temperature recorder. Flag all data for which temperature range or fluctuations are outside acceptance criteria.
Equipment O_3 analyzer	Purchase specification	Reference or equivalent method	40 CFR, Pt 53.9 EPA-600/4-79-057	Air flow controllers must be capable of regulating air flows as necessary to meet the output stability and photometer precision requirements. The photometric measurement of absorption is not directly related to flow rate, but may be indirectly related due to thermal or other effects.
Detection Noise Lower detectable level	 Purchase specification	 0.005 ppm 0.01 ppm	 40 CFR, Pt. 53.20 & 23 "	Instruments designated as reference or equivalent have been determined to meet these acceptance criteria.
Completeness (seasonal) Maximum 1-hour concentration	Daily	75% values from 9:01 AM to 9:00 PM (LST)	40 CFR, Pt 50, App H, S 3	A missing daily maximum ozone value may be assumed to be less than the standard if valid daily maxima on the preceding and following days do not exceed 75 percent of the standard.
Transfer standard Qualification and certification Recertification to local primary standard	Upon receipt of transfer standard 1/3 months (if at a fixed site)	±4% or ±4 ppb (whichever greater) RSD of six slopes # 3.7% Std. dev. of six intercepts #1.5% New slope = ±0.05 of previous	EPA-600/4-79-056 EPA-600/4-79-057 " "	6 comparison runs that include, at minimum, 6 concentrations per comparison run including 0 and 90 ± 5% of upper range. A single six-point comparison run.
Local primary standard Certification/recertification to Standard Photometer (if recertified via a transfer standard)	1/year "	Difference # ±5 % (preferably ± 3%) Regression slopes = 1.00 ± 0.03 and two intercepts are 0 ± 3 ppb	*Determination of Ozone by Ultraviolet Analysis (draft)* "	The local primary standard is a standard in its own right, but it must be repaired and recertified if the acceptance criterion is exceeded.
EPA Standard Reference Photometer recertification	1/year	Regression slope = 1.00 ± 0.01 and intercept < 3 ppb	Protocol for Recertification of Standard Reference Photometers... (TRC Environmental Document)	9 replicate analysis over 12 conc. ranges. Disagreement must be resolved. EPA Standard Reference Photometer rechecked with NIST. If OK Network STANDARD REFERENCE PHOTOMETER must be repaired.
Zero air	Purchase specification	Free of O_3 or any substance that might react with O_3 (e.g., NO, NO_2, hydrocarbons, and particulates)	EPA-600/4-79-057	Return cylinder to supplier

Measurement Quality Objectives - Parameter O_3 (Ultraviolet Photometric)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Ozone analyzer calibration				
Zero/span check -level 1	1/ 2 weeks	Zero drift # ± 20 to 30 ppb Span drift # ± 20 to 25 %	Vol II, S 12.6 “	**If calibration updated at each zero/span**, Invalidate data to last acceptable check, adjust analyzer, perform multipoint calibration.
		Zero drift # ± 10 to 15 ppb Span drift # ± 15%	Vol II, S 12.6 “	**If fixed calibration used to calculate data**, Invalidate data to last acceptable check, adjust analyzer, perform multipoint calibration.
Multipoint calibration (at least 5 points)	Upon receipt, adjustment, or 1/ 6 months	Linearity error <5%	40 CFR, Pt 50, App D, S 5.2.3 EPA-600/4-79-057 S.5 Vol II, S 12.2	Zero gas and at least four upscale calibration points. Check verify accuracy of flow dilution. Redo analysis. If failure persists corrective action required.
Performance Evaluation				
(NPAP)	1/yearatselected sites	Mean absolute difference # 15%	Vol II, S 16.3	Use information to inform reporting agency for corrective action and technical systems audits.
State audits	1/year	State requirements	Vol II, App 15, S 3	
Precision				
Single analyzer	1/ 2 weeks	None	40 CFR, Pt 58, App A	Concentration = 0.08-0.10 ppm.
Reporting organization	1/3 months	95% CI < ± 15%	EPA-600/4-83-023 Vol II, App 15, S 6	
Accuracy				
Single analyzer	25 % of sites	None	40 CFR, Pt 58, App A	Four concentration ranges. If failure, recalibrate and reanalyze.
Annual accuracy	quarterly (all sites yearly)	95% CI # ± 20%	EPA-600/4-83-023 Vol II, App 15, S 6	Repeated failure requires corrective action.

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Measurement Quality Objectives - Parameter Lead (Atomic Absorption Spectroscopy)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Reporting Units	All data	:g/m^3	40 CFR, Pt 50.12	
Filter Checks				
Visual defect check	All filters	See reference	Vol II, MS 2.2.4	Discard any defective filters
Filter Integrity				
Collection efficiency	Purchase specification	99%	40 CFR, Pt 50, App B, S 7.1	Measure using DOP test (ASTM-2988). Reject shipment
Integrity		2.4 mg max weight loss	"	
pH		6 to 10	"	
Equipment				
Sampler	Purchase specification	Reference or equivalent method	40 CFR, Pt 53.9 40 CFR, Pt 50, App B, S 7	
Flow rate transfer standard	Purchase specification	0.02 std. m^3/min	"	
Detection Limit				
LDL	Not applicable	0.07 µg/m^3	40 CFR, Pt 50, App G, S 2	This value is based on a collaborative test of the method. Assumed air volume of 2,400 m^3.
Completeness	Quarterly	75%		
Sampler calibration				
Orifice calibration unit (flow rate transfer standard)	On receipt and yearly	Indicated flow rate within ±2% of actual flow rate	Vol II, MS 2.8.1 Vol II, MS 2.2.2	Adopt a new calibration curve. A rotary-type, gas displacement meter is the recommended NIST-traceable reference standard. Adjust or replace meter
Elapsed time meter	On receipt and 1/6 months	± 2 min/24 hours	"	
On/Off Timer	On receipt and 1/3 months	± 30 min/24 hour	Vol II, MS 2.2.2	Checked against elapsed time meter. Adjust or repair.
Sampler flow rate	On receipt, if audit deviation > 7 %, after maintenance	All points within ± 5 % of full scale of best-fit straight line	"	Rerun points outside limits until acceptable.
Analytical calibration				
Reproducibility test	On receipt	# 5%	Vol II, MS 2.8.1	Reproducibility = 100 ([high response-low response]/average response). Responses should be corrected for the blank level. If acceptance criterion is exceeded, instrument should be checked by a service rep or qualified operator.
Calibration stability	Before first sample, after every tenth sample, after last sample	# ± 5 % deviation from calibration curve.	Vol II, MS 2.8.5	Alternate between two control standards with concentrations# 1 :g/mL or 1 to # 10 :g/mL. Take corrective action and repeat the previous ten analyses.

Measurement Quality Objectives - Parameter Lead (Atomic Absorption Spectroscopy)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Performance Evaluation (NPAP)	1/year at selected sites	Mean absolute difference# 15%	Vol II, S 16.3 40 CFR, Pt 58, App A	Use information to inform reporting agency for corrective action and technical systems audits
Sampler performance Audit (flow rate)	1/3 months	Percentage difference # ±7%	Vol II, MS 2.2.8	Recalibrate before any additional sampling
Precision				
Single analyzer	1/6 days	None	40 CFR, Pt 58, App A, S 5.3	Both lead values must be > 0.15 :g/m^3
Reporting organization	1/ 3 months	95% CI < ± 15%	40 CFR, Pt 58, App A, S 5.3	
Accuracy				
Single analyzer	25 % of sites quarterly	Percentage difference # ± 16%	Vol II, MS 2.8.8	Analyze three audit samples in each of the two concentration ranges. The audit samples shall be distributed as much as possible over the entire calendar quarter.
Reporting organization		95% CI # ± 20%	40 CFR, Pt 58, App A, S 3.4 EPA-600/4-83-023	

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Measurement Quality Objectives - Parameter PM10 (Dichotomous Sampler)				
Requirement	**Frequency**	**Acceptance Criteria**	**Reference**	**Information/Action**
Reporting Units	All data	: g/m^3	40 CFR, Pt 50.7	
Filter Checks				
Visual defect check	All filters	See reference	Vol II, MS 2.10.4	Discard any defective filters
Filter Integrity				
Collection efficiency	Purchase	99 %	40 CFR, Pt 50, App M, S 7.2	As measure by DOP test (ASTM-2988). Reject shipment.
Integrity	specification	± 5 : g/m^3	"	
Alkalinity		< 25.0 microequivalents/gram	"	Following 2 months storage at ambient temp and relative humidity. Reject filters
Filter Conditioning				
Equilibration time	All Filters	at least 24 hours	40 CFR, Pt 50, App M, S 9.3	Repeat equilibration
Temperature range	"	15 to 30° C	40 CFR, Pt 50, App M, S 7.4	Keep thermometer in balance room and record temperature daily.
Temperature control	"	± 3° C	"	
Humidity range	"	20 to 45 % relative humidity	"	Keep hygrometer in the balance room and record humidity daily.
Humidity control	"	± 5 % relative humidity	"	
Equipment				
Sampler	Purchase specification	Reference or equivalent method	40 CFR, Pt 53.9	
Flow rate transfer standard	Purchase specification	± 2 % accuracy (NIST traceable)	40 CFR, Pt 50, App M, S7.3	
Analytical balance	Purchase specification	Sensitivity = 0.1 mg	40 CFR, Pt 50, App M, S 7.5 Vol II, MS 2.10.4	This acceptance criterion is inconsistent with other acceptance criteria for balance that are in the quality assurance handbook.
Mass reference standards	Purchase specification	NIST traceable (e.g., ANSI/ASTM Class 2)	Vol II, MS 2.10.4	
Detection Limit				
LDL	Not applicable	Not applicable	40 CFR, Pt 50, App M, S 3.1	The lower limit of the mass concentration is determined by the repeatability of filter tare weights, assuming the nominal air sample volume for the sampler.
Completeness	quarterly	75%	40 CFR, Pt 50, App K, S 2.3	
Sampler Calibration				
Flow control device	On installation, after repairs, after out-of-limits flow check	<4% difference from manufacturers spec and actual	40 CFR, Pt 50, App M, S 7.1 Vol II, MS 2.10.2	Adopt new calibration curve if no evidence of damage, otherwise replace.
Elapsed time meter	On receipt and 1/6 months	± 15 min	40 CFR, Pt 50, App M, S 7.1 Vol II, MS 2.10.1	Adjust or replace.
Flow-rate transfer Standard	Periodically	±2% over the expected range of ambient conditions	40 CFR, Pt 50, App M, S 8.2 Vol II, MS 2.10.1	Checked against NIST-traceable primary standard.

Measurement Quality Objectives - Parameter PM10 (Dichotomous Sampler)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Balance Calibration	1/year		Vol II, MS 2.10.4	Calibrate and maintain according to the manufacturer's recommendations.
Performance Evaluation (NPAP)	1/year at selected sites	Mean absolute difference # 15%	Vol II, S 16.3	Use information to inform reporting agency for corrective action and technical systems audits
Precision				
Single analyzer	1/6 days	# 5 µg/m³ for conc. #80 µg/m³	40 CFR, Pt 50, App M, S 4.1	Both PM10 values must be > 20 µg/m³.
Reporting organization	1/ 3 months	7% for conc. >80 µg/m³ 95% CI < ± 15%	40 CFR, Pt 58, App A, S 5.3 EPA-600/4-83-023	
Accuracy				
Single analyzer Annual accuracy	25 % of sites quarterly (all sites yearly)	None 95% CI # ± 20%	40 CFR, Pt 58, App A EPA-600/4-83-023 Vol II, App 15, S 6	Transfer standards different then those used in calibration. Recalibrate before any additional sampling. Invalidate data to last acceptable flow check if difference $\geq$ 10%.
QC Checks				
Field calibration flow check	1/month	Percentage difference # ±7 % from sampler's indicated flow rate or # ± 10 % from design condition flow rate	40 CFR, Pt 50, App M, S 8.2 Vol II, MS 2.10.3	Trouble shoot and recalibrate sampler.
"Standard" filter weighing	at beginning of weighing day	± 20 µg of original weight	Vol II, S 2.10.4	Trouble shoot and reweigh.
Reweighing filters	5 exposed and 5 unexposed/day	± 20 µg of original weight	Vol II, S 2.10.4	Trouble shoot and reweigh.
Balance zero and calibration check	every fifth filter	± 4 µg at zero ± 2 µg at 10 mg	Vol II, S 2.10.4	Trouble shoot and reweigh.

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Measurement Quality Objectives - Parameter SO_2 (Ultraviolet Fluorescence)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Standard Reporting Units	All data	ppm	40 CFR, Pt 50.4	
Shelter Temperature				Instruments designated as reference or equivalent have been tested over this temperature range. Maintain temperature above sample dewpoint. Shelter should have a 24- hour temperature recorder. Flag all data for which temperature range or fluctuations are outside acceptance criteria.
Temperature range	Daily	20 to 30° C	40 CFR Pt. 53.20	
Temperature control	Daily	# ± 2° C	Vol II, S 7.1 [1/] Vol II, MS 2.9	
Equipment				
SO_2 analyzer	Purchase specification	Reference or equivalent method	Vol II, MS 2.9	
Air flow controllers		Flow rate regulated to ± 2 %	"	
Flowmeters		Accuracy ± 2 %	"	
Detection				
Noise	Purchase specification	.005 ppm	40 CFR, Pt 53.20 & 23	Instruments designated as reference or equivalent have been determined to meet these acceptance criteria.
Lower detectable level		.01 ppm	"	
Completeness				
Annual standard	Quarterly	75%	40 CFR, Pt 50.43	
24-hour standard	24 hours	75%	"	
3-hour standard	3 hours	75%	"	
Compressed Gases				
Dilution gas (zero air)	Purchase specification	SO_2 free, 21 % O_2/78 % N_2, 300 to 400 ppm CO_2, # 0.1 ppm aromatics	Vol II, MS 2.9.2	Return cylinder to supplier. It is recommended that a clean air system be used instead of compressed air cylinders.
Gaseous standards	Purchase specification	NIST Traceable (e.g., permeation tube or EPA Protocol Gas	EPA-600/R97/121	Sulfur dioxide in nitrogen EPA Protocol Gases have a 24-month certification period for concentrations between 40 and 499 ppm and a 36-month certification period for higher concentrations.
Calibration				
Multipoint calibration (at least 4 points)	Upon receipt, adjustment, or 1/ 6 months	All points within + 2% of full scale of best-fit straight line	Vol II, S 12.6 Vol II, MS 2.9.2	Zero gas and at least three upscale points. Note: two pages from Section 2.4 (Calibration Procedures) of Vol II, MS 2.9.2 are missing from the 1994 reprinting of the QA Handbook.
Zero/span check -level 1	1/ 2 weeks	Zero drift # ± 20 to 30 ppb Span drift # ± 20 to 25 %	Vol II, S 12.6 "	**If calibration updated at each zero/span**- Invalidate data to last acceptable check, adjust analyzer, perform multipoint calibration
		Zero drift # ± 10 to 15 ppb Span drift # ± 15%	Vol II, S 12.6 "	**If fixed calibration used to calculate data**. Invalidate data to last acceptable check, adjust analyzer, perform multipoint calibration
Flowmeters	1/3 months	Accuracy ± 2 %	Vol II, App 12	Flowmeter calibration should be traceable to NIST standards

Measurement Quality Objectives - Parameter SO_2 (Ultraviolet Fluorescence)				
Requirement	**Frequency**	**Acceptance Criteria**	**Reference**	**Information/Action**
Performance Evaluation (NPAP) State audits	1/yearat selected sites 1/year	Mean absolute difference # 15% State requirements	Vol II, S 16.3 Vol II, App 15, S 3	Use information to inform reporting agency for corrective action and technical systems audits.
Precision Single analyzer Reporting organization	1/2 weeks 1/3 months	None 95% CI < ± 15%	40 CFR, Pt 58, App EPA-600/4-83-023 Vol II, S 16, S2	Concentration = 0.08-0.10 ppm.
Accuracy Annual accuracy check- Reporting organization	25 % of sites quarterly (all sites yearly)	None 95% CI # ± 20%	40 CFR, Pt 58, App A EPA-600/4-83-023 Vol II, S 16	Four concentration ranges. If failure, recalibrate and reanalyze. Repeated failure requires corrective action.

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Measurement Quality Objectives - Parameter CO (Nondispersive Infrared Photometry)

Requirement	Frequency	Acceptance Criteria	Reference	Information/Action
Standard Reporting Units	All data	ppm	40 CFR, Pt 50.8	
Shelter Temperature **Temperature range** **Temperature control**	 Daily Daily	 20 to 30° C. < ± 2° C	 40 CFR, Pt. 53.20 Vol II, S 7.1 [1/]	Instruments designated as reference or equivalent have been tested over this temperature range. Maintain shelter temperature above sample dewpoint. Shelter should have a 24- hour temperature recorder. Flag all data for which temperature range or fluctuations are outside acceptance criteria.
Equipment CO analyzer Flow controllers Flowmeters	 Purchase specification	 Reference or equivalent method Flow rate regulated to ± 1% Accuracy ± 2%	 40 CFR, Pt 50, App C " "	
Detection Limit Noise Lower detectable level	 Purchase specification	 0.5 ppm 1.0 ppm	 40 CFR, Pt 53.20 & 23 "	Instruments designated as reference or equivalent have been determined to meet these acceptance criteria.
Completeness 8-hour average	hourly	$75% of hourly averages for the 8-hour period	40 CFR, Pt 50.8	
Compressed Gases Dilution gas (zero air) Gaseous standards	 Purchase specification Purchase specification	 < 0.1 ppm CO NIST Traceable (e.g., EPA Protocol Gas)	 40 CFR, Pt 50, App C " EPA-600/R97/12	 Return cylinder to supplier. Carbon monoxide in nitrogen or air EPA Protocol Gases have a 36-month certification period and must be recertified to extend the certification.
Calibration Multipoint calibration (at least 5 points)	 Upon receipt, adjustment, or 1/ 6 months	 All points within ± 2% of full scale of best-fit straight line	 Vol II, S 12.6 Vol II, MS.2.6.1	 Zero gas and at least four upscale calibration points. Points outside acceptance criterion are repeated. If still outside criterion, consult manufacturers manual and invalidate data to last acceptable calibration.
Zero/span check-level 1	1/ 2 weeks	Zero drift # ± 2 to 3 ppm Span drift # ± 20 to 25 %	Vol II, S 12.6 "	**If calibration updated at each zero/span**, invalidate data to last acceptable check, adjust analyzer, perform multipoint calibration.
		Zero drift # ± 1 to 1.5 ppm Span drift # ± 15%	Vol II, S 12.6 "	**If fixed calibration used to calculate data**, invalidate data to last acceptable check, adjust analyzer, perform multipoint calibration.
Flowmeters	1/3 months	Accuracy ± 2 %	Vol II, App 12	Flowmeter calibration should be traceable to NIST standards.

Measurement Quality Objectives - Parameter CO (Nondispersive Infrared Photometry)				
Requirement	**Frequency**	**Acceptance Criteria**	**Reference**	**Information/Action**
Performance Evaluation (NPAP) State audits	1/year at selected sites 1 /year	Mean absolute difference # 15% State requirements	Vol II, S 16.3 Vol II, pp 15, S 3	Use information to inform reporting agency for corrective action and technical systems audits
Precision Single analyzer Reporting organization	1/2 weeks 1/3 months	None 95% CI # ± 15%	40 CFR, Pt 58, App A EPA-600/4-83-023 Vol II, App 15, S 5	Concentration = 8 to 10 ppm. Aggregation of a quarters measured precision values.
Accuracy **Single analyzer** **Reporting organization**	25 % of sites quarterly (all sites yearly)	None 95% CI # ± 20%	40 CFR, Pt 58, App A	Four concentration ranges. If failure, recalibrate and reanalyze. Repeated failure requires corrective action.

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Measurement Quality Objectives- Parameter $PM_{2.5}$

Requirement	Frequency	Acceptance Criteria	40 CFR Reference	QA Guidance Document 2.12 Reference
Filter Holding Times				
Pre-sampling	all filters	< 30 days before sampling	Part 50, App.L Sec 8.3	Sec. 7.9
Post-sampling Weighing	"	< 10 days at 25° C from sample end date < 30 days at 4°C from sample end date	" "	Sec. 7.11 "
Sampling Period	All data	1380-1500 minutes or value if < 1380 and exceedance of NAAQS	Part 50, App.L Sec 3.3	
Reporting Units	All data	µg/m^3	Part 50.3	Sec. 11.1
Detection Limit				
Lower DL	All data	2 µg/m^3	Part 50, App.L Sec 3.1	
Upper Conc. Limit	All data	200 µg/m^3	Part 50, App.L Sec 3.2	
Sampling Instrument				
Flow Rate	every 24 hours of op	≤ 5% of 16.67	Part 50, App.L Sec 7.4	
	"	≤ 2% CV	"	
	"	measured ≤ 5% average for < 5 min.	"	
Filter Temp Sensor	"	≤ 5° C of ambient for <30min		
Data Completeness	quarterly	75%	Part 50, App. N, Sec. 2.1	
Filter				
Visual Defect Check	All Filters	See reference	Part 50, App.L Sec 6.0	Sec 7.5
Filter Conditioning Environment				
Equilibration	All filters	24 hours minimum	Part 50, App.L Sec 8.2	Sec. 7.6
Temp. Range	"	20-23° C	"	"
Temp. Control	"	±2° C SD over 24 hr	"	"
Humidity Range	"	30% - 40% RH or	"	"
		_± 5% sampling RH but >20%RH	"	"
Humidity Control	"	± 5% SD over 24 hr.		
Pre/post sampling RH	"	± 5% RH	Part 50, App.L Sec 8.3.3	
Balance	"	located in filter conditioning environment	"8.3.2	
Filter Checks				
Lot Blanks	3 filters per lot	less than 15 µg change between weighings	not described	Sec. 7.7
Exposure Lot Blanks	3 filters per lot	less than 15 µg change between weighings	not described	Sec. 7.7

Measurement Quality Objectives- Parameter $PM_{2.5}$

Requirement	Frequency	Acceptance Criteria	40 CFR Reference	QA Guidance Document 2.12 Reference
Lab QC Checks				
Field Filter Blank	10% or 1 per weighing session	±30 µg change between weighings	Part 50, App.L Sec 8.3	Sec. 7.7
Lab Filter Blank	10% or 1 per weighing session	±15 µg change between weighings	Part 50, App.L Sec 8.3	"
Balance Check	beginning, every 10th sample, end	≤ 3 µg	not described	Sec. 7.9
Duplicate Filter Weighing	1 per weighing session	±15 µg change between weighings	not described	Sec 7.11
Calibration/Verification				
Flow Rate (FR) Calibration	If multi-point failure	± 2% of transfer standard	Part 50, App.L, Sec 9.2	Sec 6.3
FR multi-point verification	1/yr	± 2% of transfer standard	Part 50, App.L, Sec 9.2.5	Sec 6.3 & 8.4
One point FR verification	1/4 weeks	± 4% of transfer standard	Part 50, App.L, Sec 9.2	Sec 8.4
External Leak Check	every 5 sampling events	80 mL/min	Part 50, App.L, Sec 7.4	Sec. 6.6 & 8.4
Internal Leak Check	every 5 sampling events	80 mL/min	"	Sec. 6.6 & 8.4
Temperature Calibration	If multi-point failure	± 2% of standard	Part 50, App.L, Sec 9.3	Sec. 6.4
Temp M-point Verification	on installation, then 1/yr	± 2°C of standard	Part 50, App.L, Sec 9.3	Sec. 6.4 and 8.4
One-point temp Verification	1/4 weeks	± 4°C of standard	"	Sec. 6.4 and 8.4
Pressure Calibration	on installation, then 1/yr	±10 mm Hg	"	Sec. 6.5
Pressure Verification	1/4 weeks	±10 mm Hg	"	Sec. 8.2
Clock/timer Verification	1/ 4 weeks	1 min/mo	Part 50, App.L, Sec 7.4	not described
Accuracy				
FRM Performance Evaluation	25% of sites 4/yr	± 10%	Part 58, App A, Sec 3.5	Sec 10.2
External Leak Check	4/yr	< 80 mL/min	not described	Sec. 10.2
Internal Leak Check	4/yr	< 80 mL/min	not described	"
Temperature Audit	4/yr	± 2°C	not described	"
Pressure Audit	4/yr (?)	±10 mm Hg	not described	"
Balance Audit	1/yr	Manufacturers specs	not described	"
Accuracy				
Flow Rate Audit	1/2wk (automated) 4/yr (manual)	± 4% of audit standard	Part 58, App A, Sec 3.5	Sec. 10.2
Precision				
Collocated samples	every 6 days for 25% of sites	CV ≤ 10%	Part 58, App.A, Sec 3.5 and 5.5	Sec. 10.2
Single analyzer	1/3 mo.	CV ≤ 10%	not described	not described
Single Analyzer	1/ yr	CV ≤ 10%	not described	not described
Reporting Org.	1/ 3 mo.	CV ≤ 10%	not described	not described

Measurement Quality Objectives- Parameter $PM_{2.5}$				
Requirement	**Frequency**	**Acceptance Criteria**	**40 CFR Reference**	**QA Guidance Document 2.12 Reference**
Calibration & Check Standards				
Flow Rate Transfer Std.	1/yr	±2% of NIST-traceable Std.	Part 50, App.L Sec 9.1 & 9.2	Sec. 6.3
Field Thermometer	1/yr	± 0.1° C resolution	not described	Sec 4.2 & 6.4
		± 0.5° C accuracy		"
Field Barometer	1/yr	± 1 mm Hg resolution	not described	"
		± 5 mm Hg accuracy		"
Working Mass Stds.	3-6 mo.	0.025 mg	not described	Sec 4.3 and 7.3
Primary Mass Stds.	1/yr	0.025 mg	not described	"

Measurement Quality Objectives - Parameter PAMS Volatile Organic Compounds (VOC)				
Requirement	**Frequency**	**Acceptance Criteria**	**Reference**	**Information/Action**
Standard Reporting Units	All data	ppbC	TAD, July 1997	
Shelter Temperature **Temperature range**	Daily	20 to 30° C.	Vol II, S 7.1 [1/]	Instruments designated as reference or equivalent have been tested over this temperature range. Maintain shelter temperature above sample dewpoint. Shelter should have a 24- hour temperature recorder. Flag all data for which temperature range or fluctuations are outside acceptance criteria.
Detection Limit System detection limit		1 ppbC	TAD Sect 2.8 2.3	Calculation based on multiple manual or automated analysis and 40 CFR recommendations
Completeness (sesonal)	annually	85 %	TAD 2.8.1	
Calibration Multipoint retention time calibration standard	Start of analytical season	correlation coefficient $\geq$ 0.995	TAD 2.8.2.3	Triplicate analysis of multiple level propane standards over the expected sample concentration range (a minimum of three levels)
Performance Evaluation NPAP	prior to start of sampling season and twice during monitoring season	In absence of specified objectives within 25%	TAD 2.8.2.3	Useful for informing reporting agency for corrective actions and technical systems audits.
Precision Duplicate samples	once/2 weeks automated 10% -manual	± 25% RSD or RPD	TAD 2.8.2.1.1	Comparison of duplicate field samples, or replicate sample analysis using manual or automated field devices.
QC Checks Retention time (RT) calibration check Canister cleaning	Weekly	Response Factor within 10% RPD of calibration curve < 10 ppbC total	TAD 2.8.2.3	Retention time checked versus annual PAMS retention time cylinder provided to each site in the program. Canister cleaning per approved methodology
Background/carryover	weekly and after calibration & RT	< 20 ppbC for both columns or <10 ppbC per column	TAD 2.8.2.3	Background testing according to TAD