Guidance on the Data Certification Process for Calendar Year 2020 AQS Data

Please see the Questions and Answers on Ambient Air Monitoring Data Certification for CY2020 Data for information on which data needs certification, the certification process, the certification reviews, and the certification flag meanings.

OAQPS realizes that the CY2020 data, including data completeness and QA/QC completeness, for many organizations may have been impacted due to COVID-19. Data should be appropriately validated, flagged, and submitted to AQS. If a monitoring organization requires assistance in determining appropriate flags or actions pertaining to their data (including QA/QC) please work with your Regional Office to determine the best course of action. Checks of analyzers that produced a measurement to test technical functionality (e.g., precision check, flow check, etc) of an analyzer or sampler and are specified as critical criteria in Appendix D, Measurement Quality Objectives and Validation Templates, of the Quality Assurance Handbook for Air Pollution Measurement Systems Volume II or in an approved QAPP, were not subject to change. However, QA/QC checks and data validity are subject to 40 CFR Part 58, Appendix A, Section 1.2.3, including failure to conduct QA/QC, “weight of evidence”, and use of data submitted.

Certifying Agencies vs. PQAOs

It is recommended that wherever technically feasible, PQAOs be set up as “Certifying Agencies”. A State Agency may choose to be the certifying agency for several PQAOs within the state. Certifying agencies do not necessarily equate to PQAOs and yet several summary parameters use data aggregated at the PQAO level, for example:

- NPAP Data (valid audits and NPAP bias)
- Collocation Data (PM10, Pb and PM2.5 completeness and CV)
- PEP Data (PM2.5 and Pb completeness and bias)
- Pb Analysis Audit Data (completeness, bias)

For the data which are aggregated and assessed at the PQAO level, monitoring organizations that are part of a larger PQAO but decide to certify the sites/data within their “certifying agency” will see the same results for the parameters listed above as other monitoring organizations within the same PQAO. Therefore, AQS recommended flags for these parameters will be consistently applied to every monitoring organization within the PQAO. For example, if there are three distinct monitoring organizations within a PQAO and organization #1 has 4 PM10 sites, organization #2 has 3 PM10 sites, and organization #3 has 7 PM10 sites, the collocation summary for each organization (if each organization decides to certify their own data) will identify a total of 14 sites requiring 2 collocated monitors for the PQAO (14*0.15=2.1). Like the AMP256 QA Data Quality Indicator Report, the AMP600 will then determine the percent complete and the precision estimate for the PQAO.

Evaluation of PEP and NPAP Data Suspended for CY20 Certification

The AMP600 will report completeness and bias data of any PEP values reported to AQS but will not perform any automated evaluations (flagging) of that information.

Routine Data Completeness
Data completeness for routine monitoring data for the AMP600 is based on the sample period start date and end date of the monitor and is not based on a calendar year. For example, if a monitor is started on July 1, 2020 and monitored successfully at the required sampling frequency through the remainder of the year (sample period end date was after December 31, 2020) then the completeness would be calculated as 100%. From a NAAQS standpoint this monitor would be incomplete, but for the AMP600 the monitor would be determined to be 100% complete (based on the sample period start date).

For ozone data completeness determinations, the ozone season is used. For non-NCore monitors that report data outside the ozone season, this data will not be used in completeness calculations. NCore ozone monitors are required to operate all year, so the AMP600 completeness evaluation for these monitors is based on the entire year.

For Continuous PM Monitors
There may be a difference between the estimate of routine data completeness between the AMP430 Data Completeness Report and the AMP600 report for continuous monitors. The AMP430 report evaluates completeness by hourly values while the AMP600 evaluates completeness by the number of valid days compared to the number of scheduled days for the monitor. Therefore, while a valid day for a continuous monitor is 18 hours or greater, the AMP430 report estimates completeness based on the number of valid hours sampled in that day divided by 24. For example, a day where only 18 valid hours were sampled the AMP430 completeness would be reported as 75% (18/24). The AMP600 report would consider this day to be valid but would report data completeness as 100%. Since the AMP600 report evaluates data completeness over a complete year for a site (from sampler begin date to end date as entered into AQS), the discrepancy between the two reports should be small.

QC data
Any valid QC check (for gaseous, PM, and Pb) must be reported to AQS. For 1-pt QC checks, please refer to January 30, 2018 technical memo posted on AMTIC[1]. The changes in the memo have not been completed in the AMP600. If a 1-pt QC check is determined to be invalid but the routine data is still considered valid, the 1-pt QC can be coded “1C” which means the 1-pt QC will count towards QC completeness but will not affect the QC bias calculation. At this time, there is not yet a field on PM QA/QC entries for null codes.

Comparing the AMP256 to AMP600
In previous certification periods there were a few discrepancies between the AMP256 report and the AMP600 report. The following fixes have been made to ensure that both reports provide the same information:

[1] Steps to Qualify Data after an Exceedance of Critical Criteria Checks

Flow rate criteria - For semi-annual flow rates the AMP256 acceptance criteria requires two audits that are within 5-7 months from each other. The "Criteria Met" field in the AMP256 is based on the two audits being within this time period; however, completeness will still show 100% on the AMP256 even if the criteria are not met. The AMP600 uses the same criteria for the completeness estimate but will code the field as yellow and report 70% if there are a least two audits in two quarters of the year but the 5-7month rule was not met, and red (recommended "N" flag) if only 1 or no audit was performed during the year (≤50% completeness).

Flow Rate Verifications - The March 2016 Revision to 40 CFR Part 58 Appendix A included the reporting of flow rate verification data for all PM parameters (PM10, PM2.5 and Pb). Prior to the new rule, the flow rate verification data were only required for PM10 continuous monitors. The certification reports for 2020 will not evaluate flow rate verification data for the PM parameters other than PM10 continuous samplers. This feature is planned to be applied to all PM parameters in the future.

How Does Data in the Summary Section of the AMP600 Reports Get Used at the Site Level?

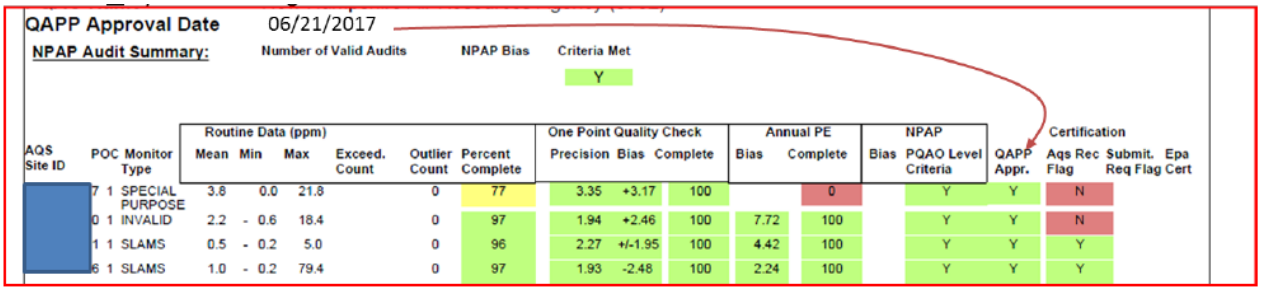
There has been some question on how the certification flags are generated for the "PQAO Criteria Met" fields. Below provides some explanation and examples.

QAPP Approval -The QAPP Approval Field is based on QAPP approval dates supplied from the monitoring organizations to the EPA Regions. Figure 1 provides an explanation on how flags are set at the site pollutant level. The QAPP approval date (if one exists) will be displayed above the site details but then transferred down to the site level. The QAPP approval field is implemented in the same manner for all pollutants.

QAPP Approval

QAPP Approval – If a QAPP approval date is in AQS it will appear on the PQAO Pollutant Page

- If no approval date or date > 5 years old, all sites will have AQS red "N" flag.
- If date is ≤ 5 years all sites will have AQS green "Y" flag, unless impacted by other parameters.



QAPP Approval Date 06/21/2017

NPAP Audit Summary:

Number of Valid Audits	NPAP Bias	Criteria Met
		Y

AQS Site ID	POC	Monitor Type	Routine Data (ppm) Mean	Min	Max	Exceed. Count	Outlier Count	Percent Complete	One Point Quality Check Precision	Bias	Complete	Annual PE Bias	Complete	NPAP Bias	PQAO Level Criteria	QAPP Appr.	Certification Aqs Rec Flag	Submit. Req Flag	Epa Cert
	7 1	SPECIAL PURPOSE	3.8	0.0	21.8		0	77	3.35	+3.17	100		0		Y	Y	N		
	0 1	INVALID	2.2	- 0.6	18.4		0	97	1.94	+2.46	100	7.72	100		Y	Y	N		
	1 1	SLAMS	0.5	- 0.2	5.0		0	96	2.27	+/-1.95	100	4.42	100		Y	Y	Y		
	6 1	SLAMS	1.0	- 0.2	79.4		0	97	1.93	-2.48	100	2.24	100		Y	Y	Y		

Fig 1

NOTE: Any QAPPs whose approval date is greater than 5 years old will have all sites flagged with Red "N" in the QAPP approval column and the AQS recommended flag column. This was described in a July 11, 2017 technical memo posted on AMTIC[2].

[2] EPA Review of Monitoring Organizations QAPP's for Critical Criteria Conformance

Gaseous Pollutants

1-point QC Check Completeness

The 1-point QC completeness data will be evaluated in the following manner:

1. Count the number of checks in each 14-day interval starting with the Jan 1-14 interval. For each 14-day interval, multiple checks will only count as one.
2. Divide the total number of checks in #1 by 26
3. Must be within the ranges identified in 40 CFR Part 58 Appendix A Section 3.1.1. If a 1-Point QC transaction is submitted with the assessment concentration outside the valid ranges, it will be accepted with a warning, but will not be used in regulatory precision and bias statistics or count towards meeting the required frequency[3].

For certification, a green Y is ≥ 75% completeness. That means a monitoring organization could miss six 14-day intervals (meaning no checks performed during a 14-day interval) and still get a green "Y" flag. For a yellow flag, they could miss nine 14-day intervals and get a yellow "Y" warning. Missing ten or more 14-day intervals will prompt a red "N" flag to be displayed. In the event that ample valid checks were performed and reported to AQS, but the dates of the checks do not align with the AQS programmed spacing, the certifying agency can opt to include a comment in the comment field explaining the discrepancy. The EPA Regional Office can then work with the certifying agency to determine the appropriate EPA evaluation flag.

PM2.5 Pollutant PQAO Level Criteria

PM2.5 Collocation - 40 CFR Part 58 Appendix A requires that a PQAO collocate 15% of the monitors for each method designation. The AMP256 has been revised to assess whether there is 15% collocation for each method designation of only the primary monitor and therefore matches the results in the AMP600 report. However, there may be cases where more than one method designation was used at a site for the primary monitor. Any method designation used as a primary monitor at any time during the year will be counted towards the collocation evaluation. For example, if a method 118 sampler runs as the primary sampler for 6 months and a method 143 sampler runs as the primary sampler for the other 6 months at the same site, the AMP600 will expect to see collocation for each method designation within the PQAO.

Several interactions occur with collocation data. Figure 2 provides an example PM2.5 AMP600 report where these interactions are highlighted for discussion. First, each method designation that was reported as a primary monitor for a site will be listed in the collocation summary. Data from this summary should be the same information one would see on the AMP256 report, at least for the collocations that occurred. As mentioned earlier, the AMP256 now only counts those monitors that are considered the primary monitor at each site, so both the AMP600 and the AMP256 results should be

[3] This information was Question #10 during the AQS "Ask the Experts" webinar hosted in November 2018.

similar. However, there will be cases where more than one method designation is reported for a site and both method designations will be identified for collocation (see Fig. 2 116/117). “PQAO Criteria Met” for collocation is based on the completeness summary statistic **and** the precision estimate (CV-UB). In the Figure 2 example, the method 116 sampler shows 100% completeness and a PQAO precision estimate of 15.93 which is in the warning range. Therefore, all sites using 116 as the primary method code are color coded yellow. Sites that had a primary method designation of 117 did not have collocation data available (completeness is 0%), so these sites do not meet criteria and are flagged as “N”. Also note that any individual collocated site/monitor where the CV is greater than 25% will be flagged with an AQS recommended “N” flag even if the PQAO level CV estimate is less than 25% (see method 170 examples in Figure 2).

PQAO Level “Criteria Met” Flags
For Collocation and PEP , AQS Recommended flags are generated at the PQAO level and then “transfered” back to each site

Collocation
based on CV, and completeness and is also associated with method designation

Bias
based on bias estimate **not** completeness.

Parameter: PM2.5 - Local Conditions (88101)
PQAO Name: [redacted]
Quality Assurance Project Plan Approval Date: 03/31/2011

Collocation Summary

Method	# Sites	# Sites Req	# Sites Collocated	% Collocated	CV Est	CV UB	Criteria Met?
116	2	1	1	100	13.87	15.93	Y
117	2	1	0	0			N
170	6	1	2	100	21.44	24.69	Y

PEP Summary

# Methods	# Audited Methods	# PEP Required	# PEP Submitted	% Complete	Bias	Criteria Met?
3	3	8	4	50	+5.02	Y

Monitors Summaries

AQS Site ID	POC	Method	Monitor Type	Routine Data (ug/m3) Mean	Min	Max	Exceed. Count	Outlier Count	% Complete	Flow Rate Audit Bias	% Complete	Collocation CV	% Complete	PQAO Crit. Met	PEP PQAO Crit. Met	Certification QAPP Appr.	AQS Rec Req Value	EPA Value
[redacted]	1	116	SLAMS	9.91	1.8	27.2		0	97	-1.22	100			Y	Y	Y	Y	
	1	116	SLAMS	6.79	2.0	14.4		0	100	+0.00	100			Y	Y	Y	Y	
	3	170	SLAMS	4.28	-3.0	28.3		0	97	+0.83	100			Y	Y	Y	Y	
	1	116	SLAMS	8.59	1.9	27.1		0	98	-2.29	100	15.93	100	Y	Y	Y	Y	
	2	116	SLAMS	9.51	1.9	25.9		0	92	-1.57	100			Y	Y	Y	Y	
	1	116	SLAMS	7.73	2.4	24.3		0	100	-0.43	100			Y	Y	Y	Y	
	3	170	SLAMS	7.75	-3.0	47.3		0	84	-0.27	100			Y	Y	Y	Y	
	3	170	SLAMS	6.37	-3.0	40.1		0	91	-0.39	100			Y	Y	Y	Y	
	1	116/117	SLAMS	6.68	1.3	19.3		0	93	+0.66	100			N	Y	Y	N	
	3	170	SLAMS	8.70	-3.0	79.3		0	87	-1.23	100	26.87	100	Y	Y	Y	N	
	3	170	SLAMS	6.26	-3.2	53.2		0	91	+0.33	100	25.99	96	Y	Y	Y	N	
	1	117	SLAMS	8.19	1.8	24.0		0	97	-0.74	100			N	Y	Y	N	

Fig.2

PM2.5 Bias- Bias data is derived from the PEP and is aggregated at the PQAO level. **However, for CY2020 data the AMP600 will report the information but will not flag this data in the report.**

PM10 Pollutant PQAO Level Criteria

PM10 Collocation - PM10 collocation is only required for manual (intermittent) samplers. The AMP256 and the AMP600 only count sites where a manual sampler is the primary sampler at a site. However, there may be times when a site had a manual sampler as the primary for a period of time and then switched to a continuous monitor. Sites where the manual sampler operated as the primary for any time during the year will be included in the manual count.

In addition, CFR does not distinguish method designations for PM10, so all primary intermittent samplers are aggregated at the PQAO level and 15% of the sites where intermittent monitors are listed as primary monitors are required to be collocated. Therefore, "Method" code information is not identified in the summary line of Figure 3. In the example below, like PM2.5, both collocation completeness at the summary level and the CV_UB are used for the Collocation "PQAO Criteria Met" column at the site/monitor level. Data from this summary should be the same information in the AMP256 report. In Figure 3 both the collocation and CV_UB were acceptable.

Parameter: PM10 Total 0-10um STP (81102) INTERMITTENT
PQAO Name:
Quality Assurance Project Plan Approval Date: 04/01/2007

Collocation Summary

# Sites	# Sites Req	# Sites Collocated	% Collocated	CV Est	CV UB	Criteria Met?
13	2	2	100	5.55	6.11	Y

Monitors Summaries

			Routine Data (ug/m3)						Flow Rate Audit		Collocation			Certification		
AQS Site ID	POC	Monitor Type	Mean	Min	Max	Exceed. Count	Outlier Count	% Complete	Bias	% Complete	CV	% Complete	PQAO Crit. Met	QAPP Appr.	AQS Rec Req Value	EPA Value Value
	1	SLAMS	20.47	7.0	46.0	0	0	97	+0.63	100	7.42	100	Y	Y	Y	
	2	SLAMS	20.18	7.0	44.0	0	0	90	-1.11	100			Y	Y	Y	
	1	SLAMS	15.70	6.0	32.0	0	0	92	+0.09	100			Y	Y	Y	
	1	SLAMS	13.07	4.0	23.0	0	0	95	+0.21	100			Y	Y	Y	
	1	SLAMS	16.04	6.0	36.0	0	0	93	+0.55	100			Y	Y	Y	
	1	SLAMS	17.37	2.0	36.0	0	0	93	+1.51	100			Y	Y	Y	
	1	SLAMS	19.58	2.0	33.0	0	0	98	+0.34	100			Y	Y	Y	
	1	SLAMS	15.24	6.0	30.0	0	0	95	-1.84	100	5.15	100	Y	Y	Y	
	2	SLAMS	15.58	2.0	28.0	0	0	87	-0.59	100			Y	Y	Y	
	1	SLAMS	16.20	2.0	41.0	0	0	82	+1.53	100			Y	Y	Y	
	1	SLAMS	15.48	2.0	68.0	0	0	98	+1.23	100			Y	Y	Y	
	1	SLAMS	15.28	2.0	36.0	0	0	93	+1.93	100			Y	Y	Y	
	1	SLAMS	16.18	2.0	31.0	0	0	90	+1.15	100			Y	Y	Y	

Fig. 3

Lead Parameters

There are currently two Pb parameters; Pb-TSP and Pb-PM10. They will be discussed separately.

Pb-TSP - Pb-TSP (Fig. 4) is a more established program**.** Like the other PM parameters, both the collocation completeness and the precision estimate (CV-UB) will be used in the "Collocation PQAO Criteria Met" column. The analysis audits are the audits described in 40 CFR Part 58 App A section 3.3.4.2. Both the completeness and

the bias estimate will be used in the “Lead Analysis Criteria Met” column at the site monitor level. EPA has improved it’s reporting of Pb-PEP data but will not use this information in the certification evaluations for this year.

Lead (TSP) LC (14129)
PQAO Name: [redacted]
Quality Assurance Project Plan Approval Date: 06/01/2012

PEP Data Not Used this Year

Collocation Summary:

Number of Sites	Number of Colloc Sites Required	Number of Actual Colloc Sites	Percent Collocated	CV Est	CV UB	Criteria Met
15	2	2	100	10.57	11.35	Y

PEP Summary

Number of Methods	Number of Methods Audited	Number of PEP Audits Required	Number of Audits Submitted	Percent Complete	Bias	Criteria Met
1	0	2	0	0		Y

Analysis Audit Summary:

Number Required	Number Submitted	Percent Complete	Bias	Criteria Met
24	22	92	+/-5.09	Y

Monitors Recommended for Certification

AQS Site-ID	POC	Monitor Type	Routine Data (ug/m^3) Mean	Min	Max	Exceed. Count	Outlier Count	Percent Comp.	Flow Rate Audit Bias	Percent Comp.	CV UB	Collocation Percent Comp.	PQAO Crit. Met	PEP PQAO Crit. Met	Lead Analysis Crit. Met	QAPP Appr.	Certification AQS Rec. V	Req. Value	EPA Value
[redacted]	1	SLAMS	0.024	0.001	0.262	0	0	100	-2.04	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.198	0.004	2.135	3	0	100	-1.62	100	13.06	100	Y	Y	Y	Y	Y		
	2	SLAMS	0.207	0.006	2.196	3	0	95	-1.22	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.216	0.005	2.229	3	0	100	-3.29	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.075	0.004	0.577	0	0	98	-1.64	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.175	0.004	1.884	1	0	100	-2.45	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.041	0.000	0.518	0	0	97	-1.24	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.042	0.003	0.479	0	0	95	-2.44	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.486	0.005	7.668	4	0	100	-1.19	100	11.37	100	Y	Y	Y	Y	Y		
	2	SLAMS	0.512	0.005	3.594	4	0	100	-1.89	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.027	0.001	0.284	0	0	98	-0.41	100			Y	Y	Y	Y	Y		
	1	SLAMS	0.036	0.003	0.196	0	0	98	-1.63	100			Y	Y	Y	Y	Y		

Fig. 4

Pb-PM10 - Since there are different implementation requirements for sampling Pb-PM10 at source and non-source-oriented sites, collocation and PEP are not required at every PQAO implementing this parameter[4]. Due to complications with programming these requirements, collocation and PEP evaluations will not be used for certification on a site/monitor level for CY2020 data. However, if values (as seen in Fig. 5) are available, they will be reported. Lead analysis audit data will be used for certification.

Certification Report for Lead

Certification Year 2012
Certifying Agency Name: [redacted]
Lead PM10 LC FRM/FEM (85129)
PQAO Name: [redacted]
Quality Assurance Project Plan Approval Date: 06/01/2012

Collocation and PEP not used in Certification This Year

Collocation Summary:

Number of Sites	Number of Colloc Sites Required	Number of Actual Colloc Sites	Percent Collocated	CV Est	CV UB	Criteria Met
1	1	1	100	7.68	9.15	

PEP Summary

Number of Methods	Number of Methods Audited	Number of PEP Audits Required	Number of Audits Submitted	Percent Complete	Bias	Criteria Met
1	0	1	0	0		

Analysis Audit Summary:

Number Required	Number Submitted	Percent Complete	Bias	Criteria Met
24	18	75	-1.81	Y

Monitors Not Recommended for Certification

AQS Site-ID	POC	Monitor Type	Routine Data (ug/m^3) Mean	Min	Max	Exceed. Count	Outlier Count	Percent Comp.	Flow Rate Audit Bias	Percent Comp.	CV UB	Collocation Percent Comp.	PQAO Crit. Met	PEP PQAO Crit. Met	Lead Analysis Crit. Met	QAPP Appr.	Certification AQS Rec. V	Req. Value	EPA Value
[redacted]	1	SPECIAL	0.348	0.001	2.446	3	0	79	-0.18	50	9.15	100			Y	Y	N	Y	

Fig 5

[4] A March 2016 revisions to 40 CFR Part 58 Appendix A discontinued Pb-PEP at non-source NCore sites

Attachment 1

Criteria That Will Generate Green (Acceptable) Warning (Yellow) and "N" Flags (Red)

Notes:

1. **Blue shaded rows are evaluations that will be reported (when data is available) but not used in certification flag settings**
2. **Green shaded rows are rules promulgated in March 2016 but will not be evaluated in 2020**
3. **One Red for any monitor will elicit an AQS recommended "N" flag**
4. **Three warnings (yellow) for any monitor will elicit an AQS recommended "N" flag**

NOTE: For the 2020 data certification process (due May 1, 2021), any sites for PQAOs whose QAPP approval date is greater than 5 years old will be given a Red "N" flag.

Assessment	Current CFR Requirement or Guidance	Green (Acceptable)	Yellow (Warning)	Red (Recommend N Flag)	Comments
Technical Systems Audit	PQAO every 3 years	TSA within 3 years	TSA within 4 years	TSA > 5 years	Not a monitoring Org responsibility. Will be reported on summary page not by pollutant
Gaseous Criteria Pollutants					
Routine Data Completeness	75%	> 80%	80-70%	< 70%	Based on CFR criteria for data use 100* Number of hourly obs/number of hours in monitor sample period[1]
QAPP Approval	Approval date within 5 years of current date	Approval date within 5 years of current date	N/A	Not approved and/or approval date greater than 5 years	Could be sole reason for "N" flag if QAPP not approved.
1-Point QC Completeness	75%	> 75%	65-75%	< 65%	Based on 26, 1-point QC for a year. Calculated based on the number of days the monitor operated.
1-Point QC Precision	< ±7.1% O3, < ±10.1% CO, SO2 < ±15.1% NO2	< ±7.1% O3, < ±10.1% CO, SO2 < ±15.1% NO2	±8-20% O3 ±11-25% CO, SO2 ±16-25% NO2	> ±20% O3 > ±25% others	Based on all valid 1-point QC checks in AQS for the year. Value should reflect AMP256 value
1-Point QC Bias	< ±7.1% O3, < ±10.1% CO, SO2 < ±15.1% NO2	< ±7.1% O3, < ±10.1% CO, SO2 < ±15.1% NO2	±8-20% O3 ±11-25% CO, SO2 ±16-25% NO2	> ±20% O3 > ±25% others	Based on all valid 1-point QC checks in AQS. Value should reflect AMP256 value
Annual PE Completeness	1 PE/year 3 audit levels	1 PE/year 3 audit levels	1 PE/year 2 audit levels	No PE or 1 audit level	Will not count more than one actual value in an audit level. For example, two audit in one level count as 1 audit level.
Annual PE Bias O3, SO2, NO2	< ±1.5 ppb / < ±15.1%	< ±1.5 ppb / < ±15%	< ±1.6-3.0 ppb/ ±16-25%	> ±3.0 ppb/ ±25%	Average PD of all PE values for the monitor
CO	< ±0.031 ppm/ < ±15.1%	< ±0.031 ppm/ < ±15.1%	< ±0.04-0.06 ppm/ ±16-25%	> ±0.06 ppm/ ±25%	
NPAP Audit Completeness - PQAO	20% of sites in PQAO	20% of sites in PQAO	10-19% of sites in PQAO	<10% of sites in PQAO	Not a monitoring Org responsibility. Will be marked as "Y"

Assessment	Current CFR Requirement or Guidance	Green (Acceptable)	Yellow (Warning)	Red (Recommend N Flag)	Comments
NPAP Bias	< ±10.1% O3 < ±15.1% others	< ±10.1% O3 < ±15.1% others	±10.1-20% O3 ±15.1-25% others	> ±20% O3 > ±25% others	median PD for all values at a site and median PD for PQAO level estimate
NPAP Audit Completeness - Site	4 levels	4 levels	2-3 levels	< 1 level	Not a monitoring Org responsibility
PM2.5 Criteria					
Routine Data Completeness	75%	> 80%	80-70%	< 70%	Based on CFR criteria for data use 100 * number of creditable samples/number of scheduled samples in monitor sample period[1]
QAPP Approval	Approval date within 5 years of current date	Approval date within 5 years of current date	N/A	Not approved and/or approval date greater than 5 years	Could be sole reason for "N" flag if QAPP not approved.
Flow Rate Verification Completeness	every 30 days (12 /year)	Every 30 days (11-12/year)	Every 45 Days (8-11/year)	> 45 days (< 8/year)	Not implemented in 2020
Flow Rate Verification Bias	< ±4.1% of transfer standard < ±5.1% from design	< ±4.1% of transfer standard < ±5.1% from design	±4.1-6% of transfer standard ±5.1-7% from design	> ±6% of transfer standard > ±7% from design	design =design flow rate Average PD for audits at monitor level Value should reflect AMP256 value Not implemented in 2020
Flow Rate Audit Completeness	2 /year every 6 months	2/year every 5-7 months or 3 or 4 with one audit in 3 or 4 quarters	2 across 2 quarters	1 audit	Semi-annual flow rate audits. Based on how long sampler operated. If sampler operates <9 months at least 1 is expected. If operated >9 months two audits expected.
Flow Rate Audit Bias	< ±4% of transfer standard < ±5% from design	< ±4% of transfer standard < ±5% from design	±5-6% of transfer standard ±6-7% from design	> ±6% of transfer standard > ±7% from design	design =design flow rate Average PD for audits at monitor level Value should reflect AMP256 value

Assessment	Current CFR Requirement or Guidance	Green (Acceptable)	Yellow (Warning)	Red (Recommend N Flag)	Comments
Collocation Completeness	75%	> 75%	65-74%	< 65%	By method designation Summary level= average of completeness of site level values Site level = number of reported observations /30 Based on how long sampler operated
Collocation Precision	< 10.1%	< 10.1%	10.1-25%	> 25%	By method designation Same statistics as AMP256 for summary level and site level. Value should reflect AMP256 value
PM2.5 PEP Completeness	5 or 8	5 or 8	3-4 or 6-7	< 3 or 6	Not a monitoring Org responsibility
PEP Bias	< ±10.1%	< ±10.1%	±10.1-30%	> ±30%	Value should reflect AMP256 value
PM10 Continuous Methods					
Routine Data Completeness	75%	> 80%	80-70%	< 70%	Based on CFR criteria for data use 100 * number of valued strata (days per collection frequency) / total number of strata
QAPP Approval	Approval date within 5 years of current date	Approval date within 5 years of current date	N/A	Not approved and/or approval date greater than 5 years	Could be sole reason for "N" flag if QAPP not approved.
Flow Rate Verification Completeness	75%	> 75%	65-74%	< 65%	12 per year, based on how long sampler operated Not implemented in 2020
Flow Rate Verification Bias	< ±7.1% of transfer standard	< ±7.1% of transfer standard	±7.1- 9% of transfer standard	> ±9% of transfer standard	Average of percent differences. Value should reflect AMP256 value Not implemented in 2020

Assessment	Current CFR Requirement or Guidance	Green (Acceptable)	Yellow (Warning)	Red (Recommend N Flag)	Comments
Flow Rate Audit Completeness	2 /year every 6 months	2/year every 5-7 months or 3 or 4 with one audit in 3 or 4 quarters	2 across 2 quarters	1 audit	Semi-annual flow rate audits Based on how long sampler operated. If sampler operates <9 months at least 1 is expected. If operated >9 months two audits expected.
Flow Rate Audit Bias	< ±10.1% of audit standard	< ±10.1% of audit standard	±10.1-12% of audit standard	> ±12 % of audit standard	Semi-annual flow rate audits. Value should reflect AMP256 value Average of percent differences
Collocation Completeness	75%	> 75%	65-74%	< 65%	Summary level= average of completeness of site level values Site level = number of reported observations /30 Based on how long sampler operated
Collocation Precision	10%	≥ 10%	11-20%	> 20%	Same statistics as AMP256 for summary and site level. Value should reflect AMP256 value
PM10 Manual Methods					
Routine Data Completeness	75%	> 80%	80-70%	< 70%	Based on CFR criteria for data use 100 * number of valued strata (days per collection frequency) / total number of strata
QAPP Approval	Approval date within 5 years of current date	Approval date within 5 years of current date	N/A	Not approved and/or approval date greater than 5 years	Could be sole reason for "N" flag if QAPP not approved.
Flow Rate Verification Completeness	every 30 days (12 /year)	Every 30 days (11-12/year)	Every 45 Days (8-11/year)	>45 days (<8/year)	Not implemented in 2020
Flow Rate Verification Bias	< ±7.1% of transfer standard	< ±7.1% of transfer standard	±7.1-9% of transfer standard	> ±9% of transfer standard	Semi-annual flow rate audits. Value should reflect AMP256 value Not implemented in 2020

Assessment	Current CFR Requirement or Guidance	Green (Acceptable)	Yellow (Warning)	Red (Recommend N Flag)	Comments
Flow Rate Audit Completeness	2 /year every 6 months	2/year every 5-7 months or 3 or 4 with one audit in 3 or 4 quarters	2 across 2 quarters	1 audit	Semi-annual flow rate audits Based on how long sampler operated. If sampler operates <9 months at least 1 is expected. If operated >9 months two audits expected.
Flow Rate Audit Bias	< ±10.1% of transfer standard	< ±10.1% of transfer standard	±10.1-12% of transfer standard	> ±12 % of transfer standard	Semi-annual flow rate audits. Value should reflect AMP256 value
Collocation Completeness	75%	> 75%	65-74%	< 65%	Summary level= average of completeness of site level values Site level = number of reported observations /30 Based on how long sampler operated
Collocation Precision	10%	≥ 10%	11-20%	> 20%	Same statistics as AMP256 for summary and site level. Value should reflect AMP256 value
Pb-TSP					
Routine Data Completeness	75%	> 80%	80-70%	< 70%	Based on CFR criteria for data use 100 * number of creditable samples/numbers of scheduled samples in monitor sample period[1]
QAPP Approval	Approval date within 5 years of current date	Approval date within 5 years of current date	N/A	Not approved and/or approval date greater than 5 years	Could be sole reason for "N" flag if QAPP not approved.
Flow Rate Verification Completeness	every 90 days and 4 times a calendar year	every 90 days and 4 times a calendar year	every 120 days and 3 times a calendar year	> every 120 days and < 3 times a calendar year	Not implemented in 2020
Flow Rate Verification Bias	< ±7.1% from transfer standard	< ±7.1% from transfer standard	±8-9% of transfer standard	> ±9% of transfer standard	Not implemented in 2020

Assessment	Current CFR Requirement or Guidance	Green (Acceptable)	Yellow (Warning)	Red (Recommend N Flag)	Comments
Flow Rate Audit Completeness	2 /year every 6 months	2/year every 5-7 months or 3 or 4 with one audit in 3 or 4 quarters	2 across 2 quarters	1 audit	Semi-annual flow rate audits Based on how long sampler operated. If sampler operates <9 months at least 1 is expected. If operated >9 months two audits expected.
Flow Rate Audit Bias	< ±7.1% of transfer standard	< ±7.1% of transfer standard	±8-9% of transfer standard	> ±9% of transfer standard	Semi-annual flow rate audits. Value should reflect AMP256 value
Collocation Completeness	75%	> 75%	65-74%	< 65%	Summary level= average of completeness of site level values Site level = number of reported observations /30 Based on how long sampler operated
Collocation Precision	< 20.1%	< 20.1%	21-30%	> 30%	Same statistics as AMP256 for summary and site level
Pb PEP Completeness	5 or 8	4 or 7	3 or 6	< 3 or 6	Not a monitoring Org responsibility
Pb PEP Bias	< ±15.1%	< ±15.1%	±15.1-25%	> ±25%	Average PD
Analysis Audit Completeness	75%	> 75%	65-74%	< 65%	Average completeness by quarter than take average of all 4 quarters
Analysis Audit Bias	< ±10.1%	< ±10.1%	±10.1-18%	> ±18%	Average PD
Pb-PM10					
Routine Data Completeness	75%	> 80%	80-70%	< 70%	Based on CFR criteria for data use 100 * number of creditable samples/numbers of scheduled samples in monitor sample period[1]
QAPP Approval	Approval date within 5 years of current date	Approval date within 5 years of current date	N/A	Not approved and/or approval date greater than 5 years	Could be sole reason for "N" flag if QAPP not approved.

Assessment	Current CFR Requirement or Guidance	Green (Acceptable)	Yellow (Warning)	Red (Recommend N Flag)	Comments
Flow Rate Audit Completeness	2/year every 6 months	2/year every 5-7 months or 3 or 4 with one audit in 3 or 4 quarters	2 across 2 quarters	1 audit	Semi-annual flow rate audits Based on how long sampler operated. If sampler operates <9 months at least 1 is expected. If operated >9 months two audits expected.
Flow Rate Audit Bias	< ±4% of transfer standard	< ±4% of transfer standard	±5-6% of transfer standard	> ±6% of transfer standard	Semi-annual flow rate. Value should reflect AMP256 value
Collocation Completeness	75%	> 75%	65-74%	< 65%	Summary level= average of completeness of site level values Site level = number of reported observations /30 Based on how long sampler operated
Collocation Precision	20%	≤ 20%	21-30%	> 30%	Value should reflect AMP256 value
Pb PEP Completeness	5 or 8	5 or 8	3 or 6	< 3 or 6	Not a monitoring Org responsibility
Pb PEP Bias	±15%	±15%	±16-25%	> ±25%	
Analysis Audit Completeness	75%	> 75%	65-74%	< 65%	Based on 24 audits per year
Analysis Audit Bias	10%	10%	< 18%	> 18%	Average of percent differences. Value should reflect AMP256 value

[1] Sample period is the time interval between the sample period start date and the sample period end date.