

One Point QC Checks

View of District Operations

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Agenda

- Focus on O₃ only sites
- Regulation and frequency
- O₃ level and acceptance criteria
- QC check example & timeline
- Valid vs invalid for AQS reporting
- Discussion on decimals



Regulation and Frequency Key Points

3.1. Gaseous Monitors of SO₂, NO₂, O₃, and CO.

3.1.1 One-Point Quality Control (QC) Check for SO₂, NO₂, O₃, and CO. (a) A one-point QC check must be performed at least once every 2 weeks on each automated monitor used to measure SO₂, NO₂, O₃ and CO. With the advent of automated calibration systems, more frequent checking is strongly encouraged. See Reference 10 of this appendix for guidance on the review procedure. The QC check is made by challenging the monitor with a QC check gas of known concentration (effective concentration for open path monitors) between the prescribed range of 0.005 and 0.08 parts per million (ppm) for SO₂, NO₂, and O₃, and between the prescribed range of 0.5 and 5 ppm for CO monitors. The QC check gas concentration selected within the prescribed range should be related to the monitoring objectives for the monitor. If monitoring at an NCore site or for trace level monitoring, the QC check concentration should be selected to represent the mean or median concentrations at the site. If the mean or median concentrations at trace gas sites are below the MDL of the instrument the agency can select the lowest concentration in the prescribed range that can be practically achieved. If the mean or median

Why more Frequently?

- Minimize data loss
- Ability to better track operation of monitor
- VCAPCD runs automated check every other day
- Little down side when system is automated
- Better Air Quality System (AQS) statistics

Data Quality Indicator Report (AMP 256)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM

DATA QUALITY INDICATOR REPORT
One Point Quality Control

Feb. 19, 2019

Pollutant:		42602 (Nitrogen dioxide (NO2))				PQAO: California Air Resources Board (0145)				App A? Y		
Year	Region	State	Ste IDs	POC	MT	Begin Date	End Date	Intervals Required	Valued Intervals	% Complete	CV UB	BiasUB
2018	09	CA	06-111-2002	1	S	01-JAN-18	31-DEC-18	26	26	100	1.83	+ 3.52
2018	09	CA	06-111-3001	1	S	01-JAN-18	31-DEC-18	26	26	100	3.34	+/- 3.33
2018			SUMMARY			01-JAN-18	31-DEC-18	52	52	100	3.85	+/- 3.35
SUMMARY		SUMMARY				01-JAN-18	31-DEC-18	52	52	100	3.85	+/- 3.35
Pollutant:		44201 (Ozone)				PQAO: California Air Resources Board (0145)				App A? Y		
Year	Region	State	Ste IDs	POC	MT	Begin Date	End Date	Intervals Required	Valued Intervals	% Complete	CV UB	BiasUB
2018	09	CA	06-111-0007	1	S	01-JAN-18	31-DEC-18	26	26	100	1.03	+/- 0.74
2018	09	CA	06-111-0009	1	S	01-JAN-18	31-DEC-18	26	26	100	1.56	+/- 1.80
2018	09	CA	06-111-1004	1	S	01-JAN-18	31-DEC-18	26	26	100	1.28	+/- 0.82
2018	09	CA	06-111-2002	1	S	01-JAN-18	31-DEC-18	26	26	100	1.97	+/- 2.29
2018	09	CA	06-111-3001	1	S	01-JAN-18	31-DEC-18	26	26	100	2.57	- 3.55
2018			SUMMARY			01-JAN-18	31-DEC-18	130	130	100	1.97	+/- 1.75
SUMMARY		SUMMARY				01-JAN-18	31-DEC-18	130	130	100	1.97	+/- 1.75

O₃ Assessment Value and Acceptance Criteria

- 40 CFR Part 58 Appendix A, 3.1.1
 - Between 5 and 80 ppb
- VCAPCD assessment value 50-55 ppb
- Acceptance criteria +/- 1.5 ppb or +/- 7 % whichever is greater
- VCAPCD action level is 5 %

Pt. 58, App. A

ance on the review procedure. The QC check is made by challenging the monitor with a QC check gas of known concentration (effective concentration for open path monitors) between the prescribed range of 0.005 and 0.08 parts per million (ppm) for SO₂, NO₂, and O₃, and between the prescribed range of 0.5 and

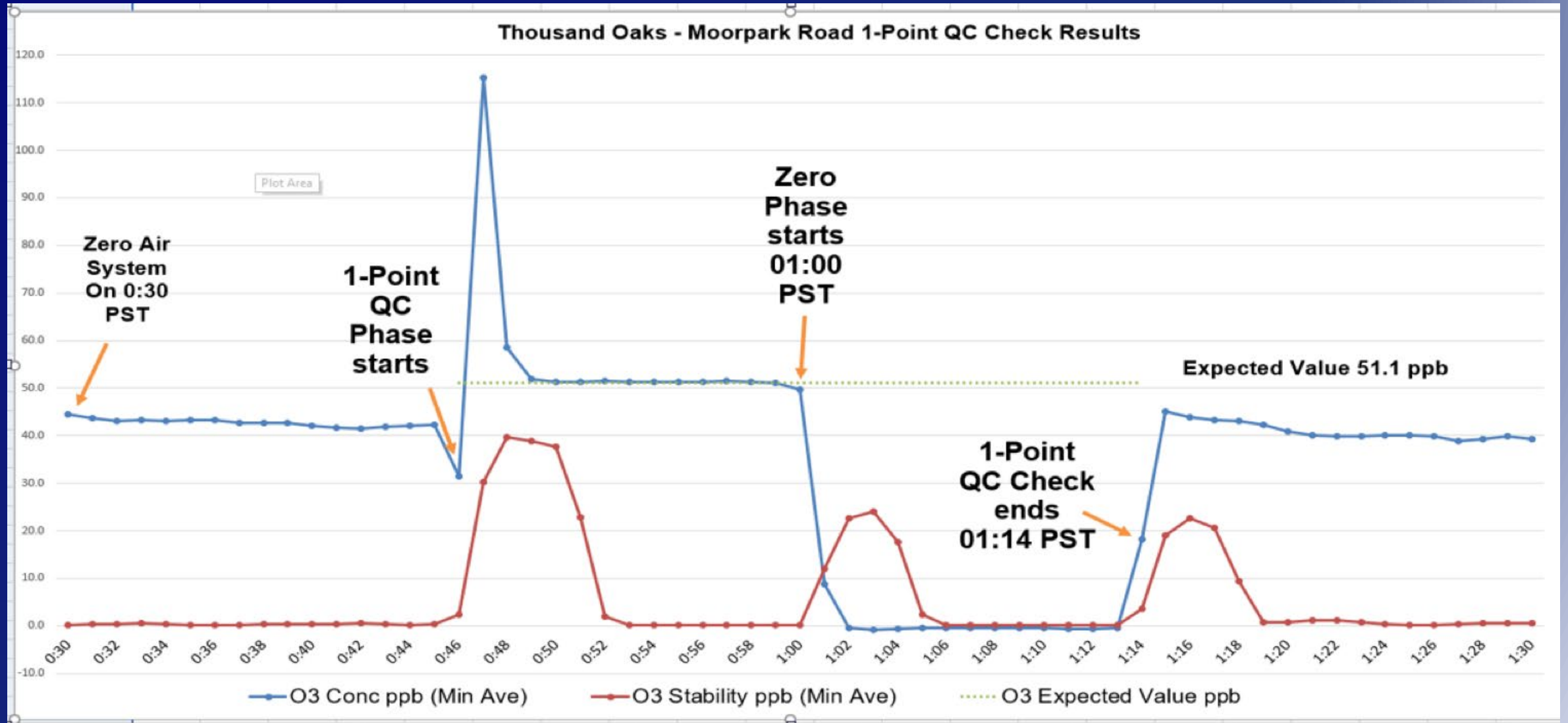
QC Check Example

- Can save QC check hour for O₃ only sites
- Equipment must stabilize quickly
- Timing critical and must steal from consecutive hours
- Contributes to increased data completeness

Timeline Details

- 00:46 Data logger triggers calibrator – hour is valid
- O₃ output is 51.1 ppb
- 00:53 O₃ is stable (7 minutes)
- 00:59 data logger records value (avg last 5 minutes)
- 01:00 Zero phase begins
- 01:06 Zero is stable
- 01:13 data logger records value (avg last 5 minutes)
- 01:14 One point QC check ends
- Time lost
 - 14 min first hour
 - 14 min second hour
- Both hours are valid

QC Check One-Minute Graph



Data Completeness Report (AMP 430)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AIR QUALITY SYSTEM
DATA COMPLETENESS REPORT

Mar. 19, 2019

MONITORS REPORTING

DATE RANGE: JAN. 01, 2018 THRU DEC. 31, 2018
REGION: (09) SAN FRANCISCO
STATE: California

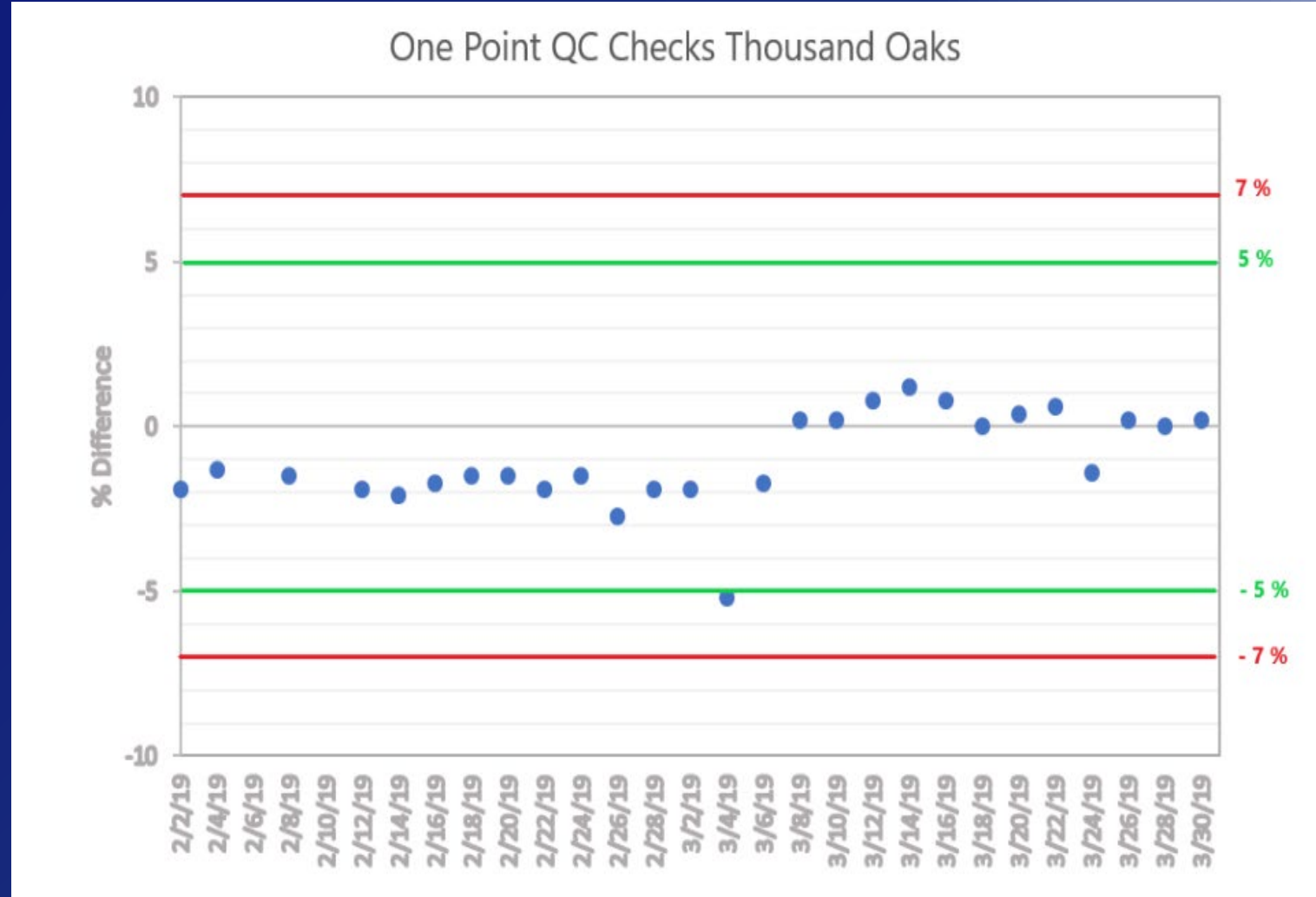
REP ORG: Ventura County APCD
MONITOR TYPE: SLAMS

SITE ID CITY ADDRESS	PARAMETER	POC	DURATION METHOD	OBSERVATIONS												YEAR
				NUMBER / PERCENT												
				JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
06-111-0007 Thousand Oaks 2323 Moorpark Road, Thousand Oaks, CA 91360	44201 Ozone	1	1 087	743 100%	669 100%	744 100%	713 99%	740 99%	720 100%	744 100%	744 100%	720 100%	743 100%	720 100%	744 100%	8744 100%
06-111-0007 Thousand Oaks 2323 Moorpark Road, Thousand Oaks, CA 91360	88101 PM2.5 - Local Conditions	3	1 170	742 100%	569 85%	742 100%	717 100%	738 99%	698 97%	742 100%	741 100%	718 100%	741 100%	716 99%	740 99%	8604 98%
06-111-0009 Piru	44201 Ozone	1	1 087	713 96%	644 96%	713 96%	659 92%	711 96%	689 96%	710 95%	713 96%	690 96%	710 95%	684 95%	713 96%	8349 95%



At the Office

- Review cal report
- < 7% OK and data valid
- < 5% & 1-min graph stable
no action required
- > 5% - analyzer requires
action
- > 7% - Action required –
expect to invalidate data



Daily Calibration Report (VCAPCD)



Calibration Report

07-Apr-2019

<u>Site</u>	<u>Parameter</u>	<u>Sequence</u>	<u>Phase</u>	<u>Start Time</u>	<u>End Time</u>	<u>Value</u>	<u>Expected Value</u>	<u>Error</u>	
El Rio-Rio Mesa School #2	O3	PRECTEST	O3PREC	07-Apr-2019	00:46:00	02:05:18	49.5	50.9	2.67
			ZERO	07-Apr-2019	00:46:00	02:13:24	0.4	0	.41
Ojai-Ojai Avenue		O3PREC	O3PREC	07-Apr-2019	00:46:00	01:16:04	52.5	53.4	1.5
			O3ZERO	07-Apr-2019	00:46:00	01:31:08	-0.4	0	-.46
Piru-Pacific Avenue			O3PREC	07-Apr-2019	00:46:00	01:16:03	51.8	53.2	-1.44
			O3ZERO	07-Apr-2019	00:46:00	01:31:06	-0.2	0	-.23
Simi Valley-Cochran Street		PRECTEST	O3PREC	07-Apr-2019	00:46:00	02:01:19	51.3	52.2	-.81
			ZERO	07-Apr-2019	00:46:00	02:13:25	-0.3	0	-.35
Thousand Oaks-Moorpark Road		O3PREC	O3PREC	07-Apr-2019	01:00:0	51.2	51.1	.12	
			O3ZERO	07-Apr-2019	00:46:00	01:14:06	-0.4	0	-.42

Valid vs Invalid QC Checks for AQS Reporting

- EPA Air Monitoring Technology Information Center (AMTIC) memo



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711
OFFICE OF AIR QUALITY PLANNING AND STANDARDS

Steps to Qualify or Validate Data after an Exceedance of Critical Criteria Checks

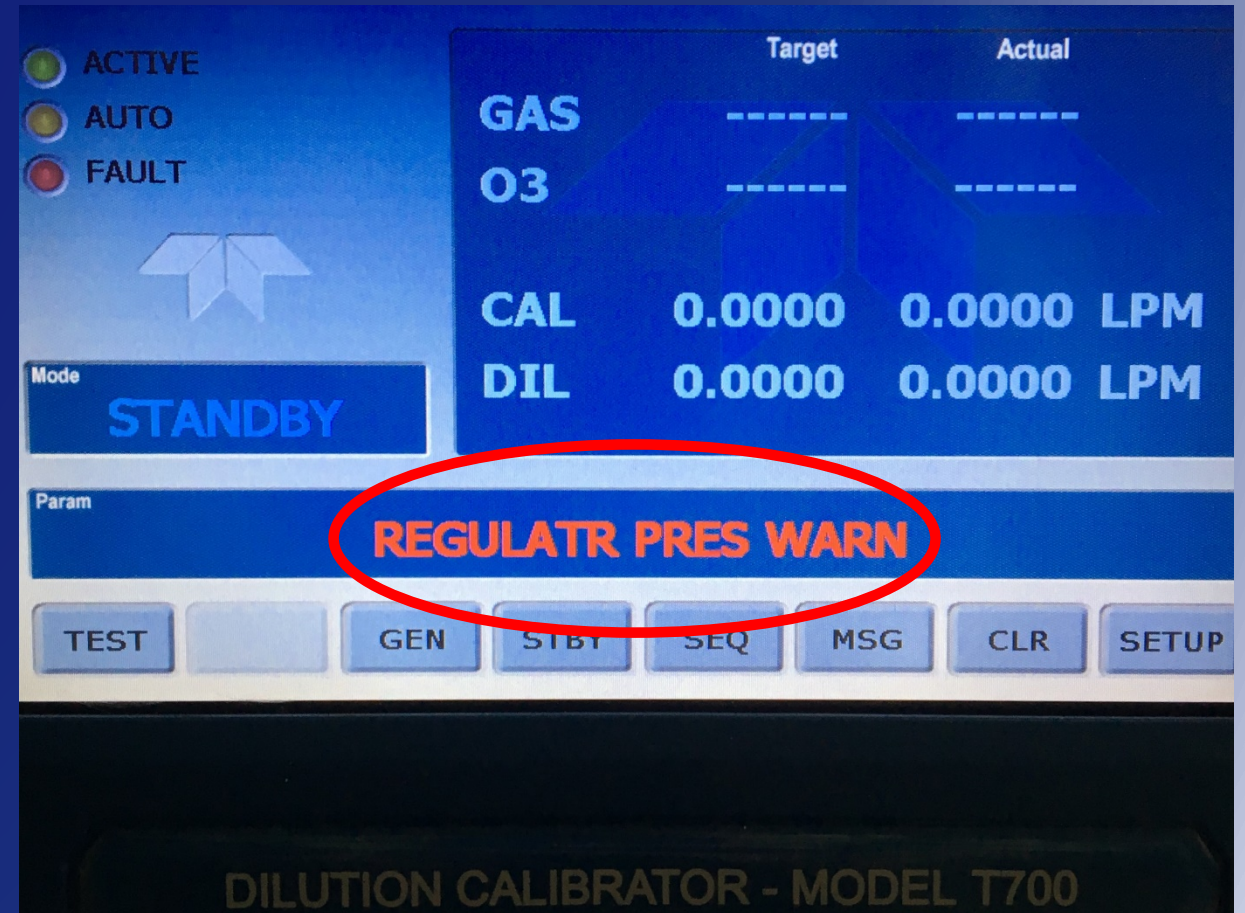
1/30/2018

https://www.epa.gov/sites/production/files/2018-01/documents/critical_criteria_qualifier_memo_v1_0.pdf



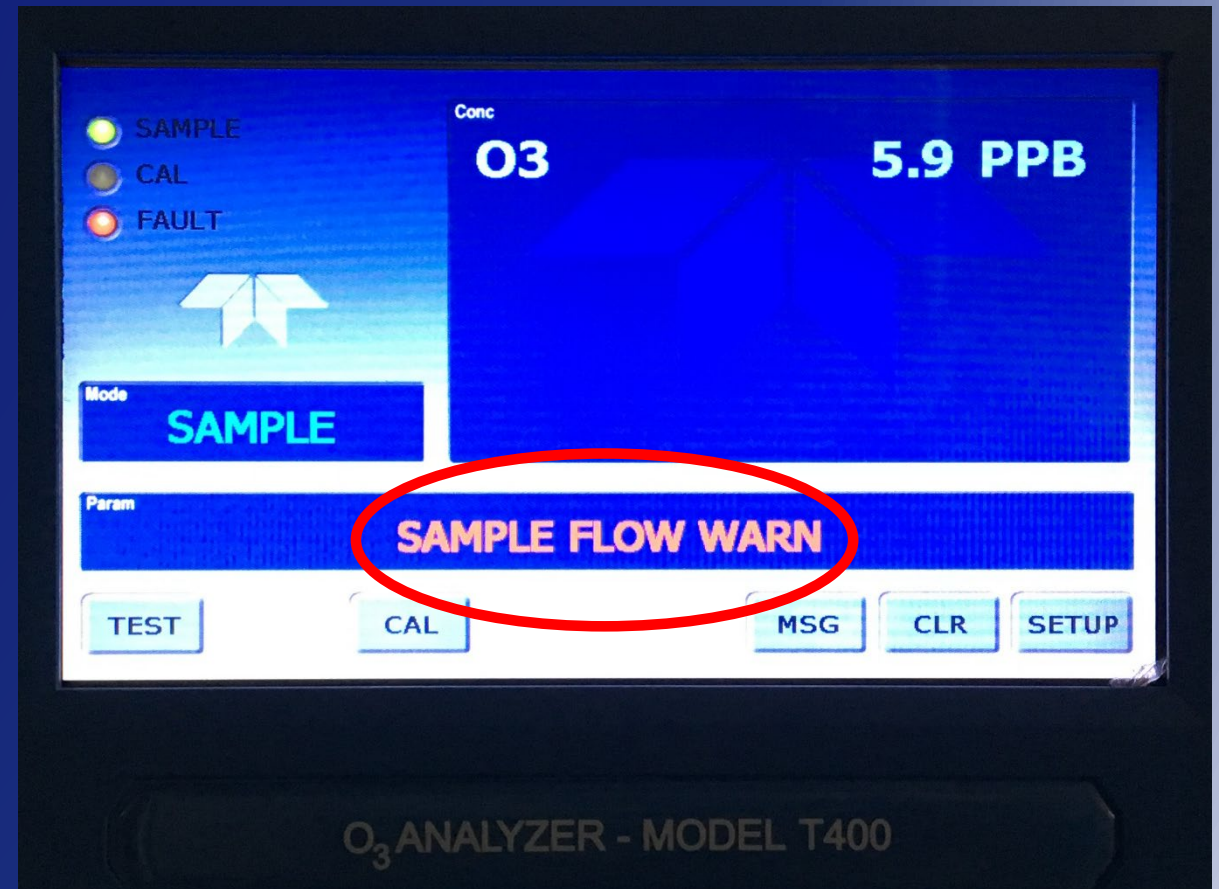
Invalid QC Check

- Calibration system failure therefore test concentration not accurate
- Compelling evidence data is valid
 - Obvious zero air system failure
- QC check reported to AQS with “1C” null code
- 1C code tells AQS that QC check occurred for completeness



Valid QC Check

- Calibration system ok and test concentration accurate
- QC check exceeds criteria
- Analyzer needs repair or adjustment
- Routine data invalidated
- QC check reported but NOT used for precision & bias statistics



Discussion about Decimals

- Previously VCAPCD used no decimals (ppb) for one point QC checks
- Zero decimals in ppb creates report with little variation
- Most VCAPCD checks reported 0 or +/- 1.9%
 - Checks were accurate and within EPA regulations
- Many zeros or repeated values look questionable
- Changes implemented during scheduled calibrations
 - Required extra staff time correcting reports and some logger issues

Raw Monitor Assessment Report (AMP 251)

no decimals

Method	Assess Date	Number	Assess Conc.	Monitor Conc.	% Diff	Unit Abbr.
087	2018-07-21	1	53	53	0	ppb
087	2018-07-23	1	53	53	0	ppb
087	2018-07-25	1	53	53	0	ppb
087	2018-07-27	1	53	53	0	ppb
087	2018-07-29	1	53	53	0	ppb
087	2018-07-31	1	53	53	0	ppb
087	2018-08-02	1	53	53	0	ppb
087	2018-08-04	1	53	53	0	ppb
087	2018-08-06	1	53	53	0	ppb
087	2018-08-08	1	53	53	0	ppb
087	2018-08-10	1	53	53	0	ppb
087	2018-08-12	1	53	53	0	ppb
087	2018-08-14	1	53	53	0	ppb
087	2018-08-16	1	53	53	0	ppb
087	2018-08-18	1	53	53	0	ppb
087	2018-08-20	1	53	53	0	ppb
087	2018-08-22	1	53	53	0	ppb
087	2018-08-24	1	53	53	0	ppb
087	2018-08-26	1	53	53	0	ppb
087	2018-08-28	1	53	53	0	ppb
087	2018-08-30	1	53	53	0	ppb

with decimals

Method	Assess Date	Number	Assess Conc.	Monitor Conc.	% Diff	Unit Abbr.
087	2019-02-16	1	53	53.2	0.4	ppb
087	2019-02-18	1	53	54.1	2.1	ppb
087	2019-02-20	1	53	53.4	0.8	ppb
087	2019-02-22	1	53	53.8	1.5	ppb
087	2019-02-24	1	52	53.3	2.5	ppb
087	2019-02-26	1	52	53	1.9	ppb
087	2019-02-28	1	52	52.9	1.7	ppb
087	2019-03-02	1	52	52.8	1.5	ppb
087	2019-03-04	1	52	53.3	2.5	ppb
087	2019-03-08	1	52	53.2	2.3	ppb
087	2019-03-10	1	52.2	51.5	-1.3	ppb
087	2019-03-12	1	52.2	51.4	-1.5	ppb
087	2019-03-14	1	52.2	51.8	-0.8	ppb
087	2019-03-16	1	52.2	52	-0.4	ppb
087	2019-03-18	1	52.2	51.9	-0.6	ppb
087	2019-03-20	1	52.2	51.2	-1.9	ppb
087	2019-03-22	1	52.2	51.2	-1.9	ppb
087	2019-03-24	1	52.2	51	-2.3	ppb
087	2019-03-26	1	52.2	52	-0.4	ppb
087	2019-03-28	1	52.2	51.5	-1.3	ppb
087	2019-03-30	1	52.2	51.5	-1.3	ppb

QA Handbook

EPA suggests reporting more decimals

QA Handbook Vol II
Section 14.0, Page 11
of 16

occur, monitoring organizations should review CFR for the specifics of this requirement.

The AQS manuals are located at the AQS Website⁹. The AQS Data Coding Manual replaces the previous Volume II and provides coding instructions, edits performed, and system error messages. The AQS User Guide replaces the former Volume III and describes the procedures for data entry. Both manuals will be updated as needed and the new versions will be available on the website. Table 14-1 provides the units and the number of decimal places that, at a minimum, are required for reporting to AQS for the ambient air concentrations for criteria pollutants. These decimal places are used for comparison to the NAAQS and are displayed in AQS summary reports. However, AQS has been revised to allow monitoring organizations can report data up to 30 values to the right of the decimal and it is suggested that monitoring organization take advantage of reporting to more decimal places than required in Table 14-1.

For QA/QC data reported to AQS, it is suggested that more decimals than those required in Table 14-1 be reported.

Table 14-1 AQS Data Reporting Requirements

Pollutant	Units	Decimal Places	Example	Minimum reporting requirement (as described in 40 CFR Part 50)
PM _{2.5}	µg/m ³	1	10.2	shall be reported to AQS in micrograms per cubic meter (µg/m ³) to one decimal place, with additional digits to the right being truncated (App. N)
PM ₁₀	µg/m ³	1	26.2	<i>No description found</i>
Lead (Pb) TSP and PB-PM ₁₀	µg/m ³	3	1.525	Pb-TSP and Pb-PM ₁₀ measurement data are reported to AQS in units of micrograms per cubic meter (µg/m ³) at local conditions (local temperature and pressure, LC) to three decimal places; any additional digits to the right of the third decimal place are truncated (App. R).
O ₃	ppm	3	0.108	Hourly average concentrations shall be reported in parts per million (ppm) to the third decimal place, with additional digits to the right of the third decimal place truncated (App. P).

Summary of Critical Criteria for O₃ One Pt QC Check

- Frequency – Every 14 days
 - More frequent checks will reduce data invalidation
- Percent difference must be < 7 %
 - Operational action level around 5% will reduce crisis visits
- O₃ range must be 5 to 80 ppb
 - Recommend using typical daily concentration if not too low