UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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OFFICE OF AIR QUALITY PLANNING AND STANDARDS

Technical Note- Alternative to Calibration Procedures Described in NO2, SO2 and CO Methods

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Summary

The following technical note allows monitoring organizations to calibrate using a calibration scale based on ambient air concentrations rather than calibrate across the full scale of a monitor when performing a calibration.

Background

As methods used in our ambient air monitoring programs improve in sensitivity, precision and bias, and as pollutant concentrations -continue to decrease, it becomes beneficial to calibrate ambient air monitoring instruments at lower concentrations so that more of the calibration points represent ambient air concentrations.

Monitoring organizations have solicited EPA to allow for calibrations at concentrations other than at "full scale", which is a term used in some of the ambient air monitoring methods in 40 CFR Part 50.

In section 12 of the 2017 QA Handbook[1], EPA explained, as seen below, the use of a new term called "calibration scale" and how it differs from calibration at full scale.

> *Full Scale versus Calibration Scale*
>
> *Many older documents and some of the CFR reference methods refer to calibration at "full scale". The interpretation of this meant that monitoring organizations would calibrate to full scale of one of the FRM/FEM approved operating ranges of the instrument. For example, ozone instruments are approved at 0-500 ppb or 0-1000 ppb. Many monitoring organizations calibrate the instrument by evenly spacing four upscale points up to around 500 ppb (if that is the operating range they are using). In this scenario, with most sites reading less than 80 ppb, the majority of the upscale calibration points would be at levels not measured in ambient conditions. EPA suggests monitoring organization calibrate using points that are more applicable to the concentrations found in their networks while still being protective of concentrations exceeding the NAAQS. For example, an ozone analyzer may be calibrated on a 0-150 ppb scale, as opposed to 0-500 ppb. For convenience, EPA will use the term "calibration scale" to refer to the concentration range used for calibrating the monitoring instruments. Section 10.4 of this Handbook provides more details on this concept and process.*

[1] QA Handbook for Air Pollution Measurement Systems Volume II https://www3.epa.gov/ttn/amtic/qalist.html

Section 10.4 of the QA Handbook also provides examples of how monitoring organizations can develop the calibration scale for their instruments based on the ambient air concentrations in their network.

In 2015, the ozone method (40 CFR part 50 Appendix D) was revised by EPA's Office of Air Quality Planning and Standards (OAQPS), and EPA's Office of Research and Development (ORD). They included the term calibration scale in this revision and is based on guidance found in sections 10 and 12 of the QA Handbook. OAQPS/ORD plan to include use of the term calibration scale when they have the opportunity to revise the CO, SO_2 and NO_2 gaseous pollutant methods.

EPA provided the QA Handbook guidance with the assumption that monitoring organization could use this alternative calibration technique. In fact, this alternative approach is strongly encouraged as it will help ensure air monitors are calibrated and accurate at the concentrations normally seen in the local environment. It will also help State and local Agencies meet the concentrations prescribed in 40 CFR Part 58, Appendix A (3.1.2.1); the annual performance evaluation audit requirements. This technical note reinforces the QA Handbook guidance that allows monitoring organizations to develop calibration scales for the criteria pollutants.