

## An update on the WMO CO X2014A scale

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With the release of the WMO CO X2014A scale revision, NOAA changed the method of maintaining the WMO CO in air scale. Previous scales were defined by repeated gravimetric sets made every 4-6 years. With X2014A, we maintain a single set of primary standards and all calibrations since January 2011 are traceable to this single set. This is more consistent with how other calibration scales are maintained by NOAA. However, the lack of stability of CO standards in high pressure aluminium cylinders means we had to develop a method for evaluating drift in the primary standards. We use an internal tracer technique to monitor the slow growth of CO in the primary standards. Percent-level gravimetric mixtures of CO and CH<sub>4</sub> in air are used as “parent” tanks. We assume growth of CO has no significant impact on the gravimetrically determined CO:CH<sub>4</sub> ratio. Static dilutions from these parent tanks were made to create suits of standards with CO covering the range of interest (30 – 1000 nmol mol<sup>-1</sup>). CH<sub>4</sub> in these daughter products is measured and CO is calculated using the known CO:CH<sub>4</sub> ratio of the parent. The parents are considered stable and by making fresh daughter standards periodically, we can determine the growth rate of CO in the primary standards.

At GGMT-2015 we described the internal tracer method, and the X2014A scale revision was released shortly thereafter. We have continued measuring the primary standards twice per year using the internal tracer technique since then. At the time of the X2014A scale revision we felt the applied drift rates were probably too high. Subsequent measurements since 2015 have confirmed this. While still data limited, current best estimates of drift rates are approximately 0.1 – 0.2 nmol mol<sup>-1</sup> yr<sup>-1</sup> lower than the X2014A assignments. We present an update on the most recent determinations of the drift rates in the CO primary standards, implications for the WMO CO scale, and future plans to ensure scale stability.