

Technical Note No. 006

Baseline Stability for the Model 205 Ozone Monitor

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Author: John Birks

Question Addressed

Accurate measurements of ozone concentration require measurements of the instrument “zero” in which the apparent ozone concentration is measured in ozone-scrubbed air. It is desirable that the zero drift be small so that correction for the zero offset need not be frequent. The following data were obtained with a Model 205 Ozone Monitor in order to assess its baseline stability.

Experimental

The inlet of a Model 205 Ozone Monitor was attached to a calibration manifold where it sampled air with and without ozone as follows:

- 1) Ozone-scrubbed ambient air (1.1 hours)
- 2) High ozone concentration (not a constant source), 1.1 hours
- 3) Ozone-scrubbed ambient air (1.1 hours)
- 4) Ambient air (1.7 hour)
- 5) Ozone-scrubbed ambient air (2.4 hours)

Results

The results are graphed in the figure shown below. The data set includes zero data before exposure to a high ozone concentration of 270-300 ppb (First Zero), immediately after exposure to high ozone (Second Zero), and immediately after exposure to room air (Third Zero). Linear regression was applied to the First, Second and Third Zero to obtain the degree of degree of baseline drift in ppb/hr. As can be seen in the following summary, the absolute value of the drift was always less than 0.34 ppb /hour, and the precision averaged 1.0 ppb without any detrending of the data to account for drift. There was no significant effect on the instrument of exposure to high ozone concentration or exposure to ambient air.

Measured Ozone Trends (Drift) and Precisions

	Drift	Precision (1σ)
First zero	-0.34 ppb/hr	1.10
Second zero	+0.29 ppb/hr	0.96
Third zero	+0.29 ppb/hr	1.04

Model 205 Drift Experiment

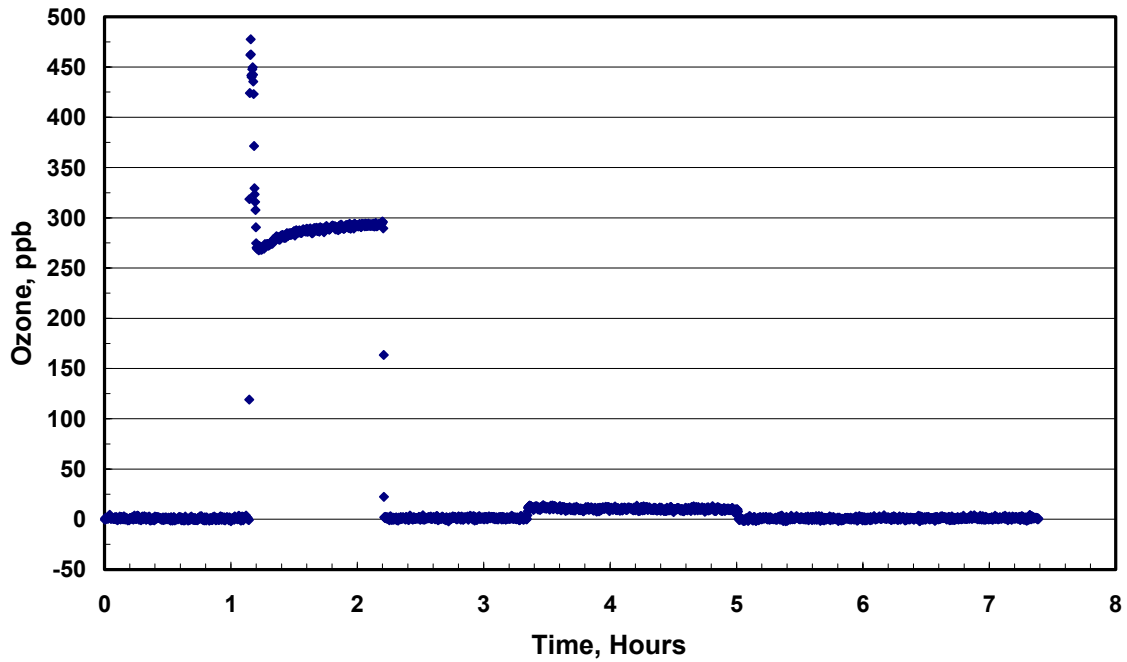


Fig. 1. Ozone data plotted full scale showing the exposure to high ozone concentration.

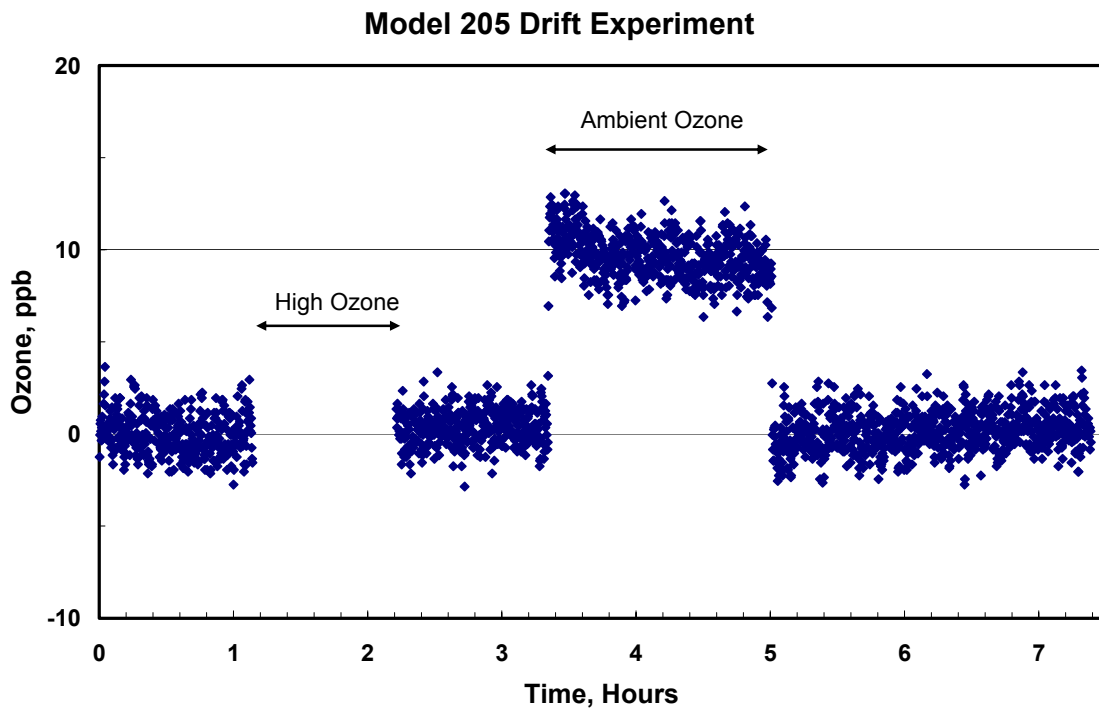


Fig. 2. Ozone data plotted on an expanded scale.

Conclusions

Over the 7.4-hour period tested, the Model 205 Ozone Monitor exhibited an overall zero drift of much less than 1 ppbv. Exposures to high ozone concentrations and to ambient air had no significant effect on the instrument baseline.