We would like to clarify comments we made in our previous submissions to CASAC. Both high and low end concentrations move towards midrange levels at many O₃ monitoring sites as emissions are reduced in the U.S. This phenomenon is not an artifact of modeling or merely a theoretical expectation, it has been observed empirically.

Toward the end of Dr. Lefohn’s May 28, 2014 testimony to CASAC, he stated the following:

The Agency's air quality model predictions show the low end coming up and the high end coming down, both meeting in the middle. The phenomenon is real and is described in Lefohn et al. (1998), Lefohn et al. (2010), and Oltmans et al. (2013). The middle concentrations are heavily influenced by background, whose effect on risk estimates becomes even more important as the standard is lowered.

As noted in our written comments, EPA concluded in the HREA and PA that mortality and morbidity risks showed little change when existing or alternative levels of the standard were met. During its deliberations on May 28, 2014 on the teleconference call, several CASAC members mentioned that they believed that the predictions from the EPA’s air quality model that showed the lower concentrations shifting toward the mid-level values were associated with the assumptions built into the model. Several CASAC members hypothesized that if alternative assumptions were used in the air quality model, the concentrations in the lower part of the distribution would not shift upward but rather might remain at their current levels or perhaps even move downward, with the result that the health risk estimates would then show greater benefits if the O₃ standard were lowered from the current value of 0.075 ppm.

However, results published in the peer-reviewed literature illustrate how distributions of O₃ concentrations change as emissions are reduced under real world ambient conditions. Lefohn et al. (1998) noted that as O₃ levels improved (i.e., the environment experienced lower O₃ exposures) due to reduced emissions, the high hourly average concentrations shifted toward the mid-range as did the lower concentrations. Under real-world ambient conditions, the reduction in the number of low hourly average O₃ concentrations was associated with lack of NOₓ scavenging (US EPA, 1996). Several investigators (Oltmans et al., 2006; Lefohn et al., 2008; Oltmans et al., 2008; Lefohn et al., 2010; Oltmans et al., 2013) have reported trending results,
using ambient hourly average concentrations across O₃ monitoring sites in the U.S., that showed
shifts in the distribution over time, where both the high and the low ends of the distributions of
O₃ concentrations shifted toward the mid-level values. Similar observations have been reported
for European sites (Oltmans et al., 2013). Figs. 1-3 from Lefohn et al. (2010) illustrate the
concentration shifts by month for O₃ monitoring sites across the U.S.

Fig. 1. Actual distribution changes by month for a monitoring site located in San
Bernardino County, California (AQS 060710005) for 1994-2008 for the months with
statistically significant changes. (Source: Lefohn et al., 2010).
Fig. 2. Actual distribution changes by month for a monitoring site located in Fulton County, GA (AQS 131210055) for 1994-2008 for the months with statistically significant changes. (Source: Lefohn et al., 2010).

Fig. 3. Actual distribution of changes by month for a monitoring site located in Bristol County, MA (AQS 250051002) for 1994-2008 for the months with statistically significant changes. (Source: Lefohn et al., 2010).
EPA’s air quality modeling results showing the low end of the distribution shifting toward the mid-level concentrations as emission controls are implemented agree with trending observations reported in the peer-reviewed literature. The phenomenon occurs in the real world and is not an artifact associated with EPA’s modeling assumptions.

As noted in the HREA, with respect to changes in the distribution of O₃ concentrations as a function of emission reductions, the risk metrics used in the HREA were influenced by how the distribution of O₃ concentrations change (HREA, page 9-32). Information in the HREA and PA clearly illustrate that mortality and morbidity risks showed little change when existing or alternative levels of the standard were met and that most of the estimated risk was associated with background O₃ concentrations.

References


