Comments on US EPA's Review of the Primary National Ambient Air Quality Standard for Sulfur Oxides: Risk and Exposure Assessment Planning Document

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Thank you for the opportunity to speak on behalf of the American Petroleum Institute. The Risk and Exposure Assessment Planning Document (REA-PD) presents a good approach for conducting an assessment of sulfur dioxide (SO_2), but there are two areas that should be modified or expanded. As described below, the REA should only focus on health benchmarks at exposures of 200 parts per billion (ppb) and higher. Second, the REA should evaluate a broad set of options for the averaging time, level, and form of the primary SO_2 standard.

The REA-PD indicates that health benchmarks of 100, 200, 300, and 400 ppb will be evaluated in the REA, but evidence, particularly from controlled exposure studies, indicates that respiratory effects are not likely to occur below 200 ppb in healthy or asthmatic individuals. Also, the only available controlled human exposure studies that evaluated exposures below 200 ppb were conducted using mouthpieces, which can cause breathing alterations, and do not reflect the typical mixture of nasal, oral, and oronasal breathing patterns in humans (Johns *et al*., 2011). These studies do not adequately simulate the amount of SO_2 reaching the lungs under normal breathing conditions. In addition, people with moderate or severe asthma are not likely to achieve the level of exercise in controlled exposure studies.

I also note that there is no evidence that exposures at 100 ppb will lead to adverse health effects, and all available data for these exposures are associated with a high degree of uncertainty. Thus, the REA should focus on benchmarks of 200 ppb and above. In addition, all risk estimates should be accompanied by thorough quantitative and qualitative assessments of uncertainty and variability.

As for my second point, the REA-PD states that the expanded 5-minute SO_2 monitoring dataset could allow for a better characterization of exposures and risks. Controlled human exposure studies have demonstrated that 5-10 minute SO_2 exposures may cause respiratory effects, and therefore the 2009 REA focused on whether the existing 24-hour standard and other alternative standards could adequately protect public health from 5-10 minute exposures. This assessment was partly based on exposure and risk assessments conducted using the 5-minute monitoring data available at that time. The 2009 REA also evaluated the 98th percentile and 99th percentile as alternative forms for a 1-hour standard that was primarily based on an analysis using available 5-minute SO_2 monitoring data.

The current primary SO_2 NAAQS is the 3-year average of the 99th percentile 1-hour daily maximum SO_2 concentration. The averaging time and form of this standard were chosen in part based on analyses conducted using 5-minute SO_2 monitoring data from 98 sites; however, there are now 380 sites with 5-minute SO_2 monitoring data. This expanded dataset should provide further information on short-term SO_2 exposure peaks that might be experienced throughout the US. Using these new data, the forthcoming REA should re-evaluate the continued need for the current standard, the adequacy of various averaging times, including 8 and 24 hours, and the form, with a particular focus on the 98th percentile.

In conclusion, the REA-PD presents a good approach for conducting an assessment of SO_2. However, the REA should only focus on health benchmarks at 200 ppb or higher, and it should re-evaluate the averaging time and form of the primary SO_2 standard, with a focus on longer averaging times and a 98th percentile form.

References

Johns, DO; Linn, WS. 2011. "A review of controlled human SO_2 exposure studies contributing to the US EPA integrated science assessment for sulfur oxides." *Inhal. Toxicol.* 23(1):33-43. doi: 10.3109/08958378.2010.539290.