Policy Assessment for the Review of the Primary National Ambient Air Quality Standard (NAAQS) for Sulfur Oxides, External Review Draft

Staff from the
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency

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Clean Air Scientific Advisory Committee

Purpose of the Policy Assessment (PA) and Schedule for the Current Review

Purpose of the PA

- The PA provides staff evaluations to help bridge the gap between the relevant scientific information and assessments and the judgments required of the EPA Administrator in determining whether to retain or revise the current standard.

NAAQS Review Schedule

- In March 2017, we met with the CASAC to discuss the 2nd draft ISA and the REA Planning Document
- The final ISA is to be released by December 2017*
- The final REA and PA will reflect consideration of the CASAC's advice and public comment
- The notice of proposed rulemaking is to be signed by May 25, 2018*
- The notice of final rulemaking is to be signed by January 28, 2019*

* These dates are specified by a court-ordered schedule.

Overarching Policy Relevant Question for the PA

- Staff evaluation in the draft PA is focused on consideration of the following overarching question:
  - **Do the currently available scientific evidence and exposure/risk-based information, as reflected in the ISA and REA, support or call into question the adequacy of the protection afforded by the current primary SO_2 standard?**
    - Current standard is 75 ppb in terms of a 3-year average of the 99th percentile of daily maximum 1-hour SO_2 concentrations
    - In reviews where staff concludes – and CASAC agrees – that the currently available information calls into question the current standard, a second draft PA then considers alternative standards

Policy Relevant Questions: Health Effects Evidence

- With regard to the currently available scientific evidence, the draft PA addresses the overarching question by considering a series of specific questions, including:
  - Importance of SO_X other than SO_2 with regard to abundance in ambient air, and potential for human exposures and health effects
  - Health effects associated with exposure to SO_2
  - At-risk populations
  - Exposure duration and concentrations associated with health effects
  - Important uncertainties, new or remaining from the last review
  - Size of at-risk populations and their distribution in the U.S.

Health Effects Evidence: Overview

- The health effects evidence is consistent with that in the last review
  - Causal relationship between short-term SO_2 exposure and respiratory effects
  - Strongest evidence comes primarily from controlled human exposure studies, although epidemiologic studies also support an association between short-term SO_2 exposures and hospital admissions and emergency department visits
  - Key effects are lung function decrements and respiratory symptoms in people with asthma exposed to SO_2 for 5 to 10 minutes at elevated breathing rates
    - Strong evidence for concentrations at and above 200 ppb, limited information at lower concentrations
  - At-risk population is people with asthma, particularly children with asthma
    - ~8% of U.S. population has asthma, with much higher rates in some population groups
  - Uncertainties still remain from the last review regarding the population groups with asthma that may be at greatest risk and the extent of effects at low concentrations

Policy Relevant Questions: Exposure/Risk Information

- With regard to the current draft quantitative analysis of estimated population exposure and risk, the draft PA addresses the overarching question by considering a series of specific questions:
  - Magnitude of population exposure and risk estimated in different types of study areas under conditions just meeting the current standard; and portion of the at-risk populations estimated to be affected
  - Key uncertainties associated with exposure/risk estimates
  - Public health importance of estimated exposures and risk for at-risk populations under conditions just meeting the current standard

Exposure/Risk Information: Overview

- Across all study areas and all three years of analysis period:
  - No one in any at-risk population estimated to experience a day with 5-minute exposures at or above 300 ppb. Less than 1% of children with asthma estimated to experience a day at or above 200 ppb.
  - Less than 1% for sRaw increase of at least 200%. Less than 2% of children with asthma estimated to experience a day with sRaw increase of at least 100%.
- Among key uncertainties are the fine scale temporal and spatial pattern of SO_2 concentrations in ambient air in locations just meeting the standard, lung function risk estimates for exposure concentrations below those studied, and potential for effects in population groups and at exposures not studied.
- While there are differences between 2009 REA and current analyses, the current exposure/risk estimates for conditions just meeting the current standard are generally consistent with those considered when the standard was set, indicating a level of protection consistent with the 2010 decision.

Preliminary Staff Conclusions

- Health effects evidence newly available in this review is generally consistent with evidence base in last review.
- Exposure and risk estimates for air quality conditions just meeting the current standard generally reflect the ranges of estimated exposures and risks from the last review.
- Preliminary staff conclusion is that the available evidence and quantitative information, including uncertainties, do not call into question the adequacy of protection provided by the current standard, and thus, support consideration of retaining the current standard, without revision.
- Accordingly, the draft PA does not identify alternative standards for further evaluation.

Key Uncertainties and Areas for Future Research

- Limitations in available data that affect ability to capture fine scale spatial and temporal pattern of SO_2 concentrations in ambient air
- Extent of effects and shape of exposure-response relationship at lower 5-minute exposure concentrations (i.e., below 200 ppb)
- Potential for greater risk in some population groups with asthma for which evidence is limited or lacking (e.g., young children and people with more severe asthma)
  - Factors contributing to susceptibility in SO_2-responding individuals
- Variation in potential population exposure circumstances across the U.S. (related to living and/or exercising in an area with elevated SO_2 concentrations, e.g., near a source)