

Comments on EPA's 2ND Draft SO₂ REA

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on behalf of the
American Chemistry Council

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SO₂ REA Proposes to:

- ▶ Add a new 1-hr standard
- ▶ Set lower boundaries for 1-hour standard based on observational epidemiological studies (see REA Tables 5-1 through 5-5)
 - ▶ Wilson et al. 2005
 - ▶ NYDOH 2006
 - ▶ Ito et al. 2006
 - ▶ Schwartz 1995.

General Comments

- ▶ Four studies all showed generally low RRs (range of 1.07-1.20 associated with IQR or 20 ppb increase in SO₂); very likely to have publication bias; not known how many other studies showed no association with SO₂
- ▶ Any standard setting should be considered within framework of entire SO₂ literature, not selectively chosen few studies at low exposure levels
- ▶ Has been suggested that ambient SO₂ measurements are better surrogate for PM_{2.5} than personal exposure to SO₂; confounding by PM_{2.5} may be real concern in observational studies of SO₂

Wilson et al. 2005

- ▶ Hospital ED visits in two cities for all respiratory and asthma symptoms
- ▶ Important study because it had a 99 percentile exposure of 47 ppb; basis for the proposed lower level of 50 ppb for SO₂ 1-hour standard
- ▶ Only one of two cities assessed (Portland ME) had statistically significant elevated RR
- ▶ Single pollutant models did not control for PM or for NO₂; Portland had generally higher PM_{2.5} levels associated with high SO₂

Wilson et al. 2005 (continued)

- ▶ Authors claim that smaller population of Manchester may account for lack of statistically significant RR disputed by the fact that it had more years of study (21 quarters vs. 13 quarters of data for Portland) and also the CIs for the Manchester study were much tighter than for Portland
- ▶ Figure 6 does not suggest that exposure-response relationship is linear; in fact, appears to be a definite turning downwards in response at higher exposure levels
- ▶ Authors noted that “the effects seen in this analysis may be due in part or entirely to $PM_{2.5}$ ”

NYDOH 2006

- ▶ ED visits for asthma in two NY locations (the Bronx and Manhattan)
- ▶ Statistically significant RR in the Bronx but not in Manhattan in single and multi-pollutant models considering O₃, NO₂, and PM_{2.5}
- ▶ Authors state that high correlations between pollutants make it difficult to confidently identify critical components

Ito et al. 2007

- ▶ Paper is not a study of SO₂ but rather is primarily concerned with multi-collinearity among air pollution and weather variables; analysis of SO₂ and other covariates treated as an example to explore this issue
- ▶ RR for asthma ED visits in NYC elevated in single pollutant model; loses statistical significance in multi-pollutant model with NO₂

Schwartz 1995

- ▶ Hospital admissions for respiratory disease in two cities, New Haven CT and Tacoma WA
- ▶ RR statistically significant in single pollutant models in both cities but in both cities loses significance in some multi-pollutant models with PM_{10} and O_3
- ▶ Study conducted in 1995 using older methods
 - ▶ Used 19 day moving average to control for temporal trends; newer methods use spline smoothing
 - ▶ Study completed before problems with GAM S+ convergence issues were recognized

Conclusions

- ▶ Four epidemiological studies relied upon by EPA in proposing levels for new 1-hour standard far from persuasive
- ▶ Studies marked by inconsistencies and omissions
- ▶ Full range of information on SO₂ not considered by EPA
- ▶ Recommend that EPA reevaluate basis for new SO₂ 1-hour standard