Review of the Ozone NAAQS: Scope and Methods Plan for Health Risk and Exposure Assessment

Ted Russell

The 2011 Ozone Scope and Methods for Health Risk and Exposure (S&M-Health) is largely derived from the last REA conducted for the prior ozone NAAQS review, which should lead to some efficiencies, e.g., in the application of APEX, though it means it will have some of the weaknesses as well. However, it does appear that they are ready to conduct a more comprehensive uncertainty analysis, which is good. Conducting a thorough uncertainty analysis should be a priority with the infrastructure and appropriate data being built up from the beginning. As noted, there may be limitations, but do not let those interfere with the level of analysis discussed in the S&M plan.

The air quality section notes that their analysis of current conditions will rely predominantly on the data available from AQS, which is appropriate. They note they may use non-AQS data in areas where epidemiologic studies used non-AQS data. This is fine, and little difference is expected for a pollutant such as ozone. The discussion about fusing modeled and observed data sounds like more trouble than it is worth in this case, and may actually introduce issues and require more work to show that the results are better. Similarly, it is not apparent what might be gained by the route explained (not very specifically) at the bottom of 2-2. For one, how do these manipulations conflict with how the epidemiological studies were done, or how APEX would use the data? This needs to be addressed before going down this road.

The section on using a quadratic rollback is not well explained (nor was it last time around). For one, in what independent variable is it quadratic? A diagram would help. Also, they should address how they would modify concentrations that are under the PRB with reasoning.

Use of GEOS-Chem or a similar global model is an appropriate route to take to determine PRB. However, it is imperative that an approach is identified to address known biased results (high or low). This might be a case for data fusion, i.e., to identify the degree to which the base case is biased (using more rural monitors) and how this likely suggests that the PRB should be scaled back/up. I'm of the opinion that the model is more accurately predicting the ozone formed from anthropogenic emissions than getting the transported ozone just right, so that might also suggest scaling back the PRB by the absolute amount that the simulated ozone is above/below the observations.

It was not apparent why they would use GEOS-Chem 2006-2008, but observations from 2008-2010. If GEOS-Chem results are not going to be available, state that specifically, but it would be nice to see what can be done to make the two overlap (even going to 2007-2009 has some attractiveness in terms of a direct comparison over two years, including seeing if the trends agree). Also, the discussion of methane was a bit confusing. What I take from this is that it is not possible to remove North American anthropogenic methane emissions, so there is a need to fudge this because studies shown methane emissions are of some importance in terms of global ozone. It would help if the reason for why methane is being treated the way it is was made clear.

The REA should provide some quantitative information as to the likely change in PRB levels over the next decade and discuss the implications on the potential health (and welfare) benefits over time.

I applaud their continued use of exposure modeling, and that they would appear to be ready to do more uncertainty analysis. This should be a commitment. Only three cities seems to few. Their list of twelve cities contains appropriate ones, though some prioritization would be good, and I would look first at the cities that have the highest ozone levels, with some consideration as to geographical coverage.

Spell out the name of the Detroit Study.

They should also discuss the potential use of other exposure modeling approaches and why APEX is the current choice over, say, SHEDS.

Review of the Ozone NAAQS: Scope and Methods Plan for Welfare Risk and Exposure Assessment

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The S&M-Welfare provides a reasonably thought out preliminary plan for conducting the welfare REA, though it is rather scant on details. Pages 1-8 though 1-11 identify the right type of questions. Many of my comments about the air quality characterization from the S&M-Health carry over here.

I am a bit uncomfortable with how they plan to characterize ozone in more rural areas, at least as currently presented. They note that there are fewer ozone monitors in rural areas, which is true, though ozone levels are somewhat more uniform. To deal with the lack of ozone monitors they discuss using modeled ozone (e.g., using CMAQ) along with observations to develop a fused field. Then, they are looking to use PRB fields developed by GEOS-Chem. At this point you are looking to mesh ozone "data" from three different origins. However, I would suggest that the models are best at getting the ozone production correct more than the background. Thus (as I discussed for the S&M-Health) a rational approach should be developed and tested as to how to modify the GEOS-Chem PRB using current-day observations. (I am also a bit uncomfortable in mixing years.) This could have additional significance here in that the W126 function is non-linear. Thus, staff needs to spend some time thinking about how to develop consistent "current", PRB and alternative ozone fields, and by consistent I mean that appropriately use the observations and model(s) in a way that give results that are sensible in terms of matching current conditions and respond to controls in the expected way, and have an endpoint consistent with what would be expected if North American emissions were removed. It is understood that however this is done there will be some uncertainties, but it needs to be clearly articulated and justified. While it was good to see that they are undertaking an exploratory study of ozone-elevation relationships, how this information is used adds another degree of freedom in merging the various types of information on ozone levels to get the National Ozone Exposure Surface. Again, start considering how all of this might be used, and to a degree have this inform the next ISA in terms of presenting the background (i.e., methods research) that support the likely approaches.

In regards to what the Welfare REA will look like, I trust some of the same staff that worked on the NOx-SOx secondary REA and PA are working on this one such that many of the lessons learned will get carried over. Many of the issues regarding estimating the impact on ecosystem services and its valuation would carry over. It might be good to having one of the decision similar case study areas to build up a stronger conceptual model of the welfare effects and processes in one or two areas. (I note that GSM is one of the candidates here.) Again, it would be good to provide the appropriate information in the ISA that will be critical to the REA, e.g., in the NOx-SOx review, having more information earlier on about the Ecoregions that were used in the Policy Assessment would have been useful (I realize that the approaches were more in flux, during the NOx-SOx review due to the novelty of that review).