

05-29-15 Preliminary Draft Comments from Clean Air Scientific Advisory Committee (CASAC) Oxides of Nitrogen Review Panel. These preliminary pre-meeting comments are from individual members of the Panel and do not represent CASAC consensus comments nor EPA policy. Do not cite or quote.

**Preliminary Comments from Members of the CASAC Oxides of Nitrogen Review Panel on
EPA’s Risk and Exposure Assessment Planning Document
(External Review Draft – May 2015)**

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Dr. Philip M. Fine

Chapter 2 – Air Quality and Health Benchmark Comparisons

1. Section 2.1 provides an overview of the NO₂ air quality characterization and health effect benchmark comparisons from the last review of the primary NO₂ NAAQS. To what extent is the information in this section clearly presented, and to what extent does it provide useful context for the subsequent discussions in Chapter 2?

The information in this section generally clear and provides very useful background for the following sections. The references to adjusting ambient concentrations is a little confusing without the proper background, and although it is explained in detail later in the Chapter, a little more background in this section would be useful.

2. Section 2.2 provides an overview of the information available in the current review that could inform updated analyses comparing NO₂ air quality and health effect benchmarks. Section 2.2.1 discusses the data available to inform the characterization of ambient NO₂ concentrations, including concentrations on and near roads. Section 2.2.2 provides an overview of the health information assessed in the 2nd draft ISA that could inform the identification of NO₂ health effect benchmarks in the current review.

a. To what extent does section 2.2.1 identify the most important and relevant information available to inform updated analyses of ambient NO₂ concentrations? What are the Panel's views on the extent to which this new information could reduce important uncertainties identified in the last review, particularly with regard to characterizing ambient NO₂ concentrations on or near roads?

The section provides much of the information needed, but would benefit by including additional information on available traffic count and fleet mix data, as well as historical emissions data and trends. The new information is critical for better quantifying near road impacts, since the last review had very little data available.

b. To what extent does section 2.2.2 appropriately characterize the health evidence from the 2nd draft ISA that could inform the identification of NO₂ health effect benchmarks in the current review?

The section appropriately characterizes the health evidence from the ISA.

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3. Section 2.2.3 presents staff's preliminary conclusion that updated analyses comparing ambient NO₂ concentrations to health effect benchmarks are supported in the current review, with a particular focus on updating analyses of concentrations on and near roads. What are the Panel's views on this preliminary conclusion?

The conclusion supporting an updated analyses is sound, given the new information available from near and on road monitoring. But since the health effect benchmarks proposed are much higher than current ambient levels, and given the expected further decline in emissions and ambient levels, there may be some opportunities for a more limited analysis.

4. Section 2.3 describes the technical approach staff is proposing to use in the current review for updated analyses comparing NO₂ air quality to health effect benchmarks (section 2.3.1) and presents preliminary results for a single urban study area (section 2.3.2).

a. Section 2.3.1.1 identifies the NO₂ health effect benchmarks to be evaluated, based on the ISA's assessment of the evidence for NO₂-induced increases in airway responsiveness. What are the Panel's views on these benchmarks, and on the extent to which particular benchmarks should be emphasized?

The choice of benchmarks is supported by the information presented.

b. Section 2.3.1.2 describes staff's planned approach for selecting urban study areas, based on consideration of diversity and availability of ambient monitoring data, representativeness of the highest measured daily maximum 1-hour concentrations, having large populations residing in the study area, and overall U.S. geographic coverage. What are the panel's views on these factors and their proposed use in selecting urban study areas?

These factors are appropriate, but the addition of an additional factor looking at diversity and variation of the mobile source fleet mix and CA vs. EPA emissions standards would also be useful.

c. Section 2.3.1.3.1 presents staff's planned approach to adjusting ambient NO₂ concentrations to just meet the existing primary NO₂ NAAQS, and any potential alternative standards judged appropriate. What are the Panel's views on this adjustment approach?

The adjustment approach is reasonable, but there will be additional uncertainties since the adjustment will necessarily be large in magnitude in most areas.

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d. Section 2.3.1.3.2 presents staff's consideration of potential approaches to simulating NO₂ concentrations on roads in the selected study areas. To what extent does this section identify the most relevant evidence to inform our understanding of roadway NO₂ concentrations? What are the Panel's views on the various potential approaches to simulating NO₂ concentrations on roads?

All the potential approaches appear to be reasonable.

e. Section 2.3.2 presents an illustrative example of the proposed approach for the air quality and health benchmark comparisons, using air quality data from the Philadelphia CBSA. To what extent does the Panel find the analyses and results to be clearly presented, informative, and appropriately characterized?

The illustrative example is extremely helpful and informative. An additional example in another city with different analysis challenges might also be helpful.

Dr. Timothy Larson

Chapter 1 Introduction

1. Chapter 1 provides introductory and background information to provide perspective on the role of the REA planning document within the broader context of the review of the primary NO₂ NAAQS. To what extent is the information in this chapter appropriate for this purpose and clearly communicated?

The key considerations for doing updated quantitative risk and exposure assessments is clearly stated and summarized in Figure 1-3. The choice of doing this for both causal as well as likely to be causal effects is reasonable.

2. Section 1.3 outlines the approach to informing staff's preliminary conclusions on the extent to which updated quantitative analyses are supported in the current review. Key components of this approach include consideration of the available health evidence; consideration of the available technical information, tools, and methods; and judgments as to the likelihood for particular quantitative analyses to provide substantial insights into NO₂ exposures or health risks, beyond the insights gained from the analyses conducted in the last review. What are the Panel's views on this approach to considering support for updated quantitative analyses?

There is a lot of emphasis on the short-term standard, given that this was the “controlling” standard in the 2008 REA . However, the conclusion from epidemiological evidence that long-term exposures are likely to be causally related to selected respiratory effects would appear to make a newly revised long-term standard the “controlling” standard. Specifically, as listed in Table 2-2, there are a number of CBSAs that have 2013 annual averages associated with long-term respiratory effects. Therefore, it might very well be the case that adjusting the short term concentrations to just meet the current standard will lead to annual average values in these same CBSAs that exceed the ranges observed in the selected epidemiological studies. That would imply exceedances of any newly proposed long-term standard value.

Chapter 3 – Exposure Assessment

1. Chapter 3 presents the proposed approach to reaching staff conclusions on support for an updated model-based assessment of human exposures in the current review. This proposed approach is based in large part on considering the implications of results from the air quality and health benchmark comparisons described in Chapter 2. What are the Panel's views on this proposed approach?

The approach is reasonable, but if the long-term standard becomes the controlling standard, it will be necessary to rely on a combination of deterministic meteorologically based models as

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well as measurements with spatial interpolation (possibly universal kriging based on additional spatial covariates) in order to produce a defensible set of exposure surfaces for use in a exposure model.

2. Chapter 3 also provides overviews of the exposure assessment conducted in the last review (section 3.1) and the new information that could potentially inform an updated exposure assessment in the current review, should one be judged appropriate (section 3.2). To what extent does the Panel find this information to be clearly presented and appropriately characterized? Is there additional new information that staff should consider?

If a new quantitative REA is therefore required, it is worth noting that the CBSAs with the most NO₂ monitors are, for the most part, those whose annual average concentrations are the highest. Note however that the number of monitors in the CBSAs highlighted in Table 2-2 have been decreasing dramatically in the past few years.

The use of AERMOD may not be able to accurately capture the relevant atmospheric transformations of NO₂. The algorithms in AERMOD do not include the concept of a photochemical steady state ratio of NO₂ to NO, nor to the ultimate conversion of NO₂ to NO_y. Some of the highest annual averages of NO₂ are found in photo-chemically active urban areas (LA, Houston, Riverside). This suggests the need for a combination of a chemical transport model coupled with a relatively dense monitoring network, a requirement that may limit the choice of cities for any newly proposed REA.

CTM models alone are not able to capture small scale spatial variability. Therefore a hybrid approach such as described in Dionisio et al (2014) is seemingly required if the long-term average becomes the controlling standard. This approach may limit the available urban areas, however, given the relatively few published studies.

Dr. Jeremy Sarnat

1. *Chapter 3 presents the proposed approach to reaching staff conclusions on support for an updated model-based assessment of human exposures in the current review. This proposed approach is based in large part on considering the implications of results from the air quality and health benchmark comparisons described in Chapter 2. What are the Panel's views on this proposed approach?*

I am generally supportive of the model-based exposure assessment outlined in the Draft REA, although details about the specific approach are lacking (see second bullet below). I also understand that the utility of conducting this assessment is in large part dependent on the outcomes of the air quality assessment. Below are a several, relatively minor comments and questions, on this chapter.

- Table 3-1 is a useful qualitative presentation of potential model uncertainties among several relevant exposure factors. How was the characterization of uncertainty magnitudes determined? For transparency and prioritization of data gaps, I recommend using quantitative uncertainty analysis methods for characterizing and comparing these potential sources of uncertainty.
 - It's unclear whether a similar exposure assessment, using a single city as an intensive case study, is being proposed for a future REA. I understand why the APEX study area was limited to one city in the 2008 REA, Atlanta, but I'd like to see another city included within a future REA, if possible, along with the broad national air quality characterization. From an exposure factor standpoint, specifically with regard to city-wide building infiltration factors, I am guessing that Atlanta is fairly non-representative of the US population at-large.
2. *Chapter 3 also provides overviews of the exposure assessment conducted in the last review (section 3.1) and the new information that could potentially inform an updated exposure assessment in the current review, should one be judged appropriate (section 3.2). To what extent does the Panel find this information to be clearly presented and appropriately characterized? Is there additional new information that staff should consider?*
- New information is presented clearly, albeit in a cursory manner. There is a lot of cross-referencing to external documents, including the previous 2008 REA.
 - Since the 2008 ISA, numerous hybrid or blended approaches for estimating NO_x have been published that integrate across CTM, LUR, and ambient monitoring data. One promising method, developed within EPA, is built around a hierarchical Bayesian

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approach that uses AERMOD dispersion output (Crooks and Isakov, 2013). Is there a possibility of using one of these hybrid methods to address uncertainties in the current AERMOD approach for estimating exposures? Although I have not used the most recent AERMOD version, I am encouraged by the options that allow for inclusion of ambient monitoring data, which gets closer to being able to use all available data to generate exposure output.