

10-10-19 Preliminary Draft Comments from Members of the Independent Particulate Matter Review Panel (IPMRP).  
These preliminary pre-meeting comments are from individual members of the Panel and do not represent IPMRP  
consensus. Do not cite or quote

**Preliminary Comments from Members of the  
Independent Particulate Matter Review Panel**

**on**

**EPA’s Policy Assessment for Review of the National Ambient Air  
Quality Standards for Particulate Matter (External Review Draft –  
September 2019)**

**Received as of 10-09-19**

Dr. Peter Adams..... 2  
Dr. John Balmes (revision of earlier comments)..... 6

**Dr. Peter Adams**  
**October 9, 2019**

CASAC Policy Assessment pre-meeting comments / October 8, 2019 / Peter Adams

**EPA-2. Chapter 2 – PM Air Quality: To what extent does the CASAC find that the information in Chapter 2 is clearly presented and that it provides useful context for the review?**

SCQ-2.1 What are the panel's views regarding whether the draft PA accurately reflects and communicates the air quality related information most relevant to its subsequent evidence-based assessment of the health and welfare effects studies, including uncertainties, as well as the development of the risk assessment for current and alternative standards? In particular, do the following sections accurately reflect and communicate current scientific understanding, including uncertainties, for: (a) relationships between annual and daily distributions of PM; (b) the review of hybrid modelling approaches used to estimate exposure in some studies and the risk assessment; and (c) information on background levels of various PM indicators?

Overall, I found that Chapter 2 was clearly presented, provided useful context for the review, and accurately summarized and communicated relevant knowledge of the atmospheric behavior of PM. In particular, I found that Figures 2-10 and 2-11 and associated discussion provided useful and relevant evidence about the relationship between annual and daily PM levels. Similarly, Section 2.3.3 provided a good overview of the strengths and weaknesses of hybrid modeling approaches for exposure assessment.

I note that information about ultrafine PM was very sparse in this report. I urge EPA to consider dedicating more resources to modeling, monitoring, and exposure assessment for ultrafine PM.

Regarding background levels of PM, this is a somewhat harder question. While useful information was presented, I noted a tendency to label some kinds of PM as natural and/or background when it might, in fact, be a mix of natural and anthropogenic. This includes wildfires and biogenic SOA. More detailed notes on this are below.

Page 2-3: Wildland fires are partly natural sources but partly anthropogenic as well, depending on the origin of the fire. This becomes relevant again in Section 2.4 on Background PM.

Page 2-3: Similarly, it is not straightforward to say whether biogenic SOA is natural or anthropogenic. The VOC precursor is natural (well, even this is debatable for any managed land). But there is a literature of work pointing out that biogenic SOA levels are higher due to human activity for at least two reasons: 1) ozone is enhanced by anthropogenic activities and is a key oxidant for many biogenic VOCs and 2) some SOA yield are NO<sub>x</sub>-dependent and most NO<sub>x</sub> is anthropogenic. Hence, separating natural from anthropogenic biogenic SOA is non-trivial. This becomes relevant again in Section 2.4 on Background PM.

Section 2.4.3: The text describes the measured organic matter at IMPROVE sites in the Southeast as an "upper bound" of natural biogenic aerosol, and it is

indeed an upper bound. The fact that these IMPROVE sites have all demonstrated significant decreases in organic matter concentrations strongly suggests that much of the organic matter is controllable. It strikes me as highly unlikely that additional emissions controls would not result in further decreases even in biogenic SOA for the reasons described above.

Otherwise, I present some more minor notes of statements that could be revised or clarified but do not substantially hinder the overall success of the document.

Page 2-9: "Anthropogenic SO<sub>2</sub> and NO<sub>x</sub> are the predominant precursor gases in the formation of secondary PM<sub>2.5</sub>, and ammonia also plays an important role in the formation of nitrate PM by neutralizing sulfuric acid and nitric acid."

I think it is wrong, or at least an over-simplification, to call SO<sub>2</sub> and NO<sub>x</sub> "predominant" and relegate ammonia and VOCs to supporting roles. In many US locations, there is more organics (mostly SOA) in PM<sub>2.5</sub> than sulfate. Hence, VOCs are important. Sulfate has declined in importance over the past 10-15 years – and in some locations has not been important for a while. NO<sub>x</sub>/nitrate are very important in some locations, really not important in others. The current text acknowledges an "important role" for ammonia, but by many measures, PM<sub>2.5</sub> concentrations are more sensitive to ammonia than NO<sub>x</sub> emissions.

Page 2-18: Section 2.2.5 mentions particle count measurements but does not elaborate to the same degree as the section does for other measurements (aetholometer, EC/OC).

Pages 2-21 and 2-22: The text gives a somewhat too simple view of PM<sub>2.5</sub> concentrations (highest in west, lower in east). Except for a few locations in the west (CA's central valley, LA, and others), the west is cleaner than the east. There are more people breathing air just below the annual-average NAAQS (i.e. in the 10-12 ug/m<sup>3</sup> range) in the east than in the west.

Page 2-29: "The draft ISA describes a two-peaked diurnal pattern in urban areas, with morning peaks attributed to rush-hour traffic and afternoon peaks attributed to a combination of rush hour traffic, decreasing atmospheric dilution, and nucleation (U.S. EPA, 2018, section 2.5.2.3, Figure 2-32)."

I cannot believe that nucleation has any impact on PM<sub>2.5</sub> mass concentrations. Rather, the draft probably means to say efficient oxidation in the afternoon of precursor gases, which condense (rather than nucleate) onto existing particles.

**EPA-5. Chapter 5 – Review of the Secondary Standards: What are the CASAC views on the approach described in Chapter 5 to considering the evidence for PM-related welfare effects in order to inform preliminary conclusions on the secondary standards? What are the CASAC views regarding the rationale supporting the preliminary conclusions on the current secondary PM standards?**

I found the approach and rationale EPA took in reaching the preliminary conclusions to be reasonable.

SCQ-5.1 To what extent does the panel find that the questions posed in this chapter appropriately reflect the important policy-relevant issues for the secondary PM standards? Are there additional policy-relevant questions that should be addressed?

I found the questions to be sufficient and relevant.

SCQ-5.2 What are the panel's views of the draft PA evaluation of the currently available scientific evidence with respect to the welfare effects of PM. Does the assessment appropriately account for any new information related to factors that influence:

- a) Quantification of visibility impairment associated with PM<sub>2.5</sub> and examination of methods for characterizing visibility and its value to the public?
- b) The effects of PM<sub>2.5</sub> components on climate?
- c) The effects of fine and coarse particles on materials?

I found that the draft PA did a good job of summarizing the state of knowledge at the time of the last NAAQS review, now, and the new information that has become available in between. I found this to be the case for visibility and climate effects but note that I do not consider myself an expert on material damage.

SCQ-5.3 What are the panel's views of the draft PA preliminary conclusion that the currently available scientific evidence does not call into question the protection afforded by the current secondary PM standards against PM welfare effects and that it is appropriate to consider retaining the current secondary PM standards without revision?

I found the draft PA preliminary conclusion to be appropriate and well supported.

Lastly, I note some minor issues that could be revised and clarified in the PA but do not substantially impair it from serving its purpose.

Page 5-5: "In addition, at the time of the proposal, the Administrator recognized that suitable equipment and performance-based verification procedures did not then exist for direct measurement of light extinction and could not be developed within the time frame of the review (77 FR 38980-38981, June 29, 2012)."

This statement confuses me since nephelometers and aetholometers exist and could do the job. This also seems to contradict statements made on the bottom of page 5-11 about available measurement methods.

Page 5-25: "The IPCC AR5, taking into account both model simulations and satellite observations, reports a radiative forcing from aerosol-radiation interactions (RFari) from anthropogenic PM of  $-0.35 \pm 0.5$  watts per square meter (Wm<sup>-2</sup>) (Boucher, 2013), which is slightly reduced compared to AR4."

Here “reduced” is confusing. The effect is reduced in absolute magnitude but increased from -0.5 to -0.35 W/m<sup>2</sup> from AR4 to AR5. This could be revised for clarification.

Page 5-26: “While research on PM-related effects on climate has expanded since the last review, there are still significant uncertainties associated with the accurate measurement of PM contributions to the direct and indirect effects of PM on climate.”

I think it’s more appropriate to say “accurate estimation” given the number of modeling studies involved.

Page 5-29: “Such uncertainties include those related to our understanding of: • The magnitude of PM radiative forcing and the portion of that associated with anthropogenic emissions; and,”

Although the term “radiative forcing” can sometimes be used slightly different ways, the most common and general definition is the difference in the Earth’s energy balance due to the presence (versus absence) of anthropogenic emissions. Hence, radiative forcing is, by definition, anthropogenic. In contrast, it’s common to say “radiative effect” when one means the net result of anthropogenic and natural aerosols. A similar statement is made on page 5-40 and should be remedied there.

**Dr. John Balmes**  
**October 9, 2019**

***[this includes responses to SCQ-4.1 through SCQ-4.3]***

**Charge Question SCQ-3.1**

*Does the panel find that the questions posed in this chapter appropriately reflect the important policy-relevant issues for the PM<sub>2.5</sub> review? Are there additional policy-relevant questions that should be addressed?*

In general, the questions posed in the chapter capture most of the policy-relevant issues. One area that deserves more attention is the relatively greater exposure to PM<sub>2.5</sub> of communities of color and low socioeconomic status (SES) for which there is considerable evidence. These communities also tend to have greater vulnerability to adverse health effects of PM<sub>2.5</sub> exposure. The chapter briefly alludes to the greater exposure and vulnerability of poor people of color when spatial averaging is discussed, but the need to protect the health of this population deserves greater attention in the draft PA.

**Charge Question SCQ-3.2**

*What are the panel's views on the relative weight that the draft Policy Assessment gives to the evidence-based (i.e. draft PA, section 3.2) and risk-based (i.e. draft PA, section 3.3) approaches in reaching conclusions and recommendations regarding current and alternative PM<sub>2.5</sub> standards?*

The evidence-based approach to whether the current and alternative PM<sub>2.5</sub> standards protect public health using the air quality distributions of the epidemiological studies that demonstrate associations between exposures to PM<sub>2.5</sub> and adverse health effects is appropriate. The second approach using "pseudo-design values" to determine whether PM<sub>2.5</sub> concentrations in epidemiological study areas would have exceeded the current or alternative standards also adds to the assessment.

The description of the risk-based approach is more difficult to follow, especially regarding the adjustments that were made for areas "requiring either a downward adjustment to air quality or a relatively modest upward adjustment." The method by which exposure reductions based on a hybrid approach using both measured concentrations and modeled estimates are developed both for the current and alternative standards is again somewhat difficult to follow.

The evidence-based approach deserves more weight, but the fact that the risk-based approach produces similar information is reassuring.

**Charge Question SCQ-3.3**

*What are the panel's views on the evidence-based approach, including:*

*a) The emphasis on health outcomes for which the draft ISA causality determinations are "causal" or "likely causal"?*

The emphasis on health outcomes that the draft ISA identified as "causal" or "likely causal" is appropriate, although the lack of treatment of respiratory outcomes and long-term exposures with the risk-based approach is disappointing.

*b) The identification of potential at-risk populations?*

Again, people of color and low SES should also be identified as a potential at-risk population.

*c) Reliance on key multicity epidemiology studies conducted in the US and Canada for assessing the PM<sub>2.5</sub> levels associated with health effects?*

European multi-city epidemiological studies should also be considered.

*d) Characterizing air quality in these key studies using two approaches: the overall mean and 25th/75th percentiles of the distribution and the “pseudo design value” reflecting a monitor with the highest levels in an area?*

Mean PM<sub>2.5</sub> concentration may not be the best way to characterize the exposure of the populations in epidemiological studies that demonstrate associations with adverse health effects. Some of the statements about pseudo-design values are hard to understand such as “For studies with 25th percentiles  $\leq 12.0 \mu\text{g}/\text{m}^3$ , at least 25% of the study area population lived in locations likely to have met the current annual standard over the study period (i.e., in at least 25% of health events occurred in such locations”. How do we know this?

*e) The preference for continuing the use of an annual PM<sub>2.5</sub> standard as the principle means of providing public health protection against the bulk of the distribution of short- and long-term PM<sub>2.5</sub> exposures?*

The argument for the use of an annual standard as the primary approach to protecting public health is logical and well-stated. That said, high short-term exposures to PM<sub>2.5</sub> from catastrophic wildfires remain a major driver of health impacts even if these are not regulated by EPA.

*f) The draft PA conclusions on the extent to which the current scientific information strengthens or alters conclusions reached in the last review on the health effects of PM<sub>2.5</sub>?*

These conclusions are appropriate based on the review of the health effects literature in the draft ISA.

*g) Whether the discussions of these and other issues in Chapter 3 accurately reflect and clearly communicate the currently available health effects evidence, including important uncertainties, as characterized in the ISA?*

While the discussion of Chapter 3 accurately reflects the currently available health effects evidence, communication of important uncertainties, such as the impacts of high peak sub-24-hour exposures, is not always clear. High sub-24-hour peak exposures are increasingly occurring as a result of wildfires in the Mountain West.

### **Charge Question SCG-3.5**

*What are the panel’s views on the draft PA preliminary conclusion that, taken together, the available scientific evidence, air quality analyses, and the risk assessment can reasonably be viewed as calling into question the adequacy of the public health protection afforded by the current primary PM<sub>2.5</sub> standards?*

The preliminary conclusion that the current may not be adequate to protect the public health with a sufficient margin of safety is reasonable given the evidence reviewed in the draft ISA.

### **Charge Question SCQ-4.1**

*To what extent does the panel find that the questions posed in this chapter appropriately reflect the important policy-relevant issues for the PM<sub>10</sub> NAAQS review? Are there additional policy-relevant questions that should be addressed?*

The questions posed in this chapter are appropriate

### **Charge Question SCQ-4.2**

*What are the panel’s views of the draft PA assessment of the currently available scientific evidence regarding the health effects associated with exposures to thoracic course particles, PM<sub>10-2.5</sub>?*

As I noted in my comments regarding the draft ISA, I think the evidence for short-term exposure to PM<sub>10-2.5</sub> and respiratory outcomes (particularly asthma exacerbations) is more supportive of

10-10-19 Preliminary Draft Comments from Members of the Independent Particulate Matter Review Panel (IPMRP).  
These preliminary pre-meeting comments are from individual members of the Panel and do not represent IPMRP  
consensus. Do not cite or quote

a “likely to be causal” assessment than EPA staff’s assessment of “suggestive of a causal relationship.” That said, the assessment of draft PA of the evidence regarding health effects associated with the coarse particle fraction is otherwise reasonable.

**Charge Question SCQ-4.3**

*What are the panel’s views on the draft PA preliminary conclusion that the available evidence does not call into question the adequacy of the public health protection afforded by the current primary PM10 standard and that evidence supports consideration of retaining the current standard?*

Based on my assessment of the evidence for the association of short-term exposures to the coarse fraction and acute exacerbations of asthma, I would favor consideration of a stricter PM10 standard.