

**Preliminary Comments from Dr. Jason West on  
EPA's Policy Assessment (PA) for the Reconsideration of the Ozone  
National Ambient Air Quality Standards (External Review Draft Version 2)  
03-28-23**

**Chapter 2 –Air Quality**

*1. To what extent does the Panel find that the information in Chapter 2 is clearly presented and that it provides useful context for the reconsideration?*

Chapter 2 provides background information that is clearly presented, and provides useful context for the reconsideration, with some comments to follow.

As I understand, the purpose of the Policy Assessment is to draw out information from the Integrated Science Assessment that is most relevant for policy and decision-making for setting the standard. In this context, this chapter seems quite long and detailed to me, though the content provided is good quality. Several figures on ozone levels and trends are updated from the ISA, given the fact that the PA is now being rewritten based on the 2020 ISA, and those updates are appropriate and helpful. The long section on background ozone (USB) seems out of place given that what is written here is longer than what appeared in Appendix 1 of the 2020 ISA, and Page 2-28, line 5 says “The section, which presents the information and analysis that were also presented in the parallel section of the 2020 PA.” It would be better to state how this review differs from the 2020 PA. Later it seems that the purpose is to present new USB O<sub>3</sub> estimates, but that is not clear at the start of this section. EPA may have reasons to write this long section, but to me it seems out of proportion given what I understand to be the purpose of the PA. The USB analysis focuses on MDA8 as a health-relevant metric, but I don't see that metrics relevant for plants are also modeled (perhaps that was beyond EPA's capability), and so that may be a limitation in considering the secondary standard.

While section 2.5.4 presents a nice summary of the findings from the new USB analysis, the section does not present or discuss how USB is relevant for the decisions in setting the primary or secondary ozone NAAQS. Searching the document for “USB” I see that it is not used once in Chapters 3 or 4. If USB is not used in EPA's analysis of primary and secondary NAAQS values for the Administrator, then why is it important to have this in the PA? I do not wish to argue that it is not relevant, but that EPA should consider being explicit about how USB might be used in setting NAAQS and what is their motivation for including this analysis in the PA.

Figure 2-1 presents emissions from the NEI for ozone precursors. For NO<sub>x</sub>, VOCs, and CO, biogenic emissions are clearly presented as a wedge of the pie chart. The CH<sub>4</sub> plot does not list biogenics. I'm aware that biogenic emissions are a major source of emissions globally, but I'm not sure in the US. Are biogenics included in the “Other” category for CH<sub>4</sub>? Or if biogenic CH<sub>4</sub> are excluded from this pie chart, then the caption should explain that is the case.

1 Page 2-17, l. 5 or caption for Figure 2-9 – The level of significance in the trends should be stated (p-  
2 value or equivalent). EPA should be aware that statisticians encourage moving away from statements of  
3 significant or not significant and toward reporting p-values and using calibrated language like “very  
4 likely” etc.

5  
6 Page 2-17, l. 9 – Would it be worth mentioning changes in electricity generation, particularly closing of  
7 coal-fired power plants, as a cause for the ozone decreases?  
8

9 Page 2-35, l. 24 – To me, “Post-Industrial” means after industrial activities stop, or when services  
10 outweigh heavy industries. I don’t think that is the intention here. How about “Industrial Methane” or  
11 “Human-caused Methane” or “Methane Increases since the Industrial Revolution”. The term post-  
12 industrial is also used later in this section.  
13

14 Page 2-35, l. 28 – I don’t think it’s correct to say that fossil fuel combustion is a major source of  
15 methane. Fossil fuel extraction and use (coal, oil and gas) are a major source. I think it would be better  
16 here to just list all major anthropogenic sources.  
17

18 Page 2-36, line 9 – “A major limitation ...” I don’t think this is a major limitation. For methane, it is  
19 concentrations rather than emissions that directly determine contributions to ozone, and methane  
20 concentrations from well before the Industrial Revolution are known from ice core samples. The  
21 preindustrial contribution of methane to O<sub>3</sub> is constrained by the preindustrial CH<sub>4</sub> concentration, which  
22 is presumably a result of mainly natural emissions with small anthropogenic contributions. Perhaps  
23 instead EPA could discuss here how methane’s contribution to USB O<sub>3</sub> is a result of anthropogenic  
24 methane emissions from the US and all other nations, and that the US contribution is usually not  
25 separated.  
26

27 Page 2-36, line 32 – Is this saying that HTAP emissions have more direct contributions from individual  
28 countries than CEDS or EDGAR? I don’t think this is true. I also am not sure that national emissions  
29 estimates are more accurate than international ones.  
30

31 Section 2.5.1.7 – I’m not clear on why this section omits carbon monoxide (CO). Much of what is said  
32 here would also apply to CO.  
33

34 p. 2-38, line 20 – I’m not clear why CO is omitted from these emissions. And when EPA says methane  
35 is omitted, I assume that is for estimating domestic contributions. Foreign contributions should include  
36 methane.  
37

38 Figure 2-19 – I think what is shown is the 3-month average of MDA<sub>8</sub>.  
39

40 Figure 2-30 – I think this is showing MDA<sub>8</sub> ozone concentrations, and that should be stated in the figure  
41 caption.  
42  
43  
44

## Chapter 4 –Review of the Secondary Standard

*2. In the Panel’s view, does the discussion in section 4.5 provide an appropriate and sufficient rationale to support staff’s preliminary conclusions with respect to the current secondary standard and associated considerations regarding conclusions on potential alternative options?*

The PA dismisses effects of tropospheric ozone on climate as a basis for a secondary ozone standard, because of the difficulty and uncertainty in relating ground-level concentrations over the US with global climate effects. I think the EPA is right to do this, as a concentration-based standard is perhaps not a clear way of addressing ozone’s influence on climate under the Clean Air Act. But my sense is that the argument for why it is dismissed is not clearly laid out.

On p. 4-63/64, EPA states that ozone’s influences on climate are more uncertain than that of other greenhouse gases. While this is true, we do have a good ability to quantify ozone’s radiative forcing and impacts on climate, and EPA does not evaluate whether this quantification is sufficiently certain to consider it further as a secondary standard. This paragraph cites uncertainties, but these are not the same uncertainties that are given as the reason for discounting ozone’s climate influences in Section 4.5.2.

Later Section 4.5.2 (page 4-119) cites “limitations and uncertainties in the evidence base that affect our ability to characterize the extent of any relationships between O<sub>3</sub> concentrations in ambient air in the US and climate-related effects”. And later a “lack of quantitative tools”. While this is true, it is also true that O<sub>3</sub> is known to be a greenhouse gas and that concentrations in air above the US are contributing to global warming, which we observe to be happening due to human emissions (IPCC, 2021), and the contribution of global tropospheric ozone has been quantified. Current global models, while uncertain, have been used to quantify the contribution of emissions from North America (if not the US) to global ozone radiative forcing and global temperature change. Current global models also can consider the effects of reducing O<sub>3</sub> concentrations only over the US (however that might be done), even if exactly this experiment has not been conducted. So I’m not sure model insufficiency is the problem. But this paragraph gives a better articulation for excluding ozone on climate than on 4-63.

I agree that it would be difficult to establish an ozone concentration over the US that would protect public welfare from damages of climate change. But to me, the reasons why include these:

- O<sub>3</sub> concentrations through the troposphere affect climate, not just at ground level.
- Climate change is a global phenomenon with global drivers, not just O<sub>3</sub> concentrations over one nation.
- O<sub>3</sub> is one of many GHGs or forcing agents contributing to global climate change, although the contributions of global O<sub>3</sub> have been quantified.
- While NAAQS intends to ensure concentrations do not exceed standards at any particular location or time, it is the net effect of all elevated (above natural background) O<sub>3</sub> levels that affects climate warming, not peak concentrations.
- Emissions of ozone precursors influence both methane and ozone concentrations, and how ozone is controlled determines the effects of those controls on climate.

I would encourage EPA to consider a broader discussion of these factors, as the logic for excluding ozone.

On the last point, the PA does not discuss the relationships between emissions of precursors – NO<sub>x</sub>, VOCs, CO and CH<sub>4</sub> – on ozone radiative forcing and climate impacts. Briefly, reducing VOCs, CO and CH<sub>4</sub> benefit climate by reducing both ozone and methane concentrations, while reducing NO<sub>x</sub> alone is generally thought not to benefit climate because the resulting increase in methane outweighs the reduction in ozone in climate forcing. How ozone concentrations are reduced therefore determines the climate impact, not just the ozone concentration, which is what the NAAQS regulates. Discussing these relationships can strengthen the case for why EPA chooses not to pursue a secondary NAAQS further for ozone’s effects on climate, because it would show that setting a standard for ground-level ozone concentration over the US may not effectively slow climate warming. This CASAC’s review of the 2020 ISA suggested that EPA consider adding this discussion to future ozone ISAs, and here I’d suggest some discussion of choices for the NAAQS. Doing so could clarify whether reducing uncertainties and improving tools might make ozone’s effects on climate a basis for a secondary NAAQS in the future. It could also further clarify and motivate EPA actions apart from the NAAQS process that would benefit climate change by encouraging reductions in US VOC, CO and CH<sub>4</sub> emissions.

p. 4-25 bottom – I suggest 3 short additions to this paragraph. 1) Acknowledge that tropospheric ozone’s impacts on climate result from global concentrations through the depth of the troposphere, and not just ground level concentrations. 2) I suggest adding a sentence to discuss how ozone impacts on global vegetation impacts the carbon cycle. 3) The statements about ozone’s importance for climate are based on the 2020 ISA. These statements are broadly consistent with findings in the IPCC AR6, which came out after the 2020 ISA, and so this sentence could reference finding from the AR6.

p. 4-30 middle – Consider saying more about the negative impacts of climate change (and ozone’s contributions to it), rather than immediately discounting it because of uncertainties with relationships between ground-level concentrations in the US and climate effects.

On crop yields, p. 4-130 states that “not every effect on crop yield will be judged adverse to public welfare”. The section then explains that through crop management, yields can be maintained. These management actions include fertilizer. In this case, from an economic point of view, it would seem that if one doesn’t account for the lost crop yields, then one should account for the cost of the excess fertilizer and environmental impacts from fertilizer application. I would think these impacts would be adverse to public welfare.

*3. What are the Panel’s views regarding the areas for additional research identified in section 4.6? Are there additional areas that should be highlighted?*

This section is quite short, but the areas for future research are presented well. Given that the EPA finds uncertainty and lack of quantitative tools to be important in not suggesting a secondary standard for ozone’s effects on climate, it might be appropriate to list some areas of research that would address these gaps. No comment is made here on investigating ozone’s impacts on climate. From the discussion in earlier sections, it seems that EPA would benefit from applications of existing models that evaluate the

1 radiative forcing and climate impacts of reductions in ground-level ozone over the US itself. Since no  
2 strategy would only reduce ground-level ozone, these studies could investigate the effects of reductions  
3 in ozone through the troposphere, or investigate emission reductions and their effects on ground-level  
4 ozone as well as radiative forcing and climate. Improvements in models would also be welcome, but it  
5 seems to me that the main limitation now is not the quality of the models but their application for these  
6 specific questions.  
7