Comments to
EPA Clean Air Scientific Advisory Committee, Ozone Review Panel

Letter to EPA on the 2nd External Review Drafts
Health Risk and Exposure Assessment for Ozone
Policy Assessment for Ozone

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The CASAC reviews of the second drafts of the Health Risk and Exposure Assessment (HREA) and the Policy Assessment (PA) for Ozone provide thorough and constructive recommendations to EPA to improve and clarify the documents. I particularly appreciate the Panel's acknowledgement and inclusion of important public comments made via the docket and at the March 2014 meeting. My specific comments regarding letter content are summarized below.

COMMENTS ON THE HREA LETTER

NOx vs. NOx+VOC EMission Reductions

Both the cover letter to the EPA Administrator and the main document indicate some confusion among CASAC members as to whether EPA applied NOx-only or NOx+VOC emission reductions. This confusion stems from the fact that in several locations in initial chapters of the HREA, the EPA states that both NOx and VOC were reduced to meet alternative primary standards in 12 cities, while much later EPA states that NOx-only cases were used. The fact is EPA ran NOx-only scenarios for the health risk calculations, and ran only some limited NOx+VOC sensitivity tests. The CASAC's cover letter needs to be revised to reflect this fact. I agree with many of the CASAC comments that EPA needs to be clearer about the use of primarily NOx-only emission reduction scenarios.

Under Chapter 2 of the main document (page 2, lines 24-26), CASAC states: "The end of Section 2.2.1 should be modified to note that ozone formation may be NOx-limited during summer/high ozone conditions. In contrast, during much of the year, ozone formation in cities can be radical-limited due to the lack of sunlight." Later, in recommending that EPA better define the purpose of NOx-only US-wide emission reductions specific to each city (page 4, lines 19-22), CASAC states: "…these estimated spatial and temporal distributions of ozone are appropriate for the intended purpose of evaluating air quality at levels consistent with possible alternative standards, but do not imply a preferred approach for possible future compliance with possible alternative standards."

NOx-only reductions are ineffective in the often "radical-limited" urban conditions (high NOx, large NOx dis-benefit). They are certainly not the "only real viable approach to lowering O3 levels" (page A-29, lines 10-11). NOx-only emission scenarios may be "reasonable" and effective at reaching particular alternative standards, but the resulting annual ozone frequency distributions could be quite different from NOx+VOC reductions (a much more reasonable assumption for most cities), thereby affecting health risk outcomes and exacerbating

uncertainties in the reported health benefits. EPA needs to state this along with any appropriate disclaimer that NOx-only controls are not implied as a preferred approach.

The CASAC comment on page 4, lines 25-26 ("NOx-only reduction may provide an upper bound for ozone exposure for areas attaining a given ozone standard") needs clarification and better explanation. Is the intended message related to the NOx dis-benefit effect, by which more ozone increases occur relative to balanced NOx+VOC reductions?

On page 4, lines 35-37, CASAC states: "It would be helpful to clarify that this assumption [nationwide percent reduction in NOx] is not explicitly imposed when a given percent emission reduction is exercised in an urban area to attain a given ozone standard." At first read, it is unclear whether CASAC is referring to simulations or reality. Perhaps CASAC means that this assumption would not be explicitly imposed ***in reality*** when it comes time to develop emission control strategies for a given city (absolutely true). If CASAC really means that this assumption is not applied in the HDDM projections for each city, then they misunderstand EPA's approach. Each city is individually analyzed for alternative levels of the primary standard by applying HDDM sensitivity coefficients derived from US-wide across-the-board emission reductions.

Background Ozone Response to US Emission Reductions

Under Chapter 2 of the main document (page 2, lines 20-22), CASAC states: "These methodological approaches should be explained as part of a discussion of how background is addressed indirectly in air quality analyses and as to why background is not needed for the risk estimation process." EPA also needs to clearly explain that background is what remains as emission cuts approach 100% (which is shown to be necessary in several of the 12 analysis cities to reach alternative standards) so that background must be correctly represented in the model, and evaluated against the literature. Such evaluation is described in the PA, but statements such as these are needed in the HREA to set the stage, rather than entirely dismiss background because it is implicitly handled by HDDM.

Use of HDDM Results in Empirical Regression Models

In discussing the approach EPA has taken to extend HDDM modeling of 8 months in 2007 to other years via empirical regressions, CASAC states (page 4, lines 6-10): "Even though there are no theoretical foundations to support the generality of these relationships, the approach is innovative and is suitable for the intended applications. More research will be needed in the future to explore how best to estimate the real-world sensitivity coefficients using information from model simulations and monitored ozone concentrations." I agree that it is certainly innovative, but I question its suitability without a clearer demonstration of the additional uncertainty that it brings. Uncertainty stemming from the use of these empirical relationships should be transferred to the health risk models to expand uncertainty ranges in health-risk outcomes. This was a major point in my public comments to CASAC and to the HREA docket.

On page 13, lines 44-46, CASAC states: "There is also concern about how the standard errors for each city were calculated, and the HREA should acknowledge that the regression approach used

would benefit from further scrutiny as part of future work." I fully agree, and EPA should extend an uncertainty analysis of the regression approach through the health-risk models.

I particularly applaud Dr. Chocks individual comments on this subject (page A-17, lines 21-32).

EPA's Tables Qualifying Amounts of Component Uncertainty

On page 5, lines 28-36, CASAC comments on Table 4-6 that lists sources and qualitative levels of uncertainty. I applaud CASAC's statements and stress that EPA needs to improve these characterizations. This was a major point in my public comments submitted to the HREA docket.

Miscellaneous

On page 1 (line 47) of the CASAC cover letter, it would be clearer to state: "…improving the accuracy of ***modeled*** estimates in the monitored areas." A similar statement is made in several locations in the HREA, which should also be clarified.

COMMENTS ON THE PA LETTER

Background and International Transport

The PA includes an extensive review of background ozone with new modeling, using two different techniques, consistent with the modeling period employed using HDDM to characterize the evolution of ozone to meet alternative standards. CASAC comments on this topic are appropriate and consistent with current scientific information, yet they bring up new issues related to potentially controlling international transport in the future. In quoting past research on modeled estimates of international transport contributions to background ozone, the CASAC letter only lists seasonal averages. If this is indeed to be a significant consideration, then it would be more important for EPA to characterize episodic peak contributions from international transport (and natural sources such as fires and the stratosphere), especially in the western US where background ozone constitutes a significant fraction of total ozone, and where lower standards will heighten the frequency of otherwise uncontrollable exceedances in "pristine" rural areas. This will have additional ramifications for EPA's current exceptional events policy, which may need to be revised to account for the role of background ozone on higher exceedance frequencies in the west.

Background Ozone Response to US Emission Reductions

As I and other public commenters have continuously stressed in our submissions, background ozone is dynamic, both in the amount that enters the US troposphere as a function of time and space, but also in the way that it interacts with US emissions. The two techniques that EPA employed in modeling background (counterfactual "zero-out", and source apportionment) are indeed complex and it is difficult to describe their nuances to both the lay and technical audiences. While I agree that the description of the source apportionment estimates in PA Chapter 2 is too minimal, and its importance is not sufficiently evident, EPA needs to better stress how the source apportionment technique comprises an integral component of the background assessment. For example, source apportionment is the only viable approach by which to estimate the fraction of current total ozone that is background. Furthermore, source

apportionment considers the chemical interaction (decay) of background ozone with current US emissions, and therefore sets a lower bound on the contribution of background to current total ozone throughout the US. In contrast, zero-out modeling estimates the background if all US anthropogenic emissions are removed, and therefore sets an upper bound on background ozone (in the absence of increasing international contributions or impacts from climate change). Therefore, I disagree with CASAC recommendations that apportionment-based background estimates should be relegated to an appendix just because it is perceived to be more complicated and less relevant. Instead, Chapter 2 should be enhanced with an improved (yet streamlined) description of both modeling techniques, an explanation of their mutual yet different importance to the background assessment, and a more clear and informative juxtaposition of their background estimates.