April 4, 1996

EPA-SAB-CASAC-LTR-96-006

Honorable Carol M. Browner
Administrator
U.S. Environmental Protection Agency
401 M. Street SW
Washington, DC 20460

RE: Closure by the Clean Air Scientific Advisory Committee (CASAC) on the Secondary Standard Portion of the Staff Paper for Ozone

Dear Ms. Browner:

A Panel of the Clean Air Scientific Advisory Committee (CASAC) of EPA's Science Advisory Board (SAB) met on March 22, 1995, to review a draft of the primary standard portion of the document entitled *Review of National Ambient Air Quality Standards for Ozone Assessment of Scientific and Technical Information* - OAQPS Staff Paper. At that time, a draft of the secondary standard portion of the document was not completed. In August, 1995, a revised Staff Paper, which included a first draft of the secondary standard portion was sent to the CASAC panel members for review. On September 19 and 20, 1995, the Panel met to complete this review. The Panel members' comments reflect their satisfaction with the improvements made in the scientific quality and completeness of the primary standard portion of the Staff Paper and reached closure on that part (see CASAC Letter Report: EPA-SAB-CASAC-LTR-96-002, November 30, 1995). However, the Panel could not come to closure on the secondary standard portion of the Staff Paper which was a first draft. To facilitate further development of this part of the Staff Paper, the Panel members provided detailed comments to your staff. The Panel felt that the suggested revisions were extensive enough to warrant a review of the next draft.

On March 21, 1996, a subset of the Panel, consisting of all four of the Panel members with expertise in ozone effects on vegetation plus three additional CASAC members, met in Research Triangle Park, NC to review a second draft of the secondary

portion of the Staff Paper. In addition, a Panel member with expertise in economics reviewed the Staff Paper and provided written comments. Overall, the comments from the Panel members reflected their satisfaction that the Staff Paper was much improved; however, the verbal and written comments provided to your staff indicated that important, additional modifications are still required. Nevertheless, it was the consensus of the Panel that an additional review of the document by the Panel was not necessary. Consequently, the majority of the Panel agreed to come to closure on the Staff Paper assuming that the Agency would incorporate the Panel's latest comments. It was the opinion of six of the seven members of the Panel who were present that the Staff Paper will provide an appropriate scientific basis for making regulatory decisions concerning a secondary ozone standard once the additional changes are incorporated. The additional modifications are summarized below.

It should be pointed out that the Panel members all agreed that damage is occurring to vegetation and natural resources at concentrations below the present 1-hour national ambient air quality standard (NAAQS) of 0.12 ppm. The vegetation effects experts were in agreement that plants appear to be more sensitive to ozone than humans. Further, it was agreed that a secondary NAAQS, more stringent than the present primary standard, was necessary to protect vegetation from ozone. However, agreement on the level and form of such a standard is still elusive for a number of reasons.

The first issue is the level of uncertainty associated with the crop loss risk assessment presented in Tables VII-5a-d through VII-7 of the Staff Paper. While some of the sources of uncertainty are addressed earlier in the Staff Paper, other sources of uncertainty are not addressed at all. The estimates in these Tables should only be presented as rough estimates for a number of reasons. First, the dose-response functions are based upon open-top chamber studies which have the advantage of providing the least amount of environmental modification of any outdoor chamber, but, nevertheless, they still alter ambient microclimate conditions which will introduce uncertainty. In these studies, plant response to ozone has been optimized under conditions which do not reflect the real-life ambient field conditions. Two of the plant experts said that the open-top chamber experiments by their very design and execution produced results that overestimated the effects of ozone on plant yield. The other two experts agreed that the open-top chambers do alter the environment in the chamber with respect to ambient field conditions but did not agree with there being a positive bias. Research has not yet provided methods that clearly are better than open-top chambers for establishing ozone dose-response relationships for a wide variety of

crops. Second, the estimated exposures are based on a non-peer-reviewed, empirical model which has not been subjected to any performance evaluation. In addition, insufficient details are given either in the Staff Paper or the unpublished Agency report for anyone to perform an evaluation. Third, the estimated exposures are then extrapolated to hypothetical scenarios where various secondary NAAQS are attained. Details of this extrapolation procedure are also insufficient to judge the appropriateness of the procedure. Fourth, the exposure estimates are then extrapolated to the entire coterminous U.S. using a Geographic Information System (GIS) which is based on an unpublished, non-peer-reviewed, internal EPA memorandum that contains insufficient details to adequately evaluate the GIS. The exposure estimates and the dose-response function estimates are then input into the economic models which introduce additional uncertainties. Furthermore, the losses are computed from an assumed 12-hr. background ozone concentration of 0.025 ppm which is too low and will over-inflate the crop loss estimates. A more reasonable 12-hr. daylight, summertime background is more likely closer to the 8-hr. background of 0.03-0.05 ppm. As a result, the Panel felt that the absolute values of the numbers in Tables VII-5a-VII-7 are highly uncertain estimates of crop losses and are a result of a propagation of uncertainties. They are rough estimates, and this should be explicitly stated in this discussion. The Panel believes, however, that these Tables can be of some use in identifying rough relative incremental benefits associated with a given NAAQS as long as it is recognized that small differences in benefits may have no significance because of these uncertainties.

A related issue is the estimated yield losses and seedling biomass losses displayed on the maps in Appendix E of the Staff Paper. Since these are also based on the results of open-top chamber experiments as well as the results of the GIS technology approach, the uncertainties are large. The concern here is that the maps will be used out of context and the caveats ignored. The limitations and uncertainties of the data need to be clearly stated in the legend of each map.

The SUM06 standard reflects a change in thinking over the current 1-hour standard with respect to how plants respond to ambient ozone exposure. This proposed form of the standard implicitly recognizes that vegetation response to ambient ozone is cumulative. However, there is disagreement over whether this is the best form for a cumulative standard and what the level of the standard should be to protect vegetation from damage by ozone. One of the Panel's ecology experts thinks the form and the range of between 25 to 38 ppm-hours proposed by the Agency is appropriate. A second expert thinks the form proposed by the Agency is appropriate

and biologically based, but feels that a level of 20 ppm-hours is necessary to adequately protect natural resources. The other two experts are uncomfortable with a SUM06 form because they feel it lacks a biological basis. One member stated that he feels very uncomfortable with SUM06 and would not want to defend it because he feels there is too much uncertainty associated with its derivation. The fourth expert is concerned that a SUM06 form is unnecessarily complicated, and the level proposed by the Agency would not eliminate ozone damage. Instead, he proposes that the 1-hour average ozone should not exceed 0.05 ppm for more than one hour between the hours of 0700-1500. In his written comments, the Panel's economist noted that the welfare benefits of a secondary standard depend on the decision regarding the primary standard. For example, he points out that if the primary standard remains at 0.12 ppm for 1-hour, or is changed to an 8-hour standard of 0.09 ppm with one allowable exceedence, Table VII-5a suggests potentially significant incremental benefits associated with a secondary standard based on SUM06. He further states that if the primary standard is set at 0.07 or 0.08 ppm with one exceedence, there is little to be gained by establishing a separate secondary standard.

Although the three remaining CASAC members were neither biologists or economists, they offered their opinion on the secondary standard proposals. Two think the form proposed by the Agency is appropriate. One thinks that the level proposed by the Agency is appropriate, while the other feels that the Administrator's discretion should be broader than the range presented in the Staff Paper. One of these members pointed out, however, that the Staff Paper does not make it clear enough that the SUM06 standard as proposed is a practical choice being made as to the level of effects that will be tolerated and not a level that will prevent effects from occurring. The third is uncomfortable with SUM06 and based on the estimates in Tables VII-5a-VII-7, recommends an 8-hour standard at the same level as the new primary standard. The three members also concurred that given the crudeness of the risk assessment estimates, policy decisions cannot be based firmly on science.

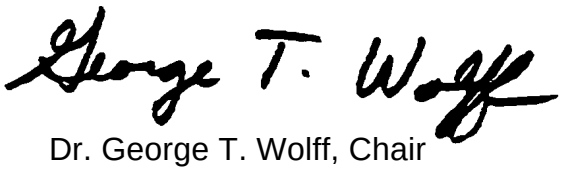
A number of the Panelists offered their insights as to why there are such divergent opinions on the recommended form and level of the standard. The main issues are the lack of sufficient rural ozone data, and the lack of relevant plant exposure studies. There are serious deficiencies in terms of the distribution of monitoring sites, particularly in rural areas that prevent us from accurately assessing exposure once ozone damage is observed. The Panel is in agreement that plants are being damaged by ozone and that the current secondary standard is not sufficiently protective, but there remain important limitations to our understanding of the extent of

the response of vegetation to ozone under field conditions. Five years from now, if we do not have the results of research coupling ozone air quality and plant biology under conditions more representative of ambient field conditions, to avoid the shortcomings of the open-top chamber experiments, then we will continue to be hampered by our inability to come to consensus on the levels of air quality that are protective of vegetation and ecosystems at the most reasonable cost. In addition, a number of Panelists expressed the importance of knowing the consequences of decisions concerning National Ambient Air Quality Standards. Once a decision is made to change the standard or to maintain the status quo, we must be able to determine, by appropriate monitoring and research, what the consequences will be in terms of ambient air quality and effects on vegetation and ecosystems.

In summary, a majority of the Panel has come to closure on the secondary part of the ozone Staff Paper despite the desire of the Panel for additional significant revisions. These revisions have been communicated to your staff by this letter and in written comments by individual Panel members. The Panel trusts that your staff will address these concerns.

CASAC would appreciate being kept informed of progress on establishing a revised or new ozone standard, and plans for research on ozone effects. Please do not hesitate to contact me if CASAC can be of further assistance in this matter. We look forward to seeing the final version of the secondary standard portion of the Staff Paper.

Sincerely,



Dr. George T. Wolff, Chair
Clean Air Scientific Advisory Committee

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