



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

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OFFICE OF
THE ADMINISTRATOR

Subject: CASAC Review and Closure of the OAQPS Staff
Paper for Particulate Matter

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From : Sheldon K. Friedlander, Chairman
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To : Anne M. Gorsuch
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The Clean Air Scientific Advisory Committee (CASAC) recently completed its second and final review of the document entitled Review of the National Ambient Air Quality Standards for Particulate Matter: Assessment of Scientific and Technical Information, OAQPS Staff Paper. The Committee notes with satisfaction the improvements made in the scientific quality and the completeness of the staff paper. It has been modified in accordance with the recommendations made by CASAC in July and November 1981. This document is also consistent in all significant respects with the scientific evidence presented and interpreted in the combined criteria document for sulfur oxides and particulate matter. It has organized the data relevant to the establishment of particulate primary and secondary ambient air quality standards in a logical and compelling way, and the Committee believes that it provides you with the kind and amount of technical guidance that will be needed to make appropriate revisions to the standards.

CASAC has prepared this closure memorandum to inform you more specifically of its major findings and conclusions concerning the various scientific issues and studies discussed in the staff paper. In addition, the Committee's review of the scientific evidence leading to the particulate standard revision leads to a discussion of its own role in the process for setting the standard.

CASAC Conclusions and Recommendations on Major Scientific Issues and Studies Associated With the Development of Revised NAAQS for Particulates

1. Based upon the review of available scientific evidence, a separate general particulate standard remains a reasonable public health policy choice.

2. CASAC reaffirms its initial recommendation of July 1981 to establish a 10 micrometer cut point for a revised primary particulate standard. This recommendation is based upon a recognition of the periodic, and sometimes frequent, tendency of both healthy and sensitive populations to breathe through their mouths and/or oronasally. This practice increases the amount of particulate matter that can penetrate into the thorax because the larger particles are not filtered in the oronasal passages. Deposition of particulates into this region is of special concern to those individuals with pre-existing respiratory problems and children. In addition, the collection of particles of less than 10 micrometer diameter size more closely resembles particles passing into the thoracic region of the human body than the collection of larger sized particles. Furthermore, monitors equipped for a 10 micrometer cut are less wind dependent and can provide a more accurate profile of the contemporary ambient air than samplers which measure total suspended particles.

CASAC's recommended size cut is also similar to proposals of other scientific associations. For example, 88% of the national members of the Air Quality Committee of the International Standards Organization recently voted for a particulate cut point at 10 micrometers for sampling particles which can deposit in the lungs.

The CASAC recommendation is based upon available scientific data. Other individuals and groups have discussed the possibility of establishing a revised particulate standard at a size cut considerably less than 10 micrometers. However, for the current revision of the standard, the scientific data more readily support a 10 micrometer size cut.

3. CASAC reached several major conclusions concerning the revision of the 24-hour and annual particulate standards. At the upper bound of the proposed ranges of 150-350 $\mu\text{g}/\text{m}^3$ for the 24-hour and 55-110 $\mu\text{g}/\text{m}^3$ for the annual averages, detectable health effects occur in the populations evaluated in the epidemiological studies. Since the upper end of these ranges contain little or no margin of safety, it would be appropriate to consider lower values for revising the 24-hour and annual standards. In addition, the stated ranges are based solely on quantitative evidence reported in epidemiological studies. A final decision on a revised standard should also incorporate information generated through controlled human, animal toxicology, and from other less quantitative epidemiological studies discussed in the criteria document.

There is an absence of a clearly definable exposure-response relationship for particles, as amply discussed in the criteria document and the staff paper. In addition, because airborne particles are heterogeneous in composition, the potential toxic effects of individual constituents should be considered in setting the standard. Thus, compared to margins of safety set for pollutants such as ozone and carbon monoxide, where exposure-response relationships are better established and small margins of safety are more justifiable, CASAC believes you should consider a revised standard with a wider margin of safety.

4. The Committee reached general agreement that the annual particulate standard should consist of an arithmetic mean. It is recommended that the 24-hour standard include a statistical form and that the number of exceedences is set in relation to the revised standard level.

5. During the past decade, the link between visibility and fine particle mass concentrations has been convincingly documented. Visibility is a sensitive indicator of accumulated man-made pollutants in the ambient air. The public cares about visibility and is willing to pay something for clean air. However, the quantitative basis for establishing a psychological, economic, transportation or any other welfare cost associated with visibility impairment has not been established. In addition, controls required to achieve a given visibility standard are not known due to the complexities of pollutant transport and transformation.

Defining acceptable levels of visibility is a social/policy judgment as well as a scientific decision, but science can provide some guidance. The upper end of the 8-25 ug/m³ range for fine particles (those particles with a diameter size of less than 2.5 micrometers) would tend to maintain the status quo for the eastern United States and some western urban areas, but would permit air quality degradation for large areas in the west including national parks. Also, it is highly uncertain that the recommended thoracic particle ranges for the primary standard will protect visibility. The 8-25 ug/m³ range for fine particles suggested for visibility protection is a seasonal and spatial average, unlike peak values which will be recommended for the primary standard.

The strongest case for a visibility related standard is one that links emissions of nitrogen oxides and sulfur dioxide with the interrelated aspects of acidic deposition, possible climatological effects, and visibility. Each of these three air quality issues is related to the fine particles which originate both as primary particulate emissions and as secondary aerosols from atmospheric conversions of sulfur dioxide and nitrogen oxides emitted as vapors. In terms of a control strategy to protect public welfare, it may be more efficient to consider a common standard linked to fine particles than to establish a separate set of controls for each of these problems and pollutants.

6. The Committee's evaluation of scientific data and studies in the criteria document and the staff paper lead it to conclude that there is no scientific justification for the establishment of a particulate standard for the specific protection of vegetation.

7. The Committee discussed what effect elimination of a Total Suspended Particulate (TSP) standard would have on the environment. The soiling and nuisance aspects of TSP are essentially local air quality problems because such coarse particles are not transported great distances. This contrasts with visibility or oxidant related problems which are distinctly issues of long range pollution transport. Individuals who serve on the Committee made various recommendations regarding retention or elimination of a secondary standard for TSP, but no clear consensus evolved.

The Process for Setting the Ambient Particulate Standard

In its report of September 21, 1981, CASAC made several major recommendations relating to the process for setting ambient air standards. The Committee is aware that your staff is analyzing its report and is awaiting a response.

A major underlying assumption of the Committee's recommendations was the need to make more explicit the relationship between the scientific evidence in the criteria document and the staff paper and the eventual selection of a numerical level for individual standards. The Committee strongly believes in the need to clarify the standard setting process by identifying the key studies that will shape the determination of a standard. Intensive evaluation of such studies by CASAC and the public will considerably increase your ability to set a scientifically supportable standard.

The Committee is greatly encouraged by your decision to improve the format and content of OAQPS scientific issue staff papers. In the Draft Staff Paper for Particulate Matter key studies are identified and their implications for setting primary and secondary standards are discussed. More importantly, the inclusion of numerical ranges and their supporting rationale enabled the Committee and the public to critically examine the staff's proposed use of the studies. This led to a marked improvement in the quality of the public dialogue concerning the scientific basis for revising the standard. CASAC commends your effort and recommends that all staff papers developed for ambient air standards contain numerical ranges.

CASAC recognizes that your statutory responsibility to set standards requires public health policy judgments in addition to determinations of a strictly scientific nature. While the Committee is willing to further advise you on the particulate standard, we see no need, in view of the already extensive comments provided, to review the proposed particulate standards prior to their publication in the Federal Register. In this instance, the public comment period will provide sufficient opportunity for the Committee to provide any additional comment or review that may be necessary.