April 27, 2011

California Air Resources Board
1001 I Street
P.O. Box 2815
Sacramento, CA 95812
http://www.arb.ca.gov/

Re: Public Hearing to Consider the Approval of a Progress Report and Proposed State Implementation Plan Revisions for PM2.5 (http://www.arb.ca.gov/regact/nonreg/sip2011.pdf)

Dear Board Members:

Before you approve the proposed State Implementation Plan (SIP) Revisions for PM2.5 (http://www.arb.ca.gov/planning/sip/sip.htm), there needs to be a comprehensive review of the currently available evidence that underlies the public health justification for the SIP, particularly within California. Based on my assessment of the epidemiologic evidence, there is NO current relationship between PM2.5 and total mortality in California and PM2.5 causes NO "premature deaths" in California. I have summarized this evidence in my April 21, 2010 CARB Comments (http://www.arb.ca.gov/lists/offroad09/25-carb_enstrom_comments_on_pm2.5___mortality_in_ca_042110.pdf) and my December 15, 2010 CARB Comments (http://www.arb.ca.gov/lists/on-offroad10/160-ca_relationship_pm2.5___mortality_table_121510.pdf) (http://www.scientificintegrityinstitute.org/Enstrom121510.pdf).

Primary consideration must be given to the current California-specific PM2.5 evidence, to the substantial geographic variation in PM2.5 mortality risk across the United States, and to the underlying weaknesses of the existing evidence. Reservations like these have been expressed in the April 19, 2011 U.S. Environmental Protection Agency (EPA) "Policy Assessment for the Review of the Particulate Matter National Ambient Air Quality Standards" (EPA 452/R-11-003) (http://www.epa.gov/ttn/naaqs/standards/pm/data/20110419pmpafinal.pdf). Note the equivocal statements regarding "Primary Standards for Fine Particles" and the potential lowering of the national annual PM2.5 standard to a value similar to the current California standard of 12 μg/m³ :

"In assessing the adequacy of the current suite of annual and 24-hour PM2.5 standards meant to protect public health against long- and short-term exposures to fine particles, staff concludes that the currently available information clearly calls into question the adequacy of the current standards and that consideration should be given to revising the suite of standards to provide increased public health protection. In considering alternative PM2.5 standards, staff concludes that protection from both long and short-term PM2.5 exposures can most effectively and efficiently be provided by relying primarily on the annual standard . . . "Taking into account both evidence-based and risk-based considerations, staff concludes that consideration should be given to revising the current annual PM2.5 standard level of 15 μg/m³ to a level within the range of 13 to 11 μg/m³. . . . In reaching these conclusions, staff recognizes that uncertainties and limitations remain in the currently available evidence and quantitative risk estimates." (page ES-1)

"With respect to understanding the nature and magnitude of PM2.5-related risks, as discussed above, we recognize that epidemiological studies evaluating health effects associated with long- and short-term PM2.5 exposures have reported heterogeneity in responses both within and between cities and geographic regions across the U.S. . . . "In particular, we note that there are challenges with interpreting differences in health effects observed in the eastern versus western parts of the U.S. . . . Therefore, we recognize that important uncertainties remain in this review related to understanding the temporal and spatial variability in PM2.5 concentrations, including PM2.5 components, and associated health impacts across different geographic areas and seasons." (page 2-25)

As an example of the need to reassess the public health justification for the SIP, there needs to be careful examination of the proposed revisions to the PM2.5 and ozone SIP for the South Coast Air Basin and Coachella Valley adopted by the South Coast Air Quality Management District on March 4, 2011 (http://www.aqmd.gov/hb/attachments/2011-2015/2011Mar/2011-Mar4-039.pdf). These revisions address critical issues in the November 22, 2010 U.S. EPA notice of proposed partial approval and partial disapproval of the 2007 Air Quality Management Plan (AQMP) (http://www.aqmd.gov/aqmp/07aqmp/aqmp/Complete_Document.pdf). However the 2007 AQMP does not provide a strong public health basis for the SIP regarding PM2.5 health effects.

In Chapter 2 there is a very qualified statement regarding health effects associated with particulate matter (PM10 and PM2.5) that is not specific to California (http://www.aqmd.gov/aqmp/07aqmp/aqmp/Chapter_2.pdf):

"A consistent correlation between elevated ambient fine particulate matter (PM10 and PM2.5) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, studies have reported an association between long-term exposure to air pollution dominated by fine particles (PM2.5) and increased mortality, reduction in life-span, and an increased mortality from lung cancer. . . .The elderly, people with pre-existing respiratory and/or cardiovascular disease and children appear to be more susceptible to the effects of PM10 and PM2.5."

In Appendix I there is a more detailed presentation of the health effects evidence as of June 2007 (http://www.aqmd.gov/aqmp/07aqmp/aqmp/Appendix_I.pdf), but it does not present the current California-specific PM2.5 evidence showing NO relationship between PM2.5 and total mortality, including the Enstrom 2005 study, and it does not discuss the geographic variation in PM2.5 mortality risk across the United States and the underlying weaknesses of the evidence. The presentation of "Long-Term Exposure Effects" is given on pages I-13 to I-15:

"While most studies have evaluated the acute effects, some studies specifically focused on evaluating the effects of chronic exposure to PM10 and PM2.5. Studies have analyzed the mortality of adults living in different U.S. cities. After adjusting for important risk factors, these studies found a consistent positive association of deaths and exposure to particulate matter. A similar association was observable in both total number of deaths and deaths due to cardiorespiratory causes. A shortening of lifespan was also reported in these studies.

Significant associations for PM2.5 for both total mortality and cardiorespiratory mortality were reported in a study using data from the American Cancer Society. A reanalysis of the data from this study confirmed the finding (Krewski, 2000). The Harvard Six Cities Study evaluated several size ranges of particulate matter and reported significant associations with PM15, PM2.5, sulfates, and non-sulfate particles, but not with coarse particles (PM15 – PM2.5). An extension of the Harvard Six Cities Cohort

confirmed the association of mortality with PM2.5 levels (Laden, 2006). These studies provide evidence that the fine particles, as measured by PM2.5, may be more strongly associated with mortality effects from long-term particulate matter exposures than are coarse compounds.

A follow-up study of the American Cancer Society cohort confirmed and extended the findings in the initial study. The researchers estimated that, on average, a 10 μg/m³ increase in fine particulates was associated with approximately a 4% increase in total mortality, a 6% increase in cardiopulmonary mortality, and an 8% increase risk of lung cancer mortality (Pope, 2002). The magnitude of effects is larger in the long-term studies than in the short-term investigations. An analysis of the American Cancer Society Cohort from the Los Angeles area used a more detailed estimate of long-term PM2.5 exposures and found that the risk of mortality was up to three times higher than estimated with the national cohort (Jerrett, 2005). These findings indicate that longterm exposures may be more important in terms of overall health effects.

In summary, the scientific literature indicates that an increased risk of mortality and morbidity is associated with particulate matter at ambient levels. The evidence for particulate matter effects is mostly derived from population studies with supportive evidence from clinical and animal studies. Although most of the effects are attributable to particulate matter, co-pollutant effects cannot be ruled out on the basis of existing studies. The difficulty of separating the effects may be due to the fact that particulate levels co-vary with other combustion source pollutants. That is, the particle measurements serve as an index of overall exposure to combustion-related pollution, and some component(s) of combustion pollution other than particles might be at least partly responsible for the observed health effects."

The above examples support the need for a comprehensive review of the public health justification for the California SIP before you approve the proposed SIP Revisions for PM2.5.

Thank you very much for your consideration.

Sincerely yours,

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