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October 29, 2018

Citizens' Advisory Committee
San Joaquin Valley Air Pollution Control District
1990 East Gettysburg Avenue
Fresno, California, 93726

Via Email

RE: 2018 Plan for the PM 2.5 Standards (The Plan)

Dear Committee:

On October 2, the Citizens' Advisory Committee (CAC or Committee) voted to form a subcommittee to write a report of our recommendations about the District's PM 2.5 Plan. I urge the Committee to include the following two statements in our written recommendation.

Recommendation 1:

As part of the implementation plan, we recommend that there be an updated scientific evaluation of the health risks and costs from exposure to ambient PM 2.5 in the San Joaquin Valley. There seems to have been a dramatic decrease in exposure to PM 2.5 since 1992. Accordingly, there should be proper studies that show the health effects, costs and benefits of the SJVAPCD programs implemented since 1992 and the likely benefits and costs of proposed programs to further reduce ambient PM 2.5 in the San Joaquin Valley.

Recommendation 2:

The district should implement the incentive elements of the PM 2.5 Plan, but delay implementation of the enhanced regulatory measures pending the results of further studies.

The development and submission of the Plan will not be significantly delayed by incorporating these important recommendations. I explained my recommendations in more detail below.

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RECOMMENDATION 1:
UPDATE SCIENTIFIC STUDIES.

The District has achieved remarkable success since it began implementing air quality rules in 1992. The District has adopted 650 rules as part of its "aggressive control strategy" to reduce emissions in the Valley.

The District has been able to achieve a significant reduction in PM 2.5 and other emissions by implementation of "the nation's toughest air pollution emission controls...."

Emissions from stationary sources have been reduced by 85%, cancer risk from exposure to air pollutants has been reduced by 95%, population exposure to elevated PM2.5 levels have been reduced by 85%, and population exposure to elevated ozone levels have been reduced by 90%. (page 1-1)

Emissions are at historic lows and the number of good air quality days are at historic highs through out the Valley. In my home city, Stockton, the air quality index days in 2017 were 72% good days, 23% moderate days and only 5% unhealthy days for sensitive groups. (Page A - 53).

There has been so much progress, it will be difficult and costly to reduce PM 2.5 much further, from the existing levels of about 18 micrograms per cubic meter, down to the federal 2012 standard of 12 micrograms per cubit meter.

Given the significant emissions reductions already achieved through stationary and area source regulatory strategies and the significant investment necessary to achieve emissions reductions, the Valley is at the point of diminishing returns from new regulatory controls on stationary and area sources. The search for emission reduction opportunities goes beyond traditional regulatory strategies and considers other opportunities for timely, innovative, and cost effective emissions reductions, including new incentive programs. (Page C-5)

Because of the dramatic improvement in emissions, air quality, and the substantial costs of moving to compliance with the 12 µg federal standards, we need to very carefully understand through proper research, the actual change in health outcomes as result

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of this dramatic improvement in air quality, and assess the costs and benefits looking at the past as a basis for evaluating future costs and benefits.

The remarkable successes of the past came at a cost of perhaps \$2 billion in direct subsidies and partner matching costs. I do not see where there has been an estimate of the cost of compliance 1992 through 2018 borne by other Valley residents, businesses, and governmental agencies. In the future, the cost to achieve perhaps another 6 µg improvement in ambient PM 2.5 levels could cost \$5 billion in incentive payments according to the District. We should have estimates of the economic burdens to be faced by individual Valley businesses, farms, and other parties beyond the \$5 billion in incentives.

The change in health outcomes cannot just be assumed or inferred by the use of "surrogates" as seems to be the case in most of the studies included in Chapter 3 of the Plan document. The District has the resources to undertake cogent studies of health outcomes, especially mortality, and costs and benefits the major, individual programs implemented over the period from 1992 through 2018.

The design of such studies is very important. In 2012 the EPA regional administrator stated:

Four times more people die in the San Joaquin Valley from air pollution than they do from traffic fatalities.

See attached letter and email.

These deaths were attributable to PM 2.5. As you can see from my 2012 correspondence with the EPA and my email with the recently retired executive director of the District Seyed Sadredin, the EPA did not seem to have cogent epidemiological studies at hand to support the mortality claim. Mr. Sadredin stated that he did not agree with the statistic attributable to the EPA. He further stated that premature deaths attributable to air pollution by some studies cannot be compared with traffic fatalities as suggested by the EPA.

That statement by our recently retired executive director is significant for three reasons.

First it reflects some uncertainty concerning mortality claims attributable to exposure to PM 2.5.

Second, this exchange shows that we should strive for studies with sufficient precision as to measure premature deaths from pollution exposure as we do from vehicle accidents. For example, vehicle accidents may be related to a number of factors including vehicle miles traveled (VMT), conditions of the road, and conditions of the human beings who are involved in such accidents. The conclusions of death from vehicle accidents is based on death certificates, that have a physician's determination of a cause of death, pathology reports, etc. There is a very high degree of reliability in the determination of deaths from vehicle accidents. Our studies should attempt to achieve a high degree of reliability in the determination of deaths from exposure to air pollution.

Third, there is a well developed literature on the costs and benefits of different accident mitigating public policies. Such methods may serve as a guide, or at least a standard, in designing studies to determine appropriate costs and benefits as we consider PM 2.5 exposure.

Chapter 3 of the Plan contains extensive explanations of the science that supports a link between exposure to PM 2.5 and mortality and morbidity. But there are several noteworthy issues and unknowns that could be resolved with an updated, properly designed scientific study of health risks, costs and benefits.

Some large constituents of PM 2.5 are not toxic yet standards are based on exposures to these constituents. For example ammonium nitrate may comprise about 40% of the Valley's annual PM 2.5 exposure, but it has a relatively low toxicity compared to organic carbon or elemental carbon.

Chapter 3 contains a laudable analysis of the ammonium sulfate component of PM 2.5. What must have been an extraordinary human subject experiment, 20 non-smoking subjects were exposed to PM 2.5 constituent ammonium sulfate at levels of 500 µg per meter cubed, which is about 100 times greater than ambient levels of this PM 2.5. There was no significant change in pulmonary function or subject health. It seems clear that toxicity of ammonium sulfate is very low, and yet it is counted in the ambient PM 2.5 measurements.

Similarly, for ammonium nitrate, the LD 50, (lethal dose that would kill 50 subjects) was reported to be two thirds of that of table salt. Again, this is a major part of ambient PM 2.5, and yet it clearly is not toxic.

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Where is the LD 50's for the presumed toxic constituents of PM 2.5 namely organic carbon and elemental carbon? . Perhaps they are buried in some reports, but I did not see studies that referred to the LD 50s. You can see from my 2012 letter to the EPA, I asked about LD determinations as being a part of a proper epidemiological study to support the claim of high mortality from exposure to PM 2.5. Certainly updated scientific studies should contain the LD 50 information for the chemicals in PM 2.5, as was recited in chapter 3 for ammonium nitrate.

I did not see studies that contain classic pathology reports. A major claim of Professor Enstrom from his submitted scientific article:

The EPA claim that PM 2.5 causes premature deaths is implausible because no etiologic mechanism has ever been established and because it involves a lifetime inhalation of only about 5 g of particulates that are less than 2.5 μm in diameter. (March 2017 Dose Response)

See Enstrom's September 14, 2018 submission provided to the CAC and Board:

<https://www.arb.ca.gov/lists/com-attach/2-sjvsipsupplement-VTBROQR2UnUCdlU6.pdf>

Enstrom raises a number of questions about the claim of a link between exposure to PM 2.5 and premature deaths. He claims that on average, over an 80 year life, an average adult inhales between 1 g and 5 g of PM 2.5, where there are concentrations between 8 and 15 mcg/m³. This compares to a 1 g dose delivered by smoking 20 cigarettes in a short period of time. If these statements are true, it does fundamentally question the etiological mechanism linking exposure to PM 2.5 to premature death.

Enstrom provided a list of eight peer-reviewed empirical studies that found no connection between exposure to PM 2.5 and premature deaths in the United States, and six additional studies specifically showing no mortality effect in California. The District should undertake studies that consider the claims raised by Enstrom and others cited.

Most important, well-designed studies should be able to show a clear relationship between the dramatic improvement in emissions and a expected dramatic improvement in actual health outcomes,

including a significant decrease in mortality in the San Joaquin Valley. The design of such studies should be open to review and contribution by well-qualified experts. The District does sponsor serious scientific studies, and indeed, actual health outcomes have been a special focus of the District at least since 2013.

As Chapter 3 explains, the District understands that the health risks arise from exposure to chemicals in PM 2.5 and probably from the smallest fine particles, specifically PM 0.1. Indeed, as the District stated:

Elevated exposure to freshly emitted PM 0.1 is a critical health risk factor that often does not correspond to ambient PM2.5 concentrations at local monitors. (Page 3-18)

Thus the focus on PM 2.5 measurements may be too blunt and perhaps off the mark, if we are concerned about health risks. Updated studies should concentrate on the ultrafine particles and the specific chemicals that are suspected of having adverse health risks.

The District in 2013 established its Health Risk Reduction Strategy (HRRS) program in order to maximize the public health benefits of the various measures undertaken to address air pollution, and to look more closely at the actual agents that might effect health. As the Plan recites:

Rather than ignore this growing body of scientific knowledge, the District's HRRS seeks to embrace it to the extent possible within the current CAA to maximize public health benefits. In practice, this knowledge provides the District with the necessary scientific foundation for justifying and prioritizing the pollution control measures that are necessary for demonstrating attainment of federal standards. The outcome is stronger, more health-protective Plans that reflect the current trajectory of scientific knowledge toward a more complete understanding of population risk from PM2.5 particles. (Page 3-7)

The District is playing an active role in funding "leading edge" health research focusing on the Valley population. The District should continue its commitment to "leading edge" research with a focus on the most fundamentally important studies that speak to health outcomes in the Valley.

Finally, while it is true the District must work within certain federal standards such as the Clean Air Act and the National Ambient Air Quality Standards (NAAQS), it is clear the District can and does undertake independent scientific research and evaluation. It participates in an intellectually honest effort to evaluate health risks and benefits. Read Chapter 3, and you will appreciate the District's commitment to evaluating the science. The call by the CAC to update the science is core to the mission and purpose of the District and the CAC.

Our role on the CAC is to provide comments and advice to the District and Board on proposed policy and rules, and to facilitate communication with our constituent groups. I circulated the PM 2.5 Plan document to a variety of groups in San Joaquin County, including environmental groups, agriculture and trucking. While I did not seek a formal statement of position from these groups, everyone I spoke to supported the recommendation for an update of the science that focused on actual health risk, costs and benefits. That supplication, that recommendation, certainly should be part of District policy and part of the PM 2.5 Plan.

RECOMMENDATION 2:
THE DISTRICT SHOULD IMPLEMENT INCENTIVE MEASURES BEFORE
REGULATORY MEASURES.

I could not locate full cost estimates relating to regulatory compliance in the Plan document. For past programs, the District has determined that \$2 billion was the cost of incentive programs, but no costs have been estimated for private and governmental compliance with new rules and regulations.

Similarly, we have a cost estimate of \$5 billion for future expected incentive Plans, but no estimate of the full costs of compliance. The District admits that today, it does not have established funding, or even favorable prospects, to raise the \$5 billion needed for the proposed incentive measures,

Given the lack of cost benefit studies relating to compliance proposals, and the hope that future studies will provide meaningful guidance on the most efficient and effective control Plans, the District should first implement the better developed, presumably more efficient incentive plans before issuing new regulatory rules. Also as recited above, there are significant diminishing returns to compliance measures.

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The currently establish control programs will provide the greatest reduction in PM 2.5 going forward. Indeed my reading of chapter 4 indicates that the additional reduction in emissions in PM 2.5 TPD (tons per day) under the enhanced regulatory control programs would be very minimal (e.g., 1 TPD), but potentially extremely costly. Almost all the future emission reductions are coming from regulatory elements already in place. Thus there is little loss by delaying implementation of the control measures to allow time to assess the updated science, and undertake a proper cost-benefit analysis of the various proposed measures.

The EPA has already granted an extension to meet the 2012 PM 2.5 standards until 2025. EPA guidance for extensions seems to allow the consideration of a number of factors relating to the science, health effects, natural conditions, economic feasibility, etc.

The statute also includes factors that EPA may consider in determining whether to grant the extension and the length of the extension, including the nature and extent of nonattainment, the types and numbers of sources or other emitting activities in the area (including the influence of uncontrollable natural sources and transboundary emissions), the population exposed to concentrations in excess of the standard, the presence and concentrations of potentially toxic substances in the mix of particulate emissions in the area, and the technological and economic feasibility of various control measures." (Page 6-2)

As I stated at our last Committee meeting, the District is in the vanguard of the cleanest and the greenest of all pollution control districts in the United States. The EPA would be reticent to impose sanctions to the extent there is a short delay in implementation because of the decision to update scientific studies and assess costs and benefits, with a view to implementing the most cost effective actions. Has the EPA recently issued a minatory letter or notice threatening sanctions? The District has achieved remarkable success. It seems unlikely to face draconian sanctions from the EPA by continuing with its PM 2.5 Plan even if there is some minimal delay in implementing a few elements.

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CONCLUSION.

The District has produced a remarkable document that reflects very deep and sound analyses, and accordingly, the SIP should go forward hopefully with the recommendations I proposed in this letter. I hope you will agree, the District should be open to updating the cogent science, and it should encourage consideration and analyses of economic and policy alternatives.

In considering alternatives, I hope the District will explore the benefits of promoting enhanced tree planting and maintenance in the Valley to help reduce air pollution including PM 2.5. At programs sponsored by the local chapter of the Sierra Club and Puentes, the benefits of urban and rural tree planing and maintenance were explained. I subsequently received several interesting and potentially relevant scientific papers, e.g., Variation in Tree Species Ability to Capture and Retain Airborne Fine Particulate Matter (2017 Nature Scientific Reports), and Tree and Forest Effects on Air Quality and Human Health in the United States (2014 Environmental Pollution). I do not want to presume too much, and I realize there must be cold, unbiased analysis behind any proposal, but there are deeply wonderful positive externalities from an environment blessed with an abundance of trees.

Sincerely,

Ned Leiba.

NL : ea

enc : January 31, 2012 letter to EPA Blumenfeld.

May 6, 2012, email from Seyed Sadredin.

September 14, 2018 Professor Enstrom's Submission.