

**October 19, 2012 EPA ARTBA CIAQC Teleconference  
on the CARB Request for Waiver for Off-Road Regulation**

Comments of  
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The claimed toxic effects of diesel particulate matter are hundreds of times smaller than, for example, the increased risk of lung cancer caused by cigarette smoking. These possible effects are smaller than any previously discovered in medical history, the actual exposure levels are so difficult to estimate, and there are so many confounding health factors (smoking and lifestyle) that are impossible to control, that the entire scientific basis of the regulatory policy needs to be broadly re-assessed *before* allowing CARB any kind of waiver in PM2.5 enforcement.

Over the last 4 years I've taken an objective look at all the available data on the key scientific question: Is fine particulate matter in diesel exhaust causing cancer and premature deaths of a measurable number of Californians? The short answer is that we do not yet know.

[As a professor of Physics at UCLA, I have no vested interest in which way the data point, the answer has no effect on my funding, or my career--making me almost unique in this controversy.]

FINE PARTICLES is the first "pollutant" which lacks any definition of what it is made of. Some of it is hydrocarbon residues from all kinds of combustion, but much of it can be almost anything, from specks of dirt, to airborne sea salt. The composition of what CARB defines as PM2.5 has changed over time, and is not the same as what has been studied in the eastern half of the United States. CARB stubbornly ignores these demonstrated differences. But even in the studies CARB advisors chooses to weight most heavily (the ones they are co-authors on), the claimed associations between FINE PARTICLES and "premature" deaths of almost any kind range from insignificant to barely "significant" at the 95% confidence level. In the physical sciences, you can't get a result published unless it passes the higher 99% significance level. None of the studies of mortality risks of fine particles has that statistical confidence. As the studies grow in size and in time coverage, the desperately low statistical significance of the claimed hazards of FINE PARTICLES has not improved at all. We still cannot confidently rule out the possibility that diesel exhaust is statistically associated with ZERO premature deaths.

There are many reasons:

**A fundamental problem is that the studies did not compare MATCHED samples of participants in the high- and low-exposure locations.** For example, poor people are more likely to live in polluted environments than are affluent people. Poor people are also more likely to suffer premature deaths. These correlations do NOT establish a causal connection. They do not show that it was the pollution, or the diesel exhaust in particular, that lead to the premature deaths. CARB’s policy rests on a simple, well-known statistical fallacy.

The only study which was able to select its sample through randomization still did NOT eliminate this problem of “confounding variables”. Why did that study find that the harmful effects of FINE PARTICLES vanish for people who received some education beyond high school? The particles don’t know what your education is. The obvious explanation is that more highly educated people are more affluent and enjoy healthier lifestyles—and that, not diesel exhaust, is the cause of their slightly lower premature death rates. The main finding was a 26% higher rate of premature death in the heavily polluted city of Steubenville, Ohio, compared with that of the unpolluted town of Portage, Wisconsin. This could simply be explained by slightly healthier lifestyles in Portage, but these key variables were not measured.

**The crucial question is whether CARB’s 85% rollback of diesel particle emissions will save lives.** But as CARB expert Joel Schwartz said, there is only one study of the effect of a reduction in emissions, and it found that the decreases in fine particles did NOT lead to statistically significant decreases in cardiovascular, respiratory, or lung cancer deaths (or “other” deaths).

**Even if one accepts the flawed studies without considering any of their problems, they still do not provide a clear answer.** The possible correlation between diesel exhaust particles and “premature deaths” (mostly from heart disease) is too small to have been decisively measured in previous studies. CARB puts the heaviest reliance on an elegant study which had a very small sample size of only 8000 subjects. The original effect was MARGINALLY significant. This study was extended for another 8 years. Although this substantially increased the total amount of data, it did NOT improve the statistical significance of the claimed effect, which was still MARGINAL. In fact, when the effects of sulfate emissions were included, that study shows NO harmful effects due to FINE PARTICLES.

The small sample size problem was reduced in the ACS study, which found a smaller effect than first one. However, ACS suffers much greater problems with data and methodology. When that study was extended, the statistical significance dropped to MARGINAL (Pope et al. 2002), and actually whisker-close to INSIGNIFICANT.

A major problem with all of these studies is that they estimate FINE PARTICLES exposure levels over very large areas. The CARB-funded Jerrett et al. (2011) study of the LA subset of ACS data was the only one which utilized data from particle monitors. They found NO significant correlation between PM2.5 and “premature deaths”.

**The marginal evidence described above is not supported by a larger number of other studies.** Even by CARB’s own loose standard, of the remaining studies, most of them found NO SIGNIFICANT EFFECT. These other independent studies have their

own strengths and weaknesses. Weighing all of them is more a matter of subjective taste, than a scientific process. The CARB advisors in effect chose to *ignore* them in favoring their claim of a significant, although tiny effect. If they had not “cherry-picked” the few results that supported their position, they would have had to admit that the totality of research is still consistent with the possibility that there is NO EFFECT AT ALL.

**Even if the very small claimed health hazards of diesel exhaust turn out to be real, they in no way justify CARB’s proposed draconian crash program.** CARB data show that FINE PARTICLES levels all across California were dropping rapidly before the economic recession. Their Table A-12 shows that in only 3 years starting in 2003, the pollution decreased by about 25%. By 2006 the most seriously effected region, the South Coast, had FINE PARTICLES levels which were only 50% higher than that measured in the Mojave Desert and Mountain counties. Thus most of the problem that CARB is attacking will already have disappeared under current regulations, before the proposed new ones take full effect.

The proposed regulations will require the expenditure of billions of dollars to replace most of the millions of diesel engines operating in California. **It is an iron rule of public health that making people poorer results in their being less healthy. One thing that DEFINITELY knocks a year or more off your life expectancy is losing your job. Thus even if the proposed diesel regulations do prevent an immeasurably tiny number of premature deaths, it is likely that they will DECREASE the overall health of Californians.**