

**Comments on May 22, 2008 CARB Draft Staff Report "Methodology for Estimating Premature Deaths Associated with Long-term Exposures to Fine Airborne Particulate Matter in California"**  
**Prepared for the Alliance of Automobile Manufacturers**  
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**Les Grant EPA slide 46 and selected text on pages S-10 and S-11 from entire text on pages S-5 to S-32**

In 1997, EPA relied heavily on two cohort studies, the Six-City study<sup>6</sup> and the ACS study<sup>7</sup> that reported associations of fine PM and sulfate with cardiopulmonary deaths. In a careful re-analysis of these two studies a Health Effects Institute (HEI)-sponsored team<sup>8</sup> replicated the results that show an increased risk in the range of 7 to 14 % for all-cause mortality and 12 to 19 % for cardiopulmonary mortality associated with a 10 µg/m<sup>3</sup> increase in PM<sub>2.5</sub>. However, the re-analysis also showed that 1) the increased risk was cardiovascular not respiratory, 2) one gaseous pollutant, SO<sub>2</sub>, had a strong association with mortality, 3) when SO<sub>2</sub> was included in the model the PM all-cause mortality association was materially reduced and became non-significant, 4) the increased mortality was experienced in the portion of the cohort that had a high school education or less, and 5) there was a significant spatial heterogeneity in the association, with no effect seen in western U. S. cities.<sup>9</sup> All these additional findings raise questions concerning the interpretation of the PM<sub>2.5</sub> associations as a universally applicable chronic PM health effect caused by generic PM<sub>2.5</sub>.

6 Dockery, D.; Pope, C.; Xu, X.; Spengler, J.; Ware, J.; Fay, M.; Ferris, B.; Speizer, F.; An association between air pollution and mortality in six U. S. cities, N. Engl. J. Med., 1993, 329, 1753-1759.

7 Pope, C. A.; Thun, M. J.; Namboodiri, M. N.; Dockery, D. W.; Evans, J. S.; Speizer, F. E.; Heath, C. W.; Particulate air pollution as a predictor of mortality in a prospective study of U. S. adults, Am. J. Resp. Crit. Care Med., 1995, 151, 669-674.

8 Krewski, D.; Burnett, R. T.; Goldberg, M. S.; Hoover, K.; Siemiatycki, J.; Jerrett, M.; Abrahamowicz, M.; White, W.; Reanalysis of the Harvard Six Cities Study and the American Cancer Society Study of Particulate Air Pollution and Mortality, Health Effects Institute Special Report, 2001.

9 Grant, L.; EPA Staff Presentation to CASAC, July 23, 2001; Key Revisions and Scientific Issues for Second External Review Draft of Air Quality Criteria for Particulate Matter; Slide 46 indicates an excess risk from 10 µg/m<sup>3</sup> PM<sub>2.5</sub> in the ACS cohort of +29 % in the Industrial Midwest, +25 % in the Southeast, +14 % in the Northeast, and -9 % in the West (West is a combination of cities in the Northwest, Southwest, Upper Midwest, and Southern California. NMMAPS geographic regions).

**Regional Adjustment Models for NMMAPS Regions**  
 From EPA staff presentation to CASAC 7/23/01

Region*	PM <sub>2.5</sub> Excess Risk Estimates		PM <sub>2.5</sub> and SO <sub>2</sub> Excess Risk Estimates		
	Risk	Conf. Limits	PM <sub>2.5</sub> Risk	Conf. Limits	SO <sub>2</sub> Risk
Northeast	14	(-7, 40)	3	(-15, 24)	19
Industrial Midwest	29	(10, 56)	9	(-12, 35)	19
Southeast	25	(1, 54)	9	(-4, 29)	10
West*	-9	(-29, 17)	-9	(-28, 16)	31
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7/23/01