



LETTERS

Particulate Matter Policy

Consistent with Jocelyn Kaiser's News & Comment article "Showdown over clean air science" (25 July, p. 466), airborne particulate matter (PM) has been repeatedly associated with morbidity and mortality, even at concentrations well within the Environmental Protection Agency's (EPA's) 150-microgram per cubic meter ($\mu\text{g}/\text{m}^3$) upper acceptability limit on 24-hour average PM of 10 micrometers or less (PM₋₁₀). Failure to identify plausible mechanisms by which PM₋₁₀ (or PM_{-2.5}, or both) might cause such effects at these low concentrations suggests to some that stressors associated with PM, rather than PM itself, might be causal.

Attributing PM effects to 24-hour averages reported under the National Ambient Air Quality Standard (NAAQS) is like attributing daily mortality reported in a war zone to 24-hour airborne lead concentrations instead of bullets. Real-time PM monitoring has revealed significant variability during 24-hour periods of low PM (1). Brief PM excursions have reached twice the estimated concentration prevailing during the 1952 London fog. Effects that EPA attributes to 24-hour average PM seem equally consistent with causation by excursions

to high PM concentrations, whose health significance is becoming increasingly evident. Excursions also could explain why a 24-hour PM effect threshold has been undiscernible, even though noncancerous effects typically exhibit thresholds. Effect thresholds can exist for PM too, but if they are threshold excursions embedded in 24-hour averages, their contribution to the 24-hour averages might be imperceptibly small, suggesting absence of a threshold.

This approach represents a more economical challenge for industry, whose compliance with the NAAQS could then focus on a small fraction of daily operations when PM control is least effective.

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References

1. R. A. Michaels. *Aerosol Sci. Technol.* **25**, 437 (1996).