

## HEALTH AND ENVIRONMENTAL EFFECTS OF ENGINE EMISSIONS

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The potential adverse health effects of mobile source emissions continue to be a major driver of engine emissions regulations and the development and implementation of emissions control technologies. Despite decades of research, there continue to be key uncertainties about the health hazards and risks from engine emissions. For example, studies of emissions components, such as diesel soot, often fail to include comparisons to other airborne respirable particles. It is not certain to what extent the potential health hazards from diesel engine emissions may be different from, or similar to, hazards from other combustion products. Because engines and their emissions have evolved rapidly, the relevance of past toxicological and epidemiological findings to current and future emissions is a perennial issue. Focus on health hazards from airborne particles has shifted progressively from total particulate matter, to  $PM_{10}$ , to  $PM_{2.5}$ , and to ultrafine particles. We have little knowledge of the behavior and health hazards of inhaled ultrafines, and especially those consisting of liquid condensates. It is difficult to derive useful estimates of diesel-related cancer risks from past epidemiological studies because exposures were not measured and of uncertainties about the rate of dieselization of railroads and heavy trucks. New epidemiological studies are underway, but not completed.

Overall, placing the potential health hazards from diesel engines in their proper context is complicated by our current pattern of regulatory and research focus on one man-made pollutant, pollutant class, or pollutant source at a time.

The purpose of this session is to provide an update on the OHVT effort to place the health and environmental impacts of heavy engine emissions in their appropriate context, and to provide tutorials on selected aspects of current health issues of relevance to the developers of engines, fuels, lubricants, and after-treatment technologies.

Doug Lawson provides an overview and update on OHVT's efforts in this field. Jane Warren gives an overview of the current status of diesel-related health issues and research. Mel Zeldin describes the recent and often-cited MATES-II study of air toxics in the South Coast region. John Peters describes the design, current results, and implications of the Southern California Children's Health Study which, among other goals, seeks to disentangle the effects of various air pollutants on children's respiratory health. David Diaz-Sanchez describes the latest findings regarding the potential role of diesel soot in amplifying allergic responses in the respiratory tract.