Chairman's Air Pollution Seminar Series

Wednesday, May 23, 2001
10:00 a.m. to 11:30 a.m.
Training Room 1 East/West, First Floor, Cal/EPA Building

Rethinking Exposure Assessment Using Dose Fractions

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A key step in assessing human health risks from air pollutant emissions is evaluating pollutant transport
from sources to receptors. Conventionally, this step employs modeling techniques with substantial data
requirements. This presentation will discuss the concept of dose fractions for describing source-to-receptor relationships. The concept facilitates comparing the exposures to pollutant emissions released from different sources or under different circumstances. Using dose fractions, preliminary health risk assessments for air pollutant sources can be more easily conducted. Further advances could assist in the development of control strategies tha more efficiently reduce human exposure to air pollutants.

In the context of this presentation, dose fraction is defined as pollutant mass inhaled by an exposed
individual per unit pollutant mass emitted from a source. A cumulative population dose fraction is also
defined to describe the total fraction of an emitted pollutant inhaled by all members of the exposed
population. Typical population dose fractions for an urban area from emissions outdoors ar ~10 to the 6th to ~10 to the 3rd. Population dose fractions associated with emissions in buildings or in moving vehicles are typically much higher, ~10 to the 3rd to ~10 to the 1st

As an illustration of the concept, magnitude estimates are developed of the exposure in the South Coast
Air Quality Management District to 14 pollutants from motor vehicles and environmental tobacco
smoke (ETS). For acetaldehyde and PM2.5, population doses from ETS exceed those from cars by
about an order of magnitude. These two source classes cause comparable population doses for
acrolein, benzo(a)pyrene, 1,3-butadiene, formaldehyde, and styrene. Motor vehicles dominate ETS as
a source of exposure to BTEX compounds (benzene, ethylbenzene, toluene, and xylenes) and carbon
monoxide. Ongoing work aims to refine our estimates of dose fractions from motor vehicles. We will
begin work in the fall on applying the dose fraction to explore the environmental health impact of
distributed electricity generation.

William W Nazaroff - *is the Roy W. Carlson Distinguished Professor of Civil and Environmental Engineering at the University of California, Berkeley. His research group addresses two main themes: (a) physics and chemistry of indoor air pollutants; and (b) understanding and controlling air pollutant exposures. He serves as associate editor of Journal of the Air & Waste Management*
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