

priority to those areas where risk assessors are most in need of new concepts, data, and methods. At the same time, EPA will foster the development and evaluation of new risk reduction technologies across a spectrum, from pollution prevention through end-of-pipe controls, to remediation and monitoring.

Research Topics of Interest

1. Human Health Risk Assessment

As described in the recent NRC report entitled "Science and Judgement in Risk Assessment," EPA uses health risk assessments to establish exposure limits and set priorities for regulatory activities. However, EPA is hampered by gaps in methods, models, and data needed to support risk assessments. In many cases default assumptions are used to extrapolate from animals to humans, from high to low doses, from acute to chronic exposures, and from lowest effect levels to no-effect levels.

One of EPA's Office of Research and Development's major research goals is to reduce reliance on such assumptions. For example, EPA needs biologically and physiologically-based predictive models that will provide new concepts, data, and methods that can replace default assumptions.

Research is needed on the following areas.

- Methods for estimating dose from cumulative human exposure (e.g., via air, water, soil, and food) to significant and persistent environmental contaminants. This research is intended to support evaluation of cumulative exposure and dose apportionment and to demonstrate the application of the methods developed to estimate human health risks.

- Principles governing age-dependent responses to environmental contaminants and to improve capabilities for animal-to-human extrapolation of health risks. Neurotoxicity is a priority response to be evaluated, but other end points will be considered.

- Quantitative toxicokinetic and toxicodynamic interactions among chemicals in environmental mixtures of members of chemical classes that are significant environmental contaminants (e.g., PAHs, halogenated solvents, metals, chlorinated dioxins and furans, PCBs, and pesticides).

- Toxicological interactions such as additivity, synergism, and antagonism in such mixtures. To improve the ability to estimate risks from environmental exposures, a priority is research that is focused on realistic exposures to environmental contaminants.

- Methods for quantifying non-cancer risks, such as reproductive or developmental disorders. Of special interest are methods that are based on validated correlations between biochemical or physiological markers and clinical end-points.

- Inter-individual and intra-individual variability in factors that affect susceptibility to toxicity from environmental contaminants. Further, research is needed to elucidate relationships between such variability and disease outcome.

- Human and animal reproductive processes vulnerable to environmental contamination. This research is needed to identify keystone or sentinel species whose reproduction can be monitored to signal potential risk to other species, including humans.

- Major uncertainties in risk assessment for microbial pathogens in surface and drinking waters. For example, critical gaps in knowledge exist with respect to occurrence and levels of microbial waterborne pathogens, infectious dose, survival in the environment, and susceptibility to treatment processes.

- Other research areas as defined by proposers that contribute to the overall goals of this research topic.

Approximately \$3.0 million will be available from fiscal year 1995 funds. A typical project will be supported for a period of up to 3 years at \$150,000 per year.

2. Indoor Air Quality in Large Office Buildings

The 1986 Superfund Amendments and Reauthorization Act (SARA) Title IV directs EPA to conduct and support research on indoor air quality. An important aspect of this research is improving the scientific understanding of, and reducing the uncertainties surrounding, the relationships among indoor air quality, human exposures, and large building design and operation.

Of interest are cross-sectional and/or longitudinal studies of large office buildings in relatively large geographical regions across the United States that characterize the relationships among:

- The physical, mechanical and environmental factors that influence indoor air quality;

- Relevant human exposures to aerosols, micro-organisms, volatile organic compounds, and other parameters such as air exchange rate and pesticides;

- The pathways through which these exposures occur;

- Occupant perceptions of indoor air quality and occupant productivity;

- The extent to which human activity patterns, building system operating practices or design, and indoor or outdoor air quality affect these exposures; and

- Other research areas as defined by proposers that contribute to the overall goals of this research topic.

To provide high quality data necessary for intra- and inter-building comparisons, minimum data requirements and analytical protocols must be the same or equivalent to those recommended in the following two documents: "A Standardized EPA Protocol for Characterizing Indoor Air Quality in Large Office Buildings," (6/1/94) and "The United States Environmental Protection Agency's Large Building Studies Quality Assurance Overview Document," (11/1/94). Copies of these two documents can be obtained by contacting Ross Highsmith at (919) 541-3121, or pahl.dale@epamail.epa.gov.

Approximately \$1.5 million will be available from fiscal year 1995 funds. A typical project will be supported for a period of up to 3 years at \$150,000 per year.

3. Air Pollutants (Particulate Matter, Tropospheric Ozone, and Toxics)

Certain widespread (criteria) air pollutants, such as ozone and particulate matter (PM), continue to pose serious public health risks for susceptible members of the U.S. population or risks to sensitive ecosystems. The Clean Air Act requires that EPA establish and periodically review and revise, as appropriate, criteria and National Ambient Air Quality Standards (NAAQS) for such pollutants. The Act also requires State Implementation Plans (SIPs) to be prepared, which describe control strategies that States and local authorities will employ to bring non-attainment areas into compliance with the NAAQS.

The EPA is seeking investigator-initiated grant proposals aimed at generating new knowledge to:

- (1) Improve the scientific basis for future reassessment of the PM NAAQS;

- (2) Reduce uncertainties in SIP modeling projections for tropospheric ozone and measurement of the effectiveness of SIPs in meeting the ozone NAAQS;

- (3) Increase the understanding of transport and deposition of volatile and semi-volatile toxic pollutants, and the ultimate exposure of humans and ecosystems to them; and

- (4) Other research areas as defined by proposers that contribute to the overall goals of this research topic.