Of particular interest in relation to the first area are projects that will provide information useful in resolving controversies regarding epidemiologic analyses that suggest associations between increased mortality and morbidity, and particulate matter concentrations markedly below the current particulate matter NAAQS, including:

- Improving quantitative estimates of particulate matter exposure;
- Employment of epidemiologic analyses that more directly estimate potential effects; and
- Evaluation of potential confounding variables (e.g., weather).

Possible approaches may involve, but are not restricted to, alternative biostatistical models, coupling existing or refined epidemiologic analyses to improved exposure data, case-control or cross-sectional studies of mortality, indices of morbidity, and/or biomarkers of effects. The relative roles of fine versus coarse particles and of chemical composition are of particular interest.

Of interest in the second area is fundamental research in the atmospheric chemistry, modeling, emissions, and ambient measurement of tropospheric ozone contributing to strengthened control strategy development and improved assessment of SIP effectiveness, including:

- Kinetic and mechanistic studies of gas-phase reactions involving aromatic volatile organic compounds (VOCs), biogenic VOCs, long-chain alkenes and alkanes that participate in ambient photochemistry, and studies on the link between ozone and heterogeneous or aqueous-phase reactions;
- Studies to explore boundary layer turbulence and mixing, and their interaction with atmospheric chemistry, and studies of quantitative techniques for assessing the errors or uncertainties inherent in concentration estimates from ozone air quality modeling systems;
- Studies of large-scale fluxes of biogenic emissions of VOCs and NO_X for different landscapes;
- Studies that may lead to new techniques for ambient measurement, on short time scales, of chemically-significant trace gases participating in the photochemistry of ozone; and
- Both in-situ and remotely-sensed studies of innovative methods for using ambient concentration and meteorological measurements in assessing the potential ozone response to local changes in precursor emissions/concentrations.

Of interest in the third area are projects that address compounds, including aerosols, semi-volatile pollutants, and/or trace metals that travel through the air pathway, especially those that are persistent, mobile, or bioaccumulative. Also of interest are projects that investigate major uncertainties in:

- Transport and atmospheric phase equilibria;
- Composition versus particle size;
- Deposition to surfaces;
- Food chain uptake from atmospheric deposition; and/or
- Dermal exposure from atmospheric deposition.

Projects are encouraged that result in new or improved databases, algorithms, models, or modules for pre-existing models that can be used by the scientific community in the analysis of transport and fate of air toxics; the quantification of air and air-deposition pathways; and the assessment of risks for air toxics.

Approximately $2.5 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.

4. Regional Hydrologic Vulnerability to Global Climate Change

Vulnerability research is a major responsibility of EPA's Global Climate Change Research Program. Understanding regional vulnerability to climate change is critically dependent on understanding how projected wide-spread climate change affects the hydrologic watershed at scales where water resources and related ecologic, economic, and socio-political impacts are manifested. In order to make informed decisions concerning the risks of global change, the public and policymakers need a better understanding of the hydrologic vulnerabilities of regional systems. This, in turn, requires improved methodologies that identify and quantify physical and economic regional vulnerabilities to competing hydrologic demands, under current climate patterns and under projected climate-change scenarios.

Attempts to quantify these types of vulnerabilities have been hampered by the absence of techniques for performing regional analyses using projected climate change. These regional analyses should include both direct hydrologic response (e.g., soil moisture, streamflow, stream temperature) as well as secondary impacts upon regional ecology and economics. Major sources of uncertainty in conducting regional hydrologic analyses are the sensitivities of regional hydrologic systems to changing climate and future demands for water. Accordingly, as part of EPA's interest in watershed research, this solicitation invites proposals that address climate change aspects of watershed hydrology in the following areas:

- Translation of climatic information into water availability (e.g., soil moisture and streamflow) and other ecologic variables as required by water resource and natural resource modelers.
- Linkage of water availability with water and natural resource response prediction.
- Linkage with economic activities in various sectors (e.g., agriculture and forestry) competing for the water resources, and associated feedbacks.
- Other research areas as defined by proposers that contribute to the overall goals of this research topic.

This solicitation seeks proposals that may include a range of innovative research approaches, from modeling to data analysis and observational and experimental approaches, singly or in combination. Proposals are encouraged without regard to specific location of any proposed hydrologic regional setting but should reflect the goal to reduce uncertainties in watershed hydrology as influenced by concerns about vulnerabilities to climate change.

Approximately $1.0 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.

The Application

Proposed projects must be research designed to advance the state of knowledge in the indicated areas of environmental science and technology. Applications will not be accepted for routine monitoring, state-of-the-art or market surveys, literature reviews, development or commercialization of proven concepts, or for the preparation of materials and documents, including process designs or instruction manuals.

Application forms and instructions are available in the EPA Research Grants Application Kit. Interested investigators should review the materials in this kit before preparing an application for assistance. The kits can be obtained at the following address: U.S. Environmental Protection Agency, Office of Research and Development, Office of Exploratory Research (8703), 401 M Street SW., Washington, DC 20460, (202) 260–7474.

Each application for assistance must consist of the Application for Federal Assistance Forms (Standard Forms—SF 424 and 424A), separate sheets that provide the budget breakdown for each year of the project, the resumes for the principal investigator and co-workers, the abstract of the proposed project, and