State of California

AIR RESOURCES BOARD

Resolution 80-41

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705;

WHEREAS, an unsolicited research Proposal Number 929-76 entitled "In Vivo Fate of Nitrogenous Air Pollutant Derivatives" has been submitted by the University of California at Davis to the Air Resources Board; and

WHEREAS, the Research staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 929-76 entitled "In Vivo Fate of Nitrogenous Air Pollutant Derivatives" submitted by the University of California at Davis for an amount not to exceed $115,986;

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 929-76 entitled "In Vivo Fate of Nitrogenous Air Pollutant Derivatives" submitted by the University of California at Davis for an amount not to exceed $115,986,

BE IT FURTHER RESOLVED, that the Executive Officer shall initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed in an amount not to exceed $115,986.

I certify that the above is a true and correct copy of Resolution 80-41 as passed by the Air Resources Board.

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 80-11-5a(1)
DATE: June 25, 1980

ITEM: Research Proposal No. 929-76 entitled "In Vivo Fate of Nitrogenous Air Pollutant Derivatives."

RECOMMENDATION: Adopt Resolution 80-41 approving Research Proposal No. 929-76 for funding in an amount not to exceed $115,986.

SUMMARY: Nitrogenous air pollutants include an extremely wide range of compounds: nitric oxide, nitrogen dioxide, nitrogen trioxide, dinitrogen trioxide, nitrogen pentoxides, nitrates, nitrites, nitric acid, countless organic nitro compounds, nitramines, and nitrosamines. For the most part, nitrogen oxide is the precursor of the entire photochemical sequence of the materials. Some are directly emitted through natural or industrial processes and particulate nitrogenous materials account for a significant portion of Hi-Vol samples taken from urban air.

This proposal is submitted to extend and complete a three-year research study of the biochemical and distributional fates of inhaled nitrates and nitrites. It would be directed toward specific goals to:

1. Study the biochemical and distributional aspects of carrier added NO_2^- and NO_3^- following inhalation,

2. Compare the biochemical and distributional aspects of carrier added NO_2^- and NO_3^- administered via the blood, digestive, and pulmonary systems,

3. Compare interspecies, in-vivo biochemistry of inhaled NO_2^- and NO_3^-,

4. Compare chronic vs. acute pathways and effects,

5. Study the role of certain potential NO_2^- and NO_3^- metabolic inhibitors, and

6. Prepare and study the metabolism of labeled organic nitrates and nitrosamines.

An important element of this effort is that it would provide an interspecies comparison of biochemical activity and allow a detailed look at how the materials affect mice. This has not been possible until recently due to the limited size of samples that can be taken from mice. The improvement in methods centers around making more active tracers. The importance of further mouse work is that large amounts of information dealing with toxicology and metabolisms of various compounds exists for mice.

State of California

AIR RESOURCES BOARD

Resolution 80-42

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705;

WHEREAS, an unsolicited research Proposal Number 925-76 entitled "Respirable Environmental Particulates In Humans" has been submitted by the University of California at San Diego to the Air Resources Board; and

WHEREAS, the Research staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 925-76 entitled "Respirable Environmental Particulates In Humans" submitted by the University of California at San Diego for an amount not to exceed $120,921;

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 925-76 entitled "Respirable Environmental Particulates In Humans" submitted by the University of California at San Diego for an amount not to exceed $120,921,

BE IT FURTHER RESOLVED, that the Executive Officer shall initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed in an amount not to exceed $120,921.

I certify that the above is a true and correct copy of Resolution 80-42 as passed by the Air Resources Board

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO: 80-11-5a(2)
DATE: June 25, 1980

ITEM: Research Proposal No. 925-76 entitled "Respirable Environmental Particulates in Humans."

RECOMMENDATION: Adopt Resolution 80-42 approving Research Proposal No. 925-76 for funding in an amount not to exceed $120,921.

SUMMARY: Both the State and federal governments have recognized the need to address the health implications of inhaled fine particles in terms of an ambient standard. It is felt that reliance on current TSP measurements and the associated ambient air quality standard may not provide meaningful protection from the health hazards that fine particles might pose.

Present considerations are directed toward atmospheric particles of two size regimes, respirable particles below about 2.5 microns and inhalable particles between about 2.5 microns and 15 microns. Attempts to date to settle on a numeric standard for either size fraction have been difficult. The key area of uncertainty centers on a lack of understanding of the size composition of particles and how this influences their health impacts.

The purpose of this proposal is to gather the data mentioned above and try to relate it to actual disease states. Previous work by the proponent has shown elevated particle loading associated with certain diseases and he postulates an association between particles of everyday environmental origin and certain types of lung disease. In carrying out this study, the proponent would employ human lung tissues and cells collected from human subjects. Subjects and tissues would be selected from those with residence histories in Los Angeles and San Diego in particular.

Two basic lines of research are proposed. The first would be carried out on both healthy subjects and subjects with lung disease for the Los Angeles and San Diego areas. Efforts will center on removal of alveolar macrophages from the lung and analyzing the physical and chemical nature of the particles they contain. These cells function as an important actor in the process of particle removal from the deep lung. The second portion of this study consists of obtaining tissue samples from

children and adult subjects who have suffered from specific types of lung disease thought to be associated with increased particle numbers in regions of the lung. Information would be gained on the numbers, sizes, types, and composition of particles in these tissues.

Detailed information on possible confounding occupational and smoking factors will be gathered on all subjects to allow more meaningful study of environmental pollutant exposures.

This study will provide valuable information which will be useful in establishing a fine particle standard.

State of California

AIR RESOURCES BOARD

Resolution 80-43

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705;

WHEREAS, an unsolicited research Proposal Number 911-76(a) entitled "Continued Development of a Mathematical Modeling Capability for Photochemical Air Pollution-Reactive Plumes" has been submitted by the California Institute of Technology to the Air Resources Board;

WHEREAS, the Research staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 911-76(a) entitled "Continued Development of a Mathematical Modeling Capability for Photochemical Air Pollution-Reactive Plumes" submitted by the California Institute of Technology for an amount not to exceed $99,951;

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 911-76(a) entitled "Continued Development of a Mathematical Modeling Capability for Photochemical Air Pollution-Reactive Plumes", submitted by the California Institute of Technology, for an amount not to exceed $99,951,

BE IT FURTHER RESOLVED, that the Executive Officer shall initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed in an amount not to exceed $99,951.

I certify that the above is a true and correct copy of Resolution 80-43 as passed by the Air Resources Board

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO: 80-11-5a(3)
DATE: June 25, 1980

ITEM: Research Proposal No. 911-76(a) entitled "Continued Development of a Mathematical Modeling Capability for Photochemical Air Pollution-Reactive Plumes."

RECOMMENDATION: Adopt Resolution 80-43 approving Research Proposal No. 911-76(a) for funding in an amount not to exceed $99,951.

SUMMARY: The Caltech Grid Model (CGM) developed under an earlier ARB contract is now undergoing final verification studies. This model represents the state-of-the-art knowledge in the area of airshed modeling. To make it a more versatile tool, the model should be integrated with a state-of-the-art point source reactive plume model. This will give the Board the capability to accurately model large point sources emitting NO_x and/or reactive hydrocarbons and evaluate the interaction of emissions from these sources with urban smog. The purpose of this proposal is the development of a three-dimensional model for a single point-source reactive plume and to incorporate the model into the CGM. The proposal seeks support for work which will expand upon earlier modeling efforts. The anticipated development involves three major tasks:

Task 1: Plume Dynamics - the development of models for plume rise and dispersion in an arbitrarily stratified atmosphere. An earlier computer code developed by the hydraulics group at Caltech will be modified to quantify the trajectory and dispersion of a buoyant plume in the atmosphere.

Task 2: Plume Chemistry - the development of means to calculate the rates of atmospheric reactions involving hydrocarbons, oxides of nitrogen, and sulfur dioxide occurring in a turbulently dispersing plume. As a starting point, the investigators propose to use the work of Shu, Lamb, and Seinfeld. This work deals with some of the problems of plume chemistry with the existing reactive plume models.