State of California
AIR RESOURCES BOARD

Resolution 81-55

September 24, 1981

WHEREAS, John Gibson has regularly attended Citizens Advisory Council meetings for the past three years on behalf of John Sproul;

WHEREAS, John Gibson has extensive background and interest in the legal aspects of air pollution control as assistant general counsel for Pacific Gas and Electric;

WHEREAS, John Sproul has been unable to attend Citizens Advisory Council meetings because of his responsibilities as executive vice-president of Pacific Gas and Electric;

NOW, THEREFORE, BE IT RESOLVED, that John Gibson is appointed to membership on the Citizens Advisory Council replacing John Sproul.

I certify that the above is a true and correct copy of Resolution 81-55 as adopted by the Air Resources Board.

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 81-56

September 24, 1981

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 "Responses to Oxidants" has been submitted by the University of California at Santa Barbara 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 "Responses to Oxidants" has been submitted by the University of California at Santa Barbara for an amount not to exceed $167,030;

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 "Responses to Oxidants" submitted by the University of California at Santa Barbara for an amount not to exceed $167,030,

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 $167,030.

I certify that the above is a true
and correct copy of Resolution 81-56
as adopted by the Air Resources Board.

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO: 81-19-3 b1
Date: September 23, 1981

ITEM: Research Proposal No. 929-76 entitled "Responses to Oxidants."

RECOMMENDATION: Adopt Resolution 81-56 approving Research Proposal No. 929-76 for funding in an amount not to exceed $167,030.

SUMMARY: California smog is a mixture of many compounds. Prominent are photochemical oxidants, NO_2, aerosols and hydrocarbons. The photochemical oxidant portion is a complex mix of ozone, peroxides and other organic oxidizers, particularly peroxyacyl nitrates (PANs). Considerable research effort has been brought to bear on elucidating the effects of ozone on plants and animals to the extent that a fair picture now exists of the hazards associated with this pollutant. PANs, (specifically peroxyacetyl nitrate) are another case. Early vegetation research was done to identify PAN damage followed by limited exposure work to confirm the field finding that concentrations in the 100-1000 ppb range affect certain plants. Very limited work has been done employing PAN in human or animal exposure work. Among such limited research is the early work by Drs. Gliner and Horvath at U.C. Santa Barbara showing pulmonary function effects at 0.24 ppm PAN.

Recent regulatory actions by EPA have brought up the question of how adverse effects of the oxidant complex might differ from those of ozone alone. EPA has now established an ozone standard numerically less stringent than the earlier oxidant standard. Such a standard may well protect most of the U.S. where ozone rather than other oxidants is present. One of the central issues regarding their change in the standard from oxidant to ozone was whether removing other oxidants from consideration might allow potentially harmful effects. In order to investigate this more fully, the Board funded a study last year to begin a planned three-year effort. This proposal is to complete year two. One element of this study is to determine whether acute interaction effects can be seen between O_3 and PAN (peroxyacetyl nitrate) on metabolic, pulmonary and neurological responses in man. Subjects numbering between 10 and 15 will undergo moderate exercise (at approximately 50 percent of their maximal capacity) in 30-minute shifts followed by a 30-minute intermission of exercise, and then repeated exercise for another hour. During the rest periods the subjects will perform mental accuracy, motor-skill and pulmonary function testing. Previous studies by the proponent

have demonstrated these factors to be affected by ozone exposure. Heart rate, oxygen consumption and carbon dioxide production will also be measured to indicate the metabolic state of the individuals at various times during the exposure. E.E.G. tracings will also be taken at the end of each exercise period to obtain information on nervous system status.

The second part of this study would extend previous efforts to examine the response of subjects to different regimes of repeated ozone exposure. Specifically, work would be done to: 1) provide a more definitive statement concerning effects of prior exposure to low levels of O_3; 2) determine the variables that will predict whether an individual will be sensitized by low levels of ozone, and; 3) determine the extent of sex differences in sensitivity to ozone, and the degree to which these differences are related to differences in pulmonary capacities and to differences in work capacity.

State of California
AIR RESOURCES BOARD

Resolution 81-57

September 24, 1981

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 1042-85 entitled, "Effects of SO_2 and Ozone on Growth Productivity, Physiology and Biochemistry of Crops", 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 1042-85 entitled, "Effects of SO_2 and Ozone on Growth Productivity, Physiology and Biochemistry of Crops", submitted by the University of California at Davis, for an amount not to exceed $115,531;

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 1042-85 entitled, "Effects of SO_2 and Ozone on Growth Productivity, Physiology and Biochemistry of Crops", submitted by the University of California at Davis, for an amount not to exceed $115,531,

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 $115,531.

I certify that the above is a true and correct copy of Resolution 81-57 as adopted by the Air Resources Board.

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 81-19-3 b2
DATE: September 23, 1981

ITEM:

Research Proposal No. 1042-85 entitled "Effects of SO_2 and Ozone on Growth Productivity, Physiology and Biochemistry of Crops".

RECOMMENDATION:

Adopt Resolution 81-57 approving Research Proposal No. 1042-85 for funding in an amount no to exceed $115,531.

SUMMARY:

Much of the work that makes up our current understanding of how air pollution affects plants is derived from the study of rather simple end points such as visible foliar injury or the reduction in the overall weight of plant material at the end of a growing season. Such work has commonly been done under uncontrolled field conditions or in greenhouses. More recently, we and others have tried to consider more subtle factors like protein or carbohydrate content. What is proposed here is a major departure from the more traditional field or greenhouse studies. The proponent would apply potentially more sensitive plant physiological and biochemical methods in conjunction with careful control of environmental parameters to assure a straightforward assessment of effects. In effect, this study would investigate the cellular level implications of air pollution in terms of whole plant exposure. Sulfur dioxide and ozone are the pollutants of interest. They would be employed at several concentrations, both singly and in combination. As with cellular-level assessments of pollutant effects on animal systems, the information obtained would help explain related whole-plant effects. This would allow detection of changes before visible injury occurs and may provide data that can be readily extrapolated to other species. This is the second year of a projected three year study.

This study is divided into three related efforts which address different facets of O_3 and SO_2 effects as a multi-disciplinary effort. In all cases the investigators intend to employ several different plant species and varieties within each species to allow addressing of possible mechanisms for expected variation in sensitivity to the pollutants to be employed.

The first part of this study will concentrate on the effects of SO_2 and O_3 on the viability of pollen and pollen tube growth under controlled temperature and humidity conditions. This would allow careful study of

the effects of SO_2 and O_3 on this important stage of plant reproduction.

The second part of the study would center on how exposure to SO_2 and ozone would affect leaf function in terms of water and solute movement. Air pollutants are known to affect the stomata of many plants. These act as the "first line of defense" for plants to prevent the entry of pollutants to less protected internal air space cell surfaces. Once inside, it is thought that the pollutants will have an effect on the metabolic activity of cells through effects on membrane function of such cells.

Finally, the third part of this study will concentrate on the biochemical effects of SO_2 on plants. It is the investigator's observation that SO_2 exposures initiate the release of "stress" ethylene and ethane in response to lipid peroxidation. Ethylene is also known to be produced in response to other stresses like physical injury.

Specifically the investigators would expose plants to varying amounts of SO_2 and measure the levels of "stress" ethylene and ethane. An attempt will be made to study whether the level of ethylene produced is related to the relative sensitivity of the plants employed. Efforts will also be made to determine if ethylene enhances or reduces the plant's tolerance to SO_2 through the use of agents known to block its production. The investigator would also study the fate of atmospheric SO_2 in soils by employing radio-chemical methods.

The results of these studies should provide valuable insight into the cellular level effects of pollutants on vegetation and improve our total understanding of the effects of pollutants on California crops.

State of California
AIR RESOURCES BOARD

Resolution 81-58

September 24, 1981

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 1043-85 entitled "Characterization and Control of Primary Carbon Particle Air Quality in the South Coast Air Basin", has been submitted by California Institute of Technology, 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 1043-85 entitled, "Characterization and Control of Primary Carbon Particle Air Quality in the South Coast Air Basin", submitted by the California Institute of Technology for a total amount not to exceed $321,561;

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 1043-85 entitled, "Characterization and Control of Primary Carbon Particle Air Quality in the South Coast Air Basin", submitted by the California Institute of Technology for a total amount not to exceed $321,561,

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 $321,561

I certify that the above is a true and correct copy of Resolution 81-58 as adopted by the Air Resources Board.

Sally Rump

Sally Rump
BOARD SECRETARY

State of California
AIR RESOURCES BOARD

ITEM NO. 81-19-3 b3
DATE: September 23, 1981

ITEM: Research Proposal No.1043-85 entitled "Characterization and Control of Primary Carbon Particle Air Quality in the South Coast Air Basin"

RECOMMENDATION: Adopt Resolution 81-58 approving Proposal No. 1043-85 for funding in an amount not to exceed $321,561.

SUMMARY:

The objective of this project is to establish the technical foundation for the development of primary carbon particle air quality control strategies in the South Coast Air Basin. Elemental and organic particulate carbon concentrations will be determined by a year-long 10-station monitoring network calendar year 1982. An emissions inventory will be developed to account for the emissions of primary organic and elemental carbon in the Los Angeles basin. The salient features of particulate carbon air quality behavior in the South Coast Air Basin that must be reproduced by a successful air quality model will be identified. Then candidate emissions to air quality models for particulate carbon will be reviewed in light of their data requirements. The most effective approach to primary particulate carbon control strategy development will be established.

This three year study will provide valuable information on the occurrence and control of primary carbonaceous aerosol emissions in the South Coast Air Basin. The proposed study is timely in view of the fact that carbonaceous particle emissions from diesel vehicles and wood burning are increasing in the South Coast Air Basin. Substantial deterioration of visibility and air quality are expected to result from the continued increase of such emissions unless appropriate control strategies are designed and implemented. The results from this research are expected to be critical to the Board in developing strategies to ensure that acceptable levels of air quality are not exceeded.