State of California
AIR RESOURCES BOARD

Resolution 80-50

August 28, 1980

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 934-78 entitled "Investigation of the Role of Natural Hydrocarbons in Photochemical Smog Formation in California" has been submitted by the University of California at Riverside 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 934-78 entitled "Investigation of the Role of Natural Hydrocarbons in Photochemical Smog Formation in California" submitted by the University of California at Riverside for an amount not to exceed $137,964;

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 934-78 entitled "Investigation of the Role of Natural Hydrocarbons in Photochemical Smog Formation in California" submitted by the University of California at Riverside for an amount not to exceed $137,964,

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 $137,964.

I certify that the above is a true and correct copy of Resolution 80-50 as passed by the Air Resources Board.

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO: 80-14-4(b-1)
DATE: August 28, 1980

ITEM: Research Proposal No. 934-78 entitled "Investigation of the Role of Natural Hydrocarbons in Photochemical Smog Formation in California," University of California, Riverside, Arthur M. Winer.

RECOMMENDATION: Adopt Resolution 80-50 approving Research Proposal No. 934-78 for funding in an amount not to exceed $137,964.

SUMMARY: Recent reports in the literature have advanced the hypothesis that a significant relationship exists between enhanced emissions attributable to biomass increases resulting from wet winters and abnormally high ozone levels during the following summers. Naturally-occurring hydrocarbons volatilized from supposedly increased biomass were suggested as the primary factor responsible for the observed increase in days with ozone concentrations exceeding the federal air quality standard.

One of the weakest links in the biomass hydrocarbon-ozone hypothesis is that no evidence is available to show whether reactive hydrocarbons of biogenic origin are actually accumulating to a concentration sufficiently high to significantly affect ambient ozone levels in locations such as the South Coast and Bay Area Air Basins. While a substantial amount of data gathered under ambient conditions suggests that bio-mass hydrocarbons do not accumulate to concentrations that would have a significant effect on ozone production, such conclusions have been challenged in the published literature and the issue remains unresolved.

This proposal is the second part of a two-year effort to investigate the role of natural hydrocarbons in ozone. During the first year of this study, the investigators have developed the equipment and methodology to identify and measure natural hydrocarbons in the ambient air, for measuring emission rates for vegetative communities, and for making smog chamber studies of precursor oxidant relationships in the South Coast Air Basin. In the proposed program the investigators will use these methodologies and equipment to (1) measure

rates of emission of representative plant species; (2) measure ambient concentrations of natural hydrocarbons in "source" areas in the South Coast Air Basin; and (3) determine the impact of natural hydrocarbons on smog formation.

The staff and the Research Screening Committee believe that the question concerning the importance of natural hydrocarbons as a significant precursor for photochemical smog remains largely unanswered and that sound experimental evidence is needed to permit a final scientific judgment on this issue.

State of California
AIR RESOURCES BOARD

Resolution 80-51

August 28, 1980

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 935-78 entitled "Effects of Ozone and Sulfur Dioxide on Forage and Range Species: 1. On Growth and Partioning; 2. Under Simulated Grazing (Defoliation)", has been submitted by the University of California at Riverside, to the Air Resources Board; and

WHEREAS, the Research staff has reviewed and recommended this proposal for funding:

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

> Proposal Number 935-78 entitled "Effects of Ozone and Sulfur Dioxide on Forage and Range Species: 1. On Growth and Partioning; 2. Under Simulated Grazing (Defoliation)", submitted by the University of California at Riverside, for an amount not to exceed $125,000;

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 935-78 entitled "Effects of Ozone and Sulfur Dioxide on Forage and Range Species: 1. On Growth and Partioning; 2. Under Simulated Grazing (Defoliation)", submitted by the University of California at Riverside for an amount not to exceed $125,000.

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 $125,000.

I certify that the above is a true and correct copy of Resolution 80-51 as passed by the Air Resources Board.

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO: 80-14-4(b-2)
DATE: August 28, 1980

ITEM: Research Proposal No. 935-78 entitled "Effects of Ozone and Sulfur Dioxide on Forage and Range Species: 1. On Growth and Partitioning; 2. Under Simulated Grazing (Defoliation)", University of California at Riverside, Victor Youngner

RECOMMENDATION: Adopt Resolution No. 80-51 approving Research Proposal No. 935-78 for funding for an amount not to exceed $125,000.

SUMMARY: The current state of understanding on how air pollution affects vegetation has been derived from numerous studies done on common crop or tree species. Few efforts have been expended in looking at natural or grassland vegetation. The monetary value of these uncultivated species has not been as obvious as with cultivated species, but their productivity is very important to the livestock industry, to wildlife and for the preservation of watersheds. The results of the few studies done to date on grasslands materials have shown various effects. Such factors as gradual changes in species distribution, decreased grazing capacity, protein content reductions and decreased number of tillers have been reported, sometimes after very low level exposures.

The proposal is made up of two projects that will employ different exposure facilities, plant species and exposure protocols, and study somewhat different end points.

Project 1: In this study, two important California forage grasses will be exposed to ozone and/or SO_2, each at 0.2 ppm. The exposure protocol will consist of fumigating plants 6 hours/day, 5 days/week for 15 or 26 weeks depending on the grass.

Plants will be removed at intervals for analysis of important morphological and nutritional factors.

Project 2: Two separate fumigation protocols would be employed in this project. Fumigation I would employ SO_2 at 0, 0.1 and 0.2 ppm over a 6 hour/day, 5 days/week, four month period. Each exposure level would be replicated in three chambers. Fumigation II would expose plants to the same levels of O_3 as used for SO_2 over the same time scale. Half of the plants in each group would be clipped to simulate grazing at four week intervals. The other plants will be clipped only in the later part of the season. Plants will be removed at intervals for analysis of nutrient content and morphological effects.

State of California

AIR RESOURCES BOARD

Resolution No. 80-52

August 28, 1980

WHEREAS, a proposal to augment Contract Number A8-126-31, entitled, "Emission Characteristics of Cooling Towers Using Reclaimed Waste-Water in California", has been submitted by Science Applications Incorporated, 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:

> An Augmentation to Contract Number A8-126-31, entitled "Emission Characteristics of Cooling Towers Using Reclaimed Waste-Water in California", submitted by Science Applications Incorporated, for an amount not to exceed $12,645;

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:

> An Augmentation to Contract Number A8-126-31, entitled "Emission Characteristics of Cooling Towers Using Reclaimed Waste-Water in California", submitted by Science Applications Incorporated, for an amount not to exceed $12,645

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 $12,645.

I certify that the above is a true and correct copy of Resolution 80-52 as passed by the Air Resources Board.

Sally Rump

Sally Rump
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO: 80-14-4(b-3)
DATE: August 28, 1980

ITEM: Proposal to augment Contract Number A8-126-31 entitled "Emission Characteristics of Cooling Towers Using Reclaimed Waste-Water in California", Science Applications Incorporated, Michael Rogozan

RECOMMENDATION: Adopt Resolution No. 80-52 approving Proposed Augmentation of Contract A8-126-31 for an amount not to exceed $12,645.

SUMMARY:

This proposal is a request for augmentation of an on-going study of the emissions from cooling towers that employ reclaimed waste water as their working medium. The original SAI project was co-funded by ARB and the California Energy Commission and is well under way. Most towers selected for study have been sampled once to test basin and tower sites for their numerous organic, inorganic and biologic content. The Energy Commission, through ARB, has funded UCD in a separate contract to extend efforts of this project to look more closely at viral and bacterial content of the tower water and spray drift.

Several potentially important additional areas of work have emerged after analysis of samples obtained thus far and after discussions among the contractor, UCD, Energy Commission and ARB staff. The addition of these tasks to the original scope of work for this project would allow important improvements to be made at modest expense. Most of the changes could not have been foreseen at the start of the project.

The contractor will make one more complete sampling trip to each designated tower to collect both tower water and drift samples. If approved, all changes could be applied to applicable sites.

Briefly, the added efforts include: 1) additional bacterial sampling, 2) chlorine measurement, 3) efforts required to determine Legionnaires' Disease presence or absence, 4) Detailed analysis of organics from an oil refinery using waste water, 5) analysis of the metal content of the particulate fraction of water samples.