State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 01-7
February 22, 2001

Agenda Item No.: 01-2-1

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, a research proposal, number 2477-218, entitled "Heterogeneous NO_X Chemistry in Polluted Urban Atmospheres: Implications for the Formation of Particles and Ozone and Control Strategy Development", has been submitted by the University of California, Irvine.

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

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

> Proposal Number 2477-218 entitled "Heterogeneous NO_X Chemistry in Polluted Urban Atmospheres: Implications for the Formation of Particles and Ozone and Control Strategy Development", submitted by the University of California, Irvine, for a total amount not to exceed $200,000.

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 2477-218 entitled "Heterogeneous NO_X Chemistry in Polluted Urban Atmospheres: Implications for the Formation of Particles and Ozone and Control Strategy Development", submitted by the University of California, Irvine, for a total amount not to exceed $200,000.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein, and as described in Attachment A, in an amount not to exceed $200,000.

I hereby certify that the above is a true and correct copy of Resolution 01-7, as adopted by the Air Resources Board.

Marie Kavan

Marie Kavan, Clerk of the Board

Attachment A

"Heterogeneous NO_X Chemistry in Polluted Urban Atmospheres: Implications for the Formation of Particles and Ozone and Control Strategy Development"

Background

Nitrogen oxides (NO_X) react in the atmosphere to form ozone, particles, and other pollutants. The complexity of the nitrogen chemistry occurring in the atmosphere makes it necessary that the effect of NO_X control strategies be determined with air quality models. The accuracy of the results of the air quality modeling studies depends critically on an accurate knowledge of the chemistry occurring in the atmosphere. Until recently it was assumed that the end product of tropospheric NO_X was nitric acid. However, recent work has shown that nitric acid on a surface can react with nitric oxide (NO) to regenerate nitrogen dioxide (NO_2) which can then form ozone (O_3) and particulate nitrate. This finding may have very serious implications for the effectiveness of control strategies for both ozone and particulate matter (PM). Preliminary modeling studies suggest that this reaction may increase the formation of particulate nitrate and that existing models underestimate the benefits of NO_X controls.

Objective

The objective of this proposal is to answer some of the key questions arising from previous work regarding the heterogeneous chemistry of nitrogen oxides. It will investigate whether ammonium nitrate in particles undergoes a similar reaction, what is the effect of sulfuric acid, and whether nitrous acid also reacts with surface nitric acid. The goal is to provide a more complete understanding of the effect of heterogeneous nitrogen chemistry on ozone and particle formation.

Expected Results

The chemical data collected in this project will then be used to generate a comprehensive chemical mechanism for the heterogeneous reactions of NO_X in water which will be incorporated into an air quality box model.

Significance to the Board

The information gained in this project will improve our understanding of the reactions critical to accurately predicting the effect of NO_X controls on PM and ozone levels. Thus, it will improve our understanding of the processes involved in the formation of secondary pollutants that pose health risks and degrade California's visibility. The information will also be used to improve the chemical mechanisms used in ARB's attainment modeling for the State Implementation Plan.

Contractor:
University of California, Irvine

Contract Period:
12 months

Principal Investigator:
Professor Barbara Finlyson-Pitts

Contract Amount:
$200,000

Cofunding:
None

Basis for Indirect Cost Rate:
The indirect cost rate of 10 percent is a negotiated rate agreed to by the University of California campuses and the State.

Past Experience with this Principal Investigator:
Professor Finlayson-Pitts did an excellent job on a previous ARB contract and she was very cooperative in responding to requests from ARB staff. Her previous project produced a large amount of excellent quality science.

Prior Research Division Funding to the University of California, Irvine:

Year	2000	1999	1998
Funding	$0	$501,999	$0

BUDGET SUMMARY

The University of California, Irvine

Heterogeneous NO_x Chemistry in Polluted Urban Atmospheres: Implications for the Formation of Particles and Ozone and Control Strategy Development

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$125,400	
2.	Subcontractors	$ 0	
3.	Equipment	$ 13,000	
4.	Travel and Subsistence	$ 3,000	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 34,770 (1)	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 7,500	
	Total Direct Costs		$183,670
INDIRECT COSTS			
1.	Overhead	$ 16,330	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$16,330
TOTAL PROJECT COSTS			**$200,000**

[1] Supplies include: optical components, gases, solvents, chemicals, glassware, and expendable laboratory supplies.