State of California
AIR RESOURCES BOARD

Resolution 01-33

September 20, 2001

Agenda Item No.: 01-7-3

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 2497-221, entitled “Development and Evaluation of a Gas-Phase Atmospheric Reaction Mechanism for Low NO_X Conditions," has been submitted by the University of California, Riverside;

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 2497-221 entitled “Development and Evaluation of a Gas-Phase Atmospheric Reaction Mechanism for Low NO_X Conditions," submitted by the University of California, Riverside, for a total amount not to exceed $79,884.

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 2497-221 entitled “Development and Evaluation of a Gas-Phase Atmospheric Reaction Mechanism for Low NO_X Conditions," submitted by the University of California, Riverside, for a total amount not to exceed $79,884.

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 and in Attachment A, in an amount not to exceed $79,884.

I hereby certify that the above is a true and correct copy of Resolution 01-33, as adopted by the Air Resources Board.

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Marie Kavan, Clerk of the Board

ATTACHMENT A

"Development and Evaluation of a Gas-Phase Atmospheric Reaction Mechanism for Low NO_X Conditions"

Background

Air quality simulation models are used to assess the effectiveness of the control strategies and to develop plans and regulations for achieving air quality standards by regulatory agencies. The gas-phase chemical mechanism that represents the gas-phase chemical reactions involved in the model is a critical component for predictions of concentrations of pollutants such as ozone, particulate matter, and other secondary pollutants.

Under the sponsorship of the ARB, a detailed version of the atmospheric chemical mechanism SAPRC-99 has recently been developed by Dr. William Carter at the University of California, Riverside. This mechanism has been peer-reviewed and is considered a state-of-the-science mechanism. It has been used extensively in many regulatory and research applications. For example, this mechanism was recently used in developing the reactivity scales for California's aerosol coatings regulations. However, this mechanism was developed and evaluated for high NO_X conditions typical of urban areas. Its applicability to low NO_X conditions has not been validated. Low NO_X conditions exist in many current ambient atmospheres and will become typical of future case scenarios as the urban air quality improves. Thus, the chemical mechanism must be evaluated for accuracy when modeling low NO_X conditions in regional model simulations.

Objective

The objective of this two-year project is to evaluate and improve the performance of the current version of the SAPRC-99 chemical mechanism for simulating chemical transformations under low and very low NO_X conditions.

Methods

Both experimental and model studies are proposed to accomplish the objectives of this project. The four tasks proposed are to develop a low NO_X version of SAPRC-99, to evaluate the mechanisms using available low NO_X environmental chamber data as well as for new low NO_X chamber experiments, and to update and modify the mechanism.

Expected Results

A version of the SAPRC-99 chemical mechanism for low NO_X conditions and other files and programs related to the implementation of this mechanism in airshed model simulations.

Significance to the Board

The results of this project will improve our understanding of atmospheric chemistry in rural and remote areas, allow more accurate air quality simulation when modeling low NO_X conditions, and lead to more scientifically sound control plans and strategies.

Contractor:
University of California, Riverside

Contract Period:
24 months

Principal Investigator (PI):
William P. L. Carter, Ph.D.

Contract Amount:
$79,884

Cofunding:
The U.S. EPA is funding a four-year project to develop the next-generation environmental chamber facility needed for evaluating gas-phase and gas-to-particle atmospheric reaction mechanism. Specifically, this facility is designed for mechanism evaluation under low NO_X conditions. The characterization runs will be carried out under the funding from the U.S. EPA, which are critical for the new chamber runs of low NO_X evaluation to be useful. Because the U.S. EPA is funding a significant amount of the chamber work, this project is a very cost-effective use of the ARB's research funds.

Basis for Indirect Cost Rate:
The State and the University of California System have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:
The principal investigator, Dr. William Carter, is one of the pioneers in determining and quantifying VOC reactivity. He is the leader of the NARSTO's VOC reactivity assessment team. He has published approximately 75 journal articles and almost 70 technical reports in the areas of atmospheric chemistry, chemical mechanism development, and VOC reactivity assessment. He compiled the list of compound reactivities codified in California's Low Emission Vehicles/Clean Fuels and aerosol coatings regulations. He has completed several studies on VOC reactivity for the ARB and has always delivered a quality product at a very reasonable cost.

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

Year	2001	2000	1999
Funding	$0	$ 988,578	$ 484,943

B U D G E T S U M M A R Y

University of California, Riverside

Evaluation of Atmospheric Impacts of Selected Coatings VOC Emissions

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 47,636	
2.	Subcontractors	$ 0	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 500	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 1,500	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 20,122[1]	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 3,150	
	Total Direct Costs		$ 72,908
INDIRECT COSTS			
1.	Overhead	$ 6,976	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$ 6,976
TOTAL PROJECT COSTS			**$ 79,884**

[1] Phone, copying, office supplies $ 500
Software upgrades and other computer supplies $ 2,000
Miscellaneous laboratory supplies $ 1,100
Power for chamber experiments $ 2,200
CE-CERT Lab fees: 22 days @ $651/day $14,322
$20,122