

State of California  
AIR RESOURCES BOARD

Resolution 04-2

January 22, 2004

Agenda Item No.: 04-1-3

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 2545-233, entitled "Determination of Reactive Oxygen Species Activity in PM and Enhanced Exposure Assessment for the NIH, NIEHS Study Entitled: Ultrafine Particulate Matter and Cardiorespiratory Health," 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:

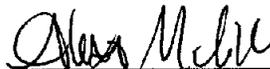
Proposal Number 2545-233, entitled "Determination of Reactive Oxygen Species Activity in PM and Enhanced Exposure Assessment for the NIH, NIEHS Study Entitled: Ultrafine Particulate Matter and Cardiorespiratory Health," submitted by the University of California, Irvine, for a total amount not to exceed \$175,000.

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 2545-233, entitled "Determination of Reactive Oxygen Species Activity in PM and Enhanced Exposure Assessment for the NIH, NIEHS Study Entitled: Ultrafine Particulate Matter and Cardiorespiratory Health," submitted by the University of California, Irvine, for a total amount not to exceed \$175,000.

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 \$175,000.

I hereby certify that the above is a true and correct copy of Resolution 04-2, as adopted by the Air Resources Board.



*fw* Stacey Dorais, Clerk of the Board

## ATTACHMENT A

### **“Determination of Reactive Oxygen Species Activity in PM and Enhanced Exposure Assessment for the NIH, NIEHS Study Entitled: Ultrafine Particulate Matter and Cardiorespiratory Health”**

#### **Background**

The National Institute of Environmental Health Sciences (NIEHS) is funding a major health study that includes collection of health outcome data from elderly people who reside at sheltered living facilities in southern California. The study, as approved by NIEHS, will use data from existing routine air monitoring stations, personal and indoor monitoring, as well as ultrafine PM counts and activity records as exposure predictors. Participants will be followed in 4 communities each studied during periods of both high and low photochemical activity. A total of 72 subjects will be followed in small groups during repeated 5-day periods of study. Each subject will wear monitors to record heart electrical activity and blood pressure, and will carry electronic diaries to record locations and activities. The investigators crafted their proposal to maximize the study sample size and to assure that critical effects measures were made while not exceeding NIEHS funding caps.

#### **Methods**

The current proposal would provide funds and monitoring resources to expand the nature of air pollution data available for the NIEHS-supported health study, as well as to add collection and evaluation of the chemical and biological characteristics of PM samples. A mobile monitoring trailer would be assembled and instrumented by ARB. It would report ultrafine particle counts, NO<sub>x</sub>, CO, Ozone, SO<sub>2</sub>, as well as continuous PM mass (PM<sub>10</sub> and PM<sub>2.5</sub>), carbon, nitrate, and sulfate. Indoor air monitoring efforts would also be enhanced by the operation of gaseous and carbon monitors. Mechanistic studies related to reactive oxygen species (ROS) are included. The ROS assays may reflect cellular level toxicity of particles that may explain how PM can harm people. The investigators will perform analyses of four quinone compounds that have previously been shown to play a role in redox reactions.

#### **Objective**

The overarching objective of the parent NIEHS funded study is to determine the nature of particulate-phase air pollution impacts on various parameters related to the health status of people who have existing cardiorespiratory disease. The specific objectives of this proposal are:

- To augment, extend, and improve existing air pollution monitoring activities. This will provide improved data for exposure assessments for particulate and gaseous air pollutants of health concern. The requested \$175,000 will be applied to fund efforts within this objective; and
- To evaluate the nature of particulate matter interactions with specific markers of possible chemical and biochemical activities that may be especially harmful. These markers are known as reactive oxygen species (ROS).

**Expected Results**

The results of this study are expected to define how common air pollutants, especially particle phase pollutants, are related to observed health impacts in people who may be at special risk because of existing cardiovascular disease. The results of joint ARB/ South Coast Air Quality Monitoring District-funded extensions of this work will enhance the likelihood of finding pollutant associations and will expand investigations to possibly explain the biological mechanisms by which effects may occur.

**Significance to the Board**

This study would address important questions of which chemical or size fractions of PM are most harmful, and what biological mechanisms underlie harmful effects. The funds requested would be heavily leveraged against a federally sponsored project. The findings of this study would have direct application to our Vulnerable Populations Research Program, to evaluations of air quality standards for PM, and increase our level of understanding regarding important air pollution exposures experienced by the elderly, a group of special concern for adverse impacts from ambient PM. The nature of the overall study, with the proposed additional monitoring, may provide findings regarding the short-term health consequences of PM exposure.

**Contractor:**

University of California, Irvine

**Contract Period:**

36 Months

**Principal Investigator (PI):**

Ralph Delfino, M.D., Ph.D.

**Contract Amount:**

\$175,000 (cost sharing is anticipated between ARB and the South Coast Air Quality Management District to fund full amount).

**Cofunding:**

This project is heavily cofunded. The base project is funded by the National Institute of Environmental Health Sciences at an amount of \$3.3 million. The current proposal requests approximately \$175,000. At this time, we plan to work with the South Coast Air Quality Management District to provide the required total funding and monitoring resources.

**Basis for Indirect Cost Rate:**

Indirect cost from the University of California, both for the prime contractor (UC Irvine) and a subcontractor (UC Los Angeles) are calculated at a rate of 10 percent while that for the subcontractor the University of Southern California are calculated at a rate of 30% (down from typical rates of over 55%).

**Past Experience with this Principal Investigator:**

The investigator has a well-earned reputation at the national level for innovative field epidemiological studies. He recently successfully completed a study funded by the ARB and the South Coast Air Quality Management District that evaluated the nature of childhood asthma and community exposures to toxic and criteria air pollutants.

**Prior Research Division Funding to UCI:**

Year	2002	2001	2000
Funding	\$140,590	\$34,800	\$200,000

# BUDGET SUMMARY

University of California, Irvine

## **“Determination of Reactive Oxygen Species Activity in PM and Enhanced Exposure Assessment For the NIH, NIEHS Study Entitled: Ultrafine Particulate Matter and Cardiorespiratory Health”**

### **DIRECT COSTS AND BENEFITS**

1.	Labor and Employee Fringe Benefits	\$ 91,707
2.	Subcontractors	\$ 0
3.	Equipment	\$ 71,200 <sup>1</sup>
4.	Travel and Subsistence	\$ 0
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 0
7.	Mail and Phone	\$ 0
8.	Supplies	\$ 2,657
9.	Analyses	\$ 0
10.	Miscellaneous	\$ 0
	Total Direct Costs	<u>\$ 165,564</u>

### **INDIRECT COSTS**

1.	Overhead	\$ 9,436
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	\$ 0
	Total Indirect Costs	<u>\$ 9,436</u>

**TOTAL PROJECT COSTS** \$ 175,000

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<sup>1</sup> Equipment- 2 continuous EC-OC analyzers (including shipping and training).