State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 06-13

April 20, 2006

Agenda Item No.: 06-4-2

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 2609-250, entitled "Effects of Inhaled Fine Particles on Lung Growth and Lung Disease", 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 2609-250 entitled "Effects of Inhaled Fine Particles on Lung Growth and Lung Disease", submitted by the University of California, Irvine, for a total amount not to exceed $450,446.

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 2609-250 entitled "Effects of Inhaled Fine Particles on Lung Growth and Lung Disease", submitted by the University of California, Irvine, for a total amount not to exceed $450,446.

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 $450,446.

I hereby certify that the above is a true and correct copy of Resolution 06-13, as adopted by the Air Resources Board.

Lori Andreoni

Lori Andreoni, Clerk of the Board

ATTACHMENT A

"Effects of Inhaled Fine Particles on Lung Growth and Lung Disease"

Background

One of the most provocative and potentially important findings from the Children's Health Study (CHS) conducted by the University of Southern California for the ARB was the significant association between reduced lung function growth and exposure to NO_2, acid vapor, fine ambient particles and elemental carbon. The cohort of children was followed to 18 years of age, by which age most lung growth is complete. Several other studies have also reported that young adults who grew up in Southern California had lower attained lung function than young adults who grew up in the San Francisco Bay area, which has lower air pollution levels. These results raise the question of whether or not air pollution exposure during the period of lung development induces lung growth deficits that are permanent, and if so, whether growth deficits can be repaired after that time. These findings also raise concern as to whether these deficits will manifest as chronic health effects in adult life.

Objective

The primary objective of this proposed study is to test the hypothesis that chronic fine particulate (PM2.5) exposures will induce oxidative stress and tissue injury in the lungs that leads to pulmonary function deficits in rodents exposed from birth to adulthood that are not reversible with subsequent filtered air exposure. The secondary objective will be to examine potential molecular mechanisms that could explain the biological basis for the phenomenon.

Methods

The objectives will be addressed using controlled animal exposures (mice) and a mobile exposure system using the VACES particle concentrator that was developed and tested with ARB support. Exposures will be conducted at two sites: the University of California, Riverside (UCR), and a site selected to be near one of the Children's Health Study sites along the Central Coast at which children showed little or no lung function loss by 18 years of age, as contrasted with Riverside. Currently the investigators are considering a site near Lompoc for the low pollution site.

The investigators will perform functional, tissue, biochemical and structural analyses of the lungs, and examine the degree to which particle chemical composition, physical characteristics, and concentrations of particles affect the observed outcomes. These measurements will be made using standard techniques.

The physical and chemical composition of the particles will be determined, and collected particles will be tested *in vitro* for the potential of these particles to produce free radicals and induce changes in cell signaling factors related to tissue growth or development.

Expected Results

The results of the study will provide critical data on possible developmental effects of PM2.5 exposure during childhood and adolescence, and the potential for PM2.5 exposure during childhood to influence development of lung disease later in life.

Significance to the Board
The project addresses a significant research gap that was identified during the recent review of the State ambient air quality standards for PM, and will support the next review of the State PM standards.

Contractor:
University of California, Irvine

Contract Period:
42 months

Principal Investigator (PI):
Michael T. Kleinman, Ph.D.

Contract Amount:
$450,446

Basis for Indirect Cost Rate:
The State and the UC system have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:
Dr. Kleinman has over 20 years experience performing research of the sort proposed. He has been PI on several previous studies that were funded by ARB, and he is well-known in the research community for the high quality of his research. His studies have contributed important information to federal and state ambient air quality standards for ozone and particulate matter.

Prior Research Division Funding to UCI:

Year	2005	2004	2003
Funding	$0	$150,000	$676,814

BUDGET SUMMARY

University of California, Irvine

"Effects of Inhaled Fine Particles on Lung Growth and Lung Disease"

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	$	316,863	
2.	Subcontractors	$	0	
3.	Equipment	$	25,000	
4.	Travel and Subsistence	$	11,892	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	577	
7.	Mail and Phone	$	750	
8.	Supplies	$	39,150	
9.	Analyses	$	3,000	
10.	Miscellaneous	$	14,537	
Total Direct Costs				$411,769

INDIRECT COSTS

1.	Overhead	$	38,677	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$38,677

TOTAL PROJECT COSTS **$450,446**