PROPOSED

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 09-63

December 9, 2009

Agenda Item No.: 09-10-1

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 2688-265, entitled "Health Effects of Central Valley Particulate Matter," has been submitted by the University of California, Davis;

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 2688-265 entitled "Health Effects of Central Valley Particulate Matter," submitted by the University of California, Davis, for a total amount not to exceed $496,429.

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 2688-265 entitled "Health Effects of Central Valley Particulate Matter," submitted by the University of California, Davis, for a total amount not to exceed $496,429.

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 $496,429.

ATTACHMENT A

"Health Effects of Central Valley Particulate Matter"

Background

Epidemiological studies have shown that respiratory and cardiovascular health effects are most associated with ambient PM concentrations one to three days previous to the advent of the adverse health response (lags 1 to 3), although respiratory and cardiovascular effects seem to have different lag structures. To date experimental human and animal studies have measured all respiratory and cardiovascular endpoints at the same time, even though the epidemiologic literature suggests that the greatest effects on the various endpoints examined to date do not peak at the same time. Consequently, it is possible that important information on the temporal pattern of respiratory and cardiovascular responses and their interrelationships has been missed.

As part of the San Joaquin Valley Health Effects Research Center, an EPA-funded PM center, the investigators have performed studies examining biological responses following exposure to concentrated ambient particles (CAP) in Fresno and Westside, California during both the summer and winter in several rodent species. The goal of these studies was to compare the relative toxicity of ambient PM in urban and rural locations in the Central Valley of California. The results to date have shown increased peripheral and systemic inflammation when measured at a single time point post-exposure, but the lag time between exposure and endpoint assessment was not investigated, leaving a key data gap related to whether inflammation peaks at a different time in the lung compared to the vasculature.

Objective

The objective of the project is to investigate the toxicity and inflammatory potential of urban and rural Central Valley PM on pulmonary, vascular and systemic health effects in a mouse model through the examination of health-related endpoints at 1, 2 and 4 days following the end of multi-day exposures to CAPs, which correspond to the time-relationship between exposure and effects in epidemiological studies.

Methods

The investigators will expose three groups of 16 Balbc mice each to filtered air (FA) or CAPs in a fully equipped mobile exposure trailer for six hours per day for 12 days during winter and summer. Animals will be acclimatized to the exposure site for one week prior to the beginning of exposure. One FA and one CAPs group of animals will be sacrificed at one, two and four days post-exposure. Half of the animals in each group will be used for analysis of lung inflammatory mediators, endothelial and platelet function, while tissues from the other half of each group will be used for studies of lung histopathology and anti-oxidant gene expression using standard methods. Endpoints will include lung and systemic markers of inflammation, inflammatory cell differential in the lungs, histology and gene expression of anti-oxidant genes in the lung tissue, and complete blood count, platelet activation and function studies to assess systemic procoagulant responses.

Expected Results
The results of this project will contribute to our understanding of how particulate matter influences cardiopulmonary function, and will support and help to explain epidemiological associations between particulate matter and adverse health effects.

Significance to the Board
The project will support the Board's activities in selecting and promulgating health protective ambient air quality standards for particulate matter.

Contractor:
University of California, Davis (UCD)

Contract Period:
36 months

Principal Investigators (PI):
Anthony S. Wexler, Kent E. Pinkerton, Fern Tablin, Dennis W. Wilson, and Laura S. Van Winkle

Contract Amount:
$496,429

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:
Each of the investigators involved in this project has more than 10 years of experience performing related work. Drs. Wexler, Tablin and Wilson have lead previous projects funded by ARB, and have produced high quality work.

Prior Research Division Funding to UCD:

Year	2008	2007	2006
Funding	$915,193	$935,020	$1,684,890

BUDGET SUMMARY

Contractor: University of California, Davis

Health Effects of Central Valley Particulate Matter

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	306,297	
2.	Subcontractors	$	0	
3.	Equipment	$	0	
4.	Travel and Subsistence	$	1,750	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	0	
7.	Mail and Phone	$	0	
8.	Supplies	$	76,300[1]	
9.	Analyses	$	0	
10.	Miscellaneous	$	73,646[2]	
	Total Direct Costs			$457,993
INDIRECT COSTS				
1.	Overhead	$	38,436	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$38,436
TOTAL PROJECT COSTS				**$496,429**

[1] The majority of supply costs will support molecular biology procedures ($24,900) such as RNA purification and reagents for ELISA and Bioplex testing ($24,900). The balance of supply costs will be used for mice, histopath supplies, imaging recharges, general laboratory expenses, and particle analysis.
[2] Miscellaneous costs comprise resident fees for two graduate student researchers during academic years 2009-2010, 2010-2011, and 2011-2012.