State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 08-14

February 28, 2008

Agenda Item No.: 08-2-2

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 2643-257, entitled "In-Vehicle Air Pollution Exposure Measurement and Modeling," 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 South Coast Air Quality Management District has agreed to cosponsor this proposal for the total amount of $250,000; and

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

> Proposal Number 2643-257 entitled "In-Vehicle Air Pollution Exposure Measurement and Modeling," submitted by the University of California, Irvine, for a total amount not to exceed $500,000.

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 2643-257 entitled "In-Vehicle Air Pollution Exposure Measurement and Modeling," submitted by the University of California, Irvine, for a total amount not to exceed $500,000.

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 $500,000.

I hereby certify that the above is a true and correct copy of Resolution 08-14, as adopted by the Air Resources Board.

Lori Andreoni

Lori Andreoni, Clerk of the Board

ATTACHMENT A

"In-vehicle Air Pollution Exposure Measurement and Modeling"

Background
Epidemiological and animal studies have shown an association between near-roadway exposure to particulate matter and other gaseous pollutants and adverse health effects. In-vehicle exposures to vehicle-related pollutants can be ten times higher than ambient levels for ultrafine particles (UFP) and volatile organic compounds, and such exposures have been shown to contribute to around half of the exposure to UFP by nonsmoking Los Angeles urbanites.

Objective
The objectives of this project is to measure and model in-cabin concentrations of key air pollutants, and apply the results to develop models for use in estimating in-transit exposures of subjects in epidemiological studies.

Methods
The contractor will measure and examine differences between vehicles for in-cabin pollutant concentrations by vehicle type and age during realistic driving conditions in southern California. The researchers specifically proposed to measure key air pollutants inside ten test vehicles for two weeks each on one selected route and inside a sport utility vehicle (SUV) on ten selected routes in southern California in order to develop new models on commuters' exposure to vehicular emissions. Air pollutants to be measured inside the ten vehicles include black carbon, particle-bound polycyclic aromatic hydrocarbons, total and non volatile particle number concentrations, particle size distributions, CO/CO_2, and PM2.5. Besides these pollutants, NO-NO_x and size segregated filter samples will also be collected inside the SUV. The contractor will examine the impact of important influential factors that contribute to in-cabin pollutant concentrations such as roadway type, diesel trucks and traffic, use of air conditioning, and geographic, meteorological, temporal conditions. Finally, the contractor will develop and validate in-vehicle exposure models for the selected pollutants measured in this study using randomly selected 30 percent of the data collected. In addition, the developed in-vehicle exposure model will be validated using black carbon data to be collected by ten subjects who will drive their own vehicles on their daily commuting routes different from what was used in the model development.

Expected Results
The models developed in this study will enable us to better understand the relationship between in-vehicle air pollutant exposures and the health of the people of California. The findings of this study will have direct application to health effect studies or epidemiological studies, and eventually the evaluation of air quality standards for particulate matter and gas pollutants to better protect the health of California residents.

Significance to the Board
The Air Resources Board (ARB) will have the ability to model in-vehicle exposures of sensitive populations and general commuters of California to assess the potential health effects of such exposures. ARB is in charge of defining clean air targets for California

and to build public support for air pollution abatement activities. Knowing the in-vehicle exposure will help understand the potential health effects and then the economic valuations of air pollution associated death and disease of such exposures. This ability will help prioritizing air pollution control measures in a more cost-effective way.

Contractor:
University of California, Irvine

Contract Period:
36 months

Principal Investigator:
Dr. Ralph J. Delfino

Contract Amount:
$500,000

Cofunding:
The California Energy Commission is contributing $250,000 to the cost of this study.

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. Ralph Delfino, has successfully contributed to studies funded or co-funded with ARB covering topics related to exposure, toxicity, and health effects of air pollution in particular with sensitive populations, such as children. He also has proven excellent collaborative research efforts with other research institutions in southern California like the University of Southern California and the University of California, Los Angeles.

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

Year	2007	2006	2005
Funding	$456,616	$368,534	$542,644

BUDGET SUMMARY

Contractor: University of California, Irvine

In-vehicle Air Pollution Exposure Measurement and Modeling

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 192,316	
2.	Subcontractors	$ 247,796	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 21,558	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 604	
7.	Mail and Phone	$ 1,855	
8.	Supplies	$ 4,646	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 6,025	
	Total Direct Costs		$474,800
INDIRECT COSTS			
1.	Overhead	$ 25,200	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$25,200
TOTAL PROJECT COSTS			**$500,000**

Attachment 1

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: Constantinos Sioutas – University of Southern California (USC)

Description of subcontractor's responsibility: USC will be responsible for the initial in-vehicle measurements and part of the data analyses. Also USC will train UCI staff on the field sampling work that will be carried out to validate the model.

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	159,747	
2.	Subcontractors	$	0	
3.	Equipment	$	0	
4.	Travel and Subsistence	$	3,104	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	0	
7.	Mail and Phone	$	0	
8.	Supplies	$	0	
9.	Analyses	$	0	
10.	Miscellaneous	$	24,089[1]	
	Total Direct Costs			$186,940
INDIRECT COSTS				
1.	Overhead	$	48,855	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$48,855
TOTAL PROJECT COSTS				**$235,795**

[1] Tuition for Research Assistant.

Attachment 2

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: Beate Ritz - University of California, Los Angeles

Description of subcontractor's responsibility: Dr. Ritz at UCLA will work to assure the relevance of exposure models to epidemiologic study designs, including ongoing or planned studies

DIRECT COSTS AND BENEFITS				
11.	Labor and Employee Fringe Benefits	$	10,910	
12.	Subcontractors	$	0	
13.	Equipment	$	0	
14.	Travel and Subsistence	$	0	
15.	Electronic Data Processing	$	0	
16.	Reproduction/Publication	$	0	
17.	Mail and Phone	$	0	
18.	Supplies	$	0	
19.	Analyses	$	0	
20.	Miscellaneous	$	0	
	Total Direct Costs			$10,910
INDIRECT COSTS				
5.	Overhead	$	1,091	
6.	General and Administrative Expenses	$	0	
7.	Other Indirect Costs	$	0	
8.	Fee or Profit	$	0	
	Total Indirect Costs			$1,091
TOTAL PROJECT COSTS				**$12,001**