PROPOSED

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 11-11

February 24, 2011

Agenda Item No.: 11-1-1

WHEREAS, the Air Resources Board (ARB or 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 2710-269, entitled "Construction of a DOAS Instrument for Installation at ARB for the Low Level Measurement of SO_2 to Investigate the Relation between SO_2 and Sulfate," 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 2710-269 entitled "Construction of a DOAS Instrument for Installation at ARB for the Low Level Measurement of SO_2 to Investigate the Relation between SO_2 and Sulfate," submitted by the University of California, Riverside, for a total amount not to exceed $90,004.

NOW, THEREFORE, BE IT RESOLVED that ARB, 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 2710-269 entitled "Construction of a DOAS Instrument for Installation at ARB for the Low Level Measurement of SO_2 to Investigate the Relation between SO_2 and Sulfate," submitted by the University of California, Riverside, for a total amount not to exceed $90,004.

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 $90,004.

ATTACHMENT A

"Construction of a DOAS Instrument for Installation at ARB for the Low Level Measurement of SO_2 to Investigate the Relation between SO_2 and Sulfate"

Background
Understanding the composition of vehicle exhaust particles is needed to evaluate their health impacts as well as their formation mechanisms including the impacts of modern aftertreatment systems. Sulfur or sulfate is one of the major components of combustion and lubricant-derived particles. Sulfate levels in vehicle exhaust particulates can be readily measured, but no instruments are available to measure SO_2 at the ppb levels present in the exhaust from vehicles using modern low sulfur fuel and oil products. Previous studies have shown a differential optical absorption spectrometer (DOAS) can be used successfully to make measurements of SO_2 at these levels from raw vehicle exhaust.

Objective
Design, construct, deliver, and verify a DOAS laboratory instrument to measure the concentration of SO_2 gas concentration in vehicle exhaust.

Methods
The system will be assembled using a gas cell, associated temperature and pressure controls, a spectrometer, and associated software to control the system and to report SO_2 concentration data.

Expected Results
Installation and verification of the DOAS at an ARB laboratory, training of staff in its use, and completion of vehicle emission tests to demonstrates its use.

Significance to the Board
Results will allow ARB to assess the impact of new vehicle exhaust aftertreatment systems on formation of sulfuric acid and sulfate nanoparticles.

Contractor:
University of California, Riverside

Contract Period:
18 months

Principal Investigators (PI):
Thomas D. Durbin, Ph.D., and John Pisano, M.S. (co-PI)

Contract Amount:
$90,004

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:
This team of investigators is very strong, having a great deal of experience in vehicle emission studies and spectroscopic measurements. ARB staff has a good relationship with this team, based on successful past collaborations as well as ongoing vehicle emission and laboratory studies.

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

Year	2009	2008	2007
Funding	$ 208,850	$ 725,902	$ 225,898

BUDGET SUMMARY

Contractor: University of California, Riverside

"Construction of a DOAS Instrument for Installation at ARB for the Low Level Measurement of SO_2 to Investigate the Relation between SO_2 and Sulfate"

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	37,588	
2.	Subcontractors	$	0	
3.	Equipment	$	34,400[1]	
4.	Travel and Subsistence	$	2,500	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	0	
7.	Mail and Phone	$	1,100	
8.	Supplies	$	0	
9.	Analyses	$	0	
10.	Miscellaneous	$	10,297[2]	
	Total Direct Costs			$ 85,885
INDIRECT COSTS				
1.	Overhead	$	4,119	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$ 4,119
TOTAL PROJECT COSTS				**$ 90,004**

Notes:

1. The purpose of this contract is to construct and test a Differential Optical Absorption Spectrometer (DOAS) that can be used to analyze samples of vehicle exhaust. The Herriot Cell and the Spectrometer are the two major components of the DOAS system.

2. As an off-campus facility of the University of California, Riverside, CE-CERT recovers direct, lease-based facilities rental charges. Facilities rental is charged at 25% of Modified Total Direct Costs (MTDC; total direct costs less any equipment, graduate student tuition/partial fee remission, and subcontract beyond the first $25,000). Base = $41,188.