State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 11-12

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 2709-269, entitled "Development of a Portable In-Use Reference PM Measurement System," has been submitted by the University of California, Riverside, and

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 2709-269 entitled "Development of a Portable In-Use Reference PM Measurement System," submitted by the University of California, Riverside, for a total amount not to exceed $300,000.

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 2709-269 entitled "Development of a Portable In-Use Reference PM Measurement System," submitted by the University of California, Riverside, for a total amount not to exceed $300,000.

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 $300,000.

I hereby certify that the above is a true and correct copy of Resolution 11-12, as adopted by the Air Resources Board.

Mary Alice Morency, Clerk of the Board

ATTACHMENT A

"Development of a Portable In-use Reference PM Measurement System"

Background
Particulate Matter (PM) from diesel engines is classified as a Toxic Air Contaminant (TAC) by ARB. Regulations that have been implemented in 2007 require the use of diesel particulate filters (DPF) and provide significant reductions in PM levels. There is need for in-use measurement of PM emissions with portable emissions measurement systems (PEMS) to verify the performance of these devices in real world use, and to estimate emission inventories for real world operating cycles. To date, comparisons of PEMS PM measurements with gravimetric reference methods have proven to be unreliable, with deviations on the order of 100%. The focus of this research will be on the development and evaluation of a high quality gravimetric proportional PM measurement system designed for in-use conditions based on the reference method.

Objective
The objective of this research project is to develop and evaluate a new gravimetrically based system designed specifically to meet Code of Federal Regulation sampling guidelines during in-use operations of heavy duty diesel engines operating in on-highway, marine, and non-road applications.

Methods
The system will be designed around readily available components and component designs including a proportional sampling system, a software controlled multi-cassette filter cartridge selection system, an embedded computer with I/O and communications hardware, custom software to provide instrument control, data monitoring and reporting, and communications through ethernet or the cellular network.

Expected Results
ARB will receive a new and necessary tool to accurately quantify the PM emissions from California's in-use fleets, both on- and off-road.

Significance to the Board
The development of a reliable, in-use gravimetric PM system is necessary to quantify and understand in-use emissions inventories for on-highway, non-road and marine applications. The measurements enabled by the system to be developed in this program can be used to help improve emission inventories and PM models, and thus provide needed information to support continued improvement of air quality.

Contractor:
University of California, Riverside

Contract Period:
30 months

Principal Investigators (PI):
Kent Johnson, Ph.D., and Thomas D. Durbin, Ph.D.

Contract Amount:
$300,000

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 laboratory, on-road, and off-road heavy duty diesel vehicle emission testing and instrument development. ARB staff has a good relationship with this team, having collaborated successfully with them in past and ongoing vehicle emission studies in the field and in the laboratory.

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

"Development of a Portable In-use Reference PM Measurement System"

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	103,254	
2.	Subcontractors	$	0	
3.	Equipment	$	68,000[1]	
4.	Travel and Subsistence	$	2,477	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	0	
7.	Mail and Phone	$	0	
8.	Supplies	$	1,321	
9.	Analyses	$	0	
10.	Miscellaneous	$	107,763[2]	
	Total Direct Costs			$282,815
INDIRECT COSTS				
1.	Overhead	$	17,185	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$17,185
TOTAL PROJECT COSTS				**$300,000**

Notes:

1. The purpose of the project is to build and test a portable emissions sampler to collect vehicle exhaust particulate matter (PM) samples during selected specific operating modes during in-use real-world vehicle operations. A Proportional Diluter, and Filter Cassette Indexer, and a Embedded Control System are the major components of the sampler.

2 Testing charges (for items such as use of the chassis dynamometer) are based on historic data and encompass multiple items related to running the test. When testing, preparation days are required before actual testing is performed; preparation days are charged at a flat rate of $2,000 per day. Additionally, 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.