State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 09-15

February 26, 2009

Agenda Item No.: 09-2-2

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 2676-263, entitled "Study of In-Use Engine Deterioration in Diesel Off-Road Equipment," 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 2676-263, entitled "Study of In-Use Engine Deterioration in Diesel Off-Road Equipment," submitted by the University of California, Riverside, for a total amount not to exceed $300,000.

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 2676-263, entitled "Study of In-Use Engine Deterioration in Diesel Off-Road Equipment," 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 09-15, as adopted by the Air Resources Board.

Monica Vejar

Monica Vejar, Clerk of the Board

ATTACHMENT A

"Study of In-Use Engine Deterioration in Diesel Off-Road Equipment"

Background
Off-road mobile sources powered by diesel engines have become increasingly greater contributors to the mobile source emissions inventories as emissions from on-road diesel engines have been reduced. However, the emissions inventories for off-road sources are not as well characterized as on-road sources. One particular need is to be able to quantify emissions deterioration for in-use off-road engines as these engines accumulate hours of operation.

Objective
The objective of this project is to quantify engine and emissions deterioration for certain categories of off-road equipment. This objective will be accomplished by administering surveys to collect data to identify engine components that deteriorate as engine hours of operation accumulate, and by collecting emissions data from in-use engines being operated in the South Coast Air Basin (SoCAB).

Methods
Surveys will be developed and administered to off-road equipment fleets operating in the SoCAB. The survey instruments will collect fleet population information and data regarding engine component durability and identify candidate engines for procurement. Recruited equipment would then be instrumented with a portable emissions measurement system to collect emissions and engine data. These data will then be analyzed with the goal of developing deterioration rates for different categories of off-road engines.

Expected Results
Survey data regarding populations and engine component durability, and diesel engine pollutant emissions data, for various classes of diesel-engine-powered off-road equipment operating in the South Coast Air Basin.

Significance to the Board
The results from this project will be used to update and improve the ARB's off-road emissions inventory model OFFROAD, and this revised model will provide ARB policy makers with improved emissions estimates for these source categories.

Contractor:
University of California, Riverside (UCR)

Contract Period:
36 months

Principal Investigators (PIs):
Dr. Thomas Durbin and Dr. Heejung Jung
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:
Dr. Durbin and his colleagues at UCR have conducted similar emissions testing projects for ARB, US EPA, Engine Manufacturers Association, and Caltrans. Dr. Durbin's team has consistently performed well for projects conducted for the Research Division.

Prior Research Division Funding to UCR:

Year	2008	2007	2006
Funding	$64,942	$215,898	$363,372

BUDGET SUMMARY

Contractor: University of California, Riverside

Study of In-Use Engine Deterioration in Diesel Off-Road Equipment

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	161,962	
2.	Subcontractors	$	0	
3.	Equipment	$	0	
4.	Travel and Subsistence	$	5,205	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	0	
7.	Mail and Phone	$	0	
8.	Supplies	$	6,714	
9.	Analyses	$	50,000[1]	
10.	Miscellaneous	$	53,731[2]	
	Total Direct Costs			$277,612
INDIRECT COSTS				
1.	Overhead	$	22,388	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$22,388
TOTAL PROJECT COSTS				**$300,000**

[1] 'Analyses' refers to emissions testing. The amount shown represents 50 days of emissions testing at $1000/day.

[2] 'Miscellaneous' refers to 'Facilities rental'. Because CE-CERT is a permanent off-campus facility, federal regulations require them to account for facilities rental as a direct cost. Facilities rental is charged based on 24% of Modified Total Direct Costs (MTDC). MTDC consists of total direct costs minus equipment, facilities rental, graduate student partial fee remission/health insurance (included in benefits), and subcontracts over $25,000.