

State of California
AIR RESOURCES BOARD

Heavy-Duty On-Road Vehicle Inspection and Maintenance Program

RESEARCH PROPOSAL

Resolution 15-25

July 23, 2015

Agenda Item No.: 15-6-2

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 2789-283, titled, "Heavy-Duty On-Road Vehicle Inspection and Maintenance Program" has been submitted by the Foundation for California Community Colleges, for a total amount not to exceed \$499,560;

WHEREAS, the Research Division staff has reviewed Proposal Number 2789-283 and finds that in accordance with Health and Safety Code section 39701, research is needed to develop and demonstrate a heavy-duty vehicle inspection and maintenance program that will improve existing programs, and result in improved air quality and reduced exposure to pollutant emissions; and

WHEREAS, in accordance with Health and Safety Code section 39705, the Research Screening Committee has reviewed and recommends funding the Research Proposal.

NOW, THEREFORE BE IT RESOLVED that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39700 through 39705, hereby accepts the recommendations of the Research Screening Committee and staff and approves the Research Proposal.

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 Proposal as further described in Attachment A, in an amount not to exceed \$499,560.

I hereby certify that the above is a true and correct copy of Resolution 15-25 as adopted by the Air Resources Board.

Tracy Jensen, Clerk of the Board

ATTACHMENT A**"Heavy-Duty On-Road Vehicle Inspection and Maintenance Program"****Background**

Over the past twenty years, ARB has reduced on-road heavy-duty vehicle (HDV) engine emissions standards for oxides of nitrogen (NO_x) and diesel particulate matter (PM) by about 97 percent. Despite these significant improvements, HDVs over 8,500 pounds are still responsible for approximately a third of California's total NO_x emissions and over a quarter of the diesel PM. While new engines employ improved engine designs and exhaust aftertreatment to certify to more stringent emissions standards, California still needs a more comprehensive HDV inspection and maintenance (I/M) program to ensure that in-use engines continue to meet emissions performance requirements, as these engines are used in HDVs that operate for 20 or more years and travel nearly a million miles.

Objective

The objectives of this project are to develop a prototype I/M program for on-road HDVs, and to perform an economic cost analysis of this prototype HDV I/M program.

Methods

The contractor will conduct a comprehensive literature review to identify candidate I/M methods, develop and demonstrate a prototype HDV I/M program, and then conduct an economic cost analysis of this prototype, including possible initial and annual operating costs, a comparison of improved program costs to existing program costs, and projected cost-effectiveness for a full-scale program.

Expected Results

The expected results are the development of a prototype HDV I/M program, including recommendations for test methods and test equipment, and an economic cost analysis of this prototype HDV I/M program, scaled up to the statewide level.

Significance to the Board

Control of in-use HDV emissions is critical to achieving the ARB's goals of meeting the ambient air quality standards for ozone, and reducing public exposure to diesel PM emissions. Results from this project will be used to inform the design of an improved HDV I/M program for consideration by the Board.

Contractor

Foundation for California Community Colleges (FCCC)

Contract period

30 months

Principal Investigators (PI):

Mark Carlock, Ph.D. (FCCC)

Co-PI: Nigel Clark, Ph.D. (West Virginia University)

Contract Amount:

\$499,560

Basis for Indirect Cost Rate:

The indirect cost rate is ten percent.

Past Experience with this Principal Investigator:

Dr. Mark Carlock has not previously contracted with ARB. Dr. Carlock has extensive experience with vehicle emissions testing and emissions modeling, and regulatory program development and analyses, including vehicle inspection and maintenance programs.

The ARB has previously successfully contracted with Dr. Nigel Clark for HDV research projects. Dr. Clark is a recognized expert on the subject of heavy-duty engines and vehicles, including: engine design and operation, vehicle and engine testing, test cycle development, and implementation of regulatory programs.

Prior Research Division Funding to the Foundation for California Community Colleges:

Year	2014	2013	2012
Funding	\$ 0	\$ 0	\$ 0

B U D G E T S U M M A R Y

Contractor: The Foundation for California Community Colleges

"Heavy-Duty On-Road Vehicle Inspection and Maintenance Program"

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$	154,447
2.	Subcontractors	\$	126,520
3.	Equipment	\$	0
4.	Travel and Subsistence	\$	2,500
5.	Electronic Data Processing	\$	0
6.	Reproduction/Publication	\$	2,000
7.	Mail and Phone	\$	0
8.	Supplies	\$	0
9.	Analyses	\$	0
10.	Miscellaneous	\$	<u>183,135¹</u>
Total Direct Costs			\$ 468,602

INDIRECT COSTS

1.	Overhead	\$	30,958
2.	General and Administrative Expenses	\$	0
3.	Other Indirect Costs	\$	0
4.	Fee or Profit	\$	<u>0</u>
Total Indirect Costs			\$ <u>30,958</u>

TOTAL PROJECT COSTS **\$ 499,560**

¹ This item includes \$50,000 for HDV rental (50 trucks @\$500/week for two weeks each), \$90,000 for vehicle emissions testing (360 tests @ \$250/test), \$21,000 for rental of emissions test equipment, \$20,135 for remote on-board diagnostics demonstration, and \$2,000 for vehicle storage costs.

ATTACHMENT 1**SUBCONTRACTORS' BUDGET SUMMARY**

Subcontractor: West Virginia University

Description of subcontractor's responsibility: Nigel Clark, Ph.D. and David McCain will be responsible for project data management. ARB previously contracted with Dr. Nigel Clark and West Virginia University on Heavy Duty Vehicle research projects, and these contracts were successfully completed.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$	58,000
2.	Subcontractors	\$	0
3.	Equipment	\$	0
4.	Travel and Subsistence	\$	4,800
5.	Electronic Data Processing	\$	0
6.	Reproduction/Publication	\$	0
7.	Mail and Phone	\$	0
8.	Supplies	\$	0
9.	Analyses	\$	0
10.	Miscellaneous	\$	<u>0</u>

Total Direct Costs	\$	62,800
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INDIRECT COSTS

1.	Overhead	\$	6,280
2.	General and Administrative Expenses	\$	0
3.	Other Indirect Costs	\$	0
4.	Fee or Profit	\$	<u>0</u>

Total Indirect Costs	\$	<u>6,280</u>
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<u>TOTAL PROJECT COSTS</u>	\$	<u>69,080</u>
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ATTACHMENT 2**SUBCONTRACTORS' BUDGET SUMMARY**

Subcontractor
HAGER Environmental and Atmospheric Technologies, LLC:

Description of subcontractor's responsibility: H.E.A.T. will provide remote sensing device (RSD) technology to the project.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$ 28,250
2.	Subcontractors	\$ 0
3.	Equipment	\$ 0
4.	Travel and Subsistence	\$ 4,800
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 0
7.	Mail and Phone	\$ 8,500 ¹
8.	Supplies	\$ 0
9.	Analyses	\$ 0
10.	Miscellaneous	<u>\$ 3,850</u>

Total Direct Costs \$ 45,400

INDIRECT COSTS

1.	Overhead	\$ 4,540
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	<u>\$ 0</u>

Total Indirect Costs \$ 4,540

TOTAL PROJECT COSTS

\$ 49,940

¹ Cost for shipping and insurance, from Tennessee to California and back, for H.E.A.T.'s remote sensing instrument.

ATTACHMENT 3**SUBCONTRACTORS' BUDGET SUMMARY**

Subcontractor: Robert B. Harris

Description of subcontractor's responsibility: Robert Harris, Ph.D., will be the project lead for the cost analysis portion of the project.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$	7,500 ¹
2.	Subcontractors	\$	0
3.	Equipment	\$	0
4.	Travel and Subsistence	\$	0
5.	Electronic Data Processing	\$	0
6.	Reproduction/Publication	\$	0
7.	Mail and Phone	\$	0
8.	Supplies	\$	0
9.	Analyses	\$	0
10.	Miscellaneous	\$	<u>0</u>
	Total Direct Costs	\$	7,500

INDIRECT COSTS

1.	Overhead	\$	0
2.	General and Administrative Expenses	\$	0
3.	Other Indirect Costs	\$	0
4.	Fee or Profit	\$	<u>0</u>
	Total Indirect Costs	\$	<u>0</u>

TOTAL PROJECT COSTS **\$ 7,500**

¹ The salary shown is a fully loaded rate which includes all labor, fringe benefits and overhead.