

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 06-33

November 16, 2006

Agenda Item No.: 06-10-2

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 2613-253, entitled "Development of the UCB-L Particle Monitor for California Applications in Environmental Justice," has been submitted by the University of California, Berkeley;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval;

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

Proposal Number 2613-253, entitled "Development of the UCB-L Particle Monitor for California Applications in Environmental Justice," submitted by the University of California, Berkeley, for a total amount not to exceed \$213,088.

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 2613-253, entitled "Development of the UCB-L Particle Monitor for California Applications in Environmental Justice," submitted by the University of California, Berkeley, for a total amount not to exceed \$213,088.

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 \$213,088.

I hereby certify that the above is a true and correct copy of Resolution 06-33, as adopted by the Air Resources Board.

Lori Andreoni, Clerk of the Board

ATTACHMENT A

“Development of the UCB-L Particle Monitor for California Applications in Environmental Justice”

Background

There is a need for PM_{2.5} measurement technology that is portable, inexpensive, and accurate at low concentrations. The adverse health effects of exposure to PM_{2.5} are serious, and reducing PM_{2.5} exposures is a Board priority, but current portable means of measuring PM_{2.5} for exposure studies are prohibitively expensive and therefore not feasible outside of well-funded studies.

Objective

The objective of this work is to develop an affordable, accurate, and portable PM_{2.5} monitor using available smoke-alarm technology and components. This would take advantage of the economies of scale of mass-produced components so as to keep the price low.

Methods

Professor Smith and his group have already adapted off-the-shelf smoke-alarm technology to measure high PM concentrations (40 to 50 $\mu\text{g}/\text{m}^3$). This proposed work will attempt to use more sensitive smoke detection methods in a similar monitor to achieve better sensitivity and accuracy at PM_{2.5} concentrations below 5 $\mu\text{g}/\text{m}^3$.

Expected Results

The primary goal in the development of the new monitor is to extend the accuracy of the lower concentration range to below 5 $\mu\text{g}/\text{m}^3$ by replacing the LED and photodetector of the previous unit with the laser and laser light detector technology from the Systemsensor “Pinnacle” smoke detector, which is a high-sensitivity detector for applications where early warning of fires is critical. Other planned improvements include a larger, rechargeable battery, for longer life; a more rugged and water-proof case; and more user-friendly software that is PDA compatible and also allows storage of GPS data. The actual sensitivity that will be achieved is unknown, so the project will have several progress evaluation points to ensure the necessary sensitivity continues to appear feasible for the project to continue.

Significance to the Board

Inexpensive and sensitive PM_{2.5} monitors may enable better spatial resolution of exposure to PM_{2.5} through greater numbers of measurements taken at more sites. One application could be air monitoring at the community level, especially in neighborhoods with environmental justice concerns.

Contractor:

University of California, Berkeley

Contract Period:

36 months

Principal Investigator (PI):

Professor Kirk Smith

Contract Amount:

\$213,088

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:

Kirk Smith holds the Maxwell Endowed Chair in the School of Public Health at UC Berkeley and is internationally renowned for his work on indoor air quality in developing nations. He oversaw the development of the previous UCB PM monitor that is the basis for this project. He has published over 200 scientific articles and 7 books, and was elected to the US National Academy of Sciences in 1997.

Prior Research Division Funding to UCB:

Year	2005	2004	2003
Funding	\$1,829,446*	\$920,205	\$715,194*

* The California Energy Commission contributed a total of \$1,003,850 to projects during these fiscal years.

BUDGET SUMMARY

University of California, Berkeley

Development of the UCB-L Particle Monitor for California Applications in
Environmental Justice

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$	71,232
2.	Subcontractors	\$	97,920
3.	Equipment	\$	0
4.	Travel and Subsistence	\$	14,923
5.	Electronic Data Processing	\$	2,590
6.	Reproduction/Publication	\$	150
7.	Mail and Phone	\$	958
8.	Supplies	\$	11,300
9.	Analyses	\$	0
10.	Miscellaneous	\$	<u>316</u>

Total Direct Costs \$199,389

INDIRECT COSTS

1.	Overhead	\$	0
2.	General and Administrative Expenses	\$	0
3.	Other Indirect Costs	\$	13,699
4.	Fee or Profit	\$	<u>0</u>

Total Indirect Costs \$13,699

TOTAL PROJECT COSTS **\$213,088**

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: EME Systems

Description of subcontractor's responsibility: EME Systems will disassemble the new generation smoke detectors, integrate them into the PM2.5 system, test and evaluate performance, and assemble additional prototypes for outside testing.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$ 29,040
2.	Subcontractors	\$ 0
3.	Equipment	\$ 0
4.	Travel and Subsistence	\$ 0
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 200
7.	Mail and Phone	\$ 150
8.	Supplies	\$ 9,209
9.	Analyses	\$ 0
10.	Miscellaneous	<u>\$ 0</u>
	Total Direct Costs	\$ 38,599

INDIRECT COSTS

1.	Overhead	\$ 2,178
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	<u>\$ 0</u>
	Total Indirect Costs	<u>\$ 2,178</u>

<u>TOTAL PROJECT COSTS</u>	<u>\$ 40,777</u>
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SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: University of California, Irvine

Description of subcontractor's responsibility: UC Irvine will conduct the outside evaluations of sensor performance including lab tests in combustion chambers measuring different aerosols that will simultaneously be measured by other PM measurement techniques.

DIRECT COSTS AND BENEFITS

1. Labor and Employee Fringe Benefits	\$ 31,621
2. Subcontractors	\$ 0
3. Equipment	\$ 0
4. Travel and Subsistence	\$ 0
5. Electronic Data Processing	\$ 0
6. Reproduction/Publication	\$ 0
7. Mail and Phone	\$ 240
8. Supplies	\$ 3,600
9. Analyses	\$ 0
10. Miscellaneous	<u>\$ 0</u>

Total Direct Costs \$ 35,461

INDIRECT COSTS

1. Overhead	\$ 2,482
2. General and Administrative Expenses	\$ 0
3. Other Indirect Costs	\$ 0
4. Fee or Profit	<u>\$ 0</u>

Total Indirect Costs \$ 2,482

TOTAL PROJECT COSTS

\$ 37,943

SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: David Zohrob

Description of subcontractor's responsibility: Mr. Zohrob has been working on developing the original UCB Particle Monitor software since the beginning of 3004. He is the best person to develop the UCB-L software because of his expertise and experience of working with the UCB group.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$	19,200
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			\$19,200

INDIRECT COSTS

5.	Overhead	\$	0
6.	General and Administrative Expenses	\$	0
7.	Other Indirect Costs	\$	0
8.	Fee or Profit	\$	<u>0</u>
Total Indirect Costs			<u>\$ 19,200</u>

<u>TOTAL PROJECT COSTS</u>	<u>\$ 19,200</u>
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