State of California
AIR RESOURCES BOARD

Resolution 03-12
May 22, 2003

Agenda Item No.:03-4-4

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 proposal, number 03-57, entitled "Development of a Low-Cost Particulate Matter Monitor," has been submitted by the University of California, Berkeley, in response to the 2003 Innovative Clean Air Technologies (ICAT) Program solicitation;

WHEREAS, the California Energy Commission will provide half the funds for grants made under the 2003 Innovative Clean Air Technologies (ICAT) Program;

WHEREAS, the proposal has been independently reviewed for technical and business merit by highly qualified individuals; and

WHEREAS, the Research Division staff and the Executive Officer and Deputy Executive Officers have reviewed and recommend for funding:

> Proposal number 03-57, entitled "Development of a Low-Cost Particulate Matter Monitor," submitted by the University of California, Berkeley, for a total amount not to exceed $291,000.

NOW, THEREFORE BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 39703, hereby approves the following:

> Proposal number 03-57, entitled "Development of a Low-Cost Particulate Matter Monitor," submitted by the University of California, Berkeley, for a total amount not to exceed $291,000.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and agreements for the efforts proposed herein, and as described in Attachment A, in an amount not to exceed $291,000.

I hereby certify that the above is a true and correct copy of Resolution 03-12, as adopted by the Air Resources Board.

Stacey Dorais, Clerk of the Board

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

Development of a Low-Cost Particulate Matter Monitor

Background

The instruments now available for monitoring the ambient concentration of $PM_{2.5}$ are not practical for widespread deployment by untrained persons and organizations of modest means. The weaknesses of the existing instruments include price (typically over $10,000), the need for laboratory analyses of samples, the need for pre-sampling preparation, and poor portability. Thus, it is generally impractical to directly determine exposures to PM distant from the fixed-site air monitors run by the ARB and other regulatory agencies. Local concentrations of directly emitted PM must be estimated by modeling applied to estimates of source strengths, using meteorological data obtained from distant stations.

Objective

The grant work will be to improve a prototype PM monitoring instrument that combines miniature piezo-electric resonators with infrared/UV absorption and to demonstrate its ability to measure the mass of fine PM and the combustion-generated fraction. This device should operate unattended for substantial periods and produce data without pre- or post-sampling laboratory work. It should be very portable, fairly inexpensive, and usable by relatively untrained personnel. It should be suitable for community organizations and power-plant siting proponents to make their own measurements of local $PM_{2.5}$ concentrations.

Methods

UCB and its partner, Lawrence Berkeley National Laboratory, will design, fabricate, and evaluate alternative methods for placing multiple micro-resonators on single disposable chips. The chosen technology will be integrated into a thermophoretic deposition channel with a UV/IR optics, electronic signal processing, and a size-selective flow inlet. The device will be optimized for signal-to-noise in laboratory simulations of PM-laden ambient air. The response of the optimized device to combustion-generated PM will be calibrated against integrated gravimetric samples and real-time instruments such as a quartz crystal microbalance and an optical counter. Finally, the device will be compared to the FRM method for $PM_{2.5}$ in ambient monitoring.

Expected Results

At the end of the project, the device should be ready for initiating commercialization work.

Significance to the Board

Completion of the grant project will greatly promote the eventual commercial availability of a new instrument for measuring the ambient concentration of fine PM and its combustion-generated fraction. A new instrument will make it more practical for persons and organizations concerned with local PM exposures to monitor air quality themselves.

By making and managing the recommended grant, the Board will fulfill in part contract R01-356 with the California Energy Commission.

Applicant: University of California, with participation by the Berkeley Sensor and Actuator Center and Lawrence Berkeley National Laboratory

Project Period: June 1, 2003, to May 31, 2005

Principal Investigator: Richard M. White, Ph.D.

ICAT Funding: $291,000

Co-funding : UC Berkeley -- $63,000

LBNL -- $40,625

Tobacco-Related Disease Research Program - $222,337

Past Experience with This Principal Investigator

None. However, the extent of review of the ICAT proposal provides an adequate basis for recommending a grant. The application was reviewed externally by academic engineers and scientists, other agencies, and academic business reviewers and internally by the Research Division and Monitoring and Laboratory Division.

Prior ICAT Funding to UC Berkeley

Year	2002	2001	2000
Funding	0	0	0

BUDGET SUMMARY

University of California, Berkeley

Development of a Low-Cost Particulate Matter Monitor

Direct Costs and Benefits	**ICAT**	**Total**
1. Labor	$ 82,137	$139,065
2. Employee Fringe Benefits	$ 5,669	$ 13,966
3. Subcontractors	$144,000	$144,000
4. Equipment	$ 0	$ 0
5. Travel and Subsistence	$ 108	$ 108
6. Materials and Supplies	$ 14,759	$ 14,759
7. Other Direct Costs	$ 29,612	$251,949
Total	$276,285	$563,847
Indirect Costs		
1. Overhead	$ 14,715	$ 53,115
2. Other Indirect Costs	$ 0	$ 0
Total	$ 14,715	$ 53,115
Total Project Costs	**$291,000**	**$616,962**