State of California
AIR RESOURCES BOARD

Resolution 03-11
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 03-17, entitled "A Simple Low-Cost Beta Attenuation Monitor (BAM) for Continuous Measurement of PM_{10}, $PM_{2.5}$ or Ultrafine Particle Concentrations," has been submitted by the University of Southern California 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 03-17, entitled "A Simple Low-Cost Beta Attenuation Monitor (BAM) for Continuous Measurement of PM_{10}, $PM_{2.5}$ or Ultrafine Particle Concentrations," submitted by the University of Southern California, for a total amount not to exceed $143,830.

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 03-17, entitled "A Simple Low-Cost Beta Attenuation Monitor (BAM) for Continuous Measurement of PM_{10}, $PM_{2.5}$ or Ultrafine Particle Concentrations," submitted by the University of Southern California, for a total amount not to exceed $143,830.

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 $143,830.

I hereby certify that the above is a true and correct copy of Resolution 03-11, as adopted by the Air Resources Board.

Stacey Dorais, Clerk of the Board

ATTACHMENT A

Innovative Clean Air Technologies (ICAT) Grant Proposal:

"A Simple Low-Cost Beta Attenuation Monitor (BAM) for Continuous Measurement of PM_{10}, $PM_{2.5}$ or Ultrafine Particle Concentrations"

Background

The instruments now available for monitoring the ambient concentration of $PM_{2.5}$ are not practical for widespread deployment by untrained persons or 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 PM can only be estimated by modeling applied to estimates of source strengths and meteorological data obtained from distant stations.

Objective

The principle of operation of the proposed device is based upon the well-characterized measurement of beta rays across a filter medium that is collecting particulate matter. The extinction coefficient, to an excellent approximation, is dependent only upon mass; it is significantly independent of chemical composition and particle size. Beta attenuation devices have a long track record of producing highly accurate, highly reliable measurements. The objective of this project is to design a low-cost BAM to measure PM_{10}, $PM_{2.5}$ and ultrafine PM levels in a wide range of environments.

Methods

The principle methods to be used in carrying out the project are:

1. Manufacture a prototype unit;
2. Perform comprehensive testing of the prototype unit via inter-comparison with existing continuous and time-integrated sampling techniques, including FRM methods;
3. Evaluate and demonstrate the unit's performance with respect to accuracy, repeatability, etc., under a wide range of sampling conditions including indoor environments, outdoor environments, stack sampling, temperature fluctuations, wind speed, and particle chemical compositions;
4. Offer the unit for sale on a commercial basis.

Expected Results

Upon completion of this project a prototype unit will be fully tested and ready for commercial availability. The results of the testing of the unit will be published in a

leading peer-reviewed scientific journal, thus providing wide visibility and scientific legitimacy for the final product. The potential users for the proposed device would be governmental entities engaged in ambient particulate monitoring for enforcement and compliance purposes. In addition, governmental or research institutions involved in health studies involving the impact of fine particles would be prime candidates for using this device.

Significance to the Board

Completion of the grant project will greatly promote the commercial availability of a new instrument for measuring the ambient concentration of particulate matter. A new instrument will make it more practical for persons and organizations concerned with local exposures of particulate matter 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 Southern California

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

Principal Investigator: Phillip M. Fine **ICAT Funding:** $143,830

Co-funding : $149,849

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. In addition, staff has previously entered into contracts with other PIs at the University of Southern California with satisfactory results.

Prior ICAT Funding to University of Southern California

Year	2002	2001	2000
Funding	0	0	0

BUDGET SUMMARY

University of Southern California

"A Simple Low-Cost Beta Attenuation Monitor (BAM) for Continuous Measurement of PM_{10}, $PM_{2.5}$ or Ultrafine Particle Concentrations"

Direct Costs and Benefits	**ICAT**	**Total**
1. Labor	$ 38,218	$ 82,109
2. Employee Fringe Benefits	$ 12,612	$ 17,885
3. Subcontractors	$ 49,000	$ 49,000
4. Equipment	$ 0	$ 0
5. Travel and Subsistence	$ 2,872	$ 2,872
6. Materials and Supplies	$ 12,325	$ 52,325
7. Other Direct Costs	$ 1,150	$ 1,150
Total	$116,177	$205,341
Indirect Costs		
1. Overhead	$ 27,653	$ 88,338
2. Other Indirect Costs	$ 0	$ 0
Total	$ 27,653	$ 88,338
Total Project Costs	**$143,830**	**$293,679**