

State of California  
AIR RESOURCES BOARD

Resolution 04-11

March 25, 2004

Agenda Item No.: 04-3-2

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 2549-234, entitled "Development of a Micro Air Particulate Analyzer (MicroAPA) for Ubiquitous Deployment in Air Quality Monitoring and Epidemiological Studies," has been submitted by the University of California, Davis;

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 2549-234 entitled "Development of a Micro Air Particulate Analyzer (MicroAPA) for Ubiquitous Deployment in Air Quality Monitoring and Epidemiological Studies," submitted by the University of California, Davis, for a total amount not to exceed \$225,310.

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 2549-234 entitled "Development of a Micro Air Particulate Analyzer (MicroAPA) for Ubiquitous Deployment in Air Quality Monitoring and Epidemiological Studies," submitted by the University of California, Davis, for a total amount not to exceed \$225,310.

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 \$225,310.

I hereby certify that the above is a true  
And correct copy of Resolution 04-11,  
as Adopted by the Air Resources Board.

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Lori Andreoni, Clerk of the Board

## ATTACHMENT A

### “Development of a Micro Air Particulate Analyzer (MicroAPA) for Ubiquitous Deployment in Air Quality Monitoring and Epidemiological Studies”

#### Background

In the past year, ARB, with co-funding from the California Energy Commission (CEC), has supported the development of new air monitoring instruments via the Innovative Clean Air Technologies (ICAT) grant program. We want devices that will be substantially cheaper and more portable than ordinary instruments and that will produce measurements in the field without laboratory support. We do not intend the instruments to be alternatives to the Federal Reference Methods for assessing compliance with ambient air quality standards. Rather, they would be tools to quantify pollutant exposures on a localized scale--that is near sources of concern or indoors. These devices could be extremely helpful for issues related to environmental justice. The CEC is especially interested in means to analyze air quality near proposed power plants, where typically there are lower income residents. ARB would like to provide people with practical means to analyze air quality in the locales where they spend much of their time.

Two ICAT projects for devices to measure the mass concentration of particulate matter are underway. The proposed project would provide the complement of particle-size analysis for the sub-micron part of the PM. The functional capability intended for the new instrument has already been attained by commercial instruments. However, they are orders of magnitude heavier and more expensive and more complex in function and use than the instrument that should result from the project.

#### Objective

This project is intended to develop an affordable, portable, easy-to-use instrument to measure the size distribution of PM smaller than one micron. This would be useful to researchers who study PM near combustion sources and indoors.

#### Methods

1. Fabrication of the differential mobility analyzer (DMA) and its integration with an ionizer and an electrometer on a single miniature substrate.
2. Integration of the sensing unit from objective 1 with miniaturized ancillary equipment --air pump, high-voltage supply, data logger, and controls--in a prototype analyzer.
3. Comparison of the prototype to standard research instruments in terms of resolution, PM load, temperature dependence, humidity dependence. Comparisons are to be made in the lab and then while sampling ambient air.

**Expected Results**

The project should produce a prototype instrument that will be ready for future intensive trials in actual research applications and that will be ready for commercialization work by UC Davis' Technology Transfer Center.

**Significance to the Board**

The device should be useful in research on indoor PM and PM in the ambient air. The portability, low cost, and ease of use should enable size characterization on a much finer spatial basis and in more situations than is now practical. This device will also make it easier for measuring air pollution where environmental justice is a concern.

**Contractor:**

University of California, Davis

**Contract Period:**

24 months

**Principal Investigator (PI):**

Professor Debbie Niemeier, Ph.D

**Contract Amount:**

\$225,310

**Cofunding:**

Half of the \$225,310 will be provided by the California Energy Commission under contract with the ARB.

**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:**

Professor Niemeier has extensive experience in the spatial characterization of PM emissions. She is co-principal investigator in a current ARB-funded project to characterize ultrafine PM from mobile sources. Her co-principal investigators in the proposed project are experts in micro-electro-mechanical systems and particle size measurement.

**Prior Research Division Funding to the University of California, Davis:**

Year	2003	2002	2001
Funding	\$0	\$0	\$587,331

## BUDGET SUMMARY

The Department of Civil and Environmental Engineering, UC Davis

“Development of a Micro Air Particulate Analyzer (MicroAPA) for Ubiquitous Deployment in Air Quality Monitoring and Epidemiological Studies”

### **DIRECT COSTS AND BENEFITS**

1.	Labor and Employee Fringe Benefits	\$ 93,911	
2.	Subcontractors	\$ 0	
3.	Equipment	\$ 30,000	<sup>1</sup>
4.	Travel and Subsistence	\$ 4,000	
5.	Electronic Data Processing	\$ 600	
6.	Reproduction/Publication	\$ 1,984	
7.	Mail and Phone	\$ 200	
8.	Supplies	\$ 60,000	<sup>2</sup>
9.	Analyses	\$ 0	
10.	Miscellaneous	<u>\$ 14,131</u>	
	Total Direct Costs		\$204,826

### **INDIRECT COSTS**

1.	Overhead	\$ 20,483	
2.	General and Administrative Expenses	\$ 0	
3.	Other Indirect Costs	\$ 0	
4.	Fee or Profit	<u>\$ 0</u>	
	Total Indirect Costs		<u>\$ 20,483</u>

### **TOTAL PROJECT COSTS**

**\$225,310**

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<sup>1</sup> data acquisition devices, power supply devices, flow-control hardware, measurement devices

<sup>2</sup> for access to fabrication and packaging facilities at UC Berkeley and UC Davis (other than in Civil and Environmental Engineering); upkeep of Aerosol Lab in Civil and Environmental Engineering; upkeep of Electronics Lab