State of California
AIR RESOURCES BOARD

Resolution 04-33

November 18, 2004

Agenda Item No.: 04-10-2

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 2515-224, entitled "Determination of the Spatial and Temporal Variability of Size-Resolved PM2.5 Composition and Mixing State in Multiple Regions in California," has been submitted by the University of California, San Diego;

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 2515-224, entitled "Determination of the Spatial and Temporal Variability of Size-Resolved PM2.5 Composition and Mixing State in Multiple Regions in California," submitted by the University of California, San Diego, for a total amount not to exceed $678,671.

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 2515-224, entitled "Determination of the Spatial and Temporal Variability of Size-Resolved PM2.5 Composition and Mixing State in Multiple Regions in California," submitted by the University of California, San Diego, for a total amount not to exceed $678,671.

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 $678,671.

I hereby certify that the above is a true
And correct copy of Resolution 04-33, as
Adopted by the Air Resources Board.

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Lori Andreoni, Clerk of the Board

# ATTACHMENT A

"Determination of the Spatial and Temporal Variability of Size-Resolved PM2.5 Composition and Mixing State in Multiple Regions in California"

## Background

Many regions in California experience excessive particulate matter levels, as defined by State and national ambient air quality standards, which compromise the health of millions of people. To help reduce these particle levels through cost-effective strategies, a scientific understanding of the sources and spatial distributions of particulate matter is needed. Up to this date, most of the research aimed at understanding PM2.5 in California has been limited to major field campaigns (SCAQS in 1987, SCOS97-NARSTO in 1997, CRPAQS in 2001), which were performed over a relatively short period of time (2-3 months), and focused on one specific region during one season. These studies have given us a much better understanding of the complexity of aerosol particle properties in California, but they represent only snapshots in time, which may not be representative of the long-term picture for a given region. This project addresses the long-term characterization of particulate matter through field studies of several regions in California that are influenced by excessive particle levels. This project addresses the spatial and temporal characterization of particulate matter through field studies of several regions in California that are influenced by excessive particulate levels.

## Objective

The objectives of this project are to provide spatial, temporal, and seasonal variability of PM and to understand the major sources and atmospheric processes aerosols undergo in California.

## Methods

A single particle approach – ATOFMS – will be used, which makes possible the identification of unique source marker spectral profiles and allows source apportionment of many important particulate contributors. In contrast to mass-based filter methods, ATOFMS preserves size-dependent composition and has high time resolution. Several ATOFMS instruments have been developed that allow different size ranges to be investigated concurrently: 50-300 μm (UF-ATOFMS) and 200-500 μm. This project will be carried out in two phases in which the first phase consists of a one-year pilot/proof-of-concept study and the second phase comprises the bulk of field measurements.

## Expected Results

This project is expected to provide the following information and tools: ambient particle and gas measurements from ATOFMS and supporting instruments at several locations in four regions in California (northern, central, southern, and transport sites), real-time ATOFMS data analysis tools and methods, source apportionment for different sites/regions/seasons, several additional source profiles, and a comprehensive database of ambient measurements and source profiles.

**Significance to the Board**
The proposed measurements would add a tremendous wealth of scientific information concerning particle sources, distribution, temporal variation, size-specific composition, and atmospheric transformations. Such knowledge provided in a timely manner through interim reports would play a critical role in the development of the 2007 State Implementation Plan. The feedback provided by these reports would also give the ARB flexibility to target regions and localities for further study that are of concern from a health impact standpoint.

**Contractor:**
University of California, San Diego

**Contract Period:**
36 months

**Principal Investigator (PI):**
Professor Kimberly Prather, Ph.D.

**Contract Amount:**
$678,671

**Basis for Indirect Cost Rate:**
The State and UC System have agreed to a 10 percent indirect cost rate.

**Past Experience with this Principal Investigator:**
Staff has extensive experience with Prof. Kimberly Prather; her single particle analysis techniques are on the forefront of aerosol science and her work is well published. ARB has played a pivotal role supporting Prof. Kimberly Prather's group in research and development of the single particle mass spectrometer system ATOFMS. In these projects, Prof. Prather's group has carried out a variety of studies concerning particulate composition and air pollution processes; these studies included ambient measurements for SCOS97-NARSTO and CRPAQS, tunnel and near-road studies, source characterization (gasoline and diesel vehicles), and particle source apportionment. Overall, these measurements and analysis techniques have provided new information and given a new perspective on the composition and evolution of particles in California.

**Prior Research Division Funding to UCSD:**

| Year | 2003 | 2002 | 2001 |
|---|---|---|---|
| Funding | $75,000 | $0 | $0 |

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

University of California at San Diego

**"**Determination of the spatial and temporal variability of size-resolved $PM_{2.5}$ composition and mixing state in multiple regions in California**"**

| | | | |
|---|---|---|---|
| **DIRECT COSTS AND BENEFITS** | | | |
| 1. | Labor and Employee Fringe Benefits | $404,914 | |
| 2. | Subcontractors | $ 0 | |
| 3. | Equipment | $ 0 | |
| 4. | Travel and Subsistence | $ 88,500[1] | |
| 5. | Electronic Data Processing | $ 0 | |
| 6. | Reproduction/Publication | $ 0 | |
| 7. | Mail and Phone | $ 0 | |
| 8. | Supplies | $ 80,000[2] | |
| 9. | Analyses | $ 0 | |
| 10. | Miscellaneous | $ 50,000 | |
| | Total Direct Costs | | $623,414 |
| **INDIRECT COSTS** | | | |
| 1. | Overhead | $ 55,257 | |
| 2. | General and Administrative Expenses | $ 0 | |
| 3. | Other Indirect Costs | $ 0 | |
| 4. | Fee or Profit | $ 0 | |
| | Total Indirect Costs | | $ 55,257 |
| **TOTAL PROJECT COSTS** | | | **$678,671** |

[1] These costs are associated with 100 days of field work per year (84 days of sampling; 16 days to set up and take down equipment), which will be carried out by two people in each of the first two years and by 1 person in the third year. The cost is $35,000 in each of YR1 and YR2 [2 people per diem = $35 per day × 100 days × 2 people =$7,000; 2 people hotel = $90 × 2 × 100 nights = $18,000; $80 truck rental per day × 100 days = $8,000; $2000 presentation of results at conferences] and $18,800 in YR3 [one person will carry out 100 days of field work].

[2] A base amount of $30,000 per year for the first two years and $20,000 the third year is needed for back-up components and supplies necessary to run all instruments for 84 days per year. These costs include laser optics, computer and printing supplies, storage media, calibration materials, pump maintenance, chemicals, consumables and miscellaneous supplies.