

State of California  
AIR RESOURCES BOARD

Research Resolutions

Research Division

June 28, 2001



## INTRODUCTION

Contained herein for Board review are three resolutions and accompanying summaries from the Extramural Research Program recommended to the Board by the Research Screening Committee.

Item 1 is a research proposal from the University of California, Los Angeles entitled, "Children's Microenvironmental and Personal Pollutant Exposures for SB 25 with NAP Health Status Survey". The principal investigator will be Dr. Steven Colome. Resolution No. 01-20

Item 2 is a research proposal from the University of California, San Francisco entitled, "Effects of Nitrogen Dioxide on Airway Inflammatory Responses in Allergic Asthmatic Subjects". The principal investigator will be Dr. Colin Solomon. Resolution No. 01-21

Item 3 is a research proposal from University of Southern California entitled, "Deployment and Operation of Scanning Mobility Particle Sizers and Low Temperature Tapered Element Oscillating Microbalance in the Children's Health Study Communities". The principal investigator will be Dr. Constantinos Sioutas. Resolution No. 01-22



**PROPOSED****State of California  
AIR RESOURCES BOARD**

Resolution 01-20  
June 28, 2001

Agenda Item No.: 01-5-6

**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 2495-220, entitled "Children's Microenvironmental and Personal Pollutant Exposures for SB 25 with NAP Health Status Survey", has been submitted by the University of California, Los Angeles;

**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 2495-220 entitled "Children's Microenvironmental and Personal Pollutant Exposures for SB 25 with NAP Health Status Survey", submitted by the University of California, Los Angeles, for a total amount not to exceed \$399,464.

**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 2495-220 entitled "Children's Microenvironmental and Personal Pollutant Exposures for SB 25 with NAP Health Status Survey", submitted by the University of California, Los Angeles, for a total amount not to exceed \$399,464.

**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 \$399,464.

## ATTACHMENT A

### “Children’s Microenvironmental and Personal Pollutant Exposures for SB 25 with NAP Health Status Survey”

#### **Background**

The Children’s Environmental Health Program is defined in the Health and Safety Code Section 39617.5 (part of Senate Bill 25, Escutia, 1999). This Section requires the ARB to conduct enhanced neighborhood monitoring in six communities in California, and to prepare a report on whether the current statewide monitoring system provides data adequate to determine exposures of infants and children to air pollutants. To obtain comprehensive data on the levels of children’s exposure to air pollutants, the ARB must conduct indoor and outdoor sampling and personal exposure measurements at locations where children spend a significant amount of time in the selected communities. The six communities have been selected and the Monitoring and Laboratory Division is measuring, or plans to measure, air pollutants near schools identified in each community. The proposed project would obtain the required indoor and personal concentration data.

#### **Objective**

The primary objective of this project is to obtain data on children’s indoor and personal exposures to air pollutants in three of the SB 25 communities. A second objective is to assess the health status of children at each site.

#### **Methods**

In each community, pollutant measurements will be made indoors in three locations at a school, at one outdoor site on the school grounds, and in one home near the school. A total of 13 weeks of measurements will be made over three seasons. Measured pollutants will include volatile organic compounds, formaldehyde, and particle mass, with particle analysis for elemental and organic carbon. Carbon monoxide and nitrogen dioxide levels will be measured in real time. Twenty-five children in each community will wear badges to measure their exposure to volatile organic compounds. Additionally, a health questionnaire will be administered to children from each community to determine their health status, primarily their incidence of asthma and allergy, in support of ARB’s Neighborhood Assessment Program (NAP).

#### **Expected Results**

This study will provide data on pollutant concentrations in microenvironments where children spend a significant portion of their time. Since the school sites in each community have been selected based on proximity to major industrial sources or freeways, the results will be representative of locations with potentially elevated exposures.

**Significance to the Board**

This study will significantly increase our knowledge of children's exposures to air pollutants in areas with potentially elevated pollution. The study will provide valuable information so that the ARB can identify differences between children's actual exposures to air pollutants and the levels measured at network monitoring sites, as required by Health and Safety Code Section 39617.5.

**Contractor:** University of California, Los Angeles, School of Public Health, Environmental Health Sciences

**Contract Period:** 24 months

**Principal Investigator:** Steven D. Colome, Sc.D.

**Contract Amount:** \$399,464

**Cofunding:** None

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

**Past Experience with this Principal Investigator:** Dr. Steve Colome has conducted previous satisfactory work for the ARB.

**Prior Research Division Funding to University of California, Los Angeles:**

Year	2000	1999	1998
Funding	\$717,744	\$0	\$668,945

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

University of California, Los Angeles

"Children's Microenvironmental and Personal Pollutant Exposures for SB 25 with  
NAP Health Status Survey"

### DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$197,542
2.	Subcontractors	\$ 0
3.	Equipment	\$ 82,293 <sup>(1)</sup>
4.	Travel and Subsistence	\$ 12,670
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 3,600
7.	Mail and Phone	\$ 3,600
8.	Supplies	\$ 15,822
9.	Analyses	\$ 53,450 <sup>(2)</sup>
10.	Miscellaneous	<u>\$ 4,800</u>
Total Direct Costs		<u>\$ 373,777</u>

### INDIRECT COSTS

1.	Overhead	\$ 25,687
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	<u>\$ 0</u>
Total Indirect Costs		<u>\$ 25,687</u>

**TOTAL PROJECT COSTS** **\$ 399,464**

<sup>(1)</sup> A substantial investment in equipment is needed to complete the study protocol. The primary costs are for sampling pumps and sampling heads to complete five sets of monitoring ensembles used for collecting simultaneous samples. Equipment costs also include six real-time carbon monoxide monitors.

<sup>(2)</sup> Costs include analysis of 170 passive badges for volatile organic compounds, 170 samples for particulate matter mass, 85 samples for elemental and organic carbon, 85 samples for formaldehyde, and 25 canisters for volatile organic compounds. Individual prices are standard charges for these matrices.

**PROPOSED****State of California  
AIR RESOURCES BOARD**

Resolution 01-21  
June 28, 2001

Agenda Item No.: 01-5-6

**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 2496-220, entitled "Effects of Nitrogen Dioxide on Airway Inflammatory Responses in Allergic Asthmatic Subjects", has been submitted by the University of California, San Francisco;

**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 2496-220 entitled "Effects of Nitrogen Dioxide on Airway Inflammatory Responses in Allergic Asthmatic Subjects", submitted by the University of California, San Francisco, for a total amount not to exceed \$248,127.

**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 2496-220 entitled "Effects of Nitrogen Dioxide on Airway Inflammatory Responses in Allergic Asthmatic Subjects", submitted by the University of California, San Francisco, for a total amount not to exceed \$248,127.

**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 \$248,127.

## ATTACHMENT A

### "Effects of Nitrogen Dioxide on Airway Inflammatory Responses in Allergic Asthmatic Subjects"

#### **Background**

Epidemiological data suggest that people with asthma may be more sensitive to NO<sub>2</sub> exposure than non-asthmatics. Animal toxicological data provide evidence that NO<sub>2</sub> exposure can affect immune function, including enhancement of allergic inflammatory responses in the lungs, including those involved in allergic asthma. Controlled human exposure studies have clearly confirmed that NO<sub>2</sub> exposure can enhance both the early and late bronchoconstrictor responses to inhaled antigen in allergic asthmatic subjects, but no data on airway inflammatory responses of asthmatic subjects to NO<sub>2</sub> exposure have been reported to date.

#### **Objective**

The proposal will address two questions. 1) Does NO<sub>2</sub> exposure enhance the specific airway inflammatory responses of asthmatic subjects during late-phase reactions to inhaled allergen, and 2) do asthmatic subjects have significant non-specific airway inflammation following exposure to a concentration of NO<sub>2</sub> not reported to cause airway inflammation in normal subjects.

#### **Methods**

The investigators will expose mild asthmatics to filtered air or controlled concentrations of NO<sub>2</sub>. The study will also evaluate airways inflammatory responses to allergen exposure. Airway inflammation will be assessed by analysis of cellular and biochemical indicators of inflammation in induced sputum samples.

#### **Expected Results**

The results of the study will help to determine: (1) whether asthmatics develop airways inflammation with exposure to an environmentally relevant concentration of NO<sub>2</sub>, and  
(2) whether NO<sub>2</sub> enhances inflammatory responses to allergens in asthmatics.

#### **Significance to the Board**

The California Ambient Air Quality Standard for NO<sub>2</sub> is 0.25 parts per million for one hour, although this standard has not been reviewed since 1992. Recently, under the requirements of The Children's Environmental Health Protection Act (SB 25, 1999), all of the California ambient air quality standards were evaluated with the purpose of prioritizing them for full review. The prioritization process placed NO<sub>2</sub> third for review because of recent epidemiological research suggesting greater effects of NO<sub>2</sub> on asthmatics than on other sub-groups of the population, and studies suggesting an interaction between NO<sub>2</sub> and allergens.

This proposal directly addresses the issues that caused NO<sub>2</sub> to be prioritized third for review. The study will provide important experimental data that is not currently available. Successful completion of this project will provide the Board with new information that is highly relevant to the upcoming NO<sub>2</sub> standard review.

**Contractor:** University of California, San Francisco, Lung Biology Center

**Contract Period:** 24 months

**Principal Investigator:** Colin Solomon, Ph.D.

**Contract Amount:** \$248,127

**Cofunding:** None

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

**Past Experience with this Principal Investigator:** Dr. Colin Solomon has conducted previous satisfactory work for the ARB.

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

Year	2000	1999	1998
Funding	\$0	\$ 409,937	\$0

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

University of California, San Francisco

"Effects of Nitrogen Dioxide on Airway Inflammatory Responses  
in Allergic Asthmatic Subjects"

### DIRECT COSTS AND BENEFITS

11.	Labor and Employee Fringe Benefits	\$ 123,041
12.	Subcontractors	\$ 50,000
13.	Equipment	\$ 0
14.	Travel and Subsistence	\$ 4,060
15.	Electronic Data Processing	\$ 0
16.	Reproduction/Publication	\$ 209
17.	Mail and Phone	\$ 400
18.	Supplies	\$ 32,074 <sup>(1)</sup>
19.	Analyses	\$ 0
20.	Miscellaneous	<u>\$ 20,331</u>
	Total Direct Costs	<b>\$230,115</b>

### INDIRECT COSTS

5.	Overhead	\$180,114
6.	General and Administrative Expenses	\$ 0
7.	Other Indirect Costs	\$ 0
8.	Fee or Profit	<u>\$ 0</u>
	Total Indirect Costs	<b><u>\$18,012</u></b>

**TOTAL PROJECT COSTS** **\$248,127**

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(notes)

- <sup>(1)</sup> Lab Supplies including NO<sub>2</sub> gas, NO<sub>2</sub> analyzer standards, sputum induction, allergen challenge, gene expression assays, glass and plastic ware and assay kits.

**PROPOSED****State of California  
AIR RESOURCES BOARD**

Resolution 01-22  
June 28, 2001

Agenda Item No.: 01-5-6

**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 2493-220, entitled "Deployment and Operation of the Scanning Mobility Particle Sizers and Low Temperature Tapered Element Oscillating Microbalance in the Children's Health Study Communities", has been submitted by the University of Southern California.

**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 2493-220 entitled "Deployment and Operation of the Scanning Mobility Particle Sizers and Low Temperature Tapered Element Oscillating Microbalance in the Children's Health Study Communities", submitted by the University of Southern California, for a total amount not to exceed \$74,679.

**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 2493-220 entitled "Deployment and Operation of the Scanning Mobility Particle Sizers and Low Temperature Tapered Element Oscillating Microbalance in the Children's Health Study Communities", submitted by the University of Southern California, for a total amount not to exceed \$74,679.

**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 \$74,679.

## ATTACHMENT A

### "Deployment and Operation of the Scanning Mobility Particle Sizers and Low Temperature Tapered Element Oscillating Microbalance in the Children's Health Study Communities"

#### **Background**

The Air Resources Board operates an air monitoring network in the South Coast air basin to provide data for the Children's Health Study (CHS). PM10 data is collected by Temperature Tapered Element Oscillating Microbalance (TEOMs) operating at 50 degrees Celsius, the U.S. EPA equivalent method configuration. At this temperature the particulate mass can be under reported due to loss of volatile organic and nitrogen compounds. In order to avoid seriously misrepresenting PM10 mass in statistical analyses, the investigators in the CHS have elected to correct PM10 mass values from the TEOMs with hi-vol mass measurements from either collocated or similar locations nearby. In some cases, hi-vol data from considerable distances are employed in this correction process. There is a likelihood that the uncertainties in this correction process introduce unknown errors into the statistical analysis efforts of the CHS. The U.S. EPA has committed to co-funding approximately two thirds of the cost of this project through the South Coast Air Quality Management District.

#### **Objective**

The objective of this project is to deploy and operate the low temperature TEOM and the SMPS in the CHS. These instruments will allow for more mass conservative PM10 determinations and collect ultrafine particle size distribution information, respectively.

#### **Methods**

The proposed TEOMs operate at reduced temperatures to avoid volatilization. This project will circulate the low temperature TEOMs throughout the CHS network to recalculate the adjustment factor applied to the PM10 data.

The deployment of the Scanning Mobility Particle Sizers (SMPS) will expand the newly initiated ultrafine particle counter network, which measures another aspect of particulate matter in the atmosphere at the CHS monitoring sites. The SMPS instruments will produce data about the size distributions of ultrafine particles and provide valuable information about particle sources and dynamics and help provide insights into the potential health consequences of exposure to these particles.

The instruments will circulate through the CHS network with periods of two to six months at each station to gather seasonal data.

**Expected Results**

The low temperature TEOM will use the new model of TEOM that operates at or near ambient temperature. Data will be collected to recalculate PM10 correction factors which will improve the data used in modeling in the Children's Health Study.

The deployment of the SMPS will produce data about the size distributions of ultrafine particles. These data will provide valuable information about particle sources and dynamics, and help provide insights into the potential health consequences of exposure to these particles.

**Significance to the Board**

This project will provide information to improve the quality of particulate matter data reported from the Children's Health Study and used in the health effects models in that study. It will also provide pioneering information about the nature and behavior of ultrafine particles, which many health researchers believe are a critical component of air pollution effects on health outcomes.

**Contractor:** University of Southern California

**Contract Period:** 36 months

**Principal Investigator:** Dr. Constantinos Sioutas

**Contract Amount:** \$74,679

**Cofunding:** \$120,000 from the U.S. EPA

**Basis for Indirect Cost Rate:** The Indirect Cost Rate is 30 percent, as previously negotiated and agreed upon by the State of California and the University of Southern California.

**Past Experience with this Principal Investigator:** The Principal Investigator has an international reputation in aerosol science, specializing in field operations and ambient monitoring. He is the Deputy Director of the Southern California Particle Center and Supersite.

**Prior Research Division Funding to the University of Southern California:**

Year	2000	1999	1998
Funding	\$0	\$0	\$6,015,941

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

University of Southern California

"Deployment and Operation of the Scanning Mobility Particle Sizers and  
Low Temperature Tapered Element Oscillating Microbalance  
in the Children's Health Study Communities"

### DIRECT COSTS AND BENEFITS

21.	Labor and Employee Fringe Benefits	\$45,691
22.	Subcontractors	\$ 0
23.	Equipment	\$ 0
24.	Travel and Subsistence	\$11,754
25.	Electronic Data Processing	\$ 0
26.	Reproduction/Publication	\$ 0
27.	Mail and Phone	\$ 0
28.	Supplies	\$ 0
29.	Analyses	\$ 0
<u>30.</u>	<u>Miscellaneous</u>	<u>\$ 0</u>
	<b>Total Direct Costs</b>	<b>\$57,445</b>

### INDIRECT COSTS

9.	Overhead	\$17,234
10.	General and Administrative Expenses	\$ 0
11.	Other Indirect Costs	\$ 0
12.	Fee or Profit	<u>\$ 0</u>
	<b>Total Indirect Costs</b>	<b><u>\$17,234</u></b>

### TOTAL PROJECT COSTS

**\$74,679<sup>1</sup>**

(notes)

<sup>1</sup> Total project cost = \$194,679; U.S. EPA co-funding will pay \$120,000 leaving ARB cost as \$74,679

