State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 05-41

September 15, 2005

Agenda Item No.: 05-8-2

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 2588-249, entitled "Assessment of Health Impacts of Particulate Matter from Indoor Air Sources: Development of *in vitro* Methodology", 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 2588-249 entitled "Assessment of Health Impacts of Particulate Matter from Indoor Air Sources: Development of *in vitro* Methodology", submitted by the University of California, Davis, for a total amount not to exceed $399,997.

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 2588-249 entitled "Assessment of Health Impacts of Particulate Matter from Indoor Air Sources: Development of *in vitro* Methodology", submitted by the University of California, Davis, for a total amount not to exceed $399,997.

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 $399,997.

I hereby certify that the above is a true and correct copy of Resolution 05-41, as adopted by the Air Resources Board.

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Lori Andreoni, Clerk of the Board

# ATTACHMENT A

## "Assessment of Health Impacts of Particulate Matter from Indoor Air Sources: Development of *in vitro* Methodology"

### Background
Exposure to particulate matter (PM) measured in ambient air is known to cause serious health effects. However, little is known of the potential health effects of PM originating from indoor sources. Indoor sources can result in elevated indoor PM concentrations, and several toxic components have been detected in PM from indoor sources. PM exposure due to indoor sources can be even greater for infants and the elderly, who spend more time indoors. Also, people tend to be closer to indoor sources such as cooking stoves and wood stoves, which increases the resulting exposure. Consequently, PM of indoor origin may have a significant health impact.

### Objective
The objective of the study is to identify and quantify the potential impact of particulate matter from important indoor sources on human health.

### Methods
This study will test the relative toxicity of PM collected from indoor sources, using cellular assays to determine impacts on cellular activity. Markers of oxidative stress, inflammation, and cytotoxicity will be measured. Four indoor PM sources will be sampled: cooking, fireplace wood burning, candle and incense burning, and vacuuming. Samples will be collected near the sources, using filters and adsorbents, and extracted for testing. To evaluate the toxicity of the indoor samples, bioassays using two human cell lines will be conducted. The relative toxicity of indoor PM sources will be determined by comparing toxicity with standards such as environmental tobacco smoke (ETS) and ambient particulate matter (urban dust). In addition, chemical analyses will be conducted for selected samples based on toxic potency.

### Expected Results
This study will provide data on the relative toxicity of major indoor PM sources, and should also provide insight into the types of chemicals responsible for their toxicity.

### Significance to the Board
This study will examine the potential health impacts of indoor-generated PM, which has not been undertaken before. The resulting data should help the ARB determine directions for health risk reduction. The expected results will enable the ARB to determine whether reductions in indoor PM emissions are needed to more effectively reduce PM exposure and risk.

### Contractor:
University of California, Davis

**Contract Period:**
36 months

**Principal Investigator (PI):**
Dr. Fumio Matsumura

**Contract Amount:**
$399,997

**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:**
Dr. Matsumura is the director of the University of California's Center for Environmental Health Sciences, sponsored by the National Institute of Environmental Health Sciences. His research findings have helped to clarify the mechanisms by which organic chemicals exert their toxic effects on biological systems. Although the ARB has not sponsored research with Dr. Matsumura, his research has included studies on the toxicology of air pollutants.

**Prior Research Division Funding to UCD:**

| Year | 2005 | 2004 | 2003 |
|---|---|---|---|
| Funding | $0 | $159,715 | $220,896 |

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

University of California, Davis

"Assessment of Health Impacts of Particulate Matter from Indoor Air Sources: Development of *in vitro* Methodology"

| | | | |
|---|---|---|---|
| **DIRECT COSTS AND BENEFITS** | | | |
| 1. | Labor and Employee Fringe Benefits | $238,049 | |
| 2. | Subcontractors | $ 4,375 | |
| 3. | Equipment | $ 16,500 | |
| 4. | Travel and Subsistence | $ 5,100 | |
| 5. | Electronic Data Processing | $ 0 | |
| 6. | Reproduction/Publication | $ 1,000 | |
| 7. | Mail and Phone | $ 750 | |
| 8. | Supplies | $ 73,300[1] | |
| 9. | Analyses | $ 19,020 | |
| 10. | Miscellaneous | $ 7,040 | |
| | Total Direct Costs | | $365,134 |
| **INDIRECT COSTS** | | | |
| 1. | Overhead | $ 34,863 | |
| 2. | General and Administrative Expenses | $ 0 | |
| 3. | Other Indirect Costs | $ 0 | |
| 4. | Fee or Profit | $ 0 | |
| | Total Indirect Costs | | $34,863 |
| **TOTAL PROJECT COSTS** | | | **$**399,997 |

[1] Supplies:

| | |
|---|---|
| Laboratory supplies and materials needed for sampling and analyses of indoor air samples. Plus supplies for sampling parallel outdoor samples and ETS control samples. | 29,800 |
| Laboratory supplies and materials for cell culture tests. | 43,500 |
| | **73,300** |

**Attachment 1**

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

Subcontractor: Dr. Lynn Hildemann

Dr. Hildemann will serve as a technical advisor on the indoor source sampling aspects of the study. She will advise on instrumentation, sampling, field study protocols, and the development of the data evaluation.

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|---|---|---|---|
| **DIRECT COSTS AND BENEFITS** | | | |
| 1. | Labor and Employee Fringe Benefits | $ 4,375 | |
| 2. | Subcontractors | $ 0 | |
| 3. | Equipment | $ 0 | |
| 4. | Travel and Subsistence | $ 0 | |
| 5. | Electronic Data Processing | $ 0 | |
| 6. | Reproduction/Publication | $ 0 | |
| 7. | Mail and Phone | $ 0 | |
| 8. | Supplies | $ 0 | |
| 9. | Analyses | $ 0 | |
| 10. | Miscellaneous | $ 0 | |
| | Total Direct Costs | | $ 4,375 |
| **INDIRECT COSTS** | | | |
| 1. | Overhead | $ 0 | |
| 2. | General and Administrative Expenses | $ 0 | |
| 3. | Other Indirect Costs | $ 0 | |
| 4. | Fee or Profit | $ 0 | |
| | Total Indirect Costs | | $ 0 |
| **TOTAL PROJECT COSTS** | | | **$ 4,375** |