

State of California  
AIR RESOURCES BOARD

**RESEARCH PROPOSAL**

Resolution 07-3

January 25, 2007

Agenda Item No.: 07-1-4

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; and

WHEREAS, a research proposal, number 2625-254, entitled "Extended Analyses of Air Pollution and Cardiopulmonary Disease in the California Teachers Study Cohort," has been submitted by the Department of Health Services;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the South Coast Air Quality Management District has agreed to cosponsor this proposal for a total amount of \$142,326; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

Proposal Number 2625-254 entitled "Extended Analyses of Air Pollution and Cardiopulmonary Disease in the California Teachers Study Cohort," submitted by the Department of Health Services, for a total amount not to exceed \$284,652.

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 2625-254 entitled "Extended Analyses of Air Pollution and Cardiopulmonary Disease in the California Teachers Study Cohort," submitted by the Department of Health Services, for a total amount not to exceed \$284,652.

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 \$284,652.

I hereby certify that the above is a true and correct copy of Resolution 07-3, as adopted by the Air Resources Board.

/s/

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Lori Andreoni, Clerk of the Board

## ATTACHMENT A

### **“Extended Analyses of Air Pollution and Cardiopulmonary Disease in the California Teachers Study Cohort”**

#### **Background**

Nationwide there are relatively few prospective studies of the effects of long-term exposures to air pollution, and even fewer that are California specific studies such as the “Air Pollution and Cardiovascular Disease in the California Teachers Study (CTS) Cohort”. This study was funded by ARB to study the effects of chronic air pollution exposure among a cohort of women teachers in California. This cohort was established in 1995 and includes former female public school teachers. Since the baseline questionnaire in 1995, the investigators have continued to collect information about address changes, mortality events, and hospitalizations. Two waves of questionnaires were sent out in 1997-1998 and 2000-2001 that obtained information on self-reported chronic conditions, hospitalizations, and other individual risk factors important in assessing the health effects of air pollution. Dr. Lipsett and colleagues demonstrated in this study that long-term exposure to PM<sub>2.5</sub>, CO, and NO<sub>2</sub> was associated with the incidence of myocardial infarction and stroke, as well as re-affirming strong and consistent relationships between PM<sub>2.5</sub> and several other air pollutants with mortality.

#### **Objective**

Dr. Lipsett and colleagues will expand the CTS to compare effect estimates of PM<sub>2.5</sub> and other gaseous pollutants using different exposure periods in order to ascertain whether there are critical time windows that are most strongly related to cardiopulmonary outcomes, and also with deaths due to more specific disease categories, including ischemic heart disease, cerebrovascular disease, lung cancer, and nonmalignant respiratory disease. They will undertake analyses restricted to never-smokers and will examine whether the pollutant effects differ in potentially susceptible subgroups by undertaking selected analyses stratified on individual characteristics such as body mass index or co-morbidities like diabetes. The investigators will also examine associations between PM<sub>2.5</sub> constituents, such as elemental and organic carbon and nitrates, to several cardiopulmonary outcomes, and compare the effect estimates with those obtained for PM<sub>2.5</sub> mass and they will explore the sensitivity of the PM<sub>2.5</sub> results to the use of pre-1999 estimated fine particle concentrations in the analyses. The study will examine whether there are departures from linearity in the exposure-response function between PM<sub>2.5</sub> and several mortality categories. The investigators will re-examine the relationships between several traffic metrics and cardiopulmonary outcomes by modeling the effects of extremes of traffic metric distributions.

#### **Methods**

Air quality data as well as mortality and hospitalization data for the CTS will be updated through December 2004. Health outcome data are based on record linkage to mortality files administered by the California Department of Health Services and to a statewide file of hospitalization data administered by the Office of Statewide Health Planning and Development. ARB staff will provide updated monthly averages and interpolated pollutant surfaces for PM<sub>10</sub>, PM<sub>2.5</sub>, ozone, CO, NO<sub>2</sub>, and several other gases. They will also provide monthly averages for selected constituents of PM<sub>2.5</sub> mass at all

speciation monitors in California from 2000-2004. As before, the primary method of analysis will be to examine the various exposure metrics as predictors of the health outcomes, using Cox proportional hazards regression, controlling for a variety of individual-level and contextual or neighborhood covariates. The analyses to be undertaken will correspond to our stated objectives, which in some instances will involve restricting population at risk (e.g., to never-smokers), stratifying the sample on individual characteristics (e.g., obesity), and so forth. The contractor will also be undertaking a more thorough examination of issues related to spatial autocorrelation, including some sensitivity analyses to address concerns raised in their previous analyses.

**Expected Results**

The additional two years will allow the investigators to account for some of the greatest decreases in particulate and gaseous air pollution when looking into windows of exposure and dose response. The investigators not only link the CTS cohort to death certificate data, but also to hospitalization data; therefore, the investigators will be able to further investigate the total and cause-specific mortality and hospitalizations for various cardiovascular and pulmonary diseases among CTS cohort members for the years 1995 through 2004.

**Significance to the Board**

This study will be able to capture the most effects from current ambient air pollution and provide us with results that will be ground breaking. The result will be important when setting standards for particulate air pollution and possibly for several gases in California and at the federal level as well.

**Contractor:**

Department of Health Services

**Contract Period:**

36 months

**Principal Investigator (PI):**

Michael Lipsett, M.D

**Contract Amount:**

\$284,652

**Cofunding:**

The South Coast Air Quality Management District is contributing \$142,326 to the cost of this study.

**Basis for Indirect Cost Rate:**

The Department of Health Services has agreed to not charge an indirect cost rate.

**Past Experience with this Principal Investigator:**

ARB research staff have had extensive interaction with Dr. Michael Lipsett as a contractor and collaborator. Dr. Lipsett currently serves as the principal investigator for ongoing cohort study (contract no. 03-313) which has produced valuable research information. In addition, he has designed and conducted air pollution epidemiological studies, including time-series studies of mortality and morbidity, as well as panel studies involving asthmatics and individuals with cardiac disease. He has served on a variety of local, state, and national committees focusing on the impact of air pollution on human health, including the ARB's Research Screening Committee.

**Prior Research Division Funding to DHS:**

Year	2006	2005	2004
Funding	\$0	\$0	\$0

# BUDGET SUMMARY

Department of Health Services

## Extended Analyses of Air Pollution and Cardiopulmonary Disease in the California Teachers Study Cohort

### DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$	0
2.	Subcontractors	\$	264,412 <sup>1</sup>
3.	Equipment	\$	3,600
4.	Travel and Subsistence	\$	1,640
5.	Electronic Data Processing	\$	0
6.	Reproduction/Publication	\$	0
7.	Mail and Phone	\$	0
8.	Supplies	\$	0
9.	Analyses	\$	0
10.	Miscellaneous	\$	<u>15,000</u>
	Total Direct Costs		\$284,652

### INDIRECT COSTS

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

### TOTAL PROJECT COSTS

\$284,652

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<sup>1</sup> Subcontractors:

Northern California Cancer Center	\$233,092
Edward Hughes Consulting	<u>\$ 31,320</u>
	\$264,412

## SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: Northern California Cancer Center

Description of subcontractor's responsibility: NCCC was part of the initial team who initiated the California Teachers Cohort Study. Because of confidentiality restrictions, the analyses cannot continue unless they are undertaken by NCCC staff on computers housed on-site at NCCC.

### **DIRECT COSTS AND BENEFITS**

1.	Labor and Employee Fringe Benefits	\$ 147,104
2.	Subcontractors	\$ 0
3.	Equipment	\$ 0
4.	Travel and Subsistence	\$ 507
5.	Electronic Data Processing	\$ 3,000
6.	Reproduction/Publication	\$ 1,335
7.	Mail and Phone	\$ 629
8.	Supplies	\$ 848
9.	Analyses	\$ 0
10.	Miscellaneous	<u>\$ 26,100<sup>2</sup></u>

Total Direct Costs	\$179,523
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### **INDIRECT COSTS**

1.	Overhead	\$ 53,569
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	<u>\$ 0</u>

Total Indirect Costs	<u>\$53,569</u>
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<b><u>TOTAL PROJECT COSTS</u></b>	<b><u>\$233,092</u></b>
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<sup>2</sup> Costs are for NCCC staff to be housed at their field office in Berkeley which will be the performance site for this project.

## SUBCONTRACTORS' BUDGET SUMMARY

Subcontractor: Edward Hughes Consulting

Description of subcontractor's responsibility: Will provide expertise related to the Cox-Poisson program.

### **DIRECT COSTS AND BENEFITS**

1.	Labor and Employee Fringe Benefits	\$ 28,000
2.	Subcontractors	\$ 0
3.	Equipment	\$ 0
4.	Travel and Subsistence	\$ 3,320
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 0
7.	Mail and Phone	\$ 0
8.	Supplies	\$ 0
9.	Analyses	\$ 0
10.	Miscellaneous	<u>\$ 0</u>

Total Direct Costs	\$31,320
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### **INDIRECT COSTS**

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

Total Indirect Costs	<u>\$ 0</u>
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<b><u>TOTAL PROJECT COSTS</u></b>	<b><u>\$31,320</u></b>
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