PROPOSED

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 12-1

January 26, 2012

Agenda Item No.: 12-1-1

WHEREAS, the Air Resources Board (ARB) 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 2733-272, entitled "Reducing In-Home Exposure to Air Pollution," has been submitted by the Lawrence Berkeley National Laboratory;

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 2733-272 entitled "Reducing In-Home Exposure to Air Pollution," submitted by the Lawrence Berkeley National Laboratory, for a total amount not to exceed $1,300,873.

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 2733-272 entitled "Reducing In-Home Exposure to Air Pollution," submitted by the Lawrence Berkeley National Laboratory, for a total amount not to exceed $1,300,873.

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 $1,300,873.

ATTACHMENT A

"Reducing In-Home Exposure to Air Pollution"

Background
In part to address indoor air quality issues, new California homes are now required to have mechanical ventilation under California's Energy Efficiency Standards for Residential Buildings [Title 24, Section 150(o)]. Some of these systems include filtration, but the most economical (and widely used) low energy systems do not filter the incoming air or filter it poorly. Since new construction often occurs near busy roadways and new land use policies, including the Sustainable Communities and Climate Protection Act of 2008 (SB 375), encourage infill developments in urban areas, potential mitigation strategies that reduce exposure to incoming ambient pollutants beyond ARB's land use planning setback guidelines need to be identified. Such a strategy may include different combinations of high efficiency filtration technologies coupled with mechanical ventilation systems deployed in new and existing construction.

Objective
The objective of this study is to measure the exposure reduction effectiveness and energy use of combinations of mechanical ventilation and filtration systems in order to identify compatible, low-energy systems that are most effective at reducing indoor exposures to indoor, and incoming outdoor, pollutants.

Methods
The investigators plan to: 1) identify and evaluate up to 15 current and new systems, and select seven of the most promising systems to be compared to one reference or baseline system; 2) identify and prepare a test home, near a major roadway and in an area with high ambient ozone and PM2.5 levels, in which the experimental measurements will be conducted; and 3) evaluate the in-situ performance of combinations of systems operating over at least several weekdays and one weekend day, during one warm and one cool season. The investigators will measure fine and ultrafine particles using several metrics (e.g., counts, mass and size distribution), ozone, volatile organic chemicals, nitrogen dioxide, and black carbon. System operation time and energy consumption, indoor and outdoor temperature and humidity, other metrics of component performance, and the average daily ventilation rate will also be measured. The investigators also will evaluate system performance for removal of indoor-generated pollutants, the effect of building-related pollutant removal processes, and performance of systems as filters age.

Expected Results
This study is expected to identify combinations of mechanical ventilation and filtration systems that are both health protective and energy efficient that can be specified for new homes and recommended for homes of people with cardiovascular disease or respiratory conditions such as asthma. In addition, this research may prompt the development of additional engineering controls to enhance pollutant removal from air supplied and re-circulated to the indoor environment.

Significance to the Board
The proposed research should enable ARB to provide guidance regarding an additional approach for reducing exposures of those living near busy roadways and in high ambient air pollution areas. Such guidance may especially benefit individuals with respiratory or cardiovascular conditions. The information obtained also will help the California Energy Commission refine the State's mechanical ventilation regulation for new homes.

Contractor:
Lawrence Berkeley National Laboratory (LBNL)

Contract Period:
36 Months

Principal Investigators (PIs):
Brett C. Singer, Ph.D.
Iain S. Walker, Ph.D. (co-PI)

Contract Amount:
$1,300,873

Cofunding:
A normal Federal Administrative Charge of $37,499 has been waived by the Contractor.

Basis for Indirect Cost Rate:
Rates are those approved by the U.S. Department of Energy and are included in LBNL's FY 2012 Forward Pricing Rates.

Past Experience with the Principal Investigators:
ARB has previously funded several successful projects with LBNL and has two current projects with them. ARB staff has had previous positive interactions with the project PI, Dr. Singer, while serving as a member of several advisory committees for his projects. Doctors Singer and Walker as well as other LBNL scientists assigned to this project are nationally recognized experts in the fields of mechanical ventilation, filtration, and indoor air quality, thereby bringing key expertise to this project. They currently are conducting related work for the California Energy Commission that will provide important baseline information that will be used in this project.

Prior Research Division Funding to Lawrence Berkeley National Laboratory:

Year	2011	2010	2009
Funding	$650,000	$0	$350,209

BUDGET SUMMARY

Contractor: Lawrence Berkeley National Laboratory

"Reducing In-Home Exposure to Air Pollution"

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 557,293	
2.	Subcontractors[1]	$ 41,600	
3.	Equipment	$ 43,480	
4.	Travel and Subsistence	$ 15,747	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 40,654	
9.	Analyses	$ 0	
10.	Miscellaneous[2]	$ 181,543	
	Total Direct Costs		$ 880,317
INDIRECT COSTS			
1.	Overhead	$ 355,625	
2.	Directed Research and Development	$ 45,280	
3.	Institutional General Plant Projects	$ 9,643	
4.	Safeguards and Security	$ 10,008	
5.	Other Indirect Costs	$ 0	
6.	Fee or Profit	$ 0	
	Total Indirect Costs		$ 420,556
TOTAL PROJECT COSTS			**$1,300,873**

[1]Item 2: LBNL is in the process of selecting the subcontractor, which will be a licensed and bonded heating, ventilation and air conditioning (HVAC) company. The cost includes primarily the labor of installation and removal of the ventilation and filtration systems, along with some system design and purchase of needed equipment and materials.

[2]Item 10 includes the following:

A. Electricity: estimated at a flat rate of $50/month. Total $1,800.

B. Department burden (5.5%) and recharges: general departmental costs including, but not limited to, laboratory and office space, telephone charges, faxes, electronic backups, photocopying, and department-level administrative support. Total $ 30,653.

C. Organization burden (17%) is a direct cost applied to salaries plus fringe benefits. Total $94,740.

D. Insurance for research equipment and damage to home. Total $5,000.

E. Test house access and related costs estimated at $3,000 per month for 15 months. Total $45,000.

F. In accordance with DOE's full-cost recovery policy, purchase costs above include a procurement burden. Total $4,350.

(Rates above are included in LBNL's FY2012 Forward Pricing Rates and approved by U.S. DOE.)