State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 11-17

February 24, 2011

Agenda Item No.: 11-1-1

WHEREAS, the Air Resources Board (ARB or 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 2721-270, entitled "Evaluation of Pollutant Emissions from Portable Air Cleaners," has been submitted by 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 2721-270 entitled "Evaluation of Pollutant Emissions from Portable Air Cleaners," submitted by the Lawrence Berkeley National Laboratory, for a total amount not to exceed $400,000.

NOW, THEREFORE, BE IT RESOLVED that ARB, 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 2721-270 entitled "Evaluation of Pollutant Emissions from Portable Air Cleaners," submitted by the Lawrence Berkeley National Laboratory, for a total amount not to exceed $400,000.

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 $400,000.

I hereby certify that the above is a true and correct copy of Resolution 11-17, as adopted by the Air Resources Board.

Mary Alice Morency, Clerk of the Board

ATTACHMENT A

"Evaluation of Pollutant Emissions from Portable Air Cleaners"

Background
ARB adopted an air cleaner regulation in 2007 that limits ozone emissions from portable air cleaners sold in California. However, new products have entered the market that combine new "air cleaning" technologies with older technologies in new, integrated models. Some of the new technologies include photocatalytic oxidation, formation of highly reactive chemical species and high-temperature combustion. While ozone emissions remain a concern, fine particles, formaldehyde and other partially oxidized volatile organic compounds may be generated from these new products as indoor air pollutants. There is little prior research to identify and quantify emissions of these potentially harmful air pollutants. This proposed study will characterize the emission profiles of these pollutants from portable air cleaners and help evaluate potential indoor air quality and health impacts of these new generation air cleaners.

Objective
The objective of this study is to investigate primary (direct) emissions and secondary emissions (chemicals formed in the air by emitted constituents) from portable air cleaners that use new technologies and to evaluate their potential impact on indoor air quality. Specifically, the investigators plan to: 1) select six "new technology" portable air cleaners with significant market presence in California; 2) develop a test protocol that takes into consideration the particular features and differences among the selected models; 3) characterize their primary and secondary emissions under realistic indoor operating conditions in a test chamber; and 4) evaluate the potential impact of those emissions on indoor air quality and health.

Methods
The investigators will test six models of household air cleaners that utilize new air cleaning technologies. Using different indoor environmental scenarios, the investigators will monitor the air concentrations of various pollutants in a stainless steel, 20 m^3 chamber in which each model is operated in idle and active cycles. The investigators will measure ozone, fine and ultrafine particulate matter (PM), volatile organic compounds (VOC) and volatile aldehydes using standard sampling and analytical protocols. Innovative sampling and analytical approaches will be developed for models that may produce reactive, short-lived chemical species and for the model that generates an exceedingly high temperature to combust the pollutants.

Expected Results
The results will include the primary and secondary emissions, and emission profiles of ozone, fine and ultrafine PM, formaldehyde, VOCs and reactive oxygen species emitted by each of the six different household air cleaners. The investigators will also assess whether such emission levels pose a risk to human health.

Significance to the Board
The proposed research will help ARB determine whether there are any indoor air quality or health concerns that need to be addressed through public education or future

regulation of air cleaners using these new technologies. In addition, this research may prompt the development of appropriate engineering controls by manufacturers to reduce the emissions of these pollutants.

Contractor:
Lawrence Berkeley National Laboratory

Contract Period:
30 Months

Principal Investigators (PIs):
Hugo Destaillats, Ph.D., and William J. Fisk, M.S.

Contract Amount:
$400,000

Basis for Indirect Cost Rate:
Rates are those approved by the U.S. Department of Energy and are included in Lawrence Berkeley National Laboratory's (LBNL) FY 2011 Forward Pricing Rates.

Past Experience with this Principal Investigator:
In other ARB-funded projects, the investigators have characterized secondary pollutants from ozone-initiated indoor chemistry and emissions from office electronic equipment under idle and active cycles. The availability of LBNL's state-of-the-art air testing chamber and the investigators' expertise in running the chamber and measuring all types of chemicals are vital to this project.

Prior Research Division Funding to Lawrence Berkeley National Laboratory:

Year	2009	2008	2007
Funding	$350,209	$0	$0

BUDGET SUMMARY

Contractor: Lawrence Berkeley National Laboratory

"Evaluation of Pollutant Emissions from Portable Air Cleaners"

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ $177,567	
2.	Subcontractors	$ 0	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 7,980	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 0	
7.	Mail and Phone	$ 0	
8.	Supplies	$ 17,392	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 66,202[1]	
	Total Direct Costs		$269,141
INDIRECT COSTS			
1.	Overhead	$ 112,170	
2.	Directed Research and Development	$ 13,118	
3.	Institutional General Plant Projects	$ 2,792	
4.	Safeguards and Security	$ 2,779	
5.	Other Indirect Costs	$ 0	
6.	Fee or Profit	$ 0	
	Total Indirect Costs		$130,859
TOTAL PROJECT COSTS			**$400,000**

Notes:

1. Miscellaneous includes the following:
   A. Electricity: estimated at a flat rate of $50/month. B. A stipend of ~$2,000/month that will be paid during ~1 year to student(s) hired to help on this project. C. Department burden (5.5%) and recharges: covers general departmental costs including, but not limited to, laboratory and office space, telephone charges, faxes, electronic backups, photocopying, and department-level administrative support.
   D. Organization burden (17%), a direct cost applied to total salaries plus fringe benefits. Rates are included in LBNL's FY2011 Forward Pricing Rates and approved by DOE.