

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 05-21

March 17, 2005

Agenda Item No.: 05-3-2

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 2575-247, entitled "Ventilation and Indoor Air Quality in New Homes", has been submitted by Indoor Environmental Engineering, in response to RFP No. 04-310;

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

WHEREAS, the California Energy Commission is funding this proposal in full for a total amount of \$1,042,935; and

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

Proposal Number 2575-247, entitled "Ventilation and Indoor Air Quality in New Homes", submitted by Indoor Environmental Engineering, for a total amount not to exceed \$1,042,935.

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 2575-247, entitled "Ventilation and Indoor Air Quality in New Homes", submitted by Indoor Environmental Engineering, for a total amount not to exceed \$1,042,935.

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 \$1,042,935.

I hereby certify that the above is a true
and correct copy of Resolution 05-21, as
adopted by the Air Resources Board.

Lori Andreoni, Clerk of the Board

ATTACHMENT A

“Ventilation and Indoor Air Quality in New Homes”

Background

Concerns have been raised regarding whether households in new California homes use windows, doors, exhaust fans, and other mechanical ventilation devices enough to remove indoor air pollutants and excess moisture. Various building materials, heating and cooking appliances, and other products used in new homes can emit substantial amounts of formaldehyde, other toxic air contaminants, combustion pollutants, and/or water vapor. Building practices and building standards for energy efficiency have led to more tightly-sealed homes that rely on occupants to open windows for ventilation. However, there is very little information on current ventilation practices, indoor air quality, or indoor pollutant sources in new California homes.

Objective

The overall objective of this study is to obtain information on ventilation characteristics and indoor air quality in new single-family detached homes in California through a field study. The specific objectives include: determining the occupants' use of windows, doors, exhaust fans and central heating and cooling systems; measuring indoor air pollutant levels, environmental conditions, building ventilation rates, and fan and central system use; and examining the relationships among home ventilation characteristics, indoor air quality, and house and household characteristics. Another study objective is to identify incentives and barriers that influence household actions to improve ventilation and indoor air quality.

Methods

This field study will characterize ventilation, indoor air quality, and household characteristics and activities in over 100 homes, in at least two seasons and two regions of the state. Indoor air levels of volatile organic compounds, aldehydes, PM_{2.5}, and nitrogen dioxide will be measured over one day; some homes will have measurements in multiple days and seasons. Temperature, humidity, and wind speed will be measured. Home ventilation will be determined through tracer gas measurements, building leakage measurements, window use measurement, air flow measurements of fan systems, and occupant diaries. This field study will build on, and use available results from, the current ARB-Commission funded mail survey of ventilation practices and indoor air quality in new single-family homes.

Expected Results

For the first time, California will have representative, accurate and current information on ventilation and indoor air quality in new California homes. Measured levels of ventilation and indoor air quality will be compared to current guidelines and standards. Information on the use of windows, fans, and central systems will help establish realistic values for developing state standards for building energy efficiency. Indoor air quality and household ventilation practices will be obtained from multiple seasons and regions of the state, which will help characterize the full range of indoor pollutant exposure in California.

Significance to the Board

The study results will improve ARB's ability to identify current sources of indoor air pollutants, to assess Californians' current exposure to measured toxic air contaminants (per Health and Safety Code Section 39660.5), and to recommend effective strategies

for reducing indoor air pollution. The Commission will use the study results as a scientific basis to revise the state's building energy efficiency standards in order to provide more healthful, energy-efficient homes in California.

Contractor:

Indoor Environmental Engineering, San Francisco, California.

Contract Period:

31 months.

Principal Investigator (PI):

Francis J. Offermann

Contract Amount:

\$1,042,935

Cofunding:

The California Energy Commission is contributing the total cost of this project, which is \$1,042,935.

Basis for Indirect Cost Rate:

Rates are similar to those of other firms performing similar work in Northern California.

Past Experience with this Principal Investigator:

The Principal Investigator performed well in conducting a small study to develop and test an indoor monitoring method for polycyclic aromatic hydrocarbons.

Prior Research Division Funding to Indoor Environmental Engineering:

Year	2004	2003	2002
Funding	\$0	\$0	\$0

BUDGET SUMMARY

Indoor Environmental Engineering

Ventilation and Indoor Air Quality in New Homes

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$214,267
2.	Subcontractors	\$361,281 ¹
3.	Equipment	\$ 0
4.	Travel and Subsistence	\$ 71,052
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 0
7.	Mail and Phone	\$ 0
8.	Supplies	\$ 52,721
9.	Analyses	\$124,994 ²
10.	Miscellaneous	<u>\$ 2,701</u>
	Total Direct Costs	\$827,016

INDIRECT COSTS

1.	Overhead	\$121,107
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	<u>\$ 94,812</u>
	Total Indirect Costs	<u>\$215,919</u>

TOTAL PROJECT COSTS **\$1,042,935**

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1. Expertise and resources from multiple technical areas are needed for this project.
 2. Laboratory analysis costs for volatile organic compounds and aldehydes (\$97,416), PM2.5 and nitrogen dioxide (\$15,178), and sodium hexafluoride tracer gas (\$12,400). Analyses to be conducted by Berkeley Analytical Associates and DataChem Laboratories.

Attachment 1

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: RLW Analytics Inc.

Sample recruitment, quality assurance/control management, and data analysis.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$70,788	
2.	Subcontractors	\$ 0	
3.	Equipment	\$ 0	
4.	Travel and Subsistence	\$ 700	
5.	Electronic Data Processing	\$ 0	
6.	Reproduction/Publication	\$ 0	
7.	Mail and Phone	\$ 0	
8.	Supplies	\$ 0	
9.	Analyses	\$ 0	
10.	Miscellaneous	<u>\$13,700</u>	
	Total Direct Costs		\$85,188

INDIRECT COSTS

1.	Overhead	\$23,761	
2.	General and Administrative Expenses	\$40,949	
3.	Other Indirect Costs	\$ 0	
4.	Fee or Profit	<u>\$ 5,206</u>	
	Total Indirect Costs		<u>\$69,916</u>

TOTAL PROJECT COSTS

\$155,104

Attachment 2

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: Davis Energy Group

Ventilation team leader: develop field protocols, train field staff, make measurements, and analyze data.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$71,154	
2.	Subcontractors	\$ 0	
3.	Equipment	\$ 0	
4.	Travel and Subsistence	\$ 2,239	
5.	Electronic Data Processing	\$ 0	
6.	Reproduction/Publication	\$ 0	
7.	Mail and Phone	\$ 0	
8.	Supplies	\$16,466	
9.	Analyses	\$ 0	
10.	Miscellaneous	<u>\$ 0</u>	
	Total Direct Costs		\$89,859

INDIRECT COSTS

1.	Overhead	\$43,936	
2.	General and Administrative Expenses	\$ 0	
3.	Other Indirect Costs	\$ 0	
4.	Fee or Profit	<u>\$13,379</u>	
	Total Indirect Costs		<u>\$57,315</u>

TOTAL PROJECT COSTS

\$147,174

Attachment 2

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: Amaro Construction

Ventilation team field technicians.

DIRECT COSTS AND BENEFITS

1. Labor and Employee Fringe Benefits	\$41,603	
2. Subcontractors	\$ 0	
3. Equipment	\$ 0	
4. Travel and Subsistence	\$ 1,399	
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		\$43,002

INDIRECT COSTS

1. Overhead	\$16,001	
2. General and Administrative Expenses	\$ 0	
3. Other Indirect Costs	\$ 0	
4. Fee or Profit	<u>\$ 0</u>	
Total Indirect Costs		<u>\$16,001</u>

TOTAL PROJECT COSTS \$59,003