State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 05-3

January 20, 2005

Agenda Item No.: 05-1-2

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 2561-246, entitled "Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California", has been submitted by the University of California, Los Angeles.

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 2561-246 entitled "Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California ", submitted by the University of California, Los Angeles, for a total amount not to exceed $422,089.

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 2561-246 entitled "Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California," submitted by the University of California, Los Angeles, for a total amount not to exceed $422,089.

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 $422,089.

I hereby certify that the above is a true and correct copy of Resolution 05-3, as adopted by the Air Resources Board.

_____
Lori Andreoni, Clerk of the Board

"Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California"

Background

It is generally well established that short-term air pollution exposure can exacerbate respiratory symptoms in asthmatic children. Most of these studies used measurement data from existing monitoring networks that are more designed to capture regional pollutant data or are not dense enough to adequately measure pollutants that are distributed heterogeneously throughout communities such as carbon monoxide, ultrafine particles and nitrogen dioxide. The studies that used more sophisticated emissions and air dispersion models to estimate traffic pollutant concentrations at homes and schools reported greater effects. A more recent approach for assessing exposure to traffic exhaust pollutants is the development of land use-based regression (LUR) models, such as the models built for the Impact of Traffic-Related Air Pollution on Childhood Asthma study in Europe. These LUR models predict a greater range of variation in NO_2 concentrations based on spatially extensive networks of monitoring sites rather than based on the government sites alone. These studies have been done mostly in the Netherlands and the United Kingdom. It is unknown how well these studies can be extrapolated to the U.S. population since vehicle and population factors may differ. Therefore, there is a need to develop and test accurate measures of traffic and its associations to respiratory health in California.

Objective

The objectives of this study are to conduct NO_x and NO_2 monitoring at 200 locations within the Los Angeles Family and Neighborhood Study (L.A. FANS) domain for the development of the LUR model for the Los Angeles county area. The LUR models will be used to predict traffic pollutants (NO_x, NO and NO_2) exposures for all of the L.A. FANS subjects, to evaluate associations between these traffic pollutant exposure and lung function and asthma (prevalence, exacerbation and possibly incidence) in children ages 0-17 years. This study will also use geostatistical models to estimate regional background concentrations of ozone and PM2.5 to evaluate whether concentrations of these more regionally distributed background pollutants confound or modify the effects of exposure to the more heterogeneously distributed traffic-related pollutants of NO_x, NO and NO_2 on lung function and asthma.

Methods

This study will take advantage of the ongoing L.A. FANS survey study. The L.A. FANS Wave One survey was conducted during April 2001-January 2002 and included 3,090 households in 65 census tracts (neighborhoods). Wave Two will take place in 2005-2007 and will survey another 1,000 households in the same 65 original communities. By design, the L.A. FANS survey specifically targets children of 18 and younger that are economically disadvantaged and minority populations in Los Angeles County. Thus the proposed study specifically focuses on potentially vulnerable subgroups of the population, possibly both from an exposure and susceptibility standpoint.

This proposed study will conduct NO_x and NO_2 monitoring at 200 locations within the L.A. FANS study domain for the development of the LUR models for the study area to evaluate the "traffic exhaust" hypothesis association for asthma incidence and exacerbation and lung function effects. In addition to the 200 monitored input data from this study, the LUR Model will require a number of other input data sets in order to

accurately determine the heterogeneous spatial distributions for these pollutants. However, once the LUR model is developed the investigators will be able to weigh the estimated concentrations, for those school age children, at the home and school locations by the time spent at each place based on 4-week prior to interview time activity data collected as part of the study.

Wave Two of the L.A. FANS study will collect a panel of biomarkers including lung function, measured weight and height (to determine obesity) and cortisol (as a marker of stress). The investigators will have several objective measures of respiratory health to evaluate in their study, in addition to the survey based measures of asthma. They will also be able to evaluate potential confounding and effect measure modification of observed air pollution and respiratory endpoint associations by obesity and stress. In addition, the extensive data on socioeconomic status, access to health care and neighborhood perception collected by L.A. FANS will allow for a thorough evaluation of confounding by these factors and the use of multilevel modeling to examine neighborhood level effects. This study will also use geostatistical models to estimate regional background concentrations of Ozone and PM2.5 to evaluate whether concentrations of the more regionally distributed background pollutants (O_3 and PM2.5) confound or modify the effects of exposure to the more heterogeneously distributed traffic-related pollutants (NO_x, NO and NO_2) on lung function and asthma.

Expected Results
This study will conduct NO_x and NO_2 monitoring at 200 locations and will develop the LUR model for the Los Angeles county area of traffic pollutants (NO_x, NO and NO_2) exposures for all of the L.A. FANS subjects. This study will also evaluate associations between these traffic pollutant exposure and lung function and asthma in children ages 0-17 years that live in high traffic density areas and who may be more susceptible to adverse health impacts from air pollution exposure due to economic disadvantage. This study will provide a model for future traffic studies and will help elucidate associations between traffic and health, and investigate issues of environmental justice.

Significance to the Board
This proposed study is a family and not school-based study like the Children's Health Study or the East Bay Children's Respiratory Health Study and, thus, for the first time allows enrollment and assessment of a much younger group of non-school age children that has never been studied in Los Angeles at the population level in a cohort study. This study will provide a model for future traffic studies and will help elucidate associations between traffic and health, and investigate issues of environmental justice. For the first time this study will be able to evaluate potential interactions between stress and air pollution on childhood respiratory health. The findings from this study would help inform policy decisions on motor vehicle emissions control and asthma prevention, control and education in low socioeconomic status populations. They would also help in the development of air pollution exposure models that could be used in future epidemiologic studies in LA County focused on different age groups and different adverse health outcomes.

Contractor:
University of California, Los Angeles

Contract Period:
36 months

Principal Investigator (PI):
Beate Ritz, Ph.D.

Contract Amount:
$422,089

Cofunding:
The are several studies that the principal investigator will be collaborate with. They are: the L.A. FANS study which is financed by National Institute of Environmental Health Sciences (NIEHS) and by design focuses on disadvantaged neighborhoods and children, performs at-home interviews, and collects extensive data on neighborhood characteristics. In addition, Dr. Ritz will be able to take advantage of the recent decision by NIEHS to fund Wave Two of the L.A. FANS to collect a panel of biomarkers including lung function, measured weight and height, and cortisol. Dr. Ritz's study will also benefit from the development of the LUR modeling work being developed by Dr. Jerrett as part of his on-going research projects that will be completed under existing grants from the Health Effects Institute, the Southern California Environmental Health Sciences Center, and the Wright Foundation. In addition, Dr Ritz's study will benefit from a monitoring study as part of the Children's Environmental Health Center (CEHC) funded through NIEHS and the U.S. EPA.

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. Ritz has demonstrated her ability to direct and bring to completion complex epidemiology studies in such varied topics as cancer mortality and radiation exposure, and Parkinson's disease mortality and pesticide exposure. Much of Dr. Ritz's work has been targeted to the effects of air pollutants on children's health. Specific areas of Dr. Ritz's investigations with children have included: the effects of ambient carbon monoxide on low birth weight; the effects of air pollution on preterm birth; the effects of indoor exposure of gas cooking and on respiratory health; the effects of molds and allergic sensitization on health; and more recently, the effects of residential proximity to traffic and adverse birth outcomes.

Prior Research Division Funding to UCLA:

Year	2004	2003	2002
Funding	$109,975	$0	$0

BUDGET SUMMARY

University of California, Los Angeles

Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	$ 241,702	
2.	Subcontractors	$ 64,762	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 7,766	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 4,500	
7.	Mail and Phone	$ 2,160	
8.	Supplies	$ 25,487	
9.	Analyses	$ 40,128[1]	
10.	Miscellaneous	$ 0	
	Total Direct Costs		**$ 386,505**

INDIRECT COSTS

1.	Overhead	$ 35,584	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		**$ 35,584**

TOTAL PROJECT COSTS   **$ 422,089**

---

[1] NO_2 Analysis   608 Samples x $33.00 = 20,064
   NO_x Analysis   608 Samples x $33.00 = 20,064
                                        40,128

BUDGET SUMMARY

Subcontractor, University of Southern California

"Traffic-Related Air Pollution and Asthma in Economically Disadvantaged and High Traffic Density Neighborhoods in Los Angeles County, California"

DIRECT COSTS AND BENEFITS

1. Labor and Employee Fringe Benefits	$	53,315
2. Subcontractors	$	0
3. Equipment	$	0
4. Travel and Subsistence	$	0
5. Electronic Data Processing	$	3,000
6. Reproduction/Publication	$	0
7. Mail and Phone	$	0
8. Supplies	$	0
9. Analyses	$	0
10. Miscellaneous	$	0

Total Direct Costs $ 56,315

INDIRECT COSTS

1. Overhead	$	8,447
2. General and Administrative Expenses	$	0
3. Other Indirect Costs	$	0
4. Fee or Profit	$	0

Total Indirect Costs $ 8,447

TOTAL PROJECT COSTS $ 64,762