State of California
AIR RESOURCES BOARD

Resolution 87-34
April 23, 1987

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 request for budget augmentation for Contract Number A5-188-32, entitled "A Study of Excess Motor Vehicle Emissions - Causes and Control," has been submitted by Sierra Research, Inc.;

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:

> Augmentation to Contract Number A5-188-32, entitled "A Study of Excess Motor Vehicle Emissions - Causes and Control," submitted by Sierra Research, Inc. by $56,971, for a total amount not to exceed $256,908.

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:

> Augmentation to Contract Number A5-188-32, entitled "A Study of Excess Motor Vehicle Emissions - Causes and Control," submitted by Sierra Research, Inc. by $56,971, for a total amount not to exceed $256,908.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts to augment the research effort referred to herein by $56,971, for a total amount not to exceed $256,908.

I hereby certify that the above is a true and correct copy of Resolution 87-34, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b) 1
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Augmentation for Contract No. A5-188-32 entitled "A Study of Excess Motor Vehicle Emissions - Causes and Control."

RECOMMENDATION: Adopt Resolution 87-34 approving a budget augmentation of Contract Number A5-188-32 by $56,971 for a total contract amount not to exceed $256,908.

SUMMARY: This augmentation will provide funds for the contractor to perform two additional tasks that were not included in the original contract but which are now needed on a priority basis. The additional tasks are the analysis of regulatory and legislative changes needed to implement improvements to the Inspection/Maintenance program and the assessment of options for a post-1990 Inspection/Maintenance program. This work is necessary to carry out the recommendations of the California Inspection/Maintenance Review Committee which were prepared for the California Legislature.

Both the original study and this augmentation address objectives for diesel and motor vehicle research contained in the ARB's Long-Range Research Plan, specifically, to define causes of excess emissions from in-use motor vehicles and to reduce emissions from in-use motor vehicles.

The principal investigator for this proposed effort is Mr. Robert G. Dulla of Sierra Research, Inc.

State of California
AIR RESOURCES BOARD

Resolution 87-35
April 23, 1987

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 solicited research proposal, Number 1524-133, entitled "Costs of Reducing Aromatics and Sulfur Levels in Motor Vehicle Fuels," has been submitted by Arthur D. Little, Inc.;

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

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

> Proposal Number 1524-133, entitled "Costs of Reducing Aromatics and Sulfur Levels in Motor Vehicle Fuels," submitted by Arthur D. Little, Inc. for a total amount not to exceed $124,994.

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 1524-133, entitled "Costs of Reducing Aromatics and Sulfur Levels in Motor Vehicle Fuels," submitted by Arthur D. Little, Inc. for a total amount not to exceed $124,994.

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 in an amount not to exceed $124,994.

I hereby certify that the above is a true and correct copy of Resolution 87-35, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board secretary

ITEM NO.: 87-6-2(b).2
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1524-133 entitled "Costs of Reducing Aromatics and Sulfur Levels in Motor Vehicle Fuels."

RECOMMENDATION: Adopt Resolution 87-35 approving Proposal No. 1524-133 for funding in an amount not to exceed $124,994.

SUMMARY: The purpose of this study is to estimate the costs of reducing the levels of aromatic hydrocarbons and sulfur-containing compounds in diesel and gasoline motor vehicle fuels. Limits on these constituents are being considered as a means of reducing pollutant emissions when these fuels are used in motor vehicles.

This study addresses two objectives for diesel and motor vehicle research contained in the ARB's Long-Range Research Plan, specifically, to identify ways to reduce or eliminate visible emissions from diesel vehicles, and to reduce excess emission of hydrocarbons from in-use vehicles. It also addresses an objective for toxic air contaminant research, i.e., to investigate control strategies for toxic air contaminants.

Reductions in aromatic and sulfur content would improve diesel fuel quality and would result in improved combustion and lower smoke and sulfate emissions from diesel vehicles. This study will investigate the incremental costs and feasibility of achieving a range of reductions in aromatic and sulfur levels in diesel fuel and the incremental costs for reducing aromatics in gasoline fuel.

The contractor for this study is Authur D. Little, Inc. The principal investigator will be John R. Felten.

State of California
AIR RESOURCES BOARD

Resolution 87-36
April 23, 1987

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 solicited research proposal, Number 1540-133, entitled "A Study of Multi-Day Storage Patterns for Gasoline-Fueled Vehicles in the South Coast Air Basin," has been submitted by Valley Research Corporation;

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 1540-133, entitled "A Study of Multi-Day Storage Patterns for Gasoline-Fueled Vehicles in the South Coast Air Basin," submitted by Valley Research Corporation for a total amount not to exceed $99,985.

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 1540-133, entitled "A Study of Multi-Day Storage Patterns for Gasoline-Fueled Vehicles in the South Coast Air Basin," submitted by Valley Research Corporation for a total amount not to exceed $99,985.

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 in an amount not to exceed $99,985.

I hereby certify that the above is a true and correct copy of Resolution 87-36, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b)3
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1540-133 entitled "A Study of Multi-Day Storage Patterns for Gasoline-Fueled Vehicles in the South Coast Air Basin."

RECOMMENDATION: Adopt Resolution 87-36 approving Proposal No. 1540-133 for funding in an amount not to exceed $99,985.

SUMMARY:

The purpose of this project is to characterize the frequency, duration and location of gasoline-fueled on-road vehicles standing idle (soaking) for multiple days in the South Coast Air Basin. Recent ARB and EPA vehicle emission test data have shown that extended periods of soaking can overload charcoal canisters and result in excess evaporative emissions of hydrocarbons above the levels to which the systems were originally certified. This study will provide specific, detailed vehicle usage information needed to estimate these excess emissions.

This study addresses an objective for diesel and motor vehicle research contained in the ARB's Long-Range Research Plan, specifically, to define the causes of excess emissions of hydrocarbons from in-use motor vehicles.

The contractor would conduct eight separate surveys in the South Coast Air Basin to obtain storage pattern data for privately-owned and commerically-owned vehicles, both registered and unregistered. These surveys would obtain data on soak frequency, duration and location of all gasoline-fueled on-road vehicles and determine the number of vehicles experiencing multiple-day soaking in the Basin. The results will be used by ARB staff to improve the vehicular emissions inventory and to more accurately characterize ozone AAQS attainment efforts.

The contractor for the study is Valley Research Corporation. The principal investigator will be Dr. Yuji Horie.

State of California
AIR RESOURCES BOARD

Resolution 87-37
April 23, 1987

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 solicited research proposal, Number 1490-131, entitled "Control of Benzene Emissions from Light-Duty Motor Vehicles," has been submitted by Southwest Research Institute;

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 1490-131, entitled "Control of Benzene Emissions from Light-Duty Motor Vehicles," submitted by Southwest Research Institute, for a total amount not to exceed $148,517.

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 1490-131, entitled "Control of Benzene Emissions from Light-Duty Motor Vehicles," submitted by Southwest Research Institute, for a total amount not to exceed $148,517.

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 in an amount not to exceed $148,517.

I hereby certify that the above is a true and correct copy of Resolution 87-37, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2-(b)5
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1531-133 entitled "Measurements of Toxic Exhaust Emissions from Gasoline-Powered Light-Duty Vehicles"

RECOMMENDATION: Adopt Resolution 87-38 approving Proposal No. 1531-133 for funding in an amount not to exceed $199,604.

SUMMARY: The purpose of this study is to measure known and suspected toxic substances in the exhaust emissions of gasoline-powered passenger cars. In particular, the contractor will conduct screening tests to determine the presence or absence of specific contaminants in vehicle exhaust, and then will determine the emission rates using standard vehicle emission test protocols.

This study will address an objective for toxic air contaminant research contained in the ARB's Long-Range Research Plan, specifically, to investigate toxic air contaminant emissions from mobile sources.

The information provided by this study will permit ARB and others to assess the need for reducing emissions of specific toxic substances from this category of sources.

The study would be performed by the Southwest Research Institute. The principal investigator would be Dr. Lawrence R. Smith.

State of California
AIR RESOURCES BOARD

Resolution 87-38
April 23, 1987

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 solicited research proposal, Number 1531-133, entitled "Measurements of Toxic Exhaust Emissions from Gasoline-Powered Light-Duty Vehicles," has been submitted by Southwest Research Institute;

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 1531-133, entitled "Measurements of Toxic Exhaust Emissions from Gasoline-Powered Light-Duty Vehicles," submitted by Southwest Research Institute, for a total amount not to exceed $199,604.

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 1531-133, entitled "Measurements of Toxic Exhaust Emissions from Gasoline-Powered Light-Duty Vehicles," submitted by Southwest Research Institute, for a total amount not to exceed $199,604.

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 in an amount not to exceed $199,604.

I hereby certify that the above is a true and correct copy of Resolution 87-38, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b) 4
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1490-131 entitled "Control of Benzene Emissions from Light-Duty Motor Vehicles."

RECOMMENDATION: Adopt Resolution 87-37 approving Proposal No. 1490-131 for funding in an amount not to exceed $148,517.

SUMMARY: The main purpose of this project is to investigate the potential reduction of benzene and total organic gas emissions from gasoline-powered light-duty vehicles through the development of a total emission control system optimized for reducing such emissions, without sacrificing control of other criteria pollutants.

This study will address two objectives for motor vehicle and toxic air contaminant research contained in the ARB's Long-Range Research Plan, specifically, to reduce emissions from in-use motor vehicles and to reduce emissions of priority toxic compounds from selected sources.

Benzene has been identified by the Air Resources Board as a toxic air contaminant. Benzene is a constituent of gasoline, and is also formed as a combustion by-product from other aromatic compounds in gasoline. Motor vehicle exhaust and evaporative emissions constitute the largest known source of benzene in the atmosphere.

The contractor would identify the most promising control techniques for reducing benzene and hydrocarbon emissions from light-duty vehicles, design a prototype system for benzene emission control, install the system on a 1987 model vehicle, and operate the vehicle for 5,000 miles. Following this test, a second vehicle would be fitted with the same system and both vehicles would be delivered to the ARB for a 12-month durability test.

The contractor for this study is Southwest Research Institute. The principal investigator will be Harry E. Dietzmann.

BUDGET SUMMARY

Southwest Research Institute

"Measurements of Toxic Exhaust Emissions from Gasoline-Powered Light-Duty Vehicles"

BUDGET ITEMS:

Salaries	$52,509	
Benefits	20,478	
Supplies	6,518	
Equipment Rental*	8,082	
Other Costs	2,000	
Travel	7,205	
TOTAL, Direct Costs		$ 96,792
TOTAL, Indirect Costs		102,812
	TOTAL PROJECT COST	$199,604

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* Rental of test vehicles

State of California
AIR RESOURCES BOARD

Resolution 87-39
April 23, 1987

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 solicited research proposal, Number 1542-133, entitled "Chlorinated Dibenzodioxin and Furan Contamination of the Food Chain," has been submitted by Midwest Research Institute;

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 1542-133, entitled "Chlorinated Dibenzodioxin and Furan Contamination of the Food Chain," submitted by Midwest Research Institute for a total amount not to exceed $74,978.

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 1542-133, entitled Chlorinated Dibenzodioxin and Furan Contamination of the Food Chain," submitted by Midwest Research Institute for a total amount not to exceed $74,978.

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 in an amount not to exceed $74,978.

I hereby certify that the above is a true and correct copy of Resolution 87-39, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(B) 6
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1542-133 entitled "Chlorinated Dibenzodioxin and Furan Contamination of the Food Chain"

RECOMMENDATION: Adopt Resolution 87-39 approving Proposal No.1542-133 for funding in an amount not to exceed $74,978.

SUMMARY: The purpose of this study is to determine the concentrations of polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) in the diet of California residents. These substances are being reviewed for possible regulation as toxic air contaminants, in accordance with Section 39650 of the California Health and Safety Code. Dietary concentrations of the PCDDs and PCDFs, along with airborne concentrations, contribute to the body burdens of these substances. The airborne concentrations and body burdens are being measured in other studies sponsored or planned by the ARB.

This study will address an objective for toxic air contaminant research contained in the ARB's Long-Range Research Plan, specifically, to conduct health effects assessments for selected toxic air contaminants.

The data from this study, to be conducted in the Los Angeles area, will be coordinated with data from related studies on the body burdens and airborne emissions of these pollutants to assess the relationship between levels of PCDDs and PCDFs in air, diet and body burden.

The contractor for this work is Midwest Research Institute and the principal investigator is Dr. John Stanley.

State of California
AIR RESOURCES BOARD

Resolution 87-40
April 23, 1987

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 solicited research proposal, Number 1534-133, entitled "Determination of Current Body Burdens of Polychlorinated Dibenzo-p-Dioxins and Dibenzofurans in California Residents," has been submitted by the Midwest Research Institute;

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 1534-133, entitled "Determination of Current Body Burdens of Polychlorinated Dibenzo-p-Dioxins and Dibenzofurans in California Residents," submitted by the Midwest Research Institute, for a total amount not to exceed $149,930.

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 1534-133, entitled "Determination of Current Body Burdens of Polychlorinated Dibenzo-p-Dioxins and Dibenzofurans in California Residents," submitted by the Midwest Research Institute, for a total amount not to exceed $149,930.

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 in an amount not to exceed $149,930.

I hereby certify that the above is a true and correct copy of Resolution 87-40, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b)7
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1534-133 entitled "Determination of Current Body Burdens of Polycholorinated Dibenzo-p-Dioxins and Dibenzofurans in California Residents."

RECOMMENDATION: Adopt Resolution 87-40 approving Proposal No. 1534-133 for funding in an amount not to exceed $149,930.

SUMMARY: The purpose of this research is to determine the current body burden of polychlorinated dibenzodioxins and dibenzofurans in California residents.

This study will address four objectives: (1) determine, through a program of sampling and analysis of human tissues, the current body burden of dioxins and furans in a representative sample of the California population; (2) analyze the samples for those 15 specific dioxin and furan isomers and congeners that have been identified as toxic air contaminants; (3) determine if any correlation exists between body burden and personal or lifestyle factors (such as age, sex, occupation, or area of residence); and (4) carry out these studies in a manner which ensures the quality and reliability of the data.

This research proposal is part of the Air Resources Board's plan to increase its knowledge of the actions, effects and exposure to chlorinated dioxins and furans. Both the Air Resources Board and the Scientific Review Panel on Toxic Air Contaminants have asked the ARB staff to continue to update its knowledge on levels of these compounds in air, food and human tissues. Board members have indicated that when the Board makes risk management decisions for dioxins and furans, they would like to have further information on these risk assessment issues.

The contractor for this project is the Midwest Research Institute. The principal investigator will be Dr. John Stanley, who has been involved in several studies to determine the levels of polychlorinated dibenzodioxins and dibenzofurans in human tissues.

BUDGET SUMMARY

Midwest Research Institute,

"Determination of Current Body Burdens of Polychlorinated Dibenzo-p-Dioxins and Dibenzofurans in California Residents"

BUDGET ITEMS:

Salaries	$26,004	
Benefits	8,901	
Supplies	14,620	
Subcontract*	30,200	
Other Costs	2,250	
Travel	5,300	
TOTAL, Direct Costs		$ 87,275
TOTAL, Indirect Costs		62,655
	TOTAL PROJECT COST	$149,930

* Selection and collection of samples of human adipose tissue.

State of California
AIR RESOURCES BOARD

Resolution 87-41
April 23, 1987

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, an unsolicited research proposal, Number 1538-133, entitled "A Coordinated Multidisciplinary Research Program on Carbon Monoxide Health Effects," has been submitted by the University of California, Irvine;

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

WHEREAS, the Research Division has reviewed and recommends for funding:

> Proposal Number 1538-133, entitled "A Coordinated Multidisciplinary Research Program on Carbon Monoxide Health Effects," submitted by the University of California, Irvine for a total amount not to exceed $191,945.

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 1538-133, entitled "A Coordinated Multidisciplinary Research Program on Carbon Monoxide Health Effects," submitted by the University of California, Irvine for a total amount not to exceed $191,945.

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 in an amount not to exceed $191,945.

I hereby certify that the above is a true and correct copy of Resolution 87-41, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b)8
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1538-133 entitled "A Coordinated Multidisciplinary Research Program on Carbon Monoxide Health Effects."

RECOMMENDATION: Adopt Resolution 87-41 approving Proposal No. 1538-133 for funding in an amount not to exceed $191,945.

SUMMARY:

The scientific basis for both the state and national ambient air quality standards for carbon monoxide (CO) has recently come under close scrutiny. This scrutiny has precipitated research to confirm earlier findings in patients prone to developing chest pain due to an insufficient supply of oxygen to the heart muscle (angina pectoris). The conduct of these recent studies has brought to light some concerns about current knowledge of the effects of CO. The first year of this two-year project was funded to allow an interdisciplinary team of investigators at UC Irvine, headed by Dr. Michael Kleinman, to begin a coordinated and thorough study of the effects of CO. This proposal is to fund the second year of the project. This study addresses an objective for health effects research identified in the ARB's Long Range Research Plan; specifically, to study the physiological effects of CO.

The project has four objectives:

The first objective is to develop and use improved experimental protocols to study the response of people prone to experiencing angina pain due to CO exposure. The results of the first year's study will be used to design a clinical study proposed to take place in the second year of the project. This work at the altitude of Lake Tahoe will be important in the review of the ambient air quality standard appliable to that air basin. Additionally, this proposed study will explore the effect of CO in an atmosphere with the oxygen content lowered to simulate an altitude of 2,000 meters (approximately 6,000 feet).

The second objective of this project is to resolve problems with techniques for measuring carboxyhemoglobin (COHb) levels by improving protocols

for operating the instrument most widely used for this purpose, and to evaluate a new instrument to measure COHb. Much of the work under this objective will be completed during the first year of this project, but several studies will continue into the second year.

The third objective is to evaluate factors that contribute to differences in COHb levels in different individuals. The investigator will conduct a thorough literature survey of relevant physiological parameters in various parts of the population, and will conduct tests on selected subjects to experimentally determine how differences in selected parameters affect CO uptake.

The fourth objective is to develop study protocols and conduct limited pilot studies to investigate the effects of CO on people prone to developing heart beat irregularities. Work under the third and fourth objectives was begun in the first year and will continue into the second year.

BUDGET SUMMARY

University of California, Irvine

"A Coordinated Multidisciplinary Research Program on Carbon Monoxide Health Effects"

BUDGET ITEMS:

Salaries	$105,591	
Benefits	29,105	
Supplies	12,800	
Other Costs*	21,000	
Travel	2,000	
Consultant**	4,000	
TOTAL, Direct Costs		$174,496
TOTAL, Indirect Costs		17,449
	TOTAL PROJECT COST	$191,945

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* Other Costs:

Rental of Echocardiography equipment	$7,500
Human subject compensation	8,000
Computer costs	1,500
Publication costs	1,000
Equipment maintenance	3,000

** Consultant:

Brian Whipp to advise on improvements to respiratory gas exchange evaluation

State of California
AIR RESOURCES BOARD

Resolution 87-42
April 23, 1987

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, an unsolicited research proposal, Number 1536-133, entitled "Studies of Air Pollution: NO_2 Effects on Airway Caliber and Reactivity in Asthmatic Subjects; Nasal and Bronchial Effects of SO_2 in Asthmatic Subjects; NO_2 Effects on Lung Lymphocytes and Antiprotease Activity," has been submitted by the Univeristy of California, San Francisco;

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 1536-133, entitled "Studies of Air Pollution: NO_2 Effects on Airway Caliber and Reactivity in Asthmatic Subjects; Nasal and Bronchial Effects of SO_2 in Asthmatic Subjects; NO_2 Effects on Lung Lymphocytes and Antiprotease Activity," submitted by the University of California, San Francisco for a total amount not to exceed $119,486.

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 1536-133, entitled "Studies of Air Pollution: NO_2 Effects on Airway Caliber and Reactivity in Asthmatic Subjects; Nasal and Bronchial Effects of SO_2 in Asthmatic Subjects; NO_2 Effects on Lung Lymphocytes and Antiprotease Activity," submitted by the University of California, San Francisco for a total amount not to exceed $119,486.

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 in an amount not to exceed $119,486.

I hereby certify that the above is a true and correct copy of Resolution 87-42, as adopted by the Air Resources Board.

/s/ Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b) 9
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1536-133 entitled "Studies of Air Pollution: NO_2 Effects on Airway Caliber and Reactivity in Asthmatic Subjects; Nasal and Bronchial Effects of SO_2 in Asthmatic Subjects; NO_2 Effects on Lung Lymphocytes and Antiprotease Activity."

RECOMMENDATION: Adopt Resolution 87-42 approving Proposal No. 1536-133 for funding in an amount not to exceed $119,486.

SUMMARY: The response of asthmatic subjects to nitrogen dioxide (NO_2) provided a basis for the State's current one hour ambient air quality standard for NO_2. Very recently, the scientific evidence on the responsiveness of asthmatic subjects to NO_2 has become more ambiguous. This proposal is to fund a project at the University of California, San Francisco, headed by Dr. Homer Boushey, to study the effects of NO_2, and to fund a smaller related investigation into the effects of SO_2. This study addresses an objective for health effects research identified in the ARB's Long Range Research Plan; specifically, to investigate the effects of gaseous criteria pollutants on sensitive subjects.

The first objective of the project is to resolve contradictions in the evidence on the effects of exposure of asthmatics to ambient levels of NO_2. The investigators will expose carefully characterized asthmatic subjects to 0.3 ppm NO_2 and will assess each subject's response by employing lung function tests and tests that reflect changes that occur in the deep lung. This study will also examine whether NO_2 exposures affect the subject's responses to SO_2.

The second objective of this project is to investigate, in asthmatics, the relationship between the response of the nasal chamber and the response of the bronchial airways to inhaled SO_2. This study is an extension of work underway. The investigators will administer SO_2 via each subject's nose on one occasion, and via the mouth on a separate occasion, and will measure resultant changes in resistance to airflow.

The third objective of this project is to determine whether cellular and biochemical indices of injury can be detected in human subjects exposed repeatedly to NO_2 and to correlate any such changes with possible lung function changes. Healthy subjects will inhale NO_2 on four separate occasions. The investigators will evaluate the effect of the exposures by measuring changes in lung function, changes in important cells in the immune system, and changes in a key enzyme.

BUDGET SUMMARY

University of California, San Francisco

"Studies of Air Pollution: NO_2 Effects on Airway Caliber and Reactivity in Asthmatic Subjects; Nasal and Bronchial Effects of SO_2 in Asthmatic Subjects; NO_2 Effects on Lung Lymphocytes and Antiprotease Activity

BUDGET ITEMS:

Salaries	$66,100	
Benefits	18,725	
Supplies	7,511	
Other Costs*	12,044	
Travel	1,800	
Equipment**	2,765	
TOTAL, Direct Costs		$108,945
TOTAL, Indirect Costs		10,541
TOTAL PROJECT COST		$119,486

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* Other Costs:

Human subject compensation	$8,144
Phones, copies, publications	$1,500
Equipment maintenance and repair	$2,400

** Equipment:

Regulator for NO_2 tank	$1,000
Immunoelectrophoresis kits	900
Electrophoresis cell	865

State of California
AIR RESOURCES BOARD

Resolution 87-43
April 23, 1987

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, an unsolicited research proposal, Number 1544-133, entitled "Pilot Survey of Human Lung Tissue for Air Pollution Effects in Los Angeles County," has been submitted by the University of Southern California;

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 1544-133, entitled "Pilot Survey of Human Lung Tissue for Air Pollution Effects in Los Angeles County," submitted by the University of Southern California for a total amount not to exceed $219,330.

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 1544-133, entitled "Pilot Survey of Human Lung Tissue for Air Pollution Effects in Los Angeles County," submitted by the University of Southern California for a total amount not to exceed $219,330.

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 in an amount not to exceed $219,330.

I hereby certify that the above is a true and correct copy of Resolution 87-43 as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b)10
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1544-133 entitled "Pilot Survey of Human Lung Tissue for Air Pollution Effects in Los Angeles County."

RECOMMENDATION: Adopt Resolution 87-43 approving Proposal No. 1544-133 for funding in an amount not to exceed $219,330.

SUMMARY: The objective of this pilot project is to investigate the impact of long-term exposure to ambient air pollution on human lung tissue. This study addresses a Board objective for health effects research identified in the Long Range Research Plan; specifically, to investigate the effects of long-term exposure to ambient air pollution. This study will be performed by Dr. Russell Sherwin of the University of Southern California in cooperation with: staff of the University of California, Los Angeles; the State Department of Health Services; and the Los Angeles County Coroner. This study will use methods that were developed in earlier Board-sponsored studies of mouse lungs.

The investigative team will collect autopsy samples of lung tissue from approximately 120 to 150 traffic accident victims 15 to 25 years old. The study will use information about each victim's residence history, lifestyle, and smoking habits to estimate pollutant exposure history.

The investigators will study the lung tissues using microscopic techniques to detect changes in the lung structure related to the development of chronic diseases, changes in cell populations shown to occur in test animals in response to air pollutants, and changes in tissues associated with repeated irritation of the lung. The investigators will also culture specific living cells collected from the lungs of some of those subjects to obtain information on the effects of long-term exposure to air pollution on the overall level of immune system activity in the lung.

BUDGET SUMMARY

University of Southern California

"Pilot Survey of Human Lung Tissue for
Air Pollution Effects in Los Angeles County"

BUDGET ITEMS:

Salaries	$86,417		
Benefits	24,629		
Supplies	8,714		
Other Costs*	27,779		
Travel	4,650		
Consultants**	7,650		
Equipment***	11,540		
TOTAL, Direct Costs			$171,379
TOTAL, Indirect Costs			47,951
		TOTAL PROJECT COST	$219,330

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* Other Costs:

Computer supplies	$ 915
Lung tissue processing	3,720
Equipment maintenance	10,493
Phone, library, publications	3,720
Epidemiologic evaluations	8,931

**Consultants:

Statistician	$ 4,650
Technical writer	3,000

***Equipment:

Camera replacement for image analyzer	$10,650
Magneta sealer	890

State of California
AIR RESOURCES BOARD

Resolution 87-44
April 23, 1987

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, an unsolicited research proposal, Number 1537-133, entitled "Variability of Cultivar Responses to Ozone," has been submitted by the Universty of California, Riverside;

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 1537-133, entitled "Variability of Cultivar Responses to Ozone," submitted by the University of California, Riverside for a total amount not to exceed $124,806.

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 1537-133, entitled "Variability of Cultivar Responses to Ozone," submitted by the University of California, Riverside for a total amount not to exceed $124,806.

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 in an amount not to exceed $124,806.

I hereby certify that the above is a true and correct copy of Resolution 87-44 as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-6-2(b)11
DATE: April 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1537-133 entitled "Variability of Cultivar Responses to Ozone."

RECOMMENDATION: Adopt Resolution 87-44 approving Proposal No. 1537-133 for funding in an amount not to exceed $124,806.

SUMMARY: The investigator will study the differences in growth, yield and physiological response of four varieties of each of six crops to ambient oxidants and ozone. The crops will include: tomatoes, dry beans, cotton, lettuce, broccoli, and onions. The crops will be grown in both ambient air and purified air in the Board's open top field chambers.

The results of this study will be used to strengthen the Air Resources Board's statewide crop loss assessment efforts by providing information on the relative sensitivities and representativeness of crop varieties grown throughout California. This information has been requested by the Chair of the Agricultural Advisory Committee. Additionally, if a clear relationship can be determined between yield response and physiological response, then that relationship may provide a means of screening crop varieties for sensitivity to ozone without the need for costly season-long field studies.

The contractor for this project is the University of California, Riverside. The principal investigator will be Dr. Patrick J. Temple, who has previously participated in the U.S. EPA National Crop Loss Assessment Program.