State of California
AIR RESOURCES BOARD

Resolution 87-3
January 23, 1987

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California, pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, an unsolicited research proposal, Number 139-20, entitled "Acid Air Pollutant Mixtures: Respiratory System Responses and Effects of Exercise," has been submitted by the University of California, Irvine to the Air Resources Board, and

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

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 139-20, entitled "Acid Air Pollutant Mixtures: Respiratory System Responses and Effects of Exercise," submitted by the University of California, Irvine for a total amount not to exceed $278,183.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 139-20, entitled "Acid Air Pollutant Mixtures: Respiratory System Responses and Effects of Exercise," submitted by the University of California, Irvine for a total amount not to exceed $278,183.

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 $278,183.

I hereby certify that the above is a true and correct copy of Resolution 87-3, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-2-4(b) 1
DATE: January 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 139-20 entitled "Acid Air Pollutant Mixtures: Respiratory System Responses and Effects of Exercise."

RECOMMENDATION: Adopt Resolution 87-3 approving Proposal No. 139-20 for funding in an amount not to exceed $278,183.

SUMMARY: Previous experiments by the proponent have suggested that one of the important effects of acidic atmospheres may be to aggravate the effect of ozone. The objective of this proposed research project is to determine the extent of this acidic effect. High levels of atmospheric acidity are frequently associated with high levels of photochemical activity; thus, it is likely that individuals living in California may encounter conditions where ozone levels and acidity levels are elevated concurrently.

In these experiments, approximately 400 rats, both at rest and while engaged in moderate exercise, would be exposed to ozone alone and in combination with acidic air pollutants. Exercise is an important variable in the exposure regimen, because exercise has been shown to greatly increase the adverse effects of some air pollutants. The acidic air pollutants to be employed are a mixture of nitric and sulfuric acids, and also an atmosphere of hydroxymethanesulfonic acid (HMSA), all of which make a significant contribution to acidic air pollution in California. The experiments to investigate the effect of HMSA are a pioneering effort. HMSA has been found in substantial amounts in acidic fogs sampled in California. The effects of the exposures to pollutants will be assessed by measuring breathing pattern changes, histopathology, and chemical changes in important lung fluids. The research contractor is the University of California, Irvine, and the principal investigator is Dr. William Mautz.

BUDGET SUMMARY

University of California, Irvine

"Acidic Air Pollutant Mixtures: Respiratory System Responses and Effects of Exercise"

BUDGET ITEMS:

Salaries	$139,674	
Benefits	38,794	
Supplies*	27,067	
Other Costs**	23,425	
Travel	3,000	
Consultant & Subcontract*** (Cal. State Fullerton)	21,217	
TOTAL, Direct Costs		$253,177
TOTAL, Indirect Costs		25,006
	TOTAL PROJECT COST	$278,183

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* Supplies:

Laboratory rats	$10,827
Histology supplies	5,413
Glassware, reagents and isotopes	5,413
Tubing, filters, pumps	2,707
Ion chromatography columns	2,707

** Other costs:

Service contract, medical gas analyzer	$ 3,125
Service contract, FTIR spectrophotometer (Cal State Fullerton)	$10,015
Veterinary charges, animal facilities	3,383
Copying, phones, library, publications	3,383
Instrument maintenance	3,519

*** Consultant and Subcontract:

Consultant: Stanley Trim, for computer-instrument interface and software development for rodent plethysmograph	$ 6,664
Subcontract: Barbara Finlayson-Pitts, lung surfactant analysis	$14,553

State of California
AIR RESOURCES BOARD

Resolution 87-4
January 23, 1986

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in Califonia pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, an unsolicited research proposal, Number 107-16, entitled "Effects of Particle Size and Air Temperature on Aerosol Induced Bronchoconstriction," has been submitted by the University of California, San Francisco; to the Air Resources Board; and

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

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 107-16, entitled "Effects of Particle Size and Air Temperature on Aerosol Induced Bronchoconstriction," submitted by the University of California, San Francisco for a total amount not to exceed $58,421.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 107-16, entitled "Effects of Particle Size and Air Temperature on Aerosol Induced Bronchoconstriction," submitted by the University of California, San Francisco for a total amount not to exceed $58,421.

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 $58,421.

I hereby certify that the above is a true and correct copy of Resolution 87-4, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

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

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 107-16 entitled "Effects of Particle Size and Air Temperature on Aerosol Induced Bronchoconstriction."

RECOMMENDATION: Adopt Resolution 87-4 approving Proposal No. 107-16 for funding in an amount not to exceed $58,421.

SUMMARY: The objective of this study is to determine how the size of acidic fog droplets and cold air affect the airways of asthmatics. This proposal adds new procedures to an existing effort. The present work involves the use of six-micrometer droplets. The proposed work would include a group of exposures with smaller diameter aerosols. These smaller droplets, which are present in large numbers in some acidic fogs, are expected to be irritants to the airways. Work is also proposed to investigate the role of cold air temperatures, which can aggravate the effect of other irritants in asthmatics. The research contractor is the University of Califoria, San Francisco, and the principal investigator is Dr. Dean Sheppard.

BUDGET SUMMARY

University of California, San Francisco

"Effects of Particle Size and Air Temperature on Aerosol Induced Bronchoconstriction"

BUDGET ITEMS:

Salaries	$33,812	
Benefits	8,998	
Supplies*	4,900	
Other Costs**	5,400	
Travel	-0-	
TOTAL, Direct Costs		$53,110
TOTAL, Indirect Costs		5,311
TOTAL PROJECT COST		$58,421

* Supplies:

Nebulizers, tubing, values, charge neutralizers	$1,400
Compressed gases, pneumotachograph, thermocouples	900
Reagents, glassware	1,300
Recorder and computer paper	1,300

** Other costs:

Human subject compensation	$5,400

State of California
AIR RESOURCES BOARD

Resolution 87-5
January 23, 1987

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 1451-129, entitled "Measurement of Nitrous Acid, Nitrate Radical, and Formaldehyde, has been submitted by University of California, Riverside;

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

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 1451-129, entitled "Measurement of Nitrous Acid, Nitrate Radical, and Formaldehyde," has been submitted by the University of California, Riverside, for a total amount not to exceed $159,816.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 1451-129, entitled "Measurement of Nitrous Acid, Nitrate Radical, and Formaldehyde," has been submitted by the University of California, Riverside, for a total amount not to exceed $159,816.

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 $159,816.

I hereby certify that the above is a true and correct copy of Resolution 87-5, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-2-4(b) 3
DATE: January 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Proposal No. 1451-129 entitled "Measurement of Nitrous Acid, Nitrate Radical, and Formaldehyde"

RECOMMENDATION: Adopt Resolution 87-5 approving proposal no. 1451-129 for an amount not to exceed $159,816.

SUMMARY: The Southern California Air Quality Study (SCAQS) is a multi-year, integrated air quality study whose overall goal is to develop a comprehensive and properly archived air quality and meteorological data base for the South Coast Air Basin (SoCAB) that can be used to test, evaluate and improve elements of air quality simulation models for oxidants, PM_{10}, fine particles, toxic air contaminants and acidic species. The study will take place in the SoCAB during the summer of 1987 for 12 intensive sampling days and for seven intensive sampling days during the winter of 1987-88.

The objective of this proposal is to provide in situ differential optical absorption spectroscopy (DOAS) measurements on a semi-continuous basis at both the source (Long Beach) and the receptor (Upland) sites during the summer phase of the study and at the source site only during the winter phase of the study. Using this technique, ambient concentrations of nitrous acid, formaldehyde, nitrogen dioxide and nitrate radicals will be measured.

These measurements will provide critical data needed (a) as inputs to the various air quality/acid deposition simulation models to be used in development of future air quality control strategies, and (b) for validation of the photochemistry modules of those models.

The research contractor is the University of California, Riverside, and the principal investigator is Dr. Arthur M. Winer.

BUDGET SUMMARY

University of California, Riverside

"Measurement of Nitrous Acid, Nitrate Radicals, and Formaldehyde"

BUDGET ITEMS:

Salaries	$93,764	
Benefits	23,628	
Supplies	11,950	
Travel Expenses[1]	6,400	
Equipment[2]	5,000	
Other direct cost[3]	5,000	
TOTAL, Direct Cost		$145,742
TOTAL, Indirect Cost		14,074
	TOTAL PROJECTED COST	$159,816

1. Includes $5,200 for travel and per diem during field program.
2. Includes two chart recorders @ $1,500 each and $2,000 for DOAS system accessories.
3. Includes $1,800 for maintenance of DOAS system and $3,200 for machine, electronics and computer shop charges.

State of California
AIR RESOURCES BOARD

Resolution 87-6
January 23, 1987

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a request for budget augmentation for Contract Number A4-143-32, entitled "Cloud and Precipitation Scavenging Processes in the South Coast Air Basin," has been submitted by the University of Washington;

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

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding the augmentation:

> Contract Number A4-143-32, entitled "Cloud and Precipitation Scavenging Processes in the South Coast Air Basin," has been submitted by the University of Washington, for a total amount not to exceed $154,265.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Contract Number A4-143,32, entitled "Cloud and Precipitation Scavenging Processes in the South Coat Air Basin," has been submitted by the University of Washington, for a total amount not to exceed $154,265.

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 $154,265.

I hereby certify that the above is a true and correct copy of Resolution 87-6, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

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

State of California
AIR RESOURCES BOARD

ITEM: Request for Budget Augmentation for Contract A4-143-32 entitled "Cloud and Precipitation Scavenging Processes in the South Coast Air Basin."

RECOMMENDATION: Adopt Resolution 87-6 approving a budget augmentation of Contract A4-143-32 for an amount not to exceed $154,265.

SUMMARY: The originally planned study of cloud scavenging processes by the University of Washington was modified and the contractor has been redirected by ARB staff and the Scientific Advisory Committee on Acid Deposition to provide airborne air quality measurements during the Southern California Air Quality Study (SCAQS). This revised work plan requires a minimum of 72 hours of flight time. However, the original contract ($141,743) with UW included only 23 hours of flight time. An additional $154,265 is needed to defray the cost of the increased flight time and sampling.

The University of Washington's Convair C131A research aircraft would be used in the summer field experiments to determine the three dimensional distribution of ozone, nitrogen oxides, sulfur dioxide, nitric acid, peroxyacetylnitrate, hydrogen peroxide and ammonia concentrations and the chemical composition and concentrations of aerosols, and hydrocarbons throughout the South Coast Air Basin. The aircraft will make two flights per day, each lasting between 3 to 4 hours, in the early morning and in the afternoon. Flights will be made on twelve days in 2 to 3 day sequences over a six-week period.

Airborne measurements are required to determine the pollutant distribution in the vertical dimension. They are especially important for documenting initial conditions, pollutant carryover, mixing layer height, representativeness of surface measurements, and nighttime chemistry aloft and are essential for the development and testing of air quality simulation models. The contractor is the Univesity of Washington and principal investigators are Drs. Peter Hobbs and Dean Hegg.

BUDGET SUMMARY

University of Washington
Seattle, WA

"Cloud and Precipitation Scavenging Processes
in the South Coast Air Basin"

BUDGET ITEMS:

Salaries	$35,802	
Benefits	7,574	
Supplies	5,500	
Travel Expenses[1]	32,085	
Subcontract[2]	21,999	
Aircraft Operation	124,830	
Other direct cost[3]	16,550	
TOTAL, Direct Cost		$244,340
TOTAL, Indirect Cost		51,668
	TOTAL COST	$296,008
	LESS ORIGINAL CONTRACT	141,743
	AUGMENTATION AMOUNT	$154,265

1. Includes $29,085 for per diem and travel during the six week field program.

2. Subcontract with Dr. Donald Stedman, University of Denver for high resolution, high sensitivity measurements of nitrogen species.

3. Includes $4,000 for aircraft ground fees, $5,500 for computer services, and $2,200 for publication services

State of California
AIR RESOURCES BOARD

Resolution 87-7
January 23, 1987

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, an unsolicited research proposal, Number 141-20, entitled "Snow, Snow Melt, Rain, Runoff and Chemistry in A Sierra Nevada Watershed," has been submitted by the University of California, Santa Barbara;

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

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 141-20, entitled "Snow, Snow Melt, Rain, Runoff and Chemistry in a Sierra Nevada Watershed," has been submitted by the University of California, Santa Barbara, for a total amount not to exceed $365,002.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 141-20, entitled "Snow, Snow Melt, Rain, Runoff and Chemistry in a Sierra Nevada Watershed," has been submitted by the University of California, Santa Barbara, for a total amount not to exceed $365,002.

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 $365,002.

I hereby certify that the above is a true and correct copy of Resolution 87-7, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-2-4(b) 5
DATE: January 23, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 141-20 entitled "Snow, Snow Melt, Rain, Runoff and Chemistry in a Sierra Nevada Watershed"

RECOMMENDATION: Adopt Resolution 87-7 approving Proposal No. 141-20 for funding in an amount not to exceed $365,002.

SUMMARY: The major objective of this study is to characterize snow and hydrologic processes in the Emerald Lake Basin, Sequoia National Park, as part of the ARB's Integrated Watershed Study (IWS). This field and modeling study is a continuation of work begun in 1984 to determine the effects of acid deposition on a representative, high-elevation watershed of the Sierra Nevada.

The IWS Study is a coordinated series of studies at a high-elevation site (9200') in the Sierra Nevada designed to monitor potential effects of acid deposition on the biogeochemistry of a subalpine system. To determine the effects of acid deposition to Sierra watersheds, it is necessary to understand the chemistry of snow inputs, which often represent greater than 90 percent of the total wet deposition to these systems. It is also crucial to understand the way water flows through the Basin during snowmelt and summer storm events. These flow paths determine the amount of buffering materials that reach the lake and neutralize acidic materials.

To accomplish these objectives, the proponents will collect field data at the IWS site during two winter seasons, and during the summer 1987. These measurements will include: total deposition volume and chemistry, surface and groundwater flows and storages, meteorological variables and snowmelt runoff and episodic stream chemistry.

These data, along with existing data bases, will be used to formulate snowmelt and runoff routing models for the Basin. The data will be used to validate the models. These models will be formulated so that they can be used as part of a biogeochemical model of the watershed to predict the response of the watershed to various levels of acid deposition.

BUDGET SUMMARY

"Snow, Snow Melt, Rain Runoff and Chemistry
in a Sierra Nevada Watershed"

BUDGET ITEMS:

Salaries	$213,495	
Benefits	26,849	
Supplies	29,930*	
Equipment	7,500**	
Other Costs	31,510***	
Travel	23,218	
TOTAL, Direct Costs		$332,502
TOTAL, Indirect Costs (10%)		32,500
TOTAL PROJECT COST		$365,002

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* Sample collection materials, laboratory chemical supplies and personnel field equipment for collection and analysis of approximately, 1,000 samples.

** Equipment includes an autotitrator ($4,500) and a capacitance meter for liquid water content measurements ($2,000)

*** Includes computer time ($19,500), satellite data ($9,900) and aerial overflights ($4,000) for data and modeling purposes.