State of California
AIR RESOURCES BOARD

Resolution 87-48
June 11, 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 158-23, entitled "Hydrochemical Modeling at Emerald Lake, Sequoia National Park," submitted by U. S. Geological Survey to the ARB; 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 158-23, entitled "Hydrochemical Modeling at Emerald Lake, Sequoia National Park," submitted by U. S. Geological Survey for a total amount not to exceed $83,400.

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 158-23, entitled "Hydrochemical Modeling at Emerald Lake, Sequoia National Park," submitted by U. S. Geological Survey for a total amount not to exceed $83,400.

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 $83,400.

I hereby certify that the above is a true and correct copy of Resolution 87-48, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-48
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 158-23 entitled "Hydrochemical Modeling at Emerald Lake, Sequoia National Park."

RECOMMENDATION: Adopt Resolution 87-48 approving Proposal No. 158-23 for funding in an amount not to exceed $83,400.

SUMMARY: This project is part of the Research Division's modeling effort for determining the effects of acid deposition on Sierran Lakes. The modeling effort consists of three main objectives: 1) the evaluation of existing lake acidification models; 2) the development of a process model for Emerald Lake Watershed, and; 3) the development of a simple predictive model that can be applied to all lakes in the Sierra Nevada. This proposal addresses the first objective.

The primary purpose of this research project is to provide a systematic evaluation of existing lake watershed acidification models for application to high-elevation Sierran watersheds. Because most lake acidification models have been developed for lakes in quite different geographic locations compared to the Sierra Nevada, an evaluation of this nature will determine the components of various models that can be used to describe lake acidification processes in the Sierra Nevada. Based on this evaluation the research group will provide a process-driven lake model that will be combined with a watershed compartment model formulated by the University of Arizona research group.

The results of this research will aid the Air Resources Board in defining the differences in acidification response between Sierran watersheds and those in other parts of the United States. In addition, the study will provide the first estimates of the relative importance of different watershed processes that may exert control on lake surface water chemistry and the response of lake water chemistry to inputs of strong mineral acids.

State of California
AIR RESOURCES BOARD

Resolution 87-49
June 11, 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 151-23, entitled "Development of Watershed Models for Emerald Lake Watershed in Sequoia Natural Park and for Other Lakes of the Sierra Nevada," has been submitted by the University of Arizona to the ARB; 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 151-23, entitled "Development of Watershed Models for Emerald Lake Watershed in Sequoia National Park and for Other Lakes of the Sierra Nevada," submitted by the University of Arizona, for a total amount not to exceed $150,000.

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 151-23, entitled "Development of Watershed Models for Emerald Lake Watershed in Sequoia National Park and for Other Lakes of the Sierra Nevada," submitted by the University of Arizona, for a total amount not to exceed $150,000.

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 in an amount not to exceed $150,000

I hereby certify that the above is a true and correct copy of Resolution 87-49, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 87-49
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 151-23 entitled "Development of Watershed Models for Emerald Lake Watershed in Sequoia National Park and for Other Lakes of the Sierra Nevada"

RECOMMENDATION: Adopt Resolution 87-49 approving Proposal No. 151-23 for funding in an amount not to exceed $150,000.

SUMMARY: This project is part of the Research Division's modeling effort for determining the effects of acid deposition on Sierran Lakes. The modeling effort consists of three main objectives: 1) the evaluation of existing lake acidification models; 2) the development of a process model for Emerald Lake Watershed; and 3) the development of a simple predictive model that can be applied to all lakes in the Sierra Nevada. This proposal addresses the second objective.

The purpose of this research project is to develop a process-driven lake acidification model for Emerald Lake of the Integrated Watershed Study (IWS), and to develop from the process model a simple predictive model for general application to other Sierran lakes. The project serves as the single most important unifying component of the IWS modeling effort. It integrates the various individual watershed projects into a dynamic model capable of simulating and demonstrating the means by which the watershed processes interact with each other to control lake water chemistry. Consideration of the dominant watershed processes derived from the process model will be generalized for applications across the Sierra. In addition, the results of this modeling effort will be used by the University of Iowa researchers in developing a simple predictive model to assess "Resources at Risk" (see Item 3).

The contractor is the University of Arizona. The principal investigators are Drs. Sorooshian and Bales.

B U D G E T S U M M A R Y

University of Arizona

"Development of Watershed Models for Emerald Lake Watershed in Sequoia National Park and for Other Lakes of the Sierra Nevada"

BUDGET ITEMS:*

Salaries	$80,000	
Benefits	4,040	
Supplies	5,000	
Travel	5,000	
Other Costs**	8,000	
TOTAL, Direct Costs		$102,040
TOTAL, Indirect Costs		47,960
TOTAL PROJECT COST		$150,000

* The breakdown of budget items is approximate pending receipt of final budget from the contractor. The total project cost, however, is exact.

** Computing Services ($8,000)

State of California
AIR RESOURCES BOARD

Resolution 87-50
June 11, 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 160-23, entitled "California Lake Resources at Risk to Acid Deposition with Application of the Enhanced Trickle-Down Model to Emerald Lake," has been submitted by the University of Iowa to the ARB; 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 160-23, entitled "California Lake Resources at Risk to Acid Deposition with Application of the Enhanced Trickle-Down Model to Emerald Lake," submitted by the University of Iowa, for a total amount not to exceed $100,000.

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 160-23, entitled "California Lake Resources at Risk to Acid Deposition with Application of the Enhanced Trickle-Down Model to Emerald Lake," submitted by the University of Iowa, for a total amount not to exceed $100,000.

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 in an amount not to exceed $100,000.

I hereby certify that the above is a true and correct copy of Resolution 87-50, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-50
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 160-23 entitled "California Lake Resources at Risk to Acid Deposition with Application of the Enhanced Trickle-Down Model to Emerald Lake."

RECOMMENDATION: Adopt Resolution 87-50 approving Proposal No. 160-23 for funding in an amount not to exceed $100,000.

SUMMARY: This project is part of the Research Division's modeling effort for determining the effects of acid deposition on Sierran Lakes. The modeling effort consists of three main objectives: 1) the evaluation of existing lake acidification models; 2) the development of a process model for Emerald Lake Watershed, and; 3) the development of a simple predictive model that can be applied to all lakes in the Sierra Nevada. This proposal addresses the third objective.

The purpose of this research project is to estimate the response of Sierran lake water chemistry to changes in loadings of acidic deposition through time. This modeling effort will provide information on classification of lakes according to sensitivity to acidic deposition, information on the chronology of lake acidification, and information on the buffering capacity or ability of lake water to resist changes in pH due to a given deposition loading. This "resources at risk" analysis has been used in other parts of the United States to predict the extent and timing of lake acidification.

The results of this research will be used to identify sensitivity criteria for California, identify lake systems that could be sensitive to acidic deposition, and determine if lakes have become acidified. The modeling results can be compared with similar analyses in other parts of the United States in order to define the regional characteristics important for predicting lake acidification potential.

The contractor is the University of Iowa. Dr. Jerald Schnoor is the principal investigator.

B U D G E T S U M M A R Y

University of Iowa

"California Lake Resources at Risk to Acid Deposition
with Application of the Enhanced Trickle-Down Model to Emerald Lake"

BUDGET ITEMS:*

Salaries	$48,784	
Benefits	12,185	
Supplies	1,500	
Travel	4,000	
Other Costs **	5,000	
TOTAL, Direct Costs		$71,429
TOTAL, Indirect Costs		28,571
TOTAL PROJECT COST		$100,000

* The breakdown of budget items is approximate pending receipt of final budget from the contractor. The total project cost, however, is exact.

** Computing Services ($5,000).

State of California
AIR RESOURCES BOARD

Resolution 87-51
June 11,1987

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 161-23, entitled "Survey of Soils of the Sierra Nevada for Sensitivity to Acid Deposition," has been submitted by North State Resources to the ARB; 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 161-23, entitled "Survey of Soils of the Sierra Nevada for Sensitivity to Acid Deposition," submitted by North State Resources, for a total amount not to exceed $150,000.

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 161-23, entitled "Survey of Soils of the Sierra Nevada for Sensitivity to Acid Deposition," submitted by North State Resources, for a total amount not to exceed $150,000.

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 in an amount not to exceed $150,000.

I hereby certify that the above is a true and correct copy of Resolution 87-51, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-51
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 161-23 entitled "Survey of Soils of the Sierra Nevada for Sensitivity to Acid Deposition."

RECOMMENDATION: Adopt Resolution 87-51 approving Proposal No. 161-23 for funding in an amount not to exceed $150,000.

SUMMARY: This research project is designed to produce a soils map of the western slope of the Sierra based on soil sensitivity to acidic deposition. To accomplish this the researchers will combine soil survey information with a new soil sensitivity scheme derived from important soil chemical reactions and soil physical properties. The researchers will then identify important areas of the western slope not included in the present surveys and conduct an appropriate scale survey of the region.

The research outputs will allow the ARB to identify watersheds and forest areas that may be susceptible to the effects of acidic deposition based in part on the extent and type of soil cover. Since the nature and properties of soils play an important part in terrestrial and aquatic ecosystem response to acidic deposition, the map and classification system produced by this effort will be of considerable use in assessing the potential for soil mediated acid deposition effects in California.

The contractor is North State Resources and the principal investigator is Mr. Timothy Reilly.

B U D G E T S U M M A R Y

North State Resources, Inc.

"Survey of Soils of the Sierra Nevada
for Sensitivity to Acid Deposition"

BUDGET ITEMS:

Salaries	$39,380.08	
Benefits	9,845.02	
Supplies	8,166.63	
Other Cost*	50,000.00	
Travel	9,285.00	
TOTAL, Direct Costs		$116,676.73
TOTAL, Indirect Costs		33,323,27
TOTAL PROJECT COST		$150,000.00

* Includes:

1. U.C. Davis subcontract ($25,000) for developing soil sensitivity scheme.
2. Technical expert ($9,000) for correlating soil survey and soil property information. (Mr. Daniel Enstrom)
3. Lab analysis ($16,000) of soil samples. (CH2MHILL)

State of California
AIR RESOURCES BOARD

Resolution 87-52
June 11, 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 165-23, entitled "Monitoring of Ozone and Atmospheric Particles, Sequoia National Park," has been submitted by the University of California, Davis;

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 165-23, entitled "Monitoring of Ozone and Atmospheric Particles, Sequoia National Park," submitted by the University of California, Davis, for a total amount not to exceed $30,009.

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 165-23, entitled "Monitoring of Ozone and Atmospheric Particles, Sequoia National Park," submitted by the University of California, Davis, for a total amount not to exceed $30,009.

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 $30,009.

I hereby certify that the above is a true and correct copy of Resolution 87-52, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-52
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 165-23 entitled "Monitoring of Ozone and Atmospheric Particles, Sequoia National Park."

RECOMMENDATION: Adopt Resolution 87-52 approving Proposal No. 165-23 for funding in an amount not to exceed $30,009.

SUMMARY: UCD will measure the concentrations of ozone and atmospheric particles at Emerald Lake using a solar powered air sampler for 10 weeks beginning in July, 1987, and will continue to measure the concentrations of particles at Giant Forest. The solar unit at Emerald Lake will also be used by ARB's Haagen-Smit Laboratory to power equipment for measuring concentrations of acidic gases. The measurements will be used as input to a model of the watershed and to help elucidate the trajectories of air masses that arrive at higher elevations in Sequoia National Park.

The contractor is University of California, Davis. Dr. Thomas Cahill is the principal investigator.

State of California
AIR RESOURCES BOARD

Resolution 87-53
June 11, 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 164-23, entitled "Measurement of Atmospheric Dry Deposition at Emerald Lake in Sequoia National Park," submitted by the 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 164-23, entitled "Measurement of Atmospheric Dry Deposition at Emerald Lake in Sequoia National Park," submitted by the University of California, Riverside, for a total amount not to exceed $21,219.

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 164-23, entitled "Measurement of Atmospheric Dry Deposition at Emerald Lake in Sequoia National Park," submitted by the University of California, Riverside, for a total amount not to exceed $21,219.

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 $21,219.

I hereby certify that the above is a true and correct copy of Resolution 87-53, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-53
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 164-23 entitled "Measurement of Atmospheric Dry Deposition at Emerald Lake in Sequoia National Park"

RECOMMENDATION: Adopt Resolution 87-53 approving Proposal No. 164-23 for funding in an amount not to exceed $21,219.

SUMMARY: This research addresses the quantification of dry deposition at Emerald Lake, the site of the Integrated Watershed Study (IWS). The dry deposition will be measured using natural vegetative surfaces. The determination of cation and anion fluxes due to dry deposition represents an important input for the modeling effort at the IWS. In addition, the research will estimate the degree to which physiologically active vegetation can influence the composition of dry deposition on foliage. Fluxes that will be measured in this study will be compared to fluxes to artificial surfaces (Item 7) in order to obtain the best possible estimate of this important component of acid deposition. These measurements will be used in conjunction with ambient concentration measurements made by the ARB staff for determining deposition velocities.

The contractor is University of California, Riverside. The principal investigators are Drs. Andrzej Bytnerowicz and David Olszyk.

B U D G E T S U M M A R Y

University of California, Riverside

"Measurement of Atmospheric Dry Deposition
at Emerald Lake in Sequoia National Park"

BUDGET ITEMS:

Salaries	$4,881	
Benefits	1,324	
Supplies*	8,285	
Travel	4,100	
Other Costs	700	
TOTAL, Direct Costs		$19,290
TOTAL, Indirect Costs		1,929
TOTAL PROJECT COST		$21,219

* Includes chemical analysis ($7,000) of samples, pH electrode and miscellaneous supplies.

State of California
AIR RESOURCES BOARD

Resolution 87-54
June 11, 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 A6-186-32, entitled "Dry Deposition Measurement During the Southern California Air Quality Study," has been submitted by Carnegie-Mellon University;

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 A6-186-32, entitled "Dry Deposition Measurement During the Southern California Air Quality Study," submitted by Carnegie-Mellon University, for a total amount not to exceed $18,775.

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 A6-186-32, entitled "Dry Deposition Measurement During the Southern California Air Quality Study," submitted by Carnegie-Mellon University, for a total amount not to exceed $18,775.

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 $18,775.

I hereby certify that the above is a true and correct copy of Resolution 87-54, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-54
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Request for Budget Augmentation of Contract No. A6-186-32 entitled "Dry Deposition Measurement During the Southern California Air Quality Study."

RECOMMENDATION: Adopt Resolution 87-54 approving a budget augmentation of Contract No. A6-186-32 for an amount not to exceed $18,775.

SUMMARY: This proposal is to extend dry deposition work which the contractor will perform during SCAQS to the Emerald Lake Basin after the SCAQS summer sampling is finished. Under this proposal, the contractor will measure dry deposition fluxes to artifical surfaces at a site near the lake. These fluxes to surrogate surfaces will be compared with dry deposition fluxes to natural vegetation (Item 6) in order to provide the best estimate of this important component of acid deposition. The deposition flux data will also be used in conjunction with ambient concentration measurements at the same location to calculate deposition velocities. This information may also be used by the Board to make decisions regarding the effect of acid deposition on forests and high elevation ecosystems.

The contractor is Carnegie-Mellon University. Dr. Cliff Davidson is the principal investigator.

State of California
AIR RESOURCES BOARD

Resolution 87-55
June 11, 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 167-23, entitled "Real Time Nitric Acid Measurements During SCAQS," has been submitted by Unisearch Associates, Inc.;

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 167-23, entitled "Real Time Nitric Acid Measurements During SCAQS," submitted by Unisearch Associates, Inc., for a total amount not to exceed $14,678.

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 167-23, entitled "Real Time Nitric Acid Measurements During SCAQS," submitted by Unisearch Associates, Inc., for a total amount not to exceed $14,678.

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 $14,678.

I hereby certify that the above is a true and correct copy of Resolution 87-55, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-55
DATE: June 12, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 167-23 entitled "Real Time Nitric Acid Measurements During SCAQS."

RECOMMENDATION: Adopt Resolution 87-55 approving Proposal No. 167-23 for funding in an amount not to exceed $14,678.

SUMMARY: Under a current contract with the Coordinating Research Council, Unisearch will bring to Claremont, California and will operate a state-of-the-art tunable diode laser to measure the concentrations of hydrogen peroxide continuously during the twelve intensive study days of SCAQS. Under this proposal, Unisearch would operate the same equipment to continuously, measure nitric acid throughout the six-week period of the SCAQS summer study, except for a few days of continuous formaldehyde measurements during SCAQS intensive days. The data collected, both for CRC and under this proposal, will become a part of the PM_{10} and photochemical model data base developed for SCAQS. The nitric acid data will also be used as a standard for a method comparison study to be conducted on non-intensive days. This information will allow the Board to compare the California Dry Deposition sampler with others used throughout the country for other sampling networks.

Under this proposal, the cost of making the nitric acid measurements consists of salary, equipment maintenance and labor overhead only.

The contractor is Unisearch, Inc. Dr. Gervase Mackay is the principal investigator.

State of California
AIR RESOURCES BOARD

Resolution 87-56
June 11, 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 147-23, entitled "Modeling of Cloudwater Chemistry in the South Coast Air Basin," submitted by Bechtel National, Inc.;

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

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

> Proposal Number 147-23, entitled "Modeling of Cloudwater Chemistry in the South Coast Air Basin," submitted by Bechtel National, Inc., for a total amount not to exceed $49,861.

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 147-23, entitled "Modeling of Cloudwater Chemistry in the South Coast Air Basin," submitted by Bechtel National, Inc., for a total amount not to exceed $49,861.

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 $49,861.

I hereby certify that the above is a true and correct copy of Resolution 87-56, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-56
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 147-23 entitled "Modeling of Cloudwater Chemistry in the South Coast Air Basin"

RECOMMENDATION: Adopt Resolution 87-56 approving Proposal No. 147-23 for an amount not to exceed $49,861.

SUMMARY: The formation of sulfate and nitrate species in the atmosphere is a topic of great importance in air quality because these species lead to acid deposition, visibility degradation, and increased aerosol concentrations. It has been known for some time that high sulfate concentrations in the South Coast Air Basin (SCAB) are associated with periods of fog or cloud and hence that chemical reactions in water droplets may play an important role in the conversion of sulfur dioxide to sulfate. During the past four years, the Air Resources Board has sponsored experimental field studies in the SCAB to measure the composition of the trace gases, aerosols, and cloudwater to obtain data related to liquid-phase chemical processes.

The purpose of this study is to conduct an analysis of the data collected during the ARB-sponsored cloud sampling program using a cloud chemistry model. The specific objectives are to evaluate the chemistry of sulfate and nitrate formation in clouds, to identify the most important chemical pathways leading to acid formation, and to investigate the relationships between the concentrations of precursors and acid species.

The contractor is Bechtel National, Inc. Dr. Christian Seigneur is the principal investigator.

B U D G E T S U M M A R Y

Bechtel National, Inc.

"Modeling of Cloudwater Chemistry in the South Coast Air Basin"

BUDGET ITEMS:

Salaries	$16,461	
Benefits	6,714	
Travel Expenses	120	
Consultants*	13,568	
Other direct cost**	4,562	
TOTAL, Direct Cost		$41,425
TOTAL, Indirect Cost		8,436
	TOTAL PROJECTED COST	$49,861

* Dr. Willard Richards (Sonoma Technology, Inc.) and Mr. Pradeep Saxena (Private Consultant)

** Includes San Francisco tax at 1.5% of labor; material, supplies and reproduction; communication; and publications.

State of California
AIR RESOURCES BOARD

Resolution 87-57
June 11, 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 166-23, entitled "Development of a State-of-the-Art Acid Deposition Model for the South Coast Air Basin of California," submitted by California Institute of Technology to the ARB; 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 166-23, entitled "Development of a State-of-the-Art Acid Deposition Model for the South Coast Air Basin of California," submitted by California Institute of Technology, for a total amount not to exceed $197,050.

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 166-23, entitled "Development of a State-of-the-Art Acid Deposition Model for the South Coast Air Basin of California," submitted by California Institute of Technology, for a total amount not to exceed $197,050.

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 $197,050.

I hereby certify that the above is a true and correct copy of Resolution 87-57, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-57
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 166-23 entitled "Development of a State-of-the Art Acid Deposition Model for the South Coast Air Basin of California."

RECOMMENDATION: Adopt Resolution 87-57 approving Proposal No. 166-23 for funding in an amount not to exceed $197,050.

SUMMARY: The objective of this study is to develop a three-dimensional Eulerian model (including sensitivity analysis) capable of predicting the airborne concentrations of gaseous, particulate and aqueous-phase acidic species. This proposal extends the previous effort by the proponent which resulted in a Lagrangian trajectory model for the South Coast Air Basin. The earlier model was capable of predicting, for a given trajectory, the gas and aerosol phase ambient concentrations. This effort will include aqueous-phase chemistry and will develop a Eulerian (grid) model.

The Caltech Airshed Model will be updated to include the most current understanding of gas-phase and aqueous-phase chemistry. A series of sensitivity runs will be carried out to investigate the key features of the model in the following areas: a) role of daytime and nighttime gas-phase chemistry of nitric acid formation; b) degree of hydrocarbon speciation required; c) importance of the aqueous-phase reactions; and d) comparative roles of gas-, aerosol-, and droplet-phase routes for generation of atmospheric acidity.

The proposed model would provide information to help the Board and others understand the quantitative relationships between emissions of acid precursors and dry and wet deposition, the mechanisms of production of fine particles in the atmosphere, and to help evaluation of the effectiveness of potential control strategies for acidic species.

The research contractor is the California Institute of Technology and the principal investigator is Dr. John Seinfeld.

B U D G E T S U M M A R Y

California Institute of Technology

"Development of a State-of-the-Art Acid Deposition Model for the South Coast Air Basin of California"

BUDGET ITEMS:

Salaries	$77,000	
Benefits	22,715	
Supplies	10,000	
Other Cost*	14,000	
Travel	1,000	
TOTAL, Direct Costs		$124,715
TOTAL, Indirect Costs		72,335
TOTAL PROJECT COST		$197,050

* Other Costs:

Computer time	($12,000)
Publication Costs	($ 2,000)

State of California
AIR RESOURCES BOARD

Resolution 87-58
June 11, 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 A5-157-32, entitled "Proposal for the Southern California Air Quality Study (SCAQS) - Program Management," has been submitted by Sonoma Technology, Inc.; and

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 A5-157-32, entitled "Proposal for the Southern California Air Quality Study (SCAQS) - Program Management," submitted by Sonoma Technology, Inc., for a total amount not to exceed $99,318.

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 A5-157-32, entitled "Proposal for the Southern California Air Quality Study (SCAQS) - Program Management," submitted By Sonoma Technology, Inc., for a total amount not to exceed $99,318.

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 $99,318, for a total amount not to exceed $388,984.

I hereby certify that the above is a true and correct copy of Resolution 87-58, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 87-58
DATE: June 11, 1987

State of California
AIR RESOURCES BOARD

ITEM: Augmentation for Contract No. A5-157-32 entitled "Proposal for the Southern California Air Quality Study (SCAQS) - Program Management."

RECOMMENDATION: Adopt Resolution 87-58 approving a budget augmentation of Contract No. A5-157-32 for an amount not to exceed $99,318.

SUMMARY: This augmentation provides for the continued services of Sonoma Technology, Inc.(STI) as the program coordinator for the fall portion of SCAQS. STI's current contract, which provided only for the program planning and execution of the summer field program, will expire in September 1987.

Under this proposal STI will provide expert assistance in planning, coordinating and executing the winter portion of SCAQS which will occur between November 16, and December 11, 1987. STI's assistance is needed because of the size and complexity of the field program.

As with the current contract, the contractor is STI and the principal investigator is Dr. Donald L. Blumenthal.