

State of California
AIR RESOURCES BOARD

Resolution 84-13
April 27, 1984

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 025-4(R), entitled "Dry Deposition of Acidic Gases and Particles", has been submitted by the State Department of Health Services; and

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

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

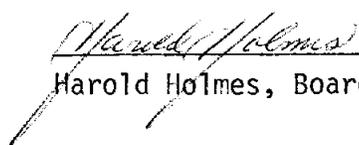
Proposal Number 025-4(R) entitled "Dry Deposition of Acidic Gases and Particles", submitted by the State Department of Health Services for a total amount not to exceed \$134,927.

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 025-4(R) entitled "Dry Deposition of Acidic Gases and Particles", submitted by the State Department of Health Services for a total amount not to exceed \$134,927.

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 \$134,927.

I certify that the above is a true and correct copy of Resolution 84-13 as passed by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM: 84-8-4b(1)
DATE: April 27, 1984

ITEM: Research Proposal No. 025-4(R) entitled "Dry Deposition of Acidic Gases and Particles."

RECOMMENDATION: Adopt Resolution 84-13 approving Proposal No. 025-4(R) for funding in an amount not to exceed \$134,927.

SUMMARY: The relative importance of dry deposition in the overall phenomenon of acid deposition has only recently been identified. In the northeastern U.S. and Canada, wet deposition of acidity reportedly equals or exceeds dry deposition in both winter and summer. Accordingly, Federal researchers have placed relatively little emphasis on measuring and assessing dry deposition. In contrast, dry deposition in the South Coast Air Basin has been estimated to be more than ten times the level of wet deposition in terms of total flux of acidity. Any realistic assessment of acid deposition rates and possible effects in California will require the measurement of dry as well as wet deposition.

The proposed research is a continuation of multi-year effort to develop monitoring techniques for dry acid deposition. In the initial phase of the study, atmospheric concentrations of particulate strong acids, vapor-phase nitric acid sulfates, ammonium ion, ammonia, sulfur dioxide, and nitrogen oxides were measured at various locations in the state and multiplied by the deposition velocity specific to the pollutant and site to obtain estimates of deposition flux (i.e., pounds of deposited sulfate per acre per year). Potential techniques for measuring the size distribution of acid particles and the feasibility of using materials and vegetative surfaces as direct measures of deposition were also investigated.

The specific objectives of the present work are to: 1) measure the size distributions of acidic particles at various locations within the state in order to determine the appropriate deposition velocities; 2) develop a "spot test" for ambient acidic particles which will provide a measure of corrosivity for material damage assessment; 3) measure acidic particle deposition on vegetation; 4) develop a "surrogate leaf" as a passive monitor for sulfur dioxide and as a mean for determining deposition rates within a plant canopy; and 5) improve the sampling of acid particles by designing an ammonia denuder which can tolerate ambient moisture.

Accurate and reliable measurement and assessment methods for dry acid deposition are essential to the Board and staff if we are to carry out the requirements of the Kapiloff Acid Deposition Act in evaluating comprehensively the present and potential effects of acid deposition in California.

State of California
AIR RESOURCES BOARD

Resolution 84-14
April 27, 1984

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 018-3(R), entitled "Snow Deposition, Melt, Runoff and Chemistry in a Small Alpine Watershed Emerald Lake Basin, Sequoia National Park", has been submitted by the University of California, Santa Barbara; and

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

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

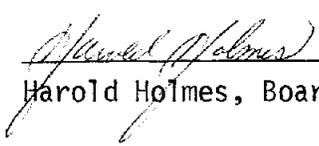
Proposal Number 018-3(R) entitled "Snow Deposition, Melt, Runoff and Chemistry in a Small Alpine Watershed, Emerald Lake Basin, Sequoia National Park", submitted by the University of California, Santa Barbara for a total amount not to exceed \$357,686.

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 018-3(R) entitled "Snow Deposition, Melt, Runoff and Chemistry in a Small Alpine Watershed, Emerald Lake Basin, Sequoia National Park", submitted by the University of California, Santa Barbara for a total amount not to exceed \$357,686.

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 \$357,686.

I certify that the above is a true and correct copy of Resolution 84-14 as passed by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM: 84-8-4b(2)
DATE: April 27, 1984

- ITEM: Research Proposal No. 018- 3(R) entitled, "Snow, Deposition, Melt, Runoff and Chemistry in a Small Alpine Watershed, Emerald Lake Basin, Sequoia National Park."
- RECOMMENDATION: Adopt Resolution 84-14 approving Research Proposal No. 018-3(R) for funding not to exceed \$357,686.
- SUMMARY: In high elevation watersheds in California, snow is the dominant form of wet deposition. Large snowpacks accumulate throughout the winter and then melt within a short time span in the spring and summer. Little is known about the patterns of snow deposition melt and runoff in these high elevation basins of California. In other parts of the world, where surface water acidification is a problem, pollutants can become concentrated in snowmelt and can rapidly acidify lakes and streams during a short acid "pulse" that occurs with the onset of snowmelt. It is not known if such mechanisms operate in the mountainous regions of California.
- The Kapiloff Acid Deposition Act requires that the Air Resources Board initiate a program to identify sensitive areas within California that may be damaged by excessively acidic inputs. The Act further requires that the Air Resources Board quantify and describe those inputs. A Request for Proposals was issued to solicit proposals to study intensively a typical watershed in the Sierra Nevada. One component of the watershed study includes a study of the physics and chemistry of snow, melt water and runoff in the selected watershed. The Research Division received three proposals to study snow chemistry and snowmelt processes.
- The proponent selected by the Board's Scientific Advisory Committee on Acid Deposition is a research team at the University of California, Santa Barbara. This group has been active in snow studies in high-elevation systems of the Sierra Nevada, both on the eastern and the western slopes, and in studies of both snow dynamics and snow chemistry. They have also developed a series of computer models to simulate the complex snow processes in the Sierra Nevada.
- A long term, comprehensive study of snow deposition and melt processes in a high elevation watershed is needed for two reasons: (1) to provide baseline data on the quantity and composition of snow falling in the basin; and (2) to

identify snowmelt and runoff processes that might serve to concentrate acidity in the early meltwater fractions. The general approach taken by the proponent to meet these objectives will be: to study physical and chemical characteristics of snowfall, snowpack and runoff in the Emerald Lake Basin of Sequoia National Park during two snow seasons; and to model the changes that occur in the snowpack using field measurements, satellite imagery and meteorological measurements as inputs.

The proponent has described a thirty-month program that may be divided into seven tasks: (1) analysis of basin topography and selection of sampling grid; (2) measurement of inputs as snow; (3) chemical sampling of snow, snowmelt and runoff; (4) measurement of losses from the snowpack; (5) development of a meltwater dynamics model that will be verified using actual field measurements; (6) development of models to predict runoff timing and routes based on field observations; and (7) calculation of a water balance for the basin. The proponent will make use of laboratory facilities at the National Park Service headquarters at Ash Mountain and at the University of California, Santa Barbara. Computer models will be developed and applied at the Computer Systems Lab at the University of California, Santa Barbara.

These tasks will be accomplished by a combination of the following: (1) use of satellite imagery and aerial photography to define basin characteristics; (2) regular measurements of snowfall events and snow cores; (3) development and installation of devices to measure meltwater in situ and to collect runoff; (4) chemical analysis of snow, meltwater and runoff for major ions and nutrients; (5) measurement of meteorological variables to aid in estimating snowpack dynamics; and (6) development and refinement of models designed to estimate changes in the snowpack through time.

The results from this work are needed and will be used by the Board researchers to assess the present and potential effects of acid deposition upon sensitive lakes and streams in the Sierra Nevada.

B U D G E T S U M M A R Y: University of California, Santa Barbara
 "STUDY OF SNOW CHEMISTRY AND SNOWMELT PROCESSES IN A SELECTED WATERSHED"
 (\$357,686--30 Months)

BUDGET ITEMS:	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>
	July 1, 1984 June 30, 1985	July 1, 1985 June 30, 1986	July 1, 1986 December 31, 1986
Salaries	53,465	60,041	40,723
Employee Benefits	8,092	9,727	8,075
Equipment	18,000	6,500	0
Supplies & Materials	5,000	7,000	3,500
Travel	12,240	15,375	7,175
Other Expenses	9,700	13,200	7,600
Total Direct Costs	106,497	111,843	67,073
Indirect Costs	24,514	29,180	18,579
Total Project Cost	131,011	141,023	85,652

State of California
AIR RESOURCES BOARD

Resolution 84-15
March 22, 1984

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 026-3(R), entitled "Statewide Survey of Aquatic Ecosystem Chemistry: Comprehensive Study", has been submitted by the Department of Fish and Game of the State of California;

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

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

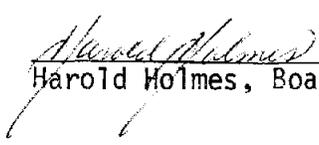
Proposal Number 026-3(R) entitled "Statewide Survey of Aquatic Ecosystem Chemistry: Comprehensive Study", submitted by the Department of Fish and Game of the State of California for a total amount not to exceed \$400,000.

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 026-3(R) entitled "Statewide Survey of Aquatic Ecosystem Chemistry: Comprehensive Study", submitted by the Department of Fish and Game of the State of California for a total amount not to exceed \$400,000.

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 \$400,000.

I certify that the above is a true and correct copy of Resolution 84-15 as passed by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM: 84-8-4b(3)
DATE: April 27, 1984

ITEM: Research Proposal No. 026-3(R) entitled, "Statewide Survey of Aquatic Ecosystem Chemistry: Comprehensive Study".

RECOMMENDATION: Adopt Resolution 84-15 approving Research Proposal No. 026-3(R) for funding in an amount not to exceed \$400,000.

SUMMARY: The Kapiloff Acid Deposition Act provides for the Air Resources Board to design and implement a comprehensive research and monitoring program to investigate the nature, extent and potential effects of acid deposition in California. Such effects may include damage to certain sensitive aquatic systems, particularly lakes and streams located at high elevations in granitic basins. Little is known about the extent of these sensitive aquatic systems in the State or seasonal changes in such chemical variables as pH, alkalinity, major ions and nutrients.

The objective of this study is to collect baseline data on pH, alkalinity and other important variables necessary to characterize the sensitivity of these systems to acid deposition. A network of stations will be established and monitored to detect changes in surface water chemistry in California over time.

A Request for Proposals was issued to solicit proposals to conduct a survey of surface water quality throughout the State. Eight proposals were received in response to the RFP.

The proponent selected by the Board's Scientific Advisory Committee is the State Department of Fish and Game. DFG has conducted water quality monitoring in sensitive areas of California for many years and, as determined by the SAC, DFG offered the most technically sound and efficient proposal for accomplishing the objectives of the RFP. Complementary to the Board's interests, DFG researchers are also particularly interested in possible effects of acid deposition on surface waters and fish or amphibian populations that inhabit them.

The approach taken by the proponents to meet the ARB's objectives in this research will be: (1) to select about 50 lakes and streams that are located in geologically sensitive regions of California; (2) to collect surface water samples twice a year at each station and to perform specified physical and chemical measurements on-site; (3)

to perform extensive chemical analyses on water samples at the Department of Fish and Game's Water Pollution Control Laboratory in Rancho Cordova; and (4) to establish a data base management system that will allow for the entering of future years' data and manipulation of the data base to detect changes in water quality parameters through time.

This measurement program will be carried out over thirty months, with samples being collected during five sampling periods. Water collection will occur in the late summer and during the spring snowmelt period. Major ions and nutrients will be measured, along with an array of trace elements known to be mobilized by acid deposition. These data will form the basis for a long-term monitoring program of surface water quality as it relates to acid deposition effects.

This study is needed to provide detailed chemical data for lakes and streams in California that may be sensitive to acid deposition effects. These baseline data will provide evidence for evaluating seasonal effects and possible trends in surface water chemistry, particularly alkalinity, which may be influenced by acid deposition.

B U D G E T S U M M A R Y: Department of Fish and Game

"STATEWIDE SURVEY OF AQUATIC ECOSYSTEM CHEMISTRY"

(\$400,000--30 Months)

BUDGET ITEMS:	<u>YEAR 1</u>	<u>YEAR 2</u>	<u>YEAR 3</u>
	July 1, 1984 June 30, 1985	July 1, 1985 June 30, 1986	July 1, 1986 December 31, 1986
Salaries	55,077	64,084	38,037.5
Employee Benefits	12,836.70	14,662.20	8,063.25
Equipment	25,100.46	4,175.70	4,070.89
Supplies & Materials	4364.66	3,978.3	3,509.6
Travel	23,600	25,800	20,460
Other Expenses	5,440	6,300	5,050
Total Direct Costs	126,418.82	119,000.20	79,191.24
Indirect Costs	22,999.27	29,854.37	22,536.1
Total Project Cost	149,418.09	148,854.57	101,727.34

State of California
AIR RESOURCES BOARD

Resolution 84-16
April 27, 1984

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 015-3(R), entitled "Effects of Acid Deposition on Important Soil Processes in a Selected Watershed", has been submitted by the University of California, Riverside; and

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

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

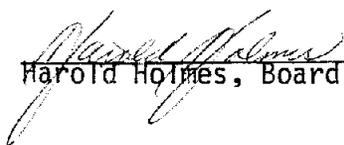
Proposal Number 015-3(R) entitled "Effects of Acid Deposition on Important Soil Processes in a Selected Watershed", submitted by the University of California, Riverside for a total amount not to exceed \$170,976.

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 015-3(R) entitled "Effects of Acid Deposition on Important Soil Processes in a Selected Watershed", submitted by the University of California, Riverside for a total amount not to exceed \$170,976.

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 \$170,976.

I certify that the above is a true and correct copy of Resolution 84-16 as passed by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM: 84-8-4b(4)
DATE: April 27, 1984

- ITEM: Research Proposal No. 015-3 entitled "Effects of Acid Deposition on Important Soil Processes in a Selected Watershed", University of California, Riverside, California, Steve Nodvin.
- RECOMMENDATION: Adopt Resolution 84-16 approving Research Proposal No. 015-3 for funding for an amount not to exceed \$170,976.
- SUMMARY: The Kapiloff Acid Deposition Act requires the Air Resources Board to determine which areas of California may be sensitive to acid deposition and to assess present and potential damage to ecosystems from acid deposition. The proposed research is one component of an intensive study of Emerald Lake in Sequoia National Park. Emerald Lake basin is a small, high elevation watershed formed on granitic bedrock; it has been identified by the Board's Scientific Advisory Committee as being representative of sensitive watersheds in the Sierra Nevada. The other components of the Integrated Watershed Study include studies of aquatic systems, vegetation and snow chemistry and dynamics within the watershed.
- The proposed study of the soil processes would determine the role of the soil in the watershed in influencing vegetation growth and aquatic chemistry. Nitrogen and sulfur cycling within the soil will be studied. Litter decomposition rates will be determined. The sensitivity of each soil type to acid deposition will also be determined. Sulfate absorption characteristics of the major soil types in the watershed will be measured and used to develop a model of solute transport for sulfate. Aluminum mobility and speciation will be determined.
- This information will provide baseline data which is needed to identify possible trends in soil processes that may be affected by acid deposition. The information is also needed to help determine whether effects significant from acid deposition are occurring. This proposal was chosen from among four proposals received for this component of the Board's Request For Proposals for an Integrated Watershed Study. The total funding request for all proposals received was approximately \$870,000.

B U D G E T S U M M A R Y: University of California, Riverside
 "EFFECTS OF ACID DEPOSITION ON IMPORTANT SOIL PROCESSES IN A SELECTED WATERSHED"
 (\$170,976--18 Months)

BUDGET ITEMS:	<u>YEAR 1</u>	<u>YEAR 2</u>
	July 1, 1984 June 30, 1985	July 1, 1985 December 31, 1985
Salaries	59,046	32,543
Employee Benefits	13,597	7,828
Equipment	0	0
Supplies & Materials	8,600	2,250
Travel	12,500	6,952
Other Expenses	0	0
Total Direct Costs	93,743	49,573
Indirect Costs	18,092	9,568
Total Project Cost	111,835	59,141

State of California
AIR RESOURCES BOARD

Resolution 84-17
April 27, 1984

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705;

WHEREAS, an unsolicited research proposal, Number 1241-106, entitled "Project Basin", has been submitted by the University of California, Los Angeles, to the Air Resources Board; and

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

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

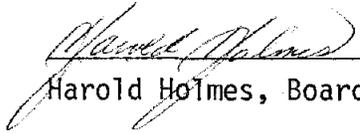
Proposal Number 1241-106 entitled "Project Basin", submitted by the University of California, Los Angeles, for a total amount not to exceed \$62,952.

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 1241-106 entitled "Project Basin", submitted by the University of California, Los Angeles, for a total amount not to exceed \$62,952.

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 \$62,952.

I certify that the above is a true
and correct copy of Resolution 84-17
as passed by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 84-8-4b(5)
DATE: April 27, 1984

ITEM: Research Proposal No. 1241-106 entitled "Project Basin".

RECOMMENDATION: Adopt Resolution 84-17 approving Research Proposal No. 1241-106 for funding in an amount not to exceed \$62,952. From that amount \$24,900 will be retained by the State for the purchase of expendable items budgeted for this study.

SUMMARY: Ozone levels in the Los Angeles Basin currently exceed the health-based federal ambient air quality standard by a wide margin. It is uncertain when and how healthful levels of air quality can be achieved and maintained in the most cost-effective manner. However, under all reasonable air quality management scenarios that have been considered, significant additional emission control measures will be required. Air quality simulation models will have to be used, together with detailed air quality and meteorological data, to evaluate the effectiveness of alternative strategies.

High ozone concentrations within the stable inversion layer have been documented in recent field studies conducted in the Los Angeles Basin. However, air quality simulation models and ozone forecasting procedures currently in use are deficient in their treatment of the transport and dilution of these elevated layers. This is due to the sparseness of the upper level meteorological measurements needed to develop realistic three-dimensional wind models.

In this proposed study, the existing network of surface-based meteorological stations will be supplemented with six sites to collect upper level measurements of wind, temperature and humidity over a twenty-eight day cycle including the dates of the Summer Olympic Games. Interest generated by the Olympics has resulted in offers by several private contractors and government agencies to lend the University of California, Los Angeles all equipment needed for this study. In addition, some of the instruments will be installed and operated by the donors. The contribution of equipment and labor on a volunteer basis provides a major benefit to the proposed study, at no cost to the ARB. In particular, the staff estimates the value of the voluntary effort to be approximately \$20,000. The

measurements collected in this study will be analyzed to construct three-dimensional fields of wind, temperature and humidity. This analysis will be used to develop and apply more realistic models to simulate the transport and transformation of pollutants.

The improved models and meteorological data base that will result from this research are needed to evaluate alternative control measures and to help air pollution control officials in identifying the most cost effective measures for achieving and maintaining health-based ambient air quality standards in the South Coast Air Basin.

State of California
AIR RESOURCES BOARD

Resolution 84-18
April 27, 1984

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705;

WHEREAS, an unsolicited research proposal, Number 1238-105(R), entitled, "Inhalation Toxicology of Combined Acid and Soot Particles", has been submitted by the University of California, Irvine, to the Air Resources Board; and

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

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

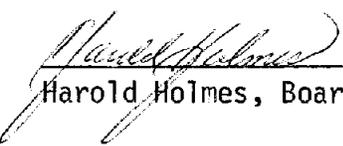
Proposal Number 1238-105(R) entitled "Inhalation Toxicology of Combined Acid and Soot Particles", submitted by the University of California, Irvine, for a total amount not to exceed \$247,528.

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 1238-105(R) entitled "Inhalation Toxicology of Combined Acid and Soot Particles", submitted by the University of California, Irvine, for a total amount not to exceed \$247,528.

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 \$247,528.

I certify that the above is a true and correct copy of Resolution 84-18 as passed by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM: 84-8-4b(6)

DATE: April 27, 1984

- ITEM: Research Proposal No. 1238-105(R) entitled, "Inhalation Toxicology of Combined Acid and Soot Particles".
- RECOMMENDATION: Adopt Resolution 84-18 approving Proposal No. 1238-105(R) for funding in an amount not to exceed \$247,528.
- SUMMARY: Recent measurements of both acidic aerosols in the respirable size range and highly acidic fog droplets have prompted renewed concern about how California's unique forms of atmospheric acidity may affect human health. These concerns have been expressed by members of this Board, the Scientific Advisory Committee on Acid Deposition and the Research Screening Committee.
- Because the kinds of atmospheres that need to be studied--containing strongly acidic vapors and droplets along with suspended solid particles, all of such small diameter that they can reach the deepest recesses of the human lung--have never been evaluated before, initial experiments will need to be carried out with animals. When the kinds of effects that these atmospheres have upon the respiratory system have been established and the approximate concentrations at which they occur have been determined, studies with human subjects may be designed and carried out.
- The Research Screening Committee has received a proposal from the Air Pollution Health Effects Laboratory at the University of California, Irvine, to carry out an extensive series of exposure tests that will provide the required information. The experimental animals--rats--will be exposed to mixtures containing, in various combinations, sulfuric acid droplets, nitric acid vapor and carbon particles. The exposures will be intermittent, five hours per day, five days per week for five weeks. The rats will be exercised during exposure. Levels of both acids and particulate carbon will approximate the maximum levels that might occur in California.
- Following exposure, the lungs of the rats will be examined microscopically to determine whether lesions or other kinds of damage have been induced by the test atmospheres.
- The staff, in response to suggestions made by the Research Screening Committee and members of the Board, has negotiated with the proponents to develop both an improved experimental protocol and a budget that more fully reflects a strong management approach for the project. A detailed budget summary is attached hereto.

BUDGET SUMMARY: University of California, Irvine
 "Inhalation Toxicology of Combined Acid and Soot Particles"
 (\$247,528/24 months)

BUDGET ITEMS	Year 1 March 1, 1984 - February 28, 1985	Year 2 March 1, 1985 - February 28, 1986
SALARIES	\$ 27617	\$ 31901
EMPLOYEE BENEFITS	8263	9866
EQUIPMENT	31600*	2500
SUPPLIES AND MATERIALS	14500	21600
TRAVEL	2000	2200
OTHER EXPENSES	13296	21752
TOTAL DIRECT COSTS	97276	89819
INDIRECT COSTS	25942	34491
TOTAL PROJECT COST	123218	124310

*Equipment, Year 1 itemized:

1 NBS/EPA Aerosol generator, \$11000.

1 Titrimeter, \$8118, plus printer/plotter, \$2850.

1 Cahn electro-balance, \$5032.

Upgrade scintillation counters for clearance measurements, \$4600 (sodium iodide crystals, with bases, preamplifiers, cables).

State of California
AIR RESOURCES BOARD

Resolution 84-19
April 27, 1984

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705;

WHEREAS, a solicited research proposal, Number 1234-105, entitled, "Recommendation of Particle Sizing Methodologies", has been submitted by the Southern Research Institute to the Air Resources Board; and

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

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

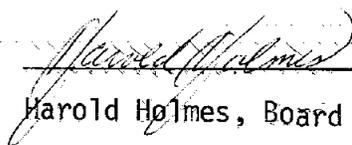
Proposal Number 1234-105 entitled "Recommendation of Particle Sizing Methodologies", submitted by the Southern Research Institute for a total amount not to exceed \$142,362.

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 1234-105 entitled "Recommendation of Particle Sizing Methodologies", submitted by the Southern Research Institute for a total amount not to exceed \$142,362.

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 \$142,362.

I certify that the above is a true
and correct copy of Resolution 84-19
as passed by the Air Resources Board.


Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 84-8-4b(7)
DATE: April 27, 1984

ITEM: Research Proposal No. 1234-105 entitled "Recommendation of Particle Sizing Methodologies".

RECOMMENDATION: Adopt Resolution 84-19 approving Research Proposal No. 1234-105 for funding in an amount not to exceed \$142,362.

SUMMARY: The primary objective of this project is to develop three practical and widely applicable methods which can be used by source testing teams to make accurate emissions and particle size measurements of ducted (as contrasted with fugitive) fine particle emissions from stationary sources. These methodologies are needed to measure and to be able to assess, in a more precise and reliable manner, the effects on air quality attribute to stationary emission sources of fine particulate matter. Such assessments are critical to the design of attainment strategies for the new Federal and State PM₁₀ air quality standards.

Fine particulate matter is emitted into the atmosphere from a variety of sources, both stationary and mobile, and it can be an important component of the atmospheric burden of hazardous and toxic air pollutants. However, a precise and reliable assessment of the sources and distribution of atmospheric fine particles requires the capability to measure source emissions of fine particles on a size- and chemically-specified basis. Such a capability has not yet been demonstrated and documented as a well-defined and accepted source testing methodology. This study is intended to provide such a methodology.

Three methods will be identified which will include the capability of sample collection for subsequent chemical analysis and the capabilities to assess a wide range of particle loadings. Because some of the fine particulate matter in the atmosphere is formed by condensation after cooling of directly emitted vapors, the techniques will include both sampling at stack temperatures and sampling after cooling by dilution air. A review of particle sizing methods and equipment will identify the best available candidate techniques for further evaluation. Calibration calculations will be verified and each method will be evaluated by means of a representative field test. The proposed work statement provides for literature research, engineering evaluation, laboratory calibrations and field testing of the three methods at an industrial site to be selected.