ITEM NO.: 85-6-3(b)2
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 064-10 entitled "Vegetation Process Studies".

RECOMMENDATION: Adopt Resolution 85-18 approving Proposal No. 064-10 for funding in an amount not to exceed $145,478.

SUMMARY: The Kapiloff Acid Deposition Act requires the Air Resources Board to study the potential effects of acid deposition upon forested ecosystems with priority to poorly buffered ecosystems. In addition, the Board is required to assess the impacts, including economic impacts, of acid deposition upon forests and recreational aesthetic resources.

Emerald Lake, which is located in Sequoia National Park, was identified as a representative, poorly buffered watershed and chosen for an intensive ecosystem study supported by the ARB and other cooperating agencies. Emerald Lake occupies a subalpine basin with sparse vegetation and few tree species. Economically important tree species exist in greater abundance at lower elevations in the Sierra Nevada. For this reason, the proponent was funded to study vegetation at both Emerald Lake and the Log Meadow Watersheds in Sequoia National Park during the 1984 growing season. The proposal presented here would continue the research initiated in 1984.

The objectives of the research at both the Emerald Lake and Log Meadow watersheds are to collect baseline information on the above-ground and below-ground productivity of important plant species and the fluxes of nitrogen, sulfur, phosphorus, and aluminum through the vegetation. This information can serve as reference data from which future changes in the watersheds may be compared. The productivity of foliage and timber would be studied because these are the plant parts that are usually economically important, and acid deposition may affect the above-ground plant parts directly. Root productivity would be studied because acid deposition may affect plant growth through changes in soil chemistry and

processes. The amounts of nitrogen, sulfur, phosphorus, and aluminum in the vegetation would be determined and used to estimate the flow of these important elements from the soil, through the plants and into decomposing litter. In addition, the proponent would study the tolerance of white and red fir to aluminum under controlled experiments in growth chambers. This would be important information since aluminum mobility in the soil is increased by increasing acid deposition and since aluminum is known toxic to plants.

State of California
AIR RESOURCES BOARD

Resolution 85-18
April 26, 1985

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

WHEREAS, an unsolicited research proposal, Number 064-10, entitled "Vegetation Process Studies", has been submitted by the University of California, Los Angeles; 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 064-10 entitled "Vegetation Process Studies", submitted by the University of California, Los Angeles for a total amount not to exceed $145,478.

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 064-10 entitled "Vegetation Process Studies", submitted by the University of California, Los Angeles for a total amount not to exceed $145,478.

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 $145,478.

I hereby certify that the above is a true and correct copy of Resolution 85-18, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-19
APRIL 26, 1985

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 065-10, entitled "Integrated Watershed Study: An Investigation of Fish and Amphibian Populations in the Vicinity of the 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 065-10 entitled "Integrated Watershed Study: An Investigation of Fish and Amphibian Populations in the Vicinity of the Emerald Lake Basin, Sequoia National Park", submitted by the University of California, Santa Barbara for a total amount not to exceed $160,781.

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 052-8 entitled "Integrated Watershed Study: An Investigation of Fish and Amphibian Populations in the Vicinity of the Emerald Lake Basin, Sequoia National Park", submitted by the University of California, Santa Barbara, for a total amount not to exceed $160,781.

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 $160,781.

I hereby certify that the above is a true and correct copy of Resolution 85-19, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)3
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 065-10 entitled "Integrated Watershed Study: An Investigation of Fish and Amphibian Populations in The Vicinity of the Emerald Lake Basin, Sequoia National Park".

RECOMMENDATION: Adopt Resolution 85-19 approving Proposal No. 065-10 for funding in an amount not to exceed $160,781.

SUMMARY:

The Kapiloff Acid Deposition Act requires the California Air Resources Board to assess the potential for damage to natural ecosystems of the State due to acid deposition. Since the Sierra Nevada is known to be one of the most sensitive areas to acidic inputs, research to date has focused on the aquatic and terrestrial systems in this region. The objective of the ARB's Integrated Watershed Study (IWS) at Emerald Lake in Sequoia National Park is to perform an in-depth study of a subalpine watershed to determine the sensitivity of the ecosystem to acid deposition and to monitor ecological changes due to acid inputs. One component of the five-year IWS is an extensive, long-term study of fish and amphibian populations in the Basin. These biological populations have been identified as indicator organisms that respond readily to acid stress.

This proposal by the University of California, Santa Barbara will study the life history, feeding and reproductive behavior of fish and amphibian populations in Emerald Lake and associated streams and ponds. Additional fish population studies are proposed for other subalpine lakes in the vicinity of the IWS site for comparison purposes.

The proponents would carry out a two-year study of these populations. Population surveys and in-situ manipulation of the vertebrate populations would be carried out year round to determine changes in age and size structure and reproduction rates. Mark-recapture studies of brook trout would be undertaken throughout the ice-free season to investigate movements of individuals between the lake and streams.

This baseline information on population parameters for fish and amphibians would be evaluated along with chemical and biological data currently being collected in the Emerald Lake Basin. These data bases would aid in the understanding of the relationships between acid levels in lakes and streams of the Sierra Nevada and population changes in naturally reproducing fish and amphibian populations. This project would be integrated with the other IWS studies to provide a long-term data base on biogeochemical processes in a representative subalpine watershed. This data base would be used to identify changes in sensitive ecosystem variables due to acidic inputs.

The original proposal submitted by the University of California at Santa Barbara described a 30-month program to investigate fish and amphibian population sensitivity to acidic deposition. The SAC approved only a 24-month project to include the study of vertebrate populations for two field seasons. The SAC advised Research Division Staff to evaluate the two-year data base at the conclusion of the study and recommend,if necessary, a biological monitoring program to be continued at the IWS site until the completion of the Kapiloff Acid Deposition Research Program.

BUDGET SUMMARY

University of California, Santa Barbara

"Integrated Watershed Study: An Investigation of Fish and Amphibian Populations in the Vicinity of the Emerald Lake Basin, Sequoia National Park"

BUDGET ITEMS:

Salaries	$75,355	
Benefits	30,092	
Supplies	5,105	
Equipment	4,300	
Travel	8,716	
Other Costs	3,270	
TOTAL, Direct Costs		$126,838
TOTAL, Indirect Costs		33,943
TOTAL PROJECT COST		$160,781

State of California
AIR RESOURCES BOARD

Resolution 85-20
April 26, 1985

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 066-10, entitled "The Hydrologic Mass Balance Component of the Emerald Lake Basin, Integrated Watershed Study", has been submitted by the University of California, Los Angeles, and the University of California, Santa Barbara;

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 066-10 entitled "The Hydrologic Mass Balance Component of the Emerald Lake Basin, Integrated Watershed Study ", submitted by the University of California, Los Angeles, and the University of California, Santa Barbara, for a total amount not to exceed $200,570.

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 066-10 entitled "The Hydrologic Mass Balance Component of the Emerald Lake Basin, Integrated Watershed Study", submitted by the University of California, Los Angeles, and the University of California, Santa Barbara, for a total amount not to exceed $200,570.

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 $200,570.

I hereby certify that the above is a true and correct copy of Resolution 85-20, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)4
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 066-10 entitled "The Hydrologic Mass Balance Component of the Emerald Lake Basin, Integrated Watershed Study".

RECOMMENDATION: Adopt Resolution 85-20 approving Proposal No. 066-10 for funding in an amount not to exceed $200,570.

SUMMARY: The Kapiloff Acid Deposition Act requires the California Air Resources Board to conduct research to determine the impacts of acid deposition on natural ecosystems of the state. To satisfy this requirement, the Research Division has initiated the Integrated Watershed Study at Emerald Lake, Sequoia National Park. This program is designed to investigate the ecological processes important in determining the response of a representative Sierra lake to acidic inputs. Parts of the watershed study have already been funded under the Kapiloff Acid Deposition Research Program and field data were collected during the first year of this five-year investigation.

The various research components of the IWS (aquatic systems, terrestrial systems, wet and dry deposition) need to be integrated to allow for an analysis of the effects of acid inputs on the watershed. A study of the hydrology and chemical flows through the watershed would provide this needed integration. Such a study would characterize the mass flow of water and dissolved solutes through the basin.

The unsolicited proposal received from the University of California, Los Angeles and the University of California, Santa Barbara describes a program of field research and modeling that would provide the needed system integration. This two-year research program has two principal objectives: (1) to measure or estimate the magnitude of water flows and storages in the Emerald Lake Basin, and (2) to characterize the chemical composition of those flows and storages to allow for the calculation of a material balance for the watershed. This research program is designed to link together information on chemical flows and cycles collected during the various program components.

Changes in the chemistry of inputs as water flows through the basin will be measured, especially during major storm events. These data are important inputs to an understanding of surface water acidification.

The three general tasks to be performed as part of this project are: (1) measurement and monitoring of hydrology and chemistry, (2) carrying out of field experiments to identify and quantify the important water flow pathways and storages, and (3) modeling of the basin hydrology and material flows to aid in an understanding of surface water acidification.

This study would be useful to the Board by providing a method of integrating data collected by other IWS researchers. An analysis of chemical mass flows through the Basin is essential to an understanding of how acidic atmospheric inputs are chemically altered through the watershed.

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

University of California, Los Angeles
University of California, Santa Barbara

"The Hydrologic Mass Balance Component of the Emerald Lake Basin, Integrated Watershed Study"

BUDGET ITEMS:

Salaries	$101,644	
Benefits	7,777	
Supplies	7,400	
Other Costs	17,350	
Travel	12,750	
Equipment	11,800	
TOTAL, Direct Costs		$158,721
TOTAL, Indirect Costs		41,849
TOTAL PROJECT COST		$200,570

State of California
AIR RESOURCES BOARD

Resolution 85-21
April 26, 1985

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 068-10, entitled "Particulate Monitoring for Acid Deposition Research at Sequoia National Park, California", has been submitted by the University of California, Davis;

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 068-10 entitled "Particulate Monitoring for Acid Deposition Research at Sequoia National Park, California", submitted by the University of California, Davis, for a total amount not to exceed $58,092.

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 068-10 entitled "Particulate Monitoring for Acid Deposition Research at Sequoia National Park, California", submitted by the University of California, Davis for a total amount not to exceed $58,092.

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 $58,092.

I hereby certify that the above is a true and correct copy of Resolution 85-21, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)5
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 068-10 entitled "Particulate Monitoring for Acid Deposition".

RECOMMENDATION: Adopt Resolution 85-21 approving Proposal No. 068-10 for funding in an amount not to exceed $58,092.

SUMMARY: During 1984, five research projects were funded as part of the ARB's Integrated Watershed Study at Emerald Lake in Sequoia National Park. These projects were designed to assess the possible effects of acid deposition upon the watershed. No studies have been funded, however, to measure the atmospheric inputs to the basin. Except for a wet deposition monitor installed in summer 1984 to measure precipitation inputs, monitoring data are limited. Specifically, very little is known about the dry atmospheric inputs. The proposed study is designed to fill this knowledge gap.

The objective of this research project is to measure airborne particle concentrations at ground level during summer months so that dry deposition fluxes can be calculated. Specific objectives are: 1) to characterize the composition of fine particles by measuring concentrations of all elements from hydrogen through lead; 2) to resolve particle size in sufficient detail to make flux calculations possible; 3) to determine how particle concentrations vary with time in response to meteorological changes; and 4) to determine how particle concentrations vary with elevation and thereby estimate the extent of transport from the San Joaquin Valley.

The contractor will sample particles at Ash Mountain (elevation 2000 ft.), Giant Forest (6300 ft.) and Emerald Lake (9200 ft.) from mid-June through mid-October. A combination of samplers (stacked filter units and rotating drum impactors) and analysis methods will be used to maximize information obtained while considering analysis costs and logistics of sampling. The analysis methods will include mass by gravimetric analysis, carbon soot by Laser Integrating

BUDGET SUMMARY

University of California, Davis

"Particulate Monitoring for Acid Deposition Research at Sequoia National Park, California"

BUDGET ITEMS:

Salaries	$ 16,491	
Benefits	2,682	
Supplies	3,000	
Equipment*	8,560	
Travel	1,000	
Other Costs**	12,462	
TOTAL, Direct Costs		$ 44,195
TOTAL, Indirect Costs		13,898
TOTAL PROJECT COST		$ 58,092

* Inludes $5000 for 1 drum sampler and $3000 for two solar powered aerosol impactors

** Includes $9462 for accelerator costs at Crocker Nuclear Laboratory (U.C. Davis) for PIXE analysis.

State of California
AIR RESOURCES BOARD

Resolution 85-22
April 26, 1985

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

WHEREAS, an unsolicited research proposal, to augment Contract A3-104-32, entitled "PROJECT BASIN", has been submitted by the University of California, Los Angeles;

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

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

> An augmentation to Contract A3-104-32, entitled "PROJECT BASIN", submitted by the University of California, Los Angeles for a total amount not to exceed $15,000.

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:

> An augmentation to Contract A3-104-32, entitled "PROJECT BASIN", submitted by the University of California, Los Angeles for a total amount not to exceed $15,000.

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 $15,000.

I hereby certify that the above is a true and correct copy of Resolution 85-22, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)1
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal to augment Contract A3-104-32 entitled "PROJECT BASIN".

RECOMMENDATION: Adopt Resolution 85-22 approving Proposed Augmentation of Contract A3-104-32 for funding in an amount not to exceed $15,000.

SUMMARY: In the first phase of this study researchers from UCLA augmented the existing network of surface-based meteorological stations 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. This major field effort was carried out with direct ARB support and major contributions of funds, equipment and labor from other sponsors, including the South Coast Air Quality Management District. The data collected in this study need to be analyzed to construct three-dimensional fields of wind-flows, temperature and humidity. This analysis will provide needed input to the Board's planned Southern California Air Resources Study and, ultimately, will assist in the development of more reliable 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 85-23
April 26, 1985

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

WHEREAS, an unsolicited research proposal, Number 069-10, entitled "Nitric Acid and Ammonia in Air, Sequoia National Park", has been submitted by the University of South Florida;

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 069-10 entitled "Nitric Acid and Ammonia in Air, Sequoia National Park", submitted by the University of South Florida for a total amount not to exceed $47,036.

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 069-10 entitled "Nitric Acid and Ammonia in Air, Sequoia National Park", submitted by the University of South Florida for a total amount not to exceed $47,036.

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 $47,036.

I hereby certify that the above is a true and correct copy of Resolution 85-23, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)6
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 069-10 entitled "Nitric Acid and Ammonia in Air, Sequoia National Park".

RECOMMENDATION: Adopt Resolution 85-23 approving Proposal No. 069-10 for funding in an amount not to exceed $47,036.

SUMMARY: Although the ARB is currently monitoring acid deposition in precipitation in the Emerald Lake Watershed, very little is known about dry acid deposition. In particular, the magnitude of deposition of gaseous nitric acid and particulate nitrate is unknown. Furthermore, the deposition of neutralizing ammonia compounds has not been studied.

The primary objective of this research project is to estimate dry deposition flux by measuring the concentrations of nitric acid, ammonia, particulate nitrate, and ammonium ion in Sequoia National Park during the summer months of 1985. A secondary objective is to participate in a comparison of nitric acid sampling methodologies in Riverside, California, for one week during the summer of 1985.

The contractor will set up a laboratory at Giant Forest in Sequoia National Park. Samples will be collected and analyzed using an automated sampler on a nearly hourly basis. Two researchers will be stationed at Giant Forest to maintain operations. Concentrations of nitric acid, ammonia, particulate nitrate and ammonium ion will be measured. Samples will also be collected at Emerald Lake and Ash Mountain on a less frequent basis using a portable sampling apparatus, then carried back to Giant Forest for analysis. Calibration and maintenance will be carried out on a regular schedule.

The contractor will participate in a comparison of nitric acid sampling methods in Riverside for one week during the summer. One of the two people stationed at Giant Forest will travel to Riverside to set up a temporary laboratory and collect samples.

State of California
AIR RESOURCES BOARD

Resolution 85-24
April 26, 1985

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

WHEREAS, an unsolicited research proposal, Number 070-10, entitled "Atmospheric Tracer Experiments Aimed at Characterizing Upslope-Downslope Flows", has been submitted by the California Institute of Technology;

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 070-10 entitled "Atmospheric Tracer Experiments Aimed at Characterizing Upslope-Downslope Flow", submitted by the California Institute of Technology for a total amount not to exceed $46,321.

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 070-10 entitled "Atmospheric Tracer Experiments Aimed at Characterizing Upslope-Downslope Flow", submitted by the California Institute of Technology for a total amount not to exceed $46,321.

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 $46,321.

I hereby certify that the above is a true and correct copy of Resolution 85-24, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)7
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 070-10 entitled "Atmospheric Tracer Experiments Aimed at Characterizing Upslope-Downslope Flows".

RECOMMENDATION: Adopt Resolution 85-24 approving Proposal No. 070-10 for funding in an amount not to exceed $46,321.

SUMMARY: The objective of this research proposal is to quantitatively characterize the transport and dispersion of pollutants associated with upslope and downslope flows along the western slopes of the Sierra Nevada. This will be accomplished by tracking a plume of tracer material from the San Joaquin Valley to Emerald Lake.

The contractor will conduct four full scale tracer releases during the summer of 1985. The first two releases will be from the vicinity of Three Rivers. The release points for tests 3 and 4 will be decided following analysis of the initial results and consultation with the ARB. The initial tracer releases will follow the upslope flow during the day, transition and downslope flow during the night, and subsequent upslope flow the following day. The plan for releases 3 and 4 will likely follow this same schedule, but may be altered depending on the results obtained from the initial releases and other factors.

BUDGET SUMMARY

California Institute of Technology, Pasadena

"Atmospheric Tracer Experiments Aimed

at Characterizing Upslope-Downslope Flows"

BUDGET ITEMS:

Salaries	$17,000	
Benefits	2,655	
Supplies*	8,000	
Other Costs	0	
Travel	8,620	
Equipment	2,000	
TOTAL, Direct Costs		$ 38,275
TOTAL, Indirect Costs		16,046
TOTAL PROJECT COST		$ 54,321

* The expenditure of $8,000 would be required to purchase tracer gas, SF_6. The ARB (and not the contractor) would purchase the SF_6 gas directly to avoid overhead charges of $4,240. The actual amount of the contract with Caltech will be $46,321 ($54,321 - $8000).

State of California
AIR RESOURCES BOARD

Resolution 85-25
April 26, 1985

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

WHEREAS, an unsolicited research proposal, Number 071-10, entitled "Transport of Atmospheric Aerosols Above the Sierra Nevada Slopes", has been submitted by the University of California, Davis;

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 071-10 entitled "Transport of Atmospheric Aerosols Above the Sierra Nevada Slopes", submitted by the University of California, Davis for a total amount not to exceed $43,777.

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 071-10 entitled "Transport of Atmospheric Aerosols Above the Sierra Nevada Slopes", submitted by the University of California, Davis for a total amount not to exceed $43,777.

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 $43,777.

I hereby certify that the above is a true and correct copy of Resolution 85-25, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)8
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 071-10 entitled "Transport of Atmospheric Aerosols Above the Sierra Nevada Slopes".

RECOMMENDATION: Adopt Resolution 85-25 approving Proposal No. 071-10 for funding in an amount not to exceed $43,777.

SUMMARY:

The vertical structure of the atmospheric boundary layer is believed to influence strongly the upslope transport of pollutants into the Emerald Lake Basin. A recent study in the Sacramento Region revealed the existence of an elevated transport layer for water vapor. If the same phenomenon exists in the foothills of the Sierra, it could constitute an efficient mechanism for delivering air pollution, including acidic species, to high elevations in relatively undiluted form. The work proposed here would provide a test of this hypothesis and aquantification of pollutant concentrations in Emerald Lake Basin.

The objective of this proposal is to characterize the transport of aerosols in upslope flow from the San Joaquin Valley to high elevations in the Sierra Nevada.

The contractor will perform intensive measurements of boundary layer meteorology and vertical aerosol profiles during two 10-day periods in July and August 1985. In each period, pilot balloons will be released four times each day at Ash Mountain, Giant Forest, and Emerald Lake. Atmospheric stability will be measured at each location as well. At Giant Forest, a tethered balloon will be used to make detailed boundary layer measurements of temperature, humidity, and winds. A second tethered balloon will be used to collect aerosol samples in two size ranges at four levels above the surface. A time lapse camera will visually record the flow of aerosols at Giant Forest.

An instrumented aircraft will be used to provide additional vertical profiles of temperature, humidity, ozone, aerosols in five size ranges, and atmospheric turbulence. The aircraft will be operated on two 2-day periods within the 10-day periods of boundary layer studies. The 2-day periods will be selected to coincide with the tracer releases proposed in Item 7 (Caltech Study).

BUDGET SUMMARY

University of California, Davis

"Transport of Atmospheric Aerosols Above the Sierra Nevada Slopes"

BUDGET ITEMS:

Salaries*	$ 0	
Benefits*	0	
Supplies	4,060	
Other Costs**	13,200	
Travel	13,256	
Equipment	1,500	
TOTAL, Direct Costs		$ 32,016
TOTAL, Indirect Costs		11,761
TOTAL PROJECT COST		$ 43,777

* The principal investigators (Drs. Leonard Myrup and Robert Flocchini) would each provide 1.2 months of effort with no cost to ARB as their salaries are covered by U. C. Davis. Based on their salaries, this constitutes a U. C. Contribution of $9,260.

** Includes $4,800 for PIXE analysis of samples and $6,400 for aircraft operation.

State of California
AIR RESOURCES BOARD

Resolution 85-26
April 26, 1985

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 067-10, entitled "Calibration of Diatom-pH-Alkalinity Methodology for the Interpretation of the Sedimetary Record in Emerald Lake, Integrated Watershed Study", has been submitted by the University of California, Santa Barbara;

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 067-10 entitled "Calibration of Diatom-pH-Alkalinity Methodology for the Interpretation of the Sedimentary Record in Emerald Lake, Integrated Watershed Study", submitted by the University of California, Santa Barbara, for a total amount not to exceed $35,902.

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 067-10 entitled "Calibration of Diatom-pH-Alkalinity Methodology for the Interpretation of the Sedimentary Record in Emerald Lake, Integrated Watershed Study", submitted by the University of California, Santa Barbara, for a total amount not to exceed $35,902.

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 $35,902.

I hereby certify that the above is a true and correct copy of Resolution 85-26, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)9
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 067-10 entitled "Calibration of Diatom-pH-Alkalinity Methodology for the Interpretation of the Sedimentary Record in Emerald Lake, Integrated Watershed Study".

RECOMMENDATION: Adopt Resolution 85-26 approving Proposal No. 067-10 for funding in an amount not to exceed $35,902.

SUMMARY: As part of the Integrated Watershed Study (IWS) at Emerald Lake Basin, Sequoia National Park, the Air Resources Board has funded a study to investigate aquatic chemistry and biology of Emerald Lake and associated streams. One component of this ongoing project is a sediment core study. This study includes the collection of sediment cores from Emerald Lake and the reconstruction of the relative chemical history of the lake by analyzing core sections for diatom (algal cells having siliceous skeletons) remains and assaying ^{210}Pb to date the specimens. The diatom population data collected from the sediment cores can be used as indicators of historical lake pH and, possibly, alkalinity. These data are important in the determination of historical trends in lake pH and alkalinity. Changes in lakewater chemistry due to acidic inputs may be identified using this technique. This work is in progress, under the direction of Dr. Robert Holmes, University of California, Santa Barbara.

The relationship of lakewater chemistry and diatom population assemblages is region specific. Researchers in Canada, Scandinavia and the northeastern United States have developed "reference" sets or "calibration" collections of diatoms from recent sediments that can be correlated with current lake pH in their specific geographic areas. No such reference set relating diatom species and abundance with lakewater pH currently exists for the Sierra Nevada.

This proposal recommends a one-year, 30-lake survey in the alpine and subalpine regions of the Sierra Nevada to fill this reference data gap. The objective of this study is to develop a reference set of indicator diatom assemblages based on samples of water and

recent sediments collected from lakes known to have a range of pH values (pH 5.7-9.4).

This study will include one field season for sample collection. The following tasks will be carried out as part of this proposal:

1) thirty lakes, with a range of pH and alkalinity values, will be selected from among lakes whose water chemistry has already been characterized by J. Melack (Univeristy of California, Santa Barbara);

2) water samples and surface sediment samples will be collected, preserved and analyzed at UCSB and the Sierra Nevada Aquatic Research Laboratory (SNARL). Analyses of these samples will include major anions, cations and diatom species and numbers; and

3) a regression equation will be developed to relate lake pH and alkalinity with diatom assemblages in Sierra lakes. This relationship will be used to interpret data collected as part of the Emerald Lake core study and to assign numerical lake pH values to sequential core sections analyzed for Emerald Lake.

BUDGET SUMMARY

University of California, Santa Barbara

"Calibration of Diatom-pH-Alkalinity Methodology for the Interpretation of the Sedimentary Record in Emerald Lake, Integrated Watershed Study"

BUDGET ITEMS:

Salaries	$18,812		
Benefits	739		
Supplies	2,708		
Other Costs	1,555		
Travel	4,300		
TOTAL, Direct Costs			$ 28,114
TOTAL, Indirect Costs			7,788
		TOTAL PROJECT COST	$ 35,902

State of California
AIR RESOURCES BOARD

Resolution 85-32
April 26, 1985

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

WHEREAS, a solicited research proposal, Number 1294-113, entitled "Particulate Trap Demonstration for Heavy-Duty Diesels", has been submitted by Southwest Research Institute;

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

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

> Proposal Number 1294-113, entitled "Particulate Trap Demonstration for Heavy-Duty Diesels", submitted by Southwest Research Institute for a total amount not to exceed $219,144.

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 1294-113, entitled "Particulate Trap Demonstration for Heavy-Duty Diesels", submitted by Southwest Research Institute for a total amount not to exceed $219,144.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $219,144.

I hereby certify that the above is a true and correct copy of Resolution 85-32, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)11
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1294-113 entitled "Particulate Trap Demonstration for Heavy-Duty Diesels".

RECOMMENDATION: Adopt Resolution 85-32 approving Proposal No. 1294-113 for funding in an amount not to exceed $219,144.

SUMMARY: Heavy-duty diesel vehicles (HDD) are a major source of air pollution in California. The Air Resources Board is pursuing stringent emission standards and, as part of its long-range research plan, is encouraging the adaptation and demonstration of devices to reduce particle emissions from diesels. The Southern California Rapid Transit District (RTD) and Johnson-Matthey, Inc., are currently evaluating a prototype wire mesh catalytic trap oxidizer to be installed on an RTD coach. To broaden our understanding of the capabililites, limitations and relative requirements of different control technologies, the ARB solicited additional participation in a similar demonstration project to design, produce, install, and evaluate self-regenerating traps on one or more test buses.

Two proposals were received in response to the ARB's Request for Proposals. The proposal submitted by SWRI was determined to be the higher rated proposal.

Under its proposal, SWRI would adapt and demonstrate ceramic trap oxidizer on a diesel-powered RTD bus. The technology proposed, a monolithic catalytic ceramic trap oxidizer, is considered to be the most feasible alternative approach to the wire mesh trap. The optional fleet demonstration task included in the RFP would not be undertaken at this time.

Adapting and installing the trap system would cost approximately $159,355. In addition, SWRI would assist the ARB during durability testing at a cost of $59,789. The total project cost is further itemized in the budget summary attached.

This planned study, together with the study of a wire mesh catalytic trap oxidizer that is already underway at Johnson Matthey, should greatly enhance the Board's understanding of the capabilities and limitations of diesel particulate trap technology.

State of California
AIR RESOURCES BOARD

Resolution 85-33
April 26, 1985

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

WHEREAS, a solicited research proposal, Number 1303-114, entitled "Effects of Airborne Particulate Matter", 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 Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1303-114, entitled "Effects of Airborne Particulate Matter", submitted by the University of California, Davis for a total amount not to exceed $269,823.

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 1303-114, entitled "Effects of Airborne Particulate Matter", submitted by the University of California, Davis for a total amount not to exceed $269,823.

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 $269,823.

I hereby certify that the above is a true and correct copy of Resolution 85-33, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)12
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1303-114 entitled "Effects of Airborne Particulate Matter."

RECOMMENDATION: Adopt Resolution 85-33 approving Proposal No. 1303-114 for funding in an amount not to exceed $269,823.

SUMMARY: Much of evidence used for setting the ambient air quality standard that limits community exposure to respirable particulate matter (PM_{10}) for California was obtained from epidemiology studies conducted in London in the 1960's. Direct application of this and other European health effects information to California is difficult because the London atmosphere was dominated by carbon-based particles, SO_2 and cold temperatures. California air, however, has high concentrations of photochemical aerosols, oxidants, and warmer temperatures.

An RFP for work to remedy this difficulty was issued earlier this year. The objectives of this RFP were to: 1) provide more useful interpretation of London data for upcoming reviews of our PM_{10} standard; and 2) initiate research on health effects of California-specific particles.

Four proposals were received in response to the RFP. The Research Screening Committee has recommended for funding a proposal from the University of California, Davis. This project will study groups of healthy rats and rats with an emphysema-like condition exposed to simulated California or London atmospheres. The California-type exposure atmosphere will include a mixture containing nitrates, sulfates, carbon and clay with and without ozone. The London-type atmosphere will be composed of coal flyash, carbon and ammonium sulfate particles with and without SO_2. The animals will be exposed for three days (acute) or 30 days (subchronic). Following exposure, the lungs of the animals will be tested for: inflammation, adverse cellular changes and alterations in their ability to clear themselves of particles. Various blood and protein changes which could be used as markers of exposure in humans will also be measured.

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

University California, Davis

"Effects of Airborne Paticulate Matter"

BUDGET ITEMS:

Salaries	$181,857	
Equipment	2,550*	
Materials/Supplies	43,690	
Travel	-	
TOTAL, Direct Costs		$228,097
TOTAL, Indirect Costs**		$ 41,726
TOTAL PROJECT COSTS		$269,823

* Two particle-counter printers at $1,275.

** Includes material and labor overhead and general and administrative expenses.

State of California
AIR RESOURCES BOARD

Resolution 85-34
April 26, 1985

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

WHEREAS, an unsolicited research proposal, Number 1300-113, entitled "Determination of the Effects of Photochemical Oxidants and/or SO_2 on Yield of Valencia Oranges", has been submitted by the University of California, Riverside;

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 1300-113, entitled "Determination of the Effects of Photochemical Oxidants and/or SO_2 on Yield of Valencia Oranges", submitted by the University of California, Riverside for a total amount not to exceed $125,850.

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 1300-113, entitled "Determination of the Effects of Photochemical Oxidants and/or SO_2 on Yield of Valencia Oranges", submitted by the University of California, Riverside for a total amount not to exceed $125,850.

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 $125,850.

I hereby certify that the above is a true and correct copy of Resolution 85-34, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)13
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1300-113 entitled "Determination of the Effects of Photochemical Oxidants and/or SO_2 on Yield of Valencia Oranges".

RECOMMENDATION: Adopt Resolution 85-34 approving Proposal No. 1300-113 for funding in an amount not to exceed $125,850.

SUMMARY: This proposal seeks funding for the continuation of the study of the effects of ambient oxidants and sulfur dioxide on the yield of oranges, a study which was begun under an earlier ARB contract. This will be the third year of the planned three-year study. The project will continue to use five experimental treatments in which Valencia orange trees will be exposed to ambient air, filtered air and sulfur dioxide in different combinations. The investigator will measure the effects of the air pollutant treatments on the trees including yield, growth, and several physiological variables such as photosynthesis and gas exchange by leaf surfaces.

The investigators will collect and analyze data for two harvests, the first in 1985 and the second in 1986. The results will permit the investigators to evaluate the possible carryover of pollution effects from one year to the next.

Oranges are among California's most important fruit crops. This is the first study of the effects of air pollution on oranges to be carried out using open top field chambers. It will provide valuable information on the potential for damage to this important fruit crop by air pollution. This will be especially useful to the Board's program in crop loss assessment.

BUDGET SUMMARY

University of California, Riverside

"Determination of the Effects of Photochemical Oxidants and/or SO_2 on Yield of Valencia Oranges"

BUDGET ITEMS:

Salaries	$51,202	
Benefits	9,361	
Equipment	9,241*	
Supplies	17,450	
Other Costs	3,535	
Travel	1,448	
TOTAL, Direct Costs		$ 92,237
TOTAL, Indirect Costs		33,613
TOTAL PROJECT COST		$125,850

* Major Equipment Detail:

Fence	$4,556
Apple IIe Computer	$1,293
Data Logger	$3,392

State of California
AIR RESOURCES BOARD

Resolution 85-35
April 26, 1985

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

WHEREAS, an unsolicited research proposal, Number 1311-115, entitled "Evaluation of the Health Effects of Air Pollution in Asthmatics by a Novel Application of Analysis Methods", has been submitted by the University of California, Los Angeles;

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

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

> Proposal Number 1311-115, entitled "Evaluation of the Health Effects of Air Pollution in Asthmatics by a Novel Application of Analysis Methods", submitted by the University of California, Los Angeles for a total amount not to exceed $39,260.

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 1311-115, entitled "Evaluation of the Health Effects of Air Pollution in Asthmatics by a Novel Application of Analysis Methods", submitted by the University of California, Los Angeles for a total amount not to exceed $39,260.

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 $39,260.

I hereby certify that the above is a true and correct copy of Resolution 85-35, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-6-3(b)14
DATE: April 26, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1311-115 entitled "Evaluation of the Health Effects of Air Pollution in Asthmatics by a Novel Application of Analysis Methods".

RECOMMENDATION: Adopt Resolution 85-35 approving Proposal No. 1311-115 for funding in an amount not to exceed $39,260.

SUMMARY: This proposal is for further statistical analysis of a large and comprehensive set of daily data on pollutant concentrations, meteorology, and asthmatic response collected in Glendora, a high-oxidant area of Los Angeles County. These data are potentially more informative than other similar epidemiological data sets because the sample size is larger, the period of collection longer, and the information on asthmatic response and confounding variables more complete. Description and analysis by standard statistical methods have yielded encouraging results. The complexity of the data set and of the relationships being studied require the application of statistical methods not previously used for this sort of data.

The proposed analysis will potentially yield a clearer understanding of the relationship between concentrations of pollutants in the complex mixtures characteristic of urban atmospheres and asthmatic responses. This information will be useful to the Board in future assessments of effects of both gaseous and particulate pollutants.