State of California
AIR RESOURCES BOARD

Resolution 84-8
March 23, 1984

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

WHEREAS, a solicited research Proposal Number 017-3 entitled, "Chemical and Biological Survey of Lakes and Streams Located in Emerald Lake Watershed (Sequoia National Park) of the Sierra Nevada", 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 017-3 entitled "Chemical and Biological Survey of Lakes and Streams Located in Emerald Lake Watershed (Sequoia National Park) of the Sierra Nevada", submitted by the University of California, Santa Barbara for a total amount not to exceed $426,913.

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 017-3 entitled "Chemical and Biological Survey of Lakes and Streams Located in Emerald Lake Watershed (Sequoia National Park) of the Sierra Nevada", submitted by the University of California, Santa Barbara for a total amount not to exceed $426,913.

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 $426,913.

I certify that the above is a true and correct copy of Resolution 84-8 as passed by the Air Resources Board.

Harold Holmes
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 84-5-2b1
DATE: March 23, 1984

ITEM: Research Proposal No. 017-3 entitled, "Chemical and Biological Survey of Lakes and Streams Located in Emerald Lake Watershed (Sequoia National Park) of the Sierra Nevada".

RECOMMENDATION: Adopt Resolution 84-8 approving Research Proposal No. 017-3 for funding in an amount not to exceed $426,913.

SUMMARY: In parts of the world known to be affected by acid deposition, lakes and streams located at high altitudes have been the first to exhibit adverse changes due to acidic inputs. Weakly buffered lakes and streams located in granite basins have been found to be the most sensitive. Such alpine ecosystems are characteristic of the Sierra Nevada in California. However, currently available data are not adequate to assess reliably the present or future potential for acid deposition damage to natural ecosystems in the State.

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 acid deposition. The Board is also responsible for assessing present or future impacts due to acidic inputs to natural ecosystems in the State.

A Request for Proposals was issued to solicit proposals to study intensively, through an integrated series of studies, one watershed in the Sierra Nevada. The Research Division received six proposals to survey the chemistry and biology of lakes and streams in a selected watershed.

The proponent selected by the Board's Scientific Advisory Committee has been active in lake and stream research in the mountainous regions located on the western slope of the Sierra Nevada. This research, much of it performed in Sequoia National Park, has provided evidence of the sensitivity of aquatic systems in this region.

A much more comprehensive program of research into the chemistry and biology of such high-elevation lakes and streams is needed for two reasons: (1) to provide baseline data on ecosytem processes and biological populations in sensitive aquatic systems of the Sierra Nevada, and (2) to identify any changes that may now be occurring in these systems due to acid deposition.

The general approach taken by the proponent to meet these objectives will be: to collect physical, chemical and biological baseline information on lakes and streams in Emerald Lake Basin in Sequoia National Park, to investigate biogeochemical processes at work in these aquatic systems and to evaluate the stress to these aquatic systems in an attempt to determine if acid deposition induced changes are already occurring.

The proponent has proposed a thirty-month program which can be divided into two parts: (1) basic measurements and (2) an expanded program of data collection and *in situ* experimental work. This work will complement and be coordinated with work being performed by the National Park Service at the same site. 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.

The basic measurement program will include regular sampling of lakes and streams to determine the hydrology, chemistry and biology of these systems. Aquatic processes including primary productivity, nitrogen cycling and sediment/water column exchange, will be investigated on-site. Biological populations will be monitored and compared with other similar lakes and streams in the area. The expanded research program will include a study of lake sediment cores to determine historical chemical trends in the lake.

In situ acidification of enclosed bags in the lake and artificial stream channels will be performed to assess biological and chemical changes that might occur following surface water acidification. This program will be coordinated with other components of the integrated watershed study. The data will be used to formulate a hydrological and biogeochemical model of sensitive aquatic systems applicable throughout the Sierra Nevada.

State of California
AIR RESOURCES BOARD

Resolution 84-9
March 23, 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 Section 39903;

WHEREAS, a solicited research Proposal Number 014-3 entitled, "Vegetation Process Studies", 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 Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

Proposal Number 014-3 entitled "Vegetation Process Studies", submitted by the University of California, Los Angeles for a total amount not to exceed $99,191.

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 017-3 entitled "Vegetation Process Studies", submitted by the University of California, Los Angeles for a total amount not to exceed $99,191.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $99,191.

I certify that the above is a true and correct copy of Resolution 84-9 as passed by the Air Resources Board.

Harold Holmes
Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 84-5-2b2
DATE: March 23, 1984

ITEM: Research Proposal No. 014-3 entitled, "Vegetation Process Studies".

RECOMMENDATION: Adopt Resolution 84-9 approving Research Proposal No. 014-3 for funding in an amount not to exceed $99,191.

SUMMARY: Damage from acid precipitation to aquatic ecosystems in Sweden and the northeastern U.S. has been documented. Because the effects of acid deposition on vegetation are not yet fully understood, it is not known whether such damage may occur in California.

The Kapiloff Acid Deposition Act requires the Air Resources Board to establish a comprehensive research program, including acid deposition studies on forest ecosystems with priority given to poorly buffered soil systems. A Request for Proposals was issued to solicit proposals to study intensively, through an integrated series of studies, one watershed in the Sierra Nevada. The Research Division received five proposals to study the vegetation of the watershed. The total funding requested by all proponents was $504,198.

The proponent selected by the Board's Scientific Advisory Committee will collect and analyze existing vegetation surveys of Emerald Lake (9000 feet elevation) and Log Meadow (6000 feet elevation) in Sequoia National Park, which is the watershed study site selected by the Board's Scientific Advisory Committee. Data summaries from this research project will include mapped stand data of tree populations, identification of understory plants and species diversity of all groups of vascular plants.

Lichens are known to be sensitive to air pollution. Therefore lichen frequency and quantity of species will be determined. Lichens will also be analyzed for concentrations of toxic trace elements.

Tree-ring cores from lodgepole pine and western pine at Emerald Lake will be divided into 10 year increments and analyzed for concentrations of aluminum, cadmium, lead, copper, iron, manganese, zinc and titanium. This will determine if toxic trace elements have accumulated in trees over time.

The proponent will also estimate the biomass and production of above-ground parts of giant sequoia, red fir, white fir, sugar pine and California black oak. An estimate of below-grand root production will also be made.

An analysis of mortality data for white fir, red fir, giant sequoia and ponderosa-Jeffery pine hybrids will be done.

The information from this study, together with the other components of the Board's Integrated Watershed Study, will provide baseline data on an ecosystem sensitive to acid deposition that can be compared with similar data taken in the future so that trends in plant populations can be identified and followed. The information may also be used to detect possible changes in plant populations that are related to acid deposition.