

State of California
AIR RESOURCES BOARD

Resolution 02-5

February 21, 2002

Agenda Item No.: 02-1-6

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 research proposal, number 2504-223, entitled "Keeping Tahoe Blue through Ambient Air Quality Modeling: Aircraft and Boat Measurements of Air Quality and Meteorology Over Lake Tahoe", 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 2504-223 entitled "Keeping Tahoe Blue through Ambient Air Quality Modeling: Aircraft and Boat Measurements of Air Quality and Meteorology Over Lake Tahoe", submitted by the University of California, Davis, for a total amount not to exceed \$133,382.

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 2504-223 entitled "Keeping Tahoe Blue through Ambient Air Quality Modeling: Aircraft and Boat Measurements of Air Quality and Meteorology Over Lake Tahoe", submitted by the University of California, Davis, for a total amount not to exceed \$133,382.

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, and as described in Attachment A, in an amount not to exceed \$133,382.

I hereby certify that the above is a true and correct copy of Resolution 02-5, as adopted by the Air Resources Board.



Marie Kavan, Clerk of the Board

ATTACHMENT A

“Keeping Tahoe Blue through Ambient Air Quality Modeling: Aircraft and Research Vessel Measurements of Air Quality and Meteorology Over Lake Tahoe”

Background

Nutrient loading is believed responsible for loss of clarity in Lake Tahoe. Enrichment of nitrogen and phosphorus in Lake Tahoe has been observed and some researchers have attributed a significant portion of that enrichment to atmospheric sources. However, the estimates of atmospheric (and some non-atmospheric) contributions are uncertain. Better quantification is required to understand what actions would be effective for reducing nitrogen enrichment of the Lake. Through dry and wet deposition, atmospheric nitrogen oxides including NO_x , nitric acid and organic nitrates may contribute to increases in the nitrogen available as a nutrient in the Lake. Sources of atmospheric nitrogen oxides may include direct emissions within the Basin from vehicles and home wood burning as well as natural sources and emissions from combustion, bacterial modification of fertilizers and natural bacterial emissions from the Sacramento Valley and the Bay Area that are transported to the Tahoe Basin. To understand this type of enrichment, the Board's staff will conduct modeling of Lake Tahoe air quality. This proposal will provide input and validation databases for these modeling exercises by developing and delivering vertical profiles of meteorological parameters and ambient concentrations.

Objective

This project's objectives are to obtain, during spring, summer and fall,:

- 1) Vertical profiles of wind, relative humidity, and temperature over Lake Tahoe to determine proper wind characteristics for deposition estimation,
- 2) Vertical profiles of nitric acid and ammonia,
- 3) Vertical profiles of concentrations of aerosols bigger than $0.3\mu\text{m}$ and bigger than $3\mu\text{m}$ in equivalent optical diameter,
- 4) Vertical profiles of ozone, NO , and NO_y

This project's objective during winter is to collect an equivalent suite of measurements onboard a research vessel.

UC Davis may also perform transactions across the Lake when the on-board measurements would indicate high concentrations or on their way to the proper altitude for spirals.

Methods

UC Davis will use a dedicated aircraft during three seasons and a research vessel during the winter. The investigators will measure wind and relative humidity, aerosol concentrations (channel 1 measures particles bigger than $0.3\mu\text{m}$ and channel 2 bigger than $3\mu\text{m}$ in equivalent optical diameter), and concentrations of ozone, NO , NO_y , (~ 1 ppbv detection limits). Gas phase ammonia, nitric acid, particulate phosphorous nitrate and ammonium will be collected through an annular denuder-filter system. In spring,

summer and fall, these instruments will be flown on board a Cessna airplane flown over and across Lake Tahoe. In winter, these instruments will be installed in a research vessel, which will make dedicated cruises on the Lake.

Expected Results

The contractor will supply vertical profiles of meteorological and air quality parameters. These will be analyzed to show the degree of mixing of concentrations aloft and near Lake level. This information on thermal stratification and vertical mixing will be important to assessing when and to what degree upwind concentrations and local emissions will impact concentrations at Lake level. These observations and information will be used in the air quality analysis and modeling efforts to assess the relative importance of local and upwind sources to the deposition of nitrogen and phosphorus to the Lake Tahoe Basin.

Significance to the Board

Analyses and modeling of the air quality and deposition in the Lake Tahoe area will rely on the meteorological and air quality data supplied by this contractor. The analyses and modeling of air quality and deposition at Lake Tahoe is expected to characterize any enrichment from the atmosphere to the Lake and evaluate required control measures to reduce that enrichment.

Contractor:

University of California, Davis

Contract Period:

27 months

Principal Investigators:

John J. Carroll and Cort Anastasio

Contract Amount:

\$133,382

Cofunding:

This research at Lake Tahoe is to be funded by the California Air Resources Board. However, it is part of a larger cooperative research effort that includes funding of various aspects by the California State Water Quality Control Board, U. S. EPA, Tahoe Regional Planning Agency (TRPA), and the U. S. Forest Service.

Basis for Indirect Cost Rate:

The State and UC System have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigators:

The Principal Investigators and the UCD aircraft group successfully contributed to a number of air quality studies including SCOS 97-NARSTO and CCOS 2000 with the

BUDGET SUMMARY

University of California, Davis

Keeping Tahoe Blue through Ambient Air Quality Modeling: Aircraft and Boat
Measurements of Air Quality and Meteorology Over Lake Tahoe

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$ 66,327
2.	Subcontractors	\$
3.	Equipment	\$
4.	Travel and Subsistence	\$ 9,580
5.	Electronic Data Processing	\$ 450
6.	Reproduction/Publication	\$ 400
7.	Mail and Phone	\$ 1,190
8.	Supplies	\$ 900
9.	Analyses	\$
10.	Miscellaneous	<u>\$ 33,500¹</u>

Total Direct Costs \$ 112,347

INDIRECT COSTS

1.	Overhead	\$ 11,235
2.	General and Administrative Expenses	\$
3.	Other Indirect Costs	\$ 9,800
4.	Fee or Profit	<u>\$</u>

Total Indirect Costs \$ 21,035

TOTAL PROJECT COSTS

\$ 133,382

¹ The miscellaneous cost (of \$33,500) consists entirely of charges for use of a research aircraft (150 hours at \$200 per hour) and research vessel John LeConte (35 hours at \$100 per hour). These rates are based on operating costs including fuel, maintenance and insurance. Both are integral to the proposal.