PROPOSED

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 09-57

December 9, 2009

Agenda Item No.: 09-10-1

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 38700 through 39705;

WHEREAS, a research proposal, number 2684-265, entitled "Determination of the Spatial Distribution of Ozone Precursor and Greenhouse Gas Concentrations and Emissions in the LA-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:

> Proposal Number 2684-265 entitled "Determination of the Spatial Distribution of Ozone Precursor and Greenhouse Gas Concentrations and Emissions in the LA-Basin," submitted by the University of California, Los Angeles, for a total amount not to exceed $299,968.

NOW, THEREFORE, BE IT RESOLVED that the Air Resources Board, pursuant to the authority granted by Health and Safety Code section 38500, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 2684-265 entitled "Determination of the Spatial Distribution of Ozone Precursor and Greenhouse Gas Concentrations and Emissions in the LA-Basin," submitted by the University of California, Los Angeles, for a total amount not to exceed $299,968.

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 $299,968.

ATTACHMENT A

"Determination of the Spatial Distribution of Ozone Precursor and Greenhouse Gas Concentrations and Emissions in the LA-Basin"

Background

Assembly Bill 32 (AB 32), which requires a reduction in emissions of greenhouse gases (GHG) in California to 1990 levels by 2020, presents a challenge to the existing observational network. The current network was designed to monitor air pollutants at ground level with the aim of estimating human exposures. New technologies are required for long-term monitoring of spatial concentrations and emissions of GHGs. The proposed research will develop novel remote sensing methods to map out three dimensional concentrations of trace gases and, combined with new inverse modeling techniques, to monitor emissions of air pollutants and GHGs in the South Coast Air Basin (SoCAB).

Objective

The primary objective of the proposed research is to develop remote sensing methods to measure three-dimensional concentrations of nitrogen dioxide (NO_2), formaldehyde (HCHO), glyoxal, sulfur dioxide (SO_2), dimer of oxygen (O_4), aerosol extinction, as well as GHGs carbon monoxide (CO), carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) over the SoCAB. Combined with new inverse modeling methods, these long-term measurements will form the basis for a better spatio-temporal description of air pollutants and GHGs in the SoCAB.

Methods

The proposed research is based on remote sensing of the SoCAB by two different spectrometers from a site on Mt. Wilson overlooking the basin (NASA's Jet Propulsion Laboratory's California Laboratory for Atmospheric Remotes Sensing site). Observations will be integrated with new inverse modeling techniques that resolve trace gas and aerosol concentration fields and emissions.

A UV-vis MAX-DOAS instrument, which has been used by the PI in several previous field studies, will measure scattered solar radiation from different viewing directions (upward and downward towards the basin). These measurements in combination with radiative transfer calculations will allow determination of vertical profile concentrations of NO_2, HCHO, glyoxal, SO_2, O_4, and aerosol extinction. The MAX-DOAS will be operated automatically every day from sunrise to sunset; these measurements will be supplemented by pictures of the atmosphere taken by a CCD camera.

A high-resolution near-IR Fourier Transform Spectroscopy (FTS) instrument, which has recently been constructed, will measure absorption paths CO, and GHGs CO_2, CH_4, and N_2O in the near infrared and visible spectrum. As for the MAX-DOAS, the near-IR FTS will scan the basin, but in a 5X5 grid.

Expected Results
The proposed research will develop new remote sensing methods on a unique observational platform - Mt. Wilson - to measure three-dimensional concentrations and emissions of air pollutants and GHGs in the SoCAB. These observations will help improve the GHG emission inventory and greatly expand the range of possible monitoring stations.

Significance to the Board
The product will be a unique spatio-temporal description of concentrations and emissions within the SoCAB. This data will help support and improve the GHG emission inventory for AB 32 and lay the foundation for a next generation air quality monitoring network.

Contractor:
University of California, Los Angeles (UCLA)

Contract Period:
36 months

Principal Investigator (PI):
Professor Jochen Stutz

Contract Amount:
$299,968

Cofunding:
The proposed project is an ARB contribution to CalNex 2010, which is a collaborative study with the National Oceanic and Atmospheric Administration (NOAA) to address scientific questions which bear upon the ability to formulate policy related to mitigation of air pollution and climate change. NOAA is contributing resources and direct funding to CalNex conservatively estimated at $15,000,000. The NOAA contributions include a dedicated research vessel and multiple research aircraft, ground support, planning, and direct funding of contracted measurements.

Basis for Indirect Cost Rate:
The State and the UC system have agreed to a ten percent indirect cost rate.

Past Experience with this Principal Investigator:
Staff had very good interactions with the PI, Professor Jochen Stutz, on an ARB-funded project that was recently completed (05-307 titled, "Impact of Reactive Halogen Species on the Air Quality in California Coastal Areas"). In this work, the PI successfully completed all proposed tasks and wrote a detailed final report synthesizing data from several groups. In addition, Professor Jochen Stutz has carried out many field studies using remote measurements and has made significant contributions to differential optical absorption spectroscopy. For example, the PI is coauthor of a book on

differential optical spectroscopy, *Differential Optical Absorption Spectroscopy: Principles and Applications.*

Prior Research Division Funding to UCLA:

Year	2008	2007	2006
Funding	$70,347	$616,171	$348,990

BUDGET SUMMARY

Contractor: University of California, Los Angeles

Determination of the Spatial Distribution of Ozone Precursor and Greenhouse Gas Concentrations and Emissions in the LA-Basin

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 252,156	
2.	Subcontractors	$ 0	
3.	Equipment	$ 0	
4.	Travel and Subsistence	$ 3,000	
5.	Electronic Data Processing	$ 0	
6.	Reproduction/Publication	$ 4,300	
7.	Mail and Phone	$ 300	
8.	Supplies	$ 3,942	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 9,000	
	Total Direct Costs		$ 272,698
INDIRECT COSTS			
1.	Overhead	$ 27,270	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$ 27,270
TOTAL PROJECT COSTS			**$ 299,968**