State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 06-36

November 16, 2006

Agenda Item No.: 06-10-2

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 2615-253, entitled "Impact of Climate Change on the Frequency and Intensity of Low-Level Temperature Inversions in California," has been submitted by the University of California, San Diego;

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

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

> Proposal number 2615-253, entitled "Impact of Climate Change on the Frequency and Intensity of Low-Level Temperature Inversions in California," has been submitted by the University of California, San Diego, for a total amount not to exceed $249,989.

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 2615-253, entitled "Impact of Climate Change on the Frequency and Intensity of Low-Level Temperature Inversions in California," has been submitted by the University of California, San Diego, for a total amount not to exceed $249,989.

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 $249,989.

I hereby certify that the above is a true and correct copy of Resolution 06-36, as adopted by the Air Resources Board.

Lori Andreoni

Lori Andreoni, Clerk of the Board

ATTACHMENT A

"Impact of Climate Change on the Frequency and Intensity of Low-Level Temperature Inversions in California"

Background

Concentration of several of the key air pollutants (ozone, secondary particulate matter) depend strongly upon the vertical gradient of temperature (e.g. inversion strength) in the lower atmosphere. Low-level atmospheric temperature inversions (where temperature increases with height) inhibit vertical movement of air and can thereby increase the concentrations of pollutants near the ground. As the climate and regional circulation patterns change, the frequency and intensity of low-level temperature inversions will be impacted in an unknown manner. A better understanding of future changes in the temperature structure and other meteorological parameters is crucial to preparing for regional air quality plans in California over the next several decades.

Objective

The objective of this research proposal is to better understand how the frequency and intensity of low-level temperature inversions have varied historically, and how these characteristics might vary or change in California in a changing climate. Particular emphasis will be placed upon the San Joaquin and South Coast air basins.

Methods

The proposed research study is divided into two parts, to be conducted over a two year study period. Part I includes an investigation of historical occurrence, variability, and regional-large scale causal factors of low level inversions in California, with focus on the San Joaquin and South Coast air basins. The properties of low-level temperature inversions obtained from coarse resolution global model simulations can vary from observations. Additionally, other atmospheric variables (e.g. temperature, humidity, winds, frequency of frontal passage, etc.) can also strongly influence the concentration of pollutants. As a result, in addition to examining low-level temperature inversions, this study will also analyze the present-day and projected future properties of other atmospheric variables that influence pollutant concentrations.

Part II is an investigation of the occurrence, and in particular, changes in frequency and intensity, of conditions conducive to low level inversions in the next 100 years, from a set of 4 climate change model simulations. Climate linkages to the San Joaquin and the South Coast air basins will both be considered to assess possible effects of climate change on the two basins during the next century.

Expected Results

At the conclusion of the research project, a final report will be prepared describing data, model simulations, analyses and results. Journal article preparation will be taken up as soon as results emerge, with manuscript(s) submitted to professional journals that target the air quality and the applied climate community.

Significance to the Board
Based upon recent studies over a variety of global climate models and greenhouse gas emissions scenarios, potential warming over California during the 21st Century would range from about 2°C to 5°C (i.e.,+3.6°F to about +9.0°F change of temperature in 2100 relative to recent 1961-1990 historical climatology). Because the magnitude of these changes may rival or exceed the magnitude of natural year-to-year climate variability in California, these changes could have significant consequences on the production and buildup of air pollutants in California's air basins. Thus, a better understanding of future changes in the temperature structure and other meteorological parameters is crucial to preparing for regional air quality plans in California over the next several decades.

Contractor:
University of California, San Diego

Contract Period:
24 months

Principal Investigator (PI):
Dr. Daniel R. Cayan

Contract Amount:
$249,989

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:
Dr. Cayan is lead scientist in the California Applications Program, and the California Climate Change Center, climate research programs to improve climate information and forecasts for decision makers in the California region. Dr. Cayan has worked with the California Energy Commission (CEC) on several climate change research projects and produced excellent products. He and his team have recently participated in an ARB's climate change research project and performed the statistical downscaling of global climate model results. Dr. Cayan had separate funding from the CEC; however, he supported ARB's investigators extensively without any funding requirement for several months.

Prior Research Division Funding to UCSD:

Year	2005	2004	2003
Funding	$0	$678,671	$75,000

BUDGET SUMMARY

University of California, San Diego

Impact of Climate Change on the Frequency and Intensity of Low-Level Temperature Inversions in California

DIRECT COSTS AND BENEFITS			
1.	Labor and Employee Fringe Benefits	$ 196,462	
2.	Subcontractors	$ 0	
3.	Equipment	$ 10,500	
4.	Travel and Subsistence	$ 6,384	
5.	Electronic Data Processing	$ 5,316	
6.	Reproduction/Publication	$ 5,000	
7.	Mail and Phone	$ 2,425	
8.	Supplies	$ 2,130	
9.	Analyses	$ 0	
10.	Miscellaneous	$ 0	
	Total Direct Costs		$228,217
INDIRECT COSTS			
1.	Overhead	$ 21,772	
2.	General and Administrative Expenses	$ 0	
3.	Other Indirect Costs	$ 0	
4.	Fee or Profit	$ 0	
	Total Indirect Costs		$21,772
TOTAL PROJECT COSTS			**$249,989**