State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 10-9

February 25, 2010

Agenda Item No.: 10-2-1

WHEREAS, the Air Resources Board (ARB or 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 2690-266, entitled "Are there any counteracting effects that reduce the global warming benefits attributed to diesel and other black carbon controls?" has been submitted by the University of California, San Diego (UC San Diego);

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

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

> Proposal Number 2690-266, entitled "Are there any counteracting effects that reduce the global warming benefits attributed to diesel and other black carbon controls?" has been submitted by UC San Diego, for a total amount not to exceed $114,751.

NOW, THEREFORE, BE IT RESOLVED that ARB, pursuant to the authority granted by Health and Safety Code section 39703, hereby accepts the recommendation of RSC and approves the following:

> Proposal Number 2690-266, entitled "Are there any counteracting effects that reduce the global warming benefits attributed to diesel and other black carbon controls?" has been submitted by UC San Diego, for a total amount not to exceed $114,751.

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 $114,751.

I hereby certify that the above is a true and correct copy of Resolution 10-9, as adopted by the Air Resources Board.

Sandra Bannerman, Clerk of the Board

ATTACHMENT A

Are there any counteracting effects that reduce the global warming benefits attributed to diesel and other black carbon controls?

Background
Atmospheric aerosols play an important role in the global climate system by modifying the global radiation budget: directly, by scattering and absorbing radiation; and indirectly, by modifying cloud properties. Black carbon (BC) is a major component of aerosol particles that is generally emitted by combustion sources such as automobile exhaust and biomass burning. Unlike the greenhouse gases, BC has a short atmospheric lifetime resulting in a strong correlation to regional emission sources. BC is the main light-absorbing component of atmospheric aerosols and has been associated with regional climate change by its contribution to global warming and its suppression of precipitation. The mitigation of BC climate change effects by emission controls has been proposed as a viable policy. This project will provide useful new measurements and analysis of immediate value for understanding the pathways by which BC affects climate change, and will serve to better inform policy-making on the regulation of BC emissions.

Objective
The objective of this proposed study is to separate the direct and indirect effects of BC on radiative forcing of the Earth's atmosphere by a comparison of a detailed chemical-microphysical model to the parameterizations embedded in global model simulations.

Methods
Chemically-resolved aerosol measurements collected in California, such as single particle data analyses (aerosol time-of-flight mass spectrometer and scanning transmission X-ray microscopy), will be compiled and analyzed. All available chemical measurements will be used to identify the chemical and physical properties of the aerosol for water uptake and light absorption. The observational data will be directly used as input in an aerosol-cloud parcel model to determine the indirect radiative effect due to BC, and to characterize BC mixing with other aerosol components. The impact of BC control will be predicted by repeating the case studies using a 50 percent and 90 percent reduction in total BC mass and number concentrations. The differences between the results of the baseline case and studies with reduced BC will be used to establish the role of BC in cloud droplet distributions, and to assess the future impact of BC controls. This research project will also include meaningful contributions from three consultants as part of this project.

Expected Results
The fundamental understandings of the BC indirect effects are important, as they may giver rise to radiative forcings that offset the warming effects due to BC aerosols. This research proposal will provide an assessment of the relative importance of the indirect and direct forcing on California's climate due to the aerosol effects of BC. At the

conclusion of the research project, a final report will be prepared describing data, model simulations, analyses and results.

Significance to the Board
The atmospheric lifetimes of BC aerosols are of the order of one week, much shorter than most greenhouse gases that have atmospheric lifetimes of several years or decades; and BC aerosols are not well-mixed in the atmosphere, but are geographically and temporally correlated to emission sources. Reducing BC emissions is therefore a viable control strategy for climate change that is expected to have an immediate and regional impact. Policy makers and air quality regulators need to be fully informed of the magnitude and importance of the BC radiative impacts, and the subsequent climate response, in their decision-making of control strategies to mitigate the climate effects of BC emissions.

Contractor:
Scripps Institution of Oceanography,
University of California, San Diego

Contract Period:
18 months

Principal Investigator (PI):
Professor Lynn Russell

Contract Amount:
$114,751

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:
Professor Russell will serve as the principal investigator coordinating and synthesizing the effort for the overall project. Her 15+ years of experience in aerosol science and strong publication record make her ideal to fulfill this role.

Prior Research Division Funding to UC San Diego:

Year	2008	2007	2006
Funding	$591,261	$194,304	$174,998

BUDGET SUMMARY

Contractor: Scripps Institution of Oceanography, University of California, San Diego

Are there any counteracting effects that reduce the global warming benefits attributed to diesel and other black carbon controls?

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	80,197	
2.	Subcontractors	$	20,000[1]	
3.	Equipment	$	0	
4.	Travel and Subsistence	$	2,500	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Publication	$	0	
7.	Mail and Phone	$	972	
8.	Supplies	$	650	
9.	Analyses	$	0	
10.	Miscellaneous	$	0	
	Total Direct Costs			$104,319
INDIRECT COSTS				
1.	Overhead	$	10,432	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$10,432
TOTAL PROJECT COSTS				**$114,751**

[1] Cost justification for subcontractors: Professor John Seinfeld consulting rate is $300/hr working for 33-1/3 hours for this project, and Professor Mark Jacobson consulting rate is $250/hr working for 40 hours for this project. They will perform the following tasks: Discussion of research objectives and research approaches; discussion of climate effects and treatment in global models; discussion of black carbon emissions inventory and inherent uncertainties; providing copies of current research to PI on this topic; participate in periodic conference calls and meetings at Scripps to review progress on the project; and review of progress reports and manuscripts prepared by the PI.