PROPOSED

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 09-60

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 climate change, pursuant to Health and Safety Code sections 38700 through 38705;

WHEREAS, a research proposal, number 2683-265, entitled "Determining NO_X Emissions from Soil in California Cropping Systems to Improve Ozone Modeling," 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 2683-265, entitled "Determining NO_X Emissions from Soil in California Cropping Systems to Improve Ozone Modeling," has been submitted by the University of California, Davis for a total amount not to exceed $83,500.

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 2683-265, entitled "Determining NO_X Emissions from Soil in California Cropping Systems to Improve Ozone Modeling," has been submitted by the University of California, Davis for a total amount not to exceed $83,500.

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 $83,500.

ATTACHMENT A

"Determining NO_x Emissions from Soil in California Cropping Systems to Improve Ozone Modeling"

Background

As an ozone precursor, NO_X is considered one of the most important air pollutants in air quality management. Agricultural soils are known sources of NO_X, but there are few definitive studies on NO_X emissions from soils, especially in California. The lack of information on soil NO_X emissions not only creates a data gap in California's NO_X inventory, but also may restrict ARB's ability for accurate ozone modeling. This project will provide the much needed data on NO_x monitoring in the agricultural fields that may improve ozone modeling and ultimately lead to better control strategies of NOx emissions from agricultural soils. This proposed study is built on three other concurrent projects targeting N_2O emissions, funded by ARB, California Energy Commission (CEC), and California Department of Food and Agriculture (CDFA). The combined results of all the projects will provide a more complete account of nitrogen fate and transport in California's cropping systems.

Objective

The objectives of this project are to: (1) measure NO_X emissions from five California cropping systems under various management conditions; (2) characterize the dose-response relationship of NO_X fluxes to nitrogen fertilizer rates; and (3) identify key soil variables and management factors that influence NO_X emissions from soils.

Methods

The investigators will conduct field experiments to monitor NO_x fluxes from five California cropping systems: tomato, wheat, almonds, alfalfa, and corn. The emission data will be collected for one year during the summer season when ozone concentration is usually high. The monitoring periods will surround fertilization and irrigation events, starting before the events and extend until NO_X fluxes subside to background levels. All cropping systems will be managed under conventional practices. For wheat and tomato crops, experiments will also be performed to test the dose-response relationship of NO_X emissions and N fertilizer rates. NO_X fluxes will be monitored using a dynamic chamber method equipped with a LAM-3 NO_X analyzer. A TECO NO_X Anayzer (Model 42) will be collocated at selected sites to ensure comparative results.

Expected Results

As an ozone precursor, NO_X has historically drawn intense interests from the scientific and regulatory communities. However, due to scarcity of data, NO_X emissions from agricultural soils have not been quantified and are not considered in the current California emission inventory. The proposed project will determine NO_X emissions from a range of California cropping systems, examine their relationship with fertilizer application and other regulating factors, and provide much needed field measurement data for possible development of an ozone formation module for soil processes.

Significance to the Board
Understanding sources and the magnitude of NO_X emissions is important for accurately predicting ozone production. NO_X emissions from soils have been historically unavailable in the California inventory due to lack of emission data. This research will address the data gap and the outcome is expected to improve the current California NO_x inventory and potentially our capability of ozone modeling.

Contractor:
University of California, Davis (UCD)

Contract Period:
24 months

Principal Investigator (PI):
William R. Horwath, Ph.D.

Contract Amount:
$83,500

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:
The research team of this project consists of known experts in the state on nitrogen management and cycling in agricultural ecosystems. The investigators have been involved in field studies of nitrogen fate, including N_2O, in many projects. Dr. Horwath is a professor in soil biogeochemistry and has published extensively in the leading journals regarding soil processes of nutrients management. He is currently engaged in several other projects involving monitoring of N_2O from alfalfa, wheat, rice, lettuce, and tomato fields.

Prior Research Division Funding to UCD:

Year	2008	2007	2006
Funding	$915,193	$935,020	$1,684,890

BUDGET SUMMARY

Contractor: University of California at Davis

"Determining NO_x Emissions from Soil in California Cropping Systems to Improve Ozone Modeling"

DIRECT COSTS AND BENEFITS				
1.	Labor and Employee Fringe Benefits	$	68,944	
2.	Subcontractors	$	0	
3.	Equipment	$	0	
4.	Travel and Subsistence	$	2,506	
5.	Electronic Data Processing	$	0	
6.	Reproduction/Printing	$	70	
7.	Mail, Phone, and Fax	$	78	
8.	Materials & Supplies	$	3,433	
9.	Analyses	$	0	
10.	Miscellaneous	$	878	
	Total Direct Costs			$75,909
INDIRECT COSTS				
1.	Overhead	$	7,591	
2.	General and Administrative Expenses	$	0	
3.	Other Indirect Costs	$	0	
4.	Fee or Profit	$	0	
	Total Indirect Costs			$7,591
TOTAL PROJECT COSTS				**$83,500**