

State of California  
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 05-8

January 20, 2005

Agenda Item No.: 05-1-2

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 2570-246, entitled "Reducing Emissions of Volatile Organic Compounds (VOCs) from Agricultural Soil Fumigation", has been submitted by the University of California, Riverside;

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

WHEREAS, the Air Resources Board will fund this proposal for a total amount of \$200,000; and

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

Proposal Number 2570-246 entitled "Reducing Emissions of Volatile Organic Compounds (VOCs) from Agricultural Soil Fumigation", submitted by the University of California, Riverside, for a total amount not to exceed \$200,000.

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 2570-246 entitled "Reducing Emissions of Volatile Organic Compounds (VOCs) from Agricultural Soil Fumigation", submitted by the University of California at Riverside, for a total amount not to exceed \$200,000.

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 \$200,000.

I hereby certify that the above is a true and correct copy of Resolution 05-8, as adopted by the Air Resources Board.

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Lori Andreoni, Clerk of the Board

## ATTACHMENT A

### “Reducing Emissions of Volatile Organic Compounds (VOCs) from Agricultural Soil Fumigation”

#### Background

Fumigant pesticide emissions are a significant contributor to the total VOC emissions inventory. Laboratory measurements suggest that nearly 100 percent of the VOC emissions from fumigant pesticides are released into the atmosphere. However, due to possible breakdown of fumigants in the field, this may not be the case. Field-based measurements are needed to verify that the current laboratory-based measurements are indeed reflective of real-world conditions. Additionally, little field-based data are available on the emissions reductions that can be achieved with the use of currently available mitigation technologies. Several researchers have developed pesticide application techniques to reduce peak emissions, with limited success. Some of these techniques may only delay the volatilization of fumigants. Thus, in order to develop accurate estimates of existing fumigant emissions and potential emissions reductions, additional field-based data are needed.

#### Objective

The objective of this project is to generate field-based data that can be used to verify existing laboratory estimates of fumigant pesticide emissions and to estimate the emissions reductions that are achievable with existing control strategies. The results will be used by Department of Pesticide Regulation and ARB staff to improve the current emission estimates and to assess potential emission reduction strategies.

#### Methods

The investigator proposes to conduct three experiments to investigate the effects of several parameters on emissions of fumigant pesticides. Three of the pesticides that are most commonly used in California; metam sodium, 1,3-Dichloropropene (1,3-D), and chloropicrin, will be studied in this project. The three experiments will be conducted during the ozone season on two 5-acre (minimum) fields located near each other in the San Joaquin Valley. The two fields for each experiment will contain the same soil type, soil moisture, and field preparation. Each of the two fields will be fumigated with the same chemical, at the same application rate, in the same manner, and at the same time on the same day, if possible. One of the fields will represent a standard sealing practice, or control, and the other field will include an alternative application and control method. After application of the pesticide at each field, the volatilization rate will be measured.

Emission rates will be estimated by one or two methods. The two possible methods are the micrometeorological method and the indirect flux method. In the micrometeorological approach, measurements of wind speed, temperature, and pesticide concentration are taken at different heights and coordinates within the field. The meteorological data is combined with empirical equations to estimate emission rates at the surface of the soil. In the indirect flux method, observed ambient concentrations of the pesticide around the field are used with dispersion models to back-calculate the field emission rates.

**Expected Results**

The expected results will be data that can be used to estimate the emissions rates of fumigant pesticides commonly used in California and the effectiveness of available emission reduction techniques.

**Significance to the Board**

The results will provide the ARB with more accurate estimates of emissions from the use of fumigant pesticides and the emissions reductions that are achievable from the use of available technologies.

**Contractor:**

The University of California, Riverside

**Contract Period:**

36 months

**Principal Investigator (PI):**

Scott Yates, Ph.D.

**Contract Amount:**

\$200,000

**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:**

This Principal Investigator has not performed any previous work under contract to the ARB. In addition to being a professor at the University of California at Riverside, the principal investigator is a soil scientist at the United States Department of Agriculture. In these two positions, he has participated in many research studies designed to better understand the chemistry and physics of fumigant pesticides in the soil, and the volatilization rate of fumigants and the chemical products of these fumigants.

**Prior Research Division Funding to UCR:**

Year	2004	2003	2002
Funding	\$0	\$1,036,130	\$0

# BUDGET SUMMARY

University of California at Riverside

Reducing Emissions of Volatile Organic Compounds (VOCs) from Agricultural Soil Fumigation

## **DIRECT COSTS AND BENEFITS**

1.	Labor and Employee Fringe Benefits	\$	112,910
2.	Subcontractors	\$	0
3.	Equipment	\$	5,431
4.	Travel and Subsistence	\$	9,240
5.	Electronic Data Processing	\$	0
6.	Reproduction/Publication	\$	0
7.	Mail and Phone	\$	0
8.	Supplies	\$	54,731 <sup>1</sup>
9.	Analyses	\$	0
10.	Miscellaneous	\$	<u>0</u>
	Total Direct Costs		\$182,312

## **INDIRECT COSTS**

1.	Overhead	\$	17,688
2.	General and Administrative Expenses	\$	0
3.	Other Indirect Costs	\$	0
4.	Fee or Profit	\$	<u>0</u>
	Total Indirect Costs		<u>\$17,688</u>

## **TOTAL PROJECT COSTS**

**\$200,000**

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<sup>1</sup> The supplies consist of:

Air sampling tubes	28,665
Septa for analysis	8,190
Crimp seals for analysis	3,276
Solvents	800
Gases for GC analysis	800
GC parts	1,000
Materials for field sampling equipment	4,000
Glassware	2,000
Laboratory consumables	<u>6,000</u>
	\$54,731