

State of California
AIR RESOURCES BOARD

RESEARCH PROPOSAL

Resolution 05-24

March 17, 2005

Agenda Item No.: 05-3-2

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 2582-247, entitled "Dairy Operations: An Evaluation and Comparison of Baseline and Potential Mitigation Practices for Emissions Reductions in the San Joaquin Valley", has been submitted by California State University, Fresno;

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 2582-247 entitled "Dairy Operations: An Evaluation and Comparison of Baseline and Proposed Mitigation Practices for Emissions Reductions in the San Joaquin Valley", submitted by California State University, Fresno, for a total amount not to exceed \$249,980.

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 2582-247 entitled "Dairy Operations: An Evaluation and Comparison of Baseline and Potential Mitigation Practices for Emissions Reductions in the San Joaquin Valley", submitted by California State University, Fresno, for a total amount not to exceed \$249,980.

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 \$249,980.

I hereby certify that the above is a true and correct copy of Resolution 05-24, as adopted by the Air Resources Board.

Lori Andreoni, Clerk of the Board

ATTACHMENT A

“Dairy Operations: An Evaluation and Comparison of Baseline and Potential Mitigation Practices for Emissions Reductions in the San Joaquin Valley”

Background

Dairies are a significant source of reactive organic gas (ROG) and ammonia emissions in the San Joaquin Valley. However, accurately quantifying emissions from dairies has been extremely difficult due to the complexity of the source, with its many dispersed biological processes, as well as the challenges in sampling, analyzing, and modeling the collected emissions data. Accurate emission estimates for dairies are critically needed to better understand if emission reduction strategies are needed for dairies in order to meet ambient air quality standards.

Objective

The primary objective of the project is to estimate the ROG and ammonia emissions from dairies by means of a field monitoring and ambient air quality sampling program. A secondary objective is to assess the effects on emissions of different manure management systems and technologies that are used to reduce emissions.

Methods

The investigators from California State University, Fresno will collect samples of ambient air at dairies. The samples will be collected in standard evacuated summa canisters outfitted with regulators to allow time-integrated samples to be collected. Upwind and downwind samples will normally be collected at a height of 2 meters for dispersion modeling. Some downwind samples may be taken at heights of 1, 2, 5, and 10 meters to provide input for other modeling methods. The samples will be collected three times per year for two years. The sampling periods will be about one week in duration. Full meteorological data will be collected including continuous wind speed, temperature, and humidity. Sampling periods will be selected to ensure there is a high likelihood of consistent wind speed and direction, which is necessary for accurate modeling purposes.

The samples will be analyzed by the University of California at Irvine to obtain a complete ROG emissions profile. The samples will be analyzed using gas chromatograph (GC)/Mass Spectroscopy (MS) techniques. The air quality modeling will be performed using the industrial Source Complex Term version 3 (ISC-STv3) steady state Gaussian plume model.

Expected Results

It is expected that this study will provide more accurate estimates of ammonia and ROG emissions from dairies than currently exist. It is also expected that the results of the study will allow the quantification of the effect on emissions of different manure managing practices and the quantification of emissions reductions that are achievable from the use of various emission reduction technologies.

Significance to the Board

The results of the study will allow the Board to better assess the need for regulatory strategies for dairies in order to attain ambient air quality standards.

Contractor:

California State University, Fresno

Contract Period:

36 months

Principal Investigators (PIs):

Professor Charles Krauter, Ph.D., California State University, Fresno

Professor Dr. Donald Blake, Ph.D., University of California, Irvine (Co-Principal Investigator)

Contract Amount:

\$249,980

Cofunding:

The principal investigator will apply for matching funding under the California State University Agricultural Research Initiative (ARI). The ARI is a line item in the budget for the California State University which provides matching funding for agricultural-related research. On the basis of past matching funding requests, it is expected that the principal investigator will obtain matching funding from ARI. If ARI matching funding is obtained, additional monitoring would be performed in this project. This monitoring would augment the monitoring at the selected dairies, or would be performed at additional dairies. The anticipated amount of ARI funding would be about \$250,000.

Basis for Indirect Cost Rate:

The State and the CSU system have agreed to a 25 percent indirect cost rate.

Past Experience with this Principal Investigator:

The ARB's Planning and Technical Support Division has contracted with this Principal Investigator on a previous, smaller scale study to estimate emissions from dairies, and have been satisfied with his performance.

Prior Research Division Funding to California State University, Fresno:

Year	2004	2003	2002
Funding	\$0	\$0	\$0

BUDGET SUMMARY

California State University, Fresno

Dairy Operations: An Evaluation and Comparison of Baseline and Potential Mitigation Practices for Emissions Reductions in the San Joaquin Valley

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$	54,559
2.	Subcontractors	\$	111,750
3.	Equipment	\$	0
4.	Travel and Subsistence	\$	22,946 ¹
5.	Electronic Data Processing	\$	0
6.	Reproduction/Publication	\$	0
7.	Mail and Phone	\$	0
8.	Supplies	\$	14,500
9.	Analyses	\$	23,500 ²
10.	Miscellaneous	\$	<u>0</u>
	Total Direct Costs		\$227,255

INDIRECT COSTS

1.	Overhead	\$	22,725
2.	General and Administrative Expenses	\$	0
3.	Other Indirect Costs	\$	0
4.	Fee or Profit	\$	<u>0</u>
	Total Indirect Costs		<u>\$22,725</u>

TOTAL PROJECT COSTS

\$249,980

¹ A great deal of travel will be necessary to accomplish the field testing. The transportation will be between Fresno and the location of the selected dairies. It is anticipated that from 5 to 8 dairies will be selected, and that monitoring will occur three times per year for two years. Ground transportation is estimated at \$13,530. Air transportation is estimated at \$4,416, and per diem or subsistence is estimated at \$5,000.

² In addition to the ROG analysis of air samples collected at the dairy sites, water, lagoon effluent, feed, crop tissue and soil samples will be collected and analyzed. Analysis may be performed in the field with portable equipment or at the CSU Fresno Water Institute lab on campus. This lab provides analytical services for agricultural research projects conducted by CSU Fresno personnel and collaborators. The amount budgeted for soils analysis is \$10,000, the amount for water and lagoon effluent is \$11,000, and the amount for feed and other plant tissue is \$2,500.

SUBCONTRACTOR'S BUDGET SUMMARY

Subcontractor: University of California Irvine

Description of subcontractor's responsibility: The subcontractor will perform the ROG analysis of the samples that are collected by the primary contractor.

DIRECT COSTS AND BENEFITS

1.	Labor and Employee Fringe Benefits	\$ 86,400
2.	Subcontractors	\$ 0
3.	Equipment	\$ 0
4.	Travel and Subsistence	\$ 0
5.	Electronic Data Processing	\$ 0
6.	Reproduction/Publication	\$ 0
7.	Mail and Phone	\$ 0
8.	Supplies	\$ 15,190 ¹
9.	Analyses	\$ 0
10.	Miscellaneous	<u>\$ 0</u>
	Total Direct Costs	\$101,590

INDIRECT COSTS

1.	Overhead	\$ 10,160
2.	General and Administrative Expenses	\$ 0
3.	Other Indirect Costs	\$ 0
4.	Fee or Profit	<u>\$ 0</u>
	Total Indirect Costs	<u>\$10,160</u>

TOTAL PROJECT COSTS **\$111,750**

¹ Liquid nitrogen is used for sample preconcentration, pump purification, carrier gas cleaning and GC oven cooling.

Liquid nitrogen (130 units @ 100)	13,000
Calibration standard	<u>2,190</u>
	15,190