

DRAFT

Protocol to Measure Temporal Variations of Pesticide Concentrations in the Colusa Basin Drain

I. INTRODUCTION

During the early part of the 1990 rice season, a joint study will be conducted by the California Department of Fish and Game (CDFG) and the California Department of Food and Agriculture (CDFA) to determine the relationship between acute toxicity to aquatic organisms and concentrations of insecticides in agricultural drain water and the Sacramento River. Forty-eight hour composite water samples will be collected for biotoxicity testing, and chemical and metal analyses. Previous monitoring of rice pesticides (CDFA, 1989) has been conducted using "grab" samples, which provide an instantaneous measure of pesticide residues present in the water. Composite samples provide an average measurement of pesticide or metal concentrations over the sampling time interval. Neither sampling method provides a complete picture of the residue levels in water over time. The most appropriate method of sampling depends on the variability of the residue concentrations over time and the objectives of the study. Ross, (1990) conducted a study to determine the variability of rice herbicide residues (molinate and thiobencarb) in the Colusa Basin Drain and the Sacramento River over 24 hours during the peak runoff period. Results of her study can be used to determine appropriate sampling methods and intervals when peak periods of pesticide residues are known. However, variability of pesticide concentrations in agricultural drains during transitional periods, before and after peak runoff, is unknown.

II. OBJECTIVES

The objective of this study is to measure the temporal variability of pesticide concentrations in the Colusa Basin Drain before and after the peak rice pesticide discharge period.

III. PERSONNEL

This study will be conducted by EHAP personnel under the overall supervision of Kean Goh, Senior EHS. Other key personnel include:

Project Leader/Data Analysis- Susan Nicosia

Senior Staff Scientist- Lisa Ross

Field Operations- Chris Collison

Lab Liason- Nancy Miller

Agency and Public Contact- Madeline Ames ((916) 324-8916)

IV. STUDY PLAN

Sampling:

Agricultural drain water samples will be collected and analyzed for three previously detected pesticides: carbofuran, malathion and methyl parathion. Samples will be collected at two-hour intervals over a 48-hour period (24 samples), on three occasions, from one site, CBD1. The 48-hour period was chosen to match the sampling period in the CDFG/CDFFA cooperative study. A total of 72 samples will be collected (24 samples/48-hour period x 3 occasions = 72).

Sampling will occur on the following dates:

April 26-28,

May 21-23,

May 29-31.

These dates were chosen as the most likely times to find the selected pesticides during transitional periods, before and after rice pesticide peak runoff. Sampling dates are subject to adjustment based upon timing of pesticide usage and CDFG's sampling schedule.

Data Analysis:

Results will be presented in tabular and graphical form and summary descriptive statistics (means, standard deviations, coefficients of variation, minimums and maximums) will be determined. Table 1 shows the combination of values for confidence

level and relative error which may be expected for a mean calculated from 24 samples, over several coefficients of variation (Gilbert, 1987).

Table 1. Combinations of confidence and error levels which may be expected for a mean estimated from 24 samples^a.

Confidence Level (1- α)	Relative Error	Coefficient of Variation			
		0.10	0.20	0.30	0.40
0.90	0.1	14	55	--	--
	0.2	3	14	31	54
0.80	0.1	8	33	--	--
	0.2	2	8	19	33

^aSample sizes were calculated assuming temporal autocorrelation. First, second and third order correlation coefficients were derived from results reported by Ross (1990).

Results from this study can be used to aid in interpretation of past or current data (i.e., CDFG/CDEA cooperative drain and river water study), or to plan future surface water monitoring studies.

V. SAMPLING METHODS

Water "grab" samples will be collected in 1 to 1.8-liter glass bottles by hand or using an automatic sampler, depending on equipment availability. Samples will be placed on wet ice (or refrigerated in sampler unit), transported to storage and refrigerated at 4°C until analyzed.

VI. ANALYTICAL METHODS/QUALITY CONTROL

Method validation, storage stability and continuing quality control measures will all be addressed through the work conducted

for the cooperative CDFG/CDFA study. Quality control will include blind spikes of the pesticides at three concentrations replicated three times. The same methods (for carbofuran, malathion and methyl parathion), chemists and labs (CDFA- main, CDFG- qc) will be used in the CDFG/CDFA cooperative study and this study, during the same timeframe.

VII. TIMETABLE

Site preparation	April
Sampling period	April - May
Chemical Analysis	June - July
Data Analysis	August - September
Memorandum- Final Draft	October

VIII. BUDGET

Personnel \$ 8,000

Operating Expenses \$ 18,000

TOTAL \$ 26,000

REFERENCES

- California Department of Food and Agriculture (CDFA) 1989. 1989 Program to Prevent Off-Site Movement of Pesticides from California Rice Fields. Environmental Hazards Assessment Program Report. Sacramento, CA.
- Gilbert, R.O. 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold Company Inc., New York, NY.
- Ross, L.J. 1990. Summary of the Rice Herbicide Project Conducted in May 1985. Staff memorandum. California Department of Food and Agriculture, Sacramento, CA.