Department of Pesticide Regulation
Environmental Monitoring Branch
1001 I Street
Sacramento, California 95812
March 26, 2003

GUIDANCE FOR DIAZINON REEVALUATION STUDIES

Background

Pursuant to Article 8, Subchapter 1, Chapter 2, Division 6 of Title 3 of the California Code of Regulations, the Director of the Department of Pesticide Regulation (DPR) noticed his decision to begin a reevaluation of diazinon dormant spray pesticide products on February 19, 2003. DPR initiated this reevaluation based on more than 20 surface water monitoring studies conducted between 1991 and 2001. These studies demonstrate the presence of diazinon in the Sacramento and San Joaquin Valleys at levels that exceed the Department of Fish and Game's (DFG's) water quality criteria (WQC, Table 1), especially during the dormant spray season.

Criterion ug L^{-1} (ppb)	Type	Recurrence period
0.05	chronic aquatic tox	4-day average; not to be exceeded more than once in 3 years.
0.08	acute aquatic tox	1-hour average; not to be exceeded more than once in 3 years.

Table 1. diazinon water quality criteria

Siepmann, S. and B. Finlayson. 2000. Water quality criteria for diazinon and chlorpyrifos. Ca. Dept. Fish and Game, administrative report 00-3.

Pursuant to this reevaluation, diazinon registrants are required to: (1) identify the processes by which diazinon dormant spray products are contributing to detections of diazinon in surface water at levels that exceed DFG's WQCs; and (2) identify mitigation strategies that will reduce or eliminate diazinon residues in surface water.

The purpose of this document is to provide an overview of recent typical diazinon surface water monitoring data, followed by a general study guidance for diazinon registrants in meeting re-evaluation objectives (1) and (2) above.

Overview of recent diazinon data

Diazinon dormant spray applications have steadily decreased in California's Sacramento and San Joaquin Valleys since the early 1990's (Figure 1). However, in spite of this decrease in use, there have been several recent dormant season diazinon concentration spikes in the Sacramento and San Joaquin Rivers that exceed protective WQC (e.g., Figure 2). Diazinon concentrations in agriculturally-dominated drainage canals are generally much higher than those observed in the main stem rivers (Figure 3).

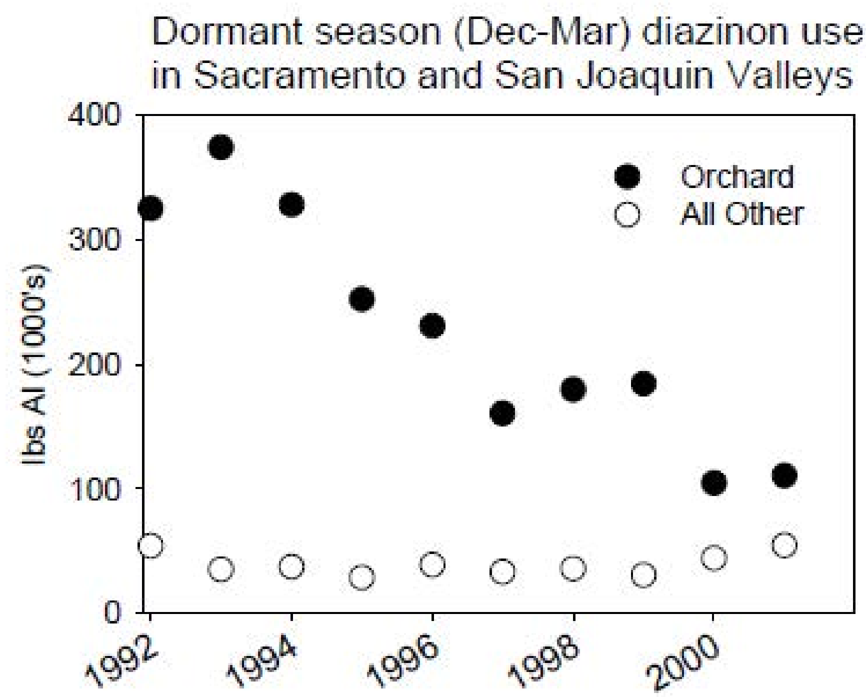


Figure 1. diazinon use 1992 - 2001

Figure 2. PERCENT exceedances of DFG acute and chronic diazinon WQC at Vernalis, San Joaquin River

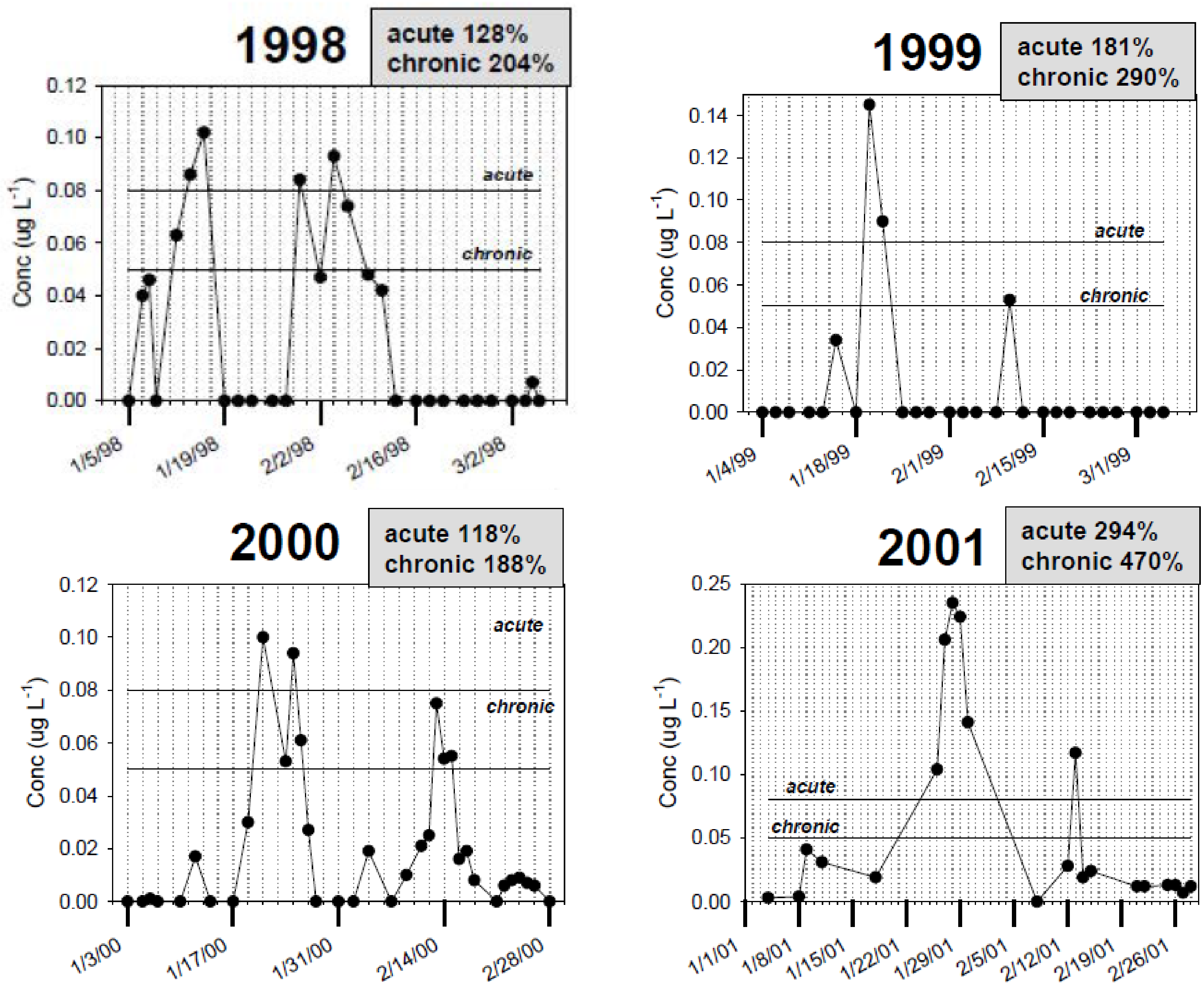
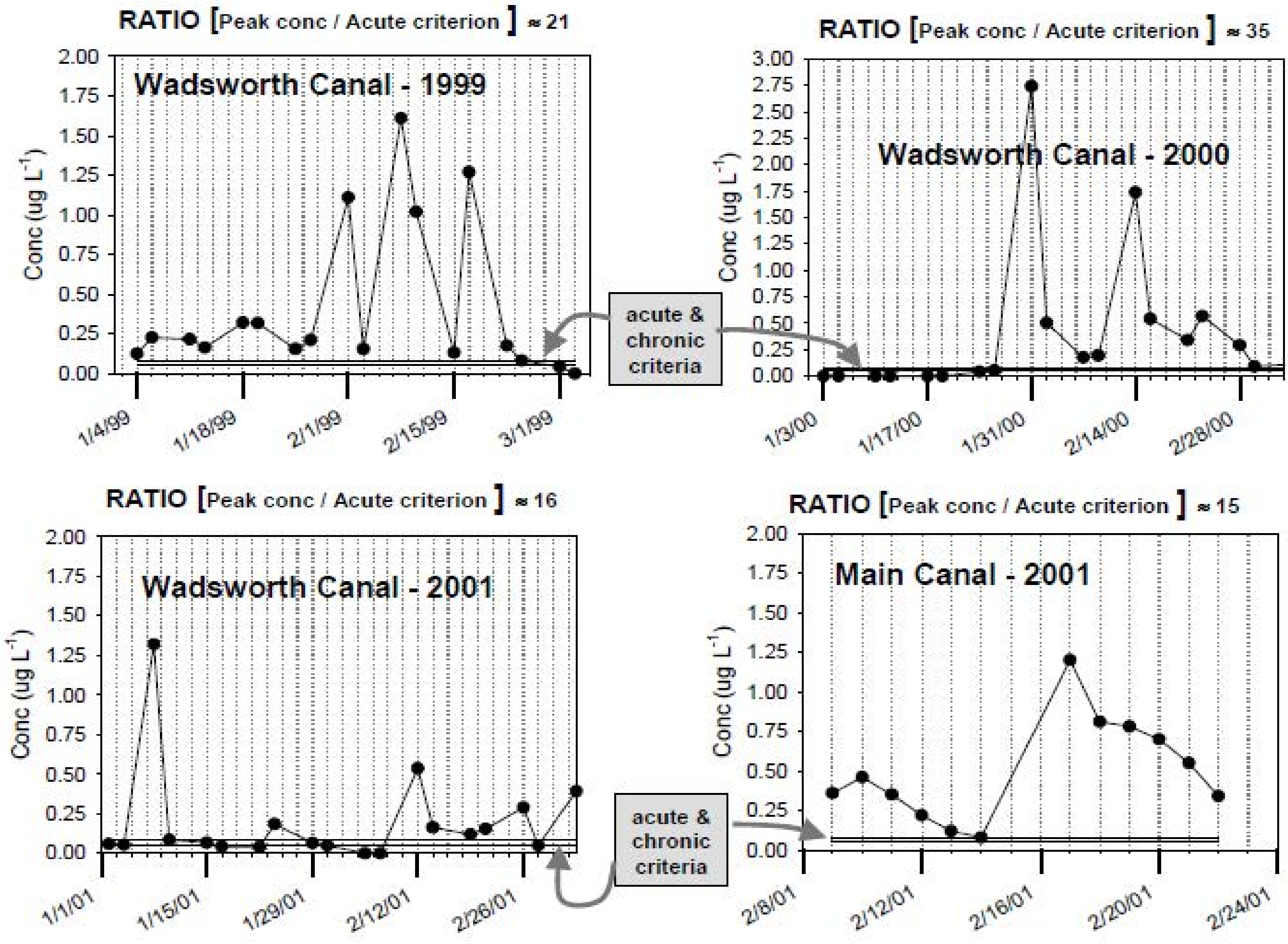


Figure 3. Selected recent tributary monitoring results relative to diazinon WQC



Reevaluation Studies – General Guidance

Objectives

(I) *identify the processes by which diazinon dormant spray products are contributing to detections of diazinon in surface water at levels that exceed DFG's WQCs.*

Some example research questions that may be related to objective 1

A. What is diazinon deposition on trees during dormant applications as a percent of application?
B. How much of a dormant spray application is typically deposited off-site (outside field boundaries)?
C. What is the contribution of that off-site drift to diazinon runoff?
D. Is there a disproportionate contribution to diazinon runoff from non- or low permeability surfaces (asphalt, compacted dirt roads, buildings, service areas)? What is that contribution?
E. Is there a disproportionate contribution to diazinon runoff from certain geographic areas? What is that contribution? What are these vulnerable areas? How can they be identified?

(II) *identify mitigation strategies that will reduce or eliminate diazinon residues in surface water.*

While there are several compilations of suggested management practices for reducing runoff of dormant sprays to California surface water, there is almost no quantitative data to document their effectiveness. Examples of compilations include:

A. Agricultural Practices and Technologies DRAFT REPORT – Central Valley Regional Water Quality Control Board. http://www.swrcb.ca.gov/rwqcb5/programs/tmdl/ag_practices_report.pdf
B. "Best Management Practices for Protecting Water Quality in California: dormant spray management practices". Ciba Crop Protection, DowElanco, CAPCA, CDPR, Mahkteshim-Agan.
C. "Orchard Practices to Protect Water Quality", and "Orchard Air Blast Sprayers: tips and techniques for protecting water quality", Coalition for Urban/Rural Environmental Stewardship, http://www.curesworks.org/
D. "Identification and Evaluation of OP Pesticide Management Practices for Orchard Dormant Sprays", Sacramento River Watershed Program, http://www.sacriver.org/subcommittees/op/documents/WQMSD_Draft/Ch4_AgPractices.html

The ultimate goal here is to provide a defensible scientific estimate (and +/- confidence limits where possible) of achievable dormant season concentration reductions in the Sacramento and San Joaquin Rivers based on regulatory implementation of a management practice(s). Note that in this context, use reduction - such as through "use caps" - may be considered a management practice. Concentration reductions should be estimated relative to recent (1997 to current) monitoring data from the two rivers. This monitoring data will provided by DPR in electronic form.

General comments

A. In general, computer simulation modeling alone will be inadequate to satisfy objectives I and II above. In certain cases modeling may be used in conjunction with geographic information system analysis to extend experimental results, such as when extrapolating results from field to basin scale.

B. With the exception of use reduction, field runoff data from replicated plots obtained under either simulated or actual rainfall runoff conditions will generally be required to demonstrate the effectiveness of management practices.

C. In general, field studies that demonstrate reduced runoff of diazinon must be accompanied by supporting quantitative data demonstrating the fundamental mechanism. For example, if a study indicates that vegetative filter strips reduce diazinon movement off-site to surface water through reduced runoff volume and/or sorption to vegetative surfaces, supporting data should include:
- replicated infiltration comparisons between cover cropped and bare ground, and/or
- batch sorption data demonstrating the extent of diazinon sorption to vegetation.

Modeling requirements

- Modeling should be conducted with accepted well-known models. Some examples include: PRZM3, GLEAMS, SWAT, and RZWQM. The choice of model should be justified based on the processes and scenarios to be simulated.
- Electronic copies of the compiled model, available documentation, and all input and output files must be provided to DPR as part of a final report.
- Input data should be of high quality and high resolution. For instance, SSURGO soil data is acceptable for runoff modeling while county level STATSGO data is not.
- The choice of empirical constants, soil hydrologic data or diazinon physicochemical data should be fully explained and justified based on known data. Examples include runoff curve number and diazinon wintertime degradation rate constants.
- DPR may be able to provide soil or other data for modeling.
- Models should be calibrated against measured data, and should accurately describe both diazinon off-site movement and water flow.

Field study requirements

- All field studies should be replicated studies of sound statistical design.
- Mass balance data is required for all field studies.
- Sampling methodology should be fully described.
- Final reports must include all analytical quality control (QC) data for all matrices. Analytical chemical results must include the following minimum QC data requirements:

  Method Validation
  - method detection limit determination
  - method validation data, including calculated control and warning limits
  - storage stability data

  Continuing QC – all matrices
  - total: 15% of all analyses, include
  - matrix spikes, blanks
  - sample splits
  - blind spikes

The Environmental Monitoring Branch's QC standard operating procedure may be useful as a general guide to QC procedures. It is available on-line:
http://www.cdpr.ca.gov/docs/empm/pubs/sops/qaqc001.pdf