

GENERAL BACKGROUND FOR PESTICIDE STUDIES

In 1986, the Regional Board initiated a toxicity monitoring program in the Sacramento River Watershed. The simple plan was to collect water samples and see if representative aquatic organisms could survive in the water. When toxicity was observed, follow-up studies were conducted to determine the chemicals responsible. Additional assessments were made to determine the potential risk to the indigenous aquatic ecosystem. In 1988, this program was extended to the San Joaquin River and the Delta and major tributaries. The program was implemented as a series of studies and was closely coordinated with monitoring programs of USGS, the Department of Pesticide Regulation and others. In 1991, the Bay Protection Program began as a follow-up on the data collected in previous studies.

Water samples collected in the Sacramento River, San Joaquin River, the Delta and major tributaries frequently test toxic in the standard US EPA three species bioassays. Toxicity identification evaluations and chemical analysis often implicate the pesticides diazinon and chlorpyrifos as the primary cause of acute toxicity to the invertebrate test species (*Ceriodaphnia dubia*), while chemical monitoring and transport studies have confirmed the frequent presence of these two compounds. Sources appear to be from both urban and agricultural applications. Instream concentrations are frequently above the various criteria to protect aquatic life, as developed by the National Academy of Science, Great Lakes Research Council, and California Department of Fish and Game. Values of diazinon and chlorpyrifos are also greater than concentrations reported in the literature to be lethal to sensitive aquatic invertebrates including species present in the Central Valley and Delta.

Other pesticides have been detected at levels that test toxic to the invertebrate test species (carbofuran for example). Invertebrate toxicity cannot always be completely explained by the pesticides that are monitored. This is not unreasonable, since only half of the most commonly used pesticides have analytical methods that allow testing at ecologically significant levels.

Toxicity testing in the Sacramento River watershed has detected a substantial amount of toxicity to the fathead minnow test species. Of particular concern is the fathead minnow mortality observed in approximately 50% of the samples collected from the Sacramento River near Freeport. Toxicity to the algal test species has been detected in both agricultural and urban drainages and receiving waters on the mainstem Rivers and the Delta.

The general actions that are required to resolve water quality problems associated with the pesticides chlorpyrifos and diazinon include (1) establishment of water quality objectives, (2) development of management practices that can be implemented to meet the targets, (3) completion of studies to determine potential ecological impacts, (4) establishment of mechanisms for assuring implementation of practices that reduce pesticide levels entering surface waters, and (5) implementation of a monitoring program to document the progress of reduction programs.

In addition to actions that are specific to diazinon and chlorpyrifos, additional actions are needed to determine the impacts of other pesticides that cause toxicity to bioassay test species or are present at levels that are known to be toxic to indigenous species. Actions include (1) toxicity

testing to continue to identify additional contaminants that cause toxicity, (2) baseline pesticide monitoring, and (3) studies to define the pesticides (or other contaminants) involved in algal and fathead toxicity.

There are some ongoing studies and programs that partially address some of these program elements. CALFED has already recommended funding proposals to fill some of the gaps. The following six water quality studies are proposed to fill the remaining gaps. The general outline of the needed actions conforms well with the earlier drafts of the Water Quality Component Program, the discussions of the Contaminant Effects Workgroup, and with the Regional Board's Delta hot spots cleanup plans.

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