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STATE OF CALIFORNIA  
DEPARTMENT OF FISH AND GAME

PESTICIDE LABORATORY REPORT

1701 Nimbus Road, Suite F  
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AGRICULTURAL COMMISSIONER  
COUNTY OF MONTEREY

Lab No: P-2334

Date Received: July 2, 2002

E.P. No. L-311-02, L-313-02

Sample: sediment, water, fish

Index: N400 PCA: H1809

To: Lieutenant Dave Fox  
Department of Fish and Game  
20 Lower Ragsdale Drive, Suite 100  
Monterey, CA 93940

Report Date: August 6, 2002

**Remarks**

A fish kill involving over 2,000 fish was reported to the Department of Fish and Game on June 28, 2002. The kill was reported to have occurred in Tembladera Slough upstream of its confluence with the Old Salinas River channel near Moss Landing harbor in Monterey County. Department wardens and biologists responded to the incident and collected water samples, sediment and dead fish. First hand observations indicated applications of unknown compounds to agricultural fields in the vicinity. Inquiries were made to the Monterey County Department of Agriculture as to compounds currently being applied in the area. County Agricultural Commissioner staff indicated that Asana® (active ingredient esfenvalerate) and Supracide® (active ingredient methidathion) may be the materials in question. The samples were delivered to the Department of Fish and Game Pesticide Investigations Unit for necropsy and tissue analyses.

**Background**

A Department of Fish and Game warden and a fisheries biologist responded to a report of a fish kill in Tembladera Slough and the Old Salinas River channel on June 27, 2002. Approximately 2,000 fish were observed dead over 3-4 miles of stream channel. It is not clear if the dead fish observed in the Old Salinas River were washed downstream from Tembladera Slough or if they died in the river channel. The species involved, by frequency of occurrence, included: Sacramento Sucker *Catostomus occidentalis*; Hitch Lavinia *sp.*; Sacramento Blackfish *Orthodon microlepidotus*; Goldfish *Carassius auratus*; Sculpins *Cottus sp.*; Sacramento Pikeminnow *Ptychocheilus grandis*, and Carp *Cyprinus carpio*. The responding biologist observed that crayfish *Procambarus clarkii* were notably absent from scavenging any of the fish carcasses. Small as well as large fish appeared to have been impacted. The condition of many of the fish carcasses indicated that the fish kill may have occurred up to 48 hours prior to Fish and Game being notified. Further review of pesticide use reports by Monterey County Agricultural Commissioner staff indicated that a small number of applications of diazinon had also been made in the general area during the time period when the fish kill occurred. Terns, Gulls and various shore birds were observed feeding on some of the fish carcasses. Dissolved oxygen concentrations were not measured at the time DFG personnel responded to the kill; partly due to equipment failure and partly to high electrical conductivity (2550  $\mu\text{mhos/cm}$ ) of the water.

COPY



## RESULTS OF EXAMINATION

Some of the fish were semi-autolytic when necropsied. This supports the probability that the kill had occurred 24 to 48 hours prior to the samples being collected. There were no external gross lesions to indicate trauma or disease as a cause for the kill. The fish did not appear to be bleeding from the gills. Gill tissue was excised and composited by species and collection location in order to ensure large enough tissue samples for analysis. The results of the analyses for the water and sediment samples are shown in Table 1 in parts per billion. Table 2 gives the results of the tissue analyses.

Table 1. Results of chemical analysis of water and sediment samples, Tembladera Slough, collected June 27, 2002. Concentrations in parts per billion (ppb).

Compound	Water						Sediment <sup>a</sup>
	p-2334-w1	p-2334-w2	p-2334-w3	p-2334-w4	p-2334-w5	p-2334-w6	p-2334-s1
Esfenvalerate	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Methidathion	0.050	0.240	N.D.	0.184	N.D.	N.D.	N.D.
Chlorpyrifos	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	0.879
Diazinon	0.183	0.125	N.D.	0.095	N.D.	0.140	0.587

<sup>a</sup> Sediment concentrations are dry weight. Sample % moisture was 40.7

Table 2. Results of chemical analysis of fish gill samples, Tembladera Slough, collected June 27 and 28, 2002. Concentrations in parts per billion (ppb), fresh weight.

Compound	Fish Gills				
	Suckers-1A	Suckers-1B	Sculpin	Gold Fish	Blackfish
Esfenvalerate	N.D.	N.D.	N.D.	N.D.	N.D.
Methidathion	N.D.	N.D.	N.D.	N.D.	N.D.
Chlorpyrifos	N.D.	N.D.	N.D.	N.D.	N.D.
Diazinon	40.0	26.8	13.0	44.0	5.2

The collections locations for the fish were as follows: A) Suckers were collected from the Old Salinas River channel on the west bank at the Potrero Road flap/tide gates; B) Sculpin were collected in Tembladera Slough, upstream of the Molera Road Bridge; C) Goldfish were collected in Tembladera Slough upstream of the Molera Road Bridge, and D) Blackfish was collected in Tembladera Slough near the suspected outfall (N 36° 46.235, W 121° 47.032).

The detected concentrations of methidathion and diazinon are below published fish LC<sub>50</sub> values for either compound. Aquatic invertebrates (LC<sub>50</sub> values 0.2 to 25 µg/L) are more sensitive to diazinon than fish (LC<sub>50</sub> values 272 to 8,000 µg/L). Toxicity tests on the aquatic invertebrate *Neomysis mercedis* have demonstrated that methidathion and diazinon can have an additive toxicity (Menconi and Siepmann 1996). The freshwater final acute value (FAV) is 0.16 µg/l diazinon and the freshwater Criteria Maximum Concentration (CMC) is 0.08 µg/l diazinon (Siepmann and Finlayson 2000). Many of the water samples approached or exceeded these values, suggesting the water quality was impaired.

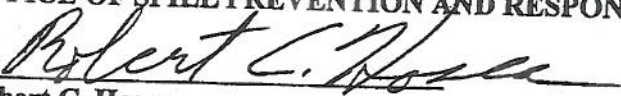
### Conclusion

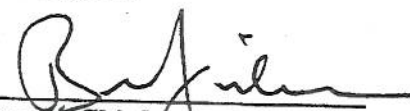
Based on the field and laboratory data it is not possible to identify a specific cause for the fish kill that occurred in Tembladera Slough. The electrical conductivity of the water was well above the normal range for most fresh water systems. Without dissolved oxygen (D.O.) measurements it is not possible to

eliminate low D.O. as a cause for the loss. Siepmann and Finlayson (2000) report that studies show diazinon does not bioconcentrate and is rapidly excreted following exposure. As such, the presence of diazinon in the fish tissues would indicate a recent exposure. Tembladera Slough is a flowing water system. If the fish kill occurred as much as 24 or more hours prior to being reported, there could be time for toxic materials to be flushed from the area or adsorb to sediments or for adverse conditions to improve.

Chemical analyses performed by Abdu Mekebri, chemist, Department of Fish and Game Water Pollution Control Laboratory.

**PESTICIDE INVESTIGATIONS UNIT  
OFFICE OF SPILL PREVENTION AND RESPONSE**

By   
Robert C. Hosea  
Principal Investigator

Approved   
Brian Finlayson, Chief  
Pesticide Investigations Unit

**Literature Cited:**

- Menconi, M., S. Siepmann. 1996. Hazard Assessment of the Insecticide Methidathion to Aquatic Organisms in the Sacramento-San Joaquin Drainage. California Department of Fish and Game, Environmental Services Division Administrative Report 96-1
- Siepmann, S., B.J. Finlayson 2000. Water Quality Criteria for Diazinon and Chlorpyrifos. California Department of Fish and Game, Office of Spill Prevention and Response Administrative Report 00-3.

**cc:**

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<b>Chemical analysis:</b>	<b>\$9,500.00</b>
<b>Assessment and report:</b>	<b><u>\$1,116.00</u></b>
<b>Total Cost of investigation:</b>	<b>\$10,616.00</b>