MONITORING FOR THE PRESENCE OF TRIBUTYLTIN AND DEGRADATION PRODUCTS IN AN INLAND LAKE OF CALIFORNIA, 1987

I. INTRODUCTION

The California Department of Food and Agriculture (CDFA) and the U.S. Environmental Protection Agency have placed into reevaluation or initiated a special review of all pesticide products containing tributyltin (TBT) used in pesticidal paints. Tributyltin compounds used to control the growth of certain aquatic organisms have been found to cause acute and chronic effects to non-target aquatic organisms that are exposed to very low TBT concentrations.

The present study to determine the presence of TBT and its degradation products in an inland lake of California, will be conducted in cooperation with the Pesticide Investigation Unit (PIU) of the Department of Fish and Game (DFG).

II. OBJECTIVES

The objectives of this study are:

1. To determine the range in concentration of TBT compounds in water, sediment, and biota associated with a marina in a California lake.
2. To determine the degree of movement of TBT compounds into a lake environment.
3. To determine the analytical variability of TBT compounds in water, sediment, and biological tissue.

III. PERSONNEL

This study will be conducted by the CDFA, Environmental Hazards Assessment Program (EHAP), under the overall supervision of David Supkoff. Field operations

will be supervised by Randy Segawa. ALL QUESTIONS CONCERNING THIS STUDY SHOULD BE DIRECTED TO MARY BROWN AT (916) 324-8916, ATSS 454-8916.

IV. MONITORING LOCATIONS

Initially, two surface water samples will be collected from each marina area in Lake Tahoe (3 marinas), Clear Lake, Lake Berryessa (2 marinas each), Millerton Lake, Clair Engle Lake and Big Bear Lake (1 marina each). Water samples will be analyzed for tributyltin (TBT), dibutyltin (DBT) and monobutyltin (MBT) concentrations. This initial information will be used to select one lake containing a marina with high organotin concentrations for additional study. Samples will be taken from three sites in the study lake. One site will be a marina with two additional sites located at different distances from that marina. Water and sediment will be taken from all three sites by CDFA personnel, and aquatic biota from two sites by DFG personnel to sample for TBT, DBT, and MBT residues.

V. STUDY DESIGN

Water - At each of 3 sites in the study lake, four replicate one liter samples will be collected at each of two depths. Surface samples will be collected 30 cm below the water surface. Bottom samples will be taken approximately 10 cm above the bottom sediment. Water samples will be collected in 1 liter polycarbonate bottles, cooled on wet ice before being placed on dry ice and frozen. Water samples will be kept at 0°C or less until analysis.

Sediment - A coring device will be used to obtain four sediment samples at each of 3 sites in the study lake. The upper 10 cm of each core will be removed from the coring device and placed in polycarbonate jars. Sediment samples will be

cooled on wet ice before being placed on dry ice after sampling. Sediment samples will be kept at 0°C or less until analysis.

Biota - Five fish and five aquatic invertebrate samples will be collected from each of two sites in the study lake. Each fish sample will consist of a composite of 3 individuals of the same species from one location. Each aquatic invertebrate sample will consist of a composite of 100 clams (Corbicula sp) or 10 crayfish (Procambrus sp.) from one location.

VI. ANALYTICAL METHODS AND QUALITY CONTROL

The chemical analysis will be performed by a DFG laboratory. Tributyltin and dibutyltin residues in sediment and biological tissue will be determined by electron-capture gas chromatography using the method of Tsuda et al. (1986). Tributyltin, dibutyltin, and monobutyltin concentrations in water will be determined by flame photometric gas chromatography using the method of Matthias et al (1986).

Two composite samples will be separately manufactured from equal parts of the five samples of fish and the five samples of aquatic invertebrates from the marina area. One composite water sample and one composite sediment sample will be created by combining equal subsamples of water or sediment collected from one location in the marina area. Each composite sample of water, sediment, or biota will be split into equal subsamples. For each composite sample, five subsamples will be analyzed for TBT and its degradation products (20 subsamples total). Two subsamples of each composite sample (8 subsamples total) will be sent to an additional laboratory for quality assurance.

VII. ESTIMATED NUMBER OF SAMPLES TO BE ANALYZED

Media		Sample Number
Initial Survey		
Water		~~20~~ 33
Main Study		3 sites × 4 reps × 2 depths = 24
Water		24
Sediment		12 3 sites × 4 reps = 12 sediment
Biota		20
Quality Control		
Water		7
Sediment		7
Biota		14
	TOTAL	~~104~~ 114

take 5 split Cs for Nalomas + 2 for Moss Marina surface water

7/15/87

30
14
50

REFERENCES

Matthias, C., J. Bellama, G. Olson and F. Brinckman. 1986. Comprehensive butylmethtin species at ultratrace levels using simultaneous hydridization/extraction with gass chromatography-flame photometric detection. Environ. Sci. Technol. 20:609-615.

Tsuda, T., H. Nakanishi, T. Morita, and J. Takebayashi. 1986. Simultaneous gas chromatographic determination of dibutyltin and tributyltin compounds in biological and sediment samples. J. Assoc. Off. Chem. 69:981-984.