

Sampling for Tributyltin at Tahoe Keys
Marina, Lake Tahoe, and Shelter Island Yacht Basin
San Diego Bay, California

INTRODUCTION

Tributyltin (TBT) has been found in high enough concentrations in coastal areas of California to pose a threat to marine life. A survey of ten marinas in six California lakes conducted during the summer of 1987 also revealed high concentrations of TBT in a freshwater marina in Lake Tahoe. The results of more extensive monitoring in September 1987 indicated an unacceptable hazard to aquatic life exists in Tahoe Keys Marina. Observed concentrations of TBT in the Tahoe Keys Marina exceeded chronic values (0.03 to 0.10 ug/L) and approached lethal levels (0.30 to 4.0 ug/L) for fish and invertebrates. Tissue residue levels in Lake Tahoe indicated fish in the main body of the lake were also exposed to TBT.

State legislation enacted at the end of 1987 restricted the use of TBT-based paints on boats shorter than 25 feet, thus practically eliminating the release of TBT in freshwater harbors and greatly reducing the release in saltwater harbors. The state Department of Fish and Game and Department of Food and Agriculture plan to continue jointly monitoring Tahoe Keys Marina and Shelter Island Yacht Basin for several years to determine the effectiveness of the new regulations in lowering TBT residues in fresh and saltwater environments. Shelter Island Yacht Basin was chosen

as the site for saltwater monitoring because of its extensive history of TBT research. The objective of the monitoring program will be to determine significant change over time in the TBT and DBT concentrations ⁱⁿ of water, sediment and biological tissue.

STUDY DESIGN:

Monitoring Locations

Sampling for the freshwater environment will occur at Tahoe Keys Marina, Lake Tahoe and for the saltwater environment at the inner harbor of Shelter Island Yacht Basin, San Diego Bay.

Schedule

Sampling at Lake Tahoe will be conducted during the week of September 19-23, 1988 and during September of each year thereafter. The sampling schedule for San Diego is dictated by favorable tides (minimal tidal flux) and for 1988 should occur November 17.

Collection

Water - At Lake Tahoe and San Diego, (six replicate samples in ^{C ? feet} ^{how many feet down at each site} one-liter polycarbonate bottles will be collected at mid-depth. Samples will be cooled on wet ice, then frozen on dry ice, and kept at 0°C or less until analysis.

Sediment - At Lake Tahoe and San Diego a coring device will be used to obtain eight sediment samples. The upper 10 cm of each core will be removed from the coring device and placed in polycarbonate jars. Sediment

where will samples be pulled? - random or systematic?

2 profiles from F/A - 1000/1000

Do we fly/dive with f/c or down/mitt

samples will be cooled on wet ice, then frozen on dry ice, and kept at 0°C or less until analysis.

Biota - At Lake Tahoe, fish will be collected in the marina area using gill nets set on the bottom substrate. Twenty-four fish of the same species will be taken from gill nets to produce eight discrete samples consisting of a composite of three individuals. The fillets from both sides of each fish will be removed for analysis. The target species will be Tahoe sucker (Custostomus tahoensis) but if not enough are caught, tui chub (Gila bicolor) will be used. Fish will be wrapped in aluminum foil, put in an airtight plastic bag, placed on dry ice and kept at 0°C or less until analysis.

Approximately 260 mussels (Mytilus californianus) will be collected from Bodega Bay and divided into 13 groups of 20 individuals. One group will be retained as a control and the other twelve groups will be transported to San Diego Bay, put into nylon bait bags, and suspended in the area of Shelter Island Boat Harbor from buoys or secured to dock pilings using skin diving equipment. Ninety-days following the transplant, eight samples of mussels will be randomly chosen from the 12 (or whatever number remains if vandalism occurs). The entire body of the mussel, excluding the shell, will be removed for analysis. Muscles will be wrapped in aluminum foil, placed on dry ice and kept at 0°C or less until analysis.

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Monthly moring records containing information on number of boats and their lengths at each marina will be obtained from harbor managers to estimate potential release of TBT into the study areas.

Chemistry

The chemical analysis will be performed by DFG laboratory. TBT and dibutyltin (DBT) residues in sediment and biological tissue will be determined by electron-capture gas chromatography using the method of Tsuda et al. (1986)^{1/}. TBT and DBT concentrations in water will be determined by flame photometric gas chromatography using the method of Matthias et al. (1986)^{2/}.

When do we do water samples?
Can't - no time - they're

Quality Control

Water - One-half of the volume from the six replicate water samples from each site will be composited and split into six duplicate^a samples for analysis.

Sediment - Sediment cores will be thawed overnight, and homogenized. One-half of the volume from the eight replicate sediment samples from each site will be composited, rehomogenized, and split into five duplicate samples for analysis.

Biota - Fish from Lake Tahoe and mussels from San Diego Bay will be thawed overnight. One-half of each of the volume from the eight replicate tissue samples of fish will be composited, rehomogenized, and split into five duplicate samples for analysis. Similar quality control will be done for the mussels.

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Quality Assurance

The U.S. Navy will analyze one duplicate water, sediment, and tissue sample from each site.

Estimated Number of Samples to be Analyzed

	DFG		Navy
	<u>Rep</u>	<u>Dup</u>	<u>Dup</u>
Tahoe Keys			
Water	6	5	1
Sediment	8	4	1
Fish	8	4	1
Shelter Island			
Water	6	5	1
Sediment	8	4	1
Fish	8	4	1
	Total	44	26
			6

^{1/} 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. 69:9181-984.

^{2/} Matthias, C., J. Bellama, G. Olson, and F. Brinckman. 1986.

Comprehensive butylmethitin species at ultratrace levels using simultaneous hydridization/extraction with gas chromatography-flame photometric detection. Environ. Sci. Technol. 20:609-615.