



UNIVERSITY OF THE PHILIPPINES

Master of Science in Environmental Science

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*Application of Direct Mercury Analysis in the Determination and Risk Estimation of
Mercury in Marketable-Sized Milkfish (*Chanos chanos*) and Tilapia
(*Oreochromis niloticus*) Cultured in the West and East Bays
of Laguna Lake*

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ABSTRACT

Direct Mercury Analysis (DMA) was validated for its detection limit and accuracy in determining total mercury in (approximately 0.010-0.100 g) fish muscle tissue samples within the 0.5224-100.9 $\mu\text{g}/\text{kg}$ (0.0261-5.046 ng) linear working range. Limit of Detection was approximately 70 times lower than the Preventive Action Limit of the most stringent standard. Accuracy was evaluated for Trueness by Bias (100.8%) and Recovery (91.91%), and for Precision through Repeatability at low (RSD = 5.035%) and high (RSD = 1.244%) levels. Deemed fit for purpose, the method was used to analyze fish muscle tissue samples of marketable-sized milkfish and tilapia cultured at the West and East Bays of Laguna Lake. Statistical treatment showed significant differences among the total mercury concentrations of the data sets and allowed ranking as follows: West Bay Milkfish (n = 30, 5.403 $\mu\text{g}/\text{kg}$) > East Bay Milkfish (n = 30, 4.633 $\mu\text{g}/\text{kg}$) > West Bay Tilapia (n = 30, 3.919 $\mu\text{g}/\text{kg}$) > East Bay Tilapia (n = 29, 2.890 $\mu\text{g}/\text{kg}$). Using these values, exposures through consumption of the fish samples were calculated for different population groups with children being the most susceptible (0.0982-0.1837 μg Total Hg/ kg BW/week) and adult males being the least (0.0333-0.0623 μg Total Hg/kg BW/week). Fortunately, risk assessment showed that mean hazard quotients for all groups (0.0067-0.1033) were below the 1.0 criterion indicating that consumption of any of the fish samples has no adverse effects with respect to mercury.