

TOXICITY ASSESSMENT OF SUSPENDED SEDIMENTS CONTAINING PERSISTENT TOXIC SUBSTANCES AROUND HONG KONG HARBOUR

KC CHEUNG¹, YK YUNG² AND MH WONG¹

¹Institute for Natural Resources and Environmental Management, and Department of Biology, Hong Kong Baptist University, Hong Kong

²Environmental Protection Department, Hong Kong

In Hong Kong, marine sediment is dredged for land reclamation and the dredging operations result in sediment resuspension. Resuspension of sediment causes increased turbidity that may adversely affect aquatic life. The toxic effects of suspended clean (Port Shelter) and contaminated (Tsing Yi) sediments on selected local marine organisms were assessed. As expected, Tsing Yi sediments were contaminated with TBT (3.2-100 µg/kg dry wt.). Chromium (Cr), copper (Cu), nickel (Ni) and zinc (Zn) in Tsing Yi sediments exceeded the Upper Chemical Exceedance Level (UCEL) of 160 mg/kg, 110 mg/kg, 40 mg/kg and 270 mg/kg, respectively (Works Bureau Technical Circular (WBTC) No. 3/2000 as "Management of Dredged/Excavated Sediment"). The lethal toxicity for clam (*Tapes philippinarum*) expressing as 96 h-LC₅₀ was 29 mg/L for Tsing Yi sediment and 290 mg/L for Port Shelter sediment, while Fish (*Siganus oramin*) was 46,000 mg/L for Port Shelter sediment, and 24,000 mg/L for Tsing Yi sediment. The results indicated that chemical properties of suspended sediment contributed more to the mortality of the tested organisms than physical effects. The clam was more susceptible to suspended sediment than fish. The sub-lethal effect was subsequently evaluated by the use of Comet Assay. The extent of DNA damage in gill cells of studied organisms was indicated by the tail moment. The ranges of tail moment in clam gill cells were 2.0 to 4.5 for Port Shelter sediment (100 – 500 mg/L) and 3.5 to 6.5 for Tsing Yi sediment (10 – 50 mg/L); and in fish gill cells, 1.5 to 8.5 for Port Shelter sediment (32,000 – 48,000 mg/L) and 8.0 to 17.5 for Tsing Yi sediment (16,000 – 32,000 mg/L) respectively. The DNA damage was shown higher in the gill cells exposed to suspended sediment contaminated with DNA-breaking agents such as Cd (0.15 mg/kg dw) and total PAHs (176 µg/kg dw) in comparison with the clean sediment (Cd: 0.09 mg/kg dw; total PAHs: 60 µg/kg dw). Other heavy metals might also exert harmful effects. The results demonstrated that the resuspension of sediment contaminated with persistent toxic substances was likely to cause ecotoxicological impact on two local species.