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Impact Of Antifouling Biocide On Marine Environment

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Organotin (Ot) compounds had been used for many years on ships, marine structures and fishery nets until detection of toxicity and accumulation characteristics. Ot compounds were subsequently prohibited on the 17th of September 2008. Alternative compounds began to be used for ships with the thought that ot alternative antifoulants would not accumulate in seawater and sediment as much as ot compounds, due to the faster resolution speed. However, ot alternative antifoulants have been detected at higher levels than initially expected which has caused concern about the possible affects. In this research, the antifouling biocide's concentration in seawater and sediment samples were investigated, then the toxicity tested, followed by the risk factor being calculated from the concentration and toxicity, and finally the environmental risk was evaluated. Research results 1 Residual concentration of antifouling biocide in seawater and sediment samples ・Concentrations of Diuron, Sea-nine211, Irgarol 1051 and M1 in seawater samples were detected at ND-0.73 µg/l, ND-0.10 µg/l, ND-0.092 µg/l and ND-1.3 µg/l, respectively. ・Concentrations of Diuron, Sea-nine211, Irgarol 1051 and M1 in surface sediment samples were detected at ND-73 µg/kg, ND-40 µg/kg, ND-28 µg/kg and ND-9 µg/kg, respectively. ・Concentrations of Diuron, Sea-nine211, Irgarol 1051 and M1 in sediment core samples were detected at ND-220 µg/kg, ND-140 µg/kg, ND-270 µg/kg and ND-13 µg/kg, respectively. 2 Effect of antifouling biocide on oyster and sea urchin embryo development ・Toxicity in oysters was higher than that in sea urchins. ・There were signs of deformity and delayed development in the 0.1µg/l treatment oyster embryos which survived on Sea-Nine 211, TBT and TPT so it was thought that no observed-effect concentration (NOEC) was under 0.1µg/l. Conclusion ・The ports and marinas were the main contributing areas to the presence of these chemicals in the waters of Hiroshima. ・Detection rate for each year was increasing so it was thought that these results were caused by the expansion of seawater pollution. ・Finally, environmental risk was decided by a risk factor with a value that exceeded 1.0. Therefore, Sea-Nine 211 was determined as the only organotin alternative antifoulant which had an effect on oyster embryos development in Hiroshima Bay. Keywords: Antifouling biocide, Environmental risk, Risk factor, Oyster, Sea-Nine 211