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DEVELOPING WATER QUALITY GUIDELINES FOR ANTARCTICA: THE SENSITIVITY OF ANTARCTIC MARINE BIOTA TO METAL CONTAMINANTS

CK King[1], BJ Kefford[2], MJ Riddle[1], D Nugegoda[2]

[1]Australian Antarctic Division, Kingston, Tasmania, Australia, [2]RMIT University, Bundoora, Victoria, Australia

There are a range of chemical contaminants of concern in Antarctic marine environments as a result of the activities of humans, including past waste disposal practices and accidental fuel spills. Environmental guidelines for contaminants, including targets for contaminated site remediation, are well established in temperate and tropical regions, but have not been developed for Antarctica. Such guidelines typically use locally derived data on the response of local organisms to environmental contaminants. There is however, very little ecotoxicological data on Antarctic organisms, and it is unknown whether water and sediment quality guidelines developed elsewhere in the world are appropriate for use in the Antarctic.

In this study, the problem of paucity of data for Antarctic species is addressed as the sensitivity of a wide range of species from numerous taxonomic groups and from a range of environments (benthic, epiphytic and planktonic) to common metal contaminants including copper, zinc and cadmium are investigated. Acute toxicity tests were conducted over a 4, 10 or 30 day period with daily monitoring of mortality and sublethal behavioural responses. Point estimates were calculated for individual species or taxa and were incorporated into species sensitivity distributions (SSD) for each metal to determine the concentrations likely to be hazardous to Antarctic biota. The sensitivity and the exposure time response of Antarctic species are compared quantitatively with the responses of related temperate and tropical species, to assess the potential for data from these environments to be used to predict the toxicity of contaminants to Antarctic, and more generally, polar organisms. This information will form the basis for the development of ecological risk assessment methods and appropriate environmental guidelines and standards for Antarctica.