the possibility of occupying contaminated land and water. This study alerts developers and mine owners to do preliminary studies on radionuclide levels in water, sediments and land, particularly where agricultural production occurs. This will assure the public that potential doses are well within limits.

## ABSTRACT

Investigations were made into the occurrence and concentration values of 226Ra and uranium in some gold and uranium mine polluted aquatic environments in the Transvaal. An overview is given on aspects of the possible environmental effects of 225Ra and uranium as well as background data on factors affecting the biological uptake and transport of both radionuclides in some terrestrial and aquatic organisms. A brief discussion is given on the prevailing physical and chemical conditions of the irrigation water and agricultural soils at three localities where analyses were made for the presence and concentrations of both radionuclides in the water, in stream sediments, in selected aquatic plants, in a decapod macro-invertebrate, in fish and in water birds. In order to evaluate the potential effects of these radionuclides on man, studies were also conducted on the concentration ratios of  $^{226}$ Ra and uranium in these organisms and the abiotic environment in which they occur, including selected vegetable crops irrigated with mine polluted river water. The experimental uptake of radium by beetroot and cabbage under controlled environmental conditions was also investigated. These data were then used in a dose assessment model looking at various potential pathways of both radionuclides to man including via soil, drinking water, vegetables, a cereal and fish.

Field results obtained showed that in virtually all cases the presence and concentrations recorded for both radionuclides were (and possibly are also at other affected areas) at least an order of magnitude lower than concentrations found in countries such as Japan, Germany and the USA, and that in all cases concentration values found for both radionuclides in the present study fall below the maximum recommended guideline values laid down by the Council for Nuclear Safety (CNS) of South Africa.

The dose assessments for the scenarios chosen indicate that the annual effective dose for uranium and radium is a fraction of the maximum allowable limit for members of the public. However it is possible that certain site specific concentration values may require controls to limit exposure.

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