Developing International Radiological Risk Assessment Tools and Approaches for Australian Arid Environments

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ABSTRACT

Recent international and Australian regulatory guidance has increased the need for effective tools to assess radiological impacts in the environment, especially arid environments surrounding uranium mines. While radiological impacts to humans are well understood, radiological impact assessment of mining activities to non-human species is important to protect wildlife diversity, especially of native species. The existing data and parameters used in internationally accepted methods and models such as ERICA (Environmental Risk from Ionising Contaminants: Assessment and Management,) and RESRAD (RESidual RADioactive Materials) are generally based on northern hemisphere conditions. There is a recognised lack of southern hemisphere data and resulting comprehensive analysis, particularly from Australia.

This presentation describes a collaborative project between university, government and industry and the industry growth centre for energy resources, aimed at developing a more complete understanding of radiological uptake of natural U decay series products by native and introduced flora and fauna species in arid Australian environments. The presentation will cover the research framework, sampling and analysis approaches which we are applying in arid environments, and how these fit into international practice. Initial data and concentration ratios from analysis of *Dodonaea viscosa* and *Acacia ligulata*, bettongs and corresponding soil will be presented. Novel approaches to measurements of radionuclides including their distributions within individual leaves and soil depth profiling will also be presented. Holistic data collection and analysis protocols are used, which form the basis of the databases used by the internationally accepted models and comparison to extant studies.

The project builds a framework for a comprehensive Australian context and understanding of radionuclides and their pathways in the environment, which may vary depending on location and species. This project demonstrates the value of applying analytical approaches and generation of robust data sets towards radionuclide modelling in arid environments.

Keywords: radioecology, uranium, flora, fauna, arid environment