

Migration of uranium in groundwater in three naturally occurring anomalous areas in South Africa.

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Desktop-level predictive modelling has identified a number of areas in South Africa where naturally elevated uranium concentrations may be expected in groundwater. Three areas were selected for the verification of this model, namely a large area extending through Bushmanland and Namaqualand, in the vicinity of the town of Pofadder which is known to have naturally elevated levels of uranium in the rocks and two areas of known potentially economic mineralisation in the Karoo Uranium Province, close to the towns of Sutherland and Beaufort West. The results of sampling in the above areas showed no clear correlation between uranium levels in groundwater and neighbouring rock material. Elevated levels of uranium existed in groundwater from the Bushmanland area, where rock concentrations of uranium were low, yet a contradictory pattern emerged in the Karoo Uranium Province. Neither leach testing of rock materials from these areas nor geochemical modelling were found to reliably predict groundwater uranium concentrations, indicating that complex processes are at work. These conclusions were used to inform the development of policy recommendations with respect to groundwater development in areas where high levels of naturally occurring uranium (or other hazardous elements) are suspected in groundwater.