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LEAD ISOTOPIC RATIOS AS A NUCLEAR FORENSIC SIGNATURE FOR AGE DATING OF URANIUM ORES

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South Africa has four uranium "ore provinces", and largely based
on the ages of the provinces, they have distinct nuclear forensics signatures. The International Atomic Energy Agency has mandated all its Member States to develop National Nuclear Forensics Libraries in response to the nuclear security threat posed by nuclear material trafficking. South Africa is thus enhancing their capabilities to interdict and attribute any nuclear material out of regulatory control within its borders, by undertaking this project to document the age and origin of uranium ore materials. In this project, we have determined lead (Pb) isotopic ratios of uranium ore sourced from South Africa and evaluated the Concordia Ages of the two uranium ores. Results show that Variations in the Pb isotopic ratios of different geologic deposits provides a unique nuclear forensic signature for dating the ores. Top ore had an age of 1.8 Ga while the deeper ore had an age of 3.8 Ga. This provides a new nuclear security tool for South Africa's nuclear materials.

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