

Geochemical alteration associated with uranium roll front mineralisation in the Lake Frome Basin

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TITLE

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RUNNING TITLE

Geochemical alteration signature at Beverley North

ABSTRACT

Sedimentary uranium systems represent a significant source of economically recoverable material, with deposits frequently clustered where conditions are favourable for roll-front formation. Exploration for sedimentary uranium usually attempts to target redox fronts within paleochannels or clastic sedimentary sequences which could be potential sites for roll front style uranium mineralisation. Sediments altered by oxidation can be re-reduced at a later date by bacteria making it difficult to determine if an oxidised fluid has moved through the sequence.

The movement of oxidising fluids through sediment will inevitably alter both the chemistry of the sediment and the fluid supplying uranium. Elements which are sensitive to redox conditions dissolve and precipitate as conditions change creating a recognisable geochemical footprint. In particular the uranium, molybdenum and arsenic contents of the sediments are changed in a way which is not reversed by re-reduction. These changes are distinctive enough to be detected using a handheld X-Ray fluorescence device which enables rapid decision making in the field even if traditional methods allow for far greater precision and accuracy.

The findings of this study describe geochemical changes linked to oxidation in the Pepegoona East and Pannikan deposits, Lake Frome region, South Australia, for use as an exploration tool. It is hoped that by studying changes in the chemistry of these sediments that we may not only improve the efficiency of exploration but also gain a better understanding of how the fluids responsible for uranium mineralisation evolve over time. The addition of data from new deposits will enhance the accuracy of the data set and provide a better understanding of how sediment composition effects alteration.

KEYWORDS

Geochemical alteration, Lake Frome, Uranium, Roll Front, Beverley North, uranium exploration

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