Guffey SD, Piercey SJ, Ansdell K, Kyser TK, Gouiza M, 2014, Footprint of 3D lithogeochemistry of the Millennium unconformity-type uranium deposit, Athabasca basin, Saskatchewan, Abstract, Soc Econ Geol, Keystone, USA

The Athabasca Basin, Saskatchewan, hosts world-class unconformity-type uranium deposits that are important contributors to global uranium production. The Millennium deposit, located in the southeastern part of the Athabasca Basin, is an example of a monometallic, basement-hosted uranium deposit containing ~ 46.8 million pounds of uranium with an average grade of 4.53% U_3O_8, and occurs at a depth of over 600 metres. The goal of this project, which is a small part of the CMIC-NSERC Exploration Footprints Project, is to examine the lithogeochemical footprint associated with alteration, mineralization, and lithostratigraphic variations in the volume of rock surrounding the Millennium deposit, and to potentially utilize these as vectors toward mineralization. Both modal and cryptic alteration haloes and other lithostratigraphic variations will be examined using elements or combinations thereof that may define the deposit footprint. Lithogeochemical data from samples from over 100 drill cores have been analyzed and contain major, trace, rare earth element, and Pb isotopic data determined through total and partial extraction methods. Ongoing work includes geostatistical analysis of the data to understand the natural variations of lithogeochemistry that result from changes in lithology and superimposed alteration and mineralization. The ultimate goal of the project is to create a 2D and 3D lithogeochemical footprint of the deposit that will provide insight as to the extent of alteration, especially its distal edges, and any elements or combinations thereof that may act as pathfinders.

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