Abstract ID: 147

Title: UNCONFORMTIY URANIUM DEPOSITS OF THE ATHABASCA BASIN, CANADA: WITH A FOCUS ON THE WORLD CLASS MCARTHUR RIVER DEPOSIT

Student: No
Topic: Economic Geology
Medium: Invited Oral Presentation

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Keywords: uranium, McArthur River, Athabasca Basin, Canada, unconformity-type deposit

Abstract: The Proterozoic Athabasca Basin in northern Saskatchewan, Canada, hosts the highest grade exploitable uranium deposits in the world. These deposits, termed unconformity-type uranium, are high-grade uranium concentrations located at or near the unconformity between relatively undeformed quartz-rich sandstone sequences of the Athabasca Group and underlying metamorphic basement rocks. Production from Athabasca uranium deposits began in the early 1970's with 11 individual deposits now mined-out and 3 currently in operation. Mining grades of deposits have ranged from 0.5% - 24% U_3O_8. Uranium production from the basin in 2006 totaled 11, 632 tonnes U_3O_8 or about 30% total world production.

The McArthur River uranium deposit is the largest and highest grade unconformity-type uranium deposit found to date in the Athabasca Basin. Current proven and probable reserves as of 12/06 were 727,000 tonnes @ 24.28% U3O8 or 389,100,000 lbs U3O8.

Past production at McArthur River is 306,000 tonnes @ 14.72% U_3O_8 or 99,300,000 lbs U_3O_8.

Uranium mineralization at McArthur River has been delineated over a strike length of 1700 m along the P2 North basement conductor that corresponds to a district scale post-Athabasca sandstone reverse fault. The exceptionally high grade basement-hosted Zone 2 ore body from which the bulk of the reserves are contained is only 60 m in length, 46 m wide and has a vertical thickness of about 90 metres. Three additional zones of mineralization were delineated by underground drilling along this fault over a strike length of 400 m SW of Zone 2.

The uranium mineralization at McArthur River exhibits a strong structural control related to reverse movement along the NE-trending P2 Fault. A major quartzite unit in the metamorphic basement may have acted as a "buttress" to the NW transport of pelitic basement rocks and the cover sandstone in this area resulting in the development of a more complex structural framework than elsewhere along the P2 Fault. This structural complexity may have contributed to an enhanced fluid focus and fluid-rock interaction in this area along the P2 Fault thereby promoting uranium precipitation. Pre-ore silicification of the lower sandstone sealed primary permeability and focused fluids in structurally-induced fracture zones. The sandstone above the ore zones exhibits typical unconformity uranium-type alteration which includes zoned argillic alteration, while basement alteration enveloping the mineralization is characterized by multiphase chlorite-dravite breccias. Textural relationships indicate alteration and mineralization were synchronous with reverse faulting along the P2 Fault.

Although a relatively large geochemical halo exists in the sandstone cover along the P2 North conductor, the very small target size, depth below surface (500-600 m) and the restricted nature of the basement alteration make exploration for further Zone 2-type ore bodies most challenging.