New Athabasca Basin Discoveries are Changes needed from Established Exploration Philosophies?

John Robbins – Manager- New Projects, AREVA Resources Canada Inc.

Successful exploration has resulted in the discovery of many significant unconformity-type uranium deposits within the Athabasca Basin (basin) over the past 45 years. In the last 5 years there have been a number of high profile uranium discoveries. A plethora of information and data has been made available by means of news releases, as well as conference presentations. Though there has been a down turn in the uranium commodity prices; in Saskatchewan, companies have spent $218 million (CDN) in capital expenditures and approximately $45 million (CDN) in exploration expenditures for 2016. In the past 20 years, the uranium mining industry has spent more than $6.4 billion (CDN) on uranium mining projects in the basin in addition to operating expenditures.

Two major discoveries have been made on the south-western edge of the basin by Fission Uranium Corp (Fission) and NexGen Energy Ltd. (NexGen), and a third discovery by Denison Mines Corporation (Denison) is located within the prolific Wollaston-Mudjatik Transition Zone corridor that hosts the world-class McArthur River and Cigar Lake deposits. All of these deposits have the commonality of being basement-hosted deposits that occur, or are estimated to occur, tens to several hundreds of metres below the sub-Athabasca unconformity.

With this in mind, should we consider the current Athabasca diagenetic-hydrothermal unconformity-type metallogenetic model being used by most exploration companies to still be valid in the search for basement-hosted mineralization? The exploration application of this model involves first targeting, by airborne electromagnetic (EM) surveys, reactivated brittle structures hosted by Paleoproterozoic graphitic metapelitic gneiss,commonly known as basement conductors. Follow-up airborne and ground resistivity, gravity surveys, EM and magnetic surveys, refine the location of anomalies interpreted to reflect host-rock alteration features associated with mineralization. The drill testing of these conductors in interpreted favorable locations evaluates the potential for the presence of ‘ingress-’ (basement-hosted) or ‘egress-’style (unconformity/sandstone-hosted) uranium mineralization. The lithological, geochemical, mineralogical, and petrophysical data/information obtained for both the Athabasca Group sandstone and the underlying basement complex help to determine if fluid-mediated alteration and mineralization processes containing potential uranium enrichment are present and provide the vectoring information necessary for subsequent exploration.

Each of these new deposits have been discovered by utilizing a different combination of existing exploration methodologies with a recognition of the results obtained from previous applications of the existing metallogenetic model to explorefor basement-hosted uranium deposits. Have the recent discoveries within the basin used a different exploration model or discovered uranium mineralization in a different setting than those set out in the current model? The answer to both of these questions is no.