

SANDSTONE-TYPE URANIUM DEPOSITS IN THE N.W. TERRITORIES

by Roger D. Morton

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ABSTRACT:

Epigenetic uranium deposits of Precambrian age occur within Proterozoic (Aphebian) strata in the East Arm of Great Slave Lake. The host sequence is a 1.5 to 12 km thick succession of sediments and volcanics laid down between 2200 and 1650 m.y. ago within the Athapuscow aulacogen. Three occurrences of uranium mineralization are described:

(1) Simpson Islands

Patchy, discordant, interstitial U mineralization occurs principally in the lower Hornby Channel Formation, a succession of orthoquartzitic and subarkosic, non-marine sandstones and conglomerates with minor shale lenses. Unleached high grade sectors yield values of 0.4 to 1.5% U_3O_8 , Th/U 0.05 to 0.07, 0.3% Cu, 1 g/t Au and 14g/t Ag with up to 1.5% pyrite. Interstitial pyrite and chalcopyrite (replacing ilmenite and magnetite) are clearly replaced by uraninite accompanied by hematite and anatase. Secondary coffinite and galena replace uraninite. Minor sphalerite and cobaltite are also present.

(2) Snowdrift (Toopon Lake)

Sulphide-rich patches in non-marine, orthoquartzites and subarkoses of the Kluziai Formation carry up to 0.6% U_3O_8 , 0.2% Cu, 0.02% Co and 8.2 g/t Ag. Interstitial pyrite and chalcopyrite are replaced by brannerite and uranian anatase (?) Barite and graphite accompany the mineralization.

(3) Reliance (Meridian Lake)

Pervasive uranium mineralization occurs in coarse, often conglomeratic, non-marine arenites of the Kluziai Formation. All the mineralized rocks are markedly hematite-rich. Grades of 2.6 to 6.7% U_3O_8 have been recorded from high grade patches. Interstitial hematite is accompanied

by 1-5 μm spherules or cubes of uraninite and rarely brannerite which replace pyrite and chalcopyrite. These minerals are accompanied by calcite, safflorite and cobaltite. Secondary coffinite replaces the uraninite. Preliminary U-Pb geochronological data indicate deposition of the uranium minerals between 1800 and 1500 m.y. ago.

It is concluded that the uraniumiferous fluviatile arenites of the East Arm are analagous, both in composition and origin, to the epigenetic sandstone type deposits of S. Dakota and N.E. Wyoming and perhaps in part to those of Gabon. The U minerals formed partly by replacement of a suite of secondary sulphides (and in part by reduction and adsorption of uranium by organic compounds) during zeolite facies burial metamorphism. The deposits may thus represent a new class intermediate between shallow deposits in younger sequences and syn-metamorphic vein deposits common throughout the western Canadian shield.