

HORNBY BAY BASIN URANIUM DEPOSITS

E.A.G. (Ted) Trueman, Pitchstone Exploration Ltd.
Ross McElroy, Triex Minerals Corporation
Frank Hassard, Consulting Geological Engineer

The Hornby Bay Basin comprises a Lower to Middle Proterozoic clastic-carbonate sedimentary sequence subdivided into a lower part dominated by clastics (Hornby Bay Group) and an upper part dominated by carbonates (Dismal Lakes Group). The two groups represent two cycles of terrestrial siliciclastic to marine carbonate deposition.

Hornby Bay Group rests unconformably on metamorphic and plutonic rocks of the Lower Proterozoic Wopmay Orogen (1,950-1,840 Ma). Northeast of Great Bear Lake, Hornby Bay Group is estimated to be 1.5-3.0 km thick and is dominated by fluvial and shallow marine sandstone. Sedimentation ended about the time of emplacement of the Narakay volcanic complex at 1,663 Ma.

Dismal Lakes Group unconformably overlies Wopmay Orogen rocks and Hornby Bay Group; in some areas the contact between Hornby Bay and Dismal Lakes is conformable. Dismal Lakes Group is up to 1.1 km thick and was deposited in shallow marine, fluvial, tidal flats and sabkha environments. Dismal Lakes Group contains sandstone and shale but is dominated by stromatolitic carbonate sediments. Dismal Lakes sedimentation was terminated by an extensional event that resulted in emplacement of the ultramafic-mafic Muskox Intrusion and extrusion of extensive Coppermine River Group plateau basalt. The age of sedimentation is constrained between Narakay (1,663 Ma) and Coppermine River Group volcanism (1,267 Ma).

The Hornby Bay Basin is much more extensive than indicated on published geology maps as it is overlain by younger Proterozoic and Paleozoic units to the north and west. It outcrops north and south of Great Bear Lake and much or all of the lake is likely underlain by Hornby Bay Basin sediments. In the Colville Lakes area, near the Mackenzie River, sediments up to 13.6 km thick have been interpreted from shallow petroleum wells and seismic data to be equivalent to Hornby Bay and Dismal Lakes groups. This would indicate that the Hornby Bay Basin is at least as extensive as the preserved portions of either the Thelon or Athabasca Basins.

Mineral exploration in the region has a long history. Small amounts of native copper were mined from the Coppermine River basalt by aboriginal people prior to the time Samuel Hearne reached the Coppermine River in 1771. In 1956 INCO discovered and explored the Muskox Intrusion. The Eldorado and Echo Bay mines at Port Radium produced intermittently from 1934 to 1982. During

1966-1969 a staking rush took place as a result of the recognition of the similarity of mineralization in the Coppermine River basalt to the copper deposits in Michigan. Uranium was discovered south of Dismal Lakes by Aquitaine in 1969. A high level of exploration activity focused on uranium in the Hornby Bay Basin from the mid 1970's to 1983, stimulated in part by the discovery in 1976 of the Mountain Lake uranium deposit near the Aquitaine discovery. Numerous uranium occurrences were identified during this period.

Pitchblende was discovered at Port Radium on the east shore of Great Bear Lake in 1930 by Gilbert LaBine. Silver and radium were produced from 1934 to 1940, uranium, silver, copper, cobalt, nickel from 1942 to 1960, and silver and copper from 1964 to 1982. During the 1942-1960 period the deposit produced 13.6 million pounds U_3O_8 at an average grade of about 0.7% U_3O_8 . The average ore grade during the final production period was 1,800 g/t silver and 1.0% copper.

Mineralization at Port Radium is within northeast trending, steeply dipping, vuggy carbonate-quartz veins up to one meter thick emplaced along fractures, shears, and also in faults that offset veins. High grade shoots are coincident with dilatant zones that rake steeply in the veins. The age and genesis of this epigenetic deposit are poorly understood. Veins are discordant within felsic and intermediate tuffs, porphyritic andesite flows and agglomerate of the Echo Bay Group (~1,800 Ma). Uranium is paragenetically late, somewhat displaced from the other metals and not always present. Uranium is spatially, and probably genetically, related to the Hornby Bay Basin sediments; silver, copper, cobalt and nickel may have been derived from the Echo Bay volcanics, which in part are highly sulphidic. Age dates for uranium of 1,623, 1,450 and 300 Ma are reported.

The Mountain Lake uranium deposit is located south of Dismal Lakes in a structurally complex setting near the junction of regional Teshierpi and Herb Dixon faults. The deposit is largely stratabound within LeRoux Formation sandstone, the basal unit of the Dismal Lakes Group, and dips 5-10° easterly. There are two or more sub-parallel zones of mineralization concordant with enclosing sediments; individual zones are up to 6.5 m thick.

An inferred resource of 1.6 million tonnes containing 3.7 million kg (8.2 million lbs) U_3O_8 at an average grade of 0.23% has been estimated for the Mountain Lake deposit (43-101 compliant). Mineralization has been traced from near surface to a vertical depth of 136 m. The deposit is within an area 1,300 m long and up to 320 m wide. Mineralized outcrops 1,100 m southwest of the deposit (the Aquitaine discovery) are possibly erosional remnants of an originally more extensive single body that included the Mountain Lake deposit.

At Mountain Lake, pitchblende, coffinite and dark grey uranium oxides occur interstitially in the clastic sediments. Minor discordant, fracture-controlled mineralization has been intersected in drill holes; up to 5.2% U_3O_8 over 0.9 m,

within an 11.1 m core interval that averaged 0.89% U_3O_8 , is recorded. Small amounts of disseminated copper and iron sulphides, and arsenides, are present; assays up to 0.53% copper, 0.26% cobalt, 0.24% nickel and 9.6 g/t silver exist in stratabound mineralized zones. Alteration products include barite, silica, iron oxides, calcite, chlorite and clay minerals.

Age dates of uranium mineralization at Mountain Lake of approximately 1,050 and 450 Ma are reported. Uranium may have been derived from the Hornby Bay Basin clastic sediments, which in turn were derived in part from the felsic plutonic rocks of the Wopmay Orogen. The deposit is spatially related to the shales of the overlying Fort Confidence Formation. The geological setting of the Mountain Lake deposit is analogous to the Oklo-Mounana uranium deposits of the Lower Proterozoic Franceville Basin, Gabon.

Numerous other uranium occurrences exist in the Hornby Bay Basin. Some are hosted by Hornby Bay Basin sediments but many occur in underlying metamorphic and plutonic rocks in proximity to the basal Hornby Bay or Dismal Lakes unconformity, particularly east of the Mountain Lake deposit within extensive land holdings of UNOR.

Most of the land within the Hornby Bay Basin has been re-acquired in recent years for its uranium potential. The most active explorers are UNOR, Triex Minerals, Pitchstone Exploration, Cameco and Hathor Exploration.

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