

PROJECTS RELATED TO URANIUM

In just five years, uranium has risen from a forgotten metal to the most significant commodity target in the province in terms of total exploration spending. The most active exploration areas are in Labrador, within the area known as the Central Mineral Belt (CMB) — now the second most important uranium exploration play in Canada, after the Athabasca Basin. Uranium mineralization in the CMB is diverse and complex, and

there is a clear need for geological information following the 25-year hiatus in systematic investigation. Uranium exploration in Newfoundland remains in its infancy, except for the sedimentary rocks of the Deer Lake Basin, which were explored in the late 1970s. The main focus of Survey research remains in Labrador, although some effort is directed towards Newfoundland.



The CMB of Labrador was initially defined as an important uranium metallogenic province over 50 years ago, and it was explored intensively during the 1960s and 1970s. This activity led to the discovery of the Kitts and Michelin deposits, which came close to commercial development prior to the decline of uranium prices in the late 1970s. Exploration for uranium resumed in 2003, and drilling has now added significantly to uranium resources at previously-known deposits. The first integrated overview of uranium in the CMB in 25 years was published in ***Current Research 2008***. The CMB of Labrador contains several styles of uranium mineralization, some of which are hard to classify, but these fall into three broad groups, which appear to be associated with magmatic, metamorphic-metasomatic and sedimentary processes, respectively. Magmatic styles of mineralization include syngenetic concentrations in pegmatites and felsic volcanic rocks, and also hydrothermal veins and breccia zones, some of which may have IOCG affinities. Metamorphic and/or metasomatic mineralization is hosted mostly by felsic metavolcanic rocks, but also occurs in metasedimentary rocks and deformed granites. This class includes the important deposits at Michelin, Jacques Lake and Kitts. Mineralization associated with sedimentary rocks is mostly hosted by terrestrial facies of the Bruce River Group, and its relation to other styles of uranium mineralization remains unclear. It seems likely that the CMB of Labrador records discrete and perhaps sequential mineralizing episodes in which uranium was progressively concentrated.

The uranium metallogeny project in 2008. Upper Photo: field work in the Benedict Mountains of the eastern Central Mineral Belt. Lower Photo: high-grade mineralization in felsic metavolcanic rocks from the Michelin deposit.

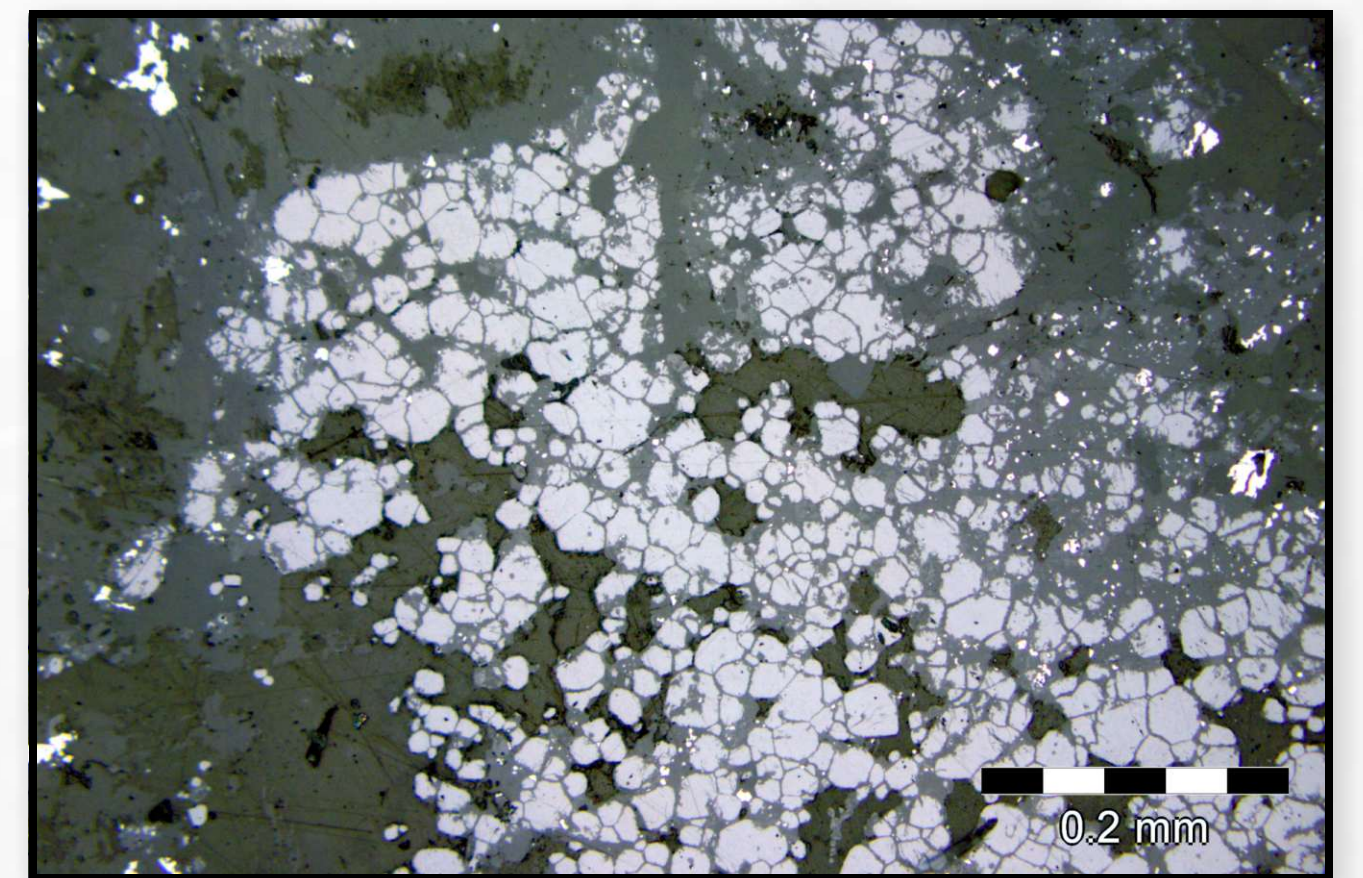
Research by the Geological Survey in Labrador is aimed primarily at providing basic descriptive information and regional context for uranium mineralization, which is lacking for many examples. Examination of drill core from numerous advanced exploration programs is also an important priority whilst exploration levels remain high and material is accessible. Much of the mineralization is epigenetic, and knowledge of the timing of mineralization is critical in assessing models and evaluating the potential of various units. Earlier

U-Pb data on uraninite separates suggest an important episode between 1.9 and 1.7 Ga. New U-Pb zircon data from both TIMS and SHRIMP techniques now places better minimum constraints on the age(s) of mineralization, and suggest that the small but high-grade Kitts deposit is significantly older than the larger, low-grade deposits at Michelin and Jacques Lake. Previous models that viewed all these as temporally related now require revision.

Uranium deposits are extremely difficult to date accurately. This is partially because radioactive decay destroys the structure of minerals and makes them prone to losses or gains of parent or daughter elements. Uranium is also easily remobilized through post-mineralization alteration. Ultimately, the answers to geochronological questions depend on studies of primary uranium-bearing ore minerals such as uraninite. Although these minerals have proven problematic for conventional TIMS

analyses, they can now be investigated on a microdomain scale using the SHRIMP instrument. We have initiated a collaborative project with the GSC to evaluate the potential for direct SHRIMP dating of uraninites from Labrador, using methods developed for studies of unconformity-style deposits in the Athabasca Basin region.

Photomicrograph of coarse uraninite from the Kitts deposit - a candidate for dating ?



In Newfoundland, some limited work was completed in the Hermitage Flexure area during 2007, and also in 2008 within and around the Deer Lake Basin. This area is famous for high-grade uranium in boulders, and has been suggested to be an analog of important sandstone-hosted deposits in Niger, west Africa. Work in the Deer Lake Basin is also anticipated to be a collaborative project with the GSC.