Uranium Exploration in Yukon - 2006

Lara Lewis and Mike Burke
Yukon Geological Survey

Yukon Geological Survey

Yukon Energy, Mines and Resources

Introduction

Uranium exploration in Yukon peaked in the early 1980s. Until recently, no new exploration or research had been undertaken for over 20 years. Renewed interest in uranium is slowly filling the knowledge gap. A flurry of uranium exploration activity occurred this year. Roughly $12 million was spent on uranium targets in 2006.

Yukon is highly prospective for uranium. Four main deposit types saw work this season: Fault/shear-associated (possible unconformity-related), Wernecke Breccia-asssociated (Iron oxide copper-gold+uranium-type), intrusion-related and volcanic-related.

Uranium Behaviour

Uranium is mobile:

•at low temperatures in oxidized environments, e.g., in groundwater, uranium may migrate many kilometres from its source before precipitating.
•in alkaline environments - high pH - with carbonates in solution
•in high-salinity fluids, e.g., in basinal brines

Uranium can remobilize due to
•weathering
•diagenesis
•metamorphism - contact, regional, dynamic
• hydrothermal interaction

Uranium precipitates under reducing conditions in contact with:
•carbonaceous material such as organic matter or graphite in fault zones
•chlorite in metamorphosed metasediments
•zones of sulphide mineralization

Uranium-mineralized (brannerite) K-feldspar-quartz veining cross-cutting reducing chloritic phyllite at the Deer Claims of Signet Minerals Inc. (Darney/Curie Yukon MINFILE 106E 031).

•In magmatic systems, uranium is incompatible and will remain in late-stage magmatic phases (crystallizing in aplite or pegmatite) or will exsolve into fluid phases and precipitate in hydrothermal veins. Uranium may remain in hydrothermal fluids down to temperatures as low as 150˚C.

Exploration Models

Wernecke fault/shear-associated (possible unconformity-related)
•uranium mineralization occurs in or near major faults or shears cutting Wernecke Supergroup rocks.
•Wernecke Breccia not obviously related to occurrences, although intrusion of breccia likely exploited same structures.
•roughly east-west structures are main mineralized features; north-south structures also mineralized
•mineralization occurs in reduced zone, along with limited sulphide minerals, commonly with chloritic and hematitic alteration.
•Simple metal association - Uranium with minor copper mineralization. •Uranium may occur as brannerite or pitchblende.
•Potential for large deposits - drilling of a roughly east-west horizon near a major north-south fault at the Jack Flash showing, Lumina property (Cash Minerals Ltd./Twenty Seven Capital Corporation; Pterd property, Yukon MINFILE 106C 069) intersected 55 m of 0.1% U3O8.

Wernecke Breccia-associated (iron oxide copper gold+uranium-type - IOCG)
•uranium minerals disseminated in Wernecke Breccia (WBx); as veins or small shears cross-cutting WBx; or, in fractures or veins in alteration zone around WBx.
•IOCG-type metal association: uranium occurs with Au, Cu, Co, Ag and minor Mo mineralization.
•uranium mineralization commonly occurs with significant alteration including the following: silicification, albitization, hematization, sericitization, chloritization and carbonatization.

Volcanic-related
•uranium mineralization occurs at or above contact between felsic intrusions and overlying younger volcanic rocks and in zones of breccia and cataclasite caused by near-surface volcanic flows
•uranium source may be volcanic rocks and/or underlying granitic rocks which can be leached/altered for many metres below contact, e.g., Hotdog property (Cash Minerals Ltd./Twenty Seven Capital Corporation; Lion property, Yukon MINFILE 115H 014), which has also been identified as a uraniferous paleo-channel deposit where regolith served as a reducing trap for uranium precipitation.

Intrusion-related
•uranium occurs in veins or aplite/pegmatite dykes cutting intrusions or surrounding sediments, in shears within granite, or as uranium minerals disseminated within the intrusion. At the Murphy project (Yukon MINFILE 115H 014), disseminated U mineralization is associated with secondary yellow and green stained cavities within the intrusion.

Acknowledgements

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References and Further Reading

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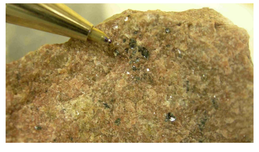
*NOTE: all assays are of rock samples collected this summer by the author during property visits or from core stored at the core library. Analyses were done by Acme Analytical Labs, 1T-MS method.

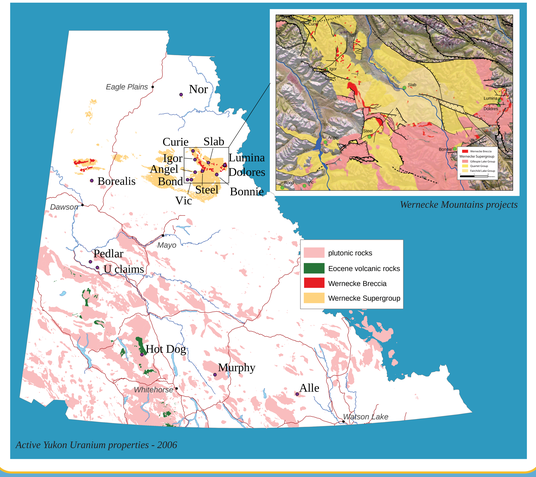
Hematitic Alteration

Hematized (red) radioactive zone in Fairchild Lake Group rocks near Wernecke Breccia at Slab Mountain. Grab sample assayed 335 ppm U, 26.7 ppm Ag, 2.7 ppm Au.*

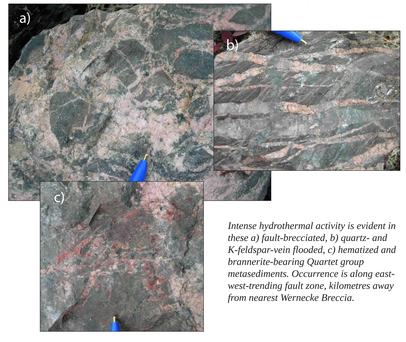
Pitchblende occupies fractures in hematized Wernecke Breccia



Shiny black brannerite crystals in hematite-altered, carbonate-rich Gillespie Lake Group rocks from Nor property (Ewen property - MINFILE 106L 061), south Richardson Mountains. This grab sample assayed 3164 ppm U, 3.1 ppm Ag and 0.1 ppm Au.*



Fault- and Shear-Associated



Intense hydrothermal activity is evident in these a) fault-brecciated, b) quartz- and K-feldspar-vein flooded, c) hematized and brannerite-bearing Quartet group metasediments. Occurrence is along east-west-trending fault zone, kilometres away from nearest Wernecke Breccia.

Intrusion- and Volcanic-related

*Figure: **Left** - Uraniferous aplite from Dawson Range area assays 59 ppm uranium*. Uranium values for an average granite are 3-5 ppm. Note red hematitic halos surrounding mafic minerals.*

*Figures: **Right** - Radioactive zone at contact between volcanic flows and underlying uraniferous granite (Hotdog property; aka Lion, Yukon MINFILE 115H 014). **Lower left** - altered, bleached granite near contact with volcanic rocks. **Lower right** - same granite at depth is less altered and assays 76 ppm uranium*.*

Key Points

Wernecke Mountains - gaps in knowledge
• Wernecke Supergroup strata and associated Wernecke Breccia have the potential to host significant uranium occurrences, along with other metals: copper, gold, cobalt, silver and Molybdenum.
• Uranium and metal mineralization likely occurred in multiple phases, and is poorly understood.
• Age of uranium mineralization is not known. The region has a complex structural history. Uranium has likely been repeatedly remobilized, e.g., radioactive zones occur in younger Cambrian rocks at northwest margin of Wernecke Supergroup rocks.
• Regional geological mapping (1:50,000 scale) -- an important tool for regional exploration -- is lacking for most of the Wernecke Mountains area.

Uranium exploration - Wernecke Mountains
• Iron oxide copper-gold+uranium and unconformity-related uranium are key models for exploration.
• hematitic alteration virtually always accompanies uranium mineralization. Red staining of country rock or vein minerals is an indicator, as is yellow staining caused by secondary uranium minerals.
• uranium commonly occurs with other mineralization (Cu, Au, Ag, Co), making any mineralized zone potentially prospective for U.
• Largest uranium showings in the Wernecke Mountains occur outside WBx, in fractures/faults and shears, precipitated by reducing chloritic or carbonaceous rocks.

Intrusion- and volcanic-related exploration
• Regional geochemical surveys and radiometric surveys are a first-pass method of indicating productive intrusive and volcanic rocks
• Dense uraniferous vein networks or aplitic dyke stockworks can produce mineable low-grade, high tonnage intrusion-related uranium deposits (e.g., Rossing deposit in Namibia)
• Reductive horizons (carbonaceous rocks, sulphide-bearing rocks, chlorite-rich volcanic flows, organic-rich regolith) will cause precipitation of uranium minerals.

For more information, contact:

Lara Lewis
(867) 667-8518
Lara.lewis@gov.yk.ca

www.geology.gov.yk.ca