

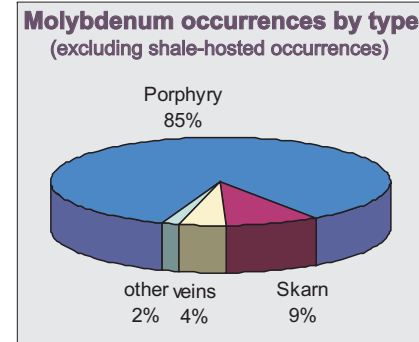
Exploration Models

Molybdenum deposit models useful for exploration in the Yukon include the following:

- 1) **Disseminated and stockwork molybdenite** developed in Devonian, Cretaceous and Tertiary intrusive rocks. Associated elements include W and Cu (e.g., Red Mountain, Logtung, Hoidahl, Klot/Patt, Casino and Tootsee).
- 2) **Molybdenite-bearing skarn** deposits developed in Paleozoic and Mesozoic carbonate rocks at, or near, contacts with felsic Devonian, Cretaceous and Tertiary intrusive rocks. Associated elements include W and Cu (e.g., Whitehorse Copper and Stormy).
- 3) **Molybdenite-bearing veins and stockworks** in hornfelsed sedimentary rocks near Cretaceous and Tertiary intrusive rocks. Associated elements include Cu, Co, Zn, W, As, Pb (e.g., Bloom and St. Elias).
- 4) **Molybdenite-bearing black shales** in areas underlain by Cambrian-Devonian Road River Group and Devonian-Mississippian Earn Group in the Selwyn Basin and North American Platform. High values of Mo and other metals occur in regional silt samples from creeks draining these areas.



Disseminated and stockwork molybdenite from the Logtung deposit



Further Reading

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For more information, check the Yukon Geological Survey website:

www.geology.gov.yk.ca



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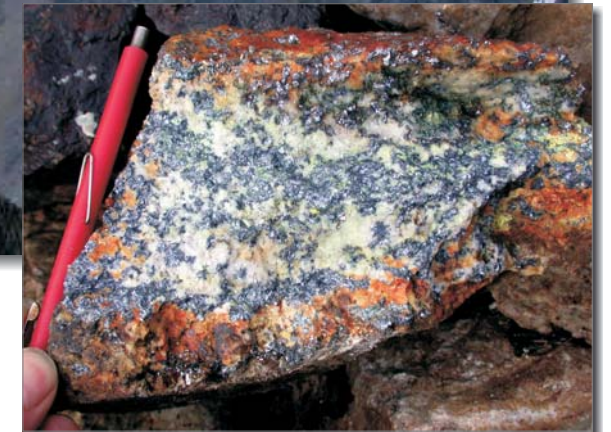


MOLYBDENUM



Yukon Molybdenum Potential

YGS Brochure 2006-3



- ▶ Molybdenum in Yukon occurs in porphyry and skarn deposits related to Devonian, Cretaceous and Tertiary plutonic suite.
- ▶ Red Mountain is the Yukon's largest molybdenum deposit, a Cretaceous porphyry containing 187.3 Mt of 0.167% MoS₂.
- ▶ Exploration is currently being directed towards porphyry deposits in southeastern Yukon.

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Introduction

Molybdenum occurs throughout Yukon and is mainly associated with Devonian to Tertiary plutonic suites. The main deposits include Red Mountain (Mo), Logtung (W-Mo) and Casino (Cu-Mo; Table 1); these are porphyry deposits.

Devono-Mississippian black shale in the Selwyn Basin and North American Platform is also locally enriched in molybdenum (with other metals). Regional stream sediment samples contain up to 1240 ppm Mo.

Geology of Molybdenum Occurrences

Molybdenum porphyry deposits are associated with several plutonic suites:

- Devonian Old Crow Suite
- mid-Cretaceous Whitehorse Suite
- mid-Cretaceous Cassiar Suite
- mid-Cretaceous Selwyn Suite
- Late Cretaceous Prospector Mountain suite
- Early Tertiary Nisling Range Suite
- Oligocene Tkope Suite



Hoidahl quartz monzonite

Molybdenite occurs largely in quartz veins and stockwork, and is also disseminated in the tops of felsic intrusions, e.g., Casino, Tad, Patt, Two Buttes, Red Mountain, Logtung & Tuna. Molybdenum-bearing skarns occur in calcareous strata adjacent to the intrusive rocks, e.g., Whitehorse Copper, Pow and Stormy.

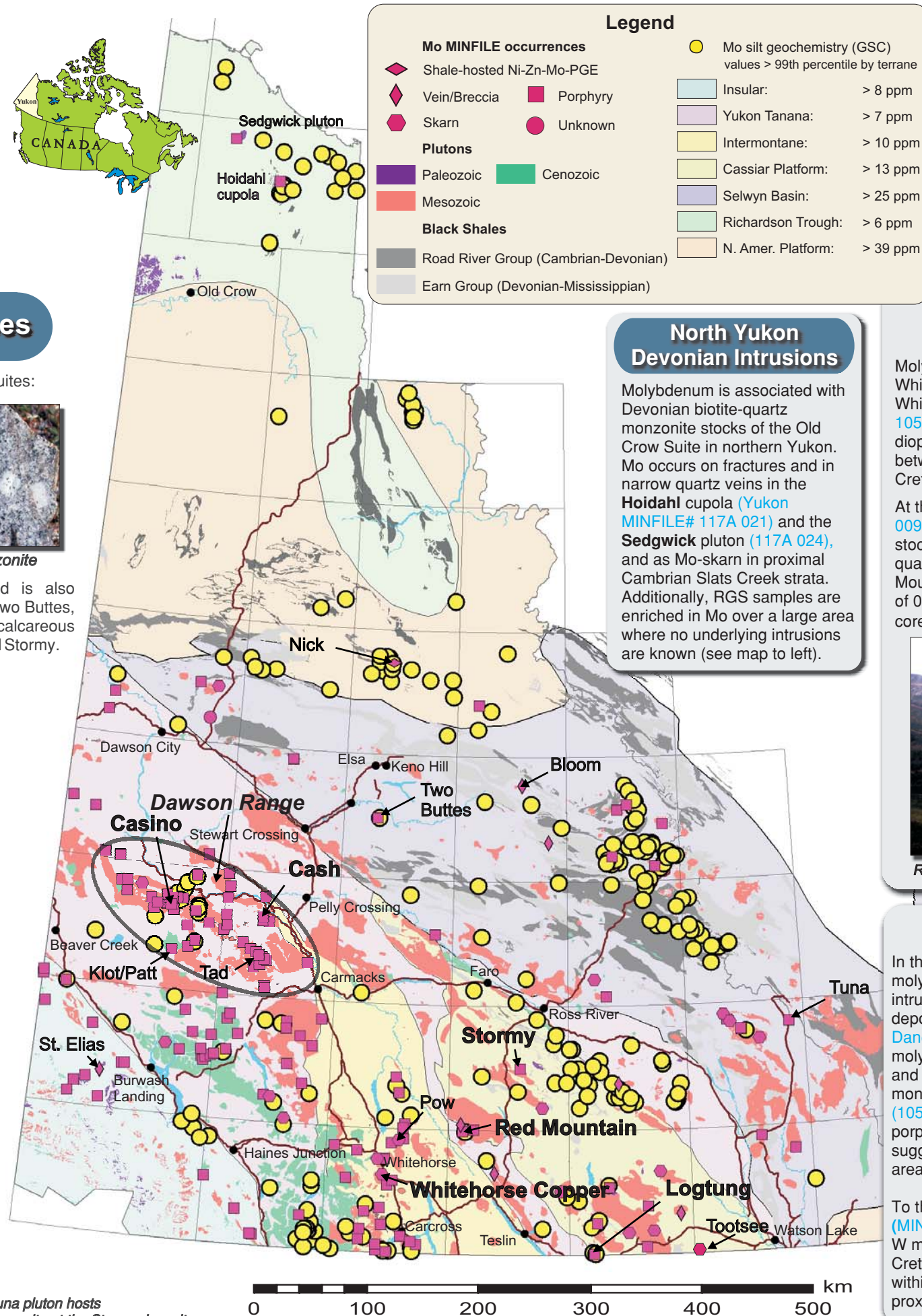
Deposit	Million tonnes	% MoS ₂	% Mo
Casino	675	0.033	0.02
Logtung	229	0.05	0.03
Red Mountain	187.3	0.167	0.111
Cash	36.3	0.03	0.018
Stormy	0.0134	0.73	0.49
Cowley Park	0.884	0.066	0.044

Table 1: Yukon molybdenum resources

Regional Geochemistry

Anomalous regional silt geochemical data for molybdenum displayed (right) with respect to Yukon terranes shows:

- Good correlation between Mo and plutonic suites known to host significant porphyry, skarn and vein molybdenum mineralization;
- Exceptions to this occur in the Selwyn Basin and North American Platform where high Mo is also in silts derived from Devono-Mississippian black shales and cherts of the Road River and Earn Groups, host to the Nick occurrence in central Yukon.



North Yukon Devonian Intrusions

Molybdenum is associated with Devonian biotite-quartz monzonite stocks of the Old Crow Suite in northern Yukon. Mo occurs on fractures and in narrow quartz veins in the Hoidahl cupola (Yukon MINFILE# 117A 021) and the Sedgwick pluton (117A 024), and as Mo-skarn in proximal Cambrian Slats Creek strata. Additionally, RGS samples are enriched in Mo over a large area where no underlying intrusions are known (see map to left).

Whitehorse Area

Most of these molybdenum occurrences are part of the **Whitehorse Copper Belt**, 28 skarn deposits that stretch for 32 km along the western margin of the mid-Cretaceous Whitehorse batholith. Although copper is the main commodity, molybdenum is abundant at the northern and southern ends of the belt where the pluton dips shallowly, e.g., Cowley Park (Yukon MINFILE# 105D 059; Table 1), Sue and War Eagle deposits.

Molybdenum skarns associated with Whitehorse Suite intrusions also occur north of Whitehorse Copper, e.g., at **Pow** (MINFILE# 105D 050), where Mo occurs in garnet-diopside-apatite skarn along the contact between Triassic limestone and the mid-Cretaceous Cap Creek pluton.

At the **Red Mountain** deposit (MINFILE# 105C 009; Table 1), molybdenum occurs in quartz stockwork in a multi-stage Late Cretaceous quartz monzonite stock of the Prospector Mountain suite. This deposit contains 187.3 Mt of 0.167% MoS₂ which includes a high-grade core of 21.3 Mt grading 0.293% MoS₂.



Red Mountain deposit

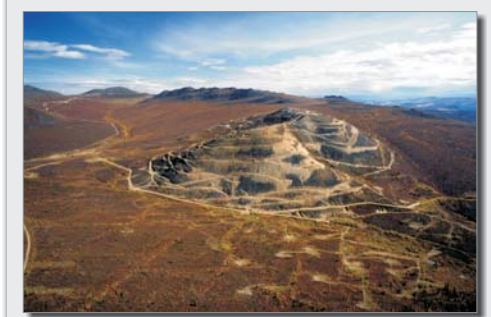
Cassiar Suite Intrusions

In the Rancheria area of south-central Yukon molybdenum is associated with mid-Cretaceous intrusions of the Cassiar Suite. Important deposits include the **Logtung** (Northern Dancer; MINFILE# 105B 039; Table 1), where molybdenite- and scheelite-bearing quartz veins and stockwork occur in a high-level quartz monzonite stock. To the east, the **Tootsee** (105B 089) occurrence, a W-Mo mineralized porphyry dyke has a magnetic signature that suggests an unroofed pluton may occur in the area.

To the northwest, the **Stormy** deposit (MINFILE# 105F 011; Table 1) consists of Mo ± W minerals densely disseminated in mid-Cretaceous diorite of the Cassiar Suite and within garnet-diopside skarn developed in proximal Lower Cambrian Rosella limestone.

Dawson Range

The Dawson Range of west-central Yukon has the highest density of molybdenum occurrences and deposits. Large porphyry Cu-Au-Mo deposits such as **Casino** (Yukon MINFILE# 115J 028; Table 1) are associated with the Late Cretaceous (74-72 Ma) Prospector Mountain suite. At Casino, supergene and hypogene mineralization is centred on an altered breccia pipe within the felsic Patton porphyry.



Casino deposit

At the **Cash** Deposit (MINFILE# 115I 037; Table 1) Cu-Mo-Au mineralization is also associated with Late Cretaceous (75 Ma) feldspar porphyry plugs and dykes of the Prospector Mountain suite.

Molybdenum is also associated with the mid-Cretaceous Whitehorse Suite intrusions in the Dawson Range. For example, at the **Tad** occurrence (MINFILE# 115I 031), molybdenum occurs in quartz veins and is disseminated within the Coffee Creek phase of the Dawson Range batholith. Molybdenite and chalcopyrite also occur on fractures in Tertiary miarolitic alaskite of the Nisling Range Suite, e.g., the **Klot/Patt** occurrence (115J 002).

Devono-Mississippian Shale

Elevated Mo (± Ni, Zn, V, U, Sn, Sb, Hg, Cu, Ba, Ag, Au) occurs in Devono-Mississippian shales of the Road River and Earn Groups in the Selwyn Basin and the North American Platform. Stream sediments draining these units contain up to 1240 ppm Mo. These anomalies are apparently caused by narrow horizons of stratiform polymetallic massive sulphide mineralization such as the **Nick** (Yukon MINFILE# 106D 092) occurrence from which samples returned up to 0.395% Mo, 5.8% Ni and 1.56% Zn. Clusters of RGS anomalies over large areas underlain by these rocks (see map to left) remain unexplained.

Cover: left - stockwork molybdenite from the Logtung deposit; centre - the Tuna pluton hosts several small molybdenite occurrences; right - molybdenite in Nisutlin pluton granite at the Stormy deposit.