# Geology of the Flex gold-silver vein system, Mount Nansen area, Yukon

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Andersen, Farrell and Stroshein, Robert, 1998. Geology of the Flex gold-silver vein system, Mount Nansen area, Yukon. *In:* Yukon Exploration and Geology 1997, Exploration and Geological Services Division, Yukon, Indian and Northern Affairs Canada, p.139-143.

## ABSTRACT

The Flex Gold-Silver deposit is a multiple vein epithermal system found within the Mount Nansen precious metal trend. High-grade gold and silver values are associated with north-northwesterly trending, sulphide-rich quartz veins that infill structures associated with regional shearing. BYG has stripped and mapped the deposit to prepare advanced exploration and mining design plans.

The mineralization is typically epithermal with extensive wall rock alteration including argillic and phyllic zones. Gold - silver values occur with sulphide-rich quartz veins, breccia veins, and silicified zones. Gold values up to 34 grams per tonne and silver values up to 1416 grams per tonne were obtained from the sulphide-rich veins.

# INTRODUCTION

The Flex gold-silver deposit is located approximately 63 kilometres along the Mt. Nansen road west of Carmacks, Yukon Territory (Fig. 1). The deposit is within two kilometres of the Mount Nansen gold mill. BYG Natural Resources Inc. has produced gold and silver at the Mount Nansen gold mill since November 1996 and refined 156 silver-gold bars weighing approximately 3 800 kg. Past production has been from the Webber and Huestis veins in 1975-76 and current production is from the Brown-McDade deposit. Future production will be from the Flex and other gold-silver rich zones on the property, including the Webber and Huestis veins.

A network of north-northwesterly trending veins is the host to the Flex deposit. The deposit was discovered in 1985 between the Huestis and Webber vein systems (Fig. 2). Forty-four diamond drill holes (1877 metres) and 33 trenches (excavated between 1985 and 1995) define the deposit. The deposit area has been completely stripped in preparation for deposit modelling because the vein distribution is complex. Earlier interpretations of the vein distribution (Eaton and Archer, 1989; Melling, 1995) did not include fault offsets and applied only a general northwesterly trend, consistent with the nearby Webber and Huestis veins.

## REGIONAL GEOLOGY

The Mount Nansen gold-silver property is located in the Dawson Range of the Yukon Tanana Terrane. The Dawson Range is underlain by Early Mississippian and older metamorphic rocks intruded by several plutonic suites (Carlson, 1987).

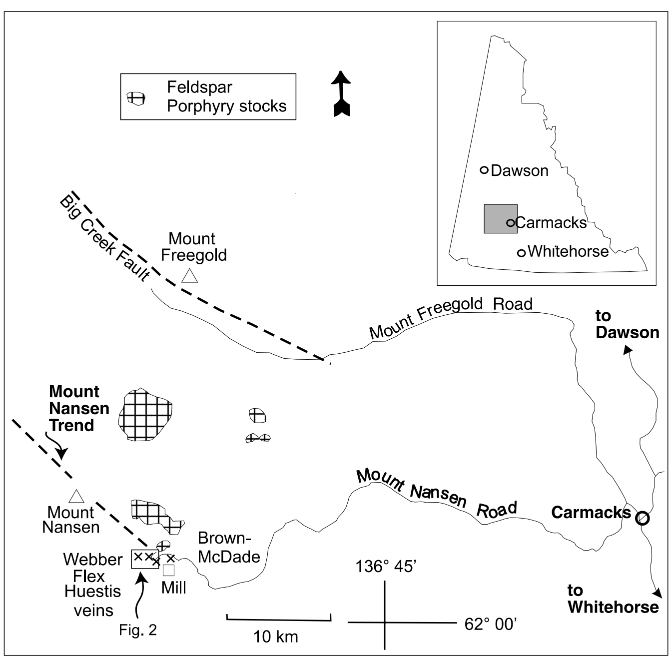


***Figure 1.*** *Location of the Mount Nansen Project, BYG Natural Resources Inc.*

The metamorphic rocks are separated into two suites, meta-sedimentary and meta-igneous. Micaceous quartz-feldspar gneiss, schist, and quartzite of the Nasina assemblage form the meta-sedimentary rock suite. The meta-igneous package includes biotite-hornblende feldspar gneiss and coarse-grained granodiorite orthogneiss with lesser amphibolite.

The metamorphic rocks are intruded by Mid-Cretaceous felsic plutonic rocks of the Coffee Creek Plutonic Suite and capped by the coeval mafic to intermediate volcanic flow and tuff rocks of the Mount Nansen Volcanic Suite (Johnston and Mortensen, 1994). Genetically related sub-volcanic feldspar porphyry dikes and plugs intrude all rock types (Sawyer and Dickinson, 1976).

The Late Cretaceous Carmacks Volcanic Suite, although lacking in the immediate Mount Nansen area, is voluminous in the region where relatively flat lying pyroclastic tuffs and flow units form prominent ridges capping the basement rocks (Carlson, 1987). The Carmacks Volcanic Suite is magmatically related to the Prospector Mountain Plutonic Suite (Johnston and Mortensen, 1994).

Mineralized structures on the Mount Nansen property consist of fault-shear-hosted veins and associated clay-rich and bleached alteration zones (Fig. 3). The vein zones range from narrow, simple quartz veins to complex, anastomosing and braided systems that crosscut all rock types. They trend northwest to north-northwest, and are generally steeply dipping across a two-kilometre wide corridor called the Mount Nansen Trend. The Mount Nansen Trend is sub-parallel to the Big Creek Fault, an apparent control to mineralization in the Dawson Range (Carlson, 1987; Hart; presentation at Geoscience Forum, 1997). The structures are interpreted as dilational fracture systems peripheral to the Middle Cretaceous porphyry intrusive bodies.

Geochronological and lead-isotope studies are being conducted to determine an appoximate time of the mineralizing event (V. Meyer, B.Sc. thesis in progress).

The Mount Nansen area was beyond the limit of the most recent continental glaciation although earlier incursions moved up the valley bottoms. Weathering extends to depths of up to 75 metres below surface which is accompanied by leaching and oxidation in the mineralized zones, and sulphides are commonly altering to limonite or other oxides (Melling, 1995).

## CURRENT WORK

The overburden stripping at the Flex deposit exposed an area 80 metres wide by 350 metres long, encompassing the mineralization defined by previous exploration. Excavator trenches have been cut within the stripped area to test for potential supergene enrichment and vertical variation in the mineralization. Geological mapping and systematic sampling of the veins and alteration zones, from both the surface and in the shallow trenches, has been completed. Additional multi-element lithogeochemical analysis of the 1140 rock-chip channel samples is planned.

An indicated resource estimate has been calculated at 90 000 tonnes grading 5.8 g/t gold and 200 g/t silver.

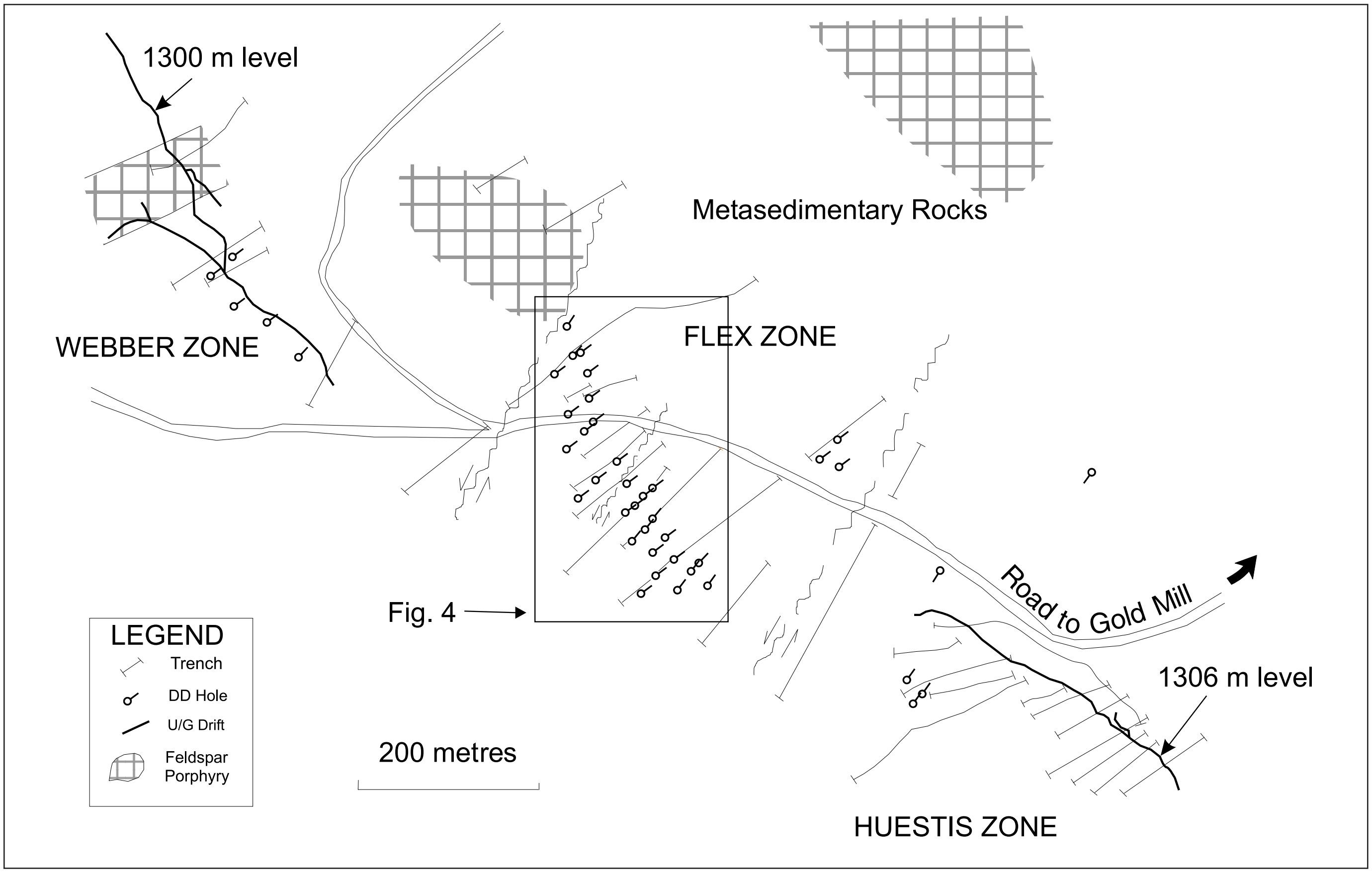


***Figure 2.*** *Recent exploration of the Flex, Huestis and Webber vein systems.*

## DEPOSIT GEOLOGY

Host rocks for the Flex veins are predominantly plagioclase-hornblende to amphibolite gneiss, minor quartzite, and micaceous felsic schist. The dark green mafic rocks are prominent in the central and northern part of the deposit while the light-coloured felsic schist is most abundant in the south half. Feldspar porphyry dikes do not occur within the deposit, although two large porphyry plugs outcropping along a ridge immediately north of the deposit may be genetically related to the mineralization (Fig. 2). This contrasts with other deposits at Mount Nansen in which feldspar porphyry dikes are common.

Near-surface weathering has caused the leaching of iron and magnesium from the rocks resulting in a bleached appearance. Strong weathering of feldspar causes clay-rich segregated layers in the gneiss. Mafic minerals are weakly to moderately chloritized below the weathering cap.

In the metamorphic rocks, foliation strikes northeast with dips of 30° to 50° northwest. Cleavage trends north to northeast, with 50° to 80° northwest dips, except where folding is present.

At least one episode of post-mineralization faulting has been identified. Faults trend approximately 040° with moderate to steep northwest dip. The vein structures exhibit left-lateral offset along the faults. On the property scale this set of faults may offset the major deposits, creating disjointed and differential movements across major structures. Differential movement

***Figure 3.*** *Part of the stripped Flex zone, showing drag-folded main vein with an envelope of bleached white clay. Looking southeast from section 3+10 N. The standing pickets are about one metre high.*

along the faults results in varying vein attitudes between the different fault-bounded blocks as between the Huestis veins trending northwesterly and the Flex veins which trend north-northwesterly.

## THE FLEX VEIN SYSTEM

Two semi-continuous bleached clay zones enclosing intermittent quartz-sulphide veins and vein breccia cross-cut metamorphic rocks in the Flex deposit. The veins are sub-parallel, trending between 340° - 010° and dip steeply to the west. The two zones, named the Main and Footwall veins in Figure 4, are approximately 30 metres apart but converge near section 2+00 N and section 3+75 N. Additional discontinuous veins have been mapped in the hanging wall of the Main vein and in the footwall of the Footwall vein and are lettered on Figure 4. The Hanging Wall vein is poorly exposed near the west side of the stripped area and has been intersected in several drill holes. The East vein occurs from 10-12 metres east of the Footwall vein in the central portion of the deposit.

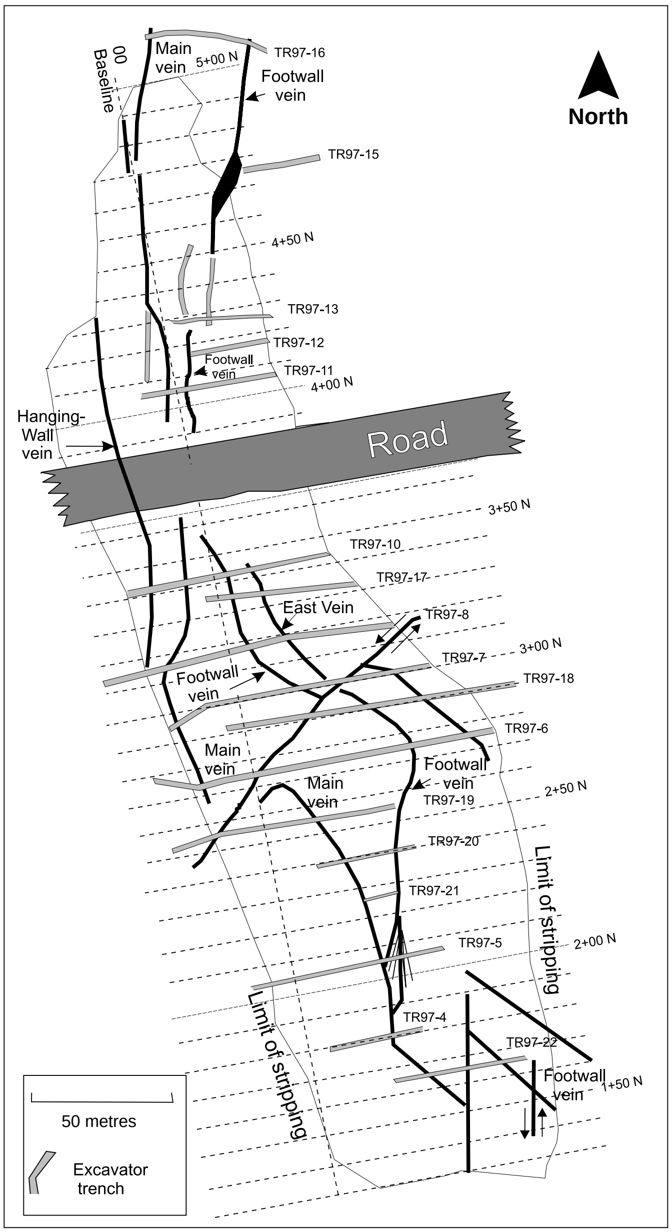


*__Figure 4.__ Plan view of the Flex vein system as exposed at surface. The four veins dip steeply west. The survey grid, by BYG Natural Resources, is in metres.*

The veins, which are locally brecciated, range from 5-50 centimetres thick. Silicification of the wallrock extends ore grade widths up to seven metres. Pinching and swelling of the veins and clay alteration zones has been traced more than 400 metres along strike.

The veins have been offset along northeast-trending faults. A prominent fault between sections 2+60 N and 3+00 N (Fig. 3) crosscuts and offsets the veins up to 26 metres left-laterally as indicated by drag-folding.

Vein alteration is primarily patchy silicification and more common in the hanging wall of the vein structures. Pervasive argillic alteration surrounds the sulphide-rich veins and forms hanging wall and footwall haloes up to three metres thick. Manganese oxides occur peripheral to the clay zones surrounding the mineralized veins. The distinctive yellowish-green stain of scorodite accompanies the quartz-sulphide veins and is a visual indicator of high-grade gold value.

## PRECIOUS-METAL MINERALIZATION

The mineralization is typically epithermal with extensive wall rock alteration including argillic and phyllic zones. The vein structures appear to be mineralized over approximately 50-60% of the length, which is comparable to the mineralization tested by drifting on the Webber and Huestis vein systems.

Three vein compositions have been identified in the Flex deposit. Dark grey, sulphide-rich, opaque, vitreous quartz carries the richest values of gold, up to 34 grams per tonne and silver values of up to 1416.3 grams per tonne (Fig. 5a). Massive grey, chalcedonic quartz containing angular brecciated wallrock clasts, carries gold values to 3.5 grams per tonne and silver values of 137.5 grams per tonne (Fig. 5b). Pale grey, opaque and vitreous quartz exhibiting open spaces, is barren of sulphide and carries very low grade gold values.

The gold- and silver-rich sulphide consists of pyrite, arsenopyrite, silver sulphosalts, galena, and sphalerite (Figs 5 a,b). Metallurgical studies show that the Flex sulphide ore is amenable to cyanidation with recoveries at 79% and 43% respectively for gold and silver. Detailed testing is in progress to develop an optimum milling process.

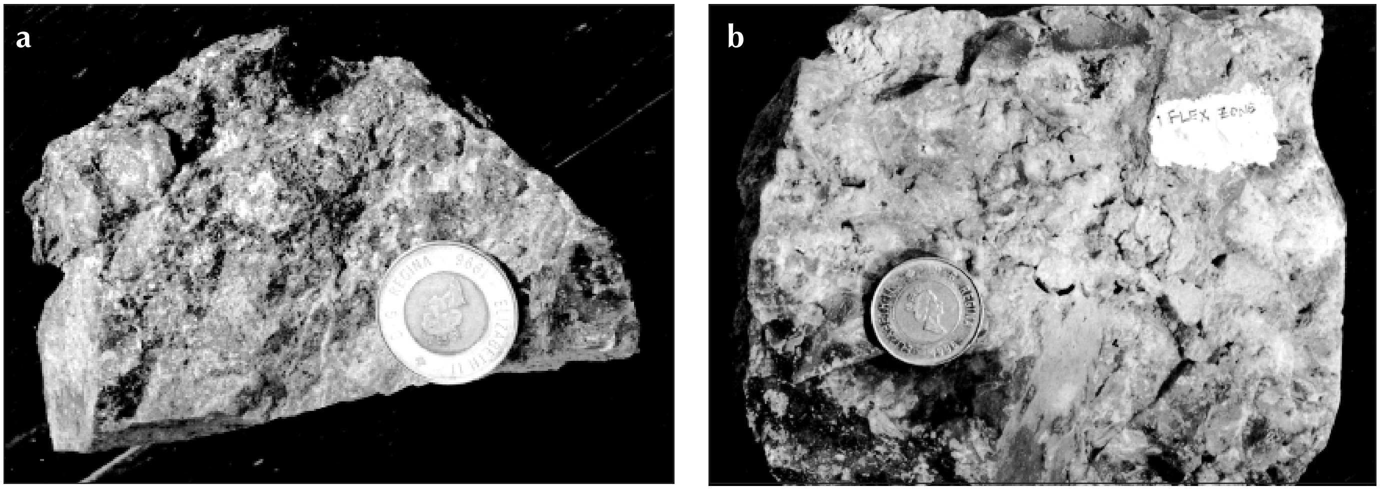


***Figure 5. a)*** *Fine-grained quartz-sulphide from the Main vein near section 5+00 N. Dark patches are sulphide-rich.* ***b)*** *Quartz-sulphide breccia from Footwall vein near section 3+00 N. Two-dollar coin for scale is 2.8 cm across. Light areas are quartz, medium grey areas are orange oxide-stained quartz, and dark grey areas are rich in sulphide minerals.*

## CONCLUSIONS

Overburden stripping and geological mapping of the Flex gold-silver vein deposit has revised the distribution and nature of the mineralized veins. The veins were previously modelled as continuous northwest-trending and moderately dipping veins. The stripping revealed that the veins trend north-northwest, dip steeply to the west, and have been offset by cross-cutting northeast trending faults with left-lateral movements of up to 26 metres.

The information derived from the detailed mapping and sampling will lead to a new geological model for the Flex Deposit, with implications for future exploration and development, as well as other areas of the surrounding Mount Nansen property.

## ACKNOWLEGEMENTS

The authors are indebted to their co-workers who carried out systematic mapping and sampling, namely: Ana Fonseca, Jennifer Lexmond, Wendy Macpherson, Chris Kuntz and Nathan Chown. We would also like to thank BYG Natural Resources Inc. for support, Nikki Krocker for drafting and Charlie Roots for editing this report.

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