



## Mineral Potential of the Bella Coola Area, Coast Mountains, British Columbia (093D)

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### INTRODUCTION

This report reviews the geology and metallic mineral potential of a segment of the Coast Mountains south of the Bella Coola River (in NTS area 093D). It is based on public domain reports and old staking records. In 1999, a regional stream sediment survey was conducted in the area by the Ministry of Energy and Mines. The program is described by Jackaman et al. (1999), this volume. The Bella Coola project was funded under the Provincial Government's Corporate Resource Inventory Initiative (CRII), as part of the Ministry's contribution to the Central Coast Land and Coastal Resource Management (CCLCRMP) planning process.

The area studied includes the communities of Bella Coola and Hagensborg. It is bounded by the Bella Coola River valley in the north, the Noeick and Nusatsum Rivers in the south and east and by South Bentinck Arm in the west (Figure 1). The area is extremely rugged and mountainous and it is noted for sharp rocky peaks, alpine glaciers and snow fields, wooded lower slopes and flat bottomed valleys. Elevations range from sea level to 2908 metres (Mount Saugstad).

Unlike most of the Central Coast, the Bella Cool area is linked by road to the interior of the province. It has limited logging road access through the Bella Coola River valley and through a coastal load-out facility at the south end of South Bentinck Arm. Otherwise, access is by helicopter or by boat.

### PREVIOUS WORK

Although there has been exploration in the Bella Coola area for over a century, it has been intermittent and much of it has been focused on a few known occurrences north of the Bella Coola River. The Ministry's MINFILE database describes work on the Bella Coola Chief (093D 009) property, the Nifty (093D 006) and adjacent Keen (093D 007) occurrences, the Sure Copper (093D 010) prospect and around the Burnt Bridge (093D 030) showing.

The Bella Coola Chief is an intrusion-related copper deposit developed in the early 1900s and explored intermittently to the late 1980s. The Nifty and adjacent Keen occurrences are volcanogenic massive sulphide showings that were explored in the 1970s and 1980s and are still of interest today. The Sure Copper prospect is a shear or fracture-hosted copper occurrence explored in the early 1900s and the Burnt Bridge prospect is a molybdenum showing located in the 1960s.

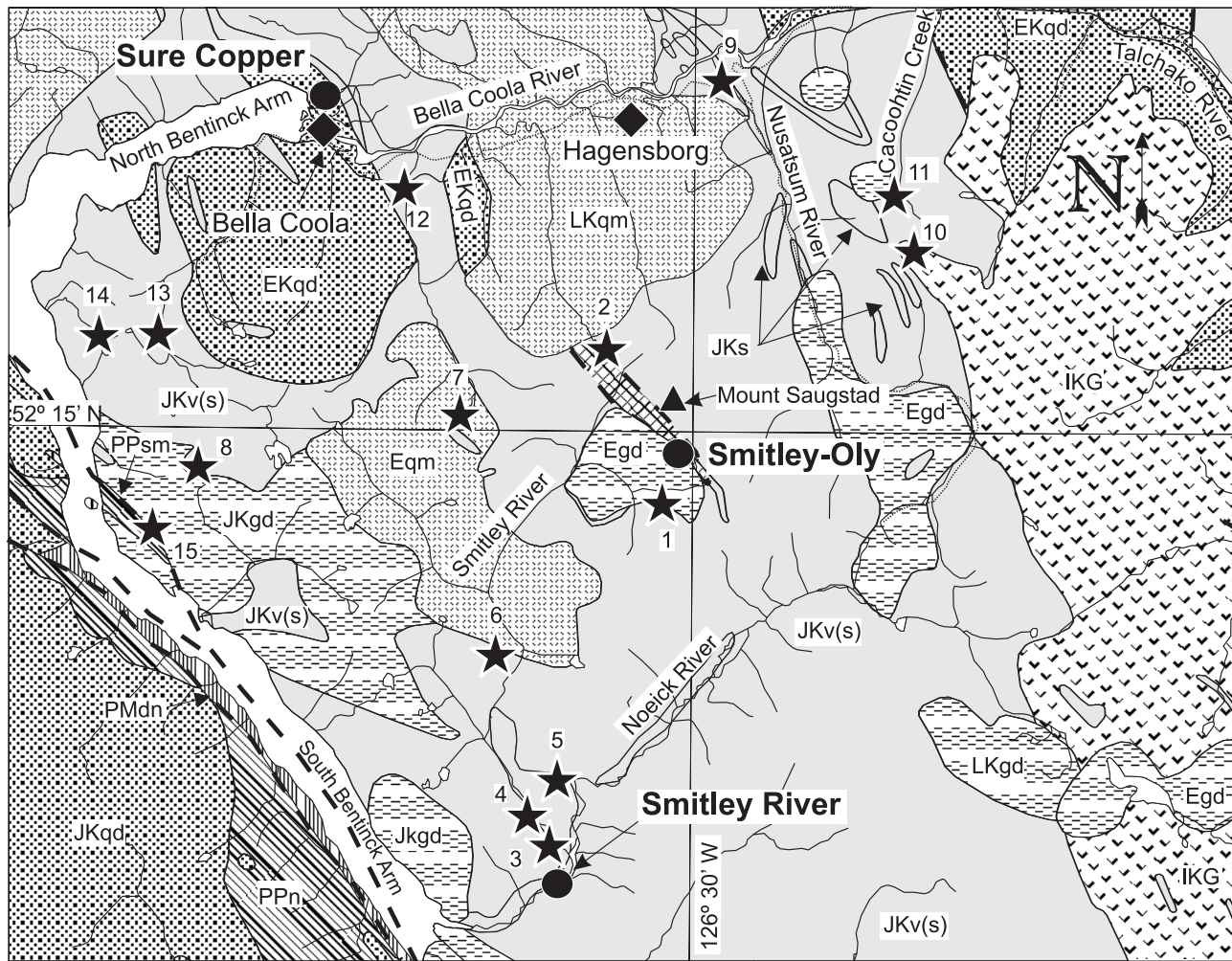
The first three occurrences are reasonably well described in public domain reports. However, the others are less well documented. There is relatively little information available on mineral occurrences south of the river.

The Geological Survey of Canada studied the geology of the Central Coast intermittently in the late 1800s and early 1900s and the coastal geology around Bella Coola is described by Dolmage (1925). The Geological Survey of Canada conducted a 1:250 000-scale mapping program in the Bella Coola area in the early to mid 1960s as part of its Coast Mountain Project. The rocks are described by Baer (1967, 1973) and van der Heyden (1990).

### GEOLOGY

The simplified map of the Bella Coola area, shown in Figure 1, is based on mapping on the MapPlace website (Bellefontaine and Alldrick, 1994). The area is underlain by a variety of stratabound and intrusive rocks of predominantly Mesozoic and younger age. It is on the eastern flank of the Coast Mountains and it is bounded on the west by a major fault that underlies South Bentinck Arm. Rocks to the west of the fault include undifferentiated paragneiss (PPn), schistose metasediment (PPsm) and mafic orthogneiss and migmatite (PMdn) typical of the core region of the Coast Mountains. Layered rocks to the east of the fault are less highly deformed and metamorphosed. They comprise two major units. One is an older, Jurassic and/or Cretaceous "greenstone" (JKv) that contains a minor amount of intercalated sediment (JKs) and is mapped as being widespread within the area studied (Figure 1). The other is a younger, Lower Cretaceous (IKG) volcanic and sedimentary unit that is mapped on the eastern border of the study area (van der Heyden, 1990; Bellefontaine and Alldrick, 1994).

The "greenstone" (JKv) comprises weakly to strongly deformed, greenschist facies, andesitic to basaltic metavolcanic rocks that are locally cut by abundant



# LEGEND

	<b>LKqm/Eqm</b>	<b>Quartz Monzonite</b>		<b>IKG</b>	<b>Gambier Group</b>
	<b>EKqd/JKqd</b>	<b>Quartz Diorite</b>		<b>Gossan</b>	<b>Gossan</b>
	<b>PPn/PPsm</b>	<b>Metasediments</b>		<b>Mineral Occurrence</b>	<b>Mineral Occurrence</b>
	<b>JKv(s)</b>	<b>Volcanics, (Sediment)</b>		<b>Lapsed Tenures</b>	<b>Lapsed Tenures</b>
	<b>JKgd/LKgd</b>	<b>Granodiorite</b>		<b>Fault</b>	<b>Fault</b>
	<b>PMdn</b>	<b>Orthogneiss</b>		<b>Road</b>	<b>Road</b>



**Kilometres**



Map Area

Geology after Baer (1973) and The MapPlace Website

Figure 1. Generalized geology of the Bella Coola area, showing the location of metallic mineral occurrences and lapsed tenure sites.

mafic dikes. The rocks grade into foliated diorite that is, locally, difficult to distinguish from plutonic rock (Baer, 1973). The sedimentary component (JKs) consists of black slate, argillite, conglomerate and limestone. Figure 1 shows that they are well exposed in the Nusatsum River area, where they appear to occur near the base of the overlying volcanic package (Baer, 1973). They are also mapped around the margins of several plutons.

The upper volcanic and sedimentary unit (IKG) is largely undifferentiated but it contains basaltic andesite, dacitic and rhyolitic tuff and breccias, and local intercalations of slaty argillite (van der Heyden, 1990). It is less deformed and metamorphosed than the underlying "greenstone" and it may have been deposited on an eroded basement that contains an abundance of plutonic rock. According to van der Heyden (1990), much of the "greenstone" (JKv) that Baer (1973) mapped along the upper reaches of the Bella Coola and Talchako rivers is granitoid plutonic rock intruded by mafic dikes. These rocks may have contributed to the clasts he reports finding in conglomerates near the base of the upper volcanic unit. Although the age of the underlying "greenstone" (JKv) unit is uncertain, it may be stratigraphically equivalent to the Hazleton Group in Central British Columbia (Baer, 1973). The upper volcanic and sedimentary unit (IKG) is thought to correlate with Gambier Group strata in southern British Columbia (van der Heyden, 1990; Bellefontaine and Alldrick, 1994).

The stratabound rocks in the Bella Coola area are intruded by several phases and ages of intrusion. They include granodiorite (JKgd, LKgd and Egd), quartz diorite (JKqd, Ekqd) and quartz monzonite (LKqm, Eqm). The older phases are commonly weakly to strongly foliated; however, the younger quartz monzonite plutons are more massive.

Although the "greenstone" unit (JKv) is locally strongly deformed and is reported to have a northwesterly trending, moderate to steep northeasterly dipping foliation throughout the Bella Coola area (Baer, 1973), the only mapped faults are in the vicinity of South Bentinck Arm (Figure 1). There may be other significant structures in the area; lineaments and contact relations suggest the presence of several north to northwesterly and northeast to easterly trending structures.

## MINERALIZATION

The Ministry's MINFILE database describes two metallic mineral deposits south of the Bella Coola River. The Smitley River (093D 013) occurrence is a polymetallic prospect near the south end of South Bentinck Arm and the Smitley-Oly (093D 022) occurrence is a precious metal-bearing quartz vein system on Mount Saugstad (Figure 1).

Although there has been exploration elsewhere in the area, it has not been described in the public domain. Staking Affidavits filed with the Ministry of Energy and Mines show that at least fifteen localities have been staked at one time or another over the past seventy years.

However, most of these tenures have lapsed and are no longer located on tenure maps. In most instances, there is insufficient geological information to warrant the sites inclusion in the Ministry's MINFILE database.

### Smitley River (MINFILE 093D013)

The Smitley River silver, copper, lead, zinc occurrence (latitude 52° 03' 25" N; longitude 126° 35' 29" W) is close to the junction of the Noeick and Smitley Rivers, approximately seven kilometres upstream from the south end of South Bentinck Arm. It is known from a single reference in the Ministry of Energy and Mines Annual Report for 1926. The report describes the staking of claims and plans to follow up a sample that was reported to have contained 891 grams per tonne silver, 3 percent copper, 12 percent lead, 10 percent zinc and a trace of gold. The type of mineralization is unknown. The prospect has been staked several times over the years. It was covered by the Nomack claims in 1944, the Lead and Copper claims in 1956 and the TK claims in 1984.

### Smitley-Oly (093D022)

The Smitley-Oly gold, silver, copper occurrence (latitude 52° 14' 11" N; longitude 126° 31' 34" W) was staked by Noranda Exploration Limited following a stream sediment geochemical survey in 1980. It staked two tenure blocks close to a granodiorite stock on the west side of Mount Saugstad. The Smitley Group (1) was staked over a precious-metal bearing quartz-carbonate vein system and the Snootli Group (2) was located over hornfels enriched in precious metals, copper and molybdenum (Price, 1985). The company revisited the area but allowed the tenures to lapse. The Smitley showing was restaked as the Patch Group by Queenstake Resources Limited in 1982 (Price, 1985) and both showings were included in the Aleeta, Bas and Nus tenures in 1984. They too were allowed to lapse; United Pacific Gold Limited staked the Oly claims over the Smitley showing in 1987 (Twyman and Forgeron, 1988).

The Smitley (1) showing is comprised of a system of sub-parallel, northwesterly to westerly trending quartz veins that crop out on both sides of a westerly flowing tributary to the Smitley River. The vein system straddles an easterly trending intrusive contact that crosses the floor of a cirque.

The main vein cuts silicified "greenstone" on the cirque wall on the south side of the creek. It has been traced for a minimum of 1500 metres but is open-ended, as it disappears under ice and moraine. It is 2.0 to 5.0 metres wide, has a westerly strike and a moderate to shallow southerly dip. The vein is composed of rusty quartz and carbonate with local, but erratic, concentrations of coarse pyrite and chalcopyrite. It is difficult to get at and it has not been systematically sampled. Price (1985) refers to a sample, collected in 1982, containing 14.0 grams per tonne gold, 118.3 grams per tonne silver and 0.15 percent copper over 1.5 metres. However, he also notes that

none of the samples collected from the east end of the vein in 1984 were so enriched in precious metals. The highest assay obtained at that time was 6.2 grams per tonne gold, 59 grams per tonne silver and 3.79 percent copper from a sulphide-rich sample of quartz float (Price, 1985). United Pacific Gold also had difficulty getting access to the vein. It reports locating one sample containing 4.55 grams per tonne gold and 62.0 grams per tonne silver (Twyman and Forgeron, 1988).

United Pacific Gold explored a more accessible quartz vein system in the floor of the cirque. It mapped and sampled a quartz-carbonate vein stockwork in a sheared, silicified and carbonatized pendant in granodiorite on the north side of the tributary. The pendant is bounded by northwesterly trending quartz veins that contain trace amounts of gold (Twyman and Forgeron, 1988).

The Snootli (2) occurrence is in a pronounced linear gossan that can be traced from the head of Snootli Creek, where it appears to terminate against a quartz monzonite pluton, for a distance of approximately 9.0 kilometres across the summit of Mount Saugstad where it is adjacent to a granodiorite intrusion (Figure 1). The underlying unit is mapped by Baer (1973) as hornfelsed grey/black siliceous argillite but Price (1985) considers it to be a silicious contact phase of the "greenstone". The unit contains well-defined lenses of pyrite and epidote as well as pods and veins of quartz that are locally enriched in gold, silver, copper and molybdenum (Price, 1985). Noranda identified a chalcopyrite and molybdenite occurrence in a cliff face at the north end of the belt, near the head of Snootli Creek (Figure 1).

## Lapsed Tenures

Based on the distribution of lapsed tenures, there would appear to have been considerable prospector interest over the years in the ground along the Smitley River and between the Smitley and Noeick Rivers. The three lapsed tenure sites (3,4,5) were probably located to cover or tie on to the Smitley River showing (Figure 1).

The rationale for staking the Chang claims (6), approximately 15 kilometres up the Smitley River, is unknown. The tenures were located in 1959 as a narrow, two-unit wide, north-south trending, claim group that crosses a northwesterly trending contact between quartz monzonite and "greenstone" (Figure 1).

Noranda Exploration Limited is known to have staked the Smitley (1) and Snootli (2) tenures as a result of stream sediment survey conducted in 1980 (Price, 1985) and it is possible that several of the other tenure blocks were staked as a result of similar surveys. They include tenures staked over a metasedimentary rock pendant in quartz monzonite on Big Snow Mountain (7) and over a granodiorite-greenstone contact at the head of Clayton Falls Creek (8).

The lapsed tenure site (9) near the mouth of Nusatsum River, upstream from the Bella Coola River junction (Figure 1), may have been located as a result of

prospecting. It was staked as the Bella property in 1970 and was known as the Brimstone occurrence in the early 1980s. The tenures covered a strongly pyritic, hornfelsed argillite unit close to the contact of a quartz monzonite pluton (Morton, 1983). The argillite is intruded by dikes of quartz feldspar porphyry and rhyolite breccia and is described as being cut by sulphide-bearing quartz-eye breccia veins. Morton conducted a limited soil geochemical survey on the property in 1983 and obtained erratic, weakly elevated, values of copper and zinc.

The two lapsed tenure sites (10,11) on the divide between the Nusatsum River and Cacohtin Creek (Figure 1) could be either prospecting or stream sediment sampling discoveries. The Jingle (10) tenures were staked at the head of Cacohtin Creek and the Nusatsum (11) tenures were staked on the west flank of the creek. Both cover a complex area of "greenstone", metasediment and granodiorite close to the postulated unconformity beneath the upper volcanic unit (Figure 1).

Three of the remaining sites are road accessible. The Doris tenures (12) were staked to cover a granodiorite contact with "greenstone" near the mouth of Thorsen Creek, and the CFC (13) and Jay Group (14) tenures, near the head of Clayton Falls Creek, were staked to cover minor quartz veins in outcrop along a logging road. They are mapped as being underlain by "greenstone". However, prospecting reports by Krusche (1993a & b) suggest that both are underlain by a mixture of "greenstone" and granodiorite.

The Goman tenures (15) covered a linear depression marking the trace of a fault that may be related to the major structure that underlies South Bentinck Arm. They cover a sliver of schistose metasediment that appears to have been tectonically emplaced in a diorite pluton (Figure 1).

## Stream Geochemistry

In September, 1999, the Geological Survey Branch conducted a stream sediment (moss mat) and water sampling survey in the Bella Coola area. It sampled 94 sites over an area of approximately 1200 square kilometres. The program is described by Jackaman *et al.* (1999), this volume.

## SUMMARY AND CONCLUSION

Although, there are only two metallic MINFILE occurrences in the area south of Bella Coola, old staking records show several areas of past exploration interest that are not sufficiently well documented to warrant inclusion in the MINFILE database.

The best described showings are on the Smitley-Oly (093D 022) property on Mount Saugstad. Price (1985) and Twyman and Forgeron (1988) describe a precious-metal bearing quartz-carbonate vein system on the lapsed Smitley (1) tenures and Price (1985) describes a possible skarn or intrusion-related copper and molybdenum occurrence on the lapsed Snootli (2) claims (Figure

1). There may be other intrusion or skarn-related occurrences in the area, as Morton (1983) documents an occurrence of this type near the mouth of Nusatsum Creek (9) and other tenures were staked over rocks mapped as meta-sediment. The geological setting appears to be similar to that of the Bella Coola Chief (093D 009) prospect, where andesite, rather than sediment, has been hornfelsed, brecciated, intruded by felsic porphyry dikes and cut by veins containing irregular pods and masses of chalcopyrite and pyrite (Krueckl, 1985).

The Smitley River (093D 013) showing is too poorly described to determine its style of mineralization, but it is located along a prominent topographic lineament and it may be structurally controlled. Similarly, the Goman tenure (15) is poorly documented but was most likely staked to cover mineralization along a splay from the main South Bentinck Arm fault.

The lapsed tenure sites south of the Bella Coola River are poorly documented and in most cases one can only guess as to why the tenures were staked. However, some may have been located as a result of stream geochemical surveys and the Ministry's moss mat survey (Jackaman *et al.*, 1999) may provide insight into the significance of some of the showings.

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