Table 1. Prospective Areas in British Columbia for Intrusion-related Gold-Tungsten-Bismuth Veins.

Area	Major Intrusions	Terrane	Mineral Occurrences	RGS Data	Comments
MID-CRETACEOUS INTRUSIONS					
Logtung-Cassiar	Cassiar and Thudaka batholiths	Cassiar, Slide Mountain	W veins and skarns, W-Mo porphyry (Logtung), beryl, placer Au, Au-quartz veins	*No Au, Bi, Sn for 104 O and P, no data for 094L*; abundant W anomalies; very weak W+Au response on 104I	interesting potential further to east in North American Craton (beryl and W occurrences in Horseranch Range area, Boya Hill W occurrences and Au placers)
Germansen Landing	Mesilinka Pluton; Osilinka stock; Germansen Batholith	Quesnellia, Cassiar	placer Au and Au-W, Au-quartz veins, pegmatite and beryl localities, a few W vein occurrences away from larger intrusions	*no Sn data*; numerous Au+W and W anomalies	placer Au and pegmatites near Williston Lake may be related
Prince George (south)	Naver Pluton	Kootenay, Cassiar, Slide Mountain	placer Au and Au-W, Au-quartz veins, W vein, Au-W±Bi veins, W veins	*no Au or Bi, Sn only for 93G,H*; numerous W anomalies	includes mesothermal quartz veins in Barkerville gold camp; however, there are no directly associated intrusives
Valemont-Revelstoke-Kimberley	Battle Range, Bugaboo, Horsethief, Fry Creek, and White Creek batholiths	North American Craton	Au-W±Bi veins, polymetallic veins, numerous Au-quartz and W veins and skarns, minor placer Au, pegmatite and beryl occurrences	*Bi only for 82G and J; no Sn for 82M and N*; numerous Au+W, Sn+Au, W, and a few Au+W+Sn anomalies	some W vein occurrences do not appear to have been sampled for Au
Creston area (southeast of Nelson)	Bayonne and Rykert (Kaniksu) batholiths	North America Craton	Au-W veins, Au occurrences, Sn veins, W porphyry, W veins, Sn porphyry, beryl	*no Bi for 82F*; a few Au+W anomalies, low Sn values may reflect analytical technique	to the east find W veins, Au placers and polymetallic veins
Salmo Camp (east of Trail)	Lost Creek Pluton; Wallace Creek and Hidden Creek stocks	Kootenay	W skarns and veins, Au-quartz veins, Au-W-Bi veins, minor placer Au	*no Bi for 82F*; a number of Au+W anomalies, low Sn values may reflect analytical technique	
LATE CRETACEOUS INTRUSIONS					
Atlin-Cassiar	Surprise Lake, Dawson Peaks, Klinkit and Glundebery batholiths	Cache Creek, Slide Mountain, Dorsey, Cassiar	placer Au and Au-W, Au-quartz veins, tungsten veins, beryl, Au-W-Bi quartz veins	*no Au or Bi data; no Sn data for 104O and P*; numerous W+ Sn and W anomalies	Surprise Lake Batholith is the most strongly anomalous area for Sn and W in the province
Hazelton	Bulkley Intrusions(Rocher Deboule)	Stikinia	placer Au, Au veins, polymetallic veins, tungsten veins	*no Bi; no Sn for 093E or 093N*; numerous Au+W and W anomalies extending north from Hazelton	
Terrace		Stikinia	numerous Au-quartz veins, placer Au, W veins	*no Sn or Bi for 103I*; a number of Au+W and numerous W anomalies	
Bridge River Camp (west of Lillooet)	Bendor Pluton	Bridge River	numerous Au-quartz veins, Au-W veins, W veins	*no Sn or Bi data for 092J and 092O*; a number of Au + W and W anomalies	Bridge River mining camp, includes Bralorne (B.C.'s largest lode Au producer)
MIDDLE TO LATE JURASSIC INTRUSIONS					
Nelson	Nelson Batholith	Quesnellia	Au and Au-W placers, Au-quartz veins, polymetallic veins, Au-W veins, pegmatites	*no Bi for 082F*; Au + W and W anomalies, low Sn values may reflect analytical technique	
southwest of Penticton	Oliver Granite; Ospray Lake Pluton	Quesnellia	Au-quartz veins, W veins, W porphyry	*no Sn or Bi for 082E*; some Au+W and W anomalies	

BRITISH COLUMBIA
Ministry of Energy and Mines
Energy and Minerals Division
Geological Survey Branch

BRITISH COLUMBIA GEOLOGICAL SURVEY

OPEN FILE 1999-3

PROSPECTIVE AREAS IN BRITISH COLUMBIA FOR INTRUSION-RELATED GOLD-TUNGSTEN-BISMUTH VEINS

By D.V. Lefebure, M.A. Fournier, and W. Jackaman

Scale: 1:2,000,000

100 0 100 200
Kilometers

LEGEND

Intrusive Rocks

- mid-Cretaceous plutons
- Late-Cretaceous
- all other plutons

The geological data extracted from Geological Survey of Canada Open File 2948 (v. 1.0) by Journeay and Williams (1995).

Mineral Occurrences

- gold-tungsten-bismuth quartz veins
- gold-tungsten-bismuth sheeted or stockwork quartz veins
- other lode gold occurrences
- placer gold occurrences
- placer tungsten-gold occurrences
- tungsten vein and vein swarm occurrences
- tungsten skarns
- tungsten porphyry occurrences
- pegmatite occurrences
- beryl occurrences (some with pegmatite)
- tin veins and greissens
- tin skarns
- tin porphyry occurrences

The mineral occurrence data has been compiled from the British Columbia (1998 file) and Yukon (1995 file) MINFILE databases. For more current details concerning specific occurrences, please work directly with these databases (available on our web site).

Regional Geochemistry Survey Anomalies

- Au (>26 ppb) + W (>3 ppm) + Sn (>3 ppm)
- Au (>26 ppb) + W (>3 ppm)
- Sn (>3 ppm *) + W (>3 ppm)
- W only (>3 ppm)

** Sn thresholds for 104N > 12 ppm, 104F and 104G > 9 ppm, and 93L > 5 ppm*

Data is compiled from the British Columbia regional geochemical survey database of silt and moss mat sediment samples. The map sheets that have been sampled are shown in Figure 2; Au, Bi, Sn, and W are available for only some of these sheets. In all cases only samples equal to, or exceeding, the 95th percentile of the database have been included. All data is available from the British Columbia Geological Survey.

Key to Terranes

AX	Alexander
BR	Bridge River
CA	Cassiar
CC	Cache Creek
CD	Cadwallader
CG	Chugach
CK	Chilliwack
CR	Crescent
DY	Dorsey
HA	Harrison
KO	Kootenay
M*	Unidefferentiated Metamorphics
MO	Manashee
MT	Methow
NA	Cratonal North America
NS	Nisling
PAP	Post-Acretionary Plutons
PR	Pacific Rim
QN	Quesnellia
SH	Shuksan
SM	Slide Mountain
ST	Stikinia
TY	Taku
WR	Wrangellia
YA	Yakutat

** includes CPC - Coast Plutonic Complex*

Terrane boundaries are approximate and derived from:
Wheeler, J.O., Brookfield, A.J., Gabriesle, H., Monger, J.W.H., Tipper, H.W. and Woodsworth, G.J. (comp.) 1991: Terrane Map of the Canadian Cordillera, Geological Survey of Canada, Map 1713A, scale 1:2 000 000.

Map Symbols

- Cities
- Roads - Multiple Lanes
- Roads - Paved
- Roads - Gravel or Dirt
- Ferry Routes

March 25, 1999

Table 2: Possible Intrusion-related Gold-Tungsten-Bismuth Quartz Veins in British Columbia.

#	Minfile Number	Name	Status	Commodities	Terrane
1	104N 053	**South (Garnet)**	Prospect	WO AU MO CU PB SN	Plutonic Rocks
2	104J 014	**Mack**	Prospect	MO CU AU WO	Overlap Assemblage
3	104A 062	**Little Pat**	Showing	WO AU AG CU MO PB	Stikinia
4	103I 047	**Gold Dome**	Showing	AU AG CU PB ZN WO	Plutonic Rocks
5	093L 073	**Whitewater**	Showing	WO AU ZN PB AG	Stikinia
6	093E 019	**Lindquist (Deerhorn)**	Developed Prospect	AU AG WO ZN PB CU	Stikinia
7	093H 023	**Hardscrabble**	Past Producer	WO AU PB ZN	Kootenay
8	093H 010	**Mosquito Creek**	Past Producer	AU AG PB ZN WO	Kootenay
9	093H 019	**Cariboo Gold Quartz**	Past Producer	AU AG WO BI PB ZN	Kootenay
10	093A 091	**Cariboo Thompson**	Past Producer	AU AG PB ZN WO	Kootenay
11	093A 071	**Cariboo Hudson**	Past Producer	AU AG PB ZN WO	Kootenay
12	093A 038	**Holmes Ledge**	Showing	AG AU PB WO ZN CU	Kootenay
13	092O 018	**Tungsten Queen**	Past Producer	WO SB HG AU	Bridge River
14	092JNE034	**Rex mountain**	Prospect	AU AG CU BI WO	Plutonic Rocks
15	092JNE024	**Arizona**	Developed Prospect	AU AG WO PB ZN CU	Cadwallader
16	092JNE071	**Bristol**	Prospect	WO AU AG ZN CU PB	Bridge River
17	082M 267	**Bizar**	Showing	AU BI CU AG	Kootenay
18	082M 080	**Stanmack**	Showing	AU AG WO MI	Kootenay
19	082M 167	**Orphan Bay**	Showing	AU WO	Kootenay
20	082M 266	**Cam-Gloria**	Showing	AU AG PB CU	Kootenay
21	082KNW032	**Ophir Lade**	Past Producer	AU	Kootenay
22	082LSW042	**White Elephant**	Past Producer	AU AG BI TE WO	Plutonic Rocks
23	082KSW184	**Oro**	Showing	AU WO	Quesnel
24	082FNW127	**Alpine Gold**	Past Producer	AU AG PB ZN MO WO	Plutonic Rocks
25	082FSW087	**Venango**	Past Producer	AU AG PB ZN WO	Quesnellia
26	082FSW086	**Kenville (Granite-Poorman)**	Past Producer	AG AU PB ZN CU CD	Quesnellia
27	082FSW168	**Athabasca**	Past Producer	AU AG PB ZN CU WO	Quesnellia
28	082FSW088	**Royal Canadian**	Past Producer	AU AG ZN PB WO	Quesnellia
29	082FSW179	**Rozan (Ridge Zone)**	Prospect	AU PB ZN AG CU	Quesnellia
30	082FSE008	**Storm King**	Prospect	AG PB SN CU AU WO	North America Craton
31	082FSE038	**Valparaiso**	Past Producer	ZN PB WO AU AG CU	North America Craton
32	082FSE055	**Sarah 2nd**	Past Producer	AG AU PB WO CU ZN	North America Craton
33	082FSE039	**Gold Basin**	Prospect	PB CU WO AU AG	North America Craton
34	082FSW046	**Kootenay Belle**	Past Producer	AU AG PB ZN WO	North America Craton
35	082FSW010	**Emerald Tungsten (Bismuth Zone)**	Prospect	WO MO BI AU	Kootenay
36	082FSW011	**Dodger (Gold Quartz Veins)**	Prospect	WO MO AU	Kootenay
37	082FSW002	**Bunker hill**	Past Producer	AU AG WO MO	Kootenay
38	082ESW084	**Gypo**	Past Producer	SI FL MI AU AG CU	Plutonic Rocks
39	082ESW090	**Susie**	Past Producer	AG AU PB ZN CU SI	Plutonic Rocks
40	092HSE101	**Granite Scheelite**	Developed Prospect	AU AG CU ZN PB WO	Plutonic Rocks
41	092HNW054	**Monument**	Prospect	AU WO CU PB	Methow
42	092HNW053	**Rodd B**	Showing	AU WO	Methow
43	092GNW013	**Ashlu**	Past Producer	AU AG CU ZN WO	Plutonic Rocks

Only the gold and tungsten occurrences are plotted in the Yukon.

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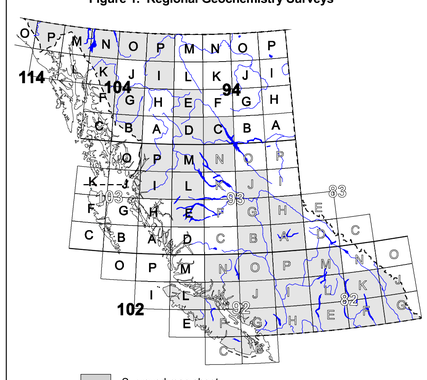
Mike Cathro of the British Columbia Ministry of Energy and Mines suggested possible gold-tungsten-bismuth quartz vein deposits and provided a list of occurrences with bismuth minerals. Discussions with Jim Mortensen of The University of British Columbia and Craig Hart and Don Murphy of the Yukon Geology Program have improved our understanding of the relevant deposits in the Yukon. Larry Jones and Maurice Johnson of the British Columbia Geological Survey helped with extracting the Yukon MINFILE data sets.

Figure 1. Regional Geochemistry Surveys



A Surveyed map sheet
silt, lake, and moss mat sediment samples

Note: Suites of elements analyzed vary with map sheet.

Figure 2
Regional Geochemistry Survey Data
- Tin

thresholds for :
93L > 5 ppm
104F > 9 ppm
104G > 9 ppm
104N > 12 ppm
others > 3 ppm

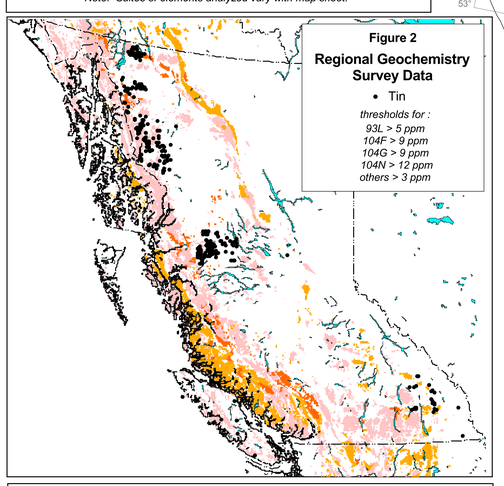
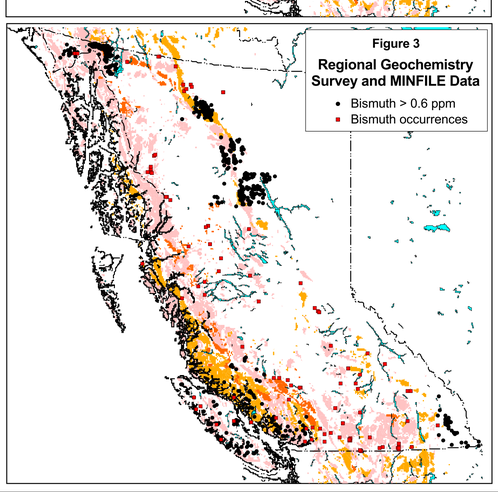


Figure 3
Regional Geochemistry Survey and MINFILE Data
- Bismuth > 0.6 ppm
- Bismuth occurrences



Albers Equal Area Projection; standard parallels 49° 00' N and 77° 00' N.

CAUTION: This map has been plotted usinig a HP 650C Inkjet Plotter. The Ink used is not waterproof. It will also fade if exposed to bright light.

Basemap amended from Journeay and Williams (1995); Geological Survey of Canada Open File 2948 (v. 1.0).