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A study of the geology of the Tsolet Mountain and the Code property, begun as described in G&M 1970, has been extended westward in response to an increase in exploration activity in the area. This report concerns the results of field work completed by the writer in the latter part of July and early August 1971 plus a brief visit to the area in the summer of 1971.

2 rm480,By B.,N. Churchs10M and +4pts,

3 lLOCATION: Lat. 54! 10.2' Long. 126! 57'sroll back,

4 rm420,(93L/2W)

5 o OMINECA M.D.,,,At approximately 3,000 feet elevation northwest of

6 Nadina Mountain, 2 to 4 miles south of Morice River.

7 oCLAIMS: CODE, FEN, COF, totalling 148.

8 oACCESS: By road from Houston, 25 miles.

9 oOWNER: Anaconda American Brass Limited.

0 oOPERATOR: HELICON EXPLORATIONS LIMITED, 1520 Alberni Street, Vancouver 5.

1 oMETALS: Silver, lead, zinc.

2 oDESCRIPTION:s10I and +4pts,

3 jINTRODUCTION:sM,,,,The substance of this report concerns the results of field

4 work completed in the latter part of July and early August 1971 plus a brief

5 visit to the area in the summer of 1972.s+4pts,

6 jMapping has been extended westward from a previously studied area on Tsalit

7 Mountain, the geological details of which were described in a report in

8 Geology, Exploration, and Mining in British Columbia, 1970.s10I and +4pts,

9 jPHYSIOGRAPHY:sM,,,,The map-area is a 50-square-mile strip of sloping terrain

0 of modest relief lying just south of Morice River (elevation about 2,200 feet)

1 and east of Lamprey Creek (Fig. ^{Church!} ,,,).s+4pts,

2 jCode Creek, a small tributary of the Morice, springs from the low marshy central

3 section of the map-area, the area of recent and current prospecting interest. This

4 stream is paralleled just to the east by Fenton Creek which drains the westerly slopes

5 of Owen Hill and Tsalit Mountain near the east boundary of the map-area. Tributaries

6 of an unnamed stream drain the area west of Code Creek including the north slope

7 of Pimpnel Mountain near the south boundary (the highest topographic feature

8 with an elevation of about 5,000 feet).s+4pts,

9 jThe last pulse of regional Pleistocene glaciation moved easterly across the

0 area scraping the high bedrock exposures leaving a mean striation direction of

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1 094 degrees. Blankets of morainal debris accumulated in numerous small valleys and
2 depressions. Granite boulders strewn westward from Owen Hill and Tsalit Mountain
3 are believed to be the product of a period of local valley glaciation which
4 postdated the last regional ice advance. Residual valley glaciers on the northerly
5 slopes of Nadina and Tsalit Mountains ^{at} first ^{drained} flowed westerly, as recorded by
6 esker-like sand and gravel deposits near the headwaters of Code Creek, then northerly
7 where meltwaters eventually carved a deep gully into outwash sands along the course
8 of Fenton Creek.s+4pts,

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1 jA peculiar area of hummocky terrain noted near the 3,500 feet contour of

2 Pimpernel Mountain does not appear to be due to glacial activity. This may be

3 a side deposit resulting from ^a seismic ^{event} activity centred somewhere on the

4 extensive fracture system known to traverse the region. s+4pts,

5 jThe area once heavily wooded below the 4,000-foot elevation level has ~~experienced~~ ^{been extensively}

6 ~~several major logging operations~~ ^{ed} in recent years. As a result the west-central

7 and northeastern parts are clear cut in places now providing ^{and} excellent summer

8 grazing land for wild animals. s10I and +4pts,

9 jPROSPECTING,,HISTORY:sM,,,In June 1965 Julian Mining Co. Ltd. ~~staked~~ ^{located} a block of 20

0 claims in response to the discovery of a silver-lead-zinc geochemical anomaly on Code

1 Creek. After some preliminary work the company was joined by Anaconda American

2 Brass Limited, in the years 1966 to 1971, in an intensive investigation which

3 included induced polarization and magnetometer surveys, a silt-soil geochemical

4 programme, and geological mapping. Other supporting work includes line-cutting,

5 bulldozer trenching, and construction of an extensive system of access roads. s+4pts,

6 jIn 1972 Helicon Explorations Limited resumed this investigation with detailed

7 induced polarization and Afmag surveys and more geochemical sampling. This concluded

8 with a diamond-drill programme of 25 holes totalling 11,000 feet in a target area

9 in the north-central part of the property. s10I and +4pts,

0 jGENERAL,,GEOLOGY:sM,,,The bedded units are mainly volcanic comprising rocks

1 thought to be ~~low in the stratigraphic column~~, part of the Hazelton assemblage,

2 and cover rocks equivalent to the Tip Top Hill, Buck Creek, and younger Tertiary

3 formations. Igneous intrusions consist of a granite stock, a small gabbroic

4 intrusion, and an assortment of dykes. s10I and +4pts,

5 jBedded Rocks:sM,,,Rocks ^{believed to be part of} assigned to the Hazelton Group crop out near the

6 east boundary, mainly on Tsalit Mountain, in the west and northwest parts, and

7 locally in the north-central part of the map-area. ^{Most} ~~The bulk~~ of these rocks

8 are mottled greenish grey and epidote bearing. They display vestiges of primary

9 volcanic structures such as amygdales and breccia textures. A distinctive brownish

0 maroon pyroclastic phase, commonly charged with small feldspar laths was found on

the ridges east of Lamprey Creek and near the main access roads in the northwest

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1 part of the map-area.s+4pts,

2 jA frequency plot of artificially prepared glass from representative samples shows
3 a broad composition range consisting of 35 per cent basalt, 20 per cent andesite,
4 20 per cent dacite, and 15 per cent rhyolite (Fig. ^{channel 2} , , , ,).s+4pts,

5 jSome shaly beds, apparently intercalations in the Hazelton volcanic pile, were
6 reportedly intersected by drilling in the central area. On the whole, however, these
7 sedimentary facies are rarely exposed.s+4pts,

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Special Instructions _____

1 jRocks thought to be the equivalent of Tip Top Hill lavas and pyroclastics
2 (Upper Cretaceous) are seen on the bluffs and ridges in the south part of the Code-Fen
3 property, on numerous knolls and low ridges near the northwest corner of the claim
4 block, and to lesser extent on the northeast claims.s+4pts,
5 jGenerally the rocks are light or medium brown, often somewhat rusted on weathered
6 surfaces. The most common phase has numerous small feldspar laths 1 to 3 millimetres
7 long mixed with a few hornblende prisms and biotite books. Arc fusion analysis
8 performed on 15 samples shows that the rocks are essentially dacites having an
9 average refractive index of 1.517.s+4pts,
0 jA wedge of ~~Cretaceous~~ (?) sedimentary rock, mainly brown quartz feldspar wacke,
1 is exposed on a low ridge just northwest of Tsalitpn Lake at the western extremity
2 of Tsalit Mountain. This ^{all} rock ^{is} well indurated, however, unlike many Hazelton
3 units there is little evidence of cataclasis.s+4pts,
4 jThe relative stratigraphic position of these beds is in doubt. It appears that
5 the material was initially deposited prior to the eruption of much ~~Cretaceous~~ volcanic
6 debris, ^{in late Cretaceous time} perhaps in Middle Cretaceous times. It seems clear from the petrography
7 of this rock that the ~~original~~ clastics were derived at least in part from a granitic
8 provenance; a terrain soon to be covered with thick volcanic accumulations.s+4pts,
9 jTertiary volcanic rocks tentatively correlated with the Eocene Houston phase of
0 the Buck Creek assemblage are exposed on scattered knolls in the central part of
1 the map-area and on the slopes of Pimpnel Mountain to the south. These lavas and
2 volcanic breccias are commonly medium or dark brown and aphanitic. In thin section
3 the rocks are found to consist largely of tiny plagioclase microlites and clusters
4 of small pyroxene crystals in a glassy matrix. X-ray analysis shows an average of
5 less than 2 per cent quartz; this is in contrast with the older volcanic rocks of
6 the area which range to as much as 40 per cent quartz in some cases. Arc fusion
7 analysis of 10 samples shows that the rocks are typically andesitic having an

7 long mixed with a few hornblende prisms and biotite books. Arc fusion analysis
8 performed on 15 samples shows that the rocks are essentially dacites having an
9 average refractive index of 1.517.s+4pts,

0 jA wedge of ~~Cretaceous~~ (2) sedimentary rock, mainly brown quartz feldspar wacke,
1 is exposed on a low ridge just northwest of Tsalitpn Lake at the western extremity
2 of Tsalit Mountain. This ^{etc and} rock is well indurated, however, unlike many Hazelton
3 units there is little evidence of cataclasis.s+4pts,

4 jThe relative stratigraphic position of these beds is in doubt. It appears that
5 the material was initially deposited prior to the eruption of much ~~Cretaceous~~ volcanic
6 debris, ^{in late Cretaceous time} perhaps in Middle Cretaceous times. It seems clear from the petrography
7 of this rock that the ~~original~~ clastics were derived at least in part from a granitic
8 provenance; a terrain soon to be covered with thick volcanic accumulations.s+4pts,

9 jTertiary volcanic rocks tentatively correlated with the Eocene Houston phase of
0 the Buck Creek assemblage are exposed on scattered knolls in the central part of
1 the map-area and on the slopes of Pimpnel Mountain to the south. These lavas and
2 volcanic breccias are commonly medium or dark brown and aphanitic. In thin section
3 the rocks are found to consist largely of tiny plagioclase microlites and clusters
4 of small pyroxene crystals in a glassy matrix. X-ray analysis shows an average of
5 less than 2 per cent quartz; this is in contrast with the older volcanic rocks of
6 the area which range to as much as 40 per cent quartz in some cases. Arc fusion
7 analysis of 10 samples shows that the rocks are typically andesitic having an
8 average refractive index of 1.552.s+4pts,

9 jThe youngest formation, here tentatively named 'Fenton Creek volcanics,' is ^{? rocks*} found mainly
0 confined to a 1.5 by 2.5-mile laterally elongated zone in the east-central part

Footnote

* The term 'volcanic rocks' is used here by instruction of the editors. Stricto Senso a rock is a mineral aggregate and glass being an isotropic amorphous substance like water is not mineral and therefore not rock. The "Fenton Creek volcanic rocks" consisting in large part of glassy lava and breccia should in the writers view be described as the Fenton Creek volcanics - the word volcanics being more inclusive than volcanic rocks.

Tape B, Ref. 06

cm420 ,sUN-10M, TABLE,, OF,, CHEMICAL,, ANALYSES
td70 ,1140 ,d40 ,c33,d40 ,c27,,

	1	2
Oxides Recalculated to 100 -		
td110 ,1100 ,d40 ,r33,d40 ,r27,,		
SiOsmath down,2sM up ,	78.08	74.4
TiOsmath down,2sM up ,	0.10	0.3
Alsmath down,2sM up ,Osmath down ,3sM up ,	13.78	13.7
Fesmath down,2sM up ,Osmath down ,3sM up ,	0.49	1.5
FeO	0.08	0.9
MnO	0.04	0.1
MgO	0.56	0.4
CaO	2.32	1.2
Nasmath down,2sM up ,0	2.94	3.4
Ksmath down,2sM up ,0	1.61	4.5s+2pts ,
	100.00	100.0

td70 ,1140 ,d40 ,c33,d40 ,c27,,
Oxides as Determined -
td110 ,1100 ,d40 ,r33,d40 ,r27,,

SrO	0.13
BaO	0.07
Hsmath down,2sM up ,0+	9.80
Hsmath down,2sM up ,0-	5.48
COsmath down,2sM up ,	0.02
Psmath down,2sM up ,Osmath down ,5sM up ,	0.02
SOsmath down,3sM up ,	0.01

s ,
om480 ,sUN8M,1,,-,, Glassy rhyolite from a
road cut west of Fenton Creek; analysis by R.,S. Young, British
Columbia Department of Mines and Petroleum Resources.s+2pts ,
o2,,-,, Daly's 1933 average rhyolite
composition, Table 1, No. 5.

Tape B, Ref. 07

s ,

0 = 26

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1 of the map-area. ^{This unit} ~~These are very fresh rocks~~ ^S consisting of volcanic breccias, lava,
2 tuff, and dykes, ^{that are very fresh and} probably of post-Miocene age. In places, especially east of Fenton
3 Creek, the unit is mostly glassy rhyolite lava and breccia (SI, sees M, the accompanying
4 chemical analysis); immediately to the northwest this volcanic complex changes to
5 predominantly feldspar porphyry trachyte and ^{to} again to quartz porphyry rhyolite ~~to~~
6 the south. Arc fusion analysis of three samples of trachyte gives an average refractive
7 index of 1.492. s+4pts,

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Insert Ref. 06^{x 07} here

Spec B, Ref. 08

td70,1180 d44,156 ,,

Quartz

29 per cent

Perthitic orthoclase

27 per cent

Plagioclase (zoned, mainly oligoclase)

39 per cent

Biotite

Chlorite

},5 per cent

Magnetite

Apatite

s,

rocks

1 jA few scattered outliers of similar and possibly related to the trachyte are found
2 on Pimpernel Mountain. s10I and +4pts,

3 jIntrusive Igneous Rocks: sM, , , , The Owen Hill granite, the largest intrusion in
4 the map-area, outcrops at the east boundary where it cuts Hazelton volcanic rocks.
5 This is a medium-grained leucocratic stock probably correlative with the young
6 (^{*Tertiary*} Upper Cretaceous) plutonic bodies on Nadina Mountain. s+4pts,

7 jModal analysis of seven samples shows the following composition: s+4pts,
8 jIt is noted that ^{*Insert Ref. 08 here*} if the albite component of the plagioclase is removed it will
9 combine in roughly equal proportions with the orthoclase and quartz with total
0 residuals less than 20 per cent. According to Tuttle and Bowen (1958, pp. 127, 128)
1 such rocks which approach eutectic or thermal minimum composition must be unequivocally
2 classed as true granites as distinguished from other rocks of the granite clan. s+4pts,

3 jThe only other intrusion worthy of description is a small fine to medium-grained
4 gabbroic stock, about one-quarter mile in diameter, found cropping out just northeast
5 of the main access logging road in the west-central part of the map-area. Thin
6 section study of two samples of a feldspathic phase of this rock shows an average
7 of 85 per cent plagioclase (Ansmath down, 40sM up, to Ansmath down, 50sM up,), 14 per
8 cent pyroxene and equivalent alteration products, and 1 per cent magnetite and other
9 accessories. A minor occurrence of chalcopyrite has been reported in the vicinity
0 of this body. s+4pts and 10I,

1 jSTRUCTURAL, , GEOLOGY: sM, , , , The area is characterized by a reticulate pattern of *small*
valleys and ~~potholes~~ ~~small~~ ~~etchings~~ ? ~~cracks~~
2 ~~topographic concordances~~ which evidently mark a system of important fractures.
3 The so-called Poplar Mountain lineament which originates near the centre of the
4 map-area is regionally the most conspicuous. This line can be traced approximately
5 15 miles to the southeast, striking about 165 degrees, to Tagetochlain Lake.
6 It sharply defines the west side of Poplar Mountain which proves to be a large
7 fault block. Somewhat weaker subparallel lineaments are observed near Tsalitpn
8 Lake and Tsalit Mountain. s+4pts,

9 jA second series of prominent lineaments coincides with a number of small but
0 important faults trending about 050 degrees. Movement on these has chopped the

Page B, Ref. 09

td50 ,c80 ,d30 ,c210 ,,
Development

Attitude

td50 ,l110 ,l210 ,,

(1) ,,Very strong

strike 100 degrees , dip 90 degrees

(2) ,,Strong

strike 140 degrees , dip 80 degrees southwest

(3) ,,Intermediate

strike 025 degrees , dip 60 degrees northwest

(4) ,,Weak

strike 065 degrees , dip 80 degrees northwest

s ,

Special Instructions _____

1 geology in the northwest sector into a number of northeasterly elongated panels.

2 Some offset in the northern extension of the Poplar Mountain lineament is also noted.^{apparent}s+4,

3 Examination of the data gathered in the field shows the prevalence of minor

4 fractures. The main attitudes are as follows:s+4pts,

5 The strongest direction (1) is parallel to a set of well-developed easterly ^{Insert Ref. 09 here}

6 trending lineaments. (These are readily confused with glacial groove^s ^{displayed by} marks on

7 photographs.) The remaining fractures cannot be easily correlated with known

8 lineament directions, possibly because of the extent of glacial cover in the

9 area and limitations in photographic resolution.s10I and +4pts,

0 MINERALIZATION:sM,,,,The zone of mineralization on the Code-Fen property is

1 coincident with an elliptical window of Hazelton acid pyroclastic rocks about

2 0.5 ^{? miles} wide extending 1.2 miles eastward from Mineral Hill and centred about 1.5

3 miles south of the Morice River road (Fig. ,,,). Owing to extensive till deposits

4 in this region visible bedrock is restricted to trenches, a few areas near the crest

5 of Mineral Hill, and along Code Creek. Where exposed the rocks are uniformly

6 bleached dacitic tuffs and tuff breccias; these appear to be massive except just

7 southeast of the gully on the east fork of Code Creek where a section of well-bedded

8 tuff was found striking 005 degrees dipping 65 degrees easterly. Fine-grained pyrite

9 and dark specks of sphalerite are disseminated widely accompanied by intense clay

0 alteration, silicification in places, and manganese encrustation on cracks. A few

1 narrow veinlets of dark sphalerite and pyrite are visible in some samples.s+4pts,

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1 jThe ~~full~~ ^{Knowledge of the} nature and origin of the mineralization is ^{incomplete} unknown. No igneous intrusion
 2 has been found in the immediate area that could be attributed as being the source
 3 of ^{metal-bearing} metalliferous solutions. In fact the only intrusions known to cut Hazelton rocks
 4 are fresh Tertiary dykes that certainly postdate mineralizing events. (Scattered
 5 pyrite reported as occurring in the quartz porphyry phase of the Fenton Creek rhyolite
 6 is not considered part of or related to the main mineralization.)s10I and +4pts,

7 jSILT,,AND,,SOIL,,GEOCHEMISTRY:sM,,,. The results of a silt geochemical survey in
 8 the Code Creek drainage basin is shown on Figure ^{Chval 3} ,,,. A total of 11 samples were
 9 collected by the writer and submitted for acid extraction treatment and atomic
 0 absorption analysis.s+4pts,

1 jThe determinations show a regular increase in silver passing upstream from a point
 2 near the mouth of Code Creek (station 11) to its east fork tributary approaching
 3 the Hazelton window (stations 3, 4, and 5). The behaviour of zinc is markedly
 4 similar to silver as is lead and manganese; copper is somewhat erratic. Average
 5 background readings established from stations on the upper reaches of Code
 6 Creek (Nos. 1, A, B, and C) are as follows:,,,0.6 ppm silver, 24 ppm copper,
 7 14 ppm lead, 74 ppm zinc, and 608 ppm manganese. The highest values, all from
 8 stations 3, 4, and 5, are:,,,4.2 ppm silver, 80 ppm copper, 233 ppm lead, 670 ppm
 9 zinc, and 4,700 ppm manganese.s+4pts,

0 jDetailed soil sampling in the area of the Hazelton window shows good geochemical
 1 coherence between lead and zinc and to a certain extent, silver. According to
 2 a company report the results of a total of 395 samples (normally taken from 'B'
 3 horizon) shows lead greater than 60 ppm and ranging to 1,000 ppm in 74 samples and
 4 zinc greater than 700 ppm and ranging to 2,000 ppm in 75 samples. Copper levels
 5 rarely exceed 75 ppm and are nowhere considered anomalous. The threshold level
 6 for silver has been set at 1.7 ppm in this area; in a few soil samples silver
 7 attains values in excess of 16 ppm.s+4pts,

8 oWORK DONE: Surface workings mapped; induced polarization survey, 5 line-miles
 9 covering central area of the Code-Fen claims; Afmag survey, 2.5
 0 line-miles covering the same claims; geochemical soil survey,

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1 270 samples covering the same claims; surface diamond drilling, 25
2 holes totalling 11,000 feet on Code 6-9, 12, 13, 15, 21 Fraction and
3 Fen 1.

4 REFERENCES: sI, Minister of Mines, B.C. sM, Ann. Rept., 1965, p. 81; 1967, p. 109;
5 1968, p. 139; sI, B.C. Dept. of Mines & Pet. Res., sM, G.E.M., 1970,
6 pp. 149, 150; 1971, p. 173; Assessment Reports 799, 1229, 2734,
7 3257, 3646; Tuttle, O., F. and Bowen, N., L., 1958, sI, Geol. Soc.
8 Amer., sM, Mem. 74, p. 153. s10B,

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