M715

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SUMMARY OF PETROGRAPHY

HURLEY PASS AREA, B.C.

50°35' N. LAT., 123°00' W. LONG.

N.T.S. 92J

by

J.S. GETSINGER, Ph.D.

for

CHEVRON MINERALS LTD.

January 24, 1989

TABLE OF CONTENTS

SUMMARY OF PETROGRAPHY, HURLEY PASS AREA, B.C.

One sulphide-rich rock sample was collected from the Hurley Road near Railroad Pass, B.C. (on map sheet NTS 92J, at approximately 50°35' N. Lat., 123°00' W. Long.), from possible subcrop, in summer of 1988. Hand specimen and thin section investigation show it to be a gneissose limestone skarn with pyrite and chalcopyrite up to 20%.

There is no evidence for determining whether the rock was originally a sedimentary limestone or vein-like pod within a sequence of a different rock type. It was collected from an area mapped as Upper Triassic Cadwallader Group near the contact with a quartz diorite of unknown age. The Cadwallader Group is a heterogeneous map unit containing andesitic breccia, tuff, and flows, greenstone, lesser slate, argillite, phyllite, conglomerate, limestone, or rhyolitic breccia and flows (Woodsworth, 1977, GSC Open File 482).

Sulphides occur as euhedral grains and anhedral blebs (up to 2 to 5 mm) disseminated along weak layering or tectonic foliation. Pyrite is more abundant than chalcopyrite and appears to have crystallized first.

The host rock is composed mainly of strained(?) calcite (75-80%) in what appears to be an equilibrium texture (granoblastic polygonal with 120 degree grain boundaries). However, optic axis figures show a biaxial angle of up to 20 degrees or more where it should be uniaxial. Although this could indicate the presence of aragonite, it is more likely to be a result of strained calcite. The rhombohedral shape, cleavage, and twinning, as well as vigorous reaction in HCl, are typical of calcite.

A colourless phyllosilicate (2-3%), with low birefringence and nearly uniaxial positive figure, could be either clinochlore (Mg-rich chlorite) or brucite ($Mg(OH)_2$), both of which are common in contact metamorphosed dolomitic rocks. Presence of brucite with calcite would indicate a high PH_2O and low PCO_2, with temperature between about 500 and 600 degrees C (Turner, 1968, p. 139). The assemblage clinochlore plus calcite has a wider stability range, and the effect of sulphur on the system has not been taken into account. Clinochlore is a more common mineral, and more likely to occur, although the phyllosilicate observed in hand specimen matches the properties of brucite better than chlorite; however, Mg-rich chlorite would also be very light-coloured. It occurs in thin section interstitially to opaques and calcite, and is commonly kinked or has undulose extinction, evidence of some deformation continuing during or after crystallization.

Other minerals noted include late quartz (1-2%), filling in spaces among calcite grains and opaques; and rare plagioclase, with albite twinning, associated with abundant fine-grained opaques. A high relief, high birefringent alteration mineral occurring in small, anhedral masses around opaques may be an iron-bearing carbonate or a hydrous silicate alteration mineral.

Deformation textures include kinked chlorite/brucite(?) (visible in thin section) and mineral lineation and foliation (visible in hand specimen). Anomalous optical properties of calcite support an interpretation of strain-causing deformation, but calcite textures also suggest a high degree of metamorphic recrystallization

Textures and mineral assemblages are consistent with an interpretation of dynamic contact metamorphism accompanied by sulphide mineralization, or else regional metamorphism to greenschist facies of a previously mineralized limestone.

REFERENCES

Turner, F.J. 1968. Metamorphic Petrology. McGraw-Hill Book Company, New York.

Woodsworth, G.J. 1977. Geology of the Pemberton (92J) Map-Area (1:250,000). Geological Survey of Canada, Open File 482.

STATEMENT OF QUALIFICATIONS

I, Jennifer S. Getsinger, do hereby certify:

1. That I am a geologist employed by Chevron Minerals Ltd. with officesat 1900 - 1055 West Hastings Street, Vancouver, B.C. V6E 2E9.

2. That I have studied geology at Harvard University (A.B. 1974), and have graduate degrees in geology from the University of Washington, Seattle (M.S. 1978), and from the University of British Columbia, Vancouver (Ph.D. 1985).

3. That I have practiced within the geological profession since 1974.

4. That I am a Fellow of the Geological Association of Canada and a member of the Geological Society of America.

5. That the opinions, conclusions and recommendations contained herein are based in part on petrographic analysis and research carried out by me.

6. That I hold no direct or indirect interest nor do I expect to receive any interest in the property or in any securities of the owner or operator, or in any associated companies.

7. That this report may be utilized for inclusion in a Prospectus or Statement of Material Facts.

Signed _____

Jennifer S. Getsinger, Ph.D.

January 24, 1989
Vancouver, B.C.

PETROGRAPHIC REPORT by J.S. Getsinger, PhD

For: Chevron Minerals Ltd. Date: 89-01
Project: Hurley - M715 (M543) Collector: Earl Dodson
Sample: M715-HPASS2 Date Collected: Summer 1988

LOCATION: Hurley Road, near Railroad Pass, B.C. NTS 92J, approx. 50 35' N.Lat, 123 00' W.Long; from Cadwallader Group (Upper Triassic) near contact with quartz diorite (ref. GSC Open File 482).

ROCK TYPE: Gneissose limestone skarn with pyrite and chalcopyrite

LITHOGEOCHEMISTRY: 30 ppb Au, 5.6 ppm Ag, 75 ppm As, 9.45% Ca, 7690 ppm Cu, 9.21% Fe, 4 ppm Mo, 52 ppm Pb, 212 ppm Zn (ICP, Chemex Cert. A8822216).

HAND SPECIMEN: Grab sample from subcrop(?), 5 x 8 x 14 cm. White to grey gneissose rock with up to 20% disseminated sulphides. Pyrite occurs as euhedral cubes (1 to 2 mm and finer); chalcopyrite as anhedral blebs and stringers up to 5 mm, but mainly smaller, possibly associated with darker grey host layers. Grain size of rock ranges from possibly microcrystalline to 2 mm (vaguely rectangular, greenish-white grains in grey, fine-grained groundmass). Earthy white material may be clay mineral (smells clay-altered). Layering is likely at least partly a tectonic foliation. A strong mineral lineation is indicated parallel to the short dimension of the sample, defined by preferred orientation of a soft, whitish, flaky mineral that resembles talc but does not feel soapy, so is likely to be sericite. Rock is non-magnetic. Soft black material on one surface streaks black easily, may be graphite. Grey-white mineral scratches easily in some places, less easily in others, and reacts vigorously in HCl everywhere, indicating abundant calcite.

THIN SECTION (Polished):

% (Approx.) MINERALS

75-80 Carbonate (strained Calcite +_ Aragonite?) - Typical carbonate appearance with extreme relief and birefringence, abundant twinning and rhombohedral form and cleavage. Grain size is finer to coarser, equant with common 120 degree grain boundaries. Excellent interference figures show colour rings and anomalous biaxial angle, with (-)2V to 20 degrees or more; this suggests presence of aragonite but is more likely just strained calcite.

2-3 Clinochlore (Mg-rich chlorite) or Brucite - Colourless phyllosilicate with low biref. to 0.019 (one end of slide may be thick); platy shape with flaky cleavage; parallel extinction, length fast; higher relief than quartz; (+)2V = 0 to 5 degrees; has patchy undulose extinction and is commonly kinked; occurs interstitially to opaques and calcite.

1-2 Quartz - Colourless, grey to pale yellow biref., generally lower relief than calcite except in one direction; uniaxial(+); interstitial to carbonate (with carbonate faces projecting into it) and opaques.

Trace Plagioclase - Rare large grey grain with grey biref. and albite twinning, in an area with abundant fine-grained opaques.

<1 Ankeritic carbonate(?) - High relief alteration mineral, occurring in small, anhedral masses, with high biref, somewhat prismatic form locally, length slow, colourless; occurs near opaques as alteration.

Opaques -

15 Pyrite - Euhedral cubes up to 2 mm, generally < 1 mm, disseminated in layers

<5 Chalcopyrite - Finer-grained than pyrite, anhedral, disseminated and interstitial among pyrite

ROCK TEXTURES/STRUCTURES: Texture is relatively evenly granoblastic, in vague layers, with equilibrium textures (120 degree grain boundaries) among the carbonate minerals and opaques, with slightly later chlorite/brucite and quartz. However, biaxial figures in calcite show high degree of strain and kinked chlorite/brucite also attests to deformation. Euhedral pyrite is apparently unstrained. Layering could be relict bedding and/or metamorphic foliation.

PROTOLITH: Limestone (with minor dolomite component)

ALTERATION/MINERALIZATION: Mineralization consists of about 15% pyrite and up to 5% chalcopyrite. Metamorphic minerals include calcite and chlorite/brucite(?). Alteration mineral near opaques may be an iron-bearing carbonate.

CONDITIONS OF FORMATION: Mg-bearing but Ca-rich carbonate rock (limestone) has been contact metamorphosed (<600 degrees C ?) and mineralized with iron +_ copper sulphides. Recrystallization was synkinematic to somewhat post-kinematic with some deformation textures remaining.