REPORT ON THE HOODOO CREEK AND FRANKLIN GLACIER PROPERTIES NEAR MOUNT WADDINGTON IN THE VANCOUVER M.D.

Held By

United Mineral Services Limited

September 1976

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REPORT ON THE HOODOO CREEK AND FRANKLIN GLACIER PROPERTIES NEAR MOUNT WADDINGTON IN THE VANCOUVER MINING DIVISION, B.C.

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1. GENERAL

A) Introduction

This report is an assessment of the Hoodoo and Franklin claims, held by United Mineral Services Ltd. in the Vancouver Mining Division, B. C.

Data presented is based on the results of a program of geochemical sampling and geological mapping carried out over the two properties in August 1976.

B) Claims

The Hoodoo property lies in the Vancouver Mining Division, B. C. and consists of one claim of 20 full sized units (see Appendix 4).

The Franklin property lies in the Vancouver Mining Division, B. C. and consists of four claims; the Scimitar (20 units), the Franklin (20 units), the Nunatuk (20 units) and the Knight (8 units).

All claims are recorded at the office of the Mining Recorder in Vancouver as follows:

Claim	Record No.	Recording Date	Owner
Hoodoo 1-20	81	April 5, 1976	R. Dickinson
Nunatuk 1-20	80	April 5, 1976	"
Franklin 1-20	82	April 5, 1976	"
Scimitar 1-20	79	April 5, 1976	"
Knight 1-8	111	Sept. 28, 1976	U.M.S.

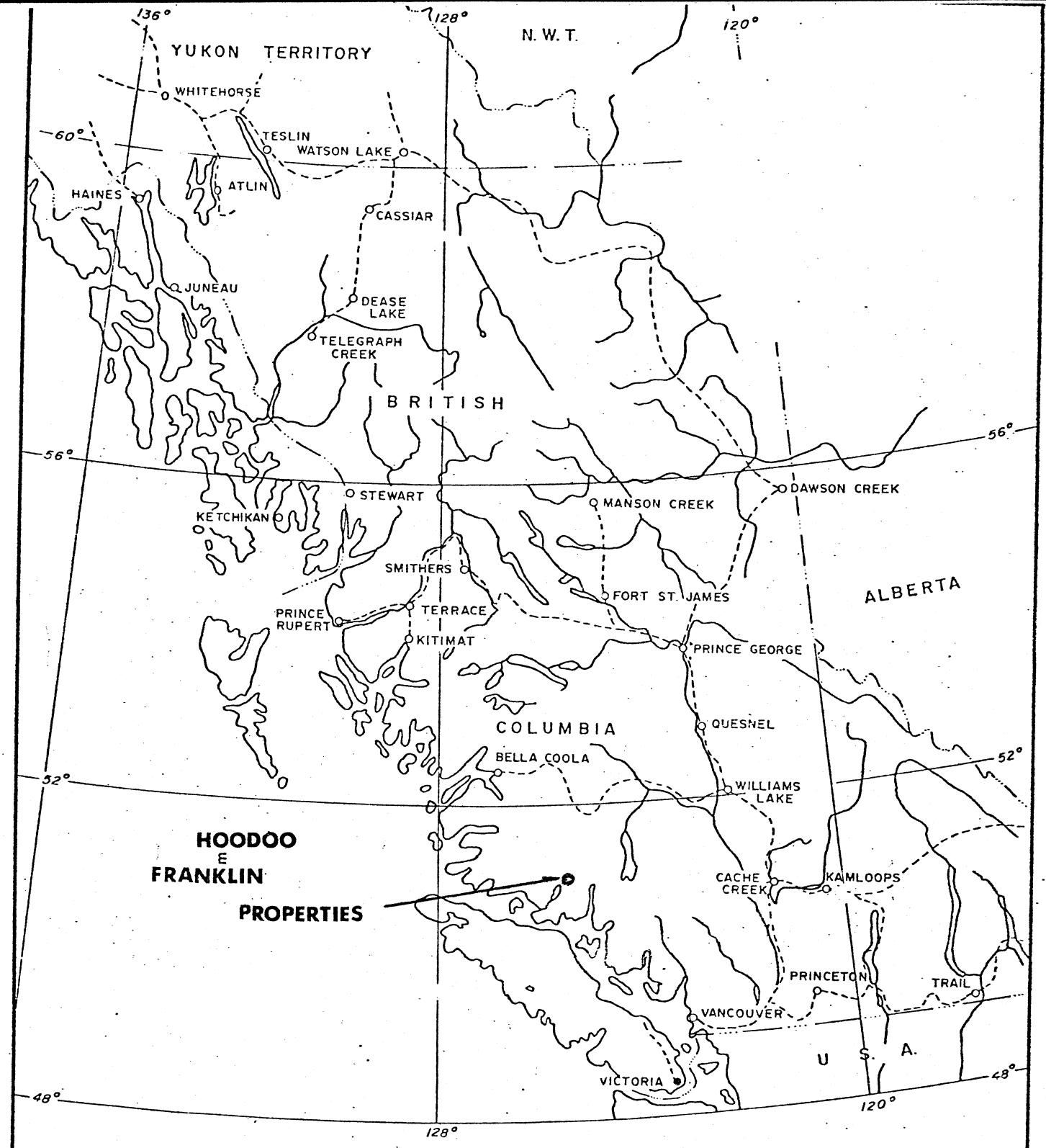
C) Location and Access

Both the Hoodoo and Franklin properties are located near the head of Knight Inlet on the west coast of British Columbia at an approximate longitude and latitude of 125°30' west, 51°20' north. The claims are accessible by helicopter from Campbell River which is 100 miles south.

D) Topography and Climate

The general area of the Hoodoo and Franklin properties is rugged and icefields remain in the areas around Mount Waddington.

The climate is one of moderately high precipitation with an annual average of fifty-five inches of rainfall recorded at Bella Coola, the nearest meteorological station.



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GENERAL LOCATION SKETCH

SCALE: 1" = 125 MILES

E) History

The Hoodoo and Franklin properties were staked and examined in the late 1960's by Kennco Explorations (Western) Limited. Kennco undertook preliminary geological mapping and a silt and soil sampling program on the Hoodoo property (see Appendix 5) while the Franklin property has had a more thorough geological examination and limited pack sack drilling (see Appendix 6).

By early 1976 all claims previously held by Kennco Explorations (Western) Limited in the region were allowed to lapse and the Hoodoo and Franklin properties were subsequently staked by United Mineral Services Limited.

F) General Geology

The properties lie on the western flank of the coast crystalline complex which is largely made up of or underlain by coarse, crystalline granodiorites and diorites of Jurassic to Cretaceous age. Within the area are several Tertiary intrusive and volcanic complexes which cut the coast crystalline complex. These Tertiary complexes lie along the "Axial Fracture Zone" (Culbert, 1971) and the plutons were emplaced into a high crystal environment. The "Axial Fracture Zone" is a north-northwesterly lineament that runs from Pemberton in the south to Bella Coola in the north. Along this zone young intrusive complexes are exposed. Salal Creek (7.9 m.y.) and Bishop River prospects near Pemberton, the Franklin and Hoodoo prospects, and an unnamed exposure near Silverthorne Mountain belong to the group of complexes.

This strong north-northwesterly structural feature has influenced both the form of the intrusions and the trend of the dyke swarms. Intrusive complexes are associated with sub-aerial volcanic tuffs and agglomerates that perhaps represent an early explosive stage in the development of the Tertiary centres.

Development of the Tertiary centres is thought to have been episodic with an early explosive stage and a later period of magmatic evolution with such operating mechanisms as cauldron subsidence located at the plutonic-volcanic interface. This particular mechanism was first suggested by C. Ney (per. comm. Dr. A. Panteleyev, and is partially supported at present by petrographic and field geological evidence.

The Tertiary complexes display many features of shallow-seated, subvolcanic phenomana such as narrowness of their aureoles, brittle fracturing of host rocks, hypabyssal nature of the acidic members and close association with sub-aerial volcanics.

G) Economic Geology

The type of mineral deposit sought after in this area is a copper-molybdenum stockwork consisting of large volumes of low grade fracture, breccia filling and disseminated copper-molybdenum mineralization. This type of deposit is similar to the simple and elaborate porphyry deposits of copper and molybdenum as described by Sutherland-Brown (C.I.M. Transactions; Vol. 72, pp 1-15, 1969). The late granitic and porphyritic intrusions expel metals into favourable structures that are found at contacts, faults and breccias.

B.P. Minerals Ltd. and Utah Construction Co. Limited are currently exploring the Salal Creek porphyry molybdenum prospect. This deposit appears to be a molybdenum stockwork with a high degree of structural control of the mineralization which is spatially related to a fine grained quartz monzonite and a coarse grained quartz monzonite contact.

The Hoodoo and Franklin claim groups have a similar geological environment favourable for the type of deposit mentioned above.

2. HOODOO PROPERTY

A) Geology

The Hoodoo property is underlain by a variety of intrusive and extrusive rocks (see Appendix 1). A suite of Tertiary igneous rocks intrudes the coast crystalline complex foliated hornblende granodiorite. Associated with the Tertiary plutonic rocks is a suite of co-magmatic early explosive volcanics. The general form of the Tertiary quartz monzonite intrusive at the Hoodoo property is a narrow (approximately 1000 feet in width) linear stock trending north-northwesterly. The southern portion of the stock breaks into steep standing dykes that narrow toward the south. The northern portion of the stock appears to intrude and die out within a tuff breccia unit. Brecciation of tuff breccia and the foliated hornblende granodiorite in the northern portion of the stock has created a breccia unit consisting of brecciated granodiorite and tuff breccia which lies between two splays of the biotite quartz monzonite. Chalcopyrite and molybdenite mineralization is spatially related to the biotite quartz monzonite stock and is fracture controlled.

Of significance is the increase of copper and molybdenum mineralization in the vicinity of and within this breccia unit. This situation could represent a structural and lithological trap for mineralizing fluids and depending upon the geometry and configuration of the breccia could represent a significant sized mineralized zone.

To the north-northeast of the biotite quartz monzonite stock is an intrusive complex consisting of quartz porphyry, porphyritic diorite and a coalescence of dyke units. The quartz porphyry is vuggy with a grey-white aphanitic matrix containing quartz phenocrysts up to .5 cm in diameter. The groundmass is extensively altered to sericite and some cavities contain pyrite.

A porphyritic diorite mass lies on the north-east side of the quartz porphyry intrusive and together with the quartz porphyry unit forms a north-northwest trending intrusive mass. Though areas of this intrusive mass is extensively altered it does not contain visible chalcopyrite or molybdenite mineralization.

Volcanic units consist of tuff breccia and volcanic agglomerate that occur in an apparently conformable succession which overlies foliated hornblende granodiorite but is cut by the various intrusive units. Volcanic agglomerate consists of boulders (up to 5 feet in diameter) of foliated hornblende granodiorite. Boulders and cobbles comprise approximately 60% of the rock within a fine, light brown ash matrix. Tuff breccia is composed of a variety of lithic fragments with foliated hornblende granodiorite fragments predominating.

An abundance of dykes crosscut the earlier described units. The dykes are predominately of two types; quartz porphyry and feldspar porphyry. The dykes trend northwesterly and dip moderately to the north-east.

In the northeastern corner of the map sheet the dykes converge to form a dyke swarm with a northwesterly vergence and a northeasterly dip. Dyking is the last phase of volcanic activity; a feature that is apparent throughout the Mount Waddington area.

B) Mineralization

Pyrite mineralization is widespread throughout the property, however chalcopyrite-molybdenite mineralization is found to be concentrated only within the brecciated granodiorite and tuff breccia unit and in the biotite quartz monzonite stock.

Within the stock, chalcopyrite-molybdenite is found along tight fractures with minor pyrite. Minor quartz veining is present and alteration type is propylitic.

Within the brecciated granodiorite and tuff breccia unit, both dry and siliceous north-northwesterly fractures contain chalcopyrite and molybdenite. Breccia fragments are in part altered to quartz and chlorite and are replaced by chalcopyrite and pyrite with accompanying molybdenite. Grades within this unit where it is exposed are variable but are probably less than 0.1% combined over any appreciable distance.

C) Geochemistry

A total of forty-one soil samples were collected over an area of 2500 feet by 1000 feet. Soil sample traverses were made in order to delineate any possible broadly anomalous zones.

Molybdenum (total content Mo) values range from 6 ppm to 68 ppm Mo (see Appendix 2). Values greater than 30 ppm lie within or proximal to (on the downslope side) of the brecciated granodiorite and tuff breccia unit and the biotite quartz monzonite stock. Values higher than 50 ppm Mo are found to lie within the area bounded by the brecciated granodiorite and tuff breccia unit.

Copper values range from 96 ppm to 660 ppm Cu. Values greater than 200 ppm Cu are found to lie within the biotite quartz monzonite stock and the brecciated granodiorite and tuff breccia unit and for limited distances proximal to these units. Values higher than 500 ppm Cu coincide with the anomalously high molybdenum values and are restricted to an area within and adjacent to the brecciated granodiorite and tuff breccia unit.

D) Summary and Conclusions

(a) A geometrically undefined copper-molybdenum bearing breccia unit is exposed in the northern end of the biotite quartz monzonite stock.

(b) The geochemical survey outlined a coincident copper and molybdenum anomaly in the area of the brecciated granodiorite and tuff breccia unit.

(c) Direct observations of the biotite quartz monzonite stock revealed that only weak pyrite-chalcopyrite-molybdenite mineralization exists along fractures within the stock.

(d) The quartz-porphyry "intrusive" is extensively altered to sericite, however no economic minerals are visible within this unit. The textures displayed by this unit attest to the sub-volcanic nature of the complex.

(e) At present no economic copper-molybdenum deposits are known to exist with the intrusives exposed along the "Axial Fracture Zone". B.P. Minerals Ltd. and Utah Construction Co. Limited are exploring the Salal Creek deposit by an aggressive drill program.

3. FRANKLIN PROPERTY

A) Scope of Field Work

The geology of the Franklin property has been examined and mapped by Kennco geologists and has also been the subject of a bachelor thesis by Mr. B. McKnight. Work by United Mineral Services Ltd. on the Franklin property consisted of re-examining the geology of the areas of economic interest, determining the controls for sulfide mineralization and determining the probability of the existence of economic concentrations of copper and molybdenum.

B) Geology

The Franklin property lies at the southeastern corner of an elongate (4 miles x 1 1/2 miles) north-northwesterly trending quartz monzonite stock (see Appendix 3). This stock has intruded plutonic rocks of the coast crystalline complex. The stock has a sharp margin with the intruded host rocks and is generally leucocratic and free of inclusions.

The stock is predominately biotite quartz monzonite that is fine to medium grained. At the southeastern contact with the coast crystalline complex the biotite quartz monzonite occurs as dykes that cut foliated hornblende granodiorite of the coast crystalline complex. The foliated hornblende granodiorite underlying the dykes has been extensively brecciated and in places mineralized.

The quartz monzite stock is extensively fractured in a north 30^{o}-40^{o} west direction. These fractures are filled with quartz and accessory pyrite. A later north-northeast fracture set cuts the previous fracture set and this set of fractures carries the greatest proportion of metal sulfides.

On the northeastern side of the quartz monzonite stock lies a volcanic unit composed of coarse volcanic agglomerates, tuff breccias, and lavas. Within the quartz monzonite stock small "islands" of hornfelsed volcanics are found. In most of these hornfelsed volcanics the original texture has been obliterated and the rock has been altered to silica and biotite. In an area adjacent to the eastern margin of the biotite quartz monzonite stock the original textures of a fragmental composed of acidic volcanics has been retained.

The hornfelsed volcanics are extensively brecciated and healed by quartz. In some zones there are occurrences of pyrite, chalcopyrite and molybdenite but never in concentrations of economic significance.

Cutting all previously mentioned lithologies are dykes of feldspar porphyry. These dykes have a consistent attitude of north-northwest and vertical. Thickness of the dykes range from ten to over fifty feet. The strong structural control of the dykes is similar to that noted at the Hoodoo property and reflect the degree of structural control imposed upon the emplacement of the Tertiary volcanic centers.

As at the Hoodoo property there are three distinct stages of evolution of the volcanic center. The first stage is the eruption and deposition of fragmental volcanics followed by the intrusion of a quartz monzonite stock. The final stage is characterized by the emplacement of porphyry dykes.

C) Mineralization

Chalcopyrite and molybdenite mineralization occur throughout a large area and within several lithologies. Only two areas show any appreciable concentration of chalcopyrite and molybdenite. Only one of these areas (Area No. 1) has been tested by shallow drilling by Kennco Explorations (Western) Limited (see Appendix 6). An area of approximately 2000 feet by 1000 feet located at the junction of three creeks and extending 2000 feet to the northwest (Area No. 1) has been the locus of previous exploration activity. Chalcopyrite and molybdenite accompanied by magnetite and/or hematite in siliceous, vuggy quartz veinlets predominates in this area. Veinlets are generally in the order of 1/8 inch wide and have associated weak sericitic or propylitic selvages. In some instances veinlets are composed of potassic feldspar with chalcopyrite occurring as infillings between crystal boundaries within the veinlet. Other veinlets noted are comprised of sugary quartz and feldspar with crystalline vugs containing coarse grained pyrite and chalcopyrite and drusy molybdenite. The mineralization within this area has been localized in a stockwork system of fractures with N20W/ vertical and N40E/75NE the predominent directions. The tenor of copper and molybdenum content varies from less than .1% Cu and less than .01% MoS_2 to .32% Cu and .06% MoS_2 (refer to Appendix 6).

The localization of mineralization within this particular area appears to be due to the intersection of several strong fault-fracture zones. These zones are emphasized by the predominence of dykes within the area which follow the same fracture directions as the mineralized veinlets. Another feature of this mineralized area is that it occurs in a deeply incised and topographically lowest portion of the biotite quartz monzonite stock.

Mineralization in Area No. 1 has the textures, mineral components and alteration features that can be attributed to deposition in a high temperature and low pressure environment. This is particularly expressed by the association of magnetite and/or specularite, with orthoclase and quartz as drusy fillings of the fracture zones. This suggests that the mineralization was deposited in an "open system" and not necessarily deposited from a fluid system.

Another mineralized area (Area No. 2) is within a brecciated portion of the foliated hornblende granodiorite at the southeastern contact with the biotite quartz monzonite. The brecciated foliated hornblende granodiorite underlies a biotite quartz monzonite dyke and extends for approximately two hundred feet from the point at which it first appears. The breccia fragments range up to 5 inches in diameter and are angular with open cavities. Infilling of the cavities and replacement and fracture filling of the breccia fragments characterize the occurrence of chalcopyrite and molybdenite mineralization within the breccia. Though this unit is an excellent host for mineralization where exposed, it does not contain amounts of copper and molybdenum in excess of .2% combined and may be restricted in size.

D) Summary and Conclusions

(a) A well developed fracture system contains low concentrations of copper and molybdenum mineralization over an area 2000 feet by 1000 feet. Weak sericitic and propylitic alteration is associated with the mineralization and the mineralization may not necessarily reflect the presence of a porphyry copper system.

(b) A breccia zone is mineralized and is an excellent host for mineralization but it may be restricted in size.

(c) A convergence of several structural controls and a greater intensity of hydrothermal mineralization within the structures is required before a significant concentration of economic mineralization will be encountered. At present no targets have been delineated that would meet these requirements.

(d) The stages of Tertiary igneous activity at the Franklin property are an early explosive activity followed by the emplacement of an evolved magma. During the evolution of the biotite quartz monzonite stock, mineralization was expelled into structural channelways. The final stage of igneous activity was the emplacement of feldspar porphyry dykes.

(e) A better understanding of volcanic processes and their relationship to porphyry deposits is required in order to fully evaluate the potential of a conduit system as exposed at the Franklin property.

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