'80-777

COPPER QUEEN CLAIMS

DIAMOND DRILLING AND GEOLOGICAL MAPPING

Greenwood Mining Division
NTS 82 E 2
Latitude 118°46.5'W; 49°7.5'N

for

Utah Mines Ltd. and
W.R. Financial Consultants Ltd.

by
R.V. Longe
Minequest Exploration Associates Ltd.

November 1980

Drill holes located on:

Crown grant L 2311
Mineral Claim Ing 1

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1. Introduction:

Exploration by Riocanex Ltd.* during the period 1975-1977 established that the Triassic Brooklyn rocks of the Greenwood area contained two separate limestone beds and that the Phoenix and probably the Motherlode orebodies occurred in the lower of these two limestone units. At the Copper Queen camp, 8 km. NW of Greenwood, copper showings occur in the upper limestone unit.

By analogy with Phoenix, where small relatively high grade orebodies occur stratigraphically above the main orebody, the Copper Queen camp was thought to be prospective on account of indications of the lower limestone beneath the upper, copper-bearing units.

This report describes the results of two diamond drill holes accompanied by some confirmatory geologic mapping carried out in 1980 by Mine-Quest Exploration Assoicates Ltd. on behalf of partners in the Greenwood Joint Venture: Utah Mines Ltd. and W.R. Financial Consultants Ltd.

* B.C. Assessment Reports Nos. 5842, 6436

2. Location Data:

The claims lie 8 km. NW of the City of Greenwood in southern B.C., and 13 km. N of the U.S. border (Figure 1).

NTS: 82/E/2

Location of principal workings of the Copper Queen Camp.

Latitude Longitude: 118°46.5'W; 49°7.5'N
UTM: 370100E; 5442000N; Zone 11
Elevation: 1,520 m. a.s.l.

3. Topography and Access:

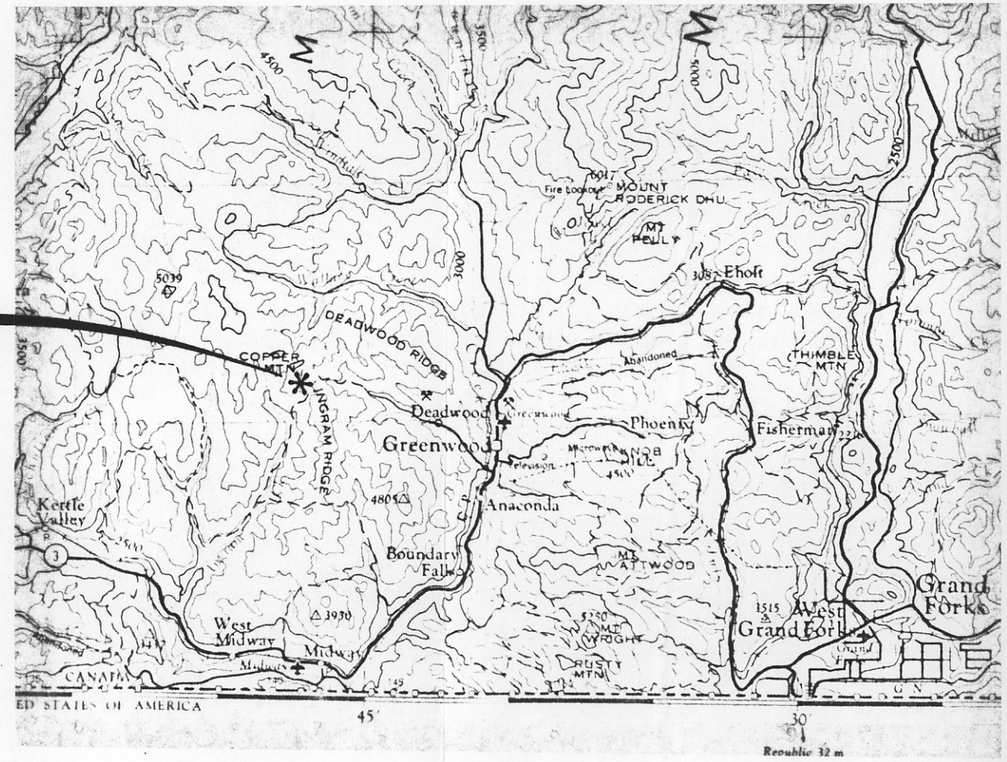
The claims straddle a ridge trending NE-SW. On the SE side the ground slopes steeply from 1300 m. at the foot of the ridge to 1500 m. at the top. To the NW lies the divide between the Wallace Creek drainage on the north and the Ingram Creek drainage to the south. Most of the south slopes are covered by widely-spaced trees and grassland. On other slopes and especially in valleys timber is of moderate size. Undergrowth is thick in places.

Access to the property is by 8 km. of gravel road from Greenwood. Numerous disused logging and mining roads cover the central part of the claims. The 1980 drill sites are accessible by four wheel drive vehicle along such roads.

Km 100 0 100 200 300 400 Km

Miles 100 50 0 100 200 Miles

COPPER QUEEN CLAIMS



SCALE 1:250,000

5 0 5 10 15 20 Km

UTAH MINES LTD. AND
W.R. FINANCIAL CONSULTANTS LTD.

GREENWOOD JOINT VENTURE

COPPER QUEEN CLAIMS

LOCATION MAP

PLAN No.	DRAWN	DATE	FIGURE
143		NOV. 80	1
Revised		N.T.S. 82 E/2	

MINEQUEST EXPLORATION ASSOCIATES LTD.

4. Ownership and Claim Status:

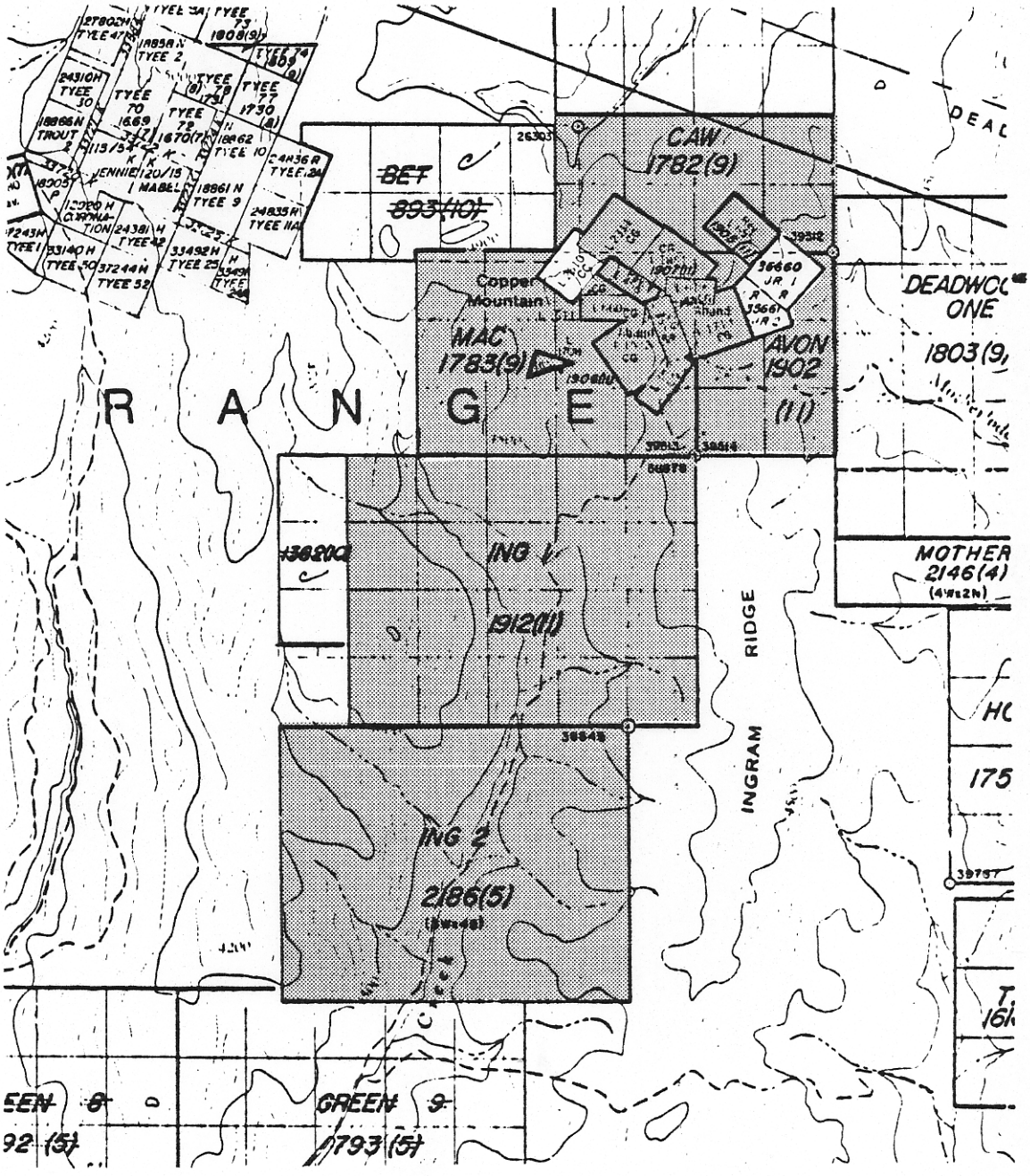
Ownership, status and location of claims and crown-grants on the Copper Queen Camp are shown in Table 1 and in Figure 2. The former mining camp is covered by ten crown-grants, six reverted crown-grants and two two-post claims surrounded by three metric grid system claims staked in 1979 and 1980. All but two claims (JR 1 and JR 2 which were not considered important) and one crown-grant (L 2610, which was not available) are under option to the partners in the Greenwood Joint Venture. These claims and crown-grants have been grouped for the purposes of applying assessment work.

To the south two 20 unit claims, Ing 1 and Ing 2 comprising the Ing Group are held under option by the Joint Venture.

The position of the crown-grants (shown in Figure 3), was determined by locating a number of old corner posts (most of them in an advanced stage of decay) and by plotting them on a 1:5,000 orthophoto.

CLAIM MAP

From B.C. Ministry of Mines Mineral Title Map 82 E 2



Properties under option to Greenwood Joint Venture

Figure 2.

TABLE 1

Claims, crown-grants, and reverted crown-grants held under option to Utah Mines Ltd. and W.R. Financial Consultants Ltd.

Name	Units	Record No.	Lot No.	Date Recorded	Owner
Claims					
CAW	8	1782	-	Sept.	
MAC	12	1783	-	Sept.	W.E.McArthur
AVON	6	1902	-	Nov.	
ING 1	20	1912	-		MineQuest Expl.
ING 2	20	2186	-		Assoc. Ltd.
Reverted crown-grants					
Jumbo			655	Nov.	
Commander Fr.			1708	Nov.	
Copper Mine			456	Nov.	
Crown-grants					
			387		Messrs. E.P. &
			388		W.D.Roberts
			617		
			1572		W.E. McArthur
			1713		
			1851		
			2311		
			660		R.F.Sandner
			2611		

The following, although encompassed by the above group of mineral properties were not held under option.

Claims					
JR 1	1	35660			D.F. Pasco
JR 2	1	35661			
Crown-grants					
			L 2610		P.C. Healy

5. The Greenwood Camp:

The Copper Queen camp lies on the fringes of the Greenwood Mining camp, the ore deposits of which fall into two classes: conformable copper or copper-zinc orebodies lying in Brooklyn Limestone (Triassic) and silver-gold veins associated with granitic intrusives (believed to be Cretaceous). All the significant base-metal deposits belong to the first category.

Most mines in the area ceased operation in 1919. By this time the Boundary Camp, as the area was then known, had produced 22 million tons of ore averaging slightly over 1.5% Cu, 0.03 oz/ton Au, and 0.5 oz/ton Ag, - over half the tonnage was produced from deposits since incorporated into the Pheonix orebody. Including its production since 1956, the Phoenix deposit re-opened by Granby in 1956, has yielded 25 million tons of 1.0% Cu plus significant gold values. The Motherlode orebody produced 3.8 million tons of 1.12% Cu plus 0.044 oz/ton Au. The B.C. Mine was smaller (100,000 tons) but of higher grade (5.8% Cu, 2.8 oz/ton Ag).

6. History of Copper Queen Camp:

The earliest record of activity in the Copper Queen camp is found in the 1894 edition of the B.C. Dept. of Mines in which an 18 foot shaft and a 40 ft. tunnel are reported on the Copper Mine. Widths are reported to have been 40 ft. in the Copper Mine and 26 ft. in the King Solomon in which grades are reported to have been between 15% and 20% copper. No information exists on tonnage mined prior to 1902 but because no railroad was put in to the Copper Queen camp, tonnage can be assumed to have been small. The 1902 and 1903 editions of the Annual Report of the B.C. Dept. of Mines report 850 tons shipped in 1901 and "about 1,000 tons" in 1902. In 1917 the King Solomon and the Big Copper between them, shipped 950 tons. After 1918, the property lay dormant until 1950 when the late W.E. McArthur carried out a programme of drilling and stripping which led to further exploration.

7. Previous Work:

Prior to the end of the first world war there had been tunnelling (probably amounting to three or four hundred feet), shaft sinking (tens of feet), and mining of a few thousand tons of oxidized copper ore from the Upper Brooklyn Limestone.

In 1953 and 1954 the late W.E. McArthur of Greenwood carried out a programme of diamond drilling and stripping of the King Solomon and Copper Mine claims. This work led to the discovery of a body of sulphides from which two carloads of ore was shipped to the Tacoma Smelter.

In 1954 Noranda Mines Ltd. drilled for extensions of the roughly-conformable body passing through the Copper Queen and King Solomon claims. It is believed, on the basis of a map supplied by McIntyre Porcupine, that four holes were drilled by Noranda. In 1955 the Consolidated Mining & Smelting Company drilled a further four holes, again in search of extensions to the conformable body passing through the Copper Queen claim. This drilling intersected mineralized limestone but of too low a grade.

In 1967 McIntyre Porcupine Mines held options on several of the Crown-grants in the vicinity and carried out geological mapping, soil sampling, induced polarization surveys, bulldozer stripping and diamond drilling. McIntyre drilled four holes all directed at I.P. anomalies.

DDH M-1 was drilled at an angle of -50^{o} towards the anomaly on Line 19. The drill hole was directed down-dip. If the anomaly represents a conformable body a drill hole would have passed beneath it. The rock intersected is called "Knob Hill" in the original drill log, but includes sharpstone among cherty lithologies which appear to belong to the same unit.

DDH M-2 was drilled on Line 18 at an angle of -60^{o} towards the I.P. anomaly. The rock intersected, includes sharpstones and cherts.

DDH M-3 was drilled vertically on Line 13. Although going to 520 feet it failed to penetrate beneath the layer of Tertiary volcanic rock.

DDH M-4 was drilled vertically on Line 16 to the southeast of the I.P. anomaly. After penetrating 557 feet of Tertiary volcanic rock the drill intersected massive white limestone. The last 53 feet of the hole were in skarn including a rock described as "green epidote brecciated sections in fine grained dense purplish rock (hornfels), 587-590 limestone, 1-2% finely disseminated pyrite". The limestone intersected in this hole was very possibly the Lower Limestone but the hole was stopped too soon for an answer to this question. Equally certainly, the base of this limestone unit was not reached. The skarn rock described from the bottom of the hole sounds remarkably similar to the purple skarn rock found in the vicinity of the Phoenix orebody.

In 1970 Pechiney Development staked a block of eleven claims to the east of the Copper Queen camp. Work included geological mapping, magnetometry and geochemical soil sampling (B.C. Dept. of Mines Assessment Report 2453). No sub-surface testing was undertaken.

In 1977 Riocanex Ltd. drilled one hole which, collared in Upper Sharpstone, was directed at reaching the Lower Limestone Unit (B.C. Assessment Report no. 6436). This hole penetrated Upper Sharpstone expanded to a considerable degree by Tertiary hypabyssal rocks followed by pyritiferous cherts which were thought to be either the cherts commonly found beneath the Upper Sharpstone or cherts of the Knob Hill basement. The hole was stopped after intersecting 80 m. of Tertiary dyke.

8. Regional Geology:

The country between Grand Forks and Rock Creek is underlain by a sequence of volcanic and sedimentary rock of pre-Permian and Triassic age, known as the Anarchist Group, which is intruded by a variety of granitic and dioritic rocks believed to be of Cretaceous age. Both the Anarchist Group and the Intrusives are extensively covered by Tertiary flows and pyroclastics. Associated Tertiary dykes and sills are numerous. Because it has been used to describe rocks both below and above a major unconformity, the term "Anarchist" is not used in this report. Below the unconformity lies the pre-Permian Knob Hill Formation of meta-volcanics and meta-sediments. Above the unconformity is the Triassic Brooklyn Formation which consists of five mappable units: a shale, two "sharpstone" conglomerates and two limestones as shown in the table below.

The Knob Hill Formation consists of intermediate and silicic volcanics, cherts, argillites and locally limestones. The Knob Hill rocks were metamorphosed, uplifted, and eroded, prior to the deposition of the Brooklyn Formation in Triassic time. The oldest unit of the Brooklyn Formation is the Rawhide Shale reported by Seraphim (1956) to occur SE of the Phoenix Mine. The shale is limited to some hundred metres thick extending approximately six hundred metres along strike. A similar shale occurs on the high ground between Wallace and Ingram Creeks and may be correlative with the Rawhide shale southeast of Phoenix. Such shales are thought to represent depressions in the eroded Knob Hill landscape prior to deposition of the succeeding units of the Brooklyn Formation.

More common than the shale as the basic unit of the Brooklyn Formation is a "sharpstone" conglomerate, an unsorted sedimentary breccia consisting of angular clasts of chert ranging in size from 0.1 to 4.0 cm.

This, the lower of two sharpstone units consists of angular chert fragments devoid for the most part of alluvial sorting. At the Phoenix Mine aeolian quartzites occur in association with this unit, the Lower Sharpstone conglomerate. This distinctive lithology is believed to have been deposited as outwash fans in a desert. The term "fanglomerate" seems to be applicable.

The following unit, the Lower Limestone represents a marine transgression. The limestones range from micro-crystalline to coarsely crystalline, and contain beds of nodular limestone and beds of pyritic fine-grained, thin-bedded limestone. The Lower Limestone has a very restricted distribution.

Overlying the Lower Limestone is the Upper Sharpstone, a unit which is widely distributed in the Greenwood area. The upper member of the Upper Sharpstone contains distinctive clasts of limestone and is known as "Puddingstone". The Upper Sharpstone conglomerate is typically of a greenish or mauvish hue, and is much finer grained than the Lower Sharpstone. Water sorting is common and considerable thicknesses of the Upper Sharpstone can be occupied by siltstones and sandstones.

The Upper Sharpstone is succeeded by a second limestone, the Upper Limestone which represents a second marine transgression. The Upper and the Lower Limestone are not easily distinguished from one another.

TABLE II

Stratigraphic and Intrusive Units

Age	Name	Predominant Lithology	Symbol
Tertiary	Kettle River	mafic to siliceous volcanic and hypabyssal rocks	Tr
	Marron	tuffs and sediments	
Cretaceous		granitic intrusives	I
Triassic	Brooklyn		
	Upper Limestone	limestone	UL
	Upper Sharpstone	sharpstone conglomerate	US
	Lower Limestone	limestone	LL
	Lower Sharpstone	sharpstone conglomerate	LS
	Rawhide Shale	shale	RS
? Permian	Unconformity		
pre-Permian	Knob Hill	metavolcanics and metasediments	KH

9. Geology of Copper Queen Claims:

The rocks most abundantly exposed on the Copper Queen Claims are Tertiary volcanics and related dykes and sills. The upper members of the underlying Brooklyn formation which dips at approximately 45 degrees to the SE are exposed on a SE slope of the ridge which runs NE-SW through the claims. Extensive outcrops of the Upper Limestone occur in the vicinity of the old Copper Queen workings and on the slopes above. Upper Sharpstone identified as such by the presence of water-sorted beds of conglomerate, siltstone, and sandstone and by the limestone-clast conglomerate (Puddingstone) is found in the south part of the map sheet (Figure 3) and to a lesser extent at the North end. Anomalous bedding attitudes observed south of the Copper Queen workings are presumed to be due to the Healy Fault.

Prior to the 1980 drill programme it was thought likely that the Lower limestone existed beneath the Tertiary cover occupying the ridge down the centre of the claims. Evidence consisted of 20 feet of limestone intersecting beneath Tertiary cover on the Whitehorse claim (Lot 2610) and lime rich rocks exposed in a trench in the north centre of the Ing 1 claim. Drilling in 1980 showed the Lower limestone to be at most very restricted. Whereas in the vicinity of the Phoenix Mine the Upper sharpstone rests on Lower limestone, in the vicinity of the Copper Queen claims it now appears that the Upper sharpstone rests directly on Knob Hill basement.

Outcrops shown on the geological map (Figure 3) fall into two categories: those shown in dotted line were located during 1980 on an orthophoto topographic base. Those outlined in dashed line were transferred from previous maps by Riocanex Ltd.

No work was done on the former workings of the Copper Queen, King Solomon or Big Copper Crown-grants. The regolithic copper showings, believed to have been formed by Tertiary concentration from sulphide bodies within the limestone are described in B.C. Assessment Report 6436.

10. 1980 Drill Programme:

Two holes totalling 502 metres were drilled in 1980.

D.D.H. 80-1, located in the south centre of the property, was collared immediately west of a ridge of easterly-dipping sharpstone and east of a trench containing sheared lime-rich rocks. The hole was drilled to the NW at a dip of 60 degrees and was directed towards rocks stratigraphically underlying the Upper Sharpstone.

Beneath 45 m. of Tertiary dyke and a fault zone the rocks intersected consist of very variable, pale grey siliceous sediment with chlorite and carbonate. Most of the rock is sheared but some of it appears completely devoid of deformation. Massive, white, crystalline limestone and sections of grey white chert were common near the top of the hole. Much of the more chloritic rock exhibits veinlets of lime.

Although comparison of thin sections from the drill hole with a thin section of type Knob Hill (Appendix II) leaves little room for doubt that the rocks intersected in D.D.H. 80-1 belong to the Knob Hill basement, there was, at the time of drilling, considerable uncertainty about identifying this rock as Knob Hill. Causing the uncertainty was a massive white limestone, previously not seen among Knob Hill rocks, and the presence of a comparatively undeformed fragmental rock which seemed to bear no indication of the metamorphic event to which Knob Hill rocks are known to have been subjected. The hole was stopped at 203 metres.

The second hole (D.D.H. 80-2), drilled on the Independence crown-grant near the NW boundary of the claim block, deepened a hole drilled by McIntyre Mines in 1967.

For the first 158 metres drilling consisted of redrilling and reaming the former McIntyre hole (M3) which had penetrated only Tertiary volcanics. Below a depth of 158 metres D.D.H. 80-2 intersected Tertiary volcanic and hypabyssal rocks to a depth of 252 metres. Hypabyssal rocks continue beneath 252 metres but they intrude a grey brecciated chert, considerably fractured and chloritized and with local disseminations of pyrite. This rock seems likely to be Knob Hill although some possibility remains that it is a Brooklyn chert. However, if these cherts belong to the Brooklyn sequence they probably fall near the base of the Upper sharpstone in which case the prospective stratigraphic levels would lie deeper still by a further 300 m. Drilling to such depths is not justified.

The purpose of this hole was to intersect a limestone, with skarn minerals, intersected in another McIntyre hole (M4) to the south. Had the single crown-grant containing the M4 hole been available to option the hole redrilled would have M4 and not M3. If M4 did, as believed, intersect Lower Limestone beneath the Tertiary volcanic rocks, then the extent of this Lower Limestone is made to seem very restricted by the results of D.D.H. 80-2.

11. Discussion:

The 1980 drill programme was based on the premise that the Lower Limestone was likely to occur stratigraphically beneath the Upper Sharpstone and buried by the capping Tertiary volcanic rocks. The two drill holes suggest that this is not so and that the Upper Sharpstone, despite its similarities to the Upper Sharpstone in the vicinity of Phoenix, lies not on Lower Limestone but on basement. Regional considerations make this a very surprising conclusion: the Lower Limestone is known to occur beneath Upper Sharpstone in Wallace Creek to the north and Lower Sharpstone outcrops extensively on the highground three kilometers to the west of the claims.

One must conclude that the Lower Limestone has a patchy and restricted distribution, possibly controlled by early faulting.

The possibility that a significant stretch of Lower Limestone exists beneath the extensive Upper Sharpstone of the Copper Queen Camp remains real but the chances of finding it seem too small to justify further exploration.

12. References:

B.C. Min. Mines Assessment Reports

1082
Report on Induced Polarization and Resistivity Surveys for McIntyre Porcupine Mines Ltd. by Moreau, Woodward & Co. Ltd.

2453
Geological, Geophysical and Geochemical Report on the Poppy Claim Group by J.P. Guelpa, 1970.

5842
Forshaw Option
1975 Drill Programme by R.V. Longe April 1976.

#6436
Queen Claims
Drilling - August 1977 by R.V. Longe September 1977.

B.C. Dept. Mines Annual Reports

1894 p. 755
1897 p. 582
1898 p. 1125
1899 p. 768
1903 p. 180
1954 p. 119
1967 p. 227

LeRoy, O.E., 1912
Geology and Ore Deposits of Phoenix Boundary District, B.C. G.S.C. Memoir 21

Seraphim, R.H. 1956
Geology and Copper Deposits of the Boundary District, B.C. C.I.M.M. Transaction Vol. IX pp. 384-394.

APPENDIX I

DRILL LOGS

DRILL LOG

D.D.H. # 80-1
Page 1 of

LOCATION: Greenwood, B.C.

NTS: 82/E/2

LAT/LONG:

PROPERTY: Copper Queen CLAIM NAME: Ing 1

MINING JURISDICTION: Greenwood

DATE STARTED: August 15, 1980

DATE COMPLETED: August 20, 1980

PURPOSE: To intersect the Lower Brooklyn Limestone beneath Upper Sharpstone exposed in outcrop.

COORDINATES:

AZIMUTH: 280 degrees

DIP: - 60

DEPTH: 203.61 m.

DRILLED BY: Bergeron Drilling Ltd.

CORE:

SIZE: BQ

LOGGED BY: R.V. Longe DATE: Aug. 27,1980

STORED AT: c/o Don Osborne, Greenwood, B.C.

CASING LEFT? Yes

DIP TESTS AT None

PERCENT RECOVERY: approx. 100%

COMMENT:

This hole intersected volcanic rocks, fine-grained sediments, breccias, chert and limestone. The presence of limestone and of a comparatively undeformed fragmental rock made field identification of the rock as part of the Knob Hill formation (basement) uncertain. Thin section comparisons (Appendix II) confirmed the rock as Knob Hill. Six samples were collected for thin section study.

DRILL LOG D.D.H. 80-1

Metres From	To	
0	13.41	- casing
13.41 -	26.06	- feldspar porphyry (pulaskite) dyke Tertiary
26.06 -	28.65	- fault zone, broken chert with graphitic slips
28.65 -	29.57	- chert, broken with minor py & cp on fractures at 29.25 m.
29.57 -	30.18	- core lost
30.18 -	34.75	- pale grey rock consisting of chert fragments in clay (? sericitic) matrix with minor chlorite. (lithology #1)
34.75 -	39.01	- pale grey siliceous rock with pale clay bands and occasional limestone and chert clasts, py up to 3% in patches (lithology #2)
39.01 -	52.12	- massive chert (41.16 to 45.43 very broken)
52.12 -	55.02	- lithology #2
55.02 -	62.18	- chert, grey-white, massive
62.18 -	70.41	- lithology #2 with lime in fractures and as "clasts" 68.37 - 68.43 m. sample 130
70.41 -	71.17	- chert, massive, white
71.17 -	75.59	- lithology #2
75.59 -	77.72	- breccia and chert clasts in a green grey siliceous matrix. Lime abundant in veinlets
77.72 -	79.55	- lithology #2

Metres From	To	
79.55	80.16	- limestone, massive white as broken fragments in lithology #2.
80.16	80.62	- breccia of white limestone in fine-grained grey matrix
80.62	83.82	- limestone, massive, white, crystalline
83.82	87.72	- fine-grained, grey, metasediment with small hematitic fragments and abundant lime, pyrite approximately 1%, locally up to 5% (lithology #3) sample 142
87.72	88.70	- limestone, massive white
88.70	104.85	- green grey, lime-rich metasediment with py (< 1%) disseminated, weakly chloritized and epidotized in places, small chert clasts abundant 102.72 - 103.02 Sample 131
104.85	106.07	- brecciated chloritic sediment
106.07	106.68	- lithology #2
106.68	107.14	- limestone, mottled and recrystallized
107.14	118.11	- greenish grey, fine-grained metasediment with trace pyrite and abundant small (< .3 cm.) chert clasts similar to lithology #3 but with less lime. 113.54 - 115.21 very broken
118.11	127.71	- chert, mostly massive with occasional clay stringers. Trace pyrite
127.71	141.12	- green grey metasediment with abundant lime both pervasive and in veinlets. Occasional hematite fragments.

Metres

From	To	
141.12	141.88	feldspar porphyry dyke
141.88	142.04	lithology #2, very broken
142.04	142.95	lime-rich metasediment as above
142.95	162.46	feldspar porphyry dyke, Tertiary
162.46	203.61	lime-rich metasediment with chert clasts, (? sedimentary breccia or fault breccia). Lime in veinlets, matrix locally epidote-rich
	174.19 - 174.25	sample 128
	182.58 - 183.18	breccia with hematitic matrix and slip surfaces of hematite
	186.99 - 187.06	sample 129
	192.94 - 196.90	less lime
	197.82 - 198.73	epidote-rich
	202.39 - 202.45	sample 127
203.61		end of hole

DRILL LOG

D.D.H. # 80-2
Page 1 of

LOCATION: Greenwood, B.C.

NTS: 82/E/2

LAT/LONG:

PROPERTY: Copper Queen CLAIM NAME: L 2311

MINING JURISDICTION: Greenwood

DATE STARTED: August 23, 1980

DATE COMPLETED: August 27, 1980

PURPOSE: To intersect Lower Brooklyn Limestone beneath Tertiary volcanic cover.

COORDINATES:

AZIMUTH:

DIP - 90 degrees

DEPTH: 298.09 m.

DRILLED BY: Bergeron Drilling Ltd.

CORE:

SIZE: BQ

LOGGED BY: R.V. Longe DATE: Aug. 27, 1980

STORED AT: c/o Don Osborne, Greenwood, B.C. Tertiary rocks on site, remainder (6 boxes) in Greenwood.

CASING LEFT? No

DIP TESTS AT None

PERCENT RECOVERY: approaching 100%

COMMENT:

This drilling deepened a hole drilled by McIntyre Mines in 1967 to a depth of 520 feet (158.5 m.). Rocks intersected beneath the Tertiary cover (ending at approx. 250 m.) were cherts belonging to either the Knob Hill or to the Brooklyn Formations. If the cherts belong to the former, the Lower Limestone is absent, if to the latter, the Lower Limestone is considerably deeper. Further drilling is not considered justified.

DRILL LOG D.D.H. 80-2

Metres From	To	
0	- 158.50	- no core (redrilling of old hole)
158.50	- 165.81	- volcanic, fine to medium-grained, grey, speckled porphyry with amphibole phenocrysts
165.81	- 171.91	- volcanic, pale grey, fine-grained
171.91	- 194.92	- volcanic, fine to medium-grained, grey, speckled, porphyritic, amphibole phenocrysts
	173.13 - 173.28	- volcanic, green-grey
	173.74 - 173.89	- chloritic, probably a xenolith
194.92	- 195.83	- grey porphyry with large feldspar phenocrysts, a dyke
195.83	- 201.63	- volcanic, fine to medium-grained grey, speckled porphyry with amphibole phenocrysts
201.63	- 212.45	- pale grey, fine-grained porphyry with feldspar phenocrysts
212.45	- 213.82	- very fine-grained pale grey volcanic, possibly a tuff
	213.66 - 216.56	fragment of dark grey volcanic
213.82	- 214.43	- pale grey, fine-grained porphyry with feldspar phenocrysts

Metres From	To	
214.43	213.97	volcanic, fine to medium-grained, grey, speckled, with amphibole phenocrysts at 214.43) breccia with volcanic 228.90) and hematite 229.21) fragments
229.21	229.67	fine-grained, brown grey volcanics
229.67	234.39	pale grey and pink feldspar porphyry
234.39	245.52	grey feldspar porphyry (pulaskite)
245.52	248.72	pale grey feldspar porphyry
248.72	249.63	breccia, green grey, with fragments of chert and volcanic and 5% disseminated pyrite probably a volcanic breccia
249.63	249.94	pink, fine-grained feldspar porphyry, probably a flow
249.94	250.70	breccia, as above, green grey with fragments of chert and volcanics
250.70	252.07	pale grey fine-grained feldspar porphyry, probably a flow
252.07	252.44	breccia as above, green grey with fragments of chert and volcanic disseminated pyrite, locally up to 10%
252.44	260.45	brecciated chert with 1% pyrite, probably Knob Hill
260.45	261.12	brecciated chert as above fractured and chloritized
261.12	261.52	lost core

From

261.52 - 262.49 - pale grey to pink chert with lime in fractures

262.49 - 264.63 - grey dyke with amphibole phenocrysts

264.63 - 268.38 - grey chert with stringers of lime and epidote. 1% pyrite

268.38 - 275.23 - grey brown feldspar porphyry dyke

275.23 - 278.13 - grey amphibole-porphyry dyke

278.13 - 279.96 - brecciated chert as above with disseminations and stringers of pyrite

279.96 - 282.40 - chert, grey, more massive than above

282.40 - 298.09 - pink feldspar porphyry

298.09 - end of hole

APPENDIX II

DESCRIPTIONS OF THIN SECTIONS

Vancouver Petrographics Ltd.

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Report for: Robert Longe,
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Samples: D-126, -127, -128, -129, -130, -131

The samples are grouped as follows:

1) ANDESITE

a) moderately porphyritic

D-131

b) slightly porphyritic

D-127 (relatively fresh)
D-126 (strongly altered)
D-128 (brecciated and veined)
D-129 (brecciated, altered, veined)

2) VOLCANOCLASTIC ROCKS

a) tuffaceous mudstone

D-130 (altered)

Most of the samples contain alteration and hydrothermal replacement minerals. The more important ones are summarized below:

D-131 : calcite, biotite

D-127 : calcite, epidote, quartz (all in veins)

D-126 : epidote, Ti-oxide (alteration minerals)
calcite, chlorite, epidote, quartz (replacement minerals)

D-128 : epidote, calcite, quartz, biotite, chlorite

D-129 : quartz, epidote, opaque?

John Payne

John Payne,
August, 1980.

Sample D-126 Strongly Altered Andesite

The strong alteration in this sample has made interpretation of the original nature of the rock difficult. Locally the rock appears to contain plagioclase phenocrysts in a very fine grained groundmass suggesting that it was either a porphyritic flow or a crystal tuff.

Plagioclase phenocrysts? are from 0.5-1 mm in average size, and have subhedral to anhedral outlines. Their vague prismatic shape and difference in alteration assemblage from the surrounding rock suggest that they were originally plagioclase. The alteration minerals are difficult to identify, but the most abundant appears to be extremely fine grained epidote. Locally in the groundmass, plagioclase laths from 0.2-0.3 mm in lenght are present; these too are completely altered to the same secondary assemblage as the phenocrysts.

The groundmass contains a few patches containing very fine grained cherty quartz. Elsewhere it is extremely fine grained with high relief, and probably contains abundant epidote and/or Ti-oxide.

Coarser grained patches and veinlets are common in the sample. These consist of fine grained aggregates of one or more of calcite, chlorite, epidote, and quartz, with scattered pyrite and biotite. One discontinuous veinlet consists of fine grained pyrite and lesser muscovite. Calcite forms a few coarser patches up to 1.5 mm across containing grains up to 0.15 mm in size.

Sample D-127 Slightly Porphyritic Andesite

The rock contains scattered plagioclase phenocrysts, mainly less than 0.7 mm long in a very fine grained groundmass dominated by plagioclase laths and containing abundnant magnetite.

phenocrysts		
plagioclase	3- 5%	
groundmass		
plagioclase	65-70	
opaque	10-15	(including abundant magnetite)
epidote	10-15	
veins		
1) calcite	1½-2	
2) epidote	1½-2	
3) quartz-calcite	1½-2	

Plagioclase forms a few coarse phenocrysts up to 1 mm long; they have prismatic outlines and are fresh. It also forms slightly more abundant finer grained (0.3-0.7 mm long) laths which grade in grain size down to the plagioclase laths of the groundmass.

The groundmass is dominated by plagioclase laths averaging 0.05-0.3 mm long. Interstitial to these is abundant opaque as grains averaging 0.02-0.03 mm in size. Epidote forms patches of grains averaging 0.1-0.2 mm in grain size as well as abundant extremely fine grained material in the groundmass.

The rock is cut by three main types of veins.

Calcite veins are up to 0.5 mm wide, and consist of very fine to fine grained aggregates of equant anhedral grains.These cut the epidote-rich veins.

The epidote veins and patches are up to 0.15 mm wide, with grains averaging 0.05 mm. Some contain lesser chlorite. A few patches consists of very fine grained chlorite plus lesser amounts of fine grained epidote.

The quartz-calcite veins are irregular and discontinuous. Grain size ranges widely from very fine to medium, with quartz very much more abundant than calcite. Epidote occurs locally in these veins and patches.

Sample D-128 Brecciated and Veined Porphyritic Andesite

The sample contains dark green to black andesite fragments up to 2 cm long in a light green groundmass consisting of scattered altered andesite fragments and vein material. A late quartz-calcite vein cuts the breccia matrix.

The andesite fragments contain 5-7% plagioclase phenocrysts averaging 0.5-0.7 mm in size; some are slightly altered to fine grained sericite flakes. The phenocrysts are set in a groundmass composed of plagioclase laths (40-60%), epidote (15-20%) and opaque (15-30%). The plagioclase laths average 0.05-0.15 mm in length, and show a slightly preferred orientation in some fragments. Epidote forms scattered patches with grain size 0.05-0.1 mm, and abundant extremely fine grained material interstitial to plagioclase laths. Opaque forms dusty to very fine grained grains and dense patches in the groundmass; in some fragments it is very abundant (locally up to 80%).

The lighter green matrix contains several fragments which appear to be altered andesite. These consist of plagioclase laths from 0.05-0.15 mm in size intergrown with an equal amount of biotite and/or chlorite flakes 0.1-0.15 mm in average length, and abundant sphene or Ti-oxide (10-15%). Biotite is pleochroic from pale to medium green. Calcite occurs in scattered irregular grains up to 0.3 mm across in some fragments.

Most of the groundmass consists of an irregular aggregate of epidote, calcite, quartz, biotite, chlorite and plagioclase. Plagioclas occurs as scattered equant grains averaging 0.5 mm in size; they are similar to phenocrysts in a few of the andesite fragments, and are slightly altered to chlorite. Epidote forms patches up to a few mm across of very fine to fine grained aggregates. Calcite forms patches and veinlets of very irregular size and shape. Quartz occurs mainly as patches up to 1.5 mm across of very fine grained mosaic to interlocking grains. Biotite and chlorite occur with epidote and calcite, and locally are abundant in patches up to 1 mm across. One epidote-rich vein-like zone contains several grains of K-feldspar up to 0.3 mm in size.

The late quartz-calcite vein consists mainly of fine to medium grained quartz in an irregular intergrowth, with very irregular patches and veinlets of calcite.

Sample D-129 Andesite, Brecciated, Altered, Veined

The rock consists of a slightly porphyritic andesite which was brecciated and altered, with formation of a breccia matrix dominated by quartz and epidote, and with the introduction of magnetite and ilmenite into the andesite adjacent to the breccia matrix. Later, a vein-like zone of alteration cut the sample, changing magnetite to hematite and ilmenite to leucoxene. Finally, epidote-quartz veins cut the sample. Epidote alteration of the andesite may have occurred during either or both of the periods of introduction of epidote into the rock.

In the least altered andesite, plagioclase forms scattered phenocrysts, mainly from 0.5-0.7 mm in size, but with a few ragged ones up to 3 mm long. The groundmass consists of plagioclase laths (15-20%) averaging 0.15-0.3 mm long, anhedral plagioclase (30-35%), opaque, in part magnetite, (10%) as dusty to very fine disseminated grains, epidote (10-15%) as scattered equant anhedral grains averaging 0.05-0.15 mm across, and leucoxene (5%) in extremely fine grained irregular aggregates.

Much of the breccia matrix consists of very fine grained aggregates of quartz and quartz-epidote. In places it cuts sharply across the andesite, whereas elsewhere, especially at one end of the section it has rounded borders with theandesite, and appears to be replacing the rock. Opaques migrated from the brecciated zones into the andesite along the borders, where they were concentrated, in places sufficient to cause the rock to be almost opaque in thin section. These zones are strongly magnetic. Some opaques may have been introduced with the breccia matrix, but it is possible that they only were mobilised from the replaced parts of the rock.

Locally vein-like zones and patches in the breccia consist of very irregular aggregates of quartz and lesser plagioclase. Some of these may be fragments of an exotic rock, others appear to be vein-like zones, suggesting more than one stage of brecciation and alteration.

The sample is cut by a reddish-brown vein-like zone in which magnetite and ilmenite were strongly replaced by hematite and leucoxene respectively as dense aggregates. In this zone is a patch up to a few mm long of fine grained epidote in an anhedral mosaic; it appears to be later than the hematite-leucoxene alteration, but is cut by the late epidote-quartz veins.

The final event recorded in the section is the formation of epidote-quartz veins and veinlets along fractures. Associated with this vein formation may be formation of patches of epidote from 0.05-0.15 mm in size in the breccia matrix of extremely fine grained epidote. Veins average less than 0.1 mm wide, and many are discontinuous. Grain size is 0.05-0.1 mm, and grains are in equant anhedral aggregates. One discontinuous calcite veinlet probably is of the same age as the late epidote-quartz veins.

Sample D-130 Altered Tuffaceous Mudstone (Calcite Alteration)

The sample contains irregular beds of mudstone and a few interlay or lenses of tuffaceous origin containing plagioclase crystal fragmen (original phenocrysts) and fine grained andesite.

The mudstone is extremely fine grained and relatively soft; it consists mainly of sericite-clay with lesser chlorite? and irregular wispy lenses parallel to bedding of extremely fine grained Ti-oxide.

A few layers contain slightly to moderately altered (to sericite and calcite) plagioclase grains up to 0.3 mm long, and fragments of andesite consisting of very fine grained plagioclase laths in an extremely fine grained groundmass. One fragment 0.7 mm across consists partly of very fine grained chert and partly of mudstone.

Chlorite forms a few patches up to 1 mm long of very fine grained aggregates, and smaller patches of sericite-clay are present locally.

Epidote forms a few patches from 0.05-0.15 mm in size in some lay these may have formed by alteration of plagioclase in tuffaceous layer

Calcite occurs as irregular patches and veinlets cutting and replacing the original rock. One coarser vein of calcite with lesser chlorite and quartz cuts the sample. Pyrite forms a few grains from 0.1-0.2 mm across, with subhedral outlines.

Probably the calcite, which comprises 7-10% of the rock, is of secondary origin.

Sample D-131 Altered Porphyritic Andesite

The sample contains abundant coarse plagioclase phenocrysts in a very fine grained groundmass. Alteration has produced the stable assemblage: calcite-epidote-biotite-sericite. The biotite suggests that the rock has undergone contact? metamorphism.

phenocrysts		
plagioclase	20-25%	
mafic?	1- 2	
groundmass		
plagioclase	40-45	
calcite	5- 7	
opaque	5- 7	(rock is moderately magnetic)
epidote	3- 4	
quartz	1½-2	
apatite	trace	
alteration patches		
calcite, lesser biotite	10-12	
veinlets		
calcite	2- 3	

Plagioclase forms anhedral to subhedral phenocrysts up to 3 mm across, averaging 1-1.5 mm. Most are equant to slightly elongate. Clusters of phenocrysts are common. Plagioclase is moderately altered to very fine grained sericite flakes, irregular patches of calcite, and some grains contain moderate very fine grained biotite.

A few clusters of biotite and calcite may represent original mafic phenocrysts. These are up to 0.7 mm across and have subhedral outlines, vaguely suggesting original pyroxene crystals. Grain size of the secondary aggregates is very fine. Biotite is pleochroic from pale to medium dark brownish-green. It forms irregular aggregates of stubby flakes, a texture common in contact metamorphic aureoles.

In the groundmass, plagioclase occurs as elongate laths from 0.2-0.5 mm in length and as irregular interstitial grains up to 0.2 mm in size. It is moderately to strongly altered to extremely fine grained sericite and epidote.

Calcite occurs as scattered irregular patches averaging 0.03-0.05 mm in size, and probably was formed during alteration.

Opaque, with abundant magnetite, forms anhedral to slightly elongate grains averaging 0.05-0.1 mm in size; locally grains are altered to hematite.

Epidote occurs as scattered equant grains averaging 0.05-0.15 mm in size. Some have a reddish-brown tinge in plane light, and some occur with quartz.

Quartz forms scattered grains from 0.05-0.1 mm in size, commonly associated with epidote.

Apatite forms a few rounded grains from 0.02-0.05 mm in size.

Ti-oxide may be present as extremely fine grained material in the groundmass, but it would be difficult to distinguish from epidote at that grain size.

Calcite with lesser biotite (as in altered plagioclase and mafic phenocrysts) forms irregular replacement patches up to a few mm across. Grain size is mainly fine to very fine, with a few medium grains in larger patches. Calcite also forms a few irregular veinlets, probably of similar age and origin as the alteration patches.

APPENDIX III

STATEMENT OF QUALIFICATIONS

Statement of Qualifications

I, R.V. Longe, hereby certify that:

1. I am a consulting geologist with a business office at 311 Water Street, Vancouver, B.C. V6B 1B8.

2. I am President of MineQuest Exploration Associates Ltd., a company performing geological consulting and contract exploration services for the mineral exploration industry.

3. I am a graduate of Cambridge University, (B.A. Hons., 1961 Natural Sciences Tripos, Parts 1 & 2, Geology) and of McGill University (M.Sc. 1965).

4. I am a fellow of the Geological Association of Canada.

5. I have practiced my profession as geologist for 15 years.

6. The information, opinions and recommendations in the attached report are based on personal observations on the property and the surrounding area.

signed R.V. Longe
(R.V. Longe)

dated at Vancouver, B.C. this
17th day of November, 1980.

APPENDIX IV

COST STATEMENT

COST STATEMENT

COPPER QUEEN CLAIM EXPENDITURES

DURING THE PERIOD JUNE, 1 TO

SEPTEMBER 31, 1980

Bergeron Drilling Ltd.

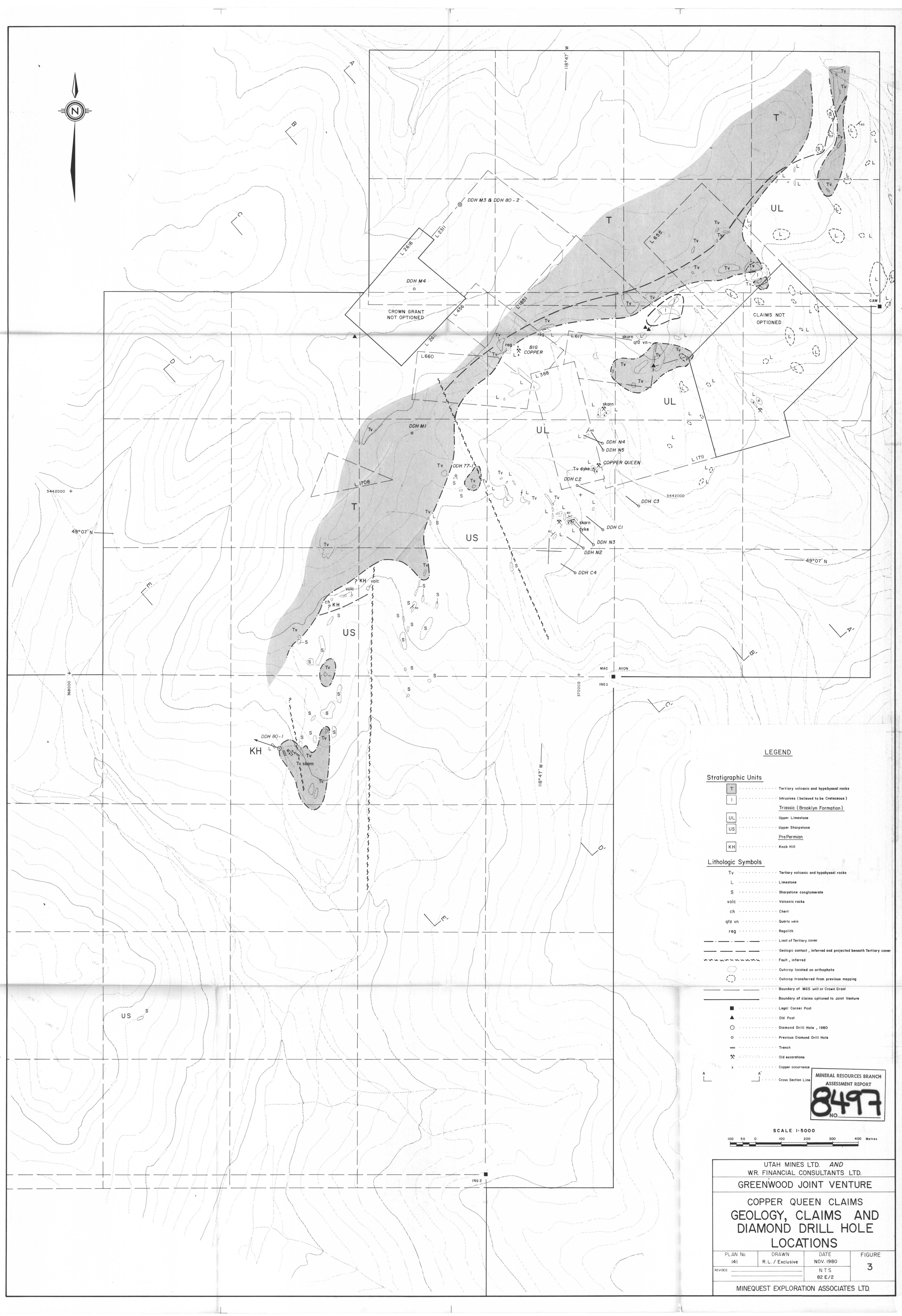
Diamond Drilling	Aug. 15 - 20 Inv. # 001	15,877.55
Bulldozing	Aug. 25 Inv. # 002	2,217.50
Bulldozing	Aug. 29 Inv. # 003	360.00
Diamond Drilling	Aug. 21 - 28 Inv. # 004	16,487.60
Slashing	Inv. # 005	200.00
		35,142.65

R.V. Longe

18 days @ $250/day for August	4,500.00

M. England	2 days @ $71.24/day	142.48
R. Hyndman	2 days @ $61.82/day	123.64
P. Green	3 days @ $61.82/day	185.48
A. Buskas	3 days @ $71.24/day	213.71
A. Gair	1 day @ $87.37/day	87.37
		752.68

Food and Accommodation @ $20/day each for 29 days	580.00
Travel costs	
Truck rental	801.82
Air fares (2 return to Penticton) $99.00 each	198.00
	999.82
Pacific Survey Corporation	
Inv. # 585	
May 20, 1980	
Map preparation	1,200.00
Orthophoto	632.00
Tax FST 9%	56.88
PST 4%	27.55
	1,916.43
Vancouver Petrographics Ltd.	
Inv. # 2167	
6 thin sections	30.00
6 ground & labelled thin section reject slices	4.00
Petrographic report	190.00
shipping	6.00
	230.00
Exclusive Drafting Services Ltd.	
Drafting (estimate)	250.00
TOTAL	$44,371.58



LEGEND

Stratigraphic Units

- T — Tertiary volcanic and hypabyssal rocks
- I — Intrusives (believed to be Cretaceous)

Triassic (Brooklyn Formation)

- UL — Upper Limestone
- US — Upper Sharpstone

PrePermian

- KH — Knob Hill

Lithologic Symbols

- Tv — Tertiary volcanic and hypabyssal rocks
- L — Limestone
- S — Sharpstone conglomerate
- volc — Volcanic rocks
- ch — Chert
- qtz vn — Quartz vein
- reg — Regolith
- Limit of Tertiary cover
- Geologic contact, inferred and projected beneath Tertiary cover
- Fault, inferred
- Outcrop located on orthophoto
- Outcrop transferred from previous mapping
- Boundary of MGS unit or Crown Grant
- Boundary of claims optioned to Joint Venture
- Legal Corner Post
- Old Post
- Diamond Drill Hole, 1980
- Previous Diamond Drill Hole
- Trench
- Old excarations
- x — Copper occurrence
- A — A' — Cross Section Line

SCALE 1:5000

100 50 0 100 200 300 400 Metres

UTAH MINES LTD. *AND*
W.R. FINANCIAL CONSULTANTS LTD.

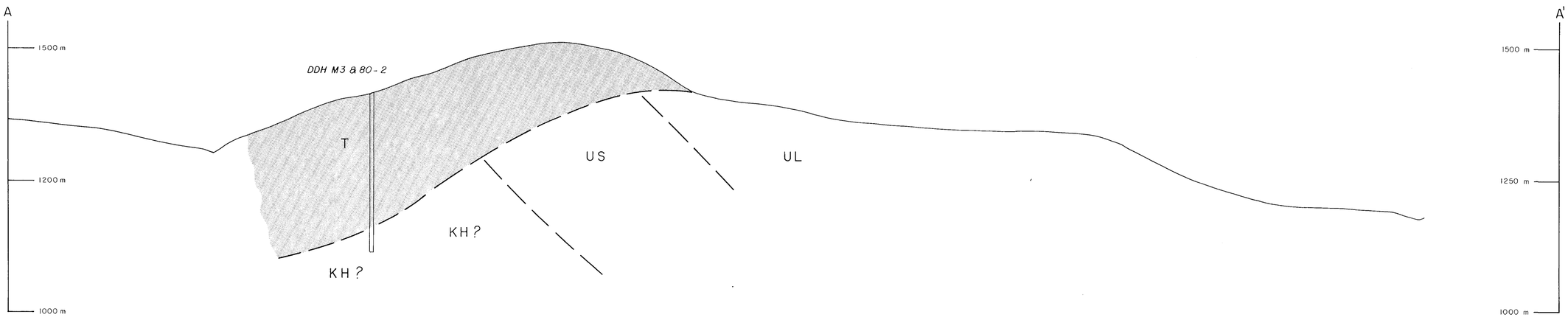
GREENWOOD JOINT VENTURE

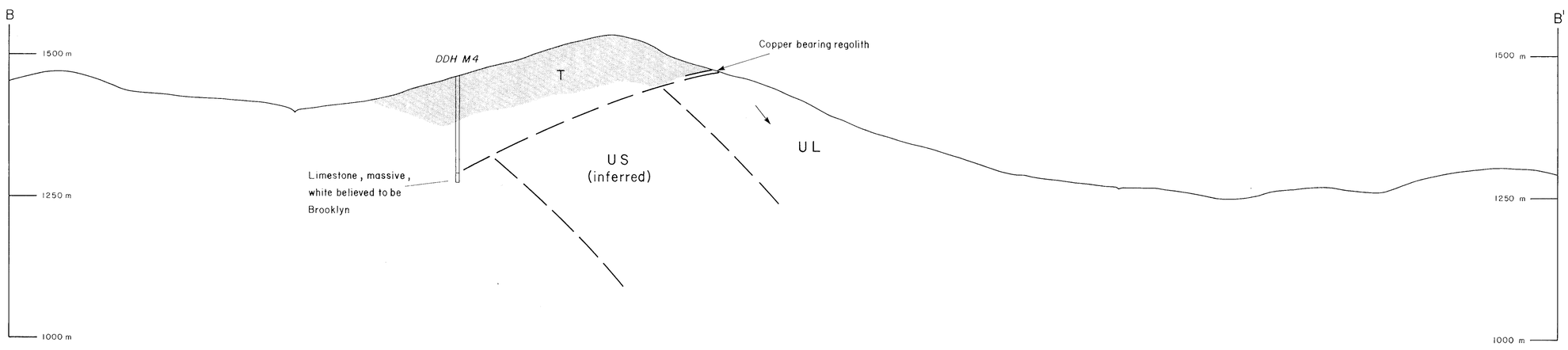
COPPER QUEEN CLAIMS

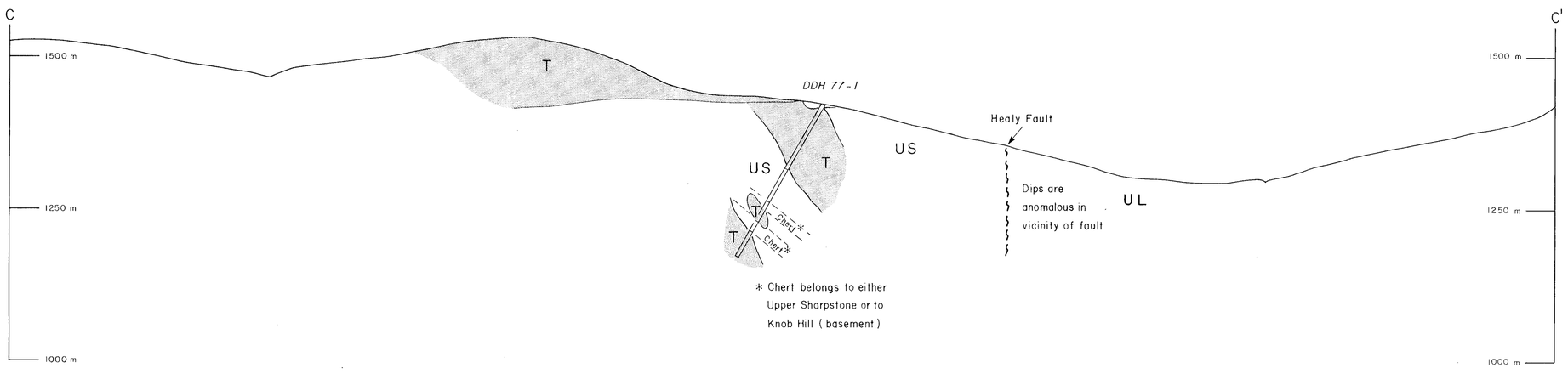
GEOLOGY, CLAIMS AND DIAMOND DRILL HOLE LOCATIONS

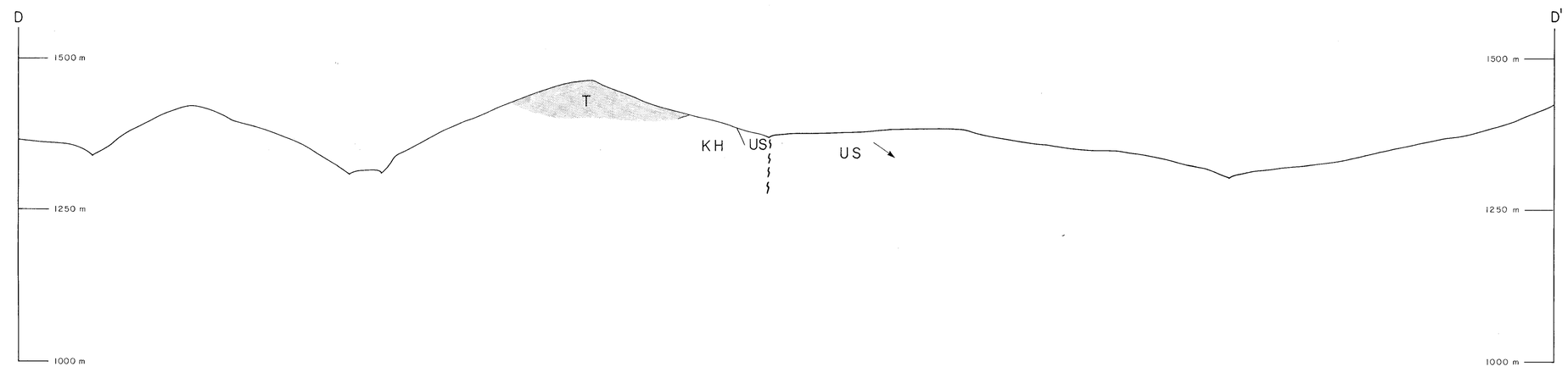
PLAN No.	DRAWN	DATE	FIGURE
141	R.L. / Exclusive	NOV. 1980	3
REVISED		N.T.S. 82 E/2	

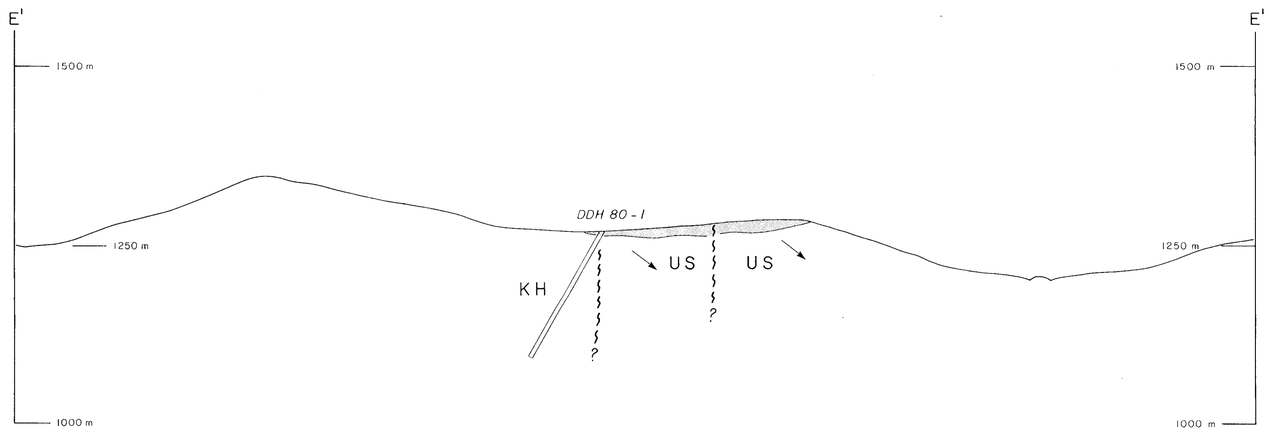
MINEQUEST EXPLORATION ASSOCIATES LTD.











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Triassic (Brooklyn Formation)

- UL — Upper Limestone
- US — Upper Sharpstone

Pre Permian

- KH — Knob Hill
- Approximate Dip
- Fault (inferred)

For location of sections, see Figure 3 (Plan No. 141)

SCALE 1:5000

100 50 0 100 200 300 400 Metres

UTAH MINES LTD. AND
W.R. FINANCIAL CONSULTANTS LTD.

GREENWOOD JOINT VENTURE

COPPER QUEEN CLAIMS

CROSS SECTIONS

PLAN No	DRAWN	DATE	FIGURE
142	R.L. / Exclusive	NOV. 1980	4
REVISED		NTS 82 E/2	

MINEQUEST EXPLORATION ASSOCIATES LTD.