

UR1981-38

1981/38. Progress report on exploratory drilling at the All Nations mine, Moina.

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Abstract

The E-W trending quartz lode intersected in two previous diamond drill holes (AN1 and AN2) has been intersected 130 m along strike to the west of AN1, in drill hole AN3, where it occurs as two quartz veins (0.1 m and 0.2 m thick) 1.8 m apart. The lode was not intersected in a fourth hole, AN4, collared 100 m to the east of AN1 but this hole may not have reached the target. The three intersections indicate a lode striking 102°M and dipping 80°S, which is similar to the All Nations lode. A zone of extensively altered porphyry associated with numerous quartz and quartz-topaz veins carrying wolframite and molybdenite in AN3, and a section of porphyry with quartz-molybdenite(-scheelite) veins in AN4 have been sampled for analysis.

INTRODUCTION

A four hole exploratory diamond drilling programme has been undertaken at the All Nations mine, located on Mineral Leases 24M/60 and 66M/78, approximately 2 km east of Moina (fig. 1).

The first two holes intersected a thick quartz vein carrying wolframite, molybdenite and bismuthinite(?); and numerous other narrow quartz and quartz-topaz veins also carrying wolframite and molybdenite (Collins, 1981). These intersections have been followed-up with two additional diamond drill holes (AN3 and AN4) located 100 m either side of the first two holes (fig. 1).

This report presents the geological data obtained from drill holes AN3 and AN4, and analytical data on two quartz vein intersections in AN3. Analytical data on the remainder of the drill core will be presented in a later report.

The geological setting and the mineralisation at the All Nations mine are summarised by Collins (1979, 1981), and are illustrated in Figure 1.

DRILLING

The diamond drilling programme was undertaken to test below a postulated low angle reverse (or thrust) fault for vein mineralisation in close proximity to the All Nations lode.

The first two diamond drill holes (AN1 and AN2), totalling 278.2 m, intersected a quartz vein (0.5 and 0.3 m thick respectively) almost directly beneath the All Nations lode (Collins, 1981). These holes were drilled from the northern side of the workings and inclined to the south.

Two additional holes (AN3 and AN4) totalling 414.7 m were drilled between August 1980 and April 1981. These holes were collared on the southern side of the workings and inclined to the north. Survey details are given in Table 1. A Pajari instrument was used for down-hole surveys, but only one orientation measurement is recorded because of instrument failure with other readings. However, the sporadic occurrence of magnetite in the core may interfere with down-hole surveys.

The third diamond drill hole (AN3) was collared approximately 100 m south of the shaft at the western end of the workings on a N-S section 100 m west of AN2 and drilled north at an inclination of -53° to a depth of 205.15 m (figs. 1 and 2). The fourth hole (AN4) was collared approximately 85 m south of the eastern end of the workings on a N-S section 100 m east of AN1, and drilled north at an inclination of -69.5° to a depth of 209.55 m (fig. 1, 3).

Total core recovery is 96% for AN3 and 91% for AN4. Core loss occurred mainly at fault intersections and in the first 10 m of each hole.

RESULTS

Geological data

Summary geological logs of the drill core are given below and are illustrated in Figures 2 and 3. Detailed diamond drill core records are available at the Department of Mines.

DDH AN3

Interval (m)	Width (m)	Recovery (%)	Description
0.00- 50.50	50.50	88	MOINA SANDSTONE. White-light grey quartz sandstone, siltstone, siliceous grit and fine quartz pebble conglomerate, and grey/green siltstone. Numerous fault intersections between 20.0-48.0 m, and thin quartz veins (up to 5 mm thick) with wolframite at 12.0-14.5 m and from 34 m.
50.50- 66.65	16.15	98	ROLAND CONGLOMERATE. 'Ghost' conglomerate composed of white-light grey quartzite pebbles in a light grey-light pink siliceous matrix, with minor light grey quartz sandstone. At 57.05-61.35 m white and pink pebbles occur in a red/grey hematitic and siliceous matrix, and are interbedded with red-dark grey hematitic sandstone. Faults from 64.0 m. At 66.65 m pebbles of siltstone, quartzite and decomposed porphyry overlie massive porphyry. The size of the pebbles increases down the hole from 30 mm to 80 mm maximum diameter.
66.65-121.50	54.85	98	BULL CREEK FORMATION. Massive, pale grey-green, fine- to medium-grained, equigranular quartz-feldspar-phyric tuff, and minor agglomerate composed

DDH AN3 (continued)

Interval (m)	Width (m)	Recovery (%)	Description
			of pink-grey aphanitic fragments. Grey aphanitic dyke(?) at 76.65-77.15 m. Faults from 95.5 m. Several quartz-topaz veins (up to 50 mm) with wolframite occur throughout the core.
121.50-142.66	21.16	97	Fine- to medium-grained, grey-brown quartz-feldspar-phyric tuff with lithic and volcanic fragments. The porphyry is extensively altered adjacent to numerous quartz veins (up to 15 mm) bearing wolframite and molybdenite.
142.66-142.83	0.17	100	Quartz vein with sericite and minor purple fluorite and molybdenite (true width = 95 mm). Quartz and tourmaline alteration of the porphyry between 142.48 and 143.05 m.
142.83-146.35	3.52	100	Grey-brown, altered and veined porphyry as previous.
146.35-146.61	0.26	100	Quartz vein with molybdenite, sericite and chlorite (true width = 200 mm). Alteration of the porphyry between 145.90-147.35 m.
146.61-169.00	22.39	100	Grey-brown, quartz-feldspar-phyric tuff extensively altered adjacent to numerous quartz-topaz veins (up to 45 mm) with wolframite and molybdenite. Skarn-type alteration at 158.50-158.60 m with fluorite, magnetite, siderite and pyrite.
169.00-205.15	36.15	99	Grey/green quartz-feldspar porphyry with short stringers of chlorite and magnetite, and several quartz veins (up to 20 mm) with molybdenite. A grey-brown, altered and veined porphyry at 190.35-194.50 m with quartz veins up to 45 mm. Bands of altered porphyry with magnetite at 203.65 m and 204.10 m.

End of hole 205.15 m.

DDH AN4

<i>Interval (m)</i>	<i>Width (m)</i>	<i>Recovery (%)</i>	<i>Description</i>
0.00- 13.35	13.35	63	MOINA SANDSTONE. Pale grey-white siltstone, quartz sandstone and siliceous grit. At 12.85-13.35 m is a fine conglomerate with rounded quartz pebbles.
13.35- 48.60	35.25	91	ROLAND CONGLOMERATE. 'Ghost' conglomerate of white-light grey quartzite pebbles (up to 50 mm diameter) in a siliceous matrix with some iron oxide; with interbedded medium-grained, light grey quartz sandstone at 17.25-19.25 m and 29.95-33.15 m. Faults at 19-30 m.
48.60-146.40	97.8	89	BULL CREEK FORMATION. Grey/green, medium-grained quartz-phyric tuff with quartz phenocrysts up to 3 mm. Several quartz veins (up to 50 mm) with variable muscovite, chlorite, beryl, wolframite and fluorite. Quartz-molybdenite veins and joint fillings from 130 m. Zones of red/pink hematitic alteration occur at 70.75-79.50 m.
146.40-192.35	45.95	100	Grey/green lithic tuff/agglomerate with fragments up to 50 mm and patchily developed chlorite alteration. Quartz-molybdenite veining to 173 m; some molybdenite on very fine fractures. Several quartz-beryl-fluorite-muscovite-wolframite-molybdenite veins up to 45 mm.
192.35-194.75	2.40	100	Light green-dark green, irregularly banded, skarn-type alteration of tuff and agglomerate with chlorite, sericite, quartz and magnetite.
194.75-209.55	14.80	99	Grey lithic tuff/agglomerate with narrow quartz veins. From 206 m is a quartz-phyric tuff with lithic fragments.

End of hole 209.55 m.

Adjacent to the quartz-beryl-topaz-fluorite-muscovite-wolframite-molybdenite veins, the porphyry exhibits quartz-tourmaline-biotite alteration which in places is relatively extensive in comparison to the width of the vein. In drill hole AN3 there is a section at 121.5-169.0 m in which these veins are numerous and have associated extensive alteration of the porphyry (fig. 2).

The thickness of the Roland Conglomerate varies considerably from hole to hole. In the first two drill holes (AN1 and AN2) it is 3-4 m thick. In AN3 it is 12-13 m thick, and in AN4 it is about 30 m thick (figs. 2, 3). This indicates the conglomerate is thickening to the east and to the south. Also, the size of the pebbles in the conglomerate increase with depth. For example, in AN3 the maximum pebble diameter increases from about 30 mm in the upper intervals to about 80 mm near the base of the conglomerate interval.

The boundary between the sediments and underlying porphyry appears to be an unconformable erosional surface, with porphyry-derived material in the basal 0.3-0.5 m of the conglomerate in each drill hole.

In both holes there are numerous fault intersections which appear to occur in specific groups within each of the holes, particularly in drill hole AN4 (fig. 3). In AN3 there are several faults immediately above the sediment/porphyry boundary which would confirm the occurrence of the previously postulated major fault zone at this stratigraphic position. However, the same stratigraphic position in AN4 is devoid of fault intersections, but there is a group of faults in the porphyry immediately below. Thus, the major fault zone immediately above the porphyry, as postulated from the information in AN1 and AN2, may be neither as extensive nor as significant as previously thought.

MINERALISATION

The mineralisation intersected in the drill core is divided into three types:

- (1) major quartz veins;
- (2) veining and alteration of the porphyry; and
- (3) magnetiferous skarn type alteration.

Quartz veins

Drill hole AN3 intersected two significantly thick quartz veins carrying molybdenite and bismuth/bismuthinite(?). Details of these intersections are given in Table 2 and illustrated in Figure 4. The veins have a probable steep south dip and as such are approximately 1.8 m apart. They may be overlapping ends of veins in an *en echelon* vein system.

The vein intersection at 142.66-142.83 m consists of white quartz with light green mica (probably a mixture of muscovite, chlorite, and sericite) and minor purple fluorite and molybdenite. The porphyry adjacent to the vein exhibits a dark grey/brown coloured quartz-tourmaline alteration of the matrix between 142.48 m and 143.05 m (i.e. about 200 mm either side of the vein).

The deeper vein intersection at 146.35-146.61 m consists of white to clear quartz, with light green intermixed muscovite and chlorite, and coarse aggregates of molybdenite. The adjacent porphyry is altered between 145.90

and 147.35 m.

Neither of the veins contain visible wolframite nor scheelite.

Analytical data for the two vein intersections are given in Table 2, and the sections analysed are illustrated in Figure 4. Only the deeper intersection contains significant mineralisation with 1.15mass% Mo (*i.e.* 1.92mass% molybdenite) and 0.21mass% Bi. All other metals are low, except for 140 g/t Sn in the first vein intersection.

In drill hole AN4 the projected position of the lode, as determined from the three previous intersections, was passed without intersecting a major vein. The only significant vein intersected in this hole is a 45 mm thick quartz vein with molybdenite at 192.85 m, which is at the projected position of the lode. This single narrow vein is not considered as being representative of the lode.

Veined and altered porphyry

In drill hole AN3, in addition to the two quartz vein intersections, the porphyry is also penetrated by numerous quartz and quartz-topaz veins with associated extensive alteration of the adjacent porphyry, similar to the veining in drill holes AN1 and AN2. Although veins occur throughout the porphyry, the alteration and veining are most prominent between 121.0 m and 169.0 m (fig. 2). In this interval there are some 35 veins with a true thickness ranging from 3-45 mm. The total thickness of these veins is 385 mm, which is increased to 680 mm if the two major quartz veins are included.

In drill hole AN4 there is only minor alteration of the porphyry associated with a few quartz, quartz-topaz and quartz-beryl veins, but there are numerous quartz-molybdenite veins (3-25 mm thick) and joint coatings, particularly between about 130 and 175 m (fig. 3).

Examination of the core in ultra-violet light has revealed significant quantities of scheelite in some of the veins. In AN3, scheelite occurs in veins between 159 and 188 m; and in AN4, scheelite occurs in veins from 161 m (figs. 2, 3).

Drill hole AN3 has been cut and sampled at 3.0 m intervals between 121.15 and 169.15 m; and at 114.0-116.0 m and 190.15-194.65 m. Drill hole AN4 has been cut and sampled at 3.0 m intervals from 128.55-209.55 m. Samples have been submitted to the Department's analytical laboratories, Launceston for analysis for Sn, W, Mo and Bi. The analytical results will be presented in a later report.

Skarn-type alteration

In drill hole AN4 there is a 2.40 m intersection of green and white, irregularly banded chlorite-magnetite-quartz-sericite-carbonate alteration zone at 192.35-194.75 m. Towards the base of this intersection the matrix of agglomeratic volcanics has been replaced. This skarn-type alteration is cut by later veins containing scheelite.

In addition to the above, there are also short stringers of magnetite and chlorite within the porphyry in holes AN3 and AN4.

SUMMARY AND CONCLUSIONS

The third drill hole (AN3), collared 100 m west of the first two holes (AN1 and AN2) intersected two quartz veins, 0.1 m and 0.2 m thick, carrying 110 g/t and 1.15mass% Mo respectively within Cambrian quartz (-feldspar) porphyry. These intersections are approximately 1.8 m apart (true width?) and occur in the target zone postulated from the results of AN1 and AN2.

The fourth hole (AN4), collared 100 m east of the first two holes, did not intersect a significantly thick quartz vein. However, with the uncertainties in the positions of the drill holes due to lack of survey data and with this type of deposit, drill hole AN4 may not have been long enough, having only been extended 7 m (true) past the target zone. Hence this hole should be deepened by a further 40 m, to 250 m.

Assuming that the two vein intersections in AN3 are of the same vein system as the intersections in drill holes AN1 and AN2, then the lode in the porphyry strikes 102°M and dips 80°S. This trend is different to that previously postulated from the first two holes, and is similar to the All Nations lode occurring in the overlying sediments.

Also, in drill hole AN3 there is a 48 m intersection of altered porphyry associated with veins carrying wolframite and molybdenite. In AN4 the porphyry generally is not altered but contains numerous quartz veins with molybdenite and scheelite from 130 m and 160 m to the end of the hole, respectively. These sections have been sampled to enable the potential for stockwork mineralisation to be evaluated.

REFERENCES

COLLINS, P.L.F. 1979. in JENNINGS, I.B. Geological atlas 1 mile series. Sheet 37. (8115S). Sheffield. *Explan.Rep.Dep.Mines Tasm.*
COLLINS, P.L.F. 1981. Exploratory drilling at the All Nations mine, Moina. *Unpubl.Rep.Dep.Mines Tasm.* 1981/14.

[22 July 1981]

Table 1. SURVEY DETAILS* OF DIAMOND DRILL HOLES AN3 AND AN4, ALL NATIONS MINE, MOINA

DDH	Mine grid co-ordinates ⁺	Depth (m)	Bearing (Mag.N)	Inclination	Elevation ^x (m)
AN3	960.05mE, 917.85mN	0	004°	-53°	612.9
		42.5	-	-55°	
		90	011.5°	-57°	
		155.5	-	-60°	
		205	-	-63°	
AN4	1203.34mE, 867.24mN	0	360°	-69.5°	647.0
		108	-	-75°	
		182	-	-72°	

* Collar positions surveyed by G. Benn, Surveyor, Department of Mines.

+ Refer to Figure 1, and Collins (1981).

x Elevations are relative to an assigned level of 597.0 m at the brace of the main shaft (fig. 1).

Table 2. QUARTZ VEIN INTERSECTIONS IN DDH AN3, ALL NATIONS MINE, MOINA

Quartz vein:

Depth (m)	142.66-142.83	146.35-146.61
Length (m)	0.17	0.26
VCA*	30°	45°
True width (m)	0.095	0.200
Elevation (m) ⁺	494.0	491.0
Co-ordinates ⁺	976.5mE 999.5mN	977.0mE 998.0mN

Analytical data^x:

Sample no.	812220	812221
Depth (m)	142.62-142.87	146.33-146.65
Ag (g/t)	<10	<10
As (g/t)	<10	51
Bi (g/t)	32	0.21mass%
Cu (g/t)	4	18
Mo (g/t)	110	1.15mass%
Pb (g/t)	<2	89
Sn (g/t)	140	29
W (g/t)	9	50
Zn (g/t)	51	39
MoS ₂ (mass%)	0.0018	1.92

* VCA = angle of vein to core axis.

+ Elevation and co-ordinates refer to Figure 1.

x Analyst: M. Frith, Department of Mines, Launceston

SECTION 970 m E

9/12

D.D.H. AN3

Bearing 004°M

Inclination - 53°

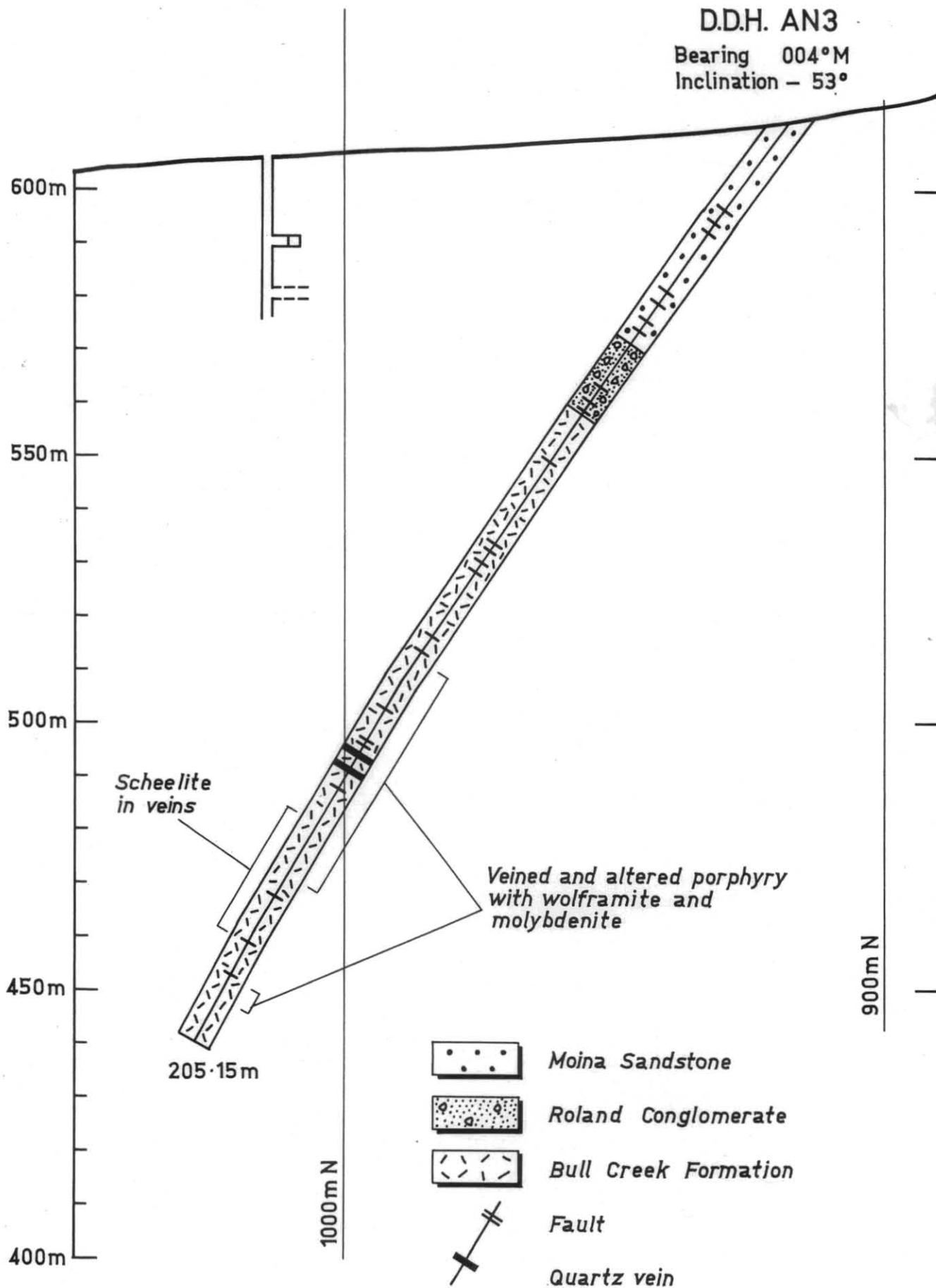


Figure 2. Section, diamond drill hole AN3, All Nations mine, Moina.

5 cm

SECTION 1200m E

D.D.H. AN4
Bearing 360°M
Inclination - 69.5°

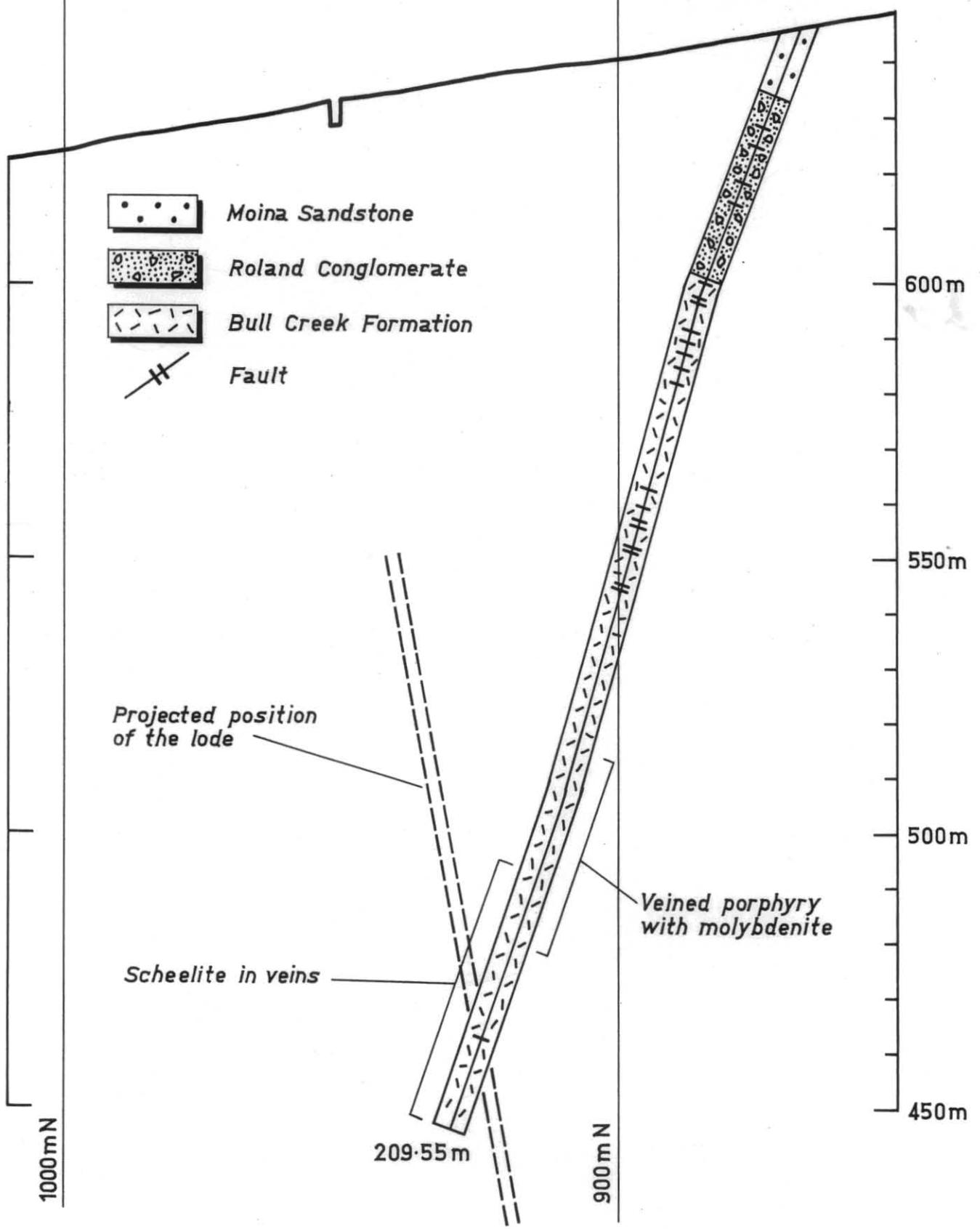
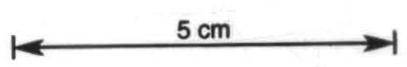


Figure 3. Section, diamond drill hole AN4, All Nations mine, Moina.



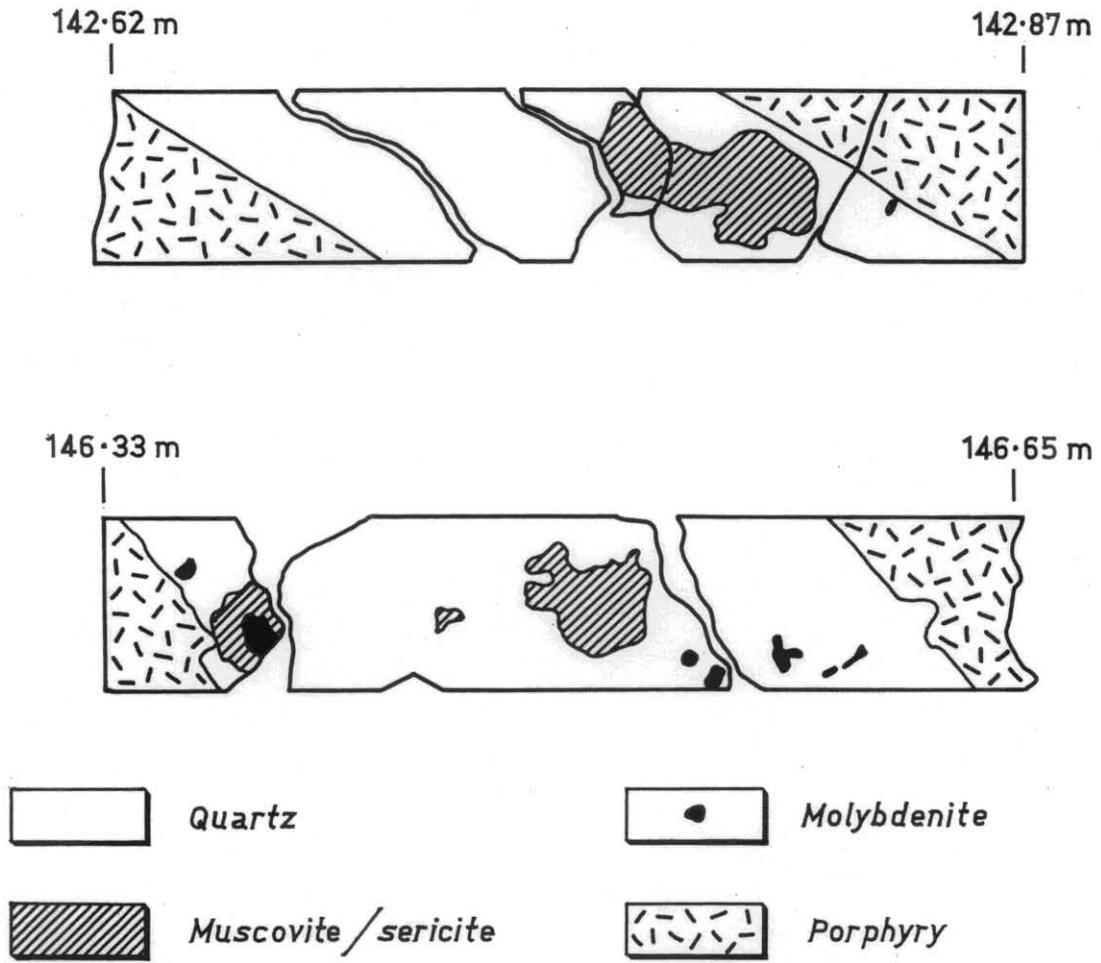
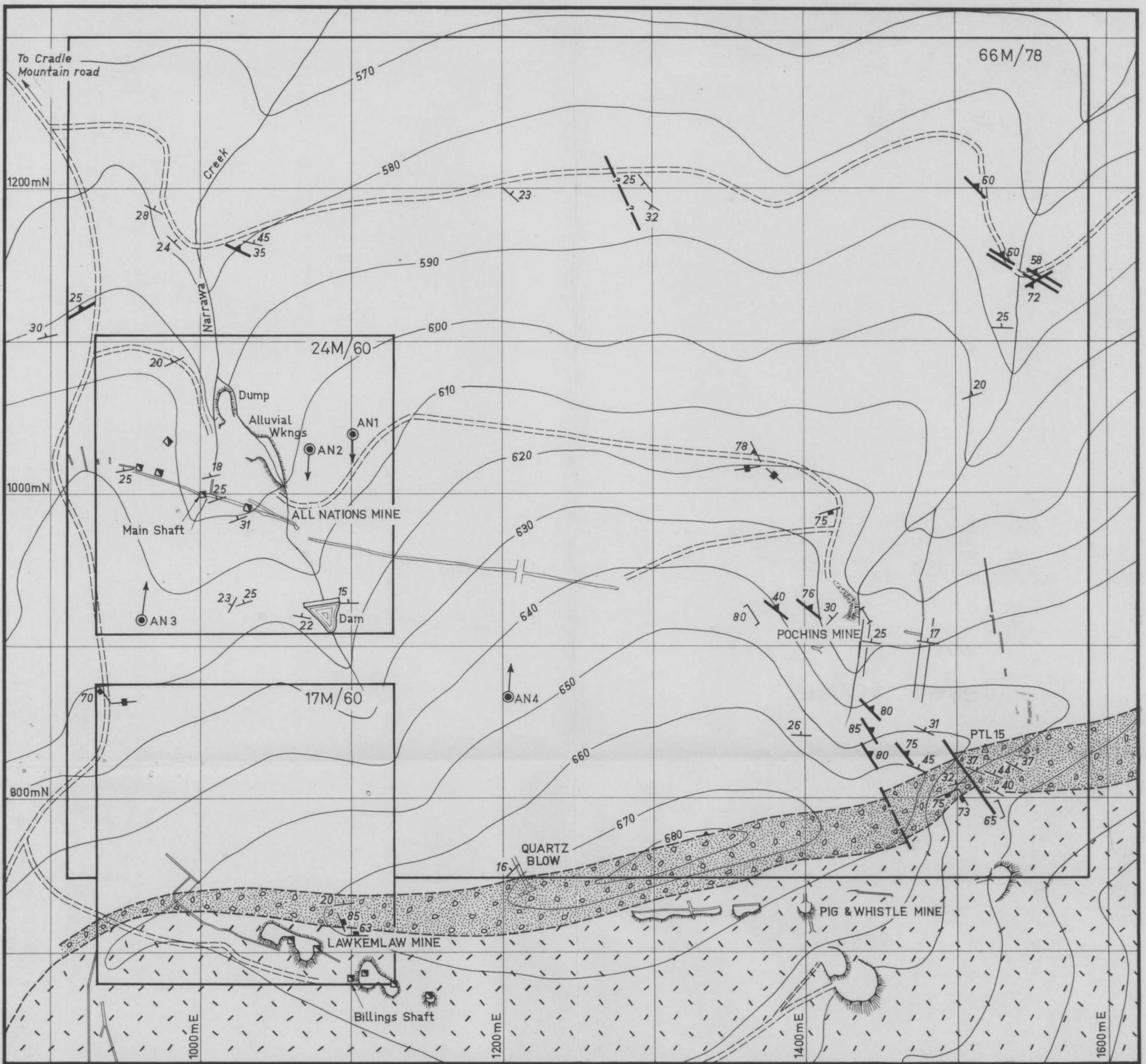


Figure 4. Quartz vein intersections in diamond drill hole AN3, All Nations mine, Moina.

5 cm



GEOLOGY OF THE ALL NATIONS AREA, MOINA

0 100 200 metres

GEOLOGIST: P.L.F. COLLINS, APRIL 1981

- | | |
|--|---|
| <p>ORDOVICIAN</p> <ul style="list-style-type: none"> MOINA SANDSTONE - Quartz-sandstone, siltstone, shale & grit/fine conglomerate. ROLAND CONGLOMERATE - Conglomerate, quartz-sandstone <p>CAMBRIAN</p> <ul style="list-style-type: none"> BULL CREEK FM. - Quartz-feldspar & quartz porphyry | <ul style="list-style-type: none"> Trench Adit Shaft Mineral Lease boundary Diamond drill hole Contour (interval 10m) <p><i>Lease boundaries approximate only</i></p> |
|--|---|
-
- | | | | |
|--|---------------------|--|-------------|
| | Geological boundary | | 20 Bedding |
| | Fault | | 60 Joint |
| | Fault-inferred | | 65 Cleavage |

GEOLOGY & MINE WORKINGS BASED ON NIXON (1954)
WITH ADDITIONAL MAPPING BY P.L.F. COLLINS.



FIGURE 1

