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GEOSCIENCE FORUM 1979

WHITEHORSE, DEC. 2nd

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Figure 1: (Geol: Map Atlin)

The Adanac molybdenum property is located on the upper part of Ruby Creek, some 33 Km. by road from the townsite of Atlin.

Figure 2:

The property was first staked in 1967 for Adanac Mining and Exploration Limited. During the 1968 field season, a geochemical survey was carried out and a drill program consisting of 12 diamond drill holes, totalling 1,502 metres was completed. In 1969, 68 diamond drill holes totalling 11,273 metres were completed on a major grid pattern over the deposit.

During 1970-71, Kerr-Addison carried out an extensive grid diamond drill program and a major underground bulk sampling program. They constructed an on-site pilot plant to mill the sample material. The agreement with Kerr-Addison terminated in 1971. The moly market was depressed, and it was concluded that, at that time, the Ruby Creek deposit would not constitute a viable economic operation.

Between 1971 and 1978, modest exploration programs were carried out by Adanac, Noranda Mines Limited and the Climax Molybdenum Company.

In December 1978, an agreement was reached between Placer Development Limited and Adanac for additional work and possible future development of the deposit.

The 1979 work program on the Adanac deposit consisted mainly of diamond drilling, although some seismic and EM surveys; and an Environmental Impact Study, were also conducted.

The main objectives of the drill program was to determine if assay values especially in the "Stage I" pit area defined by Kerr-Addison, could be upgraded through improved core recovery. Improved reliability of assay data was also sought through improved sample handling techniques. A geostatistical study concluded that there would be a ±20% confidence in the grade on a 200' grid and therefore it was decided to drill Stage I on a 100' grid. E. Caron Drilling of Whitehorse were the drilling contractors and they provided excellent service.

During the 1979 field season, Dr. Peter Christopher of the B.C. Dept. of Mines mapped the surrounding area and remapped the underground workings. continuing study will include petrographic and whole rock geochemical studies, and the age dating of various phases of the Mount Leonard intrusion. The contribution of the B.C. Dept. of Mines is gratefully acknowledged.

The Adanac MoS_2 prospect is located in a cirque at the head of Ruby Creek - 22 km. NE of Atlin. It occurs within a composite plug of quartz monzonite which is peripheral, and probably related, to the main body of the Surprise Lake batholith, to the east. The Mt. Leonard boss (13a), which hosts the Adanac MoS_2 deposit, is early Tertiary in age (62.9 $\pm$ 2.2 m.y. Christopher et al). The boss intrudes a variety of Pennsylvanian and Permian metasediments, meta volcanics and meta-serpentinites (6, 7 and 9). It also cuts the edge of a major, Jurrasic, diorite intrusion. The fourth of July batholith (12). The Mt. Leonard boss is itself cut, and unconformably overlain, by late Tertiary and Quaternary volcanic material which errupted to form Ruby Mountain and partially filled the lower reaches of Ruby Creek (16).

Figure 2 and many of the subsequent figures are taken from the work of White, Stewart and Ganster of Climax Molybdenum Company, published in the 1976 CIMM Porphyry Deposit Volume. The present discussion will do no more than expand on their deposit description, in the light of Placer Development's one summer spent drilling on the deposit.

The figure shows that the mineral deposit, which is located in the floor of the Ruby Creek cirque, is truncated by a major NE trending fault, the near-vertical Adera Fault, and that it is located in an area of local geological complexity within the Mt. Leonard boss.

In the vicinity of the deposit the boss consists of five main rock units, of which four are shown in the figure.

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Figure 3:

(1) Coarse-grained quartz monzonite (orange) consists of sheared and granulated, pink to grey, equigranular, coarse-grained (1 cm) quartz monzonite with a highly irregular texture. One variety, known as "Transition" in many of the old drill logs, contains between 5 and 20% of fine, aplitic, matrix. This variety has a subporphyritic or hybrid, texture.

Figure 4:

(2) Mafic quartz monzonite (red) is a medium-grained, grey feldsparphyric phase of the boss which has a characteristic ragged or seriate texture. It contains appreciably more biotite than any of the other phases and it commonly displays chalky white feldspar phenocrysts.

Figure 5:

(3) Sparse quartz monzonite porphyry (green) consists of between 10 and 30% of subhedral to euhedral feldspar, quartz and biotite phenocrysts in a brown aphanitic to fine-grained, or chilled, matrix. It closely resembles crowded porphyry South of the Adera Fault the sparse porphyry matrix is characteristically brown and aphanitic. North of the fault the matrix appears to be significantly coarser and more aplitic.

Figure 6:

(4) Crowded quartz monzonite porphyry (blue) resembles sparse porphyry but it contains over 30% of phenocrysts.

Figure 7:

(5) Fine-grained quartz monzonite (yellow on subsequent figures) is a sac unit which includes a wide variety of grey or brown, fine, equigranular and/or subporphyritic rock units with a characteristically aplitic texture.

Unlike the CgQM the mafic porphyry, which are fairly uniform and diagnostic in texture, the crowded and sparse porphyries are gradational in both texture and composition. They are however, limited in distribution and they are regarded as discrete intrusions. Similarly, some facies of the FgQM resemble aplitic phases of the sparse porphyry and they may be closely related. The "Transitional" variety of CgQM appears to be soaked in FgQM.

The more highly deformed C_gQM and mafic porphyry units clearly pre-date intrusion of the crowded and sparse porphyries, and F_gQM. The age of intrusion of F_gQM with respect to the porphyries is less certain.

Figure 8:

Figure 8, from White et al, shows that only a small portion of a large composite, porphyry, intrusion has been unroofed in the floor of the Ruby Creek corrie. The figure shows contoured contacts between the crowded and sparse porphyries and between both the porphyries and older country rock, mainly CgQM. The main zone of molybdenum mineralization occurs in a trough of CgQM bounded to the south and west, and at depth, by the sparse porphyry stock and in the east by its satellite lobe of crowded porphyry. The mineralized zone is truncated in the north by the Adera Fault.

Figure 9: E/W Section

Figure 10: N/S Section

Figures 9 and 10 also from White et al. show the shapes of the trough and its relation to the principal zones of mineralization.

Fill-in drilling on 100' centres has helped to define the shape of the trough and it has shown that F_gQM occurs as subhorizontal sills and lenses cutting CgQM within the trough.

Figure 11: E/W Section
Figure 12: N/S Section

The lenses thin toward the sides of the trough and towards the Adera Fault. The thickest development of FgQM occurs in the vicinity of the junction between the adit and the cross-cut put in by Kerr-Addison in 1970. In this "core" area there is extensive development of plutonic breccia, particularly at the interface between Fg and CgQM. The breccia also includes fragments of mafic porphyry. In some drill holes the breccia extends to surface.

Figure 13:

Although it seems likely that the breccia formed by the upward injection of FgQM magna derived from the porphyry stock below, our present drilling has not yet defined a feeder pipe. Vertical holes have so far shown that the brecciated zone is underlain by unbrecciated mafic and/or sparse porphyry. It is possible that the formation of the pipe predates intrusion of the underlying porphyry stocks.

Molybdenite is found in a wide variety of fractures and quartz veins cutting all five rock types. The fractures are widely spread and erratically distributed. There is no one, strong, pervasive, fracture system, although some of the best mineralization occurs in (1 - 3 cm) subhorizontal quartz veins cutting FgQM in the core of the mineralized zone.

Figure 14:

Figure 15:

These veins are bordered by inward penetrating molybdenite rosettes in the core area, but elsewhere the distribution of coarse molybdenite becomes highly erratic, and it appears to decrease laterally. Comparable quartz veins on the fringes of the trough contain only scattered blebs of molybdenite. Molybdenite is also found in 1 - 3 mm quartz veins and in quartz-free fractures. It commonly occurs at the intersection of two small fractures or veins.

Figure 16:

Steeply dipping shears are locally crusted with molybdenite which may locally add significantly to the grade of the rock.

Figure 17:

There is little alteration at Adanac that can definitely be attributed to the period of mineralization. Kspar veins and envelopes are found locally, particularly cutting FgQM in the core of the mineralized zone. Kspar overgrowths or phenocrysts in sparse porphyry locally project into earlier-formed quartz veins.

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Figure 18:

Biotite and sericite have both been observed locally in mineralized quartz veins but they are not common and most veins contain only quartz and sulphide; mainly molybdenite with minor pyrite. Traces of flourite, scheelite and carbonate have also been noted. Biotite phenocrysts found in sparse porphyry and FgQM are commonly remarkably fresh and locally fresh biotite appears to replace feldspar.

Feldspars are commonly altered to a mixture of sericite and clay although the general level of alteration is not high. In some of the more highly altered rocks there is strong development of chlorite.

In marked contrast to the main body of the deposit, the Adera Fault shows evidence of intense hydrothermal activity which may largely post-date mineralization. Molybdenite traces remain in quartz veins and on shear surfaces within the fault zone.

Figure 19:

In conclusion, it would appear that the location of the molybdenite mineralization at Adanac is controlled by deformation of CgQM "country rock" immediately adjacent to a major stock of sparse quartz monzonite porphyry. FgQM magna evidently exploited structures in the CgQM and plutonic breccias were formed. Mineralization followed. The general absence of extensive alteration suggests that this is essentially a local, igneous, event. There is no evidence for a major hydrothermal system comparable to that found at Henderson or Endako.

Drill core assays were determined by the metallurgical Dept. of Placer Development Limited. Results are presently being compiled and will be used to re-evaluate the economic potential of the Adanac Molybdenum deposit.

FIGURE I: Regional Geological Map: After Aitken (1957)

The Adanac MoS_2 prospect is located in a corrie at the head of Ruby Creek - 22 km NE of Atlin. It occurs within a composite plug of quartz monzonite which is peripheral, and probably related, to the main body of the Surprise Lake batholith, to the east. The Mt. Leonard boss (13a), which hosts the Adanac MoS_2 deposit, is early Tertiary in age (62.9 $\pm$ 2.2 m.y. Christopher et al). The boss intrudes a variety of Pennsylvanian and Permian metasediments, meta volcanics and metaserpentinites (6, 7 and 9). It also cuts the edge of a major, Jurassic, diorite intrusion. The Fourth of July batholith (12). The Mt. Leonard boss is itself cut, and unconformably overlain, by late Tertiary and Quaternary volcanic material which errupted to form Ruby Mountain and partially filled the lower reaches of Ruby Creek (16).

FIGURE 2: Local Geology: After White et al (1976).

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