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Notes on characteristics of fluid inclusions in samples of drill core from Sibola prospect,

February 25, 1996, J.J. Irwin

Ten samples of drill core were collected for fluid inclusion (FI) study from two different holes on the Sibola prospect. The main objective of this analysis is to determine if there are gradients or patterns in temperatures and/or salinity of fluids that could guide further exploration. As yet, no attempt was made to directly measure FI filling temperatures or salinities and the following observations are based on comparison between the characteristics of Sibola FI (vapor/liquid ratio, presence of daughter minerals) and other areas studied in more detail by the author.

Overall, most of the fluid inclusions in samples of Sibola drill core are generally dilute aqueous fluids trapped at relatively low temperature, < 300°C and many probably at closer to 200°C. This is a common feature in porphyry systems, caused by later influx of water and is usually irrelevant to mineralization

There is a prominent "hot spot" in the lower part of hole 4 between 316- 343 feet, ~98.2-108.2 meters as shown on core logs. Fluid inclusion trapping temperatures are estimated at 350-400°C for this interval, corresponding with temperatures of potassic alteration elsewhere. There is an increase in Cu and Mo grades in this interval as well.

Some increase in average temperature of the dilute, aqueous FI is noted with depth in hole 3 between sample S95-3-15A and S-95-410'. In this interval FI are thought to be more typically ~300°C. There is no correlation between FI temperatures and grade in this interval, and this is probably an artifact of post-mineralization fluid influx.

The better grades in hole 3 correlate with the presence of FI that are mostly vapor (i.e. > 75%), commonly interpreted to be of true magmatic origin.

Relatively common in hole 3 are FI containing 3 phases, which are mixtures of CO_2 and water. These FI appear similar to some others elsewhere that are typically ~10 mole % CO_2. This is somewhat unexpected as these fluids are not common in porphyry Cu magmatic systems and are virtually always associated with Au mineralization. The data tables I received are incomplete and do not include Au, but I expect I would have been told if concentrations are noteworthy.

There is a conspicuous absence of true magmatic, high salinity, high temperature FI associated with virtually all porphyry metal deposits. The sections of core examined are not nearly as "juicy" as higher grade systems, in the sense that they do not contain abundant, large fluid inclusions of any type.

Conclusions and Reccomendations

Compared with some other major porphyry systems the fluid inclusions in the drill cores from Sibola are small, low salinity and relatively low temperature. None of the fluid types characteristic of porphyry ore bodies elsewhere are well represented, nor are there any gradients in temperature or salinity pointing to such. This could be interpreted as either evidence that this is a relatively diffuse, low grade body, or that we have not yet found the higher grade core of the deposit. The former interpretation seems more probable considering the wide distribution of low grade Cu anomalies in holes drilled by previous operators and the wide area over which the IP chargeability anomaly occurs. The "Cu budget" typical of Cordilleran porphyry systems of this type (1-2 billion pounds of Cu) can likely be accounted for over this fairly broad area (~1,300 m x ~950 m x ~300 m, the area of chargeability high), and there is no real need for a higher grade zone. Alternatively, the system has not been definitively "drilled and killed" yet. Several deep holes across the chargeability high might resolve any questions remaining about the potential for this deposit.

next time.