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LATE STAGE MINERALIZATION IN THE LEAD-ZINC DEPOSIT BLEIBERG

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BRIGO et al. (1972) suggested a Triassic (Carnian) age for the carbonate-hosted Pb-Zn deposit at Bleiberg and associated deposits; an age corresponding to that of the host rocks. Sulfur isotope data (SCHROLL & RANTITSCH, 2005) and the discovery of fossil sulfate-reducing bacteria (KUCHA et al. 2005) support this model. Temperatures of the metal-bearing brines were around 100°C as estimated from Ga/Ge thermometry (MÖLLER, 1987).

During burial the ores were heated up to ca. 130°C (RANTITSCH, 2003). Re-mobilization processes during this late diagenetic stage largely depend on the availability of fluids. The dehydration of gypsum containing ~ 20 % H_2O is regarded as an important fluid source. Blue anhydrite of diagenetic origin is a common mineral in evaporitic limestones. At Bleiberg, irregular metasomatic bodies of blue anhydrite are hosted by the lagoonal Wetterstein limestone. Locally, these anhydrite bodies crosscut pre-existing ores.

An ore bearing blue anhydrite sample from the Antoni shaft provides new insight in this late-stage mineralization. The anhydrite is rimed by coarse grained brownish sphalerite; thus, anhydrite coexisted with sphalerite. The $\delta^{34}S$ data (anhydrite +18.8 ‰, sphalerite –15.2 ‰) suggest an isotopic equilibrium of the two phases. Gypsum was transformed to anhydrite at temperatures around 60°C (BILO, 1986). According to thermal modelling (RANTITSCH, 2003) this process lasted until the Jurassic. The $\delta\ ^{34}S$ difference of the sulfur isotopes indicates a precipitation of anhydrite and sphalerite during deep burial of the carbonate platform in the Paleogene.

Bitumen, associated with white, barren dolomite of the Raibl Formation and condensate bearing fluid inclusions in ore minerals (RANTITSCH et al., 1999) are also related to the late-stage mineralization at Bleiberg. The bitumen has a $\delta\ ^{13}C$ value of –29.9 ‰ (PDB). $\delta\ ^{18}O$ values of dolomitic host rock (– 6.7‰ PDB) and diagenetic saddle dolomite (–7.1 ‰ PDB) show nearly identical values; saddle dolomite, as well as strontianite and prismatic calcite are typical late-stage minerals at Bleiberg.

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References

BILO S.M. (1986) J. Petroleum Geol., 10: 73-86.
BRIGO L., et al. (1977) In: KLEMM D.D., SCHNEIDER H.-J (eds.). Time- and Strata- Bound Ores Deposits. Springer, pp. 273-293.
KUCHA H., SCHROLL E., STUMPFL E. (2005) Mineral. Deposita, (in print).
MÖLLER. P. (1987) Chemical Geology, 61, 153-159.
RANTITSCH G. (2003) Mitt.Österr.Geol.Ges., 93, 77-85.
RANTITSCH G., et al. (1999) Mineral. Petrol., 65, 141-159.
SCHROLL E., RANTITSCH G. (2005) Mineral. Petrol., 84, 1-18.