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Role of Hydrothermal Solution in Base Metal Enrichment in Alwar Basin, Rajasthan, India

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The Alwar basin forms part of the Meso-Proterozoic North Delhi Fold Belt (NDFB). The NDFB is known for its base metal occurrence for the last several decades. In the present work, the role of hydrothermal solution in base metal enrichment is assessed from the Amra Ka Bas area of Alwar Basin. Amara Kas Bas is situated 4 km NE of the Mundiawas Khera (MK) deposit and is situated along the trends of the MK deposit with similar host rock and ore mineral assemblages. The main rock types exposed are a metavolcanic-sedimentary sequence, tremolite-bearing dolomitic marble, and carbonaceous phyllite of the Thanagazhi formation of the Ajabgarh Group. The characteristic hydrothermal alteration zones identified in the study area are phyllic, propylitic, and argillic. Sulphide mineralization is mainly associated with the phyllic alteration zones. Epigenetic sulphide mineralization is mainly associated with the propylitic alteration zone. The spatial association of the hydrothermal alteration zone with the weak planes indicates that they might have acted as the pathways for hydrothermal fluid migration and associated sulphide mineralization in the area. Ore petrographic studies reveal at least four phases of sulphide enrichment in the area. The first and second phases are manifested as fine dissemination of sulphide phases within felsic volcanics and are syngenetic phases. The third phase appears to be mainly responsible for scavenging, remobilizing, transporting, and depositing ore along favourable weak planes with the help of the hydrothermal solution. The fourth phase is a prominent, low-temperature phase marked by the development of colloform pyrite over the early phases. The weak planes available in the area have facilitated easy migration of the ore-bearing fluid and its deposition. The main key, therefore, for identifying a promising area for future exploration is the identification of hydrothermal alteration signatures in close association with prominent weak planes of the area.