

Structural Controls and Mineralization Style of Baryte Deposits in the Azara Area, Central Benue Trough, Nigeria: Implications for Mineral Exploration

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Baryte mineralization in the Azara area, central Benue Trough, Nigeria, occurs with base metal and is viewed as part of an epigenetic, structurally controlled hydrothermal system hosted mainly by Cretaceous siliciclastic rocks with minor carbonate interbeds. This study evaluates the structural controls, vein geometry, and mineralization style of the Azara deposits to understand ore-fluid pathways and improve exploration targeting. Integrated surface mapping, satellite-image utilization, airborne radiometric analysis, and lithologic-structural logging of available exploration drill core were used to assess vein distribution, continuity, and host-rock relationships. The results show that baryte occurs in discrete vein clusters along a major NE–SW structural corridor corresponding to a topographic ridge interpreted as an anticlinal crest. Radiometric data revealed an elongate K-enriched zone which was also corroborated by ternary diagram of the presence of a major structural corridor believed to be an extended Keana anticline, while structural analysis indicates a dominant NW–SE vein set with subordinate E–W and minor N–S sets. Drill-core intersections reveal steep to subvertical, bedding-discordant mineralization expressed as massive fissure-fill lodes, breccia infill, stockwork veinlets, and open-space cavity fills. The principal assemblage is baryte with siderite and associated minor chalcopyrite–pyrite, followed by late sphalerite in dilational sites. These relationships indicate a multi-stage hydrothermal system controlled by fold-related fracture permeability and repeated reactivation of fractures. Although the K anomaly may partly reflect lithologic exposure, the combined structural and radiometric evidence highlights anticlinal crests, vein-set intersections, and dilational jogs as key exploration targets in the central Benue Trough.