

# SEG 2024 Conference: Sustainable Mineral Exploration and Development

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## The 3D Distribution of Cobalt in VHMS: The Elvira Orebody, Iberian Pyrite Belt

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Cobalt plays a critical role in the energy transition, being a key component in lithium-ion batteries. The increasing demand for cobalt and ongoing instability in its global supply chain cause a pressing need to explore new sources of this element to satisfy the industry demands.

The Iberian Pyrite Belt (IPB) boasts the largest concentration of volcanogenic massive sulfide deposits worldwide. The first compilation data show that several orebodies of this area contain significant cobalt values (>300 ppm). But this information is scarce and lacks analytical contrast, and there is a lack of knowledge regarding distribution at deposit scale. For that, we conducted a comprehensive study and 3D modeling of the Elvira deposit based on 86 drill holes.

The Elvira deposit is a polymetallic (Cu-Zn-Pb) massive sulfide hosted by dark shale, with minor volcanic rock, located in the SE extension of the Sotiel-Migollas deposit. The main mineralization comprises a 400-m lens along a 60°E strike, dipping 40°NW, with a thickness up to 50 m. The massive sulfide shows, on average, 250 ppm Co with some metre-thick intersections up to 1,200 ppm. Co tends to concentrate preferentially at the base of the massive sulfides and correlates positively with Cu. Above the massive sulfide, the bulk of the deposit includes a highly deformed 30-m-thick unit of interlayered semi-massive and massive sulfides and shale. On average, Co contents range between 50 and 100 ppm with metre-thick intersections of >500 ppm. Below the massive sulfides, there is an irregular stockwork that has similar average Co contents of ca. 100 ppm with metre-thick intersections of >500 ppm. Thrusted above the massive sulphides is an exotic stockwork with tectonic contacts. This unit, up to 100 m thick, contains high and variable Co concentrations ranging between 50 to 2,700 ppm, with rare cm-thick intersections up to 8,000 ppm.