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Petrographic Study of Zinc Ore and Subordinate Veins and Veinlets in the North Sucuri Region, Vazante Mine, Minas Gerais – Brazil

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The Vazante district, located in the northwest of the Minas Gerais state, Brazil, holds one of the largest hypogene willemite deposits in the world, hosted in carbonate rocks of the Vazante Group. The unusual deposit has a total resource of 21 Mt 6.8% zinc, 0.34% lead, and 16.6 g/t silver and contains the North Extension and Vazante mines, both placed around 8 km from the city of Vazante (Minas Gerais). Its ore is structurally controlled by the Vazante fault, with orientation N50E/60NW. In the North Sucuri region, at the northeastern limit of the Vazante mine, were found sulphide zinc bodies imbricated or not associated with willemitic ore, which is uncommon to the deposit. Petrographic studies showed that the hydrothermally brecciated zone comprises the same lithotypes common to the deposit, such as iron-carbonated breccia, greenish to pinkish and sericitized metadolomites, metabasic rocks, and a carbonate bleached, greyish breccia that usually hosts the zinc sulphide ore unrelated to the willemite principal orebody. The mineral assemblage of the zinc ore is composed of the following: (i) principal ore body: willemite + dolomite + quartz + hematite ± barite ± apatite ± franklinite ± zincite ± magnetite; (ii) willemite ore with imbricated sulphide lenses: willemite + dolomite + hematite ± franklinite ± zincite associated with sphalerite and galena; (iii) sulphide isolated bodies: sphalerite + galena ± barite ± pyrite ± hematite ± zincite ± anhydrite. The sphalerites of types ii and iii are different in visual color and Fe content. The hydrothermally altered and brecciated zone also includes late venulation of oxidized iron-carbonate + hematite ± limonite, dolomite + quartz + barite ± hematite ± zincite, chlorite ± sphalerite ± galena, and dolomite + quartz + pyrite. These veins and veinlets can occur truncated, failed and overlapping each other.