

Understanding the volcanic processes, stratigraphy and mineralization of the archean teutonic bore, jaguar and bentley volcanic massive sulphide deposits, yilgarn craton, western australia.

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Teutonic Bore, Jaguar and Bentley volcanic hosted massive sulphide deposits are situated in the Eastern Goldfields of the Archean Yilgarn Craton, Western Australia. The VMS complex is situated in the Gindalbie Terrane which is a linear belt (2695-2680 Ma). This bimodal rhyolite-basalt volcanic belt enriched in high field strength elements, consists of felsic calc-alkaline volcanic rocks, quartz rich sedimentary rocks, layered mafic complexes and mafic sills, formed during a period of regional extension in a back arc setting. The VMS deposits are hosted by a bimodal mafic and felsic volcanic succession with associated volcanoclastics and mudstones, and are located along strike over a 12 km distance. The rocks are metamorphosed to lower greenschist facies and have undergone moderate deformation.

The stratigraphy is divided into a hanging wall facies association and a footwall facies association, which are commonly separated by sulphide mineralization. The dominant lithofacies are coherent basalt, rhyolite, andesite and dolerite, which form concordant, tabular bodies black mudstone, with minor graded bedded sandstones (turbidites) and rare polymictic conglomerates, represent the ambient deep water facies that are intercalated with the volcanic units. The basalt is present in both the hanging wall and footwall and contains both massive and pillow basalt facies, indicating that at least some basalts were seafloor lavas. However, monomictic volcanic breccia, commonly with peperitic textures, occurs at the tops and bottoms of many basalt units, indicating that they intruded into unconsolidated sediments. The rhyolite is mainly present in the footwall and is highly altered. Dolerite occurs as late intrusions with coarse crystalline textures.

The Teutonic Bore consists of one steeply dipping lens of massive polymetallic sulphide underlain by stringer mineralization. The Jaguar and Bentley deposit consists of three lenses of massive sulphide that are split by a late dolerite intrusion. The massive sulphide consists of pyrite, sphalerite and chalcopyrite. The mineralization is mainly hosted by black mudstone but also occurs in pillowed basalt above the rhyolites. The sulphide lens occurs as: 1. massive bodies without any dominant fabric; 2. banded bodies of pyrite and sphalerite and chalcopyrite replacing the pyrite at places; and 3. stringer and disseminated patches. The sulphide shows replacement textures with basalt and black mudstone, and therefore represents sub-seafloor mineralization that postdates sedimentation and basalt emplacement. The disseminated sulphide occurs both in the hanging wall and footwall as patches and blebs. Hydrothermal alteration extends into the hanging wall, which also supports a late mineralizing event.