Kalgoorlie Operations

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KANOWNA BELLE

The Kanowna Belle mine site is situated in the Eastern Goldfields of Western Australia, approximately 18 kilometres northeast of Kalgoorlie. Open pit mining commenced in 1993, with full underground production achieved in 1998. The Kanowna Belle operations were acquired by Northern Star in 2014.

GEOLOGY AND MINERALISATION

Mineralisation is mainly hosted within a large porphyritic granodiorite body (Kanowna Belle Porphyry) that has intruded a sequence of sedimentary and volcaniclastic rocks. A zone of intense structural disruption (Fitzroy Shear Zone) separates the deposit into hangingwall and footwall structural domains and is the primary control on gold distribution. Gold mineralisation is locally associated with quartz-carbonate stockwork veins, breccia zones, sulphide-quartz-carbonate stringers and sheeted vein arrays. The generally tabular enveloping surface to mineralisation dips steeply to the south, has a high plunge to strike ratio and remains open at depth.

MINING

The mining method at Kanowna is a form of modified open stoping which is sequenced and driven on a stope-by-stope basis by geotechnical considerations. The open stopes are backfilled with paste utilising tailings from the Kanowna Belle Mill.

The ore is accessed on a level spacing of 30 metres, with development of footwall, and ore drives to enable longhole open stoping. The mine is subdivided vertically in mining blocks of nominally 150 to 250 vertical metres, (3 to 5 Mt).

PROCESSING

The Kanowna Belle processing facilities are located adjacent to the Kanowna Belle mine and are designed to handle approximately 2 million tonnes of feed per annum. The plant can treat a range of ores through the flotation circuit and associated concentrate roaster circuit, including carbon-in-leach (CIL) gold recovery, or bypassing the flotation circuit and going directly to a CIL circuit that is designed to treat flotation tails.

SOUTH KALGOORLIE OPERATIONS

The South Kalgoorlie Operations (SKO) are located within the Eastern Goldfields Superterrane and the 842sqkm tenement package traverses across the Coolgardie, Ora Banda, Kambalda and Boorara Domains. The South Kalgoorlie assets were acquired by Northern Star in 2018.

GEOLOGY AND MINERALISATION

SKO is located within the Eastern Goldfields Superterrane and the 842sqkm tenement package traverses across the Coolgardie, Ora Banda, Kambalda and Boorara Domains. Mineralisation is associated with the greenstone sequence that consists of a mafic to ultramafic volcanic succession that is overlain by an intermediate to felsic volcano-sedimentary sequence.

The structural architecture is dominated by NNW-trending crustal scale shear zones including the Boulder-Lefroy, Zuleika, Abattoir, Boorara, Kunanulling, Binduli and Spargoville structural corridors. These structural corridors are the key influencers of mineralisation in the greater Kalgoorlie district and to date have yielded a mineral endowment of over 100Moz.

Mineralisation styles within the district is a combination of Orogenic and Paleoplacer style deposits. Mineralisation is controlled by Brittle-Ductile shear zones, 1st and 2nd order structures that act as Lithostratigraphic contacts (as fluid conduits) through late-stage brittle structures. Mineralisation is also associated with fertile sulphidised intrusive porphyries and layered mafic intrusions with chemically reactive lithologies that provide a rheological contrast.

MINING

The HBJ gold deposit is mined by a top down long hole open stoping (LHOS) method. The orebody is accessed through the hanging wall by a central access from which north and south drives are developed.

An initial porphyry ore lode is encountered and developed. Further out in the footwall there is an ore unit sitting against an ultra-mafic contact. Development of the 2401 (ultra-mafic) lodes are delayed as late as possible but just in time for stoping extraction. Once the stoping panels are mined back towards the main access, development from the access to the north and south can be completed thus completing development. The stoping front retreats from both northern and southern extents towards the access following a top down LHOS method leaving rib pillars. Additional sill pillars are also planned on the eastern lodes where the ultra-mafic contact is present to ensure the safe extraction of the ore whilst minimizing the potential for footwall failure. The dimensions of the stopes vary depending on what lode they are extracting.

The HBJ gold mine has been extracted down to a depth of 580m below surface. Possible extensions are being investigated both to the north (Mutooroo) and the south (South Jubilee) of the current workings.

PROCESSING

The Jubilee processing plant processes up to 1.2 Mtpa of free milling gold ore at an overall gold recovery of approximately ~90%. The Jubilee processing circuit is a conventional CIL plant with a hard rock processing capacity.

The process consists of secondary crushing with a primary jaw crusher followed by a cone crusher, in closed circuit with a double desk screen. The crushing circuit presents feed to a high aspect primary mill followed by a secondary regrind mill. The grinding circuit incorporates a gravity circuit followed by the CIP process.

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