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DEVELOPMENT OF A FLOWSHEET FOR THE ROVER GOLD COPPER BISMUTH ORE PROJECT

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ABSTRACT

The Rover deposit consists of magnetite with free gold and bismuthinite and copper which are well liberated plus cobaltite and pyrite. The magnetite is likely to mill autogenously.

The ore is amenable to gravity gold with recovery ranging from 50% to 60%. Conventional tabling of the concentrate is required rather than intensive leaching because of the negative impacts of cyanide on flotation.

A bulk flotation to recover copper, bismuth and cobalt is the best option rather than selective staged flotation. The copper and cobalt concentrate will be pressure leached and processed via solvent extraction to produce a clean copper and separate cobalt product.

The products from the project will be gold ore bullion from both gravity and CIL processing. A clean copper product will be sold as copper containing bismuth is not saleable. A bismuth concentrate will be produced and this will contain minor copper. A clean cobalt product will be produced.

Eight flowsheets were considered before finalising on a preferred flowsheet.

The basis of design is for an underground crusher and a coarse ore stockpile on the surface. An autogenous mill will grind the ore in close circuit with cyclones to a P_{80} product size of 75 microns. A Knelson concentrator will be used to recover gravity gold.

The cyclone overflow will be subjected to bulk flotation. The tailings will be thickened and processed by CIL to recover gold and these tailings processed using magnetic separation to recover a clean magnetite product for coal washing use.

The bulk concentrate will be reground and separated into copper/cobalt pyrite and a bismuth concentrate for sale. There are two options here either to depress the copper or depress the bismuth which requires further testwork.

Copper cannot be sold with bismuth in it due to severe penalties. Smelters find it difficult to remove bismuth from copper. This presents a technical challenge.

The copper concentrate will be pressure leached and processed by solvent extraction to produce a clean copper product and separate cobalt product. The bismuth residue will be combined with the bismuth concentrate.

The infrastructure is very good with road and rail access plus water and a gas pipeline close by. The town of Tennant Creek will provide support services and a commercial airport with regular flight services.

The project is small and lends itself to modular design and fabrication offsite. A number of engineering deliverables are required to facilitate this. A work programme going forward is recommended

Keyword: Bismuth, bulk flotation, coal washing media, cobalt, copper, gravity gold, penalty elements, Tennant Creek,