Mining Geomechanics and Materials Engineering

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The Minserve Group
1 Swann Road,
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Attention: Alwyn Hyde-Page

Dear Alwyn,

Re: Geotechnical Input to Mine Design: Nelson Bay River Iron Project

The purpose of this letter report is to provide some initial geotechnical input for the mine design. Although no specific geotechnical drilling, logging or sampling has been made to date, the information provided in this report has been extracted from the various geological reports and based largely on experience from similar mining projects.

From the many reports provided to date there is extensive geological interpolation of the ore body petrology and structure but that there is very little data to define the characteristics of the country rock. I understand that it is essential to fully characterise the orebody petrology from the point of view of understanding the value of the resource. However, in order to establish a mine it must be understood that the open pit slopes will all be in country rock. It is essential therefore to include a similar effort for defining the host rock characteristics. These will include the structural characteristics (bedding, joints, schistose fabric, faults, etc.) and material properties of both the intact rock materials and joints.

1.0 GEOLOGY

The regional geology of the Nelson Bay River tenement consists of mixed Proterozoic siltstones, sandstones and carbonaceous mudstones of the Cowrie Siltstone, part of the Rocky Cape Stratotectonic Element. Rocks in the Nelson Bay area comprise finely laminated, psammo-pelitic, Proterozoic-aged siltstones with medium grained sandstones/quartzites. The quartzites are clean, well sorted, and massive to thinly bedded and up to 200m thick.

Adjacent to the Nelson River Iron anomaly, a plunging anticline is interpreted to be present, with the anomaly lying in the southwest limb of the anticline, possibly as a fault structure and/or as a folded dyke(?). In Figure 1, the geological interpretation is projected on the angled ‘mine-grid’ cross-section at 10300mN showing the presence of an anticlinal structure and the orientation of bedding planes in fold limbs.

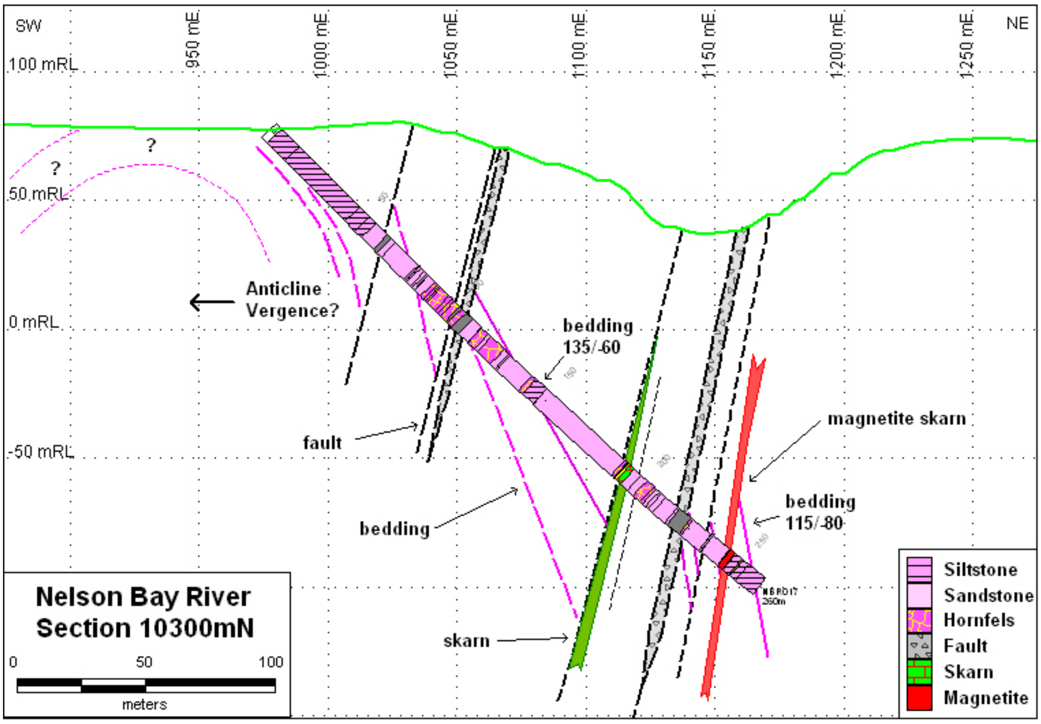

Figure 1: Geological interpretation on angled cross-section at 10300mN

Key elements of the deposit characterisation relevant to the mine design are:

- The magnetite ore is an ultramafic dyke which outcrops at the surface and dips to the south-west at an angle around 65°.
- The dyke is typically 20m to 40m thick.
- Depth to Base of Weathering in ore body is typically 10m to 25m
- The ore zone evaluated has a strike length of some 600m
- Host rock siltstone-sandstone strata dip 60° to 70° east-southeast
- The Nelson Bay River is some 10m wide and occurs to the east of the deposit
- No significant groundwater inflows are anticipated.

2 PROPOSED MINING METHOD

A shovel and truck opencut mining method has been selected as the most appropriate way to mine the deposit. The steep 65° dip of the orebody means that it is best removed in horizontal slices. This is achieved by using a hydraulic excavator in backhoe mode loading rear dump trucks situated on the bench/flitch below it to maximise digger productivity. The limited strike length of some 600m and the 65° dip mean that 1 in 10 gradient ramps out of the pit will be a constricting factor with the opencut mining method. Thus at a depth of say 200m some 2km of ramps will be needed to access ore in the bottom of the pit and this effectively precludes any opportunity to dump waste in-pit as part of the mining method.

Initially only the upper 30m weathered zone of Direct Shipping Ore (DSO) will be mined.

3 GEOTECHNICAL CONSIDERATIONS FOR MINE DESIGN

The absolute dearth of geotechnical information available at this stage precludes any geotechnical stability analysis. Hence the recommended mine design parameters are based on standard mine design practice for opencut mines. Considering that the entire ore body will be excavated, the mine slope design relates specifically to the surrounding country rock comprising interbedded siltstone-sandstone whose strata dip 60° to 70° to the east-southeast.

In order to minimize the excavation of waste rock it is recommended to mine the ore body to its footwall (east wall) contact. The footwall slope will therefore be cut to a slope of about 65°. In order to accommodate the ramps it will be necessary to push the slope away from the footwall contact. It may then be possible to increase the slope angle to 70°.

The slope angle of the hangingwall (west wall) will depend on the dip of the interbedded siltstone-sandstone strata. Assuming the dip is 60° then the maximum slope angle of 53° should provide a constraint on potential bedding plane sliding failures. The bedding dips are shown in Figure 1 to vary up to 80°, indicating that hangingwall slope designs may be optimized according to the local conditions. The key design consideration for the hangingwall must be that the slope is less than the bedding plane dip.

Initial mining will concentrate on excavation of the weathered ore (DSO) which extends down to a maximum depth of 30m. It is recommended to cut maximum 15m high benches down to 45m depth. These benches should be offset with a 5m wide catch berm.

Once more detailed geotechnical data is available for the host rock materials it will be possible to provide a substantiated design analysis. Indeed it is absolutely essential that this information be made available for mine planning beyond the DSO stage.

I trust that this limited information provides you with the basis for developing a first stage mine design.

Yours faithfully,

GEONET *Consulting Group*

Ian Clark

Dr Ian H. Clark
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