The Ernest Henry Mining (EHM) orebody

The EHM orebody is an iron oxide copper gold (IOCG) deposit with magnetite being the form of iron ore.

EHM’s Ore Reserve Estimate at 30 June 2010 is 88 million tonnes at a grade of 1% copper, 0.5 grams per tonne gold and 23% magnetite.

In 2010, EHM produced 74,595 tonnes of copper in concentrate and 91,259 ounces of gold in concentrate. EHM concentrate usually represents around 30% of Xstrata Copper North Queensland’s total production.

While magnetite has traditionally been disregarded as tailings at EHM, the new magnetite extraction plant allows it to be captured and sold as a by-product, reducing the amount of tailings sent to the on-site storage facility.

The plant also provides opportunities for the reprocessing of existing mine tailings in the future to extract magnetite, potentially enabling a further reduction in the amount of tailings stored.

Mining

Magnetite is mined as part of the usual mining process at EHM as it makes up a large percentage of the existing orebody.

EHM’s open pit mine is scheduled for completion in August 2011 and ore will be mined from the open pit using traditional drill and blast and truck and shovel methods until that time.

Processing

Copper and gold are recovered from the ore using traditional grinding and flotation methods in the EHM concentrator.

What is magnetite?

Magnetite (Fe₃O₄), like hematite (Fe₂O₃), is a form of iron ore. It is a benign and highly magnetic substance used primarily in steel manufacturing and coal washing.

Magnetite occurs in nearly all igneous and metamorphic rocks and usually only in small particles or in a solution with other minerals. Some beaches, often called black sand beaches, contain heavy magnetite deposits.
This circuit is made up of eight drums that rotate around a stationary shaft connected to a high strength magnet. As the slurry washes around within these drums, the magnetic particles it contains adhere to the drum surface closest to the magnet, allowing the magnetite to be separated from the non-magnetic material, or tailings, and collected in a launder as concentrate.

Primary cyclone cluster
The resulting magnetite concentrate contains un-liberated magnetite (magnetite particles that are still attached to other minerals) which requires further milling so that the magnetite can be liberated and extracted. Un-liberated magnetite is usually larger than liberated magnetite, so the two can be separated according to particle size. The concentrate is subjected to centrifugal force in the primary cyclone cluster which effectively separates the larger particles from the smaller particles, allowing the liberated magnetite to be captured so it can be sent to the cleaner magnetic separator circuit for additional processing. The un-liberated magnetite is currently discarded as tailings however it will be processed further once the regrind mill circuit is completed during 2011.

Regrind mill circuit
A regrind mill circuit will be constructed during 2011 so that the un-liberated magnetite can be milled further, improving magnetite liberation and yield, and further reducing the amount of tailings sent to the on-site storage facility.

The additional magnetite captured will pass through a set of regrind magnetic separators. The concentrate produced will be directed onto the cleaner magnetic separator circuit, mixing once more with the liberated magnetite from the primary cyclone cluster, while the tailings will be discarded as final tails.

The regrind plant is scheduled for completion in the second half of 2011.

Cleaner magnetic separator circuit
The cleaner magnetic separator circuit works in the same way as the rougher and regrind magnetic separator circuits, using drums and magnets to further separate the magnetite from the non-magnetic material. The magnetite slurry passes through three cleaner stages and the strength of the magnets used in each stage is progressively reduced, helping to refine the concentrate. The resulting concentrate is directed to the dewatering circuit while the tailings are recycled back to the rougher and cyclone feed sumps to be re-used as dilution water in these earlier stages of processing, minimizing raw water usage in the process.

As the discs rotate through the slurry, capillary action causes the liquid to draw through the discs while the solids build up on the external surface of the discs to form magnetite cake.

The cake, or final magnetite concentrate, contains around 8-10% moisture. It is removed from the discs with a scraper and discharged into the concentrate stockpile for storage until it is time for transportation. The tailings from the magnetite plant are directed to the existing concentrator tailings thickener for deposition at EHM's on-site tailings storage facility.

Our product
The final product is a premium grade iron ore concentrate containing around 90-98% magnetite.

EHM will produce approximately 1.2 million tonnes of magnetite concentrate per annum at full capacity for export to Asia, making it Queensland’s first iron ore concentrate exporter.

Storage and transportation
The magnetite concentrate is stockpiled at EHM and it will be transported by purpose-built trucks to a storage and rail load-out facility near Cloncurry and then by rail to Xstrata’s Port facility at Townsville.

The magnetite concentrate will be fully enclosed and contained during transportation and it will be stored in a fully enclosed storage shed at the port.

The first train load of magnetite concentrate is expected to leave Cloncurry for Townsville in the first half of 2011.

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