THE BELL MINE

(Tour notes by M.L. Malott)

INTRODUCTION

A mine tour was given by Maggie Dittrick on May 9, 1991. There was an accompanying Australian geologist, Peter Russell, Newcrest Mining Ltd. and a Noranda Exploration field crew.

Bell Mine first began production in 1972 and is projected to close in August 1992. The mine has not had a geologist on staff since the late 1970's. Maggie Dittrick was hired as mine geologist approximately 6 months ago. Maggie along with Jill Pardoe, a contract geologist involved with an extensive drill program last year, are both trying to piece together prior drill log information plus last years logs. This information is assisting in creating a series of N-S cross-sections through the pit area. Drill core from the mining phase of the project was entirely crushed. With none of this core remaining for examination, the interpretation of past logs with respect to last year's drilling has been slow. Presently the geology staff is establishing a 'representative' and 'unusual' rock collection from both core and pit samples and examining core which remains from the exploration phase.

The Bell Mine is one of three copper-gold porphyry deposits in close proximity on the northeast side of Babine Lake:

Morrison (undeveloped) (25 km to the north)
Bell (to be mined out in 1992) (middle)
Granisle (mined out in 1982) (8 km to the south)

The three deposits are thought to be part of one intrusive system consisting of biotite feldspar porphyry granodiorite through to quartz diorite.

GEOLOGY

Country Rock

Jurassic Hazelton volcanic rocks lie to the east of the property whereas mid-Cretaceous Skeena sediments and volcanics lie to the west.

Intrusive Rocks

The area is cut by a series of faults with the Newman fault, trending NNW, the most prominent. Eocene Babine Intrusions, locallized along the faults, are associated with the mineralization.

The oldest intrusive rock is **'rhyodacite'**. It is highly altered and is a light, variably coloured rock with small phenocrysts, a glassy appearance (due to quartz flooding) and has pyrite disseminated throughout. The rhyodacite is mineralized and locally constitutes ore.

The biotite of the **BFP (biotite feldspar porphyry)** has replaced hornblende. This unit is thought to be slightly younger than the rhyodacite. Another unit, the **BBFP (black biotite feldspar porphyry)** is distinguished from BFP by a very dark to black matrix and a sucrosic texture. **The QFP (quartz feldspar porphyry)** unit is a buff coloured rock with white feldspar phenocrysts and a 'gritty' texture. Grey-spotted areas are scattered within the QFP and a dyke of this 'dalmationite', intersected in a deep drill hole, is believed to be a feeder for the QFP.

Alteration

Alteration on the property is intense. There is a large pyrite halo (which Granisle did not have) and three types of alteration:

1) Propylitic alteration carries some mineralization.
2) Hydrothermal biotite alteration occurs in the shattered core of the stock. It is barren near the surface with the Cu grade picking up at depth.
3) Quartz-sericite potassic alteration is associated mainly with the BFP and carries most of the mineralization.

Gypsum occurs within many fractures. (The Granisle mill had recovery problems due to the amount of gypsum present).

Mineralization

Ore consists mostly of chalcopyrite and pyrite with some bornite. (Bornite was more common at Granisle). The mineralization occurs as disseminations and within fracture fillings. A very high grade oxidized cap was mined with most of the mineralization found within fingers and arms of the stock. The deposit remains open at depth, but the highest grade mineralization generally occurs at the contact between intrusive and country rock.

MINING

Mill recoveries were about 75% during the early years of the mine life and have now reached 82% to 83%. The current remaining reserves of 6 million tonnes grading 0.462% Cu (0.2% cutoff) will be exhausted in approximately a year with the 1550 foot level being the deepest bench planned.

The 1990 drilling further defined potential ore reserves by angled drilling (previously most holes were vertical) and also focussed on a waste dump site to the NNW of the pit. From this drilling it was determined that a five hundred foot outward expansion of the pit rim could take the pit another three hundred feet deeper (to a total depth of 1100 feet) and increase the reserves to 120 million tonnes grading 0.4% to 0.5% Cu.

Unfortunately this full expansion would create high strip ratios since there are lower grades along the N wall and a segment of the SE wall contains a non-mineralized post-ore plug of QFP. Limiting the SE portion of the pit rim to only a 300 foot expansion would create engineering pit design difficulties and steep wall problems. Therefore, expansion has not been deemed economic due to the amount of waste involved.

One possible alternative is heap leaching. Eight cribs of different rock types have been set up in order to test leachability over a one year time span. Leaching may be able to extract copper from sub-ore grade 'wate' (down to 0.07% to 0.05%). A separation of high grade ore to mill and lower grade 'waste' to the leach pile may be possible.

Problems associated with leaching entail concerns with winterization of the process and acid-base equilibration. Additionally, Au content of the ore averages 0.06% g/tonne and is recoverable by the mill. This accounts for 20% of the present financial return. Au would not be recoverable by heap leaching.

There have been few problems with wall stability to date, although it is recognized that two faults meet to form a wedge on the west wall. In anticipation of potential problems, a slope monitoring program has been set up.

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