

THE LADY LORETTA PB-ZN-AG DEPOSIT – ANALYSIS OF AN OPPORTUNITY

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INTRODUCTION

The Lady Loretta Pb-Zn-Ag deposit is located 140km NNW of the city of Mt Isa in NW Queensland and was discovered in 1969. To this day it remains undeveloped. The published resource estimate for the deposit lists a global geological resource of 8.3Mt grading 8.5% Pb, 18.4% Zn and 125 ppm Ag (Hancock and Purvis, 1990). This is a small, but high grade example of a sediment hosted Pb-Zn deposit, typical of those giant deposits for which the Mt Isa Inlier is world famous. At the time of Noranda's initial involvement regarding the evaluation of the deposit, the grand total of our knowledge with respect to the deposit is summarized in this opening paragraph.

In 1998 after a considerable evaluation and due diligence, Noranda Pacific Pty Limited, a wholly owned subsidiary of the Canadian based Noranda Inc., entered into a two-year option agreement to evaluate the Lady Loretta Pb-Zn-Ag deposit with the Australian junior mining company BUKA Minerals Limited.

A brief description of Noranda is given to acquaint the Australian reader with Noranda and set the context for the exploration group's project hurdle targets. Noranda is one of Canada's largest diversified mining and metals companies employing 18,000 people, at 15 operating mines, 18 metallurgical plants and 11 fabricating facilities worldwide with total assets of US\$8.25B. Associated subsidiaries or major interests include a 49.9% interest in Falconbridge (the world's second largest Ni producer) and a 28.4% interest in Battle Mountain Gold (a million ounce/ per annum gold producer). Attributed annual refined metal production totals 500,000t Cu, 300,000t Zn, 100,000t Pb, 45,000t of Ni, 40Moz Ag and 1.0Moz of Au. Major new projects include a 37.5% interest in the US\$2.5B Antamina Cu-Zn project in Peru, and the US\$500M Magnola magnesium project in Quebec, Canada.

As a major base metal producer and miner it is obvious that the hurdles set for the exploration group are such that any given project must demonstrate the potential to impact significantly on our total metal production, over a significant production life and by extension impact the bottom line. This can be a daunting hurdle to overcome as an explorationist within a large organization. As a result many good projects are turned down not because they are not good exploration projects, but rather because we are simply unable to demonstrate sufficient upside to meet the high expectations. Thus, explorationists must in addition to their keen exploration skills bring a thorough "business minded" approach to the opportunity in order to satisfy internal corporate expectations.

With the long history and folklore surrounding the Lady Loretta deposit, and the context above, one of the most frequently asked questions since Noranda got involved with this project is why? In this paper, I will review the thinking of Noranda's exploration group regarding the assessment and hurdle setting of this base metal opportunity.

BACKGROUND

The Lady Loretta deposit was discovered in 1969 by Placer Prospecting / Triako Mines while drill testing a pronounced Pb soil anomaly. Since that time the deposit has been extensively explored by a number of companies including: MIM, Elf-Aquitaine, Outokumpu, and Pancontinental, and a number of pre-feasibility studies have been completed. In 1996 BUKA Minerals (the current owner) acquired a 100% interest in the property in a competitive tender process. Noranda subsequently entered into an option agreement to acquire a 75-80% interest in the project from BUKA.

Historical exploration and evaluation work completed on the Lady Loretta deposit includes the development of a 4.8m diameter concrete lined shaft to a depth of 468m, some 93 surface core drill holes (totalling

30,400m), and 145 underground core drill holes (totalling 14,500m). In 1999, Noranda completed 77 surface drill holes totalling 27,253.8m.

GEOLOGY OF THE LADY LORETTA PB-ZN-AG DEPOSIT

The Lady Loretta Pb-Zn-Ag deposit is considered a classic sediment hosted base metal deposit exhibiting many of the features documented for similar deposits of the Mt Isa Inlier (ie. Mt Isa, Hilton, George Fisher etc.).

The deposit is localized in a tight NE plunging syncline (the Small Syncline) which was modified by later folding and locally offset by reverse faulting. The upper 120-150m of the ore horizon has been extensively oxidized, and at surface appears as a prominent gossanous ridge that exhibits elevated base metal values.

Mineralization occurs on both steeply dipping limbs of the synform, which connects at a thickened keel position at a depth of 500m from surface. Both the north and south limits of the deposit are fault truncated with the fault movement suggesting uplift and subsequent erosion of the ore horizon.

Mineralization within the deposit displays a well defined zonation from finely banded sulphide mineralization (dominated by fine grained sphalerite and galena) in the deeper keel area to a coarser baritic type of mineralization higher on the deposit limbs (and best developed on the East Limb). In general, the deposit exhibits a pronounced metal zonation from high Pb, Zn-rich mineralization on the west limb and in the keel, to a low Pb, Zn-rich mineralization on the east limb, extending along strike to the north.

The Ore Horizon in the deposit area is defined by the appearance of thinly banded to massive base metal sulphide mineralization (ie. sphalerite, galena) within a siltstone host, with or without pyrite bands, and locally with extensive chert–barite. The basal portion of the Ore Horizon is characterized by a significant increase in Pb-Zn grades often exceed 40% combined Pb-Zn.

The host ore sequence extends to the west into the Big Syncline where a chert-barite-pyrite horizon with minor base metal mineralization marks the expected ore position.

NORANDA'S PROJECT HURDLES

Although the Lady Loretta deposit has always been known for its high grade, its relatively small size would make it a difficult sell to the senior management of most major mining companies, whose goals are increasingly focused on finding / acquiring the next “world class” or “company maker” opportunity. It was no different with Noranda, and as historically defined this deposit would not make Noranda's project hurdle. Thus the opportunity became one of exploration rather than outright acquisition.

At this point, it is necessary to outline the minimum target thresholds for a project in which Noranda maybe interested. Aside from the expected project cash flow economics for which all companies set (not discussed here), a base metal project for Noranda must have potential to achieve 100,000t of annual metal production over a significant production life (say >10-15 years).

Previous feasibility studies based on a 500,000tpy UG mining operation utilizing conventional selective flotation processing (expected metal recoveries of say 75% for Zn), ore dilution etc. indicated that the existing resource would fall far short of our project threshold with respect to metal production. Higher production rate is one answer if technically feasible, but this would result in a shortened production life, which would also fail to meet a Noranda project criterion.

Two key factors were identified as necessary for the Lady Loretta opportunity to meet our project hurdles:

- 1) additional tonnage which would hopefully allow for a higher production rate (and metal output);
- 2) higher metal recoveries than were historically perceived for this deposit in order to take advantage of the high metal values within the deposit.

To set the hurdles, an economic base case was modeled which envisaged an 800,000tpa mining operation over a >10 mine life at historic grades with projected metal recoveries exceeding >80% for Zn. From this it was determined that a 12Mt resource (50% increase in the historic resource) of similar grade would be the minimum exploration target in order to move towards our stated project hurdles.

Although metallurgical recoveries were also viewed as a significant driver, it was decided that unless the tonnes could be found, the project would not meet our hurdles in any event.

Based on the above, the deposit and immediate area were studied in detail in order to evaluate the potential for additional tonnage. Utilizing composite vertical longitudinal sections of both the west and east limbs of the deposit, areas of high potential to add tonnes were identified for drilling. It was determined that there was potential to achieve a 50% increase in resource, and possibly even a 100% increase, in addition to any “blue sky” targets which all explorationists can arm wave about.

This was the concept presented to Senior Management and support was given to enter into an option agreement.

PUT UP OR SHUT UP

In 1999, Noranda began an aggressive drill campaign to test the deposit for significant extensions to ore. Pressure was on to achieve early success. A total of 77 drill holes (totalling 27,254m) were completed from an original planned 22 drill holes. The program did in fact meet with early success and a number of significant intersections were returned on the East limb from the south and central areas, as well as significantly upgrading the North block area. The west limb was less successful. However, mineralization in a keel position was extended to the south.

The results obtained after the first year of drilling were extremely encouraging, and it was shown that the predictions put forth from the deposit analysis were shown from the drilling program to be sound. Although an updated resource estimate from this work has yet to be disclosed at press, Noranda was satisfied that attention could be turned to the metallurgical issues.

METALLURGICAL ISSUES

The Lady Loretta deposit has always been considered, whether through fact or fiction, to possess difficult ore from a metallurgical point of view. Noranda’s due diligence had indicated that metal recovery to clean concentrates was likely to be a major issue. This is not unexpected given the stated metallurgical performance of the other Pb-Zn deposits in the Mt Isa Inlier.

However, it was felt that Noranda’s experience with the metallurgically complex Pb-Zn ores in Bathurst mining camp in New Brunswick, Canada, could be brought to bear on this issue.

Working closely with Noranda metallurgical personnel, a detailed program involving ore characterization of ore types and predictive metallurgical petrography (conducted at Lakefield research in Canada) was completed. This was followed by an extensive bench testing program involving 1.3t of drill core.

The results of the bench testing program have returned highly encouraging results with projected Zn recoveries ranging from 82.5 to 90.4% to a clean Zn concentrate grading between 54.8 – 57.5% Zn. These initial results are higher than we initially modeled in our project analysis.

A pilot program to test 25t of ore material is now being considered as part of our 2000-work program.

CONCLUSIONS

The Lady Loretta base metal deposit is a challenging project for which various factors in the past have conspired to keep it undeveloped to this day. The opportunity as historically defined did not meet Noranda's project hurdles for base metal projects, notwithstanding the quality of the historical resource.

However, by analyzing the opportunity with a clear understanding of the business issues and the corporate expectations, the evaluation by the exploration group was able to clearly define the objectives of the exploration program and demonstrate a favourable chance of success utilizing exploration dollars that are becoming increasingly scarce.

As we continue to grapple with the challenges of this deposit, we are hopeful that the Lady Loretta deposit will in fact evolve from an "Old Maid" to a "sleeping beauty" and be developed into a significant new Pb-Zn-Ag mine in NW Queensland.

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