

EVOLVING DIRECTION

COPPER NORTH'S DIFFERENT PATH BLOSSOMS



Copper North's flagship project, Carmacks project, is located approximately 30 kilometres off the Klondike Highway at Carmacks, Yukon. The Carmacks copper-gold-silver deposit is in the southern portion of an evolving copper-gold district that extends to the northwest to the Dawson gold fields.

Copper was discovered in 1970s, and the mineral deposit has been through several exploration and development programs. Carmacks is somewhat unique as it is the only large oxide copper deposit in Canada, a feature resulting from avoidance of glaciation. The deep weathering of the sulphide mineralization has left a residue of copper, gold, and silver mineralization that is amenable to leaching to produce copper cathode that can be sent directly to copper fabricators. The relatively high gold and silver grade is also somewhat unique and required Copper North to change the copper leach method to facilitate the recovery of gold and silver.

With a change in management in March 2014, the project has been brought back to life with expansion of mineral resource and re-engineering to include recovery of gold and silver. The efforts of a new team have made the project more robust and

progression to a new feasibility study that should demonstrate attractive economics, even at today's depressed copper and gold prices.

Strategic evaluation

A review of the project in March 2014 indicated that the project needed to overcome several hurdles: expansion of mineral resources, reduction of capex and opex costs, and recovery of gold and silver to increase revenues.

The previous feasibility study completed in 2012, consisted of mining the oxide copper-gold-silver resources, crushing of the ore and placement on a large leach pad, followed by sprinkling of sulphuric acid to leach the copper, collection of the copper laden (pregnant solution) liquid to strip out the copper by electrolysis to make cathode copper sheets. The operation of heap leach pads in winter conditions and closure of the leach pads provides engineering challenges.

Re-engineering of Carmacks: evolution of a new leach plan

The key to the re-engineering was the recovery of gold and silver, increasing operating revenues, and reducing opera-

tional risk. To evaluate the economics the company undertook a Preliminary Economic Assessment (PEA) to provide some insight as to the impacts of gold and silver recovery in improving project economics. The results were encouraging as the PEA indicated that a modified heap leach copper and gold-silver plan would provide an approximate 40 per cent increase in gross mine revenues and a reduction in the cost of producing copper from US\$1.65/lb copper to approximately US\$1.07/lb copper after deducting gold and silver credits.

New copper leach plan

The common approach to processing oxide copper deposits is heap leaching on engineered leach pads with multiple liners. This technology was the focus of the earlier engineering and presents considerable challenges in preparation and management of construction of liners beneath and within the leach pads.

The engineering team considered other forms of leaching the oxide copper that would ensure high recovery for the gold and silver. The metallurgical test work commenced in fall 2014, with the investigation of vat leaching. Although the test results were favourable, with acceptable



leach times for copper of approximately 16 days, the team did not stop there. This was a major step forward in addressing the concerns associated with heap leach processing as the vats are enclosed and the risk of leakage during the leach operations is reduced. Overall de-risking of the main environmental concern, previously addressed in permitting submissions, is achieved.

Copper North tested the leaching at a finer crush and confirmed that a grind to one millimetre resulted in leach times of

less than 24 hours. The motivation of pursuing the finer crush was driven by trying to reduce materials handling in winter conditions and therefore reducing operational risk. The next step was to determine how much effect temperature might have on the proposed agitated tank leach - the answer was surprising with optimal leach times for copper being approximately four hours. With these very positive test results test work moved to recovery of gold and silver using the same agitated tank leach process.

Recovery of gold and silver

Evaluation of gold and silver recovery commenced with pumping residues from the copper circuit, rinsing the residues to remove all acid and soluble copper, and pumping the washed materials directly into the cyanide circuit to recover gold and silver. The test work confirmed similar fast leaching of less than 16 hours and improved gold and silver recoveries. The gold and silver are recovered by Merrill Crowe Leach method to produce gold-silver dore.

220 KM NORTH OF WHITEHORSE, YUKON - 400 KM FROM YEAR-ROUND PORT AT SKAGWAY, AK



ADVANCING CARMACKS COPPER-GOLD DEPOSIT TO BE THE YUKON'S NEXT COPPER MINE



1120 - 1095 W. PENDER ST, VANCOUVER BC, CANADA V6E 2M6
TEL: 604 398 3210 » TOLL FREE: 1 844 401 2644 » FAX: 604 398 3456



The final stage of processing is the cyanide destruction of the waste materials and dewatering them for dry stacked tailings disposal. The later reduces many of the concerns of waste disposal at mining projects.

Mine economics and environmental performance

A new PEA is in progress to confirm the details of the new leach plan and provide the basis for re-entering the permitting process and the pursuit of project financing. Some of the key areas for improvements include the fact that we have eliminated heap leach plan which reduces capex in the July 2014 PEA (US\$225M) by approximately \$75 million; which of course will be offset to some extent by addition of tankage and fine crush equipment. The transition to agitated tank leach also reduces required manpower and leads to increased operational efficiency and an expected reduction in operating cost. The adoption of agitated tank leach technology indicates that we should expect improved recovery of copper, gold and silver, and lower reagent costs.

In further addressing capital cost reduction of equipment we have shared the engineering between JDS Energy and Mining Ltd. who built the Minto mine nearby, and Beijing General Research Institute of Mining and Metallurgy who are undertaking detailed engineering of the leach equipment utilizing their northern experience. The sourcing of equipment designed and engineered by BGRIMM includes sourcing fabricators to make and export the equipment for installation at Carmacks. Benchmarking indicates po-

tential for reduction of capex for some equipment and further capital reduction for the Carmacks Project.

We are particularly pleased by the much improved operational efficiency and control. The outcome of these improvements reduces the risk of leakage and spillage that could negatively impact the environment. We are confident that the regulators, First Nations and other interested parties will approve of the changes that we are proposing. We look forward to engaging with First Nations and the permitting of the new Leach plan.

Carmacks is bigger than you think

After dormancy of exploration since 2008, Copper North has taken on the challenge of expanding mineral resources. In fall 2014 it commenced exploration on Zone 2, located approximately 2,500 metres to the north of the planned open pit in zones 1, 4, and 7, the basis of the July 2014 PEA. The modest program at Zone 2 extended the small deposit to a mineralized zone having a length of over 500 metres and remains open to the south. Although interesting and potentially mineable it was relatively narrow compared to other targets south of the Zone 1 area.

The 2015 exploration program was expanded to \$1M, allocated to better understand controls of mineralization and commence fill-in drilling sufficient to expand mineral resources. All drilling was focused on a 2,000-metre-long mineralized zone, interpreted as the south extension of the initial proposed mine area. Copper North has news released that the tonnage potential associated with this year's drilling is approximately 10 million tonnes of

oxide and sulphide mineralization that almost doubles current Indicated and Measured mineral resources. A new NI 43-101 resource report is in progress and will include the potential resources into the new mineral resource inventory.

This year's fill-in drilling tests approximately 25 per cent of the mineralized structure. The new potential is open to depth and along strike; additional drilling will further increase mineral resources in the South Target area. The 2015 exploration work also identified attractive targets in the North Target area.

Current mineral resources are 12 million tonnes grading 1.07 per cent copper, 0.456 g/t gold and 4.58 g/t silver. Beneath the main oxide resource are approximately 4.7 M tonnes grading 0.75% per cent copper, 0.22 g/t gold and 2.45 g/t silver in the Indicated category and 4.03M tonnes grading 0.71 per cent copper, 0.19 g/t gold and 1.9 g/t silver. However, these sulphide resources are at the bottom of the pit and therefore of lower priority.

Much of the new resources in the South Target area are sulphides, commencing at depths of approximately 50 to 75 metres; they represent an attractive addition to future development. Copper North's next challenge will be to evaluate the leaching of sulphide mineralization and continue the SXEW recovery of copper, and perhaps gold and silver. This planning and investigation is at an infant stage but part of the new path forward.

Overcoming difficult markets

Copper North management are pleased that they have been able to refinance and re-engineer the project. We have raised approximately \$5 million during the past 18 months for funding our steps forward. The financing required 11 financings with widespread search of funds. We have been lucky and rewarded for our perseverance. I encourage other junior companies to not give up and fight to move forward. Despite the long period of difficult markets we remain confident that there are opportunities going forward. With the optimism, that is key to explorers and developers, Copper North acquired a large land position adjacent to the dormant Kerness Mine in northwest British Columbia. Perhaps Copper North can also make their magic on the Thor property. ■