Could the ironic return to profit in mining be in the green?

Going green with new environmentally positive mining methods likely isn't the top choice for generating new profits. Can shifting perspective to better environmental performance create opportunity? The case study featured in this note explores that paradox.

While the demand for precious metals continues, the challenge facing modern miners is extracting them. Most, if not all the 'easy gold' is mined. Remaining precious metal deposits are found in high-grade ore that is situated within narrow-vein structures that are difficult to mine profitably. Drill and blast mining, the conventional mining method, is an old technology. Other methods, such as shrinkage or long hole, are either labour intensive or present significant dilution issues.

Many known deposits lay dormant due to the industry's slow adoption of new technology. Often these deposits are within operating mines and are not generating a return for shareholders, or they face reduced returns due to use of the standard less economic mining methods.

Shareholders could do better by simply asking companies if they are they using the best methods to extract their metals for both profit and environmental impact.

Paradoxically, the return to profit for these companies may come from moving forward into green technologies. One company that stands out in this effort is Nippon Dragon Resources Inc. [NIP:TSXV] and their patented thermal fragmentation mining system for extracting high value ore. This system provides a method to meet many of the criteria for meeting the objectives

of the Green Mining Initiative [GMI]. While doing so NIP is also showing the benefit of recovering high value metals with improved economics.

The goal of the GMI is to improve the mining sector's perceived environmental performance and create green technology opportunities. This effort is led by Natural Resources Canada, in partnership with the provincial/territorial governments, industry, academia, NGOs and other interested stakeholders including the Canada Mining Innovation Council. This Initiative looks at the entire mining life cycle through four research and innovation pillars.

A Smaller Footprint for Lower Costs

The first pillar of the GMI is Footprint Reduction: minimizing the quantity of waste rock produced, reducing land used, utilizing energy-efficient mining and processing methods, and extracting valuable minerals and metals using minimum amounts of water and noxious chemicals.

Nippon's system is designed for the extraction of high-grade ores in narrow-veins, less than 1.2m. They use thermal fragmentation of the rock rather than traditional blasting methods. This mining method allows for the extraction of only the ore zone while minimizing the dilution. Blasting is still involved in the traditional mine development process of ramps and drifts, but drift development is done in the ore. This is the basis of the benefit: less rock is moved and this translates to all the desired benefits in Footprint Reduction. With less rock mined there is less waste rock produced and also less ore rock sent to the mill. Less ore to process means less water and chemicals required to recover the metals.

Also the mine is of a smaller scale. To generate the same amount of metal production, fewer tonnes need to be processed. Ounces are mined, not tonnes. This translates into a smaller mine footprint in terms of land used, energy used,

transportation of materials, infrastructure, and capital required to build the mine. This links to the economic benefit of the system—improved economics for metal production from this type of deposit and lower risk.

The second pillar of the GMI is Mine Waste Management and works towards preventing and alleviating impacts created by mineral processing. This includes minimizing and reprocessing waste and developing alternative waste disposal technologies to leave behind healthy ecosystems. The NIP system fits into this pillar as well based on its ability to minimize the amount of waste produced through in-ore development and dilution reduction. As well, the remaining openings are smaller and stable and can accept the tailings as a back fill material to reduce on surface waste disposal requirements. Less waste leads to lower related operating costs.

For the third pillar of the GMI, Mine Closure and Rehabilitation, research is being conducted to reduce long-term liabilities at mine sites. The smaller land footprint of the mine developed using the NIP systems translates into less costly and faster site reclamation. As many deposits that could use this method are located in developed mining camps there is even the opportunity for limited mine development and the use of custom milling at existing facilities therefore eliminating the need for new tailing impoundments, a further reduction in the footprint. Rehabilitating mine sites ensures the public can continue to benefit from the land at the end of the mining cycle. Mining is a temporary use of the land, unlike many industries and developments where the land is taken from the natural environment forever.

The fourth pillar, Ecosystem Risk Management, is about understanding and reducing the impacts on the fauna and flora. The NIP system mine is a smaller operation that can deliver on reducing these impacts too. Smaller mine sites, reduced chemical usage, reduced travel to site and smaller equipment are all ways that this system can deliver on reduced impacts

to the living natural environment.

Energy Consumption Savings

Natural Resources Canada is also looking at investing in research on improved technologies and best practices so that energy consumption in comminution could be significantly reduced. Comminution is the crushing and grinding processing that liberates the metals from the rock. The NIP system is also a leader in this area. The thermal fragmentation process creates rock particles ranging from 1 to 13mm in size from a typical gold bearing quartz vein. This material can go straight to the grinding circuit with no need for crushing, contributing to energy-efficiency too.

Canada can continue to be a global leader in mining by using new technologies to produce minerals and metals and leave behind clean soils, clean water, and healthy ecosystems for future generations. NIP’s mining system goes a long way to meet these goals and blaze a new trail for the industry. Good business can be green business. Perhaps is time for shareholders to ask companies to use the best green methods to extract metals for both profit and environmental impact.