

# Ecclestone on the “very big” cobalt niche

The “Blue Metal” is sometimes the term used to describe cobalt. While Cobalt has had the blues in the recent past its worst days seem behind it. Like many other specialty metals it has a poor supply prognosis as its tailwind at the current time and for the foreseeable future.

Overall, cobalt demand is projected to grow from 87,383 tonnes to 113,725 tonnes between 2014 and 2018. Cobalt supply is projected to grow from 91,577 tonnes to 100,778 tonnes over this same time frame. Rechargeable batteries and superalloys comprise 46% and 18% respectively of the total refined cobalt demand. It's important to note that most rechargeable battery users require cobalt in chemical form (sulfate and oxide), while superalloy manufacturers require metal.

Supply is linked to two base metals, one of which (nickel) has been underinvested for quite a while and still has a relatively depressed price (despite the bulls of that metal) while copper is satisfactorily priced at the moment but the bulk of the cobalt by-product rich mines are in Central Africa NOT in Latin America (Chilean mines have more Moly as the by-product).

Primary cobalt mines are interesting because they are not dependent upon the pricing of another base metal to dictate their viability. However primary cobalt mines have become a rare commodity. One of the most advanced of the handful of primary plays out there is Formation Metals' project in Idaho which I shall take a closer look at here.

## **Most Advanced to Production**

Formation Metals Inc. (TSXV: FCO) is ahead of the pack amongst the juniors. This company has the advantage, strategically,

that its project is located at Salmon in Idaho and thus could potentially provide the US with an onshore source of Cobalt. The 100%-owned deposit is one of that rare breed, the primary cobalt deposit. Its project, the 100% owned Idaho Cobalt Project (ICP) is comprised of the mine and mill site located in Lemhi County, near the town of Salmon, Idaho. The company has also mused upon establishing a refining facility, the Cobalt Production Facility (CPF), to be a stand-alone hydrometallurgical facility that would process the ICP Mine concentrates. The company owns a 16 acre industrial zoned package of land near Kellogg, Idaho which it deems suitable for the future placement of the CPF. At times it has also investigated other locations for the refining facility preferably located closer to the mine site and a railhead to reduce the operating expenditures of the ICP.

### **The Resource**

The Salmon project is endowed with Cobalt, Copper and Gold. While the most recent PEA does not have a Mineral Reserve shown, a previous PEA showed diluted, Proven and Probable Reserves of the project at 2.636 million tons @ 0.559% cobalt, 0.596% copper and 0.014 ounces per ton gold utilizing a 0.2% cobalt cut-off for a ten year mine life. This represented contained metals in a Proven and Probable Reserve category of 29.5 million pounds of cobalt, 31.4 million pounds of copper and 37 thousand ounces of gold. In addition, there are Inferred Resources of 1.122 million tons grading 0.585% cobalt, 0.794% copper and 0.017 ounces per ton gold representing contained metal of 13.1 million pounds of cobalt, 17.8 million pounds of copper and 19,000 ounces of gold.

The latest PEA has a Resource for the Ram portion of the deposit which showed:



### **The Mining Plan**

A Feasibility Study on the ICP was completed in 2008 which kickstarted the initial construction of the project. Formation has already spent US\$65.3 million (of which \$15mn was towards the CFP) and completed two phases of the ICP construction program that commenced in June 2011 and completed in December 2012. This work was comprised of extensive earthworks including access and haul road, portal bench, mill and concentrator pads and tailing waste storage facility construction. In addition, pre-purchased mining and milling equipment, including the ball mill, flotation circuits, grizzlies, hoppers, conveyors, etc., totaling approximately US\$16 million has been delivered to a staging area outside the town of Salmon, Idaho, proximal to the mine and mill. The fall in cobalt prices, and moreover, the dire financing environment put the project into abeyance at that point.



The final Phase III of construction will involve underground development and the construction of the mill and concentrator and other ancillary facilities at the ICP Mine Site and at the CPF.

Back in April 2015 the company published a new PEA on the ICP. That PEA was based on an underground mine with a target production rate of 800 tpd with a weighted average annual production of:

- 2,771,000 lbs of cobalt
- 4,533,000 lbs of copper
- 3,600 oz of gold

The output is over a 12.5 year mine life with an estimated pre-production period of 21 months utilizing a 0.20% cobalt cut-off is estimated at:

- Cobalt Production: 35,356,415 pounds
- Copper Production: 57,384,700 pounds
- Gold Production: 46,858 ounces

The economic model used a 35% corporate tax rate and an 8.5% discount rate, resulting in an after tax NPV of \$113.45mn and an IRR of 24.07%.

The key difference is that whereas the original feasibility design, centered on the Cobalt Production Facility, produced high purity cobalt metal, the revised ICP is focused on producing battery grade cobalt cathode chemicals (cobalt sulphate heptahydrate). The CPF will also produce copper sulphate, magnesium sulphate, a clean copper concentrate and gold as saleable by-products.

Current plans call for the production of a bulk sulphide concentrate that contains cobalt, copper, and gold. Further processing for recovery of the individual metals is via a hydrometallurgical treatment plant (i.e. the CPF). The hydrometallurgical process includes a copper scalping flotation to produce a copper concentrate to be shipped directly to a copper smelter, and pressure leaching of the remaining concentrate. The CPF consists of an autoclave, copper solvent extraction and cobalt solvent extraction followed by crystallizers to produce cobalt sulfate heptahydrate, copper sulfate pentahydrate, and magnesium sulfate crystals. A gold leach circuit is also included in the process to extract gold onto carbon which will be sold as a product prior to leach residue disposal. The PEA contains a \$55mn capex item for the CPF.

## **Approvals**

The ICP has received a final Environmental Impact Statement and positive Records of Decision from both the U.S. Department of Agriculture National Forest Service and the U.S. Environmental Protection Agency.

Expected production is estimated at 1,525 tons annually of super-alloy grade high-purity cobalt metal over a minimum ten year mine life. The project's output will be equivalent to

3.3% of the entire global cobalt supply and it will be able to feed 14.9% of North American demand for cobalt.

## **Conclusion**

The supply outlook for cobalt is muted to say the least, while there are potential bottlenecks on the usage side (e.g. Tesla). As we have noted before the number of players threatening to bring new production to the market is very few indeed. The prospect thus is for investors to wake up one day that cobalt is a specialty metal that, at least due to the sheer size of its market, is niche but a very big niche.

A key takeaway from last year's PEA is that LOM Average Net Cash Cobalt Production Cost is projected at US\$4.94 per lb (net of gold, copper and magnesium credits), while current Cobalt prices are around \$10 per lb on the LME, giving a very healthy margin indeed.

Formation's project is the most advanced Cobalt project held by any junior we know of. Reactivating the works is a relatively simple task that just requires the conjunction of financing and the cobalt price coming to the party. From capex financing Formation would then have 13 months of construction and eight months of ramp up for production. Therefore from start to finish for full production would be 21 months. Ergo, Formation appears to be one of the best exposures to new production. It will also be an interesting test case of the profitability of primary cobalt producing mines.