'Substantially started' to unlock KSM

The world's largest precious metals resource take another step towards production

Paul Harris in Treaty Creek, British Columbia, Canada

Seabridge Gold's Elizabeth Miller shows the plant site at KSM in British Columbia, Canada (Photo: Paul Harris)

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A chill breeze blows from the Mitchell glacier over the yellow-orange oxidised footprint of the outcropping mineralised porphyry at Seabridge Gold's Mitchell deposit in northern British Columbia. The classic U-shaped valley scrapings of glaciation have defined the region, creating a warren of steep valleys that separate the Kerr, Sulphurets and Mitchell deposits that comprise Seabridge's KSM project and its adjacent Mitchell East and Iron cap deposits.

The setting could not be more dramatic for one of the largest undeveloped mineral endowments in the world, which gives Seabridge the largest reserves and resources per share, six- and eight-times higher than any leading gold producer, and copper resources and resources per share higher than any major copper producer.

KSM is a massive low-grade porphyry that hosts reserves of 47.3Moz of gold, 7.3Blb of copper and 160Moz of silver, giving it an initial 33-year mine life. The June 2022 prefeasibility study detailed a 195,000tpd operation to produce more than 1Mozpa of gold, 178Mlb of copper, 3Moz of silver and 4.2Mlb of molybdenum following a $6.4 billion initial capital investment. The company has also completed a preliminary economic assessment on the underground block cave potential at Kerr that adds 39 years of mine life with an average annual production of 366Mlb of copper, 368,000oz of gold, 1.8Moz of silver, and 400,000lb of molybdenum following a US$1.5 billion capital expenditure.

'Leverage' is a word that is repeated during the site visit, referring to the increase in the economic value of the deposits and rising gold and copper prices. Metals prices have increased from the $3.50/lb for copper and $1750/oz for gold used in the 2022 PFS, which means that at spot prices, the 3.7-year payback is reduced to three years and the 16.1% after-tax internal rate of return (IRR) is bumped up to 21%.

"Copper companies and gold companies run their base case at conservative prices, but their internal models run at higher prices than copper is today," Seabridge Resources' chair and chief executive Seabridge Rudi Fronk said.

However, the key to their future development is how management can leverage these resources and the other benefits of their location into a joint venture deal to help fund the estimated US$6.4 billion development cost. Even with its C$2.0 billion market capitalisation, a figure most gold developers can only dream of, the KSM development cost is beyond the company's capacity to finance and build alone. The development cost is also a lot of money at a time when mining company management teams continue to exhibit capital discipline and are cautious about tackling greenfield development projects. Seabridge's strategy in recent years has been to derisk the project by initiating key infrastructure projects and securing the environmental permits for the project's life.

Seabridge has spent about C$500 million since 2021 on early-site construction to show government officials that the project development is "substantially started", including roads, advancing the development of a switching station for connection to grid power, a bridge, the Glacier Creek Fish offset project, and other projects, in addition to continual engagement with government agencies. This has brought the total project spend to date to C$1 billion. The day following the site visit, Seabridge received this designation from the BC Government that affirms the validity of the BC Environmental Assessment Certificate for the life of KSM, removing a critical risk factor.

"This is a significant regulatory milestone for the KSM project, positioning it to become a multigenerational economic anchor for northwestern BC," Fronk said.

With a five-year development timeline, getting a head start on various work programs helps reduce development risk for the partner Seabridge is seeking. Advancing work on powerline projects was also key to ensuring Seabridge's 150MW power allotment from BC Hydro on the Northwest transmission line. The company has begun construction of the switching station, and work on the project will continue through 2025 and 2026. Seabridge is funding certain aspects of the work to be completed by BC Hydro. This year's work includes C$54 million paid to BC Hydro to advance the Treaty Creek substation and procure long-lead time items, which will ultimately tie into the powerline.

Funding for this work came from selling a 1.0% net smelter returns (NSR) royalty on all metals produced from KSM to Sprott Resource Streaming for US$150 million in 2023. Seabridge can reduce this to 0.5% within three years of declaring commercial production. In 2022, it also raised US$225 million from Sprott and Ontario Teachers' Pension Plan via a secured note to be exchanged for a silver royalty.

Substation site at Seabridge Gold's KSM in British Columbia, Canada (Photo: Paul Harris)

Partner potential

Securing a partner is key for the development of KSM, both to provide technical ability but mainly to share the US$6.4 billion capital development cost, as estimated in the 2022 prefeasibility study. Higher commodity prices, improved economics and the substantially started status temper the risk a five-year greenfield development represents.

Seabridge ideally wants to retain a 40-49% interest in KSM and has sought a development partner for many years, but market vicissitudes have repeatedly interposed. After it obtained its environment permit in 2014, the bottom fell out of the gold equities market in 2015, and potential partner companies became more inward-looking and were looking to sell assets to pay down their debt.

"In 2018, we advanced a fully negotiated deal with a major mining company that would finance through feasibility and into construction. Unfortunately, the bottom fell out of the copper market, and that company was not willing to execute what we negotiated, and they wanted changes to terms we would not accept," Fronk said. That company later came back and wanted to also bring another company in on a syndicate structure, but when COVID-19 hit in March 2020, that deal also collapsed as site due diligence became impossible and companies became inward-looking again.

Fronk believes now that the substantially started designation has been obtained, the joint venture deal with a North American listed company will follow four to six months later.

"The deal will happen once we are substantially started. RBC is running the JV process, and we have six companies at the table, including some of the world's largest gold and copper companies. For the first time, we have competitive tension going on in our process. The first company to offer terms that we will accept will get the deal," he said.

Seabridge's proposed JV structure features a two-phase earn-in: the first is to sole fund and complete feasibility to earn a minority interest, which could take up to two years and cost $150 million to complete. The feasibility would start the second phase of making a construction decision, securing at least 50% of the project capital, and sole funding another amount to earn a majority position.

Fronk gave an example of how the partner funding could work. For a $6 billion project development cost, the partner must secure at least 50%, some $3 billion. The partner would then sole fund another amount before Seabridge puts any money in, to obtain a majority position, perhaps $1.5 billion, leaving $1.5 billion in residual funding. If Seabridge has 40% of the project, it will have to fund 40% of the $1.5 billion, or $600 million.

"Under our proposed structure, our dollars will come in towards the end of construction when the project is about 70% built. I like our chances of raising that money at that time," Fronk said.

With copper smelters struggling to obtain supply, monetisation of the future KSM concentrate will likely figure in the financing plans for the KSM development via a copper offtake contract. Japanese companies have repeatedly shown their willingness to contribute up to 30% of copper project development costs to obtain long-term concentrate supplies, for example. A precious metals-rich concentrate will likely be even more attractive.

Fronk has ruled out doing a deal with a Chinese company, which could face opposition from the federal government as it pushes back on Chinese ownership of Canadian natural resource companies and assets.

"It will be a North American listed company," he told *Mining Journal*.

Fish habitat project at Seabridge Gold's KSM in British Columbia, Canada (Photo: Paul Harris)

Feasibility

For Seabridge, the feasibility will focus on what is permitted today, which is aimed at the quickest payback: development of the Mitchell East, Mitchell and Sulphurets deposits and the basis of the PFS.

However, the future partner will ultimately decide on the development path and corresponding feasibility.

"Some companies are experts at open pits, some at block caving. We want them to have input into steering the feasibility, so we will wait until we have a partner before starting that," VP of Environment and Social Responsibility Elizabeth Miller said during a site visit.

A company interested in having higher copper production earlier would likely bring the Iron Cap and Deep Kerr into production sooner. Seabridge is sizing project infrastructure to handle larger capacity and have development optionality.

"All five deposits could be mined as large open pits, which over time could allow for increasing throughout to produce a lot more copper than in the PFS, and thus we are ensuring our designs don't have bottlenecks," Fronk said.

The site visit shows that Seabridge, ever looking for a partner, has invested to undertake tasks to a high standard. The campsite is high-quality, and the company has collected almost two decades of environmental baseline information.

"We have an environmental baseline, hydrology, data from six weather stations, precipitation and snowfall data, solar radiation, wind, snow core surveys, snow depths, and glacier monitoring data. We have a lot of data with which to think about climate change and the highs and lows of weather events that could come, which means a lot of modelling and scenarios to make sure our designs take into consideration all possible scenarios," Miller said.

To further entice prospective partners, the company is looking at how it can advance work on the $800 million project to build 23km twin tunnels to transport ore from the Mitchell pit to the KSM plant site. Due to its five-year development time, this is the critical path item in the development. The PFS was based on drill and blasting the tunnel, but tunnel boring technology is improving all the time and continues to be evaluated.

"The twin tunnels will take $800 million to build, so we will not begin before we have a partner in place. We are looking at reducing the development time, such as using tunnel boring machines. We believe that our partner will want to continue the road construction to the tunnel location so we can get a quick start on the tunnel once the feasibility is done," Fronk said.

The KSM project received an additional boost in July, with the federal and British Columbia governments announcing a C$195 million funding package to upgrade key highway infrastructure in the region to support critical mineral development. Although the Golden Triangle is relatively remote in northern British Columbia, it is close to Highway 37 and the high-tension power line that runs along it, enabling Seabridge to tap into hydroelectric power. The road financing will directly benefit the main transit route north from Terrace to the mine site, enabling road upgrades such as creating passing areas, widening shoulders, creating pullouts for slow-moving vehicles, snow storage space, and increasing cell coverage and Wi-Fi access.

The Mitchell deposit at Seabridge Gold's KSM in British Columbia, Canada (Photo: Paul Harris)

Mitchell first

The PFS development scenario will see mine development start at Mitchell, the largest and highest-grade deposit. The Mitchell deposit is located near the Mitchell glacier but does not extend under the glacier. The deposit outcrops with green streaks of copper oxidisation are clearly visible on the valley walls. The meltwater from this area is naturally discoloured, contains metals and is acidic. When mining begins, diversion channels will be created so that the non-contact glacial runoff water is conducted around the mine without having to be treated.

A three-lane haulage road, 49.7m wide, will feature a single trolley lane for the 360t mine trucks to use trolley assist and benefit from the hydroelectric power supply to reduce costs and emissions. Initially, some 130,000tpd of ore will be crushed and loaded into 18 bottom discharge rail wagons with 1600t per trip to be moved by an autonomous electric train to the plant through the 23km tunnel. After processing, the final product, a concentrate, will be trucked 1.5 hours by road to the deepwater port at Stewart for export. Subsequently, the Sulphurets and Kerr deposits would be developed.

Downstream from Mitchell will be a waste rock facility that can store 2.3Bt of material. Upstream from the mine will be the tailings storage facility (TSF), with an upstream design and three storage areas. The north cell will store rougher tails, and the centre cell will be lined to hold the sulphide material that is potentially acid-generating and be topped with water to reduce the oxidation of any metals contained. British Columbia has experienced TSF failures, notably the 2014 failure at Mt Polley, which means they are a focal point for communities and regulators.

"Our independent review board, which went over the engineering for the TSF, has dam specialists that have built large-scale dams around the world with about 250 years of combined experience," Miller said. "We know it is going to be a certain lens that people are looking at, and rightly so."