



SEABRIDGE GOLD'S KSM Project Risk Analysis

November 2014

Seabridge Gold's KSM Project Risk Analysis

November 2014

Photo: Mike Fay

Overview

The Kerr-Sulphurets-Mitchell (KSM) mine project is a copper, gold, silver and molybdenum deposit in British Columbia proposed for development by Toronto-based Seabridge Gold (TSX:SEA) (NYSE:SA), a junior mining company which holds a 100% interest in it. The proposed mine would be 35 km (22 miles) from the international border, just upstream from Misty Fjords National Monument in Alaska. KSM is a massive project comprised of four deposits that would be mined as a combined open-pit and underground block-cave mine. The operation would be in two locations connected by twin 23-km (14 mile) long tunnels – extending under a glacier – which would transport miners and ore between the pits and the mill and tailings impoundment. It is expected to process between 120,000 to 180,000 tonnes of ore per day over a mine life of 55 years. Opposition to the project has increased, with some analysts comparing it to the proposed Pebble Project in southwest Alaska.¹



The proposed mine would be 35 km (22 miles) from the international border, and just upstream from Misty Fjords National Monument in Alaska.

1. UNFAVORABLE ECONOMICS

KSM's low grade, remote location and lack of infrastructure make its economics problematic according to analysts.² Although the company has been promoting KSM to the majors since 2006, no major mining firm has invested in the project. KSM requires substantial new infrastructure, bringing the project to its considerable 2012 pre-feasibility estimate of \$5.3-billion capex.³ Capital costs include a \$618 million tunnel system, \$309 million for the water treatment plants required for environmental mitigation, \$217 million to link the mine to power, \$112 million for two access roads, and \$46 million for avalanche control at the high-mountain mine.⁴ A number of mining analysts say there's a reason it's undeveloped.

“

...the mine doesn't really become economical until we see a gold price of greater than \$2,000 per ounce”

— Ben Kramer-Miller,
WallStCheatSheet

“...the KSM project needs higher gold prices to be economical to construct. If we are to value the mine on a discounted cash flow basis, then using a 10 percent discount rate, the mine doesn't really become economical until we see a gold price of greater than \$2,000 per ounce.” Ben Kramer-Miller, WallStCheatSheet, March 4, 2014.⁵

“The problem with this project is that it's not economic,” said Mickey Fulp, publisher of mercenarygeologist.com. Large though KSM might be, Fulp said the ore quality is low and the costs to build a mine are too high. “The idea they could raise \$5.3 billion is, in my opinion, ludicrous.”⁶

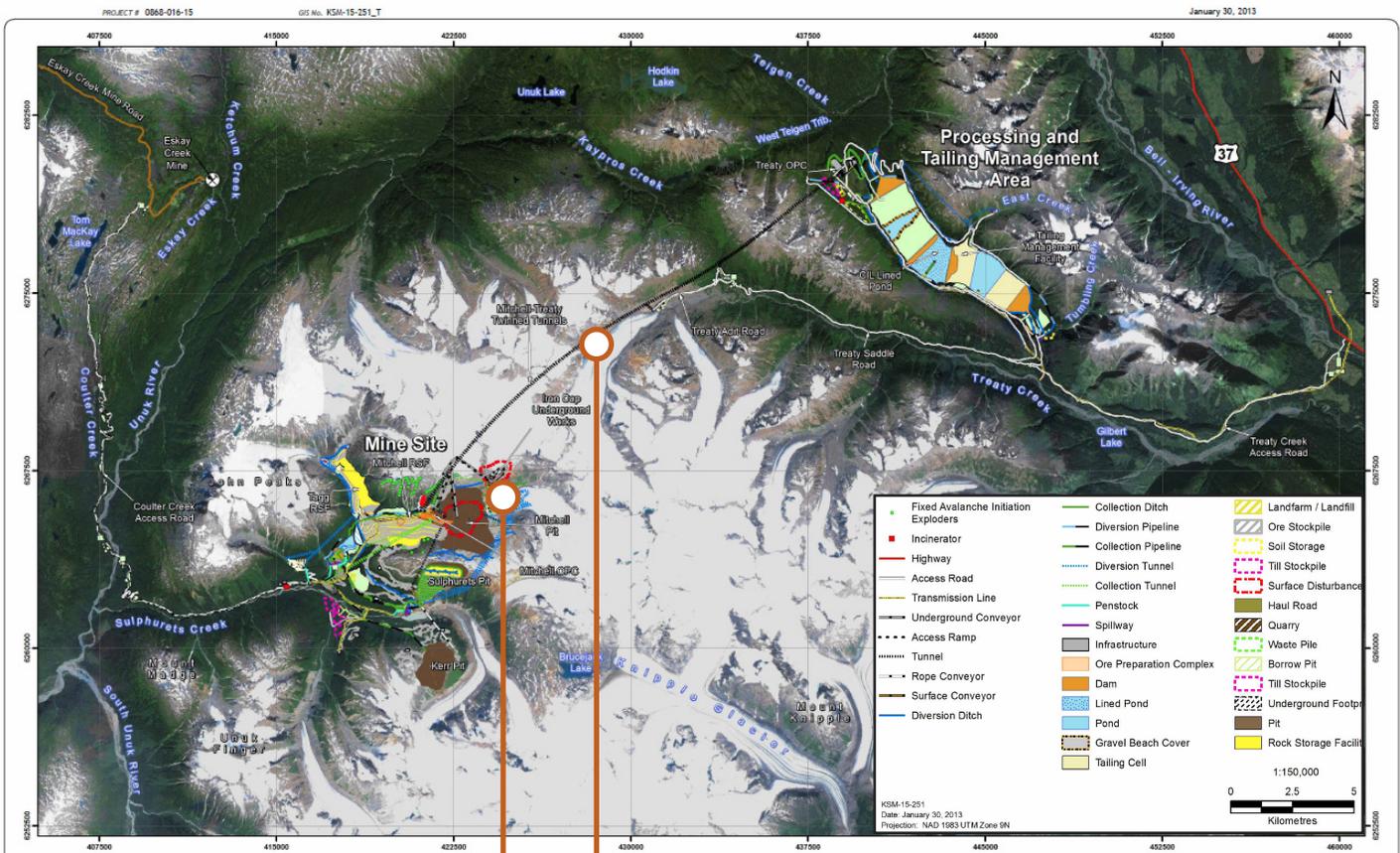
2. SUBGLACIAL MINING PRESENTS SIGNIFICANT OPERATIONAL CHALLENGES

The site is in a remote region of B.C. that currently can be reached only by helicopter. One of the deposits, the Iron Cap, is located beneath a glacier. Seabridge plans to use block-cave mining to access the deposit, creating a pit under a portion of the glacier.⁷ The pit will connect to the mill workings through twin 23-kilometre-long tunnels that will transport crushed ore, mine workers, electricity and fuel. Major risks include possible seismic activity impacting tunnel infrastructure and the potential to intercept water in these underground workings. Although subglacial mining has been proposed at several mines globally, it has rarely been put into operation. In the few places where it has been conducted (e.g., Kumtor, Svea Nord, Granduc), significant operational challenges have occurred, often resulting in significant increases in costs,⁸ production delays, safety issues and economic shortfalls.⁹ Major pit wall failures occurred at the Kumtor Mine in 2002 and 2006, attributed to seepage from subglacial melt-water.¹⁰ At the Svea Nord Mine, large volumes of glacial melt-water entered underground tunnels, causing the lower regions of the mine to flood and require costly pumping.¹¹ The Granduc Mine, the only subglacial mine operation in B.C., is used by Seabridge as an example that this plan can work. However, Granduc experienced an avalanche during tunnel drilling, resulting in the deaths of 26 miners.¹² And an avalanche killed a contracted surveyor at the KSM site in 2012.¹³



Photo: Mike Fay

Though subglacial mining has been proposed at several mines globally, it has rarely been put into operation.



Seabridge Gold Inc., Application for an Environmental Assessment Certificate/ Environmental Impact Statement, July 2013.

Sub-glacial twin tunnels will be required to transport crushed ore, mine workers, electricity and fuel from the mine site to the processing area.

The iron cap deposit is located under a glacier.

3. UNPRECEDENTED WATER MANAGEMENT

Seabridge proposes an untested water management strategy for an unprecedented volume of highly sulfuric water. The combined water management plans include the movement and treatment of up to 20.8 billion gallons of water per year.¹⁴ To the best of our knowledge, no other existing mining operation comes close to managing and treating this volume of water.

The largest open pit mine in North America, the Bingham Canyon (Kennecott) Mine, has the capacity to treat 2.7 billion gallons a year – about 1/8th the amount that KSM proposes to manage.¹⁵ The controversial Pebble Project, proposed for development in southwest Alaska, was estimated to generate 13 billion gallons a year.¹⁶ Yet the U.S. Environmental Protection Agency predicted that the Pebble Project wouldn't be able to manage that volume of water without considerable water quality impacts.¹⁷

4. LEGAL UNCERTAINTIES

The proposed Mitchell Treaty Tunnel, which is necessary to connect the mine site with the mill and tailings facility, passes through ground subject to mineral claims held by third parties.¹⁸ American Creek Resources asserts that Seabridge has not been granted access to construct the Mitchell Treaty Tunnel through the Treaty Creek property, of which it is a majority owner of the mineral claims.¹⁹ American Creek believes that Seabridge must first address the prior rights of the claimholders of the Treaty Creek property before construction can begin, and expects these terms to include provisions for condemnation drilling and independent, third-party pre-construction assessment of the mineral potential along the tunnel route as well as appropriate compensation to the mineral tenure owner.²⁰ Teuton Resources also asserts ownership rights to the mineral claims on the Treaty Creek property.²¹

The recent decision of the Supreme Court of Canada in *Tsilhqot'in v. BC* 2014 SCC 44 raises uncertainty about legal title to mineral rights in unceded areas, and the potential for increased requirements for consultation and consent from First Nations for large development projects like KSM.²²

Water Management

Comparison of the estimated maximum volume of water treatment per year.

KSM Mine
Proposed
20.8 billion gallons per year

Pebble
Proposed
13 billion gallons per year

Bingham Canyon Mine*
2.7 billion gallons per year

*Bingham Canyon is currently the largest operating open pit mine in North America



The largest open pit mine in North America, the Bingham Canyon (Kennecott) Mine, which is in a dry area of Utah, has the capacity to treat 2.7 billion gallons a year – about 1/8th the amount that KSM proposes to manage. Photo by EcoFlight.

5. POLITICAL OPPOSITION RAISES INTERNATIONAL PROFILE

KSM is opposed by eleven U.S. federally recognized tribes, and southeast Alaska's billion-dollar commercial fishing industry.²³ U.S. Senators Murkowski (AK-R), Begich (AK-D) and Rep. Young (AK-R) have raised serious concerns regarding KSM, asking the Secretary of State to conduct bilateral discussions with the Canadian government about the project.²⁴ In the aftermath of the Mount Polley tailings pond failure in B.C., U.S. Senator Begich, chairman of the Senate Commerce Committee on Oceans, Atmosphere, Fisheries and the Coast Guard, announced plans to hold a hearing on the transboundary mines to continue the discussion.²⁵ Tribal governments have also urged the State Department to request that the Canadian government elevate the mine project to a Panel Review.²⁶ Other downstream Alaskan stakeholders are calling for a referral to the International Joint Commission for a review under the Boundary Waters Treaty.²⁷

Disclaimer

While this document discusses financial issues, it does not provide specific recommendations for any particular situation or circumstances, and it should not be used as a basis for investment decisions. Such recommendations can only be provided by a qualified professional advisor. This document is for informational/educational purposes only. It is not a solicitation to buy or sell anything.



Photo: Bob Waldrop

KSM is opposed by eleven U.S. federally recognized tribes, and southeast Alaska's billion-dollar commercial fishing industry.

ENDNOTES

- 1 <http://www.mining.com/canada-mining-project-may-suffer-similar-faith-than-pebble-mine-63846/>
- 2 <http://wallstcheatsheet.com/business/heres-why-seabridge-gold-is-worth-considering.html?a=viewall#ixzz3Au7nLDxa>; <http://www.biv.com/article/20140610/BIV0108/306109984/-1/BIV/-53-billion-bc-gold-mine-faces-major-obstacles>
- 3 Tetra Tech Wardrop, Report to Seabridge Gold, 2012 KSM (Kerr-Sulphurets-Mitchell) Prefeasibility Study, June 2012.
- 4 Ibid.
- 5 <http://wallstcheatsheet.com/business/heres-why-seabridge-gold-is-worth-considering.html?a=viewall#ixzz3Au7nLDxa>
- 6 Business In Vancouver, "\$5.3 billion B.C. Gold mine faces major obstacles," June 10, 2014. Available at: <http://www.biv.com/article/20140610/BIV0108/306109984/-1/BIV/-53-billion-bc-gold-mine-faces-major-obstacles>
- 7 Seabridge Gold, "Application for an Environmental Assessment Certificate/Environmental Impact Statement for the KSM Project," Chapter 4, July 2013.
- 8 Schuler, T.V., et. al., "Assessing the future evolution of meltwater intrusions into a mine below Gruvefonna, Svalbard," *Annals of Glaciology*, Vol. 42, 2005.
- 9 Redmond, Dan, et. al., Technical Report on the Kumtor Gold Project Kyrgyz Republic for Centerra Gold Inc., March 22, 2011.
- 10 CEE Bankwatch Network, "Kumtor gold mine, Kyrgyzstan: Bringing risks to regional water systems," January 31, 2012.
- 11 Schuler, 2005.
- 12 <http://www.stewartbc.com/tunnel.htm>
- 13 Seabridge Gold, Press Release, "Seabridge Reports Contractor Fatality in Avalanche at KSM Project," October 24, 2012.
- 14 Seabridge Gold, "Application for an Environmental Assessment Certificate/Environmental Impact Statement for the KSM Project," Chapter 4, p. 4-154. July 2013.
- 15 Kennecott Utah Copper Environmental Restoration Group. April 2012. South Facilities Groundwater 2011 Remedial Progress Report. p. 2-3.
- 16 U.S. Environmental Protection Agency, An Assessment of Potential Mining Impacts on Salmon Ecosystems of Bristol Bay, Alaska, January 2014.
- 17 Ibid.
- 18 Seabridge Gold, "Application for an Environmental Assessment Certificate/Environmental Impact Statement for the KSM Project," Executive Summary, p. 2., July 2013.
- 19 <https://finance.yahoo.com/news/american-creek-resources-provides-corporate-130000362.html>
- 20 Ibid.
- 21 Teuton Resources Corp., Press Release: "Update Re Treaty Tunnels," October 6, 2014.
- 22 <http://business.financialpost.com/2014/07/21/supreme-courts-tsilhqotin-first-nation-land-title-ruling-boosts-uncertainty-in-canadas-natural-resource-sectors/>
- 23 United Tribal Transboundary Mining Work Group, Letter to Interior Secretary Sally Jewel, August 15, 2014.
- 24 Letter to Secretary of State John Kerry from U.S. Senator Murkowski, Senator Begich and Rep. Young, about KSM Project, April 2, 2014.
- 25 http://juneauempire.com/state/2014-08-20/sens-begich-murkowski-call-action-transboundary-mines#U_UZeKM4B0A
- 26 United Tribal Transboundary Mining Work Group, Letters to USDA, EPA and NOAA, August 15, 2014.
- 27 Organized Village of Kake, Resolution No. 2014-21: Protect transboundary rivers in the Alaska/British Columbia region by requesting the United States to implement the Boundary Waters Treaty through International Joint Commission (IJC) Involvement. September 18, 2014; City and Borough of Wrangell, Letter to U.S. Senator Murkowski, Senator Begich and Representative Young, September 22, 2014.



SALMON BEYOND BORDERS
DEFENDING OUR RIVERS, JOBS, AND WAY OF LIFE
www.salmonbeyondborders.org



EARTHWORKSTM
www.earthworksaction.org



Front and back cover photos by Mike Fay