Upper Kobuk Mineral Project (formerly "Ambler Prospect")

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LAST MODIFIED: 12TH AUGUST 2019
CREATED: JAN. 19, 2018



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Summary

The Upper Kobuk Mineral Project seeks to develop large and remote copper/zinc/gold/silver deposits in the northwestern Arctic. NovaCopper (http://www.novacopper.com/s/Home.asp) currently proposes to build a major open pit, truck-and-shovel mine at the prospect.

Exploration of the prospect has focused on two areas, the Bornite deposit and the Arctic deposit. NovaCopper's current proposed mine would target the Arctic deposit, which is a metal sulfide deposit containing an estimated 17 million tons of ore, composed of 4% copper, 6% zinc, 0.8 g/t gold and 60 g/t silver.

NovaGold Resources Inc (http://www.novagold.com/section.asp?pageid=3360) purchased the rights to the project in January 2010 (http://www.miningweekly.com/article/novagold-agrees-to-buy-ambler-project-in-alaska-2009-12-23) and in October 2011 reached an agreement (http://www.novagold.com/section.asp?pageid=19425) with NANA Regional Corporation for access to

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more deposits nearby. This agreement resulted in changing the name from the Ambler Prospect to the Upper Kobuk Mineral Project. This was followed by a split in NovaGold with this project now being managed by NovaCopper.

The project property now covers around 445,000 acres and is located 180 miles southeast of Red Dog Mine (/Issues/MetalsMining/RedDogMine.html) and about 140 miles east of Kotzebue. Exploration on this property was intermittent from 1965 to 1998 and then began in earnest in 2003. While no specific mining plans have been produced, the technical report (http://www.sedar.com/GetFile.do?lang=EN&docClass=24&issuerNo=00000880&fileName=/csfsprod/data87/filings/01230563/00000001/y%3A\NOVAGOLD\SEDAR\filed152\tech-ambler.pdf) prepared by NovaGold only considered an underground mine, partly as a way to mitigate the expected acid mine drainage (/Issues/MetalsMining/AcidMineDrainage.html) at the site.

A preliminary economic assessment released in April, 2011 estimated (http://www.novagold.com/section.asp?pageid=17526) total “payable metal production” over the life of the mine at 1.7 billion pounds of copper, 2.0 billion pounds of zinc, 291 million pounds of lead, 266,000 ounces of gold and 22 million ounces of silver. In 2013 a Preliminary Economic Assessment (https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CCA_IGwAQ&usg=AFQjCNHcss9G4CriPXaCGVr8zROiAMEbwg&bvm=bv.81177339,d.cGU) 29 MB was pubished.

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Electricity for the mine would likely come from diesel generation, possibly augmented by wind, although some hydro projects have been discussed (e.g. Kogoluktuk (/Issues/Renewable-Energy-in-Alaska/Kogoluktuk-Hydro.html)).

Ore vs. Waste Rock

The Arctic Deposit's Strip Ratios

Upper Kobuk's high stripping ratio (http://www.caseyresearch.com/resource-dictionary/definition/stripping-ratio) (nearly 9) means that ~9 tons of non-ore rock would be excavated for every ton of ore.

This is higher than typical. Most of Alaska's major mines have a strip ratio around 2. The proposed Donlin Creek (/Issues/MetalsMining/Donlin-Creek-gold-mine-prospect.html) prospect would have an estimated ratio of 5.5.

This high ratio is not necessarily a problem. The Upper Kobuk ore is very rich, and only the ore would be processed to extract metal. The waste rock would be stored in massive piles, less altered and therefore less able to produce harmful water contamination.

As such, an Upper Kobuk mine would require less energy and produce less harmful waste than an identical mine extracting the same amout of metal from a lower-grade ore with less waste rock.

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Problems could emerge if Upper Kobuk's waste rock begins producing acid drainage. Current plans suggest that, because of the huge volumes of waste rock in comparison to ore, the mine's tailings impoundment would not be engineered to contain the waste rock.

Upper Kobuk might produce the same amout of metal as a much larger, more expensive, and more environmentally damaging mine in low-grade ore. In this regard, it is similar to Red Dog.

Comparison to Red Dog

Upper Kobuk's Arctic deposit has been compared to the Red Dog (/Issues/MetalsMining/RedDogMine.html) deposit. Both are very rich ores, formed at the bottom of an ancient ocean when hot, mineral-rich brine ejected out of undersea "black smokers." (http://en.wikipedia.org/wiki/Hydrothermal_vent) As this hydrothermal fluid came in contact with cold ocean water, it cooled rapidly, and metal-bearing minerals rained out onto the seafloor, accumulating into thick deposits.

Based on current (2014) metal prices, the Red Dog and Arctic ores are similar in value - although Red Dog's value is dominated by zinc, and Arctic's value is dominated by copper.

Mining the Arctic deposit would require excavating and moving much more non-ore rock than Red Dog: about 9 tons of "waste rock" for every ton of ore, as opposed to less than 1 ton of waste rock for every ton of ore recovered at Red Dog. The large

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volumes of waste rock could present an environmental problem at the mine if they begin to generate acid drainage (/Issues/MetalsMining/AcidMineDrainage.html), as has occurred at Red Dog. Like Red Dog, Upper Kobuk tailings (and possibly waste rock drainage) would require perpetual (/Issues/OtherIssues/perpetual-waste-storage-perpetuity.html) storage and maintenance.

Both projects are in remote areas of western Alaska. Red Dog's ore is transported via an isolated road to the coast, where it is stored, transported to ore barges, and loaded offshore onto ships. The Upper-Kobuk area mine, in contrast, would export ore concentrate by road. Trucks would shuttle ore to the Dalton Highway, down the Mat-Su valley, and to the export terminal at Port Mackenzie.

Like Red Dog, an Upper Kobuk mine would create several hundred jobs, likely well-paying, in a remote area where employment is otherwise scarce. As currently envisioned, the mine is projected to have a 13-year life (12 years of production, 1 year of construction). After the ore is exhausted, other deposits might be mined in the area.

Road Access & Controversy

Development of this deposit is co-dependent (http://www.adn.com/article/20131107/ambler-mine-road-projects-dependent-each-other) with building an access road (the Ambler Mining District Access project (http://projects.dowl.com/projects/ambler/documents/summary_report_05_12.pdf) 15

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MB). The road has been a subject of some controversy, as it it would be state-funded and expensive to construct. The road would connect a remote part of western Alaska to the Dalton Highway, and hence the continental road system.

Estimates of road cost have varied widely. (http://www.npca.org/assets/pdf/AmblerFinancial_Facts.pdf) The Alaska Industrial Development & Export Authority (AIDEA) (http://www.aidea.org/), which is backing the project, estimates it will cost $190 to $300 million to build. The Alaska Department of Transportation estimates it will cost $400 million to build and $8.5 million per year to maintain. Based on the Tetra Tech & NovaCopper's 2013 economic analysis, the mine itself will pay a total of $214 to $371 million in state taxes and licensing over its lifetime, less than the total cost of the road if it is taxpayer funded. The economic assessment also only factored $117 million in payments for the road, suggesting the mine developer expects to pay AIDEA only a fraction of the road's cost.

AIDEA, a state-sponsored entity, has been promoting the road project. AIDEA has a mixed record, having backed multiple projects which have been financial successes, including the Red Dog Mine's Delong Mountain Transportation System (http://www.aidea.org/Portals/0/PDF%20Files/PFS_DMTS.pdf) (and likely its recent sale of the Endevour jack-up rig (http://www.akbizmag.com/Alaska-Business-Monthly/November-2014/AIDEA-to-Sell-Stake-in-Endeavour-Drilling-Rig/)). Other AIDEA projects have been major losses, including the Healy Clean Coal powerplant (/Issues/AlaskaCoal/AlaskaCoalPower.html) and the Alaska International Seafood processing plant. These projects

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are cited as 2 of the 6 big “Alaska boondoggles” (http://www.adn.com/article/dreaming-big-6-alaska-boondoggles) highlighted by the Anchorage Daily News in 2011. AIDEA is currently supporting numerous projects in the state, including the Skagway Ore Terminal, the Port Mackenzie fuel depot, and a proposal to the truck North Slope natural gas to Fairbanks.

Current Status

In April 2013 the company signed an agreement (http://www.novacopper.com/s/NewsReleases.asp?ReportID=582628) with the Alaska Industrial Development Export Authority (AIDEA) to examine the feasibility of a state-financed road to the area, the “Ambler Mining District Industrial Access Road”. In July 2013 AIDEA released (http://www.novacopper.com/s/NewsReleases.asp?ReportID=595394&_Type=News-Releases&_Title=NovaCopper-Announces-Positive-Preliminary-Economic-Assessment-for-the-Arcti...) a favorable preliminary economic assessment for the project, following a much less favorable state-commissioned report by McDowell, (http://www.mcdowellgroup.net/) an independent consultancy. In early December 2014, NovaCopper released a statement expressing concern (http://www.adn.com/article/20141218/mining-company-seeking-ambler-road-admits-substantial-doubt-its-financial-health) about their ability to obtain financing. This was followed by a halt by the state government on work related tothe proposed road and five other large infrastructure projects (http://gov.alaska.gov/Walker/press-room/full-press-release.html?pr=7050), citing budget concerns.

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Further Reading

> NovaGold website on the Ambler project (http://www.novagold.com/section.asp?pageid=3360)

> Northern Alaska Environmental Center page on Ambler project (http://northern.org/programs/clean-water-mines/hardrock-mines-in-interior-and-arctic-alaska/arctic-ambler-project)

> Technical Report on Resources, Ambler Project Arctic Deposit, Alaska (SEDAR website) (http://www.sedar.com/GetFile.do?lang=EN&docClass=24&issuerNo=00000880&fileName=/csfsprod/data87/filings/01230563/00000001/y%3A\NOVAGOLD\SEDAR\filed152\tech-ambler.pdf)

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