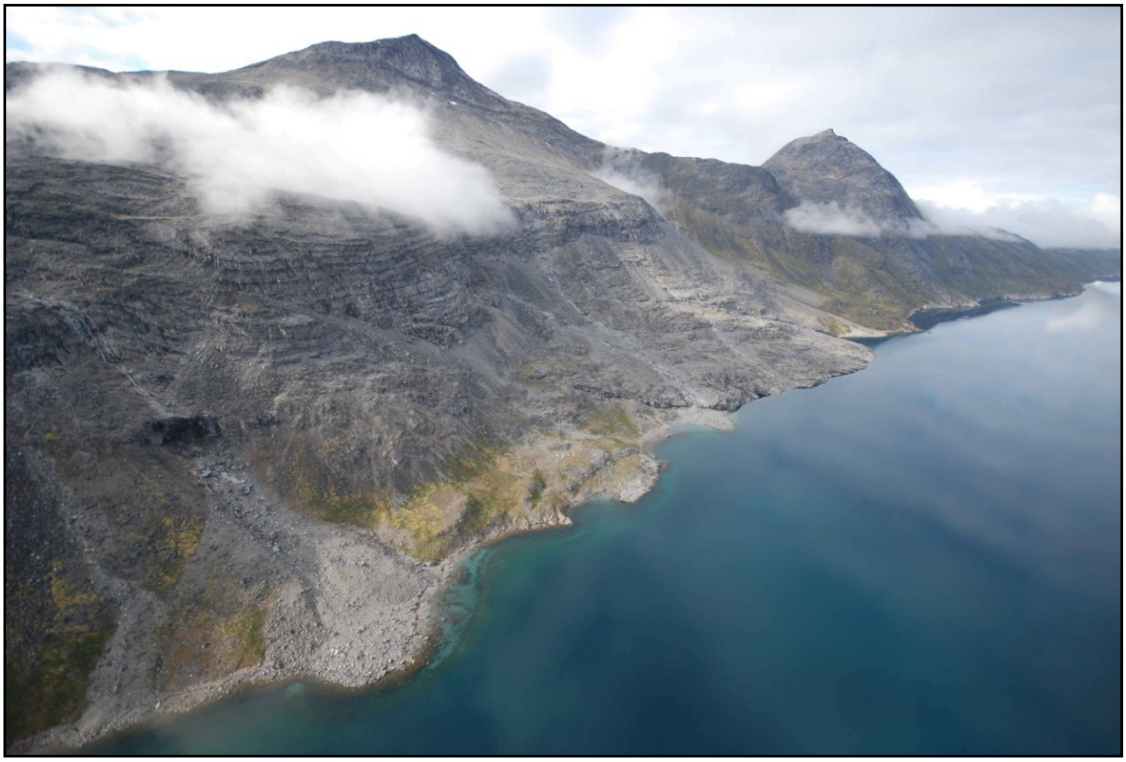
TANBREEZ

TANBREEZ MINING GREENLAND A/S

TANBREEZ PROJECT

ENVIRONMENTAL IMPACT ASSESSMENT

Non-Technical Resume and Conclusion



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1 NON TECHNICAL SUMMARY AND CONCLUSION

The TANBREEZ project will extract, process and export mineral concentrates containing Zirconium, Yttrium, Niobium, Hafnium, Tantalum and rare earth elements. The project is located at Killavaat Alannguat (Kringlerne) on the Kangerluarsuk Fjord in South Greenland. The site is about 20 km northeast of Qaqortoq and 12 km southwest of Narsaq. This Environmental Impact Assessment (EIA) assesses the environmental impact of development, operation and closure of the mining project, according to Greenlandic guidelines.

The TANBREEZ project will extract about 500,000 tons of ore per year from two open pit mines. The planned mine operation will have two phases: 1) a pit near the fjord will be excavated for the first five years (Fjord pit site), and 2) a pit on the hill at 450 m will be excavated for the last five years (Hill pit site). A processing facility near the shore will crush and magnetically separate the extracted minerals into mineral concentrates of eudialite and feldspar. About 300,000 tons of mineral concentrates will be shipped from a port facility for further processing outside Greenland. About 200,000 tons per year of tailings (fine material left from processing the ore) will be deposited as slurry in a natural tailings pond (Fostersø a small lake on Killavaat Alannguat at 470 m altitude). The tailings will be transported from the processing plant to Fostersø in a pipeline as slurry. Small amounts of waste rock (low grade rock that cannot be used for processing) will also be deposited in Fostersø.

The project also includes a diesel power plant, storage shed, worker accommodations and other facilities situated. All these facilities will be situated on the shore of the fjord. The area of the mine project will be about 2 x 5 km. A 1 km haul road will lead from the Fjord pit site to the process plant. A 5 km haul road will lead from the mine site on the Hill pit site.

The landscape at Killavaat Alannguat is characterized by relatively high and steep mountains and the long, narrow Kangerluarsuk Fjord. The port and most infrastructures will be located near the head of the fjord close to the outlet of Lakseelv, the largest river in the area. Outflow from the proposed tailings pond (Fostersø) will flow through Laksetværelv to Lakseelv. The ground is rich in minerals which lead to natural high levels of many metals in the soil, sediment and water.

Lakseelv has a large population of fish (Arctic char) while Laksetværelv and Fostersø are fishless. Killavaat Alannguat is almost devoid of vegetation above 50-100 m elevation while dwarf heath vegetation occurs along the shore of the fjord and lower parts of Lakseelv. Wildlife is limited to two terrestrial mammal species (a fox and a hare) and small numbers of marine mammals (seals and whales). The birdlife is limited to a few common and widespread species of South Greenland. No sea bird colonies are found along the fjord. A few species occurring in the study area are listed on the Greenland Red list of threatened species, most notably White-tailed eagle. However, no nesting sites of the eagle are known from the project area.

This EIA report assesses if the planned mine project will have a negative impact on the environment. The Greenlandic guidelines for EIAs require identification of potential pollution and disturbance impacts. A number of specific studies have been carried out to

assist the EIA process. These include studies of the tailings material and waste rock to determine if heavy metals would leach out if the materials are deposited in water. A study has tested if the tailings or waste rock could leach toxic substances. Another study has modelled the dispersal of airborne dust and emissions of particulate matter generated from the project. Staff from Nuuk Museum have surveyed the project area for cultural heritage sites and biologists have studied the flora and fauna. Other sources of information for the EIA process include previous studies in the area and studies from other mine projects in the Arctic.

Information about the planned mine project and the project area including its biodiversity and hydrology was compiled and all activities of the mine project that can potentially be a source of disturbance or pollution have been identified. For each potential impact the receptor and potential pathways have been identified.

The deposition of tailings and waste rock in Fostersø can potentially have an impact on the lake itself, Laksetværelv which drains Fostersø and Lakseelv downstream the point where it meets with Laksetværelv (and ultimately the fjord).

The majority of the large Arctic char in Lakseelv occur in the lower part of the river downstream the point where it meets with Laksetværelv. This is also the part of the river where most (if not all) of the Arctic char spend the winter. During summer large numbers of adult Arctic char migrate into the fjord.

A major concern regarding deposition of tailings and waste rock in Fostersø is the potential release of metals and other elements to the lake water. Such releases of contaminants, such as heavy metals, into the water of Fostersø can potentially have effects on the Arctic char population in Lakseelv and key prey organisms for these fish.

To assess to what extent metals and other elements can be released from tailings and waste rock deposited in Fostersø, a number of experiments and tests have been carried out. The tests showed that some metal leaching to the lake water will take place, however for most metals the leaching will result in concentrations below the Greenland Water Quality Guideline (GWQG) values.

Data on the metal leaching to the lake water was subsequently combined with a hydrological model of the Fostersø freshwater system to assess the potential release of metals from the tailings pond over time. The modeling showed that concentrations of metals in Fostersø will increase the first years but then reach a steady-state after about 5 years of operation. Except for lead the modeling predicts that the content of metals will be below GWQG values. The level of lead will after 5 years be elevated to 1.57µg/l and marginally exceeds the GWQG value of 1 µg/l. However, according to the BMP (2011) the GWQG value has to be met at one or more specified points downstream the mining operation not in Fostersø which as tailings and waste rock pond is part of the mining operation.

A realistic measuring point where the GWQG should be met is just below the point where the outflow of Fostersø blends with Lakseelv. During most of the year the outflow from Fostersø contributes to about 20% of the water in Lakseelv. The water from Fostersø will therefore be diluted in a short distance from the effluent point (the outlet of Laksetværelv) and the ambient water quality of Lakseelv will not exceed the GWQG.

During mid-winter (January-March) the flow of Lakseelv is much reduced. However, deposition of tailings and waste rock in Fostersø will take place all year and the addition of material to the lake will cause Laksetværelv to flow even during the coldest time of the year (as opposed to the present situation where the flow is very reduced or even stops between early January and late March). In this situation the share of inflow from Laksetværelv to Lakseelv will increase considerably.

This is unlikely to cause lead concentration in excess of the GWAQ value in Lakseelv during the first 3-5 years of mine operation because of the low lead concentrations in the lake water. To what extent the low water flow in Lakseelv during mid-winter will cause the concentration of lead to exceed the GWQG value after 3–5 years of operation is unknown. If a significant increase in the lead concentration is predicted in Lakseelv in mid-winter after 3-5 years of operation there are several ways of preventing the lead concentration to exceed the GWQG value.

One option is to build a dam across the outlet of Fostersø with a throttle valve to prevent outflow during periods of very low flow in Lakseelv. The excess water could then be released in spring when snow melting causes the flow of Lakseelv to be particularly high. Another option is to lower the water level in Fostersø in autumn by pumping water out of the lake into Laksetværelv. The lowering of the water level in the lake would then create room for waste material to be deposited without causing an outflow of water during periods of low flow in Lakseelv. The two options could also be combined.

Similar assessments have been carried out of the entire suite of potential impacts on play in connection with the TANBREEZ project. This includes changes to topography when a significant portion of the outcrop at Killavaat Alannguat is mined as well as the re-profiling of the landscape for infrastructure construction on land and along the shore of the fjord. It also includes the potential increase in dust and emissions generated by trucks and blasting and other project activities and climate change due to the fossil fuel combustion at the diesel power plant and vehicles. The potential disturbance and loss of habitat when for example vegetation is overlaid by buildings has been assessed for marine, freshwater and land animals and plants. Also pollution from other potential sources than tailings and waste has been assessed. This includes accidental release hazardous material such as oil and other hazardous waste.

The conclusion is that if the mitigating measures proposed in this EIA report are implemented and the mining activities are carried out in accordance to good environmental practice then the significance of the impacts on the environment will be low. No significant contamination by toxic materials or other pollutants is expected to take place. Dust dispersal will be small and local and will not contain toxic material. No key animals (such as White-tailed eagle and Arctic char) or rare plants are believed to decline or be displaced because of the mine project.