

White Paper

TANBREEZ Project

English version

Structure of the white paper:

A short description of the white paper, the content and its purpose

2. Hearing responses focusing on the environmental issues (EIA related topics)

3. Environmental related questions and answers (minutes) from public meetings

Contents

A short description of the white paper for the TANBREEZ Project - the content and its purpose.....	4
I. Hearing responses focusing on the environment (EIA)	6
No. 1. Ministry of Environment and Nature - Dept. for Nature, Energy and Climate	7
No. 2. Ministry of Environment and Nature - Environment Agency	13
No. 3. Greenpeace.....	15
No. 4. Ministry of Health and Infrastructure.....	31
No. 5. Jan Petersen	32
No. 6. Municipality of Kujalleq	33
No. 7. Greenland National Museum	36
No. 8. Ministry of Fisheries, Hunting and Agriculture.....	38
No. 9. WWF World Wildlife Fund	40
No. 10. DCE Danish Centre for Environment and Energy - and Greenland Institute of Natural Resources.....	63
No. 11. Kommuneqarfik Sermersooq	69
DCE/GN's comments on responses from Kommuneqarfik Sermersooq (KS)	82
No. 12. Monika Brune	85
No. 13. GEUS.....	87
No. 14. DTU Wind Energy	89
No. 15. KANUKOKA (VVM)	101
No. 16. Avataq.....	110

II. Environmental related questions and responses (minutes) from public meetings.....	118
No. A1. Questions and answers from public hearing meeting in Qaqortoq on 17 November 2013	119
No. B1. Questions and answers from public hearing meeting in Nanortalik on 18 November 2013	124
No. C1. Questions and answers from public hearing meeting in Alluitsup Paa on 18 November 2013	129
No. D1. Questions and answers from public hearing meeting in Narsaq on 19 November 2013	135

A short description of the white paper for the TANBREEZ Project - the content and its purpose

TANBREEZ Greenland Mining A/S (TANBREEZ) holds exploration license 2006/04 for exploration of minerals in a delineated area at Kringlerne in South Greenland. The exploration license has been extended for 2013 and an application for a further extension is being processed by MLSA.

On 4 September 2013, TANBREEZ submitted to MLSA (then BMP) an application for an exploitation license for the above-referenced delineated area. The application was supported by an EIA, an SIA and a FFS, all for the mechanical processing of ore at Kringlerne.

At the same time the hearing portal was opened and numerous questions, statements and comments have, since then, been submitted to the hearing portal. The deadline for comments and questions, which originally was 2 December 2013, was extended to 6 January 2014.

As part of the process, public hearing meetings were conducted in November 2013 in Qaqortoq, Alluitsup Paa, Nanortalik and Narsaq.

This white book contains all questions and statements from private citizens, NGOs and other institutions, which have been submitted to the hearing portal during the hearing period as well as minutes of the public hearing meetings conducted in South Greenland.

The white paper contains environmental related answers, comments and statements from TANBREEZ and Naalakkersuisut as well as specific references to where in the updated EIAreport these proposed changes are to be found.

The application process will continue and the content of the white book together with other input to the application will form part of the base material for preparation of the exploitation license, the IBA and the Article 19, 43 mining plant approval.

TANBREEZ and Naalakkersuisut wish to thank all citizens, NGOs and other institutions for having participated actively and enthusiastically in the public hearing process. This will give the project a solid foundation in the Greenlandic society.

I. Hearing responses focusing on the environment (EIA)

No. 1. Ministry of Environment and Nature - Dept. for Nature, Energy and Climate

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
1.1	The Nature-, Energy- and Climate department (NEKA) note that in the EIA report page 26 it is described that "It was considered to deposit the tailings in the fjord but this solution was abandoned because it would require very comprehensive and time consuming studies of the marine ecosystems of the fjord". Instead of depositing tailings in the fjord it is the intention to deposit the tailings in Fostersø which is connected to the fjord via the streams Laksetværelv and Lakseelv. NEKA would like to have it clarified how a deposition (in Fostersø) which is connected to the fjord via two streams is not expected to have any notably impact compared to a deposition in the fjord.	Deposition of tailings in natural lakes or fjords can potentially impact the aquatic ecosystems in two ways: (1) metals and other substances can be released from the tailings and impact the aquatic animals and plants, and (2) deposition of tailings at the bottom of lakes or fjords will overlay and exterminate the animals and plants associated with the benthic zone (sediment surface and some subsurface layers). Analyses and tests of the tailings material from the TANBREEZ mine show that the release of metals and other substances will be so low that it will have no negative impact of the flora and fauna of the rivers and fjord. However, the deposition of 250.000 tons of material annually in either Fostersø or the fjord will overlay and exterminate the flora and fauna in the benthic zone in a substantial area. The impact of this in Fostersø will be very small because there is no fish population and the flora and fauna at the lake bottom is very limited. Alt-	DCE/GN If required, DCE/GN will participate in the collection and analysis of water from Foster Lake, Laksetværelv and Lakseelv. If unwanted high concentrations are found, DCE/GN will take part in the evaluation of mitigation measures. By the way, we agree with TANBREEZ' answer here.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		hough detailed studies of the marine ecosystems in the fjord has not been carried out it must be expected that the depositions of large quantities of tailings will overlay the sea weed vegetation and benthic fauna in a substantial area and potentially also reduce the feeding opportunities for fish.		
1.2	In the EIA report page 56 it is described that arctic char (trout) spend the winter in the deepest parts of the river. It is also mentioned that the water flow (in the river) is very low. NEKA would like to have it quantified how much of the water from Fostersø contribute to the flow in Lakseelv as this is important in order to understand the lead-load the chars are exposed to.	During most of the year Laksetværelv contributes with c. 20% of the flow in Lakseelv but in cold winters the flow out of Fostersø and in Laksetværelv stops for a month or two. However the deposition of tailings in Fostersø would maintain an outflow even during cold spells. This could lead to a situation where the contribution from Laksetværelv makes up significantly more than 20% of the flow in Lakseelv. To avoid this, a dam with a sluice will be constructed at the outlet at Fostersø so that the outflow can be stopped during periods when the flow in Lakseelv is particularly low. This approach is described in more detail on page 80-81 of the EIA report.	DCE/GN DCE/GN agrees with TANBREEZ's answer.	None
1.3	NEKA is missing an assessment of the potential bioaccumulation of lead in the chars, as it is mentioned on page 77 (of the EIA)	The experiments and simulations that have been carried out as part of the EIA process clearly document that no heavy metals are	DCE/GN DCE/GN agrees with TANBREEZ's answer. Lead is not expected to	The utilizing the chars from Lakseelv by local people will be added

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	that it is well known that heavy metals can accumulate in arctic char. The eco-toxicological tests only assess the acute toxic properties to the chars. A buildup of heavy metals content in the fish will not necessarily lead to acute death but could have an impact on the health and value of the char stock as food, for example to people. NEKA note that utilizing the chars from Lakseelv is not mentioned in chapter 7 on local people and their use of the area.	expected in Lakseelv (or the fjord) in concentrations that can impact the fish populations. All heavy metals concentrations – including lead – will be well below the Greenlandic guideline values. It is therefore considered highly unlikely that any heavy metals such as lead should accumulate in the chars. It should be noted that systematic monitoring of the content of heavy metals in the chars (and many other animals and plants) will be part of a compulsory monitoring system that will be implemented during and after the mine operation. The monitoring will include analyses of the metal content in chars from Lakseelv and the results will be compared with levels from chars that were collected before the mine opened. Such reference specimens have already been collected from three different years and are deposited in a freezer at Danish Centre for Environment and Energy.	accumulate in chars when the lead concentration is below 1 µg/L in soft water. In hard water, lead has a lower tendency to bio accumulate in chars than in soft water. Even so, this will be thoroughly investigated as stated in the answer.	to chapter 7 on local people and their use of the area.
1.4	Regarding the geochemical analyses is says on page 77 (of the EIA) that the test are based on two representative samples. NEKA is missing similar analyses of a "worst case" sample to assess how	"Representative" means that the samples that were selected for analyzes include ore from a range of different geographical location. This means that the samples also	DCE/GN DCE/GN has reviewed the calculations of lead emission from waste to fresh water. Considering the few environmental issues shown	

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	big the release of heavy metals can potentially be.	demonstrate the range of potential metal release. It should be noted that samples of ore will be analyzed for solvable fluorine in accordance with a protocol agreed with the DCE. The results will be included in the final EIA report.	in these representative samples, DCE/GN see no reason to ask the mining company for further analyses of the "worst case" fraction. The worst case fraction is either Waste Rock2 or fine fraction. Both of these fractions are part of the compound sample that has been tested. Please note that the mining company in their analyses has crushed waste rock finely; in reality, it will not be crushed prior to depositing in Foster Lake. The analyses are thus conservative and have overestimated the future metal release into the lake (a sort of worst case). As already mentioned on several occasions, an analysis of soluble fluor is missing.	
1.5	The chapter on geochemical analyses describes a long-term study of the metal release from tailings suspended in water. The study lasted seven weeks. NEKA would like to know how a seven-week study can be considered a long term study. Perhaps this will also enlighten why the concentration of lead and other heavy metals is expected to increase in Fostersø for	The geochemical tests were designed and performed by the Swedish division of the consultancy firm Golder Associates using a Swedish laboratory. Golder (Sweden) has very large experience in long-term studies of metal release from tailings suspended in water through assignments for mine companies operating in northern Sweden. It is Golder's experience that a seven week study provides	DCE/GN Proper long-term studies are important when talking about potentially acid forming waste types which is not the case here. For good measure, the mining company should explain why they stopped studies after 7 weeks.	DCE/GN: In the EIA, the mining company should explain why studies were stopped after 7 weeks. TANBREEZ: The final EIA report will contain an explanation for the study period chosen.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	the first five years and then stabilize. Unfortunately it is not clear from the (EIA) report for how long the lead concentration in Fostersø will exceed the Greenlandic guideline value – and for how long the monitoring will have to continue. The report only states that monitoring will be carried out for three years after mine closure while the potential need for mitigating measures are not dealt with.	data that permits robust modelling of the long-term release of metals from tailings in water. It is important to note that metal is almost exclusively released from tailings material that is directly exposed to the lake water. Metals will therefore only be released from the top-layer of tailings on the lake bottom. Although the volume of water in the lake decreases as more and more tailings material is deposited the flow of clean water through the lake (from precipitation and springs) remains the same. In Fostersø it is calculated that a steady state where the content of metals are stable will be reached after five years. When the deposition of tailings stops at mine closure the concentration of metals will fall. Exactly when the concentration of lead will drop below the Greenland guideline values in Fostersø is difficult to predict, but probably in the order of 2-3 years. It is the Greenland authorities that decide for how long monitoring shall continue after mine closure and it is also the authorities that decide if mitigating measures should be imposed.		

No. 2. Ministry of Environment and Nature - Environment Agency

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
2.1	On page 28 in section 5.9 on Shipping it reads: "the ships that arrive to the (Tanbreez) port will typically use Heavy Fuel Oil (HFO)". The Department of Environment and Nature has on several occasions been informed by the Environmental department for Mineral Resources and the BMP that "in connection with activities related to mineral resources it will be a requirement that the amount of sulfur in fuel must not exceed 1.5 % - this will reduce the sulfur emissions from these activities". The Department of Environment and Nature recommends that if possible this is made a requirement for all mineral resource activities (mines, off-shore etc.) including supply vessels and ships that transport products. The Department of Environment and Nature also find it important that it is made compulsory that TANBREEZ Mining has oil spill response equipment on board all its transport ships that call in at the mine.	Comment is a matter for the Government of Greenland This is a matter for the Government of Greenland. Tanbreez Mining will comply with the requirements of the Greenlandic authorities.	DCE/GN See reply to section 20.7 and 20.8.	None
2.2	On page 28 in section 5.12 on Drinking water, it reads "Drinking	Although the desalination plant will be situated in the port area	DCE/GN	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	water will be sourced from a desalination plant that will be placed at the port". The Department of Environment and Nature recommends that it is documented that it is secure to collect water for the desalination plant close to the port.	the intake for the plant will be positioned some distance from the port to avoid any contamination of the water from activities at the port. Samples of drinking water will be analyzed regularly.	We believe that the mining company's reply is satisfactory.	
2.3	On page 30 in the section regarding "Combustible waste" it is explained that an incinerator will be constructed. The Department of Environment and Nature would like to know if the incinerator will be equipped with flue gas treatment, and if this is the case which flue gas treatment system?	The waste incinerator at the Tanbreez project will meet all requirements set by the Greenland authorities. If a flue gas treatment system is considered necessary to eliminate pollutants from the plant this requirement will also be met.	DCE/GN We believe that the mining company's reply is satisfactory.	None
2.4	In the same section it reads that the ashes will be deposited inside the mine area. Does that include fly ash and slags? What quantities of ashes are expected? Is this (deposition within the mine area) common practice in connection with mine projects? The Greenland municipalities are not allowed to deposit ash from incinerators (in Greenland) but must export it to for example Denmark (for deposition).	Tanbreez Mining will follow the requirements of the Greenlandic authorities. This includes exporting the fly ash and slags for depositing outside Greenland if this is considered necessary.	DCE/GN We believe that the mining company's reply is satisfactory.	None

No. 3. Greenpeace

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
3.1	Greenpeace appreciate that the Mineral Licence and Safety Authority extended the hearings process because of the late publication of the technical background reports. However it would have been better if the hearings process was extended by eight weeks – in particular because the extension coincided with the Christmas holyday and the complexity of the material. Greenpeace would like to underline that the organization is positive to mine project but that the present project unfortunately have a number of flaws and problems that should be solved before the project is approved. This is not just lagging information but also – and much more seriously – problems with the processes, discharge and in particular the deposition of tailings. If this is not changed/ improved Greenpeace cannot support the project as it will potentially impact the environment, nature and the local population. However, the negative impacts can be significantly reduced if the	No response is required	DCE/GN No comments.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
	Self Government tighten the requirements to Tanbreez Mining Greenland A/S.			
3.2	The hearings material shows that the Tanbreez (project) will mine 500,000 tons of ore annually (page 10). In spite of this has the owner of Rimbal Pty Ltd., Greg Barnes said that the production will increase to 1,500,000 tons of ore annually, and in 5-10 years to 3,000,000 tons. The Dust Dispersion Study (page 6) mention an annual production of 600,000 tons a year which would be a 20% exceed of the assessment in the EIA. It cannot be stressed enough that an increase of the production will lead to a similar increase in the impact on the environment and if not a limit of 500,000 tons of ore is set by the authorities the (EIA) process should start all over again and access a higher production level. Greenpeace is not necessarily against a higher production than 500,000 tons of ore per year but if this is the intension it should be assessed in the (EIA) material.	The present EIA concerns a production of 500,000 tons of ore per year and this is the production level the mine company will apply for permission to mine. If the mine company in the future wishes to increase the production this requires a new permission from the Greenland authorities. Before granting permission to increase the production it is common practice to have a new EIA prepared. The figure mentioned in the dust report is too large. The correct production figure is 500,000 tons.	DCE/GN DCE/GN is satisfied with the reply from Tanbreez. The application from Tanbreez is based on 10 years and an annual production of 500,000 tons.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
3.3	In addition, the hearings material mentions two production periods each of 5 years and a total production in 10 years. But Greg Barnes has previously said that there are minerals to thousands of years of production. Can it be confirmed that the mine life is limited to 10 years? If this is not the case should the production periods and potential impact on the environment be included (in the EIA). Alternatively should Tanbreez Mining Greenland A/S commit to a new application process after the first year.	The EIA assess a mine project that will run for 10 years. The mine company will similarly apply to the Greenland authorities for a 10 years exploitation license. If the Company at a later stage wishes to extend the exploitation license beyond 10 years it requires a new application. It is up to the Greenland authorities if this also requires preparation of a new EIA.	DCE/GN We believe that the mining company's reply is satisfactory.	None
3.4	Greenpeace wonders why the Greenland self-Government co-operates on such an important project as the development of Kringlerne with a company whose spokesperson has been sentenced for lying to the Australian authorities. Greenpeace acknowledges that sometimes you cannot choose between a large number of partners, but this should lead to tighter control with the information the company presents – this should also be seen on the background of the conflicting information regarding	In allegations of wrongdoings by Greg Barnes, all charges have been dismissed by Australian courts.	DCE/GN We trust you mean Australian courts?	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
	the production and mine life as described above.			
3.5	Tailings: Greenpeace strongly recommends that tailings are not deposited in Fostersø. The tailings will among other things contain large amounts of lead which are soluble in water and very health damaging. Tailings – and in particular with this content – should under no circumstances be deposited in a way that is harmful to the environment. Instead the Self-government must demand that the Tanbreez Mining Greenland A/S develop a long-term strategy regarding the handling and deposition of tailings so that the impact on the environment can be minimized.	The comprehensive studies carried out as part of the EIA clearly show that deposition of tailings will not pollute the surrounding environment. During mine operation and a few years after mine closure the level of lead in Fostersø will exceed the Greenland water quality limit, marginally. However, Fostersø is part of the mine. Outside the mine Greenland water quality limit will be met for all metals.	DCE/GN With reference to Greenpeace's strong recommendation that tailings be not deposited in Foster Lake, DCE/GN would like to strongly warn against a deposit which is NOT covered by water. This will lead to spreading of dust and uncontrolled leaching in rain and melt water.	None
3.6	From the (EIA) report it is very unclear how much of the tailings from Fostersø will end up in the riversystem and more information regarding the lead-pollution and its consequences are lacking. It is mentioned in the EIA-report (page 26) that deposition of tailings in the fjord was considered but that this was would require comprehensive and time consuming studies. In the hearings letter from the Department of Works, Raw materials and Works wonders how deposition of tailings in a lake that is connected to the fjord with two	The tailings material will be deposited at the bottom of Fostersø. No tailings material will enter rivers or the fjord. Deposition of tailings at the bottom of the fjord was considered as an alternative but this solution was not pursued due to the comprehensive studies that would be required by the authorities because little is known about the reaction of tailings material in salt water. Other alternatives are burying waste back in the mine hole but	DCE/GN DCE/GN finds that the suggested depositing of tailings in Foster Lake will be satisfactorily safe from an environmental point of view. DCE/GN does not have - or have not seen - any other suggestions for a more safe way of depositing tailings than that of Foster Lake. Studies, which are described in the EIA, show that the fjord will not be significantly affected by this depositing.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
	rivers will not impact the fjord. Greenpeace shares this point of view.	that would require considerable storage of waste before putting in a pit. Also, when mining, it takes much more volume to bury the same waste. An open air tailing dump was rejected because it would be exposed to wind and may increase the dust		
3.7	Table 9-6 shows that during the first 5 years the concentration of metals will increase but then stabilize. Greenpeace would like to know which specific information this assumption built on. Since tailings will make up a larger and larger part of the lake volume and reduce the depth of the lake it seems unlikely that the concentration will not keep increasing – except if a large part of the lead will be discharged with Lakseelv which would be a problem.	In many countries it is common practice to deposit tailings in natural lakes. This is for example the case in Northern Sweden where the team of experts from the company Golder (Sweden) is based that has carried out the tests and modelling of the metal concentrations in the Fostersø over time. The concentration of metals in Fostersø will reach a steady state after a number of years because; (1) the amount of metals that dissolve to the lake water remain constant because metals only dissolve from the top layer of tailings in direct contact with the lake water and (2) although the volume of water in the lake decreases as more and more tailings material is deposited the flow of clean water through the lake (from precipitation and springs) remains the same. This means that the dilution in the lake with	DCE/GN DCE has reviewed the calculations thoroughly and find that, after clarification of minor errors, there is full consistency between the calculations of the mining company and those of DCE. Studies show that 9.07 kg lead will be dissolved in Foster Lake annually. This will be diluted in 4.6 million cubic metres of water which run through the lake every year. See also replies to 25.2 and 25.3.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
		inflowing clean water is higher for every year. In Fostersø it is calculated that a steady state where the content of metals are stable will be reached after about five years. When the deposition of tailings stops at mine closure the concentration of metals will fall again and reach the natural background level in a few years.		
3.8	In spite of the general downplay of the effect of lead and the risk of discharge it appears that deposition of tailings in Fostersø will result in a significant excess of the Greenland water quality limit of 1 µg/l and that during periods the concentration will reach 1.57 µg/l. At the same time it is said that low flow in Lakseelv during mid-winter can cause the lead concentration to exceed the Greenland limit in the river (page 80).	The Greenland water quality limits apply to the Greenland environment – not to the mine area. Fostersø is part of the mine area. The EIA clearly states that the lead concentration in Lakseelv (and all other place outside the mine area) will not exceed the Greenland limits. During very cold periods when the flow in Lakseelv is particularly low the outflow from Fostersø will be stopped to avoid the lead concentration to exceed the 1 µg/l limit.	DCE/GN A revised study of the lead is slightly higher than 1.57 µg/L in the lake. DCE/GN recommends that the Greenlandic authorities determine where the instructive limit of 1 µg/will apply: We suggest Laksetværelv directly before it meets møder Lakseelv.	None
3.9	It is stated in the (EIA) report that "deposition of tailings and waste rock in Fostersø potentially can impact the lake, the outlet Laksetværelv, Lakseelv and finally the fjord (page 11 in the EIA report). This is unacceptable that no guarantees can be given that the deposition of tailings and waste rock	The quoted sentence from the EIA report is misunderstood. The sentence "deposition of tailings and waste rock in Fostersø potentially can impact the lake, the outlet Laksetværelv, Lakseelv and finally the fjord" identify one of several environmental issues to be ad-	DCE/GN DCE/GN agrees in the answer from Tanbreez, but we note that there is a risk that an increase of lead over 1 µg/L can occur in Laksetværelv.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
	will not have negative consequences for Fostersø, Laksetværelv and Lakseelv, and a solution must be found where tailings is not deposited in the lake.	dressed in the EIA. Other <u>potential</u> issues to assess are dust pollution and disturbance of wildlife. The conclusion is that deposition of tailings and waste rock in Fostersø will lead to no measurable impact on the water quality downstream of the lake (page 82).		
3.10	It is mentioned in the EIA report that studies of the impact of the critical substances in the tailings on trout and daphnia have been carried out. Unfortunately these studies do not cover other negative impact to these species. Studies of the impact of these substances on the reproduction of trout and daphnia must be available as well as on the impact on the size of fish and so on. Such studies should be included in the EIA, and if they don't exist, the BMP should consider asking Tanbreez to carry them out.	Tailings from the Tanbreez mine will consist of finely grounded rock where the saleable products have been extracted by magnetic separation. No chemicals will be used in the process. The material that is deposited in Fostersø is therefore identical to the surrounding rocks – except for the minerals that have been extracted. Because the tailings is finely grounded sand, metals and other elements that occur naturally can more readily dissolve in the lake water. To test if this could be harmful to fish and daphnia a number of eco-toxicological tests were carried out (and reported in the EIA). This is a standard precaution procedure for all mine projects in Greenland. These tests do not focus on "critical substances" but determine if the tailings material (unexpectedly) includes any substances that are	DCE/GN The mining company has carried out the required tests. The mining company's argument that tailings are not harmful because it consists of elements that occur naturally in the area is not correct. Fine grinding of the minerals may result in changed characteristics, i.e. in relation to solubility. Furthermore, minerals which are extracted from underlying layers may contain soluble elements, e.g. fluor, which are not found in the upper layers.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
		acute toxic to aquatic organisms (which it did not). So far, no specific tests of the contents of fluorine have been carried out because – due to the geology of the mine site – it was considered unlikely that solvable fluorine would occur. However, since the topic has been raised by DCE and others, TANBREEZ will carry out tests of a number of ore samples for solvable fluorine according to a protocol agreed with the DCE. The results will be presented in the final EIA report.		
3.11	Apparently the EIA report does not define if and how monitoring will be carried out in Fostersø, Lak-setværelv and Lakseelv. This should be clear from the EIA report. Greenpeace will therefore like to stress that the proposed depositing of tailings is unacceptable and a more sustainable, and long-term strategy for tailings handling must be developed.	According to the Greenlandic guideline an EIA for a mine project must include a draft monitoring plan. The draft monitoring plan for the TANBREEZ project is on page 102 – 110 in the EIA. The preliminary plan proposes weekly sampling of water from Fostersø, Lak-setværelv and Lakseelv and subsequent analyses for the metal content (page 109). The data will then be compared with baseline data that have already been collected and analyzed during three years. It should be noted that the final monitoring plan will be defined in cooperation with the Greenland authorities.	DCE/GN We believe that the mining company's reply is satisfactory.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
3.12	Wastewater: It is not clear (from the report) how waste water will be cleaned, what the water is expected to contain when discharged to the river system and how it can potentially impact the local environment. Green-peace recommends that this section is expanded and if the impact cannot be said to be very low (preferably zero-impact on the environment) Greenpeace would recommend that no dis-charge of waste water into the nature will take place and that the option for local storage is investigated.	A waste water treatment plant will be constructed in the port area that will fulfill the requirements of the Greenlandic authorities. The outlet will be into the fjord (not the river) and no im-pact on the marine environment is expected.	DCE/GN We believe that the mining company's reply is satisfactory. Greenpeace recommends that waste water is not discharged into nature; that the possibility of local storage should be investigated. DCE/GN wants to point out that the mining company does not intend to discharge uncleaned waste water.	None
3.13	Ballast water: Greenpeace support that ships that call in at the mine must comply with the convention on bal-last water in order to minimize the risk of introducing exotic invasive species.	Comment is noted	DCE/GN DCE/GN recommends that requirements of IMO Ballast Convention be met and expects this to be included in the authorities' permit when/if given, even if this convention may not have become effective at this time and even if it does not apply to Greenland. (Note: The convention will not become effective until 30 countries, representing 35% of world tonnage, have ratified it. At the moment, 30 countries have agreed; however, they do not represent the required tonnage. It is close, though. The convention does not	DCE/GN: It must be ensured that the Ballast Convention be met

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
			apply to Greenland, but even so and even if it has become effective, it should be mentioned that we want to meet the requirements here)	
3.14	Oil and chemical spills: The EIA report does not describe the local contingency plans in case of an oil or chemical spill. On several occasions the Greenlandic contingency plans for combating oil spills have proved very inadequate and there has been a serious problem with clean-ing up oil that is mixed with ice. The Navigational Safety Investigation-report shows that in addition of shipping wilt significant amounts of fuel there will be fuel tanks on land with a capacity of 1,150 m³. This is plenty of sources for a major oil spill. Greenpeace strongly recommends that The Mineral Licence and Safety Authority asks Tanbreez to develop their own contingency plans and that it is ensured that tested equipment is available is case of a spill. In addition everything should be done to avoid spills. The contingency plans should subsequently go through a hearings process before approval.	It is the Greenland authorities that define the requirements regarding equipment to cope with operational spills of oil and chemicals. This includes the development of an oil contingency plan, which is not part of the EIA, but has to be agreed between the authorities and the mine company before the mine opens. It should be noted that in the EIA report section 9.3.3. on Oil and chemical spill into fresh water and the fjord, page 83-85, include the following mitigating measures: (1) contingency plans for oil and chemical spills should be prepared including efficient combat readiness training; and (2) that properly dimensioned equipment to cope with operational spills from un-loading operations at the port area should be allocated.	DCE/GN DCE/GN agrees with Greenpeace that an efficient contingency plan must be drawn up to become effective in case of e.g. oil spills and chemical spills. DCE/GN recommends that the authorities ensures this.	DCE/GN: Ensure that efficient contingency plan and equipment are prepared and in place.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
3.15	Dust: It is not clear from the hearing documents what the dust that will be dis-persed from the mine con-sist of. It is mentioned that it includes harmful metals such as arsenic, lead and cadmium and that the standard will be exceeded within a 5 km zone daily (page 22 Dust Dispersion Report). In spite of the annual standard is not exceeded is it a problem with a daily excess when the dust contains health damaging components such as uranium, lead and arsenic.	The Dust Dispersion Study report states that dust falling on the land surface, fresh water and the fjord will be the same material as the surface it-self, and will not change the chemical composition of the surface or runoff. The report concludes that dust generation will increase ambient particulate matter concentrations close to mine activity and haul roads. EU limit values for ambient concentrations of inhalable particles (PM₁₀) apply to populated and publically accessible areas and not in industrial areas. The EU limit values have not been formally adopted in Greenland, but are used for comparison. The EU annual PM₁₀ limit value (40 µg/m³) will be exceeded only in a few small areas within the mining site itself. The EU short-term 24-hour PM₁₀ limit value (50 µg/m³), reflecting occasional adverse dispersion conditions, will be exceeded no more than 500 m from the active mine pit and haul roads.	DCE/GN DCE/GN finds the information in the EIA report satisfactory to the efect that the dust will consist of finely crushed ore with the same chemical composition as the ore itself. The duest does not consist of metals arsenic, lead or cadmium as stated by Greenpeace. However, the dust has been analysed for both these and other elements.	None
3.16	Mines that include uranium usually also have (evaporation) of radon, but this is not mentioned in the hearings material.	The ore at Tanbreez does not contain uranium above background levels. For this reason uranium or radon are not discussed in the EIA report.	DCE/GN DCE does not consider the radon issue essential as the uranium content of the ore is approx. 18	DCE/GN recommends that the mining company mention the uranium/radon issue in the EIA report.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
			g/ton; however, this should have been mentioned in the EIA report.	TANBREEZ: The final version of the EIA report will briefly mention the content of uranium/radon in the mining area.
3.17	Although dust limits are not exceeded in town in the neighborhood, Narsaq and Qaqortoq there will be an increase in the dust levels compared to the natural (background) concentrations. The natural background concentration is 2 µg/m ³ in the region and dust from the mine will increase this by 0.85 µg/m ³ in Narsaq og 0.18 µg/m ³ in Qaqortoq. It should be studied how this can be minimised and to what extent the dust is potential harmful.	The natural background concentration in the region is 2 µg/m³ which is very low indeed. Dust from the mine will contribute with 0.18 – 0.85 µg/m³ in Qaqortoq and Narsaq respectively. This is a very small contribution and typical below the detection limit of about 1 µg/m³ for PM₁₀ monitoring. As mentioned above the dust consists of the rocks in the mine area and will not change the chemical composition of the surface or run-off.	DCE/GN We have noticed that the concentrations mentioned by the mining company are far below the EU threshold value which is 50 µ/m³	None
3.18	It is not clear from the hearing material what will be required in terms of filters on ships. Emissions from the consumption of fossil fuels by ships can have a negative impact on the local environment. The Mineral Licence and Safety Authority should therefore secure that the highest possible requirements are demanded as far as filters on ships are concerned. On page 84 of the EIA report it is said that ships that call on the (mine)	It is the Greenlandic authorities that define the requirements for fuels and filters for ships. The Company understands that the Greenland authorities will require that ships that enter the fjords must use light fuels only (not HFO). Tanbreez mining will make sure that all ships that call on the mine port comply with requirements.	DCE/GN DCE/GN finds the reply from Tanbreez satisfactory; please also see the reply to section 20.7.	TANBREEZ: The text on page 28 will be corrected. DCE/GN: Greenpeace requests that the Ballast Convention be complied with. DCE agrees and expected this to be reflected in a potential permit.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
	port will bring fuel for own consumption and that the Greenland authorities will forbid the use of heavy fuel oil. This contradicts with the text on page 28 where it is stated that ships that call on the mine port will use heavy fuel oil. Greenpeace assumes that this is an error and that heavy fuel oil will not be used.	It is an error that the EIA on page 28 claim that ships that call on the mine port will use heavy fuel oil.		
3.19	Safety in connection with shipping is paramount to avoid oil spills in the fragile arctic environment and for the safety of the ship crew. In this area significant improvements can be made in terms of safety. The Navigational Safety Investigation-report (p. 28) and the accompanying ice-report (annex D) explain that in a 3-5 month the ice conditions make shipping risky and unsafe. On this background Greenpeace suggests that the period with no shipping to the mine port is extended from the suggest 3 months (page 28 in the Navigational Safety Investigation report) to 5 months and then follow the proposal in the ice report. In addition, it is states that Tanbreez Mining Greenland A/S will use ships of ice-class PC6 and 7 during the early and late shipping season. Greenpeace suggest that	It is the Greenlandic author-ities that define the re-quirements for shipping to the mine port. The Company will follow these re-quirements including make sure that the ice-class requirements are met for all ships that enter the mine port. Most years little or no sea ice occurs where the proposed mine port will be located. Ice issues are mainly associated with the "Storis" sea ice which some years block the entrance of the fjord in South Greenland in spring and make it impossible for ships to entering the ports in Qaqortoq, Narsaq and other towns. Shipping to the mine port will be schedules to avoid this period in March-April.	DCE/GN This is outside DCE/GN's eksper-tise; however, it is important in relation to safety and the environ-ment.	

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
	the requirement are extended so that ice class ships are use all years and that the demand is up-graded to at least PC 5, since ship-ping will take place in spring and during periods with possible multi-years ice.			
3.20	Fluorine: It is not clear from the EIA material how high the contents of fluoride are in the fluoride containing minerals in the mine. Greenpeace notes DCE's comment regarding potential material that contains fluoride and supports that the Self-government asks Tan-breez Mining Greenland A/S to re-port what happens with the fluo-ride in the ore and waste rock.	Fluorine within the Ilimaussaq Complex occurs mostly as villemite or sodium fluorite (NaF) and fluorite or calcium fluorite (CaF₂). Villemite is highly soluble in water while calcium fluoride is virtually insoluble in water. Thus villemite can produce fluorine rapidly into the ground water while fluorite cannot. At Ilimaussaq villemite when it dissolves from a rock it leaves a characteristic hole which is often cubic in shape, thus on the sur-face the presence of villemite can be inferred from the holes often cubic in shape. No villemite or holes after villemite have been detected south of the fjord and certainly never on the TAN-BREEZ projects ground. Geology shows, the villemite is re-stricted to the hypo agpaitic rocks which again only are known to oc-	DCE/GN <i>Greenpeace states that the EIA re-port is inadequate with regard to fluorine. DCE/EN agrees.</i>	A text on fluorine will be added to the EIA report. DCE/GN recommends that the tailings and waste rock are ana-lysed for soluble fluor.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
		cur north of the fjord (off these licenses) where they formed as a last stage differentiate. Thus, there is no chance geologically, chemically or physically for any villemite to contribute to any fluorine pollution to the water. See also answer 20.2 for a more comprehensive account on the subject. To document that the ore does not contain solvable fluorine TANBREEZ will test a number of ore samples in accordance with a protocol agreed with the DCE. The results will be included in the final EIA report.		
3.21	White-tailed eagle: It is mentioned in the EIA report that red-listed White-tailed eagles breed in the area. However, in another section of the report it reads the opposite. Greenpeace would like to have it made clear if eagles breed in the area and to what extent the mine will disturb them.	The potential disturbance of White-eagles is assessed in section 9.4.1 page 86-87. Here it is explained that eagles are regular visitors to Killavaat Alannguat but that no nesting sites are known from the proposed mine area. The disturbance impact is assessed as low.	DCE/GN Greenpeace asks whether the white-tailed eagles will be disturbed and state that there is contradictory information in the report. The EIA report should be corrected so that the information on the eagles is clear. (In general, the white-tailed eagle is found all over southern Greenland including the project area. The project might disturb breeding eagles and drive them away from the are; however, there is no indication that they breed anywhere near	DCE/GN: Correct the error on eagles in the EIA report TANBREEZ: The text on eagles in the planned mining area will be made more clear.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
			the project area, and the risk is therefore small.	
3.22	Mine projects: According to the EIA report experiences from other mine projects in the arctic have been taken into account but not which ones. Explains please.	The team behind the EIA report has drawn on experience from mine project in a number of arctic settings. This includes mines in Canada but also in Greenland (such as the proposed Isua Iron ore mine). The team has been directly involved in the preparation of the EIA for this large mine project. The team from Golder Associates in Luleå, Sweden that has been responsible for the geochemical testing has ample experience with mine projects in Northern Sweden as well as a number of mine projects in Greenland.	DCE/GN No comments.	None
3.23	Energy: The EIA report does not outline the expansion of the Qorlortorsuaq-(hydro power) plant as an option to a diesel power plant. The consultation responses by Department of works, Raw Material and Works and Nukiassiorfiits supports that such a solution should be followed. Green-peace recommends that such a study is carried out as such a solution is preferable if it is possible.	The expansion of the Qorlortorsuaq hydro power plant is a matter for the Greenland authorities. The Company is prepared to use hydropower if it becomes available at a competitive price. (See also Memo in reply to section 10, Nukissiorfiit's hearing response). TANBREEZ will continue to investigate hydropower opportunities.	DCE/GN Greenpeace wants the mining company to investigate the possibilities of using hydropower instead of diesel. DCE agrees. See reply to 25.1.	DCE/GN: Tanbreez should continue the work towards use of hydropower.

No. 4. Ministry of Health and Infrastructure

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
4.1	Department of Health and Infrastructure thanks for the opportunity to comment on the Environmental Impact assessment (EIA) for the Tanbreez project. The Health department has noted that it is expected that ash from the insinuator will be deposited in the mine area. Due to environmental considerations this ash – which content is unknown – should not be deposited outside a deposition site approved by the authorities.	Comment is noted	DCE/GN DCE/GN agrees with the Ministry.	The text of the EIA will be amended so that it is clear that the ash will be deposited at a site approved by the authorities

No. 5. Jan Petersen

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
6.1	The annual production is expected to be 500,000 tons of ore annually. Before the magnetic separation 50,000 tons of tailings (waste rock) is separated. Which technology is use to do this?	The material which cannot be used in the production because it has too low grade is called waste rock (not tailings). In connection with the Tanbreez mine site the waste rock is mainly positions on top of the ore. This material is scraped away and loaded to dumpers.	DCE/GN No comments.	None

No. 6. Municipality of Kujalleq

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
6.1	The main report starts with a description of the project and gives a good overview of the elements and design of the project. The non-technical summary of the Tanbreez report appears easy to read and gives a good picture of the potential environmental impacts.	No response is required	DCE/GN No comments.	None
6.2	Deposition of tailings In the EIA report the company only focuses on a tailings deposit in Fostersø. Alternatives such as deposition on land (dry depositing) is not sufficiently described and studied. At the public meeting it is mentioned that the mine will be active for many years, but no alternatives to tailings deposition is described when Fostersø is filled up with tailings.	Deposition of tailings on land is not possible because the tailings material is fine powder that will be spread over a large area by the wind. Other alternatives such as deposition in the fjord have been considered, but the deposition in Fostersø was considered the most environmental safe solution by the Greenland authorities and their advisors. It should be noted that will the planned production deposition of tailings in Fostersø can take place during at least 30 years.	DCE/GN DCE/GN evaluate that dry depositing is a very poor solution due to the risk of dust spreading, unstable depositing and uncontrolled percolation of rain water.	None
6.3	Table 9-6 shows that the concentration of metals will increase from year 1 to year 5, but then no further increase of the pollution will take place. From a logical point of view this appears unlikely and it	The concentration of metals in Fostersø will reach a steady state after a number of years because; (1) the amount of metals that dissolve in the lake water remain	DCE/GN DCE/GN finds that the reply from Tanbreez is satisfactory. See also our reply after section pkt. 22.10 to Kommuneqarfik Sermersooq.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	must be explained and how this can happen.	constant since metals only dissolve from the top layer of tailings in direct contact with the lake water and (2) the annual inflow of water to the lake (from rain, snow and streams) remains the same.		
6.4	Dust: The municipality believes that dust from the mine is of no special concern. This is because the dust will fall in uninhabited areas with no sheep farming.	No response is required		None
6.5	Waste management Page 30. The municipality finds it strange that reference is made to the waste management plan of Kommuneqarfik Sermersooqs when the project is in Kommune Kujalleq. If this is correct an explanation for this chose should be given. Kommune Kujalleq must be involved in the planning of waste management. New waste regulations which build on the ones in Sermersooqs are currently in the hearing process.	The reference to the waste management plan for Kommuneqarfik Sermersooqs is an mistake. The waste management plan in the EIA report is preliminary only. The final plan will be developed in co-operation with the Greenland authorities, including Kommune Kujalleq.	DCE/GN No comments. The reply from Tanbreez is satisfactory.	The text will be corrected.
6.6	Finally it should be noted that the closure plan is preliminary only. The municipality expects that a final and approved closure plan is prepared before the mine is build.	Development of the final closure plan is part of the approval process and the construction of the mine cannot start before all approval has been granted. The final closure plan will be developed in	DCE/GN No comments.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	The municipality should take part in the preparation of the final plan.	cooperation with all relevant Greenland authorities, including Kommune Kujalleq.		

No. 7. Greenland National Museum

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
7.1	Nunatta Katersugaasivia Al-lagaateqarfialu/Greenland National Museum & Archives (NKA) has noted the coverage of archeological issues in the Environmental Impact Assessment report prepared for the TANBREEZ project in connection with the planned REE/feldspar mine project at Killavaat Alannguat and refers to the report "Kangerluarsuk 2007 - Archaeological Survey" prepared by NKA which describes the cultural history/archeology of the area. In the (EIA) report it is stated that: "before any construction works are initiated it is a requirement of the Greenland authorities that staff of the Greenland Museum and Archives must first photograph and survey the archeological site" (page 99). NKA would like to clarify that documentation of archeological sites which are protected according to Greenlandic legislation can be done using a number of different methods. If the (mine) project is initiated NKA can and will require	Comment is noted Please note that the EIA was not prepared <u>by</u> TANBREEZ but <u>on behalf of</u> TANBREEZ.	DCE/GN No comments.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA/SIA
	further documentation of the specific site, for example by carrying out test excavations and measurements using DGPA-equipment. NKA looks forward to a continued dialog with Tanbreez regarding this.			

No. 8. Ministry of Fisheries, Hunting and Agriculture

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
8.1	The Department for Fishery, Hunting and Farming has assessed the EIA report for the Tanbreez project which is part of the permission process to start at a mine at Kringlerne. The Department hasn't got the competence to determine if the conclusions in the EIA report are correct regarding the pollution and impact on the fauna on land, in rivers and the marine fauna.	No response is required		None
8.2	Farming issues: The mine area is zoned as pasture, which is little used. The Department assumes that dust from the mine will have no impact on farming in the area.	The dust modelling study concludes that the dust will fall in a small area close to the mine and will not affect farming.		None
8.3	Wild terrestrial animals and birds: Disturbance of wild terrestrial animals and birds will be within the acceptable from the description of the (planned) activities.	Comment is noted		None
8.4	Fish and marine mammals: The Department notes the plan for deposition (of tailings) and the assessment of the pollutions of rivers. Without have the competences to assess the pollution and	The Greenland authorities already have limits for the discharge of heavy metals that will be met by the mine company. The EIA report presents results of tests and calculations that predict	DCE/GN DCE/GN finds that data on catches is relevant and that the mining company should include this in the EIA or SIA reports, replacing	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	the impact the Department would like to encourage (the authorities) to impose limits for the discharge of heavy metals that are robust for trout and the marine fauna. GFLK (the Department) has recorded the following catches of fish from the fjords of the mine area (area GS048 and GS049). The volume of fish is in kilos. (see Table in the other volume)	the discharge of heavy metals to Lakseelv and the fjord which are below the Greenland limits. A monitoring program will regularly (weekly) measure the actual concentrations of metals in rivers and the fjord. The information is noted Please also see comments to question 11.3.	codes with comprehensible information. APNN assumes that the spreading of dust will not inconvenience farming interests. DCE agrees. APNN comments on the planned depositing of tailings in Foster Lake. DCE/GN recommends that the mining company be instructed to meet the guiding threshold limits for discharge of heavy metals.	

No. 9. WWF World Wildlife Fund

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
9.1	Our primary concerns with the project are as follows: ☐ Deposition of tailings in Fostersø will result in increased concentrations of lead in the lake and the streams that run from the lake into the fjord. According to the EIA lead concentrations will reach 1,57 µg/l (above Greenland Water Quality Guidelines). WWF is concerned that lead levels will be beyond the modeled values after years of operation. WWF suggest that alternative depositions be considered. ☐ The potential risk of fluorine pollution is not covered in the EIA report. We recommend that a report focused on fluorine be shared with the public. ☐ Dust from the mining operations will have concentrations of lead too (up to 993 ppm). The dust will influence the towns of Narsaq and Qaqortoq as discussed in the Dust Dispersion Study, but this information is not discussed in the EIA report.	This is a summary of WWF main concerns. Each of the issues is repeated in in more detail below with accompanying answers from the Company.		None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	□ The mining activities could be powered by renewable energy from the Qorlortorsuaq hydro-power plant. WWF hopes that the dialogue between Tanbreez Mining Greenland A/S, Greenland Government and Nukissiorfiit on how the environmental footprint of the project can be reduced will continue			
9.2	Section 5 / Project description WWF Verdensnaturfonden acknowledges that efforts have been made to meet the Best Available Technique (BAT) principle for choices in machinery, processing technology and handling of waste.	Comment is noted		None
9.3	5.1 The EIA report is based on a project design that does not include a chemical separation plant. If the company decides to apply for a chemical separation plant in Greenland WWF Verdensnaturfonden recommend that a new EIA report is prepared for public consultation prior to licensing.	This is a matter for the Government of Greenland.	DCE/GN If the project is changed, e.g. if the chemical separation plant is to be built, a new EIA report will no doubt be required.	None
9.4	5.3. From the Danish version of the EIA it is stated that: 'Arfvedsonit kan ikke sælges og deponeres i stedet i Fostersø som tailings' (page 27/114). This sentence is	This is a mistake which will be corrected.	DCE/GN OK.	The sentence: 'Arfvedsonite cannot be sold and will be deposited in Fostersø as tailings' will be added to the English version on page 27.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	not included in the English version of the EIA.			
9.5	We recommend that it be checked if arfvedsonite can be used locally for construction or other purposes as mentioned in Tanbreez Greenland Day presentation, 4 December 2012. WWF Verdensnaturfonden understands that there are ways of utilizing minerals from tailings, and reducing what is left for deposits near the mine. We are familiar with the REE gain project, supported by the Danish Agency for Science, Technology and Innovation and presented in brief at the ARTEK 2013 event on sustainable mining. This study is not mentioned in the EIA. Our understanding is that new methods for extracting lithium from a fraction containing arfvedsonite are being developed. From what we understand the process when combined with the ongoing extraction process could yield a scenario of which potentially 4 megatons, corresponding to 10 pct., of the Worlds know natural lithium reserves, are utilized. Utilization of	With the present technology it is not economically feasible to extract metals from arfvedsonite. However TAN-BREEZ Mining continues to pursuit ways to utilize tailings.	DCE/GN There is no doubt that the mining company will have to prepare an environmental assessment/EIA on the use of arfvedsonite if this becomes reality.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	the tailings of the mining operation can have both large economic and environmental benefits.			
9.6	5.4 The mine will produce approx. 200.000 tons of tailings per annum. The mineral composition of these tailings must be studied and the lake must be monitored to make sure that lead and other pollutants are not spread into the environments linked to the lake.	The mineral composition of tailings has been studied carefully and the results are reported in the technical annexes to the EIA report. An environmental monitoring program is outlined in the EIA which include regular analyses of the content of metals in the lake water.	DCE/GN DCE/GN agrees with both WWF and Tanbreez.	None
9.7	5.9 Large bulk carriers and tankers will call on the harbor at the mining site to bring supplies, fuel and to carry minerals from the mine to foreign markets. The EIA does not establish if these carriers will use heavy fuel oil (HFO) or lighter fuels. WWF Verdensnaturfonden recommends that the use of HFO in all phases of the project is restricted to a minimum. The consequences and hazards of an oil spill depend, among others, largely on the properties of the specific oil. When discharged into water, the weathering processes such as evaporation, dissolving, dispersion and water uptake/emulsification will start. The lighter components evaporate and	Oil regulations are controlled by the Greenland Government regulation and will be followed by the company. The Greenland Mineral Licence and Safety Authority (MLSA) has made it clear that ships using HFO will not be allowed to enter the fjords and call on the mine port.	DCE/GN DCE/GN finds the reply from Tanbreez satisfactory and expects that fuel standards will be included in a potential permit from the authorities. (Note: Acc. to MARPOL's Resolution MEPC.176(58) Regulation 14 standards of fuel oil sulphur content were reduced on 1 January 2012 from 4.5% til 3.5% and it will be reduced again by 0.5% on 1 January 2020 (may be postponed until 2025). This will reduce one of the significant problems with HFO. On the other side of the Davis Strait, however, standards	Tanbreez: MLSA's position regarding HFO will be made clearer in the text.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	the water-soluble parts dissolve and disperse into the water column. Most marine distillate fuels do not emulsify in contrast to the HFO. The duration of these processes varies with temperature, waves, wind and most of all the properties of the oil. As study showed, where the diesel oil has fully disappeared from the surface after 3 days, nearly all the HFO is still present after 20 days. In addition, after 3- 5 days most HFO's have emulsified to the maximum water content (40-80%). This results in a significant increase in the volume to be handled by an oil spill recovery operation. Hence the consequences of HFO spills are likely to be more severe than spills of marine diesels. Arctic Council's Arctic Marine Shipping Assessment definitively states: "The most significant threat from ships to the Arctic marine environment is the release of oil through accidental or illegal discharge." It should also be noted that Antarctic, with similar environmental conditions, was designated as a special area where the carriage in bulk as cargo or carriage and use as fuel of the HFO is prohibited from 1 August, 2011 through the		are now 1% and only 0.1% (!) after 1 January 2015 because all Canada and USA have been appointed "Emission Control Area").	

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	MARPOL chapter 9 with a new regulation 43.			
9.8	Carriers and tankers must be fitted to meet standards for shipping in Arctic waters, specifically IMO guidelines for ships operating in polar waters. Also care must be taken to reduce the risk of oil spills from simple accidents, e.g. preparing safe procedures for transferring fuel from tanker to the on-shore facilities, making sure that sailing routes are clearly marked to avoid spills etc.	All ships that call on the mine port will follow IMO guidelines and meet the requirements of the Greenland authorities.	DCE/GN Agree.	None
9.9	5.10 In relation to transport to and from the mine we recommend that corridors be established to reduce the impact of these activities in wildlife.	Ships that call on the mine port will follow a well-defined corridor in the fjords and are agreed with the authorities.	DCE/GN We agree with Tanbreez.	DCE/GN: Before construction starts navigation rules must be at hand
9.10	5.11 The EIA does not clearly establish the life span of the mine, but at public meetings we learned that the expected lifespan is 10 years.	Comment is accepted	DCE/GN We agree with Tanbreez.	It will be made clear that the assessed lifespan of the mine is 10 years.
9.11	WWF Verdensnaturfonden recommends that renewable energy solutions be considered in relation to mineral resources activities, as Greenland has potentials for hydropower as well as solar- and wind energy. The EIA establishes that plans are to use three diesel	The project's large energy requirement excludes solar and wind power as options. However, if the Qorlortorsuaq hydro power plant is expanded, the	DCE/GN We recommend that hydropower be used if at all possible.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	generator units to supply the mine with power. We would have liked to see the EIA cover information about alternative energy solutions comparing the economic and environmental consequences of both solutions described. The English version of the EIA contains information about energy supply than what is in the Danish version.	Company is prepared to use hydropower if it becomes available at a competitive price. Please also see comments to question 11.3.		
9.12	5.15 Domestic and industrial waste will be disposed of through the use of an incinerator. WWF Verdensnaturfonden recommends that this incinerator be fitted with a filter to reduce the emission of sod and particles into the environment. Plans for handling sewage and waste not suitable for incineration are in accordance with national and foreign standards. Hazardous waste must be stored safely before shipped away for handling. WWF Verdensnaturfonden is pleased with plans to establish a manual for handling waste in close cooperation with local authorities, but recommend that the Greenland Government be involved in this process too.	Comment is noted The waste plan described in the EIA report is preliminary only. The final plan will be developed and approved in co-operation with the Greenland authorities.	DCE/GN We agree with WWF. DCE/GN We agree with WWF and Tanbreez.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
9.13	5.17.3 An alternative to diesel generators is to connect the mine with the Qorlortorsuaq hydropower plant. The EIA reads that the plant, with two 3.8 MW turbines, has no excess energy production to cover the need for energy in the Tanbreez project. Qorlortorsuaq started production in 2004 and supplies the towns of Qaqortoq and Narsaq with renewable energy. WWF Verdensnaturfonden urges the Greenland Government to develop a long-term strategy for renewable energy including potentials for new industry, mining etc. In South Greenland several potential mines are developing and both the environment and the economy would benefit from a long-term investment in hydropower to supply mining activities. The Nukissiorfiit site has no information on the possibilities for adding a third turbine in Qorlortorsuaq and the costs associated with connecting the power plant with the mine. Establishing hydropower in Greenland is expensive but these costs must be compared to the costs associated with diesel generators: the costs of fuel, shipment	The expansion of the Qorlortorsuaq hydropower plant is a matter for the Greenland authorities. The Company is prepared to use hydropower if it becomes available at a competitive price. (See also attached Memo in reply to section 10, Nukissiorfiit's hearing response). See also comments to question 11.3.	DCE/GN We agree with WWF. The possibilities of utilizing hydropower should be pursued. See reply to 24.1.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	of fuel and generators plus the environmental costs associated with emissions of CO ₂ , black carbon etc. If Tanbreez Mining Greenland A/S plans to mine in Killavaat Alannuat for 20 or 30 years investments in renewable energy should be considered.			
9.14	5.17.4 Tanbreez Mining Greenland A/S should look at possibilities for utilization of tailings, reducing the deposits made in Fostersø throughout the life of the mine.	Comment is noted	DCE/GN We agree that the possibilities of utilizing tailings should be looked into.	None
9.15	Section 6 / Existing environment Information on marine invertebrates, such as blue mussels, which are sensitive to contamination, is missing in the subsection on fauna. Also some references are missing in the reference list.	The comment is acknowledged and the text will be improved.	DCE/GN No comments.	The text on the marine invertebrates will be expanded.
9.16	6.8.1 In the Danish version of the subsection on vegetation above 200 m there is a reference to figures 4.5, 4.6 and 4.7, which should be 6.4, 6.5 and 6.14.	This is an error which will be corrected.	DCE/GN No comments.	Reference will be made to the correct figures.
9.17	Section 7 / Socio and economic setting 7.1 The section of population and local use is very brief. An introduction to local businesses is missing,	These issues are covered in the VSB report The Norse church ruin at Hvalsø is in the next fjord on the opposite side of a large mountain chain and	DCE/GN No comments.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	e.g. local tourism industry and the use of the Upernaviarsuk, Hvalsø and Igaliko region for hiking, sailing etc.	thus well beyond any influence of this mine. Within the immediate facility of the mine and the associated fjord – no tourists except mineral collectors or geologists have been located.		
9.18	7.2 From the brief section on archaeology and cultural heritage it is not possible to establish the cultural importance of the region for the Norse as figure 7.1 only covers a small part of the region. In the EIA the plans to include the church ruin at Hvalsø to the UNESCO World Network of Biosphere Reserve is described in brief. The church ruin is only 6 kilometers to the south east of the Killavaat Alannuat and plans for mining in the area must be coordinated with the entities responsible for a future protection of the area, primarily the Kujalleq Kommune.	A comprehensive study of Norse and Inuit settlements in and around the proposed mine area has been carried out by Greenland Museum and is reported separately. The only Norse and Inuit settlements nears the mine area are shown on the map. It is correct that the church ruin at Hvalsø and the proposed UNESCO World Network of Biosphere Reserve are only 6 km from the mine site. However, in between is a major mountain ridge that separates the mine from the Biosphere Reserve. Therefore no mine activities will be visible from the Biosphere area.	DCE/GN No comments.	None
9.19	Section 8 / Impact assessment methodology The introduction to the methodology used in the EIA is clear and gives a good introduction to the following sections of the EIA.	It is a mistake that it has not been made clear that the planned mine life is 10 years. The text will be revised.	DCE/GN We agree with WWF and accept Tanbreez' reply.	The text will be revised to make it clear that the assessment concerns a 10 years mine life.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	However, in the Danish version of the EIA (page 62/114) establishes that potential impact of the mines are assessed based on a 10 year mining period. This information is not available in the English version of the EIA. The EIA does not establish a clear time plan. Therefore, for the reader of the EIA it is not clear if plans are to mine Killavaat Alannguut for 10, 20 or maybe the 31 years that tailings can be deposited into Fostersø. And it is unclear if the impact assessment would have been different if a longer life span had been used.			
9.20	Section 9 /Impact assessment and identification of mitigation measures 6 9.1.1. WWF Verdensnaturfonden encourages that measures are taken to reduce the aesthetic impact of the mining pits. Illustrations of the area now, during mining and after, could have been used to support this section of the report.	Comment is noted	DCE/GN No comments.	None
9.21	9.1.2. A complete clean up at the site of the mine, including the deposit at Fostersø, is important for future generations. Greenland un-	This is a matter for the Government of Greenland.	DCE/GN We agree with WWF. We assume, however, that WWF when they say "A complete clean up at the	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	fortunately has sites where abandoned mines are left with buildings, equipment etc. The Greenland Government must set high standards for clean up and make sure that financial guarantees are set to guarantee a clean-up if the mine closes down early.		deposit at Fostersø" does not imply that tailings be removed from Foster Lake but rather that tailings be safely placed in Foster Lake.	
9.22	9.1.4 Planning infrastructure to have a small aesthetic footprint in the area is important, as roads etc. are permanent constructions in an environment where vegetation is both small and will take decades to develop. Conserving topsoil for use in rehabilitation of the area is one way of reducing the impacts, but roads and other infrastructure will be visible for generations. Therefore, a minimum of infrastructure must be established.	Comment is noted Most of the Ilimaussaq Complex has no vegetation. Topsoil will be retained whenever possible.	DCE/GN We agree with WWF in the viewpoints about infrastructure and conservation of topsoil. The remarks by Tanbreez that most of the Ilimausaq complex has no soil is correct	None
9.23	9.2.1 Dust is an important aspect of air environment in mining. Figure 9.1 and 9.2 gives a good illustration of dust deposition at the two sites with indication of highest values. Most dust comes from transport with trucks. Table 9.5 mentions the use of filters in crusher building to reduce dust emissions, but there is no mention	The comment is acknowledged. It should be noted though that watering of roads can only be used as a mitigating measure in part of the year.	DCE/GN We agree that watering of roads may be necessary.	Include watering of roads as mitigation measure to reduce dust from roads.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	of watering roads as a mitigation effort.			
9.24	9.2.2 Estimated consumption of fuel is 7.8 million liters per annum, increasing Greenland's CO2 emission by 20.881 tons. In the EIA this is presented as a 3.3 pct. increase in emissions from the mine compared to average emission for 2002-2009. Greenland's emissions have fluctuated but overall increased in the period used. In 2011 emissions were 763.827 tons CO2e. Compared to 1990; this is a 15.8 pct. increased and compared to 2010 a 6.4 pct. increase. 94.8 pct. of emissions are from combustion of fossil fuels, stressing the need for displacing fossil fuels with renewable energy sources (information from Statistics Greenland, emissioner af drivhusgasser 2011). Also, emissions will continue to climb as more mineral resources projects are maturing into mines. WWF Verdensnaturfonden acknowledges the need for new industry in Greenland, but encourage the Greenland Government to establish a strategy for introduction of renewable energy in new industry.	This is a matter for the Government of Greenland.	DCE/GN No comments.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
9.25	9.3.1 Of concern is deposition of tailings and waste rock in Fostersø with the potential release of metals and other elements into the lake, streams and fjords. Release of contaminants can potentially affect the Arctic char population in Lakseelv. Studies of tailings from the site document potentially elevated levels of arsenic, cadmium, chromium, lead, copper and zinc. Tests suggest a potential for metal leaching of lead and arsenics if tailings and waste rock from the mine is deposited in water. Concentrations of metals in Fostersø will increase in the first years but reach a steady level after 5 years of operation as the lake fills with tailings and waste rock. Modeling predict that content of metals will be below the Greenland Water Quality Guideline values except for lead (after 5 years 1.57µg/l and marginally exceeds the GWQG value of 1 µg/l. But according to the EIA, values have to be met not in the Fostersø but in one or more specified points downstream. WWF Verdensnaturfonden is concerned that the water of Fostersø will exceed GWQG values for lead. Controlling the outflow of water from Fostersø, constructing a dam at the outlet or pumping water out		DCE/GN We find that both WWF's and Tanbreez' comments are correct and relevant. Thus, it is important that water in Foster Lake and the two streams are thoroughly monitored, especially at the start of mining operations.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	of the lake are mitigation measures that may control concentrations in the stream, but will still allow for lead to be disposed off into the fjord. Greenland has a long history of mining and in several sites; Ivittuut, Mestersvig and Malmbjerget, the marine environment has been polluted with lead. Activities date back many years when environmental standards for mining was not found and knowledge about the consequences if bio-accumulation in animals and humans was limited. See the publication Minedrift og Miljø I Grønland: http://www2.dmu.dk/1_viden/2_publicationer/3_temareporter/rapporter/tema38.pdf Leaching modeling is described thoroughly but references to reports etc. of the actual experiments must be included as a reference for credibility. For example there is no indication of the temperature in which the experiments have been carried out, which is relevant information, as changes in temperature can alter solubility of metals. Furthermore, extreme weather phenomena like droughts can increase the concentrations of	Fostersø and its outlet Lakse-tværelv are part of the mine. The Greenland Water Quality Guidelines (GWQG) applies to the environment outside the mine area. When water from Fostersø reaches Lakseelv it will mix with water from this river and the concentration of metals – including lead – will meet the GWQG. All tests were carried out at temperatures around 20 degrees. In case of extreme weather situation – for example a particular dry period with very low flow in Lakseelv it will be possible to hold back the outflow from Fostersø until the flow in Lakseelv has normalized. In this way the GWQG can be met in both extremely dry and cold periods with much reduced flow in Lakseelv. The comment is acknowledged. It is correct that that the lead once deposited in Fostersø cannot be collected again. But it should be recalled that the lead comes from the surrounding rocks and has not been added during the mining process. Since lead (and other metals) will only dissolve to the lake water from the top layer of tailings		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	pollutants in both Fostersø and Lakseelv. Lead is known to disrupt the health system of phytoplankton, an important source of oxygen production in seas and many other marine environments. Lead accumulates in the food chain and in humans high lead levels in blood can cause birth defects and affect the physical and mental development of children. Introducing unleaded gas and other initiatives have dramatically reduced concentrations of lead in the environment, today's sources of lead pollution are mining, metal industries and waste management. Once deposited into the Fostersø lead cannot be collected again. Models show that once the mine stops the concentration of lead in the lake will fall below the GWQG values within a number of years. WWF Verdensnaturfonden is concerned about the dissemination of lead and other pollutants into the marine environment. It is recommended that monitoring of lead concentration in Fostersø, streams and the fjord, be monitored carefully during operation of the mine	the release of metals to the water will gradually stop once the mine is closed. A few years after mine closure the concentrations of metals in Fostersø will return to the background level. A preliminary monitoring program is included in the EIA report. The final program will be developed in co-operation with the Greenland authorities. This program will include regular measurements of the metal concentration in Fostersø, Laksetværelv, Lakseelv and the fjord.		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	and in the years following mining activities.			
9.26	Furthermore WWF Verdensnaturfonden notes that there are several minerals containing fluorine in the region. Fluorine is not mentioned in the EIA report. We support the recommendations made by DCE/GN that Tanbreez be asked to give a judgment of what happens to the fluorine in the ore, tailings and waste rock, based on chemical analysis and solubility of fluorine.	Fluorine within the Ilimaussaq Complex occurs mostly as villemite or sodium fluorite (NaF) and fluorite or calcium fluorite (CaF₂). Villemite is highly soluble in water while calcium fluoride is virtually insoluble in water. Thus villemite can produce fluorine rapidly into the ground water while fluorite cannot. At Ilimaussaq villemite when it dissolves from a rock it leaves a characteristic hole which is often cubic in shape, thus on the surface the presence of villemite can be inferred from the holes often cubic in shape. No villemite or holes after villemite have been detected south of the fjord and certainly never on the TAN-BREEZ projects ground. Geology shows, the villemite is restricted to the hypo agpaitic rocks which again only are known to occur north of the fjord (off these licenses) where they formed as a last stage differentiate. Thus, there is no chance geologically, chemically or physically for	DCE/GN We recommend that tailings and waste rock is analysed for soluble fluoroine.	A text on fluorine will be added to the EIA report. DCE/GN: We recommend that tailings and waste rock is analysed for soluble fluorine.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		any villemite to contribute to any fluorine pollution to the water. See also answer 20.2 for a more comprehensive account on the subject. To document that the ore contains no solvable fluorine TANBREEZ will test a number of samples in accordance with a protocol agreed with the DCE. The results will be included in the final EIA report.		
9.27	WWF Verdensnaturfonden recommends that the agreement between the licensee and the Greenland Government covers responsibilities in case of miscalculations regarding modeled levels and developments of lead, fluorine and other pollutants in Fostersø and surrounding aquatic environments. Related to this is the control with and management of Fostersø with regards to controlling lead levels in Fostersø and streams.	This is a matter for the Government of Greenland.	DCE/GN DCE/GN is unable to comment on this legal question.	None
9.28	9.3.3. Describes the impact of an accident leading to a spill of chemicals or oil into the fjord or freshwater in the region. A spill of oil may have devastating consequences for wildlife and related to this local use of the fjord. Mitigation efforts described are equipment at site available in the event	The comment is acknowledged. It should be noted that development of contingency plans in cooperation with local and national authorities responsible for managing oil spills is a requirement by the	DCE/GN DCE/GN concurs with WWF's and Tanbreez' points of view.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	of a spill and procedures for handling spills, including training for personnel. In the event of an accident this is important, but Tanbreez can reduce the risk of accidents by having clear procedures for transferring fuel from tankers to facilities on shore, by placing trays under tanks and by maintaining tanks, pumps and other facilities. Mapped and marked shipping routes are another aspect that will reduce the risk of an oil spill. Contingency plans must be prepared in cooperation with local and national authorities responsible for managing oil spills.	Greenland authorities, and is already mentioned in the EIA report.		
9.29	9.4.1 WWF Verdensnaturfonden find that the EIA does not sufficiently describe the disturbances that the mine and related activities will bring to the local environment. The section has a one page introduction to activities that create noise: the mining process, crushing, shipping and the use of trucks. But the levels of noise have not been estimated (in dB) and illustrated for the area related to activities (map). WWF Verdensnaturfonden recommends that the nearest nesting	The comment is acknowledged. The expected noise level and area impacted by noise from the mine has not been modelled and mapped because the project is not expected to generate noise that will disturb animals in and around the mine area significantly. Potential exceptions are occasional blasting at the pit and helicopters serving the mine. Locating nests of White-tailed eagles in and around the mine area is not easy and could cause considerable disturbance. However,	DCE/GN As to sailing in the fjord system, we recommend that large ships follow the indicated route at all times. In order to minimize disturbance of the local environment we recommend that helicopter traffic follow the indicated corridors.	Add to mitigating measures that helicopters should follow specific corridors to avoid disturbing eagles and other wildlife.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	sites of white-tailed eagles be localized and all traffic avoided within a radius of 5 km from the nest. In the EIA, mitigation is linked to reducing human activities outside the mining core areas in spring and summer, but WWF Verdensnaturfonden recommend the use of corridors for helicopters, boats etc.	the noise and disturbance impact from helicopter can be significantly reduced by defining corridors to follow.		
9.30	9.4.7 Describes contamination of terrestrial habitats from oil and other hazardous materials that can potentially pose a risk to animals, plants and their habitats. According to the EIA the risk of an oil spill is small and mitigation procedures for handling spill will be established. WWF Verdensnaturfonden recognize that most spills are likely to be small and local, but recommend that mitigation efforts include trays installed under tanks, maintenance of tanks and pumps, and procedures for transfer of fuel from tankers to tanks to reduce the risk of spills.	Comment is noted	DCE/GN We agree with WWF and the reply from Tanbreez.	The mitigating measures will be developed further
9.31	9.4.9 WWF Verdensnaturfonden believe that the Greenland Government should set standards for handling of ballast water in accordance with the IMO MEPC	This is a matter for the Government of Greenland	DCE/GN We agree with WWF.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	guidelines to avoid the introduction of invasive species to the local marine environment.			
29.32	9.5 WWF Verdensnaturfonden support plans to develop a waste management plan for the project. We recommend that this plan be developed in cooperation with local authorities as well as the Greenland Government, in order to ensure that fractions that can be handled in Kommune Kujalleq are separated from hazardous waste which must be handled outside Greenland.	The comment is noted. The waste management plan in the EIA report is a preliminary plan only and will be developed further in cooperation with the Greenland authorities before the project commences.	DCE/GN We agree with both.	None
9.33	9.6 The EIA establishes that the 6 km distance and the high grounds are believed to prevent noise and dust from the mine from reaching the Hvalsø church ruin, potentially to be included in the UNESCO World Network of Biosphere Reserves. From the EIA it is not clear if the mining site is or has been within the potential UNESCO site, neither is it established if the mining site will affect tourism in the area, including tourism activities near Hvalsø.	The mine area is outside the UNESCO World Network of Biosphere Reserves and separated by a mountain ridge. The mine will not be visible from Hvalsø church ruin and except perhaps for occasional blasts at the pit during special weather conditions, the mine activities cannot be heard from the tourist sites.	DCE/GN We agree with Tanbreez' reply. The mining company should be asked to consult the Ministry of Culture etc. in order to document that the mining area is not located in the area in South Greenland which is currently on the tentative list for nomination of new world heritage areas.	None
9.34	Section 11/ Environmental monitoring plan A draft monitoring plan is given in the EIA. WWF Verdensnaturfonden	The comment is noted. The monitoring plan in the EIA report is preliminary plan only and will be developed further in cooperation	DCE/GN Naturally, DCE/GN agrees.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	recommend that a detailed monitoring plan for Fostersø be established in cooperation with the Danish Center for Environment and Energy and the Greenland Institute for Natural Resources, to make sure that monitoring of the lake, streams and fjords is carried out. WWF Verdensnaturfonden recommends that metal contents in arctic char from Lakseelv be monitored at least annually.	with the Greenland authorities before the project commences.		
9.35	Section 12/ Conceptual de-commissioning and closure plan WWF Verdensnaturfonden recommends a draft budget for the closure plan be made, and money put aside during the first stages of operation, to be used for a possible unplanned closure, like in case of bankruptcy etc.	This is a matter for the Government of Greenland.	Ministry of Industry and Mineral Resources Closure is governed by the Mineral Resources Act, section 10 (§§42-44). According to §42 of the Mineral Resources Act, Naalakkersuisut can determine the conditions to ensure that the licensee meets his obligations, including guarantees. In the §43 approval, guarantees that will cover completion of the closure plan will be required. DCE/GN Regular practices are governed by the Mineral Ressource Authority.	None

No. 10. DCE Danish Centre for Environment and Energy - and Greenland Institute of Natural Resources

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
10.1	DCE and GN have had the possibility to comment on earlier versions of the EIA report including the attachments. During this process the versions of the report have been re-vised according to the needs for changes as expressed by DCE and GN. DCE/GN find that the report as it is on the hearing portal is satisfactory and describes the environmental consequences of a mine as the one described in the report. However DCE/GN shall draw the attention to two aspects: One about fluorine and one about further chemical processing.	No response is required		None
10.2	Fluorine. DCE/GN has recently become aware that there are several fluorine containing minerals in the area where mining is planned. Until now we did not place sufficient focus on the existence of these fluorine minerals. There are two reasons for this:	The question about fluorine at the TANBREEZ projects ground originates from a sample (No 154335) in a black kakortokite reported by Bailey et al. (2001) in GEUS Bulletin 190 (page 41) where a content of 2% fluorine is assayed. Fluorine within the Ilimaussaq Complex occurs mostly in two forms:	DCE/GN Tanbreez' reply is thoroughly prepared and it renders probable that substantial quantities of soluble fluor are not found in ore or waste rock. We suggest, however, that Tanbreez' views be documented by analyses of soluble fluor in tailings, waste rock and ore instead of tailings. Samples are to be taken from drill cores taken	A text on fluorine will be added to the EIA report. DCE/GN: Carry out analyses of soluble fluor. TANBREEZ: Analyses will be carried out and included in the final version of the EIA report.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	1) Toxicity test have shown that there are no toxicity in tailings and waste rocks. This means that there cannot by high concentrations of soluble fluorine in the tailings and waste rock. The company resumes the results in this way in the EIA report: To assess if the tailings or waste rock could potentially contain other toxic sub-stances than the known metals, a specific eco-toxicity test was carried out. Samples of tailings and waste rock material were placed in water tanks with daphnia and trout to test for unexpected mortality. The tests recorded no unexpected mortality among the daphnia or fish. 2) The ore processing consists of crushing and magnetic separation into an un-magnetic fraction, a medium magnetic fraction, both of which are exported, and a highly magnetic fraction. The highly magnetic fraction is planned to be deposited in the lake "Fostersø". In the separation process the fluorine containing minerals will end in one of the two fractions that are exported. We do not, however, recommend to base decisions solely on the two	1) villemite or sodium fluorite (NaF); 2) fluorite or calcium fluorite (CaF₂). Villemite or sodium fluoride is highly soluble at 4.22 g per 100 cc of water which makes it defined as a dangerous chemical with a fatal dose of only a few grams. Sodium fluoride is however added in small amounts to water to increase the fluorine content to about 1 ppm which is beneficial for teeth and at that level dissolved in water sodium fluoride poses no risk. However, at over 100 ppm sodium fluoride when dissolved can be dangerous with the European accepted maximum set at 1.5 ppm. Calcium fluoride is a compound with a solubility constant of only 3.9×10^{-11} making it virtually totally insoluble. Fluorite in the mineral of calcium fluoride is thus regularly found on the surface where it is not even affected by weathering and as such is defined as totally safe. At Ilimaussaq and many other places in the world fluoride can easily be found on the surface un-	deeper than 10-50 metres as fluor from the upper layers are probably leached.	

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	arguments given above. The company should be asked to give a judgement of what happens to the fluorine in the ore, tailings and waste rock based on chemical analyses and solubility of fluorine. Further we suggest that GEUS is consulted about their knowledge to fluorine minerals and their solubility.	weathered and thus cannot contribute fluorine to the environment. Villemite (NaF) is never found on the surface and certainly not within about 10 – 50 m of the surface as it is rapidly dissolved by ground water. Even samples taken from underground in the 1970's and left on the surface have largely lost these fluorine due to dissolution of most of its villemite. Thus villemite can produce fluorine rapidly into the ground water while fluorite cannot. At Ilimaussaq villemite when it dissolves from a rock it leaves a characteristic hole which is often cubic in shape, thus on the surface the presence of villemite can be inferred from the holes often cubic in shape. No villemite or holes after villemite have been detected south of fjord and certainly never on the TANBREEZ projects ground. Geology further shows, the villemite is restricted to the hypo agpaitic rocks which again only are known to occur north of the fjord (off these licenses) where they formed as a last stage differentiate.		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		The sample No 154335 quoted occurs within a black kakortokite was still in the archives of GEUS. This sample has been re-examined. This sample was taken from the surface contained none of the characteristic holes after villemite. Secondly, such surface samples nowhere in the complex contain fresh villemite on the surface (in fact villemite has never been anywhere in the world). Thirdly, slides taken of the rock and micro photographs clearly show fluorite grains (see photo below) here up to 1 mm in size. There is sufficient amount of fluorite in this sample to explain the fluorine assay in the original rock. Thus, there is no chance geologically, chemically or physically for any villemite to be in sample No 154335 and certainly it cannot contribute to any fluorine pollution to the water. To document that the ore contains no solvable fluorine TANBREEZ will test a number of samples in accordance with a protocol agreed with the DCE. The results will be included in the final EIA report. <u>Literature</u>		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		Bailey, John C., Gwozdz, Raymond, Rose-Hansen, John and Sørensen, Henning. 2001. Geochemical overview of the Ilímaussaq alkaline complex, South Greenland I: Sørensen, Henning (ed.) GEOLOGY OF GREENLAND SURVEY BULLETIN 190 – 2001. The Ilímaussaq alkaline complex, South Greenland: status of mineralogical research with new results.		
10.3	Chemical processing: We shall draw the attention to the fact that the EIA report is based on a project that does not include a chemical separation plant. If, at a later stage of the project, the company decides to apply for a chemical separation plant in Greenland we recommend to consider whether a new EIA report is needed.	Comment is noted	DCE/GN OK to Tanbreez' comment.	None

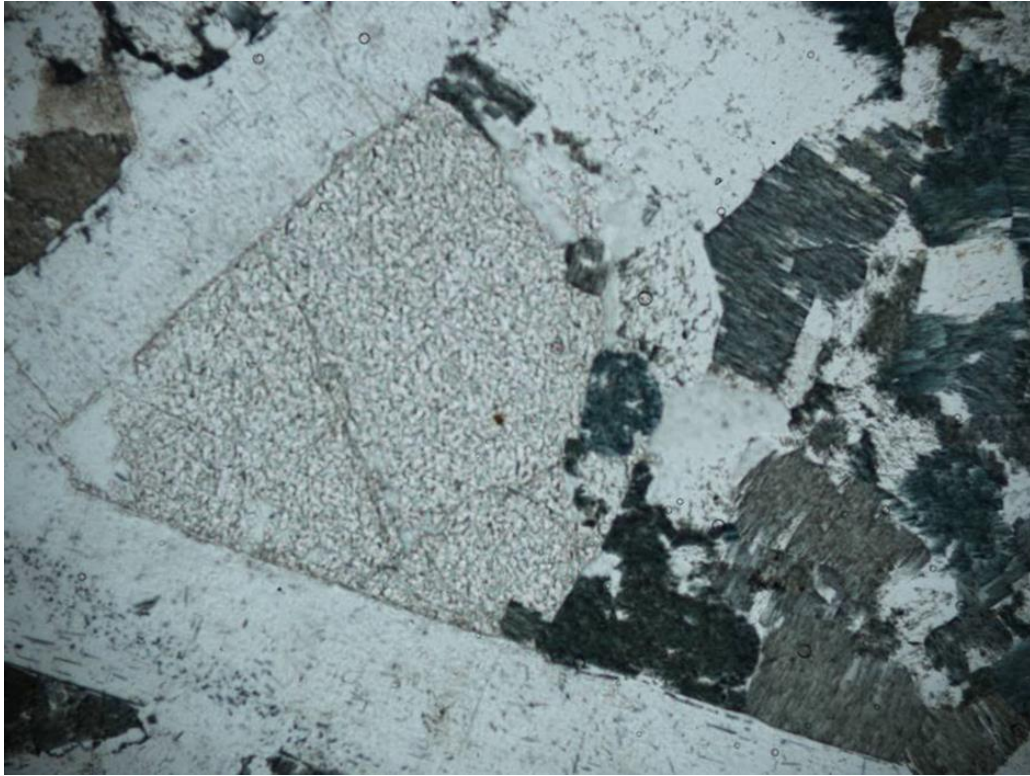


Photo of fluorspar, the grain is 1 mm in size.

No. 11. Kommuneqarfik Sermersooq

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
11.1	Kommunerqarfik Sermersooq (the Sermersooq Municipality) has received and discussed the public hearing material with the extended hearing period till 6 January 2014, and thanks for the opportunity to take part in this hearing and has decided to focus on environmental issues because the project site is in the Kujalleq Municipality. It has not been possible to discuss the hearing material in the committees of the municipality and reservations are therefore made any subsequent political announcements. Kommuneqarfik Sermerssoq has gone through the public available EIA main report and is concerned that this document has been reviewed by the Environmental Agency for the Mineral Resources Area, DCE and Greenland Institute of Natural Resources without access to any background material (reports). The mine company has subsequently made available some of	The Environmental Agency for the Mineral Resources Area, Danish Centre For Environment And Energy (DCE) and Greenland Institute of Natural Resources have had access to all technical reports prepared by the mine company and its consultants during their initial evaluation of the EIA main report.	DCE/GN It is difficult to reply to the extensive hearing response from Kommuneqarfik Sermersooq in this schematic form. Some of DEC's and GN's comments are therefore found in the note right after this. DCE/GN DCE/GN has had access to the background material. DCE'GN's assessment is thus based on the complete documentation.	None Add lead calculations to the EIA

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	the technical reports on the company's homepage. However, the very important report with the calculations of the discharge from Fostersø has been omitted. The following issues arouse worries for the environment.		Kommuneqarfik Sermersooq and other response partners have expressed their concern regarding the calculations on lead in Foster Lake. DCE/GN has reviewed the calculations and find these 'almost' correct. We recommend that calculations be shown in the EIA report for hearing partners and others to feel secure.	TANBREEZ: The calculations on discharge of lead from tailings will be included in the final version of the EIA report.
11.2	Lead: Tailings and waste rock that will be deposited in Fostersø contain large amounts of lead. Unfortunately the lead is soluble in water and will therefore be transported to the river and fjord. The (EIA) material shows that lead concentration of over 1000 times the allowable has been recorded from water mixed with tailings. The report that described the lead pollution in Fostersø is missing from the available material. The conclusion that the maximum concentration of the lead in the discharged water of 1.57 µg/l, and that it will not continue to rise as the lake is filled up (with tailings) appears untrustworthy.	Tailings and waste rock deposited in Fostersø contain the same concentration of lead as the surrounding rocks. But since tailings is finely grained material with a large surface more metals will dissolve from it to the lake water than if it was not crushed. Metals – including lead – will only dissolve from the top layer of tailings deposited at the lake bottom that is in direct contact with the lake water. As soon as tailings is over-layered with more material the release of metals to the lake water stops. Although the volume of water in the lake decreases as more and more tailings material is deposited the annual inflow from precipitation and springs remain the same. Therefore a steady state will be	DCE/GN DCE/GN does not disagree with the mining company's comments. KS is concerned about the lead that dissolves in water in Foster Lake as a result of the proposed deposition of tailings and waste rock in Foster Lake. They say that lead concentrations are found in water mixed with tailings that are more than a 1,000 times the permissible discharge values; KS states that the maximum discharge value of the lead concentration will be 1.57 µg/L. This must be a misunderstanding. The maximum permissible value of the concentration to occur in the recipient is 1 µg/L; this is not a maximum permissible value of the discharge. The figure 1.57 µg/L is the calculated concentration in the water in Foster Lake a couple of years after depositing has started.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		reached where the content of metals are stable. Experiments show that the concentration of lead in Fostersø will reach a maximum value of 1.6 – 1.8 µg/l. When the water from the lake mixes with water in Lakseelv the concentration will drop and be well below the Greenland water quality limit value of 1.0 µg/l.	(DCE/GN finds this to be 1.97 µg/L by the way). The correct approach to the lead problem is to say that water in Foster Lake exceed the limit of 1 µg/L by a factor slightly less than 2. Afterwards, however, the water will - while running in Laksetværelv - be diluted and will not contribute to exceeding the limit in Lakseelv. It is this situation that must be addressed. DCE/GN will, if required, closely monitor the water in Foster Lake, Laksetværelv and Lakseelv. If the concentration of, inter alia, lead exceeds what is deemed acceptable, there are ways to prevent this affecting Lakseelv. The calculation of future concentrations of lead in freshwater is an uncertain extrapolation of measured data. Orbicon who has reported measurements and the calculated results, has tried to use estimates that overestimate pollution if there is any doubt. It is therefore to be hoped that the modest lead pollution to be calculated will be less in reality. Due to uncertainty, however, one must be aware that it could be bigger. Therefore, monitoring of the environment is important.	
11.3	Dust from mining will also contain high concentrations of lead – up	A maximum concentration of 933 ppm lead has been recorded in	DCE/GN	

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	to 993 ppm. The "Dust Dispersion Study" shows that the water quality will not be changes, but the data shows that the dust alone – without taking into account the water from Fostersø – will increase the lead content in the river by up to 68 times compared to the original level. It further is clear that the mining will lead to an increase in the dust content in Narsaq by 43% and up to 9% in Qaqortoq. This is not mentioned in the conclusion of the EIA. In addition to lead the dust will contain uranium, thorium, aluminium, arsenic and other substances which are potentially harmful. Appendix 2, which contain the calculations and tables with the composition of the dust in Narsaq and Qaqortoq which is cited in the (EIA) material is excluded from the material. After reviewing the reports the impact on the environment from lead is assessed as potentially very damaging for the environment. The (resulting) knowledge that lead is soluble in water should lead to a review of the entire project and that tailings and waste rock	samples of waste rock. However, the statement that dust deposition will cause a 68 times increase in the lead concentration in river is not correct. The Dust Dispersion Study concludes (page 32) "Dust falling on the land surface will be the same material as the surface itself, and will not change the chemical composition of the surface or runoff. Dust particles falling directly on streams, lakes and fjords will mostly settle to the bottom, where it will have the same mineral composition as the bottom material. The natural water quality will not be altered by dust." Furthermore, on page 23 the report states that "The Tanbreez contributions to PM₁₀ (particulate matter less than 10 µm in diameter – that is dust) concentrations at Narsaq and Qaqortoq are very small and below the typical detection limit of about 1 µg/m³ for PM₁₀ monitoring. For comparison, the average natural background PM₁₀ concentration in the region is about 2 µg/m³".	KS writes that the dust will contain up to 993 ppm lead. In Table 10 there is a maximum concentration of lead in the waste rock of 933 (not 993) ppm; we assume that this is what is referred to. Table 10 shows a case of "worst case calculations", based on the dust generated by the waste rock. The actual concentration of lead in dust will be lower than 933 ppm. In Table 9 (Dust Dispersion Study), the mining company has calculated the concentration of dust in the towns (PM₁₀) to be approximately 100 times lower than the limit set by the EU. DCE is therefore not concerned about the people of the two towns in terms of dust exposure. It is likely that ongoing monitoring of dust depositing around the mine will be required in order to control the predetermined dust spreading patterns. KS writes that dust alone will increase the lead content in the river up to 68 times the natural level. We believe reference is made to Table 11 of "Dust dispersion study". In this table it is calculated that with a concentration of lead in Lakseelv of 0.21 µg/L (not 0.21 mg/L as it says), 7.2 kg lead will be emitted annually including Lakseelv. The same table shows that the total amount of	

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
			is required to analyze dust for all relevant basic substances, and it makes no sense to highlight these analyzes as a problem without evaluating the concentration of these elements.	
11.4	Fluoride: It is very worrying that fluoride is not mentioned in the EIA or the technical annexes, at all. Around 70 elements are studies but not fluoride. Compounds that include fluoride can have large scale damaging impact on the environment, and compounds containing fluoride are found close to the mine site. It is very regrettable that fluoride has not been covered and the tests carried out before the publication of the hearings material. DCE has subsequently pointed out that fluoride should be assessed. It is a mistake to publish the hearings material with taking into account fluoride which is potentially crucial for the assessment of the project. A thorough statement of the content of fluoride compounds should be prepared and made available for a public hearing.	Fluorine within the Ilimaussaq Complex occurs mostly as villemite or sodium fluorite (NaF) and fluorite or calcium fluorite (CaF₂). Villemite is highly soluble in water while calcium fluoride is virtually insoluble in water. Thus villemite can produce fluorine rapidly into the ground water while fluorite cannot. At Ilimaussaq villemite when it dissolves from a rock it leaves a characteristic hole which is often cubic in shape, thus on the surface the presence of villemite can be inferred from the holes often cubic in shape. No villemite or holes after villemite have been detected south of the fjord and certainly never on the TAN-BREEZ projects ground. Geology shows, the villemite is restricted to the hypo agpaitic rocks which again only are known to oc-	DCE/GN See reply regarding fluorine in section 21.	A text on fluorine will be added to the EIA report.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		cur north of the fjord (off these licenses) where they formed as a last stage differentiate. Thus, there is no chance geologically, chemically or physically for any villemite to contribute to any fluorine pollution to the water. To document that the ore contains no solvable fluorine TANBREEZ will test a number of samples in accordance with a protocol agreed with the DCE. The results will be included in the final EIA report. See also answer 19.2 for a more comprehensive account on the subject.		
11.5	Arctic char: Lakseelv contains important spawning grounds and wintering areas for Arctic char (trout). The impact on arctic char from the mine project has been assessed in a test where rainbow trout were kept in water with metal concentrations equal to the water that will be discharged (into Lakseelv). The chosen test concerns acute mortality within 96 hours only and is not testing any long term impacts on the fish. The (EIA) material shows that aluminum concentrations of up to 7520 µg/l have	The claim that the arctic chars in the Lakseelv will be subject to aluminum concentrations of up to 7520 µg /l is not correct. The aluminum content in waste-rock and tailings is somewhat elevated compared to average "rocks" but the values are not very high. Tests, simulations and calculations carried out by Golder Associates (Sweden) in connection with the Tanbreez project – and approved by Danish Centre For Environment And Energy and Greenland Institute of Natural Resources – estimate the concentration of aluminum in Fostersø after 5 and 10	DCE/GN See reply to this after this section. Tanbreez' reply is consistent with DCE/GN's view.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	been recorded from the water. It is documented that a concentration of c. 200 µg/l is harmful to trout. The gills will be gradually damaged, but this will not cause death within 96 hours –but lead to severe damage and reduced survival. Long term studies should also have been implemented to study if damaged takes place to the organs since the (EIA) material shows that the (mine) activities will increase the content of lead in the river by 65 times. The (lead) contribution from Fostersø adds further to that. It is very worrying that the generally known and scientific accepted damaging impact from aluminum on trout is not considered in the EIA and that this has not been complained by Environmental Agency for the Mineral Resources Area, DCE and Greenland Institute of Natural Resources.	years of tailings deposition to 74-98 µg /l. The aluminum concentration will be considerably lower in Lakseelv (where the fish lives) since the discharge from Fostersø only makes up around 20% of the flow in Lakseelv. It is also a misconception that the lead concentration in Lakseelv will increase by 65 times due to contamination from dust from mine activities (see also below). The concentration of lead in Lakseelv will remain below the Greenland water quality limit value of 1 µg /l during and after mine operation.		
11.6	Fostersø: In connection with the (planned) deposition of tailings and waste rock in Fostersø there are several issues which are unacceptable. The estimated concentrations of substances only include metals and not fluoride, phosphor and		DCE/GN Calculations prepared by Tanbreez are credible; see reply after section 20.10. KS is correct, however, that a calculation of fluor concentrations in Foster Lake after 3-5 years is missing.	Carry out and report calculation of fluor in Foster Lake

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	other compounds which are potentially harmful. Table 9-6 shows that the concentration of metals will increase from year 1 to year 5, but that no further increase in the pollution will take place. This appears very untrustworthy. The large quantities of tailings and waste rock will gradually decrease the depth of the lake and the deposited material will be mixed with a gradually smaller water volume. This will undoubtedly lead to higher concentration of metals in the discharged water. When it is taken into account that Figure 6-7 of the EIA report shows no stratification in June and that mixing must take place in spring and autumn and in connection with strong storms, the metals that are added must be mixed in the water body. Consequently must the concentration of metals increase during the entire period where Fostersø is used for deposition of tailings and waste rock.	The concentration of metals in Fostersø will reach a steady state after a number of years because; (1) the amount of metals that dissolve to the lake water remain constant since metals only dissolve from the top layer of tailings in direct contact with the lake water and (2) although the volume of water in the lake decreases as more and more tailings material is deposited the flow of clean water through the lake (from precipitation and springs) remains the same. This means that the dilution in the lake with inflowing clean water is higher for every year. In Fostersø it is calculated that a steady state where the content of metals are stable will be reached after about five years. When the deposition of tailings stops at mine closure the concentration of metals will fall again and reach the natural background level after a few years. To document that the ore contains no soluble fluorine TANBREEZ will test a number of samples in accordance with a protocol agreed		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		with the DCE. The results will be included in the final EIA report.		
11.7	The EIA material only deals with the concentration of harmful metals. It should also focus on the amounts and accumulation of harmful substances in the lake, river and fjord. It should be expected that there will be an accumulation of discharged substances in the river and fjord from the beginning of mining and several years after mine closure. A monitoring program will only document when something is gone wrong and a new Maamoralik is a reality because of a lead pollution and an unknown risk for pollution with fluoride and other substances not covered by the EIA. This impact will continue for very long because Fostersø will continue to pollute the river and fjord. In addition the water exchange in the fjord is very limited because it just like Maamoralik is a sill fjord with little water exchange.	The mine waste to be deposited in Fostersø consists of waste rock and tailings. Since no chemicals are used in the production the material that be deposited in the lake consist of the same metals, minerals etc. as the surrounding rocks – except that the salable compounds that have been removed. Since the tailings are a fine powder the metals that occur naturally in it are more readily soluble when the material is deposited in water. Metals will therefore be released from the tailings once deposited at the lake bottom but only from the top layer (as no water movements will take place in the densely packed deeper layers).	DCE/GN See reply after this. We do not disagree with the mining company.	None
11.8	Farming: The "Dust Dispersion Study" shows that dust from the mine containing harmful metals will be dispersed in a much larger areas than initially assumed. It shows	The Dust Dispersion Study report states that dust falling on the land surface will be the same material as the surface it-self, and will not change the chemical composition of the surface or runoff.	DCE/GN We agree with Tanbreez' reply.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	that the concentration of dust will increase up to 43% in Narsaq and by 9% in Qaqortoq. It should be studied if this increased amount of dust in inhabited areas poses a health problem. The dispersal of dust can have severe implications for farming since the (mine) area is used for grazing by sheep and lamp and for production of hay which is winter fodder for the sheep. Grazing takes place so close to the mine area that is desirable to put of a fence around the mine site. Studies should be carried out that document the present content of harmful metals in meat from the area and the levels should be studies following mine start.	There are no Greenlandic, Danish or EU standards for deposition of dust containing heavy metals however German air quality standards include limit values for deposition of heavy metals. Based on the maximum calculated dust deposition rate (71.9 kg/ha/year), and the highest metal concentrations measured in ore and waste rock samples, the maximum loads of arsenic, cadmium and lead in dustfall are 1.2 µg As/m²/day, 0.09 µg Cd/m²/day and 18.4 µg Pb/m²/day. These are 31%, 5% and 18% of the German limit values, respectively. In other words the dust does not contain heavy metals in harmful concentrations. The area where dust deposition is more than 20 kg/ha/year (5.5 mg/m²/day) – a level suggested by Canadian research as a lower threshold for caribou avoidance due to dust on edible vegetation (and probably also relevant in connection with sheep farming) – is limited to within about 500 m from the mine pits and haul roads. Dust concentrations at Narsaq and Qaqortoq will be very small and below the typical detection limit of about 1 µg/m³ for PM₁₀ monitoring.		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		To conclude, there are no reasons to believe that dust from the mine will have any impact on farming.		
11.9	Iron: The ore and the mine waste contains large amount of iron which are solvable in water. The Greenland water quality standard includes limits for the content of iron, which, based on the EIA material, must be expected to be exceeded. This is apparently overlooked during the assessment of the (EIA) material. If the iron is present as pyrit is can lead to troubles with ocher which is harmful to arctic char.	The claim that the ore, tailings and waste rock contain large amount of iron that is solvable in water is wrong. The content of iron is low and Table 9-6 in the EIA report shows that the concentration of iron in Fostersø following deposition of tailings in 10 years will reach a maximum value of only 0.011 µg/l (the Greenland water quality threshold value is 0.3 µg /l).	DCE/GN We agree with Tanbreez' reply.	None
11.10	Other professions: Referring to the observations that the impact on the environment will be as described above, it is recommended that analyzes are carried out regarding the direct and in-direct environmental impacts for professions on land and at sea in the neighborhood of the mine site, at a regional level and in adjacent municipalities where environmental impacts are to be expected.	This is a matter for the Government of Greenland	DCE/GN KS recommends that "analyzes are carried out regarding the direct and in-direct environmental impacts for professions on land and at sea in the neighborhood of the mine site, at a regional level and in adjacent municipalities where environmental impacts are to be expected". DCE/GN: As long as EU limit values are observed in the vicinity of the mining area, DCE/GN sees no	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
			reason to carry out calculations on the at the municipality border.	

DCE/GN's comments on responses from Kommuneqarfik Sermersooq (KS)

Writing in black: Response from Kommuneqarfik Sermersooq - Writing in blue: Answer by DCE/GN

KS assesses that the environmental impact of lead is potentially very harmful to the environment and that lead's solubility in water makes it necessary to reassess the whole project. Based on the solubility studies it can be calculated that approx. 9 kg lead will be dissolved in Foster Lake per year. The total content of lead in tailings and waste rock can be calculated at 37.9 tons per year. Thus only about ¼ per mille of the lead is soluble. The calculation is shown in the table below:

Pb	g/t	t/year	gram Pb
WR1	85	32,500	2,762,500
WR2	727	17,500	12,722,500
T1	66	136,000	8,976,000
T2	210	64,000	13,440,000
Sum		250,000	37,901,000

KS thinks, like many others, that studies of fluoride are missing. DCE/GN agrees.

KS writes that concentrations of aluminum of 7520 µg/l have been found, and that concentrations around 200 µg/L are harmful to trout.

The figure 7520 comes from a study in which the waste rock 1 is extracted with a mixture of acetic acid and sodium acetate at pH 5 and has nothing to do with solubility in rainwater. The calculated concentration of aluminum in Foster Lake is calculated to be approximately 80 µg/L after 10 years of waste deposition. That means below the mentioned 200 µg/L already before dilution in Laksetværelv. Aluminium should be included in the monitoring program.

KS writes that phosphorus is not addressed in the reports. Three measurements reported by Tanbreez indicated concentrations of phosphorus after 10 years between 0.3 and 0.8 µg/L in Foster Lake. The Greenland limit is 20. We are thus below the limit by a large margin. These measurements are probably not available to KS, who is thus correct in their observation that phosphorus is not addressed in the reports. The mining company should include phosphorus in the available reports.

In their discussion of arctic char KS repeats that the levels of lead in the river will increase by up to 65 times because of the dust. (KS wrote 68 times the first time, but that was probably just a typo). DCE has commented on this above. Dust will not increase the concentration of lead in Lakseelv by 65 times compared to the current level.

KS finds the calculation of the lead concentration in Foster Lake downright untrustworthy; especially the statement that concentration of lead will not increase as the lake is filled with tailings. Other consulting parties have also argued this view. The explanation should appear credible in the EIA report; however, it can be summarized as follows:

Annually 9.07 kg of lead are dissolved in Foster Lake. This causes the concentration to rise, and if there was no flow of clean water in the lake, the concentration would increase all the time. But 4.6 million cubic meters of water flow through the lake annually. This water flushes the dissolved lead out of the lake. The higher the concentration of lead in the lake, the more lead is flushed out by this water. When the concentration of lead reaches a level where the quantity of flushed lead is the same as the quantity that is dissolved, the concentration no longer increases. This concentration is therefore $9.07 \text{ kg} / 4.6 \text{ million m}^3$, which is $1.97 \text{ } \mu\text{g/L}$. DCE/GN cannot explain why Golder finds 1.57. In addition, some of the lake's volume is displaced by tailings. This water is flushed out of the lake, and it does not alter the above.

KS says that not only the levels of harmful substances, but also *volumes* and *accumulation* in the lake, river and fjord should be addressed in the EIA report. KS expects that there will be a higher concentration of the substances that are discharged into the rivers and the fjord. *As for quantities*, the EIA material contains sufficient data to allow interested parties to make multiplication of concentrations and mass flow. Concerning the *increased concentration* of harmful substances in the rivers and fjord trout, mussels, seaweed and fish living in the intertidal zone are surely the most vulnerable. DCE/GN believes that the applicable limits protect against unacceptable concentration of harmful substances. If these limit values are complied with, unacceptable concentrations will not occur. Monitoring after mine start-up will prove whether this is true.

KS fears that a new Maarmorilik may occur in the fjord. In Maarmorilik about 30 tons of lead was dissolved in seawater annually, whereas the Tanbreez project expects dissolution of 9 kg annually. It is a long way from Maarmorilik levels.

KS says that Foster Lake will continue to add pollution to the fjord (implied: after mine closure). This is not in accordance with experience in terms of heavy metals. Sedimented tailings will not be able to release significant quantities of heavy metal compared with tailings that has been stirred up in the water, as is the case during the deposition. It is therefore expected that, by the end of deposition in the lake, concentrations will drop significantly, which was also observed in Maarmorilik. The difference is that at Maarmorilik deposition was in salt water whereas deposition at Tanbreez will be in fresh water. Sea water is assumed to be more aggressive than fresh water because of the chlorine content. But in both cases sedimented tailings will be covered by either new tailings or natural sedimentation, which will eventually create anoxic conditions in the sediment found below 1 cm. This stops the solution of many heavy metals, especially lead.

KS writes that dust spreads over a much larger area than originally assumed. The EIA report is, to our knowledge, the first time results of the dust dispersion model are shown; "originally assumed" must be an unofficial assumption. KS recommends that it be examined whether the increased amount of dust can have serious implications for agriculture (sheep, lambs and hay). If using EU guidelines on dust are used as a criterion, there will be no unacceptable impacts on grazing or production of hay. If you want to know exactly what dust dispersion means for agriculture, the importance of dust on grazing areas must be better illuminated than it is in the EIA report. It should be possible to carry out a rough assessment without further field work by comparing the dust dispersion model, vegetation surveys and the area of distribution of sheep. One could ask the mining company for such an assessment. DCE/GN will encourage this.

KS wants fences to be erected around the mining area in order to prevent sheep and lambs grazing in areas of high dust impact. DCE/GN does not consider it necessary to have a fence around the areas mostly affected by dust as no sheep are expected in the area, or at least only rarely. If it later turns out to be wrong, fences could be erected. KS recommends carrying out studies of the current content of harmful metals in meat produced in the area and that the level is monitored after start-up of the mine. Mutton or lamb could be included in DCE/GN's monitoring plan. KS writes that there are large quantities of iron which may be dissolved in water in the waste products and they suppose that the Greenland water quality standards are exceeded. Appendices to the EIA report show that the expected concentrations of iron in Foster Lake in three measurements will be 9, 11, 12 µg/L, and the Greenland quality demand is 300 µg/L. Iron is thus unproblematic with a good margin. It must be admitted, though, KS have not had access to this data; however, a summary of the results is shown in Table 9-6, page 80 of the EIA report. It is mentioned that the iron concentration is expected to be 11 µg/L in Foster Lake after 10 years. KS writes that if iron is bound in Pyrite, this may cause problems. The iron is not; it is mainly bound in arfvedsonite which is a silicate.

No. 12. Monika Brune

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
12.1	The environmental report (EIA) describes in great detail the (potential) negative environmental impact of the mine project for example in connection with deposition of tailings in Fostersø etc. The report also list actions to be taken if something goes wrong. But the report also states that it is the management of the mine project that will carry out the control. It is the task of the management of the mine project to solves any problems. Is it the management of the mine that should protect our environment? In other words, should the mine control the mine? This is like asking wolves to look after sheep! How will the Department for Environment and Nature control that the environmental provisions are meet? Will they open an office in South Greenland in the future? Nuuk is far away! And with regard to the extension of Inuli (the cook school in Narsaq) everybody could see how	This is a matter for the Government of Greenland.	DCE/GN Monika Brune is concerned that the mining company will be controlling itself as regards the environment and provides examples from a slaughterhouse where environmental control, in her opinion, has not been good. She asks if the Ministry of Environment and Nature will be strong and brave enough to stop mining production if environmental rules are not respected. DCE/GN informs that DCE is in possession of a large number of environmental samples collected in the Kringlerne area over the past years (before mining is started). DCE/GN will be able to start environmental studies at Kringlerne once mining starts. We can then compare the old with the new samples and see if the mining company has inflicted environmental damage to nature. We will then advise the Environmental Agency for the Mineral Resources Area on these results and leave the decision as to stopping mining production with the Greenland authorities. An important part of our studies will	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	supervision from Nuuk of the construction site failed. Our new slaughterhouse (in Narsaq) should have a good waste management plan in place before production could start. But due to pressure from sheep farmers and from Nuuk they started the slaughtering before a good solution to the waste handling was found. Our administration has been way too weak! Will the Department of Environment and Nature be strong enough and have the courage to stop the production at the mine if the environmental regulations are not followed? Or will they argue that we will lose jobs and tax revenue and ignore environmental problems?		be aimed at Foster Lake, Laksetværelv and Lakseelv. The mining company will, however, also have to perform some measurements itself in the form of self-monitoring, in particular the daily, weekly and maybe monthly measurements which may be important to the operation and the environment. For example: how much is deposited, the temperature of the waste, how much water is used to pump the waste into the lake, how much dust is in the air where people live, and probably much other issues. But actual investigations of the environmental impact will be carried out by independent parties.	

No. 13. GEUS

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
13.1	GEUS has received and gone through the hearings material concerning the Tanbreez project. Initially we would like to mention an imprecise and wrong formulation: "...the rare earth element eudialyt and the mineral feldspar at Killavaat Alannguat (Kringlerne)". Eudialyt is a mineral that contains rare earth elements, but it is not a REE itself. In the present project the rock kakortokit will be exploited because of its contents of REE, niobium, tantalum and zircon and the mineral feldspar.	The comment is acknowledged and the text in the EIA report will be corrected.	DCE/GN No comments.	The text will be corrected.
13.2	The Tanbreez hearings material concerns social-, environmental and security issues in relation to mining and this is outside the subjects GEUS deals with in relation to mineral resources in Greenland. We therefore have no comments to the hearings material.	Comment is noted	DCE/GN No comments.	None
13.3	If GEUS is expected to maintain knowledge preparedness regarding production of mineral resources at Killavaat Alannguat it is important that GEUS has access to the technical and economic information regarding the plant and production. Of special importance is	This is a matter for the Government of Greenland.	DCE/GN No comments.	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	knowledge about exploration, calculation of ore body, production data (mine and processing) and tailings.			
13.4	As national databank for both Greenland and Denmark is it important that an agreement is made how data on exploration and mining is transferred regularly to GEUS.	This is a matter for the Government of Greenland.	DCE/GN No comments.	None
13.5	GEUS would like to receive the documentation regarding the resource estimates and mining calculations that forms the basis for the feasibility study as well as an opportunity to comment on this.	This is a matter for the Government of Greenland.	DCE/GN No comments.	None
13.6	It should also be secured that GEUS in connection with the exploitation activities at any time has access to geological sampling in accordance with § 2 stk. 4 of the Inatsisartut law no. 7 from 7. December 2009.	This is a matter for the Government of Greenland.	DCE/GN No comments.	None

No. 14. DTU Wind Energy

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
14.1	Power supply The conclusions in the EIA report (5.17.3) are based on Report "Hydropower Plant REP0029, rev. 3". The report describes in general the costs related to four power supply possibilities: 1. Connection to existing network 2. Alternative hydro power plants 3. Extensions of Qorlortorsuaq 4. On site diesel	(Introduction)	DCE/GN DTU states that it is possible to supply the mine with power based on hydropower, supplemented by diesel energy in short periods, e.g. in the start-up period of the mining project. Furthermore, it should be possible to combine wind energy and hydro power in a beneficial way. DCE/GN approves of the fact that hydropower and wind energy opportunities by explored in order to minimize the use of diesel. Narsaq and Qaqortoq power supply plants should be involved.	
14.2	Option 1. Connecting to the existing network focuses on the existing capacity, hydro 2x2.6-3.6MW depending on the water level and diesel 2x1.69 + 7x0.92MW = 9.82MW. The maximum expected consumption, Tanbreez 4.5MW + towns 6 MW = 10.5MW, means, as is also the conclusion, that there is sufficient capacity in the system. The total amount of energy available from Qorlortorsuaq is 32GWh/year, 21GWh of which is used for electricity directly and the	No answer is required from TANBREEZ. The prices per kWh are politically decided.		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	remaining 11GWh converted into heat. The 11GWh, equalling 1/3 of the requirement, may be used at the mine while the remaining 19GWh can be produced by the existing diesel generators. The cost of this solution is estimated on basis of the general consumer price 2.60kr/kWh (2013) + transmission 0.08kr/kWh (17.5 million kr/300million kWh = 0.058kr/kWh) = 2,68kr/kWh (2.658kr/kWh). The assumption that the mine's electricity prices will be the same as that of the current consumers is not realistic. The 11GWh hydro-power that the mine will buy is sold by Nukissiorfiit today as district heating at 0.8kr/kWh; provided that the expenditure is unchanged, the price of electricity will be 2kr/kWh for all if it is sold as electricity. The remaining 19GWh has to be produced by existing or new diesel generators in the towns, alternatively on site. The excess heat, 10-15GWh, can be used in the district heating system and will compensate for the lacking 11GWh from the electric boilers. Heat production will be sold in the existing network and			

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	will have a value equivalent to approximately 0.1x the price of oil (5.85) = > 0.585kr/kWh. Residual heat utilization and distribution of Nukissiorfiit's basic expenses of the dual production should mean that unit costs will be lower than what a new on-site diesel plant will be capable of performing. The fuel is utilized much better and will have significantly less impact on the environment. With this solution it would be possible to supply power to the mine as soon as the power line is established. <i>The supply line can also be seen as security for the mine no matter which option is chosen. If it can be established at 17.5 million kr and a reasonable electricity price be negotiated with Nukissiorfiit, it is cheap security of supply. The line will be able to supply the mine during the 20-25% of the year when processing is expected to be at a halt.</i>			
14.3	Option 2. New, smaller hydro-power plants will, as described, probably not be a competitive option.	No answer is required from TANBREEZ.		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
14.4	Option 3. The expansion of Qorlortorsuaq with an additional turbine and an increase of the surrounding area to the estimated 63GWh/year will be a natural extension of case 1. If Nukissiorfiit can expand the plant and supply clean energy to mine, this will of course be an advantage for both Tanbreez and the environment. In addition to price, the construction period (2014-17) is mentioned as a problem in relation to this option because the mine is expected to start production in 2016. <i>Based on the existing diesel capacity, the extension of Qorlortorsuaq will not necessarily delay the mine if a diesel -based supply can be accepted during the transitional period. Depending on the mine's required security of supply, this option is also likely to require some onsite backup for vital systems.</i>	No answer is required from TANBREEZ.		
14.5	Solution 4. Cost calculations for this case are based on relatively optimistic assumptions. 6,776,000 liters = 5624080kg for 30GWh = > 187.5g/kWh. This is in accordance with the manufacturer's test at the given load (laboratory test according to ISO 3046), but an increase in consumption is likely, as circumstances are not comparable	The heating value of diesel from Wärtsila is stated to 188 g/kWh. It would be reasonable to add additional 5% for operations in Greenland based on information from PAP. This changes the heating value to approx. 197 g/kWh. However, PAP has used 199.9 g/kWh in the attached diesel consumption estimate. (See also Memo in		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	with those of the testing laboratory; furthermore, there will be start-up, idling and so on. A more realistic consumption in normal industrial operation is 195g/kWh (0.235L/kWh). The fuel costs (5.35kr/l) that have been used here seem low compared to what other similar projects pay at Polar-oil (5.85kr/l). The direct fuel cost will thus be on 1.37kr/kWh. If the remaining costs from Table 5 (0.354kr/kWh) are used, the price will be 1.724kr/kWh, and if Tan-breez can get a price of 5.35kr/l, the price will be 1.61kr/kWh. <i>The supply line can also be seen as security for the mine no matter which option is chosen. If it can be established at 17.5 million kr and a reasonable electricity price be negotiated with Nukissiorfiit, it is cheap security of supply. The line will be able to supply the mine during the 20-25% of the year when processing is expected to be at a halt and allow for servicing of the power plant.</i>	reply to section 10, Nukissiorfiit's hearing response). Polaroil has stated and estimated a day price of 5.21 kr./kWh per 14 February 2014 or approx. 3% cheaper than the price used in the report Hydropower Plant REP0029, ver. 3.		
14.6	Alternative option Based on our analysis of the wind climate in South Greenland, for example Qaqortoq (source: Wind Energy Feasibility Report	Comments taken into account.		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	Qaqortoq, Greenland) and a favorable development of low-wind turbines, a water and wind power solution might be an alternative to the other options. DMI's official climate station in Qaqortoq, 04272, 57m above the sea, has registered an average wind speed of 10m above ground level of 4.4m/s. Further studies have shown that the wind speed may reach 5.7m/s at an altitude of 80 m on a plateau 200m west of the town. Suitable turbine sites with even higher wind speeds will most likely be found in the mining area and along the existing high-voltage line. Modern low wind turbines will at for example 6 m/s provide a crude capacity factor of up to 30%. If port facilities, roads and other infrastructure at the mine are used for deployment, the cost could be lowered considerably (source: Feasibility study of implementation of wind power in the Nanortalik energy system). The advantage of a water and wind solution is that these work well together and that more turbines could be added as needed. A possible scenario could be three modern mills of 3-4MW along with			

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	three 3.6MW hydropower generators, with an option to use existing boilers for additional control. The cost of this kind of installation, in the relevant area, will be roughly 35-45mill.kr/turbine + operation and maintenance 0.15kr/kWh. Production will be around 4-7MW/turbine, resulting in a simple unit cost of 0.8-1.3kr/kWh + capital costs depending on wind resources and the existing infrastructure. If mining is increased to 1.5 million tons/year and the energy requirement to 75 GWh/year, wind power will be a prime candidate to supply the missing energy, the discharging neutral.			
14.7	Dust Dispersion Study In the emissions report (01/08/14) the mean load at the power plant is given to be 4300 kW on 292 days/year and 1318 kW on the remaining 73 days. This results in an average load of 81.6% of the capacity versus 70% at 3700 kW. On the remaining 73 days, only one unit will be online. This results in a consumption of 32.4GWh.	Please see Memo in reply to section 10, Nukissiorfiit's hearing response; memo contains new diesel figures.	DCE/GN DTU Wind Energy states that the calculations of particle emissions from the diesel power plant are not correct. DTU believes that there is a (small) error in the calculation of the CO₂ emission from the power plant. If a diesel power plant is established, the mining company is asked to comment on DTU's comments on particle and CO₂ emission.	The figures on CO₂ emission will be corrected in the final version of the EIA report on basis of the new diesel figures.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	The maximum emission with both units online and a load of 100% is 0.2558 g/s, based on a maximum discharge of 50 mg/Nm³ and flow through the engine of 2.558 Nm³/s. The flow through the engine seems to be incorrect. With a calculation based on the stated flow of 5.32kg/s at 348°C the flow will be 4,1Nm³/s, which increases the quantity discharged by 60%. Assuming a linear reduction of particle emissions with the load, this is reduced to $0.816 \times 0.2558 = 0.2087$ g/s or 5.7 tons of fine particles per year. <i>The 50 mg/Nm³ and the linear reduction of the load is not believed to be entirely correct, but it may be used as a simple estimate at relatively high pressures and an unknown load profile.</i> In this section, the generator fuel consumption is given as to 198.39 g/kWh which is significantly different from the 187.5g/kWh used for economic analyses. <i>I have not been able to derive from the material where the 198.39g/kWh comes from.</i> CO₂ emissions			

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	According to the EIA (9.2.2) the mine is expected to emit 20,881 tons of CO₂/year, based on a diesel consumption of 7.8 million liters. <i>In the Hydropower report, the same power plant emissions are expected to be 6.776 million liters which must be wrong.</i> <i>If the values of Greenland Statistics are used:</i> emission factor 73.326 kg/GJ, calorific value 42.7GJ/t and density 0.82 kg/l, the emissions are 2.567kg CO₂/l or 20,003 tons/year at 7.8 million liters. When this is compared with the 2012 release of Greenland, 577 tons, this is equivalent to 3.5%.			
14.8	Wind measurements This project uses a weather station "Killavaat Alannguat" 10 meters to accumulate data on wind for the (dust) dispersal modelling etc. <i>The station is marked on the map at c. 340 m altitude above sea level on the north-west side of the mountain but in the EIA report (6.7.1) it is mentioned that the station is at 450 m.</i> The 17 months of recording during the period 2010-2011 which are presented in the report "6b1 Climate and hydrology" show large	The weather station at Killavaat Alannguat is located at 450 m altitude. The position shown on the map is just indicative and should not be used to determine the height above sea level for the station.		None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	variations in the few overlapping months. The average wind (speed) during the first year of recording is specified as 3.8 m/s, the maximum middle wind during 10 minutes as 32.1 (m/s) and the maximum wind speed in gusts as 52.4 m/s. If these recordings are compared with the recordings from the nearest official weather station for the same period and the last 10 years Table 1 (see below) it shows that the recordings seems reasonable, however based on our many years of experience in wind measurement in Greenland I know that such measurements are uncertain. In addition to the on-site measurements (3.3) some older data (1961-1999) from Narsaq and Qaqortoq are also presented. Based on these data long period with wind speeds less than 1.5 m/s are mentioned for Narsarsuaq (44%) and Qaqortoq (41%). This is not in accordance with more recent data from these stations which are presented in the "Dust Dispersion Report" (41.). Here wind speeds from the ten-year period 2003-2013 for week winds less than 1.5 m/s make up only 15-22%.	In order to portrait the overall climatic conditions in the mine area, the official 1961 – 1999 wind data series is used. However, in connection with the dust dispersion study newer data were selected although this data set consist on only 10 years and not the 30 years that is normally used to describe the "climate" of a site. The shorter but newer wind data were chosen in order to make sure that the dust dispersal study was based on the most realistic wind scenario in the area.		

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14.9	Uncertainties The climatic conditions and the complex terrain with large variations in altitude give rise to large variations in geography and weather over time. Measurements conducted in the standard height of 10 m above terrain this means that the data only applies to a very small area around the station (10 – 50 m). In addition, the quality of wind data depends very much on the equipment used and how it is mounted on the mast which is not documented. Icing of the instruments is another factor that can cause uncertainties, but to which extend corrections are made for this is not mentioned. In order to assess the distribution of wind in a larger area it is necessary to use models, in this case the CAL-MET (model). This is an advanced model that often gives a good picture (of the wind distribution) but also has its limitations in relation to the physical representativeness in relation to the meteorological conditions. The models are challenged by a very complex ter-	The choice of site and equipment for the weather station Killavaat Alannguat was done by staff at Orbicon with decades of working experience with weather stations in Greenland. Only equipment of the highest quality has been used and the equipment has been position on the mast in accordance with international standard. Icing is a well-known phenomenon in connection with compiling weather data during winter in Greenland. Wind at Tanbreez is therefore measured with a Young "alpine" anemometer situated on top on a 10 m mast. This particular type of anemometer is specifically designed to minimize problems with icing.		None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	rain by local and regional meteorological/physical processes and a thorough validation (of the data) is therefore necessary in order to assess the results. <i>Documentation for the validity of the results seems to be missing and as a minimum an assessment of the expected uncertainties.</i>	The CAL-MET program was selected because this very advanced was considered the best model to use under the present conditions. The processing of meteorological data with the CALMET software was carried out by Golder Associates and subsequently validated by AirQuality.dk who prepared the dust dispersal study report.		

	Elevation	2003-2013	05.2010-10.2011	Periode/10 år ref.
Narsaq 04280	25 m	2,5 m/s	2,3 m/s	0,92
Narsarsuaq 04270	27 m	4,3 m/s	4,5 m/s	1,05
Qaqortoq 04272	57 m	4,5 m/s	5,0 m/s	1,11
Killavaat Alannguut	340 m	-	3,8 m/s	-

Tabel 1 periode sammenlignet med 10 års reference periode, Data fra DMI tr. 13-11

No. 15. KANUKOKA (VVM)

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
15.1	The main (EIA) report starts with a brief description of the project, which gives a good overview of the projects elements and design. As it is well known KANUKOKA pay much attention to if the non-technical summary includes the relevant information for people without technical skills and gives an honest and comprehensive picture of the environmental impacts the project may have. Overall the non-technical summary of the Tanbreez project meet this requirement, but with provisions for the issues that are mentioned in the following. KANUKOKA would like to stress the importance of the non-technical summary being written in such a way that it is easily accessible for people in towns and settlements. KANUKOKA believes that generally the main elements of the EIA report covers and addresses the environmental issues that can be expected but access to the background data and calculations are missing. This makes it impossible	No response is required		None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	for independent experts and interest groups to assess the conclusions in the report. In a number of cases are the studies that are carried out not sufficient to provide a basis for decision making.			
15.2	Deposition of tailings The largest risk for a negative impact on the local environment comes for the material (tailings) that will deposited after removing the valuable elements. Tailings contain a number of substances that are harmful to the environment. It is therefore essential that the EIA gives a fair and comprehensive picture of the short and long-term consequences for the environment the different alternative for handling of tailings gives. In the EIA report the company only focuses on a deposition of tailings in Fostersø. Alternatives such as dry-depositing are not sufficiently studied. It should be required that alternative are analyzed and described and that the consequences of continuous mining past Phase 1- that is exploitation of the entire ore body – is included in the EIA.	Dry deposition of tailings is not a realistic alternative because the material will be finely gained powder that will be dispersed by the wind. The EIA covers 10 years of mining. If the mine company decides to continue mining it will require a new permit from the authorities including a new EIA.	DCE/GN We agree with Tanbreez' reply. Kanukoka's hearing response indicates, however, that the mining company has not succeeded in presenting convincing arguments for the lead estimates.	DCE/GN recommends that the mining company include lead estimates in the next version of the EIA report. TANBREEZ: Lead estimates will be included in the final version of the EIA report.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	It is KANUKOKAs opinion that that the description and studies regarding the deposition of tailings in Fostersø in a number of ways is inadequate. Table 9-6 shows that the concentration of metals in Fostersø will increase from year 1 to year 5, but then no further increase in the pollution will take place. From a logical point of view this does not seem seems likely; the large amount of tailings will gradually reduce the depth in the lake and the (tailings) material will mix with a gradually smaller volume of water. Anything else being equal this must lead to a higher (metal) concentration in the water. The conclusion that the lead leaching to the downstream river system will remain constant over time build in the view of the municipality on the wrong condition that material (metals) will not be mobilized for the deposited material and that (tailings) material will not leach pollutants to the water when covered by new material. This assumption is not documented in the available parts of the hearings material).	The concentration of metals in Fostersø will reach a steady state after a number of years because; (1) the amount of metals the dissolve to the lake water re-main constant since metals only dissolve from the top layer of tailings in direct contact with the lake water and (2) although the volume of water in the lake decreases as more and more tailings material is deposited the flow of clean water through the lake (from precipitation and springs) remains the same. This means that the dilution in the lake with inflowing clean water is higher for every year. In Fostersø it is calculated that a steady state where the content of metals are stable will be reached after about five years. When the deposition of tailings stops at mine closure the concentration of metals will fall again and reach the natural back-ground level after a few years. The calculations, geochemical tests and predictions in connection with the tailings deposition in Fostersø are made by Golder Associates (in Luleå in northern Sweden) and is based on chemical tests using tailings from a test run		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	When it is taken into account that there is no temperature stratification in the lake in June as shown in Figure 6.7, and that the water body (of the lake) will mix at least in spring and autumn and during the very powerful storms, it must be expected that the concentration (of metals) will increase during the entire period where Fostersø is used for deposition of tailings.	and on their general experience with deposition of tailings in lakes in arctic environment which is normal practice in Northern Sweden and for example also in Canada.		
15.3	The hydrological studies of the lake are not sufficient to give a fair picture of the dynamic of the lake and the river-system and how the deposited material will behave. The (EIA) report describe a situation where ice blocked the outlet of the lake and then gave away leading to a flush of water from the lake into the river. Such a catastrophic discharge must be expected to lead to stir up material from the lake bottom and cause an extraordinary transportation of sediment to the river-system and thereby increase the pollution of Lakseelv. There are not enough measurements and sampling to document this event and in the municipality's opinion has the Company not evidence to say that this occurrence is unusual – such a situation is probably a normal part	The spring discharge of lake water after ice has blocked the outlet of Fostersø for some months with potential implications for the rivers downstream will not take place if Fostersø become part of the mine and is used for tailings deposition. This is because a dam with a sluice will then will be constructed that permits the outflow to be controlled (described in more detail in the EIA report page 80-81).	DCE/GN DCE/GN believes that the hydrographical conditions in Foster Lake are sufficiently investigated (however, the report has not been made public by the mining company until recently); on the other hand, we cannot dismiss the idea of an ice plug which is also mentioned in the EIA report, page 37. DCE recommends that a permit to the mining company should stipulate that an ice plug, which may well cause catastrophic discharge of the lake, cannot occur.	Conditions in relation to ice plugs should be part of a permit; or the mining company binds itself unequivocally to preventing a catastrophic discharge of Foster Charge as a result of a thawing ice plug. DCE/GN: Add a section to the EIA report about potential mining for more than 10 years.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	of the dynamic of the water system that happens every year. The (Greenland) water quality standard will not be meet in the primary recipient (the lake) but it should be a requirement that it is meet in Laksetværelv and not just in Lakseelv as stated (in the EIA). The highest concentrations must be expected during winter when the natural input of water to the lake is low. During this period harmful concentrations will be discharged from the lake at a time when the arctic char are wintering in the river. The (EIA) material only deals with concentrations. Since lead and other metals are not degradable that disappear over time they will accumulate in the ecosystem from the start of the project till several years after mine closure. This will cause an increasing impact on the river and the fjord which is not shown by only focusing on concentrations. It should therefore be required that the overall pollution load in actual volumes for the entire potential mine life is calculated and the consequences assessed. It is only metals leaching have been discussed (in the EIA). The	It is a matter for the Greenland authorities to define where the Greenland water quality standard has to be met. For the present project it has been agreed that the standard should be meet where water from Laksetværelv mixes with water from Lakseelv. Water will not be discharged from Fostersø when the flow in Lakseelv is very low (for example due to cold weather). Only when the flow in the river is so high that the Greenland water quality standard can be meet will water from Fostersø be discharged into the river-system. Metals that dissolve from tailings deposited in Fostersø will remain dissolved in water when the water moved through the rivers into the fjord. Lead and other metals will therefore not accumulate in Lakseelv (or the river sediment) or in the aquatic flora and fauna. The	DCE/GN Kanukoka believes that water quality standards for not only Lakseelv but also Laksetværelv must be met. This is a political decision. DCE/GN does not believe that Laksetværelv, which does not have a char population and does not share the same chemistry as Foster Lake at the beginning of its course, should be considered the primary object of environmental protection. Please note that the threshold value for lead is very low. It is based on the concentration that is acceptable "in the environment" and not the concentration which is acceptable in tailings dams or other deposits. DCE/GN: Kanukoka believes that not only concentrations should be estimated, but also the overall pollution load for the lifetime of the mine including impact analyses. The mining company should be asked to carry out quantity estimates. It is thus easy to esti-	

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	EIA does not contain information on which (other) substances that the deposited material contains and which compounds that occur. Independent experts have therefore no way of controlling the claim in the EIA that the concentration of pollutants will stabilize with time.	amounts of metals that will be washed into the fjord from Fostersø if the lake is used for tailings deposition will be negligible compared to amount of metals that is washed into the fjord from the mountains. Tailings from the Tanbreez mine will consist of grinded rock except for the products that have been extracted by magnetic separation. No chemicals will be used in the process. The material that is deposited in Fostersø is therefore identical to the surrounding rocks – except for the minerals that have been extracted. No other substances can therefore be released from the tailings that can impact the environment. All background studies that form the foundation for the EIA report have been made available for the Greenland authorities and their advisors. Most reports are also available on the mine company's web side.	mate that the quantity of lead dissolved from tailings annually into the water in which tailings is deposited is 9 kg. DCE/GN: Kanukoka wants specific information about the substances of the deposited material (concentrations and chemical combinations). This information is found on the mining company's web site; see the link from the hearing portal which was published shortly before the original expiry of the hearing period on 2 December 2013.	
15.4	The planned monitoring program will only provide data that shows when things have gone wrong – not remove pollution when it has taken place. Any harmful impacts	A detailed monitoring program will be part of the mine operation. This will include regular (daily or weekly) sampling of lake water	DCE/GN In principle, Kanukoka is correct. An efficient monitoring program is	None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	will continue for a very long period of time because Fostersø will continue polluting the river-system and the fjord which is a sill fjord with very limited water exchange.	and water from streams and rivers in and around the mine. If any unexpected pollution of the environment is identified immediate action will be taken.	therefore very important especially in the beginning of the project. DCE/GN agrees with Tanbreez' reply.	
15.5	Based on the material presented KANUKOKA is uncertain if deposition of tailings in Fostersø is the environmentally best and most responsible solution and will recommend an alternative: that dry deposition in the mine is studied as an alternative.	Tailings are finely grounded power which cannot be deposited on the ground because of the strong winds in the area. The mine will be an open pit mine with no possibility for deposition of tailings. There are therefore no alternative to a deposition under water.	DCE/GN It would seem that Tanbreez' reply is correct. Had it been a closed mine, deposition of tailings could be done in abandoned mine tunnels.	None
15.6	KANUKOKA will encourage that the Company is imposed to carry out a thorough analysis of the consequences of dry depositing of tailings, which according to the view of the municipality will improve the environmental profile of the project. Furthermore it should provide better scientific evidence of the consequences of a deposition in the lake.	This is a matter for the Greenland authorities.	DCE/GN DCE/GN does not agree with Kanukoka on dry depositing of tailings. We do not find it necessary to further document the consequences of deposition in Foster Lake.	½
15.7	Dust: It is not explained what the dust from the mine contains and it is a problem that it is concluded that "the dust dispersal will be low and local and will not contain toxic components" (page 12) while	The dust that is generated in connection with the mining activities consists of the same material as the rocks of the mountain (page 72 in the EIA-report). Between 80 and 90% of the dust in the air is	DCE/GN Kanokoka is not satisfied that dust from the mining process is assessed not to contain toxic components while there are calculations in other parts of the report that show a content of arsenic,	DCE/GN: Add an assessment of "fluor in dust" to the EIA report A text on fluorine will be added to the final version of the EIA report.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	there in another part of the report are calculations that show a content of arsenic, cadmium and lead. Substances such as fluoride, phosphor, nitrogen and other substances are not covered. Figure 9.1. shows that particles will only disperse 5 km, this figure seems surprisingly small. The chosen model does not calculate the contents of dust in the air but the amount of dust that settles on the ground.	generated by trucks on the dirt roads. The rocks in the mine area contain a large number of metals but in very small – and harmless – amounts. This includes arsenic, cadmium and lead which occur in concentrations far below any air quality standard (see page 74 in the EIA report). The dust dispersion study models the amount of dust in the air (ambient particulate matter concentrations, page 73 in EIA) and the dust-fall. To document that the ore contains no solvable fluorine TANBREEZ will test a number of samples in accordance with a protocol agreed with the DCE. The results will be included in the final EIA report.	cadmium and lead. Substances like fluoride, phosphorus, nitrogen and other substances are not covered, according to K. DCE/GN agrees that fluor should have been handled in the report. However, we disagree that the other substances would pose a threat. The concentrations in the ore are very low, and toxicity tests have shown low or no toxicity in the mineral substances that have been tested. The latter also indicates that the likelihood of soluble fluor in harmful quantities is small.	
15.8	Waste handling KANUKOKA is surprised that reference is made to the waste handling system in Kommuneqarfik Sermersooqs (page 30) when the project is located in Kommune Kujalleq. No explanation for this is given and in any circumstances should it be a requirement that a study of the waste handling in	This is a mistake that will be corrected in the final version of the EIA.		Reference should be made to the waste handling system in Kommune Kujalleq (not in Kommuneqarfik Sermersooqs) The mistake will be corrected in the final version of the EIA report.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	Kommune Kujalleq is included as an alternative.			
15.9	Finally should it be pointed out that the closure plan is inadequate and that BMP should require a much more detailed plan prepared.	This is a matter for the Greenland authorities. However, it should be noted that the closure plan in the EIA report is only a preliminary draft plan meant to set out the overall framework for a much more detailed plan that will be prepared by the mine company – and must be approved by the authorities – before mining commences.	Closure is governed by the Mineral Resources Act section 10 (§§42-44). According to section §43 of the Mineral Resources Act, a specific closure plan incl. guarantees covering the costs of closure must be approved by Naalakkersuisut, before exploitation can begin. It goes without saying that this will apply to this mining project as well. DCE/GN We expect a more detailed closure plan to be prepared at a later point.	None

No. 16. Avataq

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
16.1	In December 2013 Avataq together with the NGO-coalition asked for an extension of the time for submitting letters as part of the hearings process. The reason was that the material submitted by the BMP was missing documents that are essential as documentation for the EIA report was not been made public available. The NGO coalition subsequently received a letter from the Environmental Agency for the Mineral Resources Area (EAMRA) in which it was informed that the period was extended to the 6 January 2014. This, however, was not satisfying for the NGO-coalition members and in a press note from the 13. December 2013 it was stated that one would maintain the requirement to have the hearing period extended to 20. January 2014. Since the EMRA or the MLSA did not react to this the NGO-coalition assumed that this was accepted. Fist part of the hearings material consist of comments to the EIA report (in Danish and English) prepared by Orbicon A/S on behalf of Tanbreez Mining Greenland A/S as well as part of the background	No response is required		None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	material which after pressure from the NGO-coalition was released by the EAMRA. The second part will consist of comments regarding the public hearings that took place in South Greenland in November before the original consultation deadline (6. December 2013). There are no comments to the SIA report.			
16.2	Little about the geochemical properties of the Killavaat Alannguats The area where Tanbreez plan to build the mine is within the world famous Ilimmaasaq-intrusion. The unique geology of this area was already realized by K. L. Giesecke back in 1806-09 who also named the first six out of 220 identified minerals (Petersen 2001:26-33). The attentive reader will find it remarkable that the description of the geology of area in the EIA-report is without references to scientific literature. In the geology-section (6.2) it reads: "It is the type locality for agpaitic nepheline syenites and represents an enormous concentration of a number of rare elements particularly Li, Be, Nb, Zr, Rare Earth Elements (REE), Y,	The lack of source for the sentence in the geological section is a regrettable mistake. The correct scientific source will be added to the final EIA-report.		The scientific source will be added to the geology section

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	U and Th. This explains the presence of about 220 minerals, 27 of these discovered in and first described from the complex, and nine only found there." (Orbicon 2013:34). This sentence is without reference which appears strange as it must be assumed that it is based on some scientific opinion. If one searches the literature regarding geology for the area the sentence quickly appears as it is copied from the preface of the public Henning Sørensens GEOLOGY OF GREENLAND SURVEY BULLETIN 190 • 2001 [...] (Sørensen 2001:5). Only the author knows why the source is not mentioned.			
16.3	Fluorine Since it must be assumed that the author (of the EIA) has consulted GEOLOGY OF GREENLAND [...] it is strange that the element Fluorine is not mentioned a single time in the 114 page EIA report. Fluorine is similarly not mentioned in the back ground reports prepared by Golder Associates Sweden. This element is well-known from the Ilimmaasaq-intrusionen. 29 out of the 220 minerals contain fluorine (Petersen 2001:26-30). Fluorine in	The question about fluorine at the TANBREEZ projects ground originates from a sample (No 154335) in a black kakortokite reported by Bailey et al. (2001) in GEUS Bulletin 190 (page 41) where a content of 2% fluorine is assayed. Fluorine within the Ilimaussaq Complex occurs mostly in two forms:	DCE/GN The fluorine issue has already been addressed. See section 21.2.	A text on fluorine will be added to the EIA report.

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	its most dissolvable form is found in the mineral Villiaumit which consists of almost pure sodiumfluorid (NaF) (e.g. Bondam & Ferguson 1962). Tanbreez is particularly interested in exploiting kakortorkit (Orbicon 2013:34). The black kakortorkit has a content of fluorine of 20700 ppm, the red 3830 ppm and the white 10500 ppm (Bailey et al 2001:41), in other words relatively high values. It is therefore remarkable that fluorine is not appearing in a single of the samples of tailings, waste-rock and concentrate Tanbreez handed over to Golder Associates Sweden for analyzes and for which some 70 elements have been identified. The occurrence of sodium (Villiaumit) i Kuannersuit constitute a significant health and environment problem if mined, a problem that has not yet been solved. See more information on the fluoride problem on for example http://fluoridation.com/bones.htm). One gets the impression that fluorine has been systematically removed from all reporting including the background reports which the conclusions in the EIA report builds on and Orbicon should explain why this is so. The mobility	1) villemite (Villiaumit) or sodium fluorite (NaF); 2) fluorite or calcium fluorite (CaF₂). Villemite or sodium fluoride is highly soluble at 4.22 g per 100 cc of water which makes it defined as a dangerous chemical with a fatal dose of only a few grams. Calcium fluoride is a compound with a solubility constant of only 3.9×10^{-11} making it virtually totally insoluble. Fluorite in the mineral of calcium fluoride is thus regularly found on the surface where it is not even affected by weathering and as such is defined as totally safe. At Ilimaussaq and many other places in the world fluoride can easily be found on the surface unweathered and thus cannot contribute fluorine to the environment. Villemite (NaF) is never found on the surface and certainly not within about 10 – 50 m of the surface as it is rapidly dissolved by ground water. Even samples taken from underground in the 1970's and left on the surface have largely lost these fluorine		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	of fluorine or the lack of it should also be explained.	due to dissolution of most of its villemite. Thus villemite can produce fluorine rapidly into the ground water while fluorite cannot. At Ili-maussaqa villemite when it dissolves from a rock it leaves a characteristic hole which is often cubic in shape, thus on the surface the presence of villemite can be inferred from the holes often cubic in shape. No villemite or holes after villemite have been detected south of fjord and certainly never on the TANBREEZ projects ground. Geology further shows, the villemite is restricted to the hypo agpaitic rocks which again only are known to occur north of the fjord (off these licenses) where they formed as a last stage differentiate. The sample No 154335 quoted occurs within a black kakortokite was still in the archives of GEUS. This sample has been re-examined. This sample was taken from the surface contained none of the characteristic holes after villemite. Secondly, such surface samples nowhere in the complex contain fresh villemite on the surface (in		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		fact villemite has never been anywhere in the world). Thirdly, slides taken of the rock and micro photographs clearly show fluorite grains (see photo at the end of letter 19) here up to 1 mm in size. There is sufficient amount of fluorite in this sample to explain the fluorine assay in the original rock. Thus, there is no chance geologically, chemically or physically for any villemite to be in sample No 154335 and certainly it cannot contribute to any fluorine pollution to the water. To document that the ore contains no solvable fluorine TANBREEZ will test a number of samples in accordance with a protocol agreed with the DCE. The results will be included in the final EIA report. <u>Literature</u> Bailey, John C., Gwozdz, Raymond, Rose-Hansen, John and Sørensen, Henning. 2001. Geochemical overview of the Ilímaussaq alkaline complex, South Greenland I: Sørensen, Henning (ed.) GEOLOGY OF GREENLAND SURVEY BULLETIN 190 – 2001. The Ilímaussaq alkaline complex, South Greenland:		

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
		status of mineralogical research with new results.		
16.4	Aluminium The content of aluminum in samples of waste-rock has been determined to 76900 mg/kg and 61300 mg/kg and in tailings (72700 mg/kg and 24700 mg/kg) (Golder Associates Sweden, 3.2 Total Element Content). It has been shown that aluminum under certain circumstances can have a negative impact on the gill-function of trout (see for example Dietrich & Schlatter 1989) because of increase production of slime and death of cells with will cause death. The impact of aluminum on trout has not been covered by the EIA-report.	It is correct that the aluminum content in waste-rock and tailings are somewhat elevated compared to average "rocks" but the values are not very high. However, tests, simulations and calculations carried out by Golder Associates (Sweden) in connection with the Tanbreez project – and approved by Danish Centre For Environment And Energy and Greenland Institute of Natural Resources – estimate the concentration of aluminum in Fostersø after 5 and 10 years of tailings deposition will only be 74-98 µg /l. This concentration will be further reduced in Lakseelv (where the fish lives) since the discharge from Fostersø only makes up around 20% of the flow in Lakseelv.	DCE/GN Avataq points out that all waste rock and tailings samples contain aluminum, and state that aluminum under certain circumstances has a very negative impact on trout. The circumstances they refer to are that dissolved and colloidal aluminum is very harmful to fish. This is not expected in connection with this project; see DCE/GN's reply to an almost similar comment from Kommuneqarfik Sermersooq, following section 21.10.	None
16.5	Literature 2001 Bailey, John C., Gwozdz, Raymond, Rose-Hansen, John and Sørensen, Henning Geochemical overview of the Ilímaussaq alkaline complex, South Greenland I: Sørensen, Henning (ed.) GEOLOGY OF GREENLAND SURVEY BULLETIN	No response is required		None

No.	Question/comments	TANBREEZ' answer	Comments from authorities	Changes to EIA
	190 – 2001. The Ilímaussaq alkaline complex, South Greenland: status of mineralogical research with new results. 2001 Petersen, Ole V. List of all minerals identified in the Ilímaussaq alkaline complex, South Greenland. I: Sørensen, Henning (ed.) GEOLOGY OF GREENLAND SURVEY BULLETIN 190 – 2001. The Ilímaussaq alkaline complex, South Greenland: status of mineralogical research with new results. 2001 Sørensen, Henning. Preface. I: Sørensen, Henning (ed.) GEOLOGY OF GREENLAND SURVEY BULLETIN 190 – 2001. The Ilímaussaq alkaline complex, South Greenland: status of mineralogical research with new results. 1962 Bondam, J. og Ferguson, J. An occurrence of Villiaumite in the Ilímaussaq intrusion, South Greenland. Meddelelser om Grønland, Bd. 172, Nr. 2. København. C.A. Reitzels Forlag. 1989 Dietrich, D og Schlatter, C. Aluminium toxicity to rainbow trout at low pH. In: Aquatic toxicology 15 (1989), 3, pp. 197-212.			

II. Environmental related questions and responses (minutes) from public meetings

No. A1. Questions and answers from public hearing meeting in Qaqortoq on 17 November 2013

Mayor Jørgen Wæver Johansen welcomed the participants and audience. Minister for Industry and Mineral Resources Jens-Erik Kirkegaard and Minister for Environment and Nature gave a brief introduction and background for the hearing meeting.

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
A1.3	Citizen Otto Kreutzmann It is stated that diesel energy/energy from diesel generators oil will be used in connection with the energy production and this will increase the CO2 emission. Why has Qorlortorsuaq not been considered as an energy source?	Nikolaj P. Brandt The mine will require a minimum of 4.5 MW. At that time, Nukissiorfiit and the contractor were involved in arbitration proceedings, and therefore we were only able to obtain the information that a maximum of 1 MW would be available in years with adequate precipitation. In August 2012, a settlement between Nukissiorfiit and the contractor was signed and then Nukissiorfiit was able to enter into a constructive dialogue. Nukissiorfiit is currently making investigations to assess whether or not there is sufficient water to install a third turbine. If the price of hydro-generated power is competitive compared to	Naalakkersuisoq Jens-Erik Kirkegaard The mining industry in Greenland will be very energy-intensive. It should be noted that the energy source issue in relation to Kringlerne is an estimate from the company, in accordance with the statutory requirements of Greenland. The company has looked into hydro power. It will further be examined whether other energy sources may be possible. Mayor Jørn Wæver Johansen I support Otto's thoughts. This should be a topic which must be in place from the beginning, i.e. to include sustainable energy. It would be relevant to attach Qorlortorsuaq to the project in Killavaat Alannguat. This may	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
		diesel-generated power, then Tanbreez will also look positively at this kind of power supply. In any events, an emergency diesel generator will be installed at the site. Besides, the distance between Qorlortorsuaq and the planned mining site is 7 kilometres. However, it should be mentioned that a constructive dialogue has been established with Nukis-siorfiit.	generate a financial profit as the increased sale from the hydro power plant could help reduce the prices for the other consumers. Naalakkersuisoq Kim Kielsen Increased activities within mining operations will lead to increased CO2 emission, but the general energy supply handled by Nukis-siorfiit must first and foremost secure the supply for the general public. It is not our duty to secure the supply to the mining companies, but it makes more sense to use hydro power.	
A1.5	Citizen Jensigne Ottosen What will happen with the waste and its effect on us? Will we make use of it, also when the mine closes? Can we expect Denmark to continue to accept to receive our waste? And what about reuse?		Naalakkersuisoq Kim Kielsen A waste management plan has been prepared. The waste for combustion must be burned on site whereas other waste must be transported to a different location, for instance outside Greenland. Or it can be reused. In connection with the approval of the plant, a clear plan for waste management must be prepared. This is a statutory requirement. We do not accept waste management problems. We will not sign	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			any agreements without a waste management plan. Once the plant is closed, nature must be left in the state and condition it was in when the plant was established. However, the surrounding areas will always show signs of the activities, but the effect must be kept at a minimum.	
A1.9	Citizen Sofiannguaq Lund Which other minerals will it be possible to find than those from the extraction and how will they be handled? Will the bi-products be hazardous to the environment? What will the effects of the minerals be?	Greg Barnes We expect that we can use the black part in bricks, besides to other minerals we extract. The white part will be used in glass. Clay will also be used, for instance for bathroom floors. What we have showed you today can, for instance, be used in fish tanks. Investigations will be conducted and these will show which other alternatives that may be exploited.	Head of Environment Agency for Mineral Resources Activities Søren Hald Møller It is contained in the description how all parts of the mined ore should be handled. Our aim is that the processing of ore should not have an adverse impact on the environment. The environment will not be polluted and the surrounding areas will not be adversely affected. It is our overall assessment that the project described will not have an adverse impact on the environment or nature and we do not expect any noticeable pollution as a consequence of the mining activities. The ore to be mined consists of three elements. The red part which is the most valuable one	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			will be processed and exported. The white part will also be exported. The black part, which is not poisonous, will be deposited in the lake unless the company finds a way to exploit it. We hope to do so.	
A1.10	Citizen Sofiannguaq Lund We know that the project involves uranium and that we are not allowed to ask any questions about that, but what are the plans?		Deputy Minister Jørn Skov Nielsen The zero tolerance for uranium has been cancelled. (Detailed explanations were given as to the threshold limiting values, in particular, of uranium). The level of radioactive minerals such as uranium and thorium in Kringlerne is below the level of the former zero tolerance policy. We do thus not expect any problems of that kind related to an exploitation of the deposit.	
A1.11	Citizen Sofiannguaq Lund How will this affect the surroundings and the environment? What about bi-products? How will that affect the sheep farmers and the fish?		Naalakkersuisoq Kim Kielsen Investigations show that the deposit is well below the limit and much lower than the soil we step on. I did not mention this as it has not been pointed out as a problem in relation to nature or environment. The deposits in the lake will not cause any problem for the	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			surrounding area. The contents of lead will be higher and will remain there for five years. I am not concerned. They will show consideration and the work will be monitored closely.	
A1.12	Citizen Jens Jørgen Petersen The fuel used will be diesel oil. Who will supply this and how much will be used?	Nikolaj P. Brandt We have approached Polaroil among others. They know the area and have the vessels. Approx. 6.7 million litres of diesel oil will be required per year which will be delivered to the plant four times a year.		

No. B1. Questions and answers from public hearing meeting in Nanortalik on 18 November 2013

Mayor Jørgen Wæver Johansen welcomed the participants and audience. Minister for Industry and Mineral Resources Jens-Erik Kirkegaard and Minister for Environment and Nature gave a brief introduction and background for the hearing meeting.

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
B1.4	Citizen Heinrich Petersen Why are additional generators needed when there is one in Narsaq and in Qaqortoq? There is one available in Qaqortoq, a diesel one.		Naalakkersuisoq Jens-Erik Kirkegaard Narsaq and Qaqortoq both have hydro power, and there is an extra diesel power plant. The generators in Narsaq and Qaqortoq are extra generators that will be used in case of breakdown in Qorlortorsuaq, and therefore these generators cannot be used by others, – and this also includes Tanbreez. Naalakkersuisoq Kim Kielsen Nukissiorfiit (must supply) / is responsible for supplying towns and villages and therefore has no obligation to supply mining companies. The mining companies must arrange for their own energy supplies. Maybe in the future, the	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			company will be asked to use green energy. Mayor Jørgen Wæver Johansen It is a good idea, Heinrich Petersen. This must be debated / discussed in our community if we have farming. Nukissiorfiit can open an extra turbine. If we redefine the Qorlortorsuaq possibilities, there will be a possibility for the mining companies to get green energy supplies from this source. We are interested in green energy being used for mining operations.	
B1.5	Citizen John Ole Kleist There are many reindeer and musk oxen. I do not believe that there will be no dust contamination.		Naalakkersuisoq Kim Kielsen The surveys are scientific surveys that determine the consequences of mining operations. The surveys show how the dust spreads. The surveys performed by Tanbreez' consultants have been evaluated by our own consultants. As these are now in place, they can be submitted for consultation. Senior scientist Gert Asmund, DCE	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			There are no musk oxen or reindeer in the area. There is no reason to fear fish contamination in Killavaat Alannguat. Naalakkersuisoq Jens-Erik Kirkegaard The scientific surveys form part of the documentation upon which decisions will be made. The companies are required to deposit a specific amount with a bank to be used for the clean-up process. This is also the case in the Nalunaq project. It is the aim that the advantages of mining operations should outweigh the disadvantages.	
B1.7	Citizen Heinrich Petersen Will the mine be left as the gold mine was – without clean-up.		Naalakkersuisoq Kim Kielsen The closing of Nalunaq is now being finalised. Surveys have been conducted at Nalunaq in relation to mussels and fish, and no contamination has been found.	
B1.8	Citizen Heinrich Petersen		Naalakkersuisoq Kim Kielsen	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
	Why is it not possible to install a 3 rd turbine in the water power plant in order not to increase CO2 emission?		It is true that there will be increased CO2 emissions – also in connection with increased mining operations. There are many reasons for this, e.g. the geography of the country. It should also be underlined that there are very clear rules for how the environment should be treated in connection with mining operations and in which state the environment must be left. CO2 emissions will be increase; however, emissions in Greenland are very low compared to other countries. Nalunaq is established under Danish legislation, and we must have similar legislative requirements in Greenland. The environment MUST be restored after closing down the mine.	
B1.11	Citizen Amos Ezekiasen You are saying that there is no uranium. But how high is the presence of uranium? Will there be a bi-product consisting of uranium? It is necessary to perform measurements in any environment.	Greg Barnes The level of uranium in Killavaat Alannguat is the level that is found in fish and human beings. We export fish with no problems. Uranium will not be a bi-product of the mining operations in Killavaat Alannguat.	Naalakkersuisoq Jens-Erik Kirkegaard The zero tolerance policy decision meant that minerals with a uranium contents exceeding 60ppm cannot be extracted. As regards Killavaat Alannguat, the surveys show that the uranium quantities in the rare earth elements to be extracted are far below this limit.	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			Senior scientist Gert Asmund, DCE There is a small quantity of uranium, however, it is not higher than the general natural background radiation. It is insignificant in terms of radiation.	

No. C1. Questions and answers from public hearing meeting in Alluitsup Paa on 18 November 2013

Mayor Jørgen Wæver Johansen welcomed the participants and audience. Minister for Industry and Mineral Resources Jens-Erik Kirkegaard and Minister for Environment and Nature gave a brief introduction and background for the hearing meeting.

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
C1.1	Citizen Kristian Isaksen First, I would like to welcome you to our village; we appreciate your visit. It has been said that there is no fish at the place mentioned. This is not true. It is used by lumpfish as breeding ground. There are also other fish. It was mentioned that raw materials can be extracted for 10 years, but there are raw materials for more years than that.		Naalakkersuisoq Kim Kielsen The scientific surveys conducted show that there will be no major contamination. The application is based on 10 years' exploitation. There is not much vegetation at the place in question. It should also be added that according to the legislation, after performing industrial activities nature must be left as it was found before commencing the activities. Obviously it will show that activities have been performed, but as a point of departure the area must be left as it was before commencing the activities. Ole Geertz-Hansen, Greenland Institute of Natural Resources It is true that the fjords and land areas have been important for	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			hundreds of years. There will be no impact on the fjord. Any discharge will not affect the fjord. There are for instance trout, lumpfish, and cod in the area, but it will still be possible to catch such fish without problems.	
C1.6	Name of citizen unknown What will happen if uranium is found?		Deputy Minister Jørn Skov Nielsen There is no indication of uranium in the deposit beyond the ordinary levels. If uranium is found, a new application will have to be filed.	
C1.7	Citizen Johannes Kleist I hope that the government approves the application. In this village, we have a lot of waste that causes problems. This is waste from the old factory.		Naalakkersuisoq Kim Kielsen We are listening to you at these hearings, and we will include your comments in the overall assessment. We have just held a meeting with the municipality concerning the handling of waste. Unfortunately, this area is stagnating. It is time to do something about it. If nothing is done, it should be possible in the future to impose fines.	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
C1.9	Citizen Petrus Tittussen What happens if the activities of a company that has been granted a license to an area give rise to contamination? Who will be responsible for such contamination?		Deputy Minister Jørn Skov Nielsen It is established by law that mining activities should not give rise to unacceptable contamination of the environment. All activities are subject to inspection by the Bureau of Minerals and Petroleum, the Environmental Agency and the DCE. The company is also obliged to carry out inspections and issue reports. In instances of minor contamination, the company will be ordered to clean up the contamination. In more serious instances of contamination, the activities will be discontinued. An amount must be deposited with a Greenlandic bank for closing down, restabilising and monitoring the mining area. Only the Home Rule Government can withdraw such funds deposited. The funds are paid by the company. Head of Environment Agency for Mineral Resources Activities Søren Hald Møller Responsibility after closing down: the company still has a responsibility. The company already has deposited funds to secure envi-	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			ronmental clean-up and restoration. Moreover, in the years after the closing down the mine, we will conduct surveys in the area in order to identify any contamination or other issues that should be dealt with. If the company uses chemicals, the impact on the environment and nature of the use of such chemicals must be investigated. Deputy Minister Jørn Skov Nielsen According to the statutory requirements, an Environmental Impact Assessment must be performed in order to identify the impact of the mining operations on the environment. This is also the case in the event that chemicals are used for the extraction of minerals or metals from the ore. The Environmental Impact Assessment will also point to any environmental impact that must be remedied in order to prevent unacceptable contamination. In the event that chemicals are used for potential extensions, a licence to do so will only be	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			granted if the authorities - following public consultation - are satisfied that this can be done safely. The law does not allow contamination. Section 18 of the Greenlandic Mineral Resources Act stipulates how the social benefits of raw materials extraction must revert to Greenland. This section of the Act contains several subsections providing for licensees to use labour from Greenland and Greenland enterprises and laying down that exploited mineral resources must be processed in Greenland to the widest extent possible. Foreign labour may be used where labour in Greenland with the necessary qualifications does not exist or is not available. The mining company shall assist in training Greenland labour. Requirements in this regard will be set out in agreements with the public authorities. It is also allowed to use foreign companies if Greenland enterprises are not technically or commercially competitive. Minerals may be processed outside of Greenland if processing in	

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
			Greenland would result in significantly higher costs or greater inconvenience. This could e.g. be if an Environmental Impact Assessment concludes that processing in Greenland is not safe from an environmental perspective. Naalakkersuisoq Jens-Erik Kirkegaard It is the principal aim of the Government of Greenland to ensure that mining activities and processing activities primarily take place in Greenland. Equally, the Government of Greenland strives to ensure that most of jobs stay in Greenland. Naalakkersuisoq Kim Kielsen This hearing does not cover the use of chemicals. A new situation will arise if an application for using chemicals is filed.	

No. D1. Questions and answers from public hearing meeting in Narsaq on 19 November 2013

Mayor Jørgen Wæver Johansen welcomed the participants and audience. Minister for Industry and Mineral Resources Jens-Erik Kirkegaard and Minister for Environment and Nature gave a brief introduction and background for the hearing meeting.

No.	Question/comments	Response from TANBREEZ' representatives and further comments from the company	Naalakkersuisoq's response and further comments from the authorities	Changes to EIA
D1.2	Citizen Isak Vahl I do not like the plans for the port, so I ask you to reconsider. Respect should be shown to the area in Kangerluarsuk as fishing is carried out here; would it not be an idea to use Iterlassuaq as a port instead? That is on the other side of the fjord, if ships are to come 6 times a year? The fjord is very rich on fish.	Nikolaj P. Brandt According to our assessments, it will be best to place the harbour in Kangerluarsuk.	Naalakkersuisoq Jens-Erik Kirkegaard This hearing comprises a proposal for placing the harbour in Kangerluarsuk. That is the purpose of the hearing. Your question will be included in the further process, including whether this will be possible.	
D1.3	Citizen Isak Vahl Noise from vessels will be very high; has it been examined whether this will affect the fishing environment at sea?	Greg Barnes We have looked into several locations for the harbour.	Ole Geertz-Hansen, Greenland Institute of Natural Resources Noise has been examined in other respects, for instance in connection with sea mammals. It is not considered to be a problem. The harbour in the planned area is not considered to be a problem. We have, however, only measured	

			noise in connection with the occurrence of whales.	
D1.4	Citizen Theo Kruse Is the conclusion that it will not have any effect at all on us as human beings and our descendants if mining activities are established in this area? Will this not disturb the small birds?		Naalakkersuisoq Kim Kielsen The investigations show a very minor effect on the environment and nature around Killavaat Alannguat. Focus will be directed at man-made waste and the handling of the waste will be subject to rules which must be observed.	
D1.6	Citizen Theo Kruse The citizens of Narsaq are located between Kuannersuit and Killavaat Alannguat, and there is uncertainty as to how problematic the uranium issue will be. Narsaq will have possibility of jobs in both projects (Kuannersuit and Killavaat Alannguat). There will be concerns as to choosing between Tanbreez and Greenland Minerals & Energy.	1/2	Naalakkersuisoq Kim Kielsen I want to make it clear that no application for exploitation of uranium from Kuannersuit has been submitted, and that we will not discuss uranium and Kuannersuit. This is not the issue here. Background radiation is low at Tanbreez; the uranium is worthless. When we have received the application, hearing meetings on this subject will be held.	
D1.7	Citizen Rikard Efraimsen Once Tanbreez commences the extraction, the mine will be close to the trout areas. It has been said that the extraction will not have an effect thereon. If that seems to be the case after all, and the fishermen's business is affected – who		Naalakkersuisoq Jens-Erik Kirkegaard It is our aim that the fishermen will be able to continue their fishing activities also after the mining operations have commenced. Control must be carried out. The same thing happened at Nalunaq, where investigations of, for instance, fish were conducted. Control will always be carried out –	

	will then be left with the responsibility for this? And what will happen to the fishermen?		and it will be strict. Any problems or environmental dangers will be addressed. Scientific research will be conducted on a continuous basis. The benefits must exceed the disadvantages. The extraction of minerals/raw materials should not take place at the expense of the environment or nature. Naalakkersuisoq Kim Kielsen As previously mentioned by Flemming Pagh Jensen, Biologist from Orbicon, the scattering of dust in the area around the mine will be moderate. In addition, regular control will be carried out – any problems identified will be addressed. Not much will change. Trucks and blasting will create dust, but it will be very moderate.	
D1.8	Citizen Jakob Mikaelson Can the harbour be placed in Tunulliarfik? Kelly Bertelsen The northern part of the fjord.	Greg Barnes Which part do you mean?	Naalakkersuisoq Jens-Erik Kirkegaard Plans are that it is placed as planned in Kangerluarsuk. It will come up for discussions if Tunulliarfik becomes an alternative to Kangerluarsuk.	
D1.11	Citizen Jens Christian Dahl Tailings by up to 200 tons will be placed in the lake. When the ten years of mining operations have		Senior scientist Gert Asmund, DCE As regards water floating from the tailing lake through the Salmon	

	passed, discharge will occur. Have the consequences hereof been investigated?		River (Lakseelven) and into the ocean, there is no indication that it will affect the life in the fjord.	
D1.14	Citizen Jens Christian Dahl As to the scattering of dust in connection with the blasting? Is it really a fact that the dust from the blasting is not scattered more than what has been mentioned, particularly considering the very strong winds in this area? Which calculations have been made?	Flemming Pagh Jensen The company, a US company, which has conducted the investigations of dust scattering has also conducted similar investigations for other mining companies. The investigation has been based on factual information which applies to the area around Killavaat Alannguat. According to the calculations, 80-90 % of the dust scattering will come from the truck traffic.	Gert Asmund, Greenland Institute of Natural Resources Measuring instruments will be installed to document the above description. Should the factual information prove not to be correct – attention will be directed to this and it will eventually be an issue for the politicians to address.	