WFD and Norway's disposal of mining waste

Meeting with ESA 17.12.2021

Photos: Erling Svensen

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Photo to the left: Underwater photo of Førdefjorden, near the planned dumping site. Førdefjorden is today a decleared healthy fjord (https://www.hi.no/hi/nettrapporter/rapport-fra-havforskningen-2019-48) with important fish stocks.

Photo to the right: Underwater photo of Jøssingfjorden, where mining waste was disposed of in the 80's. The seabed still bears the mark of the tailings disposal.

In this meeting

- Status of relevant water bodies and our primary concerns
- Potential impact on the chemical status of water bodies
  - Concerns regarding EIA process and leakage of heavy metals
  - Chemicals
  - Nanoparticles and microplastics
- Non-compliance with WFD art. 4(7)d
  - Sea disposals is not the best available technique
  - Sea disposals are in conflict with other profitable industries

Questions and discussion as we go

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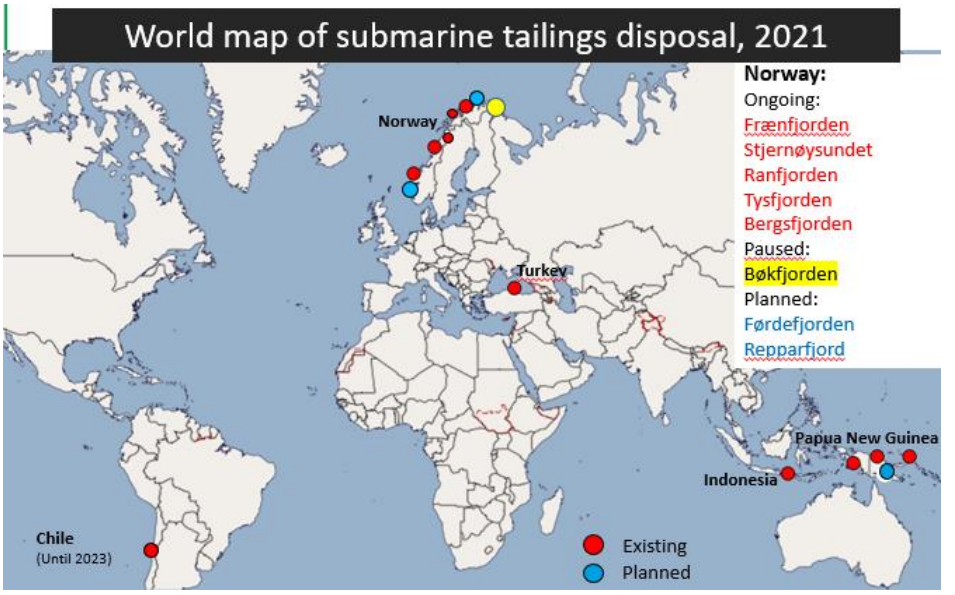
Disposal of mining waste in Norwegian fjords



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Today, 11 mining projects around the world use submarine tailings to dispose of the mining waste. 5 of them are in Norway. Norway and Papua New Guinea are the only two countries in the world that are planning new projects with submarine tailings disposals. Chile, that is a country with similar geological structure to Norway, has decided to quit all mining waste dumping from 2023.

Chemical status in relevant fjords

EXCERPT FROM vann-nett.no 2021-12-15 (our translation) Name of WB	Natural or HMWB	Comment	Degree of impact	Ecological status	Chemical status	Risk evaluation	Environmental objective - Ecological status	Environmental objective - chemical status	Impact - the effect
Bøkfjorden-midtre	Natural	Dumping of mining deposits from Sydvaranger Gruve AS leads to sullying of large parts of the Bøkfjord. Effects will be monitored according to terms in the permission from Klif. (our note: former Norwegian Climate and Pollution Agency, part of the Norwegian Environment Agency since 2013)	Large degree	Moderate	Bad	Risk	Good	Good	**Chemical pollution** Changed habitat due to morphological changes – including transfers Other substantial impact
Ranfjorden - Mo	Natural		Moderate degree	Not relevant (HMWB, GEP)	Bad	Risk	Good	Good	Chemical pollution
Ranfjorden - Sandnes	Natural		Small degree	Moderate	Undefined	No risk	Good	Good	Chemical pollution
Førdefjorden-ytre	Natural	The Engebø mine: how big the environmental impact will be the coming years is uncertain, since it has not started yet. Permission permit given in 2015. County Governor 2020: Has not yet started, why impact is set as small for now.	Small degree	Good	Good	Risk	Good	Good	Changed habitat due to morphological changes – including transfers Other substantial impact
Repparfjorden indre	Natural	Parts of the WB is still affected by earlier mining acitivity, Folldal verk. There are elevated Cu-concentrations in the sediments in the old submarine tailings disposal. See Akvaplan-Niva Rapport 4973-01, kap. 6.4: «The reason behind the elevated levels is probably that these sampling plots are affected by runoff from the old Folldal verk.»	Moderate degree	Good	Good	No risk	Good	Good	Chemical pollution
Jøssingfjord	Natural	Dumping of tailing disposals since the 1960s. Now the dumping is halted.	Moderate degree	Moderate	Bad	Risk	Good	Good	Changed habitat due to morphological changes – including transfers
Lillebukta - Ytre Simøvik	Natural	Nedslømming som følge av deponering av avgangsmasser fra gruvedrift.	Stor grad	Moderat	Udefinert	Risiko	God	God	Endret habitat som følge av morfologiske endringer - innkludert overføringer Annen betydelig effekt
Elnesvågen	Natural		Stor grad	Good	Bad	Risk	Good	Good	morphological changes – including transfers Other substantial impact
Bergsfjorden	Natural		(Small degree)	Good	Good	No risk	Good	Good	
Tysfjorden	Natural		(Small degree)	Moderate	Bad		Good	Good	

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Summary from the Norwegian data base «vann-nett». There are obviously other impacts as well in these water bodies, run off from urban areas, agricultural land etc – but this is what is in vann-nett with impact due to sea deposits of mining disposals for these water bodies. (There are 20+ more fjords influenced by mining deposits – of which more than half have chemical pollution registered as impact.

Note that Førdefjorden is not yet affected by this, but is included because a sea diposit of mining waste is planned. Førdefjorden is today a healthy fjord (https://www.hi.no/hi/nettrapporter/rapport-fra-havforskningen-2019-48). Because the diposit is planned, and not yet started, the impact is set to «small degree», see comment in table.

Mines and substances of primary concern

Fjord/water body	Mining company	Product	Permits	Substance
Førdefjord (planned)	Nordic Mining ASA / Nordic Rutile AS	Rutile and garnet	• Pollution permit (05.06.15, revised 18.01.21) • Concession persuant to the Mineral Act (June 2020, appealed)	• Sodium Isobutyl Xanthate (SIBX) • Cobalt, zink, nickel and cadmium • Microplastics • Mineral nanoparticles
Repparfjord (planned)	Nussir ASA	Copper	• Pollution permit (19.12.16, revised 13.11.21) • Concession persuant to the Mineral Act (29.11.19)	• Sodium Isobutyl Xanthate (SIBX) • Copper • Microplastics • Mineral nanoparticles

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Summary of two projects with submarine mining diposits that are planned in Norway.

Nanoparticles and titanium dioxide (TiO2)

- Nanoparticles of minerals are likely to clog gills and enter animal body tissues
- Repparfjord: 400,000 tonnes of particles <10 µm discharged per year
- Førdefjorden: 600,000 tonnes of particles <10 µm discharged per year
- Spreading of the smallest particles has not been assessed in the process of issuing the permits. The Norwegian Institute of Marine Research has shown dramatic particle spread
- In Førdefjorden, titanium dioxide (TiO2) is a particular concern
  - TiO2 is produced from rutile, the main product from the Engebø mine
  - Nordic Mining has estimated to recover 60% of the rutile, so 40% will be emmited to the fjord (>100 tons/year of TiO2 particles smaller than 100 nm)
  - In October 2021, EU banned the use of TiO2 as a food additive because of toxic effects and risks to human health
  - Emission to Førdefjorden composes a risk to marine life and human health

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Microplastics

- No preventive meassures have been considered (not mentioned in application or permits)
- Will be substantial release to the environment even with preventive meassures and best practice when using seafilling
- Amount of particles is more relevant than weight

	Repparfjord	Førdefjord
Permitted amount of disposed tailings	25 MCUM (million cubic meters)	140 MCUM (million cubic meters)
Plastic from cables 0.02 - 0.08 g per m3 of disposed rock	0.02 g/m3 x 25,000,000 m3 = 500 kg 0.08 g/m3 x 25,000,000 m3 = 2000 kg Total: 500 – 2000 kg	0.02 g/m3 x 140,000,000 m3 = 2800 kg 0.08 g/m3 x 140,000,000 m3 = 11,200 kg Total: 2800 – 11,200 kg
Plastic tubes used for casing and loading 0.18 - 0.7 g per m3 disposed rock	0.18 g/m3 x 25,000,000 m3 = 4500 kg 0.7 g/m3 x 25,000,000 m3 = 17,500 kg Total: 4500 – 17,500 kg	0.18 g/m3 x 140,000,000 m3 = 25,200 kg 0.7 g/m3 x 140,000,000 m3 = 98,000 kg Total: 25,200 – 98,000 kg
Total	**5000 – 19,500 kg**	**28,000 – 109,200 kg**

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Summary table of planned discharges of substances of most concern

Substance	Hazard Classification	Volumes	Risk	Degrading products	The chemical and ecological status
SIBX					Both fjords
Copper					Repparfjord
Zink					Førdefjord
Nickel					Repparfjord
Cadmium					Førdefjord
Chromium					
Lead					
Microplastics					Both fjords
Nanoparticles					Both fjords

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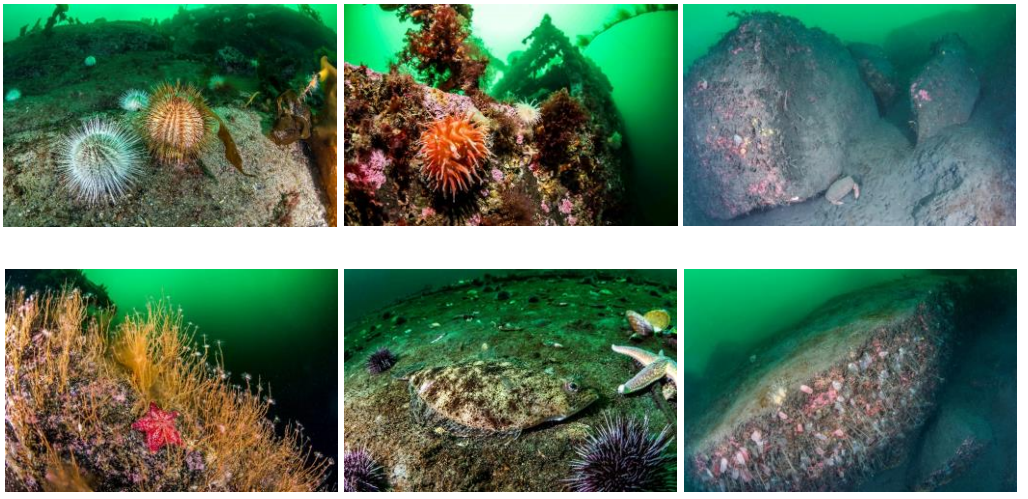
Based on the water framework directive's classification for substances, and official information related to the mining projects by Repparfjorden and Førdefjorden, we have made a summary of how the emissions of the different substances will affect the chemical status of the fjords.

Red = Failing to achieve good chemical status
Orange = Uncertain if the water body will achieve good chemical status

This table is a summary of Table 1 in the main letter to ESA.

Disposal of mining waste in Norwegian fjords

Førdefjorden: Repparfjorden: Jøssingfjorden:



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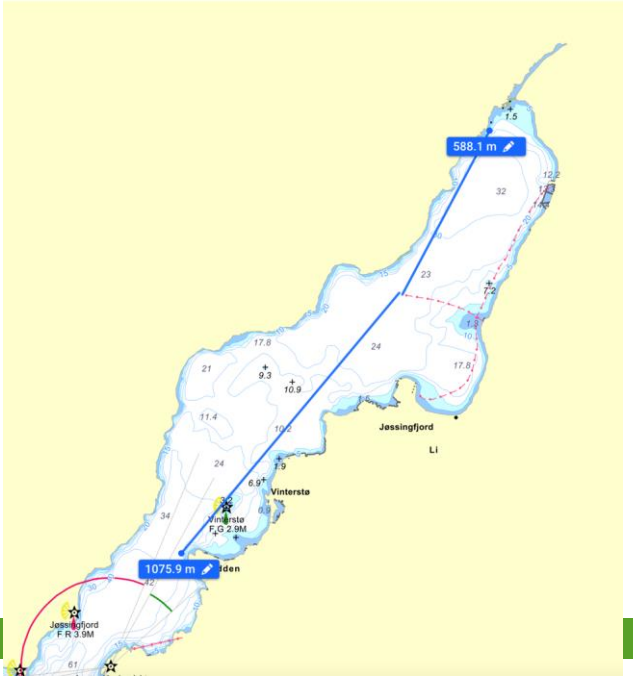
Photos to the left: Underwater photos of Førdefjorden, near the planned dumping site. Førdefjorden is today a decleared healthy fjord (https://www.hi.no/hi/nettrapporter/rapport-fra-havforskningen-2019-48) with important fish stocks.

Photos in the middle: Underwater photos of Repparfjorden. There are historic submarine tailings disposals in Repparfjorden, but these pictures are taken near the planned new diposit site.

Photos to the right: Underwater photos of Jøssingfjorden, where mining waste was disposed of in the 80's. The seabed still bears the mark of the tailings disposal.

Disposal of mining waste in Norwegian fjords



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Non-compliance with WFD art. 4(7)d

- All practicable steps are not taken to mitigate adverse impacts in the fjords
- Sea disposals of mining waste are not Best Available Technique in 2021
- In Førde this is proved by the competing company Arctic Mineral Resources (AMR)
  - Their mining project is at the same location
  - The project has no sea disposal
  - The project is assessed as profitable
  - Applied for a license persuant to the Mineral Act 30.06.21
  - Ongoing legal process against Nordic Rutile about the rights to minerals at the location

- Profitable mining can be done without sea disposals with negative impact on the aquatic environment
- There are no overriding public interests in using sea disposals - the benefits of jobs and mineral resources can be achieved without

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The operating plan, budget and an English summary of Arctic Mineral Resources' project is attached.

Non-compliance with WFD art. 4(7)d

- In addition to the environmental costs, sea disposals are in conflict with other profitable industries
- The Norwegian Fishermen's Association and Seafood Norway are concerned about the consequences for food safety, fish health and fish industry in Førdefjorden (letter 01.12.21 to the Ministry of Trade, Industry and Fisheries)
  - Førdefjorden with spawning areas of cod is important for fisheries
  - Aquaculture is an important industry in Førdefjorde, see next slide.

SjømatNorge

NORGES FISKARLAG
FISKARLAGETS SERVICEKONTOR AS

Nærings- og fiskeridepartementet
v/Næringsminister Jan Christian Vestre

Deres ref.	Vår ref.	Saksbehandler	Dato
	2020/805		01.12.2021

Det må stilles krav til gruveaktivitet slik at sjømatnæringens interesser ivaretas

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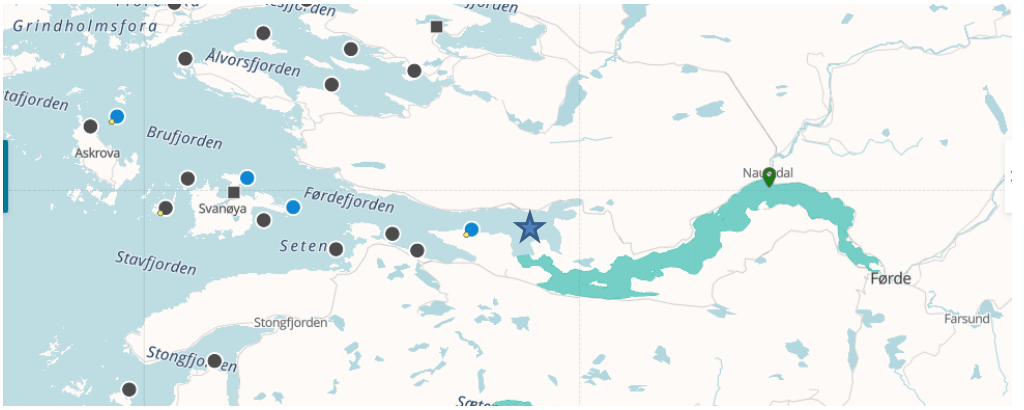
Aquaculture



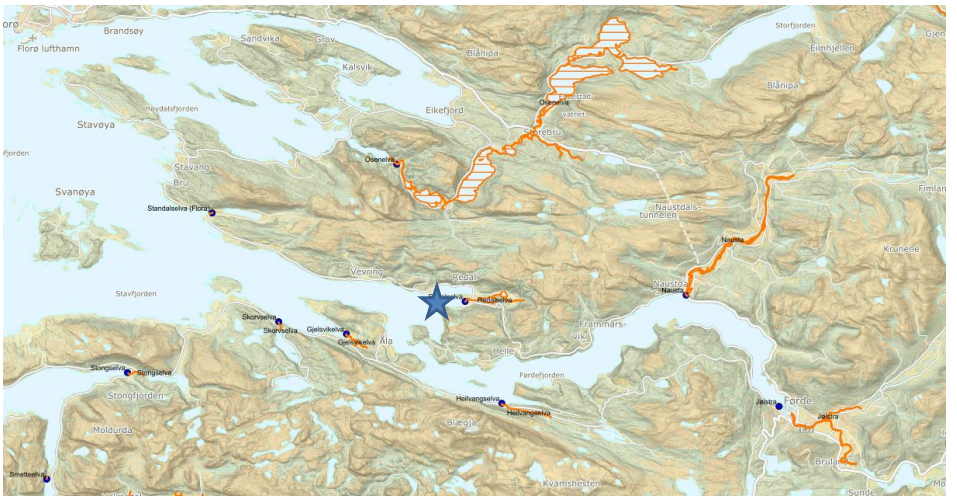
Black and blue dots are aquaculture localities. Light green is National salmon fiord.

NORSKE LAKSEELVER

- for mer liv i elva!

The star marks the planned site for the submarine tailings disposal in Førdefjorden.

Salmon rivers in the area



NORSKE LAKSEELVER

- for mer liv i elva!

The star marks the planned site for submarine tailings disposal in Førdefjorden. The orange lines marks salmon rivers with wild atlantic salmon (on the national and international red list) in the area. We here refer to letter sent by Norwegian Salmon Rivers to ESA on 14 March 2022.

Summary

- Status of relevant water bodies and our primary concerns
- Potential impact on the chemical status of water bodies
  - Concerns regarding EIA process and leakage of heavy metals
  - Chemicals, SIBX in particular
  - Nanoparticles and microplastics
- Non-compliance with WFD art. 4(7)d
  - Sea disposals is not the best available technique
  - Sea disposals are in conflict with other profitable industries

Serious concern about deteriorated status as a result of mining tailings among both environmental and industrial organizations

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