To:
The Royal Norwegian Ministry of Petroleum and Energy
submitted via email/homepage to:
post@mfa.no
https://www.regjeringen.no/no/dokumenter/horing-konsekvensutredning-pa-norsk-kontinentalsokkel/id2937810/

January 27, 2023

Response to the Ministry of Petroleum and Energy's hearing on its impact assessment for mineral activities on the Norwegian Continental Shelf.

To whom it may concern,

The Norwegian government has started a process suggesting to open areas in the Arctic for mineral exploration. The impact assessment and the decision to open areas on the Norwegian continental shelf is on public consultation until January 27th. Unfortunately the impact assessment and decision documents are only available in Norwegian so far (https://www.regjeringen.no/no/dokumenter/horing-konsekvensutredning-pa-norsk-kontinentalsokkel/id2937810/).

On December 14th, 2022, the Deep-Ocean Stewardship Initiative (DOSI) asked the Norwegian Ministry of Foreign Affairs if the documents could be translated to English. The Norwegian Ministry of Foreign Affairs forwarded our inquiry to the Ministry of Petroleum and Energy. The Ministry to DOSI stated that there were no plans to make the documents available in any language other than Norwegian.

The Deep-Ocean Stewardship Initiative is a global network of experts which seeks to integrate science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean and strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction. As a distributed network, DOSI has over 240 experts in its Deep-Sea Minerals Working Group and was granted Observer Status at the 22nd Session of the International Seabed Authority (ISA) in Jamaica in 2016. As such, DOSI offers science-based advice, and regularly reviews documents by the ISA - such as ISA's Regional Environmental Management Plan for the Northern Mid-Atlantic Ridge, or EIAs by contractors (see https://www.dosi-project.org/topics/minerals-deep-sea-mining/).

As DOSI cannot respond directly to the Norwegian text of the Ministry's impact assessment documents, we hereby provide an overview of ongoing science and policy developments with regard to polymetallic sulphide exploration that could be useful for the Norwegian Government's hearing.

If an English translation of the impact assessment becomes available, we would be happy to provide a more thorough analysis.

General characteristics of hydrothermal vent fields:

- Polymetallic sulphides are formed at active hydrothermal vent fields. An active hydrothermal vent field includes active and inactive deposits; i.e. vent sites [1].

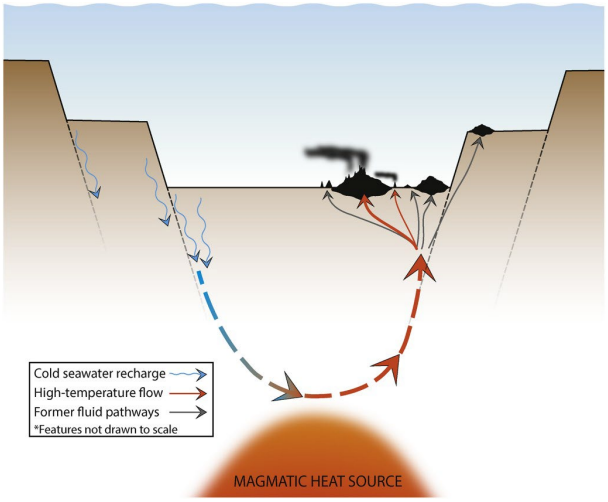

Figure 1 and text from [1]. Left: Generalized schematic view of a typical hydrothermal system on a mid-ocean ridge. Fluid circulation is driven by a magmatic heat source and focused along zones of higher permeability, such as normal faults that occur within a ridge rift zone. A vent field, composed of active and inactive hydrothermal deposits (in black) forms where the fluids discharge into the oceans. Hydrothermal plumes form above active vents.

- Worldwide, and over decades, a lot of research has been carried out at deep-sea active vents. It is very well recognized that they are unique and fragile ecosystems that require protection [2, 3].
- In Norwegian waters, to date, active vent fields have been discovered along the Mohns and Knipovich Ridge [4] (excluding the shallower vents at Jan Mayen [5]). To our knowledge, only two deep vent fields have been studied in more detail - Loki's Castle and Mohns Treasure. Results clearly show the **vulnerability of the unique faunal communities** that live on these two vent fields and their surroundings, including endemic fauna on Loki's Castle and large fields of stalked crinoids around Mohns Treasure [6-8] which are indicators of Vulnerable Marine Ecosystems [9].
- Worldwide, extremely little is known about the ecology of inactive vents [10]. Typically, it is not even known which species live there, and what their functions are for ocean health.
- In Norwegian waters, we are not aware of a single peer-reviewed and published study on inactive vents (in English language).

Protection measures:

- Several intergovernmental organizations have developed suites of criteria to identify vulnerable, sensitive, and ecologically or biologically significant ecosystems in need of protection, including FAO for VMEs (Vulnerable Marine Ecosystems), CBD for EBSAs (Ecologically or Biologically Significant Areas), and IMO for PSSAs (Particularly Sensitive Sea Areas). Recent **scientific assessment showed that all confirmed vent fields in areas beyond national jurisdiction in the Atlantic Ocean meet these criteria and thus shall be protected** [2].

- Oceanic ridges with hydrothermal vent fields continue to meet the Texel-Faial criteria (OSPAR), and new research further emphasizes their regional and global importance [4].
- Globally, many hydrothermal vents are protected in national waters [11].
- Currently developed area-based management tools to protect vents in areas beyond national jurisdiction are yet insufficient [12].
- In Norwegian waters, none of the vent fields currently has protection status [4].
- In the latest **Status Assessment 2022 - Oceanic Ridges with hydrothermal vents by OSPAR** [4] it is stated that: "Oceanic ridges with hydrothermal vents are assessed as being in good status, but low confidence is placed overall on the assessment. Any trends in status associated with climate change and ocean acidification are unknown, and **future plans to explore and exploit vents for deep-seabed minerals are of concern**. In order to improve or maintain the good status, **conservation measures for deep-sea hydrothermal vents are necessary to protect these important but rare, sensitive, island-like ecosystems with unique biotic and abiotic features**." Further, the lack of assessment of inactive vents in OSPAR regions is noted: "**Inactive vents** were not considered in this assessment, as they fall outside the scope of definition of the 2010 background document. However, inactive vents are geographically located very close to active vents, within the same vent field, and will face similar threats as active vents. Contracting Parties may wish to **consider assessing the habitat against the Texel-Faial criteria with a view to nominating it for inclusion on the OSPAR list of threatening and declining habitats**."

Mining impacts:

- Mining impacts could span far distances, potentially beyond the national waters of Norway. Plumes and especially sound may travel far [13]. Disruption of species at one vent field may impact populations at other vent fields as patches of vent habitat host a network of communities connected by dispersal of planktonic larvae [14].
- The active and inactive deposits are connected and often very close to each other (see Figure 1). Mining at inactive vents will very likely have negative impacts on active vents.
- Future mining impacts could lead to loss of species and ecosystem function [15, 16].

Please do not hesitate to contact DOSI with any questions. Thank you for the opportunity to respond to this hearing.

Sincerely,

Sabine Gollner, PhD
Senior Scientist
Royal Netherlands Institute for Sea Research
The Netherlands
Sabine.Gollner@nioz.nl
+31 222 369 426

Patricia Esquete, PhD
Researcher
University of Aveiro
Portugal
pesquete@ua.pt
+351 234 370 350

References:

1. Jamieson, J. and A. Gartman, *Defining active, inactive, and extinct seafloor massive sulfide deposits.* Marine Policy, 2020. **117**.
2. Gollner, S., et al., *Application of scientific criteria for identifying hydrothermal ecosystems in need of protection.* Marine Policy, 2021. **132**: p. 104641.
3. Van Dover, C.L., et al., *Scientific rationale and international obligations for protection of active hydrothermal vent ecosystems from deep-sea mining.* Marine Policy, 2018. **90**: p. 20-28.
4. OSPAR. *Sheet reference: BDC2022/Oceanic_Ridges_with_hydrothermal_vents*. 2022; Available from: https://oap.ospar.org/en/versions/2236-en-1-0-0-oceanic-ridges-hydrothermal-vents/, accessed on 25.1.2023.
5. Schander, C., et al., *The fauna of hydrothermal vents on the Mohn Ridge (North Atlantic).* Marine Biology Research,, 2010: p. 155-171.
6. Pedersen, R.B., et al., *Discovery of a black smoker vent field and vent fauna at the Arctic Mid-Ocean Ridge.* Nat Commun, 2010. **1**: p. 126.
7. Tandberg, A.H., et al., *Exitomelita sigynae gen. et sp. nov.: A new amphipod from the Arctic Loki Castle vent field with potential gill ectosymbionts.* Polar Biology, 2012. **35(5)**: p. 705-716.
8. Ramirez-Llodra, E., et al., *Benthic Communities on the Mohn's Treasure Mound: Implications for Management of Seabed Mining in the Arctic Mid-Ocean Ridge.* Frontiers in Marine Science, 2020. **7**.
9. FAO. *Vulnerable Marine Ecosystems.* https://www.fao.org/in-action/vulnerable-marine-ecosystems/en/. 2023.
10. Van Dover, C.L., *Inactive sulfide ecosystems in the deep sea : A review.* Front. Mar. Sci., 2019. **6**: p. 1-40.
11. Menini, E. and C.L. Van Dover, *An atlas of protected hydrothermal vents.* Marine Policy, 2019. **108**: p. 103654.
12. Blanchard, C. and S. Gollner, *Area-based management tools to protect unique hydrothermal vents from harmful effects from deep-sea mining: A review of ongoing developments.* Frontiers in Political Science, 2022. **4**.
13. Williams, R., et al., *Noise from deep-sea mining may span vast ocean areas.* Science, 2022. **377**(6602): p. 157-158.
14. Mullineaux, L.S., et al., *Exploring the Ecology of Deep-Sea Hydrothermal Vents in a Metacommunity Framework.* Frontiers in Marine Science, 2018. **5**(49).
15. Van Dover, C.L., *Mining seafloor massive sulphides and biodiversity: what is at risk?* Journal of Marine Science, 2011. **68(2)**: p. 341-348.
16. Van Dover, C.L., et al., *Biodiversity loss from deep-sea mining.* Nature Geoscience, 2017. **10**(7): p. 464-465.