MHWirth's response to the Norwegian Petroleum Directorate's Hearing Document

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Executive Summary

This document is MHWirth's response to the Norwegian Petroleum Directorate's (NPD) Hearing Document dated January 12, 2021. The response includes comments and suggestions that address specific aspects of the proposed Environmental Impact Assessment (EIA) process. Furthermore, it includes general notes concerning deep-sea mining (DSM), the legal and fiscal regime under development, among other topics. The main points are listed below:

1. The EIA of the pre-opening phase must be a fully transparent process, where everyone – including both, the public as well as the private sector – has access to the collected (raw) data, the results and conclusions derived therefrom, and can participate in the activities surrounding the EIA itself.
2. The commercial exploration phase should, in addition to collect remotely sensed data, allow for drilling and testing key technologies that may be relevant for exploration as well as for future exploitation.
3. It is proposed to follow international exploration codes such as ISBA/16/A/12/Rev.1; in particular Annex 2, §19 (i) regarding the data to be collected and provided to the respective authority.
4. Environment and social aspects should be seen in connection with onshore mining and differentiated by the type of DSM activity and resource. Based on the available information (e.g., see MIDAS research project), we consider eSMS[1] to be the most eco-friendly target for initial DSM due to low or no hydrothermal activities, lower impact on the ecosystem and smaller footprint compared to polymetallic nodule mining.
5. It is seen positive to follow or to use the UN's sustainability goals as a reference in the Hearing Document.
6. Early clarity is needed on the areas that will be opened for commercial exploration and those being protected or excluded from exploitation, to avoid or reduce spending resources on non-mining areas.
7. In general, information is requested on the fiscal regime to assess the pre-feasibility of future projects and to allow decisions to be made before committing to expensive exploration and EIA campaigns.

[1] Referring to Extinct Seafloor Massive Sulphide (eSMS) deposits, including inactive systems or deposits. See research paper of J.W. Jamieson and A. Gartman (2020) for a more elaborated definition.

A. Data collection, data sharing and stakeholder-participation during the pre-opening phase

- Unclear what data will be collected and made (at what date) accessible by the NPD to the public and interested private companies during the pre-opening process and follow-up EIAs
- The EIA of the pre-opening phase must be a fully transparent process, where everyone (including both, the public as well as the private sector) has access to the collected raw data and results
- For example, the Hearings Document informs that the University of Bergen is launching an observation system – is this sponsored by NPD and how can other stakeholders engage?
- It is suggested to allow stakeholders to publicly apply for NPD work, e.g. through public tender rounds/calls, as it may give participating stakeholders (NPD-contractors) a competitive advantage prior to "the opening"
- Early clarity is needed on the areas that will be opened for commercial exploration and those being protected or excluded from future exploitation, to avoid or reduce spending resources on non-mining areas
- The focus should be on biomass mapping, among other environmental criteria that need to be defined and specified, so that NPD or/and contractors can define target or Go/No-Go maps for exploration
- For example, it would be helpful to know at the start of "the opening" whether active SMS or (which) parts may be mined and under what conditions, and what the environmental criteria are

B. Equipment and system tests during the commercial exploration phase prior to production

- It is proposed to follow international exploration codes such as ISBA/16/A/12/Rev.1, for example
- The commercial exploration phase should allow for drilling to obtain samples and testing key technologies that may be relevant for exploration as well as for exploitation for some of the following reasons:
    - to get a better picture of the potential environmental impacts prior to production;
    - to avoid or reduce the risk that industry commences mining with unmature or untested technologies and practices – providing better knowledge of the technologies and risks;
    - to find technologies and ways to monitor and reduce or even avoid environmental impacts and to test devices under real conditions – improving the quality of the final production EIA;
    - to develop sound strategies, frameworks, and regulations for sustainable minerals resources and risk management, standards and guidelines for the exploration and exploitation and associated EIAs;
    - to find or to attract investors as the costs for the exploration, pilot mining testing & EIA scope, and the financial risks are expected to be significantly higher compared to land-based mining projects
- Sustainable extraction of minerals from the seabed will demand efficient excavation and vertical lift methods. This will most likely be the single most important factor for commercial players to enter this market, and for this industry to evolve as a strong new Norwegian industry.
- Proposed concepts for extraction of marine minerals is largely based on existing technology from the oil & gas, onshore mining, the shipping and dredging industry. There is however a big gap from the existing technology to the actual excavation and vertical lifting systems.

C. Further comments related to the Environmental Impact Assessment (EIA) process

- According to the Hearing Document no EIA is required to obtain a commercial exploration license given "minimal environmental impact" – this raises some important points:
- Clarification is needed on what constitutes "minimal environmental impacts" and to what extent physical sampling is permissible during the "commercial exploration phase"
- Physical sampling, such as drilling, can impact the nearby as well as surrounding environment due to drainage/drilling of active SMS systems or/and the formation of sediment-laden plumes, for instance
- Therefore, it is suggested to follow ISBA/16/A/12/Rev.1, Regulation 20 c, d:
    c. "A preliminary assessment of the possible impact of the proposed exploration activities on the marine environment"
    d. "A description of proposed measures for the prevention, reduction and control of pollution and other hazards, as well as possible impacts, to the marine environment"
- Besides remotely sensed data (such as electromagnetic surveys) and other survey data, physically-sampled (drill or core) data is considered highly needed for the following reasons:
    - determine whether it is worthwhile to investigate/ sample the prospect area more extensively, and to further narrow down the exploration area (e.g., to define target sites) and cut exploration costs

  - determine the third dimension of a deposit, its structure/ stratification, the sub-seabed hydrothermal venting system to define local Go/No-go maps for intensified[2] exploration and investigations
  - determine the cuttability, grade and tonnage of the polymetallic sulfide bodies, among other factors, by collecting and analyzing physical and chemical properties of the target deposit and zone
  - determine the particle size distribution of the cuttings and plume spreading already during the exploration phase by employing physical sampling (recovery) tools and monitoring equipment
  - determine the metallurgical processing efficiency of the ore, which requires recovery of larger quantities of ore to the sea surface (~ 100 metric tons) via bulk-sampling and lifting systems
  - develop cost-efficient, safe and environmentally friendly exploration and exploitation technologies (please see: *Equipment and system tests during the commercial exploration*)
- Clarification is needed on the responsibilities and obligations of contractors, while standards and guidelines are missing with respect to (please note that the list may not be complete):
  - required permits and pre-assessments such as plume models, for certain exploration activities;
  - required data, data format, measuring durations, frequencies, permitted equipment and methods;
  - permitted material recovery quantity, number, size, depth of samples/drills per study area/unit;
  - possibly other standards and guidelines for the exploration of eSMS, SMS and CRC resources
  - For example, ISBA/16/A/12/Rev.1, Annex 2, §19 (i) specifies the data to be collected and reported to the relevant authority

D. General comments related to supply and demand situation of Chapter 5.1.

- It is seen positive to follow or to use the UN's sustainability goals as a reference in the Hearing Document
- There should be a reference to report commissioned by the European Commission, which is very specific on critical raw material for European strategic technologies including defense in 2030/2050: Critical Raw Materials for Strategic Technologies and Sectors in the EU A Foresight Study
- The dominance by China is another factor that should be mentioned, and the geopolitical tension that can be found in all reports related to the demand and supply situation
- The fact that several minerals are supplied from countries that is often exposed to child labor and discrimination of woman is another important factor that should be mentioned in the Hearing Document
- The above is mentioned in the Hearing Document, but it is assumed that this will be a very important driving for were the minerals are collected, and a strategic factor to compete with other economies
- It is recommended that the above-mentioned aspects are subject of the pre-opening EIA and associated studies commissioned by NPD, in comparison to terrestrial mining and other types of DSM

E. General comments related to environment aspects of Chapter 6.4

- It is recommended to differentiate between terrestrial mining and other types of DSM activities/resources that differ in terms of their environment, ecosystem, ecological and economic value, for instance
- The hearing document mentions the area requirement for the different deposits (SMS 0,1-0,5 km² and CRC 10-20 km²). It does however not compare with Polymetallic Nodules (PMN) mining that will require vast areas of around 1 to 5 km²/day or around 750 km²/year (Volkmann & Lehnen (2017) and DeepGreen report).
- It is expected that the affected area is one of the most important aspects when it comes to environmental impacts such as removal of habitat (hard substrate) and formation of sediment-laden plumes, for example
- The environment and ecosystems, thus the mining impacts for these three distinct types of DSM resources and activities are different; mining impacts will be very local for SMS mining and even lower when targeting extinct or inactive SMS deposits (see the findings and public reports of the EU Midas Project, for instance)
- Impacts arising through noise and sediment plumes are seen better manageable, while investigation of compensation measures and restoration concepts should be subject of EIAs and associated studies
- The fact that terrestrial mining is connected with severe environmental impact, and that opening of new land based mines may destroy sensitive areas on land is another factor (see DeepGreen white paper)

[2] In the sense that more, larger and deeper wells are drilled and larger masses of seabed material are moved and eventually lifted to the sea surface.

F. Other general notes

- Scientific, industrial and joint research studies are seen vital to develop sustainable concepts for exploration, mining and processing, environmental monitoring, observation and habitat restoration, for example
- Development of technology including testing will be demanding both with regards to technical solutions and funding – acknowledging the high risks and development time associated with DSM projects
- For the above-mentioned reasons, fiscal incentives are seen as important instruments to stimulate the academic and especially the industrial players that need to make significant high-risk investments.

- <u>The following points remain unclear as to how NPD will address them in its EIA process:</u>
  I. Environmental protection, compensation and site restoration measures (parallel to or after mining)
  II. Resource management strategies, concepts, and technologies (living and non-living resources)
  III. Awareness raising and education campaigns to inform the public in a transparent and open process
  IV. Whether the metals are allowed to be sold to nations other than Norway, e.g. China
  V. Whether the areas will be opened to foreign companies and investors and if there will be incentives for local / Norwegian companies to participate in that nascent business
  VI. Missing information on the fiscal regime, tax rates and royalties; important for companies to make early decisions prior to the likely very expensive exploratio

Annex – Excerpt from ISBA/16/A/12/Rev.1, Annex 2

According to ISBA/16/A/12/Rev.1, Annex 2, §19 (i), the following is stated:

(i) Data on the location, survey and evaluation of the polymetallic sulphides in the areas, including:

a. A description of the technology related to the recovery and processing of polymetallic sulphides that is necessary for making the designation of a reserved area;
b. A map of the physical and geological characteristics, such as seabed topography, bathymetry and bottom currents and information on the reliability of such data;
c. A map showing the remotely sensed data (such as electromagnetic surveys) and other survey data used to determine the lateral extent of each polymetallic sulphide bodies;
d. Drill core and other data used to determine the third dimension of the deposits and therefore used to determine the grade and tonnage of the polymetallic sulphide bodies;
e. Data showing the distribution of active and inactive polymetallic sulphide sites and the age that activity ceased in inactive sites and was initiated at active sites;
f. Data showing the average tonnage (in metric tonnes) of each polymetallic sulphide body that will comprise the mine site and an associated tonnage map showing the location of sampling sites;
g. Data showing the average elemental content of metals of economic interest (grade) based on chemical assays in (dry) weight per cent and an associated grade map for data among and within the polymetallic sulphide bodies;
h. Combined maps of tonnage and grade of polymetallic sulphides;
i. A calculation based on standard procedures, including statistical analysis, using the data submitted and assumptions made in the calculations that the two areas could be expected to contain polymetallic sulphides of equal estimated commercial value expressed as recoverable metals in mineable areas;
j. A description of the techniques used by the applicant;