| | |
|---|---|
| **Document title** | Comments on the draft Submerged Assessment |
| **Code** | 9-2 |
| **Category** | CMNT |
| **Agenda Item** | 9 - Wrecks and other submerged hazardous objects |
| **Submission date** | 27.10.2020 |
| **Submitted by** | Secretariat |
| **Reference** | RESPONSE 28-2020 document 9-1 |

## Background

This document contains comments on the draft Submerged Assessment Volume 1 on warfare materials (document 9-1) in a separate Excel file submitted by Denmark and Germany by the given deadline on 27 November 2020. In addition, a separate attachment is also provided with the full draft Submerged Assessment, containing comments in track changes provided by representatives of Denmark and Germany.

Denmark has also provided these additional comments:

- Denmark in principle agrees with the proposed way forward as outlined in the cover note. However, Denmark finds it necessary that before the approval for publication by HOD 59-2020, it is essential that Contracting Parties can provide further comments and input after especially Objectives and Scope of the Draft Submerged Assessment report has been outlined – but also in relation to the necessary update of certain chapters as well as input to other currently missing chapters in the Draft Submerged Assessment report. It is difficult to assess the overall quality of the Draft Submerged Assessment report as it in its current form/state does not fully quantitatively document the proposed recommendations.
-
- Denmark approves in principle the Draft Submerged Assessment report, but highlights that that the report in its current form needs further work before a final approval can be given. As mentioned above it is difficult to assess the overall quality of the Draft Submerged Assessment report as it in its current form/state does not fully quantitatively document the proposed recommendations.

Denmark would also like to repeat their comments to the “Merged CCB and Submerged actions revised” document in relation to the BSAP as the comments to that document address the overlapping draft recommendations outlined in Chapter 6. Also, the comments can perhaps be taken into consideration when outlining the scope and objective of the Draft Submerged Assessment report. These comments are found in Annex 1 to this document.

As described in document 9-1, the publication of the Submerged Assessment should be approved by HOD 59-2020 (7-8 December 2020) and the decision document submission deadline for that Meeting is 15 November 2020. Therefore RESPONSE 28-2020 has been invited to approve the draft Submerged Assessment, Volume 1 on warfare materials in principle, after which the draft will be submitted to HOD-59-2020. If further comments and input, in particular from the drafting team of the Submerged Expert Group, are still received after RESPONSE 28-2020, an updated draft will be circulated for approval by the Response Working Group by correspondence to enable the final draft to be submitted to HOD 59-2020 before the final submission deadline on 30 November 2020.

## Action requested

The Meeting is invited to consider the comments together with document 9-1 and agree as appropriate.

Baltic Marine Environment Protection Commission

Proposal for the update of the BSAP Received: 2020-01-31

## Title

Development of Best Environmental Practice (BEP) and control of threats posed by munitions, wrecks and other hazardous submerged objects in the Baltic Sea, including the preparation for the remediation of areas contaminated with munitions

## Submitted by:

SUBMERGED Expert Group, Coalition Clean Baltic

## Description of measure

Dumped and abandoned conventional and chemical munitions corrode and subsequently release their toxic content to the Baltic Sea eco-system. In addition, shipwrecks from the 20th century onwards, containing oil and various cargo, can release hazardous substances to the surrounding water. Today, munitions and wrecks can potentially release ~~uncontrolled diffuse plumes of~~ toxic~~, carcinogenic and mutagenic~~ contaminants. Besides being sources of pollution they also pose physical obstacles on the sea-floor and a risk factor for maritime workers. In summary, munitions and wrecks constitute a currently unknown risk~~s~~ for the environment, offshore economy, fishing and tourism.

Risk assessment using decision support tools should be performed for conventional and chemical dumped munitions, wrecks, lost cargo and sea-dumped waste (in summary: hazardous submerged objects). Measures should then be applied accordingly, to control the effects:

1. Desktop studies: historical and contemporary document research
2. Survey: investigations of contaminated areas and wrecks (e.g. sonar, magnetometers, underwater video, divers, chemical and biological sampling)
3. Documentation: GIS supported data collation e. g., position, type, quantity of potentially hazardous objects their condition,and whether an object has been destroyed/salvaged.
4. Decision support: processing of georeferenced information e. g., by DAIMON DSS
5. Risk assessment and measures: Evaluation of hazardous objects on the seabed and in the sediment based on quantitative site-specific risk assessments ~~decision support results~~. Risk assessment, definition and, prioritisation of clearance requirements for hazardous submerged objects. Balancing of associated risks of site-specific remediation options (e.g., leave as it is, monitoring, recovery).
6. Monitoring of hot spots.
7. Development of national contingency plans for dealing with hazardous submerged objects in an open transparent process, that is based on best available science.
8. Development and selection of Best Available Techniques (BAT) and Best Environmental Practices (BEP) of environmentally friendly, secure and cost-effective low-noise and low-pollution practices and technologies for the remediation of hazardous submerged objects (e.g. robotic technologies). ~~Continuous evaluation of technical and scientific progress.~~

Hence, the proposed action includes the whole chain from archive research, surveys, object identification and assessment, to potential remediation. For future activities, connections between the private economy sector, researchers and responsible authorities should be established in order to promote technology development.

## Activity:

Military operations (infrastructure, munitions disposal)
Offshore structures (other than for oil/gas/renewables)
Fish and shellfish harvesting (bottom-touching towed gears, professional, recreational)

**Commented [KL1]:** General comment: The proposal is quite broad in its current form and in the further process it could be good to consider to address the different categories of submerged hazardous substances more separately as risk assessment and risk management differ for those categories.

We would like the proposal to include a more adequate discussion and related references on especially alternative possibilities of site-specific risk management besides remediation.

**Commented [HS2]:** What kind of threats should be descried more clearly

**Commented [HS3]:** Perhaps the areas could be prioritized?

**Commented [HS4]:** Site specific risk assessments have to follow guidelines e.g. EU TDG; HELCOM or national guidelines. Risk assessment is not performed using decision support tools. Decision support tools are risk management tools to be used after the risk assessment and integrated in the risk analysis

**Commented [HS5]:** This is extremely broad – please consider to prioritize. As mentioned, it could be good to consider to address the different categories of submerged hazardous substances more separately as risk assessment and risk management differ for those categories.

**Commented [HS6]:** Consider to elaborate on the measures

**Commented [HS7]:** What do you mean by control the effects? Are you hinting towards risk management strategies – if so you need to define the risks you are managing. Consider to change the sentence to: "Measures can then be applied accordingly for risk management of potential effects"

**Commented [KL8]:** It could be considered to address all of the eight points seperately and in more detail in the sections below. This would provide a more clear red line through the proposal and make it clear how each point is addressed.

**Commented [HS9]:** Consider to elaborate on what precisely?

**Commented [HS10]:** Not sure what you mean? Please elaborate

**Commented [HS11]:** Where? Fulfilling which criteria? Ammunition? Vrag? Hvornår er det et hotspot?

**Commented [KL12]:** What is meant by dealing with? Does it refer to handling when encountered? Monitoring?

**Commented [HS13]:** Consider to define more this whole bullet

**Commented [HS14]:** Do you have any idea of costs and time needed? It sounds very large.

Restructuring of seabed morphology (dredging, beach replenishment, sea-based deposit of dredged material)
Renewable energy generation (wind, wave and tidal power), including infrastructure
Non-renewable energy generation (fossil fuel and nuclear powerplants)
Transmission of electricity and communications (cables)
Extraction of oil and gas, including infrastructure (e.g. pipelines)

Pressure:

Input of other substances (e.g. synthetic substances, non-synthetic substances, radionuclides) — diffuse sources, point sources, atmospheric deposition, acute events
Input of anthropogenic sound (impulsive, continuous)
Disturbance of species: Other (e.g. barriers, collission)
Physical loss (due to permanent change of seabed substrate or morphology and to extraction of seabed substrate)

State:

Hazardous substances Litter
Noise
Mammals
Fish
Birds
Seabed habitats

Extent of impact:

Recent research showed that substances from munitions enter the marine environment and can be detected in the marine food web. TNT and its derivates were found in water, sediment, mussels and fish. Chemical warfare agents were found in Norwegian lobster and fish. Elevated occurrence of liver tumors in dab were associated with substances leaking from corroded munitions in a munitions dump site. A simulation model shows that dissolved substances can disperse in the Baltic Sea with currents and affect the marine ecosystem elsewhere.

Effectiveness of measure

Archive research, survey, documentation, risk assessment and prioritisation are the basis for all subsequent measures. Remediation removes point source emitters and ultimatively prevents release and spreading of contaminants and thus continued contamination of the marine environment and foodborne intake in seafood resources.

The action will positively affect marine areas of chemical munition dumpsites in e.g., Bornholm Basin, Gotland Deep and Gdansk Deep, as well as Little Belt and Skagerrak as identified in the HELCOM MUNI report. Identified conventional munition hotspots will also benefit. These are located e.g. in German (Kiel Bight, Lübeck Bight, Flensburg Fjord), Polish (Pomeranian Bay, Gulf of Gdansk), Finnish and Russian waters (Gulf of Finland). Generally it will improve the state of the entire Baltic Sea, as the large numbers of point sources of munitions, wrecks and other hazardous submerged objects are widely dispersed throughout all HELCOM Contracting States' waters.

Furthermore adherance to BAT and BEP will enable HELCOM Contracting States to perfom remediation while minimizing environmental impact. In addition, controlling the risk of submerged hazardous objects limits the negative impact on economic activies in the Baltic Sea, including offshore energy, tourism, fisheries etc.

Finally, the establishment of an entry point for the private sector will allow new technologies for remediation to be tested in an environmentally safe way.

Cost, cost-effectiveness of measure:

**Commented [HS15]:** Consider to elaborate the discussion to address that there is no evidence of significant environmental risks due to the sea-dumped munitions in the Baltic Sea. See e.g the most comprehensive review by Greenberg et al 2016: https://www.tandfonline.com/doi/full/10.3109/15563650.2015.1121272?src=recsys; Moreover, Hemström et al 2020 assessed the toxicity of metabolites of the most dumped CWA Mustardgas and found low toxicity (https://www.sciencedirect.com/science/article/pii/S0141113620301999#bib7). In the Bornholm Deep Sanderson et al (2014) reviewed 391 sample sites and found low risk to the fish community (https://www.sciencedirect.com/science/article/pii/S0304389414005573). Sanderson et al 2010 (https://pubs.acs.org/doi/10.1021/es903472a) provides an overview of data needs a decade ago summarizing the MERCW project risk related findings.

**Commented [KL16]:** In general it would be highly usefull information if this section could include a reference to economic analyses and estimates on the different kinds submerged hazardous obejcts.

The estimated costs of continuous evaluation of existing data is low and it can be included in running costs of relevant authorities of Baltic Sea countries. At the moment, the activities related to risk assessment of hazardous submerged objects are performed by various governmental agencies, however they do not produce a full picture. Required additional efforts are the consolidation and review of existing actions.

Monitoring of compounds originating from hazardous submerged objects can be included into monitoring frameworks such as MSFD monitoring, and can initially be limited to several hotspots in the Baltic Sea. Risk assessment of shipwrecks still containing oil as bunker or cargo can be performed using existing tools.

Considering the future costs of environmental damage as well as the benefit of expected technological improvements the systematic approach appears more cost-effective. If the contaminants have been introduced into water body and sediment it is unforseeable how these can be extracted at reasonable cost.

As an example, Sweden performed two operations in 2019 during which 299 $m^3$ and 60 $m^3$ of oil respectively were removed from two shipwrecks. Removal costs per tonne of oil amounted to EUR 6.788 and EUR 19.531. This is generally on the same level as reported direct clean-up costs per tonne from known uncontrolled oil spills. In addition to the direct clean-up costs, socioeconomic and environmental costs must also be included. Hence, a proactive approach is cost effective in the long run.

A number of institutions in the HELCOM area have been working on the issue on hazardous submerged objects. Hence, personnel and resources are available, which ensures the sustainable and continuous use of experience, knowledge and established connections to ongoing scientific projects.

The private sector is interested in performing remediation, thereby generating Blue Growth, which has the potential to economically outweight the costs of this action. The establishment of entry points for partnernships between public authorities and private companies is based on existing administrative resources and is not associated with high costs.

Feasibility:

Munition dumpsites and wrecks in the Baltic Sea were surveyed by both military (i. e. Baltic Sea Ordnance Safety Board, BOSB) and scientific projects (MERCW, CHEMSEA, MODUM, DAIMON, UDEMM), although the exact location and inventory of munitions is often still missing. Tools for risk assessment were created, i. a. as decision aid, and are provided to stakeholders by DAIMON and DAIMON 2 projects, while monitoring schemes and methods were developed by UDEMM, MODUM and DAIMON. Quality requirements for munitions surveys and clearance were developed by RoBEMM. Remediation strategies include blast in place operations (no longer considered safe for the environment), salvage/destruction methods and in situ delaboration. The latter is still in development stage, while recovery of munitions that are not safe to handle has not been done in the Baltic Sea, but experience exists from other areas. Therefore, there is a strong basis for the effective completion of an inventory, execution of risk assessments and provision of decision support.

Risk assessment tools also exist for wrecks. One of them is the existing VRAKA model developed and used in Sweden, while other methods are being developed in the INTERREG North Sea Wrecks project. Even though they are available for use, none of those tools are currently be applied on a broad national and European scale. There is strong and growing public support for applying control measures to hazardous submerged objects.

Successful execution of this action will promote economic growth in the Baltic Sea area in maritime and fisheries and tourist sectors. The measures both increase security for offshore workers while creating new employment opportunities in the region.

Follow-up of measure:

The proposed action includes several detailed recommendations that could be easily followed. Establishment of entry points for clearing and new remediation technology companies can be reported

**Commented [HS17]:** Do you have an amount?

**Commented [HS18]:** And cost?

**Commented [KL19]:** Can costs be estimated? What additional resources are expected to be included if decided to include in monitoring program? How is monitoring conducted in practice? Monitoring frequency?

**Commented [HS20]:** Cost?

**Commented [HS21]:** Please, define long run?

**Commented [KL22]:** The current lack of any quantitative analysis involving cost estimates makes it difficult to evaluate the economic consequences of the proposal in its current form

**Commented [HS23]:** Risk assessment need to be developed to support decision making and risk management. I think this is what is meant?

**Commented [HS24]:** Safe by whom – please, supply the some scientific and regulatory references

**Commented [HS25]:** Yes, I very much agree that risk assessment is needed first.

**Commented [HS26]:** I would suggest to assess the site as site-specific risk assessments following the relevant guidelines. Not a tool such as VRAKA.

**Commented [HS27]:** It would be good to refer to some indicator for this statement

**Commented [HS28]:** What will they be doing? Consider to suggest jobs and numbers.

**Commented [KL29R28]:** And based on what? Are there any available studies/documentation for this prediction? I cannot seem to find a reference in the present proposal's list of references

by Contracting Parties during relevant HELCOM meetings. BAT and BEP can be developed by the subsequent versions of HELCOM working group reports, namely the Submerged Expert Group, whereas their adoption by Contracting Parties would follow regular HELCOM processes. Continued data compilation and quality assured repeated assment of monitoring results is required if objects remain in the environment.

## Background material:

In the 2013 Ministerial Declaration it was agreed that by 2015, a one-off HELCOM thematic assessment on environmental risks of hazardous submerged objects covering contaminated wrecks, lost or dumped dangerous goods (e.g. containers), and other objects, also utilizing the 2013 report on dumped chemical munitions be produced. The HELCOM Expert Group on environmental risks of hazardous submerged objects SUBMERGED was formed in 2014 and is currently working on a document with an assessment. The action is based on a compilation of information by this group, including experience of several EU programmes (e.g., MERCW, CHEMSEA and DAIMON), NATO SPS project MODUM and findings reported by national projects such as ROBEMM and UDEMM. It also includes facts published by the special ad hoc working group HELCOM MUNI. The need for action regarding controlling of submerged hazardous objects results from the fact, that at least half a million tonnes of abandoned munitions and thousands of wrecks resting on the Baltic Sea bottom release harmful substances to the nearbottom water and adjacent sediments. This fact was confirmed by numerous publications, listed in the reference section. In the era of reduced anthropogenic emissions, reemission of past contaminants may be an important component of the pollution budget in the Baltic Sea.

**Commented [HS30]:** What do you mean with controlling? Do you mean risk management?

**Commented [HS31]:** So assessing the relevant environmental risk. I agree.

**Commented [HS32]:** This is not a complete nor comprehensive review of the state-of-the-science see e.g. the references mentioned above

## References


- HELCOM MUNI report
- Draft HELCOM Submerged Assessment
- MODUM
- MERCW
- Decision Aid for Marine Munitions (DAIMON) project website: https://www.daimonproject.com/
- UDEMM project website: https://udemm.geomar.de/
- BASTA project website: https://www.basta-munition.eu/
- Greinert et al. (2019): Practical guide for environmental monitoring of conventional munitions in the Seas (Environmental monitoring for the delaboration of munitions on the seabed, UDEMM). https://udemm.geomar.de/en
- Abbondanzieri et al. (2018): RoBEMM - Entwicklung und Erprobung eines robotischen Unterwasser-Bergungs- und Entsorgungsverfahrens inklusive Technik zur Delaboration von Munition im Meer im Küsten- und Flachwasserbereich, Statustagung "Maritime Technologien", Projektträger Jülich, Berlin: pp. 159-167
- Appel et al. (2018): Bioaccumulation of 2,4,6-trinitrotoluene (TNT) and its metabolites leaking from corroded munition in transplanted blue mussels (*M. edulis*). Marine Pollution Bulletin 135 1072–1078
- Beck et al. (2018): Spread, Behavior, and Ecosystem Consequences of Conventional Munitions Compounds in Coastal Marine Waters. https://www.frontiersin.org/articles/10.3389/fmars.2018.00141/full
- Beldowski et al. (2017): Towards the Monitoring of Dumped Munitions Threat (MODUM). Part of the NATO Science for Peace and Security Series C: Environmental Security book series (NAPSC).
- Frey, T. (2020) Quality Guideline for Explosive Ordnance Disposal. Beuth Verlag GmbH, Berlin
- Maser, E., Strehse, J.S. (2020). “Don’t Blast”: blast in place (BiP) operations of dumped World War munitions in the oceans significantly increase hazards to the environment and the human seafood consumer, Archives of Toxicology, https://doi.org/10.1007/s00204-020-02743-0
- Strehse et al. (2017): Biomonitoring of 2,4,6-trinitrotoluene and degradation products in the marine environment with transplanted blue mussels (*M. edulis*). Toxicology 390, 117–123

- T. Missiaen, M. Soderstrom, I. Popescu, P. Vanninen, Evaluation of a chemical munition dumpsite in the Baltic Sea based on geophysical and chemical investigations, Science of the Total Environment, 408 (2010) 3536–3553
- M. Soderstrom, A. Ostin, J. Qvarnstrom, R. Magnusson, J. Rattfelt-Nyholm, M. Vaher, P. Joul, H. Lees, M. Kaljurand, M. Szubska, P. Vanninen, J. Bełdowski, Chemical Analysis of Dumped Chemical Warfare Agents During the MODUM Project, NATO Science for Peace and Security Series C: Environmental Security (9789402411522), pp. 71-103
- J. Nawała, K. Czuprynski, S. Popiel, D. Dziedzic, J. Bełdowski, Development of the HS-SPME-GC-MS/MS method for analysis of chemical warfare agent and their degradation products in environmental samples, AnalyticaChimicaActa, 933 (2016) 103-116
- R. Magnusson, T. Nordlander, A. Ostin, Development of a dynamic headspace gas chromatography–mass spectrometry method for on-site analysis of sulfur mustard degradation products in sediments, Journal of Chromatography A, 1429 (2016) 40-52;
- J. Nawała, M. Szala, D. Dziedzic, D. Gordon, B. Dawidziuk, J. Fabisiak, S. Popiel, Analysis of samples of explosives excavated from the Baltic Sea floor, Science of the Total Environment, 708 (2020) 135198
- Beldowski, J., Klusek, Z., Szubska, M., Turja, R., Bulczak, A.I., Rak, D., Brenner, M., Lang, T., Kotwicki, L., Grzelak, K., Jakacki, J., Fricke, N., Ostin, A., Olsson, U., Fabisiak, J., Garnaga, G., Nyholm, J.R., Majewski, P., Broeg, K., Soderstrom, M., Vanninen, P., Popiel, S., Nawala, J., Lehtonen, K., Berglind, R., Schmidt, B., 2016a. Chemical Munitions Search & Assessment-An evaluation of the dumped munitions problem in the Baltic Sea. Deep-Sea Res Pt Ii 128, 85-95.
- Beldowski, J., Szubska, M., Emelyanov, E., Garnaga, G., Drzewinska, A., Beldowska, M., Vanninen, P., Ostin, A., Fabisiak, J., 2016b. Arsenic concentrations in Baltic Sea sediments close to chemical munitions dumpsites. Deep-Sea Res Pt Ii 128, 114-122.
- Czub, M., Kotwicki, L., Lang, T., Sanderson, H., Klusek, Z., Grabowski, M., Szubska, M., Jakacki, J., Andrzejewski, J., Rak, D., Bełdowski, J., 2017. Deep sea habitats in the chemical warfare dumping areas of the Baltic Sea. Sci Total Environ.
- Kotwicki, L., Grzelak, K., Beldowski, J., 2016. Benthic communities in chemical munitions dumping site areas within the Baltic deeps with special focus on nematodes. Deep-Sea Res Pt Ii 128, 123-130.