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Consequences from total collapse of a shipwreck in Skagerrak filled with chemical ammunition

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Huge amounts of conventional and chemical munitions were dumped in Norwegians waters just after the end of World War II. The dumping of chemical warfare munitions was carried out by loading abandoned ships at the ports in Germany and towing them to the predetermined scuttling positions in the deepest part of Skagerrak, south-east of Arendal. At least 38 ships, containing in total between 118 000 and 145 000 metric tonnes of chemical munitions (gross weight), may have been dumped here.

In a theoretical worst-case scenario the wreck D/S Falkenfels, filled to the brim with chemical munitions, collapses and the contents leak out and contaminate the seafloor and the surrounding water. D/S Falkenfels had a load of 9 000 metric tons of filled munition, containing an estimate of 2 700 metric tons of chemical warfare agents (30 %). In the simulated scenario, the content was either pure sulphur mustard, Clark I or tabun.

Very little is known about the effects on marine biota from dumped chemical munitions. The effects from a large-scale release from the collapsing shipwreck are divided between effects from water-soluble agents and effects on benthic organisms from agents remaining on the seafloor. The size of the area around the wreck affected by chemical warfare agents released to seawater has been estimated to be less than 50 km. The effects on fish in this area will be short-term since the dissolved agents will be diluted fairly rapidly to non-toxic concentrations. Sulphur mustard and Clark I are poorly water soluble and could stay on the seabed for several decades. The benthic organisms habiting this area could therefore be chronically exposed, potentially causing chronical toxicity or cumulative effects and adversely affect biodiversity and abundance.

References:

Tørnes J. Aa., Vik T., Kjellstrøm T.T., Leakage rate of the nerve agent tabun from sea-dumped munition, Marine Environmental Research, doi: 10.1016/j.marenvres.2020.105052

Jakacki, J., Tørnes, J. A., Johnsen, A., Muzyka, M.1, and Przyborska, A., Modelling study of potential contamination of chemical warfare agents (CWA) from collapsing shipwreck hull in Skagerrak region, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-10414, https://doi.org/10.5194/egusphere-egu22-10414, 2022