

INTEGRATED ASSESSMENT OF BIOLOGICAL EFFECTS OF CHEMICAL WARFARE AGENTS ON CAGED BLUE MUSSELS AT OFFICIAL DUMPING SITE IN THE BALTIC SEA

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Abstract

55 000 tons of chemical warfare agents (CWA) were dumped into the Baltic Sea after the World War II. In the meantime, CWA metal shells are corroding and contents leaking into the environment at an unknown rate posing a potential risk for the Baltic Sea ecosystem. The major dumping site with estimated 32,000 t of dumped chemical weapons, is located in the Bornholm Basin. Several CWAs of major concern for biota, such as inorganic arsenic and organo-arsenic compounds, have been detected in sediments of this area. The aim of this study was to investigate the bioavailability and the biological effects of these CWAs, using caged mussels for an integrated biomarker approach. Therefore, blue mussels were exposed in cages at two different depths for 2.5 months at two contaminated and a reference site. Mussels were analysed for a selected battery of biomarkers including genotoxic, cytotoxic and neurotoxic effects, oxidative stress and lysosomal responses. Integrated biomarker response index, sex and gamete development, bioenergetic status and concentrations of CWAs and their metabolites were assessed for a holistic determination of the health status of the caged mussels. First results indicated more stress symptoms in mussels caged to the CWA contaminated areas compared to mussels from the reference area. Applied integrated biomarker approach provides an important tool for monitoring and risk assessment of concerning areas engaging potential hazard to the marine environment.