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Intelligent testing strategy for Minimizing EnviRonmental ImpacTs of produced water (MERIT)

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Produced water discharges in the North Sea are the largest discharge stream associated with oil and gas extraction potentially leading to environmental impacts in the marine environment. The MERIT project which ran from 2020-2024 critically reviewed the regulatory and legislative framework of produced water discharges in the North Sea with a special focus on the risk-based approach (RBA) outlined by OSPAR. The outcome of this large review activity showed that the RBA has a relatively high data requirement for successful implementation, with inherent drawbacks of not adequately reflecting initial data uncertainties or deficiencies in the output of the extensive model (Nielsen et al., 2023). As a result of the review and our experiences gained through extensive laboratory testing of produced water samples, MERIT provided a list of recommendations to consider on a regulatory level: 1) Implement ecotoxicity data quality assessment and reporting practices to reflect uncertainties in data, 2) Increase the reliability of the substance-based (SB) approach by characterizing the PW composition, 3) Couple bioassay-directed chemical analysis from whole effluent testing and substance based assessment in toxicity identification evaluation to identify drivers of ecotoxicity in PW and 4) Assessment factors should be decreased by acceptance of chronic ecotoxicity data – however, for chronic marine ecotoxicity tests further test development is needed to meet the demands of regulatory adequacy. Furthermore, the MERIT project developed a decision-tree for an intelligent testing strategy for ecotoxicity assessment of produced water within the OSPAR RBA aimed at assisting risk management decisions in a tiered approach. The poster will present this decision-tree which combines whole effluent ecotoxicity testing, toxicity identification evaluations, and biodegradation kinetics of mixtures of discharged chemicals. We propose that the combination of the two workflows provides an environmentally relevant approach utilizing whole effluent samples, thus including mixture and matrix effects for the ecotoxicological and the biodegradation assessments.

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