



DHI SOLUTION

ENVIRONMENTAL RISK ASSESSMENT – OFFSHORE

Oil spills • discharge • deposition of chemicals • cuttings • produced water

Operators who might cause significant oil pollution must be adequately prepared, including having contingency plans in place. This includes analysing the risk of major accidents and their potential consequences on the environment.

The OSPAR Convention for the protection of the marine environment of the North-East Atlantic Ocean applies to offshore operators. Offshore operators must meet high environmental safety demands when handling oil, gas and chemicals on offshore installations. The OSPAR Convention – contracted by parties operating in the North-East Atlantic Ocean – aims to protect the marine environment.

The convention has implemented a harmonised, mandatory control system that includes actions and measures to prevent and eliminate pollution from the offshore oil and gas industry. The strategy is focused on discharge of produced water and discharge of offshore chemicals for which documentation is required by the national authorities.



We support offshore operators with oil spill contingency planning and help them meet the requirements in the OSPAR Convention. Photo: © Flying Focus

SUMMARY

CLIENT

- Contracting parties of OSPAR (Oslo and Paris Convention for the Protection of the marine Environment of the North-East Atlantic)
- Offshore operators

CHALLENGE

- Assessing the risks of discharge or depositions of chemicals, cuttings or produced water in marine environments
- Assessing the risks to the marine environment for oil spills situations – conducting contingency planning for oil spills
- Meeting the requirements for use and discharge of offshore chemicals within the North-East Atlantic Ocean

SOLUTION

- Hazard assessment including the derivation of predicted no effects concentrations
- Application of risk-based approach (RBA) for discharge situations
- Use of recognised exposure estimation tools in exposure and risk assessment of discharge or depositions of chemicals, cuttings or produced water
- Whole Effluent Assessment and Toxicity testing
- Oil spill modelling

VALUE

- Supports for oil spill contingency planning
- Provides documentation of offshore chemicals hazard to the environment and for workers
- Supports the management of produced water discharges
- Applies the RBA including hazard assessment, exposure assessment and risk characterization
- Provides bioassays of produced water effluents as Whole Effluent Toxicity (WET) testing

OUR MIKE BY DHI SOFTWARE

Our family of integrated models serve different purposes and includes:

- a wave module that calculates wave characteristics
- a hydrodynamic module that calculate currents, water levels, salinity and water temperature – the platform for simulation of any kind of spill
- a sediment module that calculates sediment transport and morphological changes
- a spreading and dispersion model that calculates pollutant concentrations (for example, PEC values, produced formation water, and dissolved oil concentrations)
- a water quality module that calculates water quality (for example dissolved oxygen (DO), biochemical oxygen demand (BOD), eutrophication, heavy metals, and so forth)
- an oil spill (particle) model that tracks oil spills (surface or sub surface spill)

OUR ECOTOXICOLOGICAL LABORATORY

Our ecotoxicological laboratory is accredited in accordance with the well-established Laboratory Quality Management System ISO 17025. It is authorised to perform studies in compliance with the OECD Principles of Good Laboratory Practice (GLP). Our experienced and qualified staff ensures that we supply you with high-quality services by using modern analytical instruments, appropriate and approved test methods, and stringent quality control.



We are accredited by DANAK (The Danish Accreditation Fund), Test Reg. Nr. 0026.

RISK-BASED APPROACH

The risk-based approach for assessing the impact of produced water includes:

- substance-based approach, where the Predicted No Effect Concentration (PNEC) values are determined for the natural occurring substances and chemicals contained in the produced water on the basis of available ecotoxicity data from REACH registration dossier (for example), Harmonised Offshore Chemical Notification Format (HOCNF) for the relevant substances, and other data.
- Whole Effluent Toxicity (WET) testing where the acute toxicity of samples of produced water is tested for toxicity as well as for the presence of persistent and bio-accumulating substances (optional)
- calculation of the Predicted Environmental Concentration (PEC)
- risk assessment conducted by the calculating and analysing the ratio PEC/PNEC

We offer a full package service that covers all of the above areas. We have extensive experience in the derivation of PNEC-values, including the evaluation of data, use of read across, use of the weight of evidence approach and QSAR. Furthermore, we have a long history of conducting WET tests on produced water and other effluents.

For risk assessments, we can calculate site-specific and discharge specific PEC-values – either by using our own MIKE by DHI modelling software or by using other tools such as Dose-related Risk and Effect Assessment Model (DREAM).

WHOLE EFFLUENT TOXICITY TESTING AND RISK ANALYSIS

According to OSPAR, bioassays to test the whole effluent toxicity of produced water must be conducted on three marine species. The standard tests for whole effluent toxicity testing in our laboratories are:

- Microtox (*Vibrio fischeri*): ISO 11348-2
- Algae (*Skeletonema costatum*): ISO 10253
- Crustacean (*Acartia tonsa*): ISO 14669

Based on the results from the marine tests, we can estimate PNEC for the effluent. We can then estimate the environmental impact based on the dilution modelling available in our MIKE by DHI modelling software or DREAM.

OIL SPILL MODELLING

We can perform oil spill modelling as well as analyse the biologic effects of an oil spill or a chemical spill. For the contingency planning in connection with the establishment of new offshore platforms or stochastic risk, for example, a risk analysis needs to be carried out to analyse the risk and consequences of accidents. We use our MIKE by DHI Spill Analysis model to simulate the transport and fate of a sub-surface (for example, a blow-out) or a surface oil spill as well as the effects of using various oil spill responses.

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For more information visit: www.dhigroup.com