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AT A GLANCE
OIL SPILL MODELLING

August 2018

While offshore oil spills are extremely rare events, it is important that oil and gas companies are ready to respond given the potentially significant consequences.

Oil spill modelling is a tool used to support oil spill preparedness and response planning. It can also be used to support response operations in the event of an actual oil spill. There are a number of different approaches to modelling, which are generally used in combination to inform risk assessment, and response and preparedness planning. Two types of oil spill modelling often used are stochastic and deterministic modelling.

Stochastic modelling

Stochastic oil spill modelling is created by overlaying a great number (often hundreds) of individual, computer-simulated, hypothetical oil spills.

The simulated oil spills for a stochastic model will all start from the same location (e.g. a drilling location or production platform) but each oil spill scenario will be subject to a different set of wind and weather conditions drawn from historical records.

Sophisticated modelling software will count how often oil may be observed in each area of the environment in all of the discrete spill events. This is often presented as a probability of exposure and can be useful for informing preparedness and response arrangements as it shows which areas are more or less likely to be impacted in the remote chance aspill occurs.

Considering many spill events and the different spill trajectories is an integral part of modern spill risk assessment and is often used to identify the range of environments that may be affected in various conditions and identify the priorities for protection.

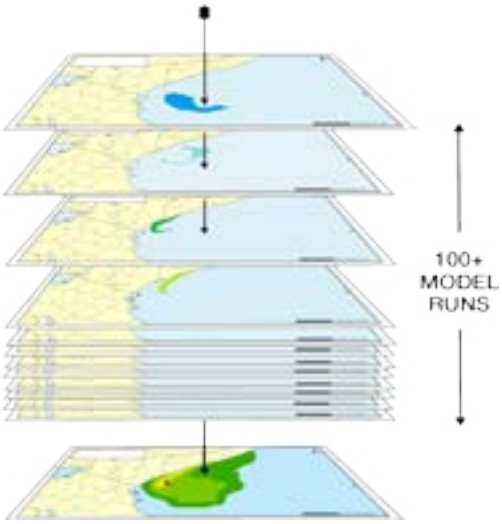

Image courtesy of RPS, Ocean Science, RI, USA.

Stochastic modeling is generally used for risk assessment and preparedness planning. By overlaying hundreds of oil spills into a single map, stochastic modeling shows all the areas that could be affected rather than just assuming one spill scenario. It is misleading to imply that stochastic modelling represents what a single spill would look like or the area it would affect.

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Deterministic modelling

Deterministic modelling creates a computer simulation of a single hypothetical oil spill subject to a single set of wind and weather conditions. Deterministic modelling is used to forecast the fate and behaviour of oil from a single model run.

Deterministic modelling is commonly used to consider the fate and effects of representative 'worst-case' oil spill scenarios. Often, one or more model runs are generated and each run will be carefully selected in consideration of the nature and scale of the offshore petroleum activity and the local environment. The information produced by deterministic modelling is very useful for informing upper limits for oil spill preparedness and response arrangements, which assumes that no other action is taken, which can then be adapted and scaled to match the particulars of different oil spills.

Deterministic modelling is generally used for response planning, preparedness planning and for supporting oil spill response operations in the event of an actual spill. The map produced by deterministic modelling provides a more realistic representation of what a single oil spill would look like and the area it may affect.

While it is impossible to prepare for an infinite number of possible oil spills it is also insufficient to only prepare to respond to a single representative worst-case oil spill, therefore, appropriate preparedness and response planning tends to be informed by both deterministic and stochastic modelling.

For more information

For further information refer to the Oil pollution risks page at **nopsema.gov.au** or email **communications@nopsema.gov.au.**