



## Deepwater drilling: improve safety indicators to help prevent disasters

**The Deepwater Horizon** accident raised concerns about the safety of deepwater drilling. From an analysis of risk assessments in the Norwegian Oil & Gas (O&G) Industry, a new study suggests that current safety approaches and indicators are limited and more extensive monitoring of drilling operations is needed to avoid events similar to Deepwater Horizon.

**Last year's Deepwater Horizon accident** in the Gulf of Mexico is considered by the US Government to be the worst environmental disaster in American history. It raised a major question about whether the accident was due to systemic safety problems in the industry or a result of one single company operating outside industry standards. This is difficult to answer unless there is careful evaluation of the level of risk and the preparedness and response of the O&G industry. This requires appropriate indicators for the monitoring of operations to be identified.

The study aimed to evaluate safety indicators of the Risk Level Project (RNNP)<sup>1</sup>, which assesses risk in the Norwegian O&G industry. Although the Deepwater Horizon rig was subject to US regulations, researchers used it as an example to illustrate the application of Norwegian O&G industry indicators and how they could be improved. The study focused on risk level related to major hazards and on two main types of indicators. *Incident indicators* are based on the occurrence of actual incidents and precursor incidents or 'near misses', while *barrier indicators* measure the effectiveness of the precautions taken to protect against major hazards.

Incident indicators that are regularly used in the RNNP are well blowouts and kicks (an inflow of gas, oil or water into the wellbore). The study recommends that greater focus should be placed on precursor events that may escalate into kicks or blowouts and on indicators to monitor responses to such events, e.g. how kicks are handled. To illustrate the suggested improvements to both types of indicators, the research team applied them to the Deepwater Horizon incident:

**Indicators related to schedule or costs.** The completion of the Deepwater Horizon rig was found to be both overdue and over budget. Although this does not determine the level of risk *per se*, it may be worthwhile to understand the timeframe of operations and costs better. Such indicators need further development and could include a comparison between the planned and actual costs and time scales to produce a fully working rig .

**Indicators based on well incidents.** In 2001, a study of deepwater kicks in the Gulf of Mexico identified several indicators to account for these incidents in advance. Although the RNNP uses the indicators of kicks and blow-outs, it could include other precursor events, such as low mud density and the presence of mud containing gas bubbles.

**Indicators related to operators' well response.** Quick and effective responses were lacking in the Deepwater Horizon incident. Indicators for this need to be developed, for example, the time from the first indication of a well incident to the first response.

**Indicators related to operation of a well/rig.** On the Deepwater Horizon rig there were many shortcomings in training, communication and lines of authority. The RNNP needs to develop indicators of well/rig operation to measure the working, planning and management of the well.

**Indicators based on the technical condition of safety critical equipment.** On the Deepwater Horizon rig, there were several leaks in the control system. Indicators in this area are partly covered by the RNNP, but could be extended to include the use of cementing, mud pumps and appropriate power management to secure supply.

A wide range of indicators are needed to assess all types of risk and the combination of these will demand a multidisciplinary approach across the industry.

1. See: [http://www.ptil.no/trends-in-risk-level/category155.html?lang=en\\_US](http://www.ptil.no/trends-in-risk-level/category155.html?lang=en_US)

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**Contact:** jon.espen.skogdalen@gmail.com.no

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