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Combining precursor incidents investigations and QRA in oil and gas industry

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Abstract

Accident investigation is the collection and examination of facts related to an occurred specific incident. Quantitative Risk Analysis (QRA) is the systematic use of available information to identify hazards and probabilities, and to predict the possible consequences to individuals or populations, property or the environment. Traditionally both methods have been used separately; however both accident investigation and QRA describe hazards in a systematic way. The extensive research that is done related to that including human and organisational factors in QRA brings accident investigation and QRA closer together. Every year there are a large number of precursor incidents recorded with the potential to cause major accidents risks in the North Sea oil and gas industry. This article describes how accident investigation and QRA can be combined using available information from a precursor incident as input to QRA-methodology to identify hazards, probabilities, safety barriers and possible consequences. The combined method is shortened as QRA PII (Quantitative Risk Analysis Precursor Incident Investigation) and makes use of well known hazard analysis techniques to produce a more complete cause and risk picture in complex systems. This includes an extended understanding of human and organisational factors in accidents and prevention of these.

Abbreviations

CFD, Computational Fluid Dynamics; DOE, US Department of Energy; EER, Evacuate, Escape and Rescue; HSE, Health, Safety and Environment and Health and Safety Executive, UK; HOF, human and organisational factors; HRO, High Reliability Organisation; MTO, Man, Technology and Organisation; NRC, US Nuclear Regulatory Commission; O&G, oil and gas; OTS, Operational Safety Condition; PSA, Petroleum Safety Authority Norway; QRA, Quantitative Risk Analysis; QRA PII, Quantitative Risk Analysis Precursor Incident Investigation; RIF, risk influencing factor; RNNP, Risk Level Project; TTS, Technical Safety Condition

Keywords

Quantitative risk analyses; Investigation; Precursor incident; Oil and gas industry

Figures and tables from this article:
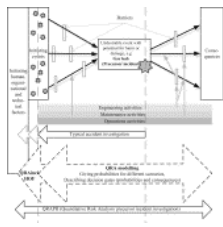

Fig. 1. Precursor incidents [65].
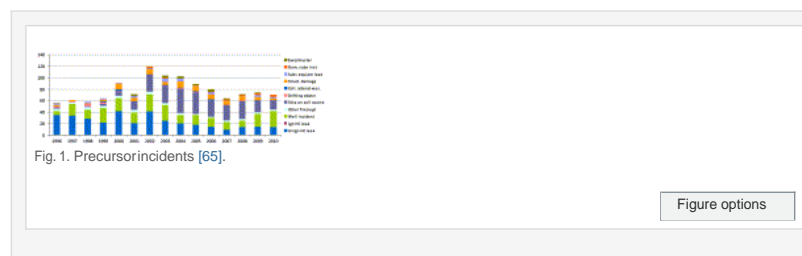
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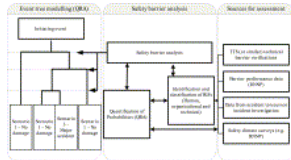
Fig. 2. Bow-tie, QRA and QRA PII.

Figure options

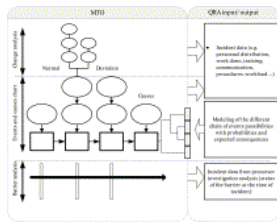Fig. 3. Event tree modeling_ safety barrier analysis_ sources for assessments.

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Fig. 4. MTO and QRA input.

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Table 1. Human and organisational factors [63].

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Table 2. Additional information when combining MTO and QRA.

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Table 3. QRA elements and comments on gas leak.

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