Chemeca 2025 and Hazards Australasia
28 – 30 September, Adelaide, South Australia

Challenges and opportunities of occupied building risk assessments

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ABSTRACT

Occupied Building Risk Assessments (OBRAs) became a focus in major hazard facilities following the BP Texas City tragedy. Two decades later, lessons from this incident still influence decisions on building placement to minimise worker exposure. Initially, the focus of OBRAs was to identify and relocate buildings with high exposure risks. Today, they assess the overall tolerability of worker risk exposure. This shift has driven the demand for more detailed, quantitative analysis of on-site risks, posing challenges for operators and risk professionals.

The American Petroleum Institute has published guidelines for placing portable and permanent on-site occupied buildings using either a consequence-based or risk-based approach. A more detailed risk-based approach is required to assess worker risk tolerability, typically achieved by using a Quantitative Risk Assessment (QRA) model. This model can account for worker movements between indoor and outdoor locations, generating risk indices and annual individual risk data that can be compared to company risk criteria to evaluate tolerability.

The case study presented illustrates the application of this risk-based approach at a manufacturing plant handling highly toxic gas. The challenges in adapting an off-site focused QRA model to assess the on-site risk to workers include the inclusion of nearfield scenarios, selecting appropriate risk indices and defining suitable risk criteria for on-site worker groups. The refined QRA model was used to estimate individual risk per annum (IRPA) for various worker groups and roles, which was then used to assess their risk tolerability.

The case study shows how facilities can better evaluate and manage worker exposure to hazards by integrating a more detailed, risk-based approach to OBRAs. It demonstrates how the QRA model identifies at-risk worker groups and proposes risk treatment strategies to reduce exposure to tolerable levels. The modified QRA model can continue to inform operational decisions for occupied building use and supports ongoing risk assessments for new buildings, temporary shutdown camps, and additional project-specific structures.

KEY WORDS

Occupied Building Risk Assessment, Quantitative Risk Assessment

BIOGRAPHY

Samara is a Senior Risk Engineer at R4Risk with over five years of experience in risk management for petroleum storage, chemicals manufacturing, logistics and oil and gas industries. She completed a Bachelor of Science / Engineering (Honours) at Monash University, where she majored in chemical engineering, atmospheric science and applied mathematics. Samara has extensive experience in completing a variety of technical studies, including consequence modelling (fire, explosion, and toxic dispersion), quantitative risk assessments, occupied building risk assessments, fire safety studies, emergency response planning and hazardous area classification.

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