

Consequence simulation of jet fire due to leakage of pipelines in a natural gas power in Malaysia

ABSTRACT

There are several non-renewable sources for the generation of electricity and one of them is by the gas-fired power plant. Gas-fired power plant is utilizing natural gas which is mainly composed of methane in its process for the production of electricity. The usage of natural gas poses safety concerns should unwanted events occurred. Therefore, the objective of this work is to evaluate possible consequences of jet fire due to leakage of pipes inside the plant using ALOHA simulation software and followed by Quantitative Risk Calculation approach. There are several parameters studied in this work such as the size of leakage aperture, pipeline pressure, pipeline temperature and wind speed. It was found from the study that the bigger the leakage size and the higher the pipeline pressure resulted to greater consequence. Meanwhile, the higher the temperature of the pipeline has resulted a lesser consequence. It was also found that variation of the wind speed does not affect the degree of consequences in terms of severity. Moreover, the consequence from the worst case scenario was studied where it was found that heat radiation intensity from the possible jet fires at a distance of 50m, 100m, 200m, 300m and 400m are 12.1 kW/m² , 3.04 kW/m² , 0.754 kW/m² , 0.342 and 0.196 kW/m² respectively. As a conclusion, the study has shown that the consequence of jet fire will only pose a deadly threat to the workers inside the plant compound. This study serves as a structured work for consequence assessment for other types of premises in the future.

Keyword: ALOHA; Natural gas; Vapour cloud explosion; Jet fire