Punnada Kanokrattanachot 2010: Risk Assessment and Analysis of Fire Protection Systems in an Engine Room on a Drilling Rig in the Gulf of Thailand. Master of Engineering (Safety Engineering), Major Field: Safety Engineering, Interdisciplinary Graduate Program. Thesis Advisor: Assistant Professor Nanthiya Hansupalak, Ph.D. 117 pages.

The purpose of this study was to perform a risk assessment of a fire occurring in an engine room on a Drilling Rig (Barge – Tender) in the Gulf of Thailand by using the What If Analysis technique. Also, the study analyzed the differences between the Carbon Dioxide (High Pressure) and Water-Mist Fire Extinguishing Systems in terms of Reliability, Failure Probability and Failure Rate by using the Fault Tree Analysis technique. The risk assessment was applied in 3 work areas to cover all areas in an engine room. The assessment results indicated a total of 40 hazardous conditions in the 3 work areas assessed, including: (1) 21 conditions leading to a fire, (2) 9 conditions resulting in personal injury or illness, and (3) 10 conditions associated with other types of risks. The highest number of hazardous conditions for fire was found in Area 3 due to the presence of a fuel tank. The results also indicated that the risk levels of those conditions in the engine room were at the Medium and Low– risk levels only. On a drilling rig, any work task at the Medium or Low risk level can proceed as usual but requires careful monitoring and adequate control. Additional requirements for tasks involving Medium risk are careful review, additional control measures, and completion of a Job Safety Analysis before starting the task. In addition, no High risk of fire conditions were found in these 3 work areas on the rig, confirming that the existing controls and safeguards that have already been established on the Rig are acceptable. Both Fire Extinguishing systems of interest involve Total Flooding system. Analysis results indicated that the Reliability of Carbon Dioxide and Water-Mist Fire Extinguishing Systems were 0.213 and 0.452, respectively. The Failure Probability of each system was 0.787 and 0.548, respectively and the Failure Rate for each was 1.548 and 0.795 failures / year, respectively. The reason that the former had lower reliability and higher failure probability and failure rates was the high quantity of cylinders that had to be installed.

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