



A Hazard and Operability Study for Assessing Hazard Risks using Fault Tree Analysis in an Iranian Petrochemical Industry Unit (2016)

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Abstract

Background: Risk assessment is an important tool for reducing casualties and financial damage in the oil and gas industry. This research aimed to identify and evaluate process hazards in the petrochemical industry in 2016.

Material and Methods: In this case study, a team was organized and briefed on the process. Besides, hazard identification was performed using the Hazard and Operability Study. Next, causes were analyzed using the Fault Tree Analysis and occurrence probability of top events. Finally, events and subevents were ranked. The minimum cut sets were determined using Boolean algebra.

Results: A total of 77 events were identified. Accordingly, unacceptable, tolerable, and acceptable risk levels were 41, 31, and 5 events, respectively. Fire was the most unacceptable risk level, with the final events of "human errors in correct gasket installation on the flange surface" and "flange defects" having had the shares of 51.2 and 21.55%, respectively.

Conclusion: The combination of the two HAZOP and FTA techniques is useful in process industries in which incomplete performance of the system and control systems is the most effective factor in the potential occurrence of fire. Human errors and flange defects are the two main factors in this event, so occupational safety and health must be improved in this system. Thus, due to complex interactions between humans, machines, materials, and the environment in systems, such as the petrochemical industry, which lead to uncertainties in safety results of the process, risk assessment is recommended to be performed periodically using different techniques.

Keywords: Safety, Chemical Hazard Release, Chemical Safety, Safety Management.

Introduction

Growth in human populations with the increase in industries have raised risk potentials and accidents. Particular attributes of the oil and gas

industry, including its vastness, huge volume of capital, numerous dangers, and high number of employees have attracted the attention of safety experts, which demand their extensive efforts to improve the level of safety in this industry [1, 2].