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Hazard Analysis of Crude Oil Storage Tank Farm

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Abstract : The major accidents in petrochemical facilities occur during storage processes. Many disastrous accidents occurred in the past, causing death or injury for workers, huge economic losses and massive environmental pollution. Thus, this work aimed to conduct profound and adequate hazard analysis in the oil storage facility. Firstly, the potential undesired accidents in the oil storage farm were identified using Hazard and Operability Study (HAZOP). Secondly, Fault Tree Analysis (FTA) was carried out to analyze all the identified hazards and effectively determine the basic events (BEs) that lead to such hazards. The FT was evaluated by generating of the Minimal Path Sets (MPSs) and calculation of the Structural Importance Degree (SID) for each BE. Thirdly, Event Tree Analysis (ETA) was implemented to analyze the occurrence path of accidents and estimate their frequencies. The results revealed that the most significant accidents in the storage farm are fire and explosion. The qualitative analysis of the FT has shown that the most critical BEs for causing the tank fire and explosion are (formation of flammable cloud) and (Confinement between cloud and air). Additionally, it is found out that the occurrence frequency of pool fire is higher than other scenarios. Finally, based on the analysis, some preventive and mitigation measures have been given to reduce the consequence severity of tank accidents, which in turn improve the safety climate in the storage tank farm.

Keywords : Hazard analysis, HAZOP, Fault Tree, Event Tree, Safety measures.

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