ABSTRACT

There have been major incidents involving Ethylene Oxide. Apart from plant, EO has been involved in transportation incidents also. Although, EO is an extremely hazardous chemical i.e. reactive, toxic and flammable it is a very fought after chemical and have various uses including condensate products. Among the different types of incidents reported during production, storage and transportation of EO fire and explosion have been the predominant type of accidents involving episodic releases due to sudden loss of containment. Though EO is toxic, the effect of major containment loss will lead to fire and explosion due to its properties such as flame speed, reactivity, violent decomposition reaction in storage leading to self polymerisation. This paper describes a risk analysis study recently conducted on two storage tanks and associated facilities in a Mono Ethylene Glycol (MEG) Plant of Reliance Industries Limited to identify the risk arising due to any malfunction affecting operating personnel as well as neighbouring population. The study follows a classical approach to risk assessment. Hazard identification studies were conducted to identify hazards from two storage tanks followed by consequence analysis. The Hazard Identification was done based on a Safety Review Checklist, Incident data and Fire and Explosion Index (F&EI) method. Based on the Hazard Identification, scenarios were identified for Consequence Analysis (CA) and Dispersion Modeling was done using Process Hazard Analysis Software Tool. The Risk Rating was done based on the onsite and offsite impacts of the scenarios, the frequency of the occurrence of the scenarios and interpolating the wind rose data and actual population data surrounding the plant with the Dispersion Models. PHAST Risk software has been used for the risk assessments. It calculated risk associated with storage in terms of individual risk contours, F-N curves and contributors to risks. To assess the safety of the existing storage the individual risk numbers obtained were evaluated against company’s risk criteria $1 \times 10^{-4}$. The study resulted in the development of in-house competency in Quantitative Risk Assessment and ability to translate such study findings into suitable risk reduction measures.