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# Study of Chlorine Gas Leak Consequences in Direct Chlorination System Failure in Cooling Towers in the Petrochemical Industry

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**Abstract :** In this paper, we are aiming to study the consequences of chlorine gas leak in direct chlorine gas injection compared to using bleach (sodium hypochlorite), studying the negative effects both on the environment and individuals. This study was performed in the cooling towers of a natural fractioning unit of Bandar-e-IMAM petrochemical plant. Considering that chlorine gas is highly toxic and based on the health regulation, its release into the surrounding environment can be very dangerous for people and even fatal for individuals. We studied performing quantitative studies in the worst cases of event incidence. In addition, studying alternative methods with a lower risk was also on the agenda to select the least likely possible option causing an accident. In this paper chlorine gas release consequences have been evaluated by using PHAST software. Reaching to 10 ppm of chlorine gas concentration was basis of hazardous area determination. The results show that the full chlorine gas line rupture scenario in Pasquill category F, were worst case, and many people could be harmed around cooling towers area because of chlorine gas inhalation.

**Keywords :** chlorine gas, consequence modeling, cooling towers, direct chlorination, risk assessment, system failure
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