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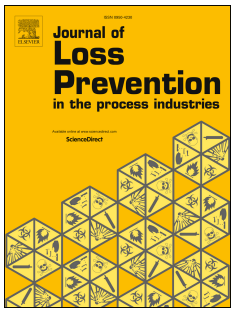

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Abstract

In present work the influence of VBR (Volume Blockage Ratio) on explosion overpressure generation are studied. As a reference a model plant of IOCL (Indian Oil Corporation Limited) Jaipur accident, 2009 is constructed with the help of CFD (Computational Fluid Dynamics). In order to understand the dense cloud behavior under calm wind conditions replicating the worst-case scenario three dimensional modeling of the plant, items and obstacles in form of vegetation are done. Fuel vapor is leaked at different rates from a valve connected to piping supplying fuel to a nearby tank and dispersion characteristics are predicted. The developed model is validated by comparing the results with standard test results and by grid independent study. It was found that under relatively calm weather conditions the flammable pancake shaped cloud is formed and covered a region of 600-900 m (equivalent diameter) in two to three hours of simulation time. CFD predictions also show that the VBR present in such plants can significantly increase the overpressure which is often properly not accounted in the risk assessment studies. In the presence of realistic VBR such large cloud is able to produce an explosion overpressure of the order of 2 to 20

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