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Hazard Analysis Study of Vehicle Impacts in a Chemical Plant

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Abstract

Vehicles in chemical plants and refineries can be ignition sources for fires and explosions, particularly in situations involving crash impacts that cause chemical leakage. Generally, HAZOP methodology is used for facility risk evaluations, but HAZOP is inappropriate for mobile vehicles and normal protection systems or safeguards typically do not address such situations adequately. Thus, incidents caused by vehicle impacts can present a gap in a facility's hazard assessment process.

Hazards associated with vehicle incidents in a chemical plant were evaluated. An initial review revealed that there are few effective operational hazard-reduction actions that can be implemented, particularly for vehicle speeds over 40 mph. Therefore, speed control becomes the most important factor for risk reduction when selecting effective safeguards and providing hazard protection. Administrative actions such as controlling speed and limiting vehicle access to certain areas are suggested. Engineering controls include gate restrictions, ditches, berms, permanent and portable concrete barriers, guardrails, and bollards or posts to reduce risks associated with vehicle impacts.

A list of suggested administrative and engineering controls is presented, along with a guideline for varied speed limits directed at reducing vehicle impacts, hence their associated risks and consequences. Hazard analysis teams can consider using this information as they conduct their reviews and make their recommendations.