

Learning the Most Common Causes of Major Industrial Accidents and Apply Best Practices to Prevent Such Accidents

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Abstract : Investigation outcomes of major process incidents have been consistent for decades and validate that the causes and consequences are often identical. The debate remains as we continue to experience similar process incidents even with enormous development of new tools, technologies, industry standards, codes, regulations, and learning processes? The objective of this paper is to investigate the most common causes of major industrial incidents and reveal industry challenges and best practices to prevent such incidents. The author, in his current role, performs audits and inspections of a variety of high-hazard industries in North America, including petroleum refineries, chemicals, petrochemicals, manufacturing, etc. In this paper, he shares real life scenarios, examples, and case studies from high hazards operating facilities including key challenges and best practices. This case study will provide a clear understanding of the importance of near miss incident investigation. The incident was a Safe operating limit excursion. The case describes the deficiencies in management programs, the competency of employees, and the culture of the corporation that includes hazard identification and risk assessment, maintaining the integrity of safety-critical equipment, operating discipline, learning from process safety near misses, process safety competency, process safety culture, audits, and performance measurement. Failure to identify the hazards and manage the risks of highly hazardous materials and processes is one of the primary root-causes of an incident, and failure to learn from past incidents is the leading cause of the recurrence of incidents. Several investigations of major incidents discovered that each showed several warning signs before occurring, and most importantly, all were preventable. The author will discuss why preventable incidents were not prevented and review the mutual causes of learning failures from past major incidents. The leading causes of past incidents are summarized below. Management failure to identify the hazard and/or mitigate the risk of hazardous processes or materials. This process starts early in the project stage and continues throughout the life cycle of the facility. For example, a poorly done hazard study such as HAZID, PHA, or LOPA is one of the leading causes of the failure. If this step is performed correctly, then the next potential cause is. Management failure to maintain the integrity of safety critical systems and equipment. In most of the incidents, mechanical integrity of the critical equipment was not maintained, safety barriers were either bypassed, disabled, or not maintained. The third major cause is Management failure to learn and/or apply learning from the past incidents. There were several precursors before those incidents. These precursors were either ignored altogether or not taken seriously. This paper will conclude by sharing how a well-implemented operating management system, good process safety culture, and competent leaders and staff contributed to managing the risks to prevent major incidents.

Keywords : incident investigation, risk management, loss prevention, process safety, accident prevention

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