

Preventing Catastrophic Incidents in Chemical Process Industries with Help of Process Hazard Analysis-Experiment on Hydrogen Manufacturing Unit of Petroleum Refinery

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Abstract: *The chemical process industry is subject to various federal and local regulations and requirements that are challenging to meet and resource intensive. Time and human factors often lead to a "Check Box" mentality where requirements are fully complied with "On Paper" with little or no emphases on quality of compliance. Occupational Safety and Health Administration's (OSHA) Process Safety Management (PSM) requirements are often exposed to this "check box" mentality, especially the Process Hazard Analysis (PHA) element which is the engine that drives and affects the whole PSM program. Poor implementation of PHA affects mechanical integrity, operating procedures, training, and emergency response; and is considered a root cause of most major incidents. Unfortunately, poor quality PHAs are widespread, hard to identify and can be more dangerous than conducting no PHA at all since it may provide a false sense of safety. Unfortunately, existing literature as well as recognized and generally accepted good engineering practices (RAGAGEP) do not provide sufficient guidelines for assessing PHA quality. The guidelines proposed in this thesis help in properly auditing PHA studies by identifying traps and bad practices that most companies fall into when performing PHAs. Hydrogen is widely produced and used in the process industries with growing use in the public domain. While the former area of focus would obviously necessitate process safety considerations, the latter involves activities such as transportation in which occupational safety issues for individuals are paramount. The current research addresses this issue by identifying several areas of application in the hydrogen economy for three key process safety concepts: (i) inherently safer design, (ii) safety management systems, and (iii) the use of case studies. This study thus illustrates, by means of referenced examples, the transferable nature of key process safety concepts to various features of the emerging hydrogen economy. The primary thesis of this work is the notion that inherently safety design principles, Process Hazard Analysis Techniques, safety management systems, and lessons learned from case histories have broader implications for safety than would be apparent by restricting their use solely to the process industries.*

Keywords: Preventing Catastrophic Incidents

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