A Simplified Risk-Based Approach for Analyzing Human Factors

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ABSTRACT

Human factors issues are critically important to process safety performance, and approaches are available to manage these risks. But most process safety management programs do not formally address human factors as of this time. Human factors for PSM is seen as a very confusing topic by most engineers and managers, and so we see little action in this area. There a lack of guidance available in the literature as to how human factors should be addressed. This paper outlines an employee-centered team approach that is an extension of the PHA element of PSM, is simple, and, yet, it provides a risk-based framework for addressing the issues.

The method involves an initial screening step to call out the risks based mostly on higher severity, higher likelihood events where human factors are seen as the potential underlying cause, key contributing factor, or initiating event. For those tasks that are deemed human factors critical, the approach goes on to identify potential active failures and to identify the latent conditions and performance influencing factors that may contribute to their catastrophic outcome using a task analysis approach. Essentially, this method involves conducting a type of PHA, however it includes specific deviations and checklist questions related to active and passive human error, latent conditions leading to human error, and an analysis of the response of operators to abnormal situations. The method uses the workplace environment and the steps of the process as the basis of the analysis, rather than primarily the P&ID. In particular, the team studies startup, shutdown, maintenance, and emergency procedures, and examines control schemes, critical human-dependencies, and areas of high consequence with few reliable and effective safeguards.

The method involves operations in the analysis, including a discussion of concerns and risks they perceive. This feedback is combined with a task-wise detailed step analysis that identifies the purpose of the step, the criteria for success, the safe operating limits, the indicators for exceeding those limits, and the possible hazards of exceeding those limits. Each risk is ranked based on a scale or likelihood and severity. The team determines the Integrity Level of the human element of the system, and the potential means to improve the reliability of that level.