

TRUTH AND LIES IN PHA

by Primatech Inc.

Process hazard analysis (PHA) practices vary widely across companies and undoubtedly the quality of studies varies widely too. This article explores some common fallacies regarding several issues in PHA that contribute to this situation.

Issue: Deviations from design intent in hazard and operability (HAZOP) studies

Lie: It is sufficient to generate deviations from design intent using a short list of common process parameters, such as flow, temperature, pressure, composition, and level.

Truth: This practice likely results in missed scenarios. The full design intent must be defined for each part of a process to ensure that scenarios are identified as completely as possible. Additional parameters may be crucial for the particular process being studied. Also, there are different types of design intent such as construction, operation, maintenance, and sampling intents. Furthermore, design intent includes a description of the interactions of the process with other processes, utilities and services, and its environment.

Issue: Validity of risk ranking results using risk matrices

Lie: Risk ranking provides objective risk estimates.

Truth:

Fundamentally, risk ranking is a subjective process open to the vagaries of the opinions of PHA team members. Process safety practitioners must estimate values of severity and likelihood for events and scenarios based on their collective knowledge and experience in the face of uncertainties in the values. Such assignments are subject to the effects of various human and psychological factors such as heuristics and cognitive biases.

Estimates of severity and likelihood values may not be consistent from team to team, across a company, or even within the same study by the same team due to differing interpretations of risk matrices and the role of human perception in making severity and likelihood estimates and seeing the risk values they generate.

Lack of consideration of uncertainties in risk estimates can lead to acceptance of risks

that exceed tolerable levels and a higher likelihood of catastrophic accidents. Process safety practitioners must be aware of uncertainties and subjectivity when using risk matrices.

Issue: Duration of PHA studies.

Lie: Study duration can be cut in half by using appropriate guidelines.

Truth: Certainly, study duration depends on the efficiency of study performance which depends on the guidelines used for conducting a study. However, practitioners who claim to conduct studies much faster than other competent practitioners should not be believed. Life safety, asset protection, and environmental protection depend on the quality of PHA studies. Measures should be taken to ensure study efficiency but taking shortcuts and cutting corners to speed up studies is not acceptable. Performing PHA studies briskly results in costly mistakes and missed scenarios. The cost of any extra time taken to perform a study properly pales in comparison to the cost of process safety incidents.

Issue: Competency of PHA team leaders

Lie: Any competent engineer can facilitate a PHA.

Truth: PHA team leaders must possess appropriate qualifications, experience, skills, training, and personal characteristics. They play a critical role in the quality of PHA studies which directly affects the level of risk tolerated for a process. The lower the quality of a PHA, the more likely higher risk will be tolerated. Due to the importance of the role played by team leaders, certification of their competency is desirable.

Issue: Expertise of PHA team leaders

Lie: PHA facilitators should be experts on the process studied.

Truth: PHA team leaders do not need to be a technical expert on the process under study and, arguably, should not be, as they would undoubtedly have mindsets about the process that could inhibit their independence in facilitating the study. Mindsets are assumptions held by an individual which are so established that the individual does not recognize they are being made. Usually, they arise after an individual has worked in a process for some time. Current methods of working and existing levels of safety

become viewed as acceptable and are no longer questioned.

Issue: Team size.

Lie: Three people can conduct an effective PHA.

Truth: OSHA's PSM standard and EPA's RMP rule require that a PHA be performed by a team with expertise in engineering and process operations, and the team shall include at least one employee who has experience and knowledge specific to the process being evaluated. Also, one member of the team must be knowledgeable in the specific process hazard analysis methodology being used.

These are minimal requirements for team membership and should not be read to imply that teams of three people necessarily meet the requirements of the regulations.

In reality, PHA teams must have a facilitator, scribe, design and/or process engineer, controls engineer, safety engineer, and one or more operators and mechanics. Also, specialty team members such as a chemist, materials engineer, and environmental engineer may be needed. Additionally, representatives from vendors, contractors and design and engineering companies may be needed.

Given these requirements, it is highly unlikely they can be met with a team of just three people.

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