

# Voluntary Hazard Reviews

## TECH TIP



**Should facilities voluntarily perform Hazard Reviews?** Hazard Reviews and Process Hazard Analysis (PHA) are used to identify potential vulnerabilities that pose a safety risk as required by United States Environmental Protection Agency (USEPA) Risk Management Plan (RMP) and Occupational Health and Safety Administration (OSHA) Process Safety Management (PSM) regulatory requirements. Even if not required by RMP or PSM, performing a PHA can be massively beneficial. PHAs identify vulnerabilities and practical recommendations to improve workplace safety and lower risk of fatalities, injuries, and facility damage. This functionality can be used to satisfy OSHA's General Duty Clause (GDC), which requires that all employers provide a workplace "free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees"<sup>1</sup>. Under the GDC, facilities are required to identify hazards that may result from accidental releases by using

appropriate hazard assessment techniques, designing, and maintaining a safe facility, taking such steps as are necessary to prevent releases, and minimizing the consequences of those accidental releases that do occur<sup>2</sup>. Another extremely valuable voluntary Hazard Review is the Design HAZOP (D-HAZOP) which uses the functionality and format of a HAZOP as a decision-making and technical problem-solving mechanism with increased flexibility during the design phase.

**Why incorporate a PHA directly into the design process?** Given the fundamental importance of PHA to plant safety and operability, the question isn't should it play a role during the design process, but how can the design process be effective and efficient without it? Implementation of design changes late in the project cycle can be much less practical and have a more significant impact on the project schedule, leading to only very high-risk vulnerabilities being addressed at a much greater cost. D-HAZOP allows for more extensive changes or larger numbers of smaller changes to be made at earlier stages of the project, which is more cost-effective and

measurably improves safety and decreases operational risk. The conceptual and detailed design phases are periods of time where the application of interactive D-HAZOP can be the most beneficial. Although safety reviews can be more thorough if done when everything is finalized, using HAZOP as a problem-solving process throughout the design phase allows the team to have more useful input into the design, avoid last-minute complications, and actively contribute to facility safety. In addition to a HAZOP, high risk scenarios and those involving Safety Instrumented Systems (SIS) as safeguards, can perform a simultaneous Layer of Protection analysis (LOPA) to streamline changes and

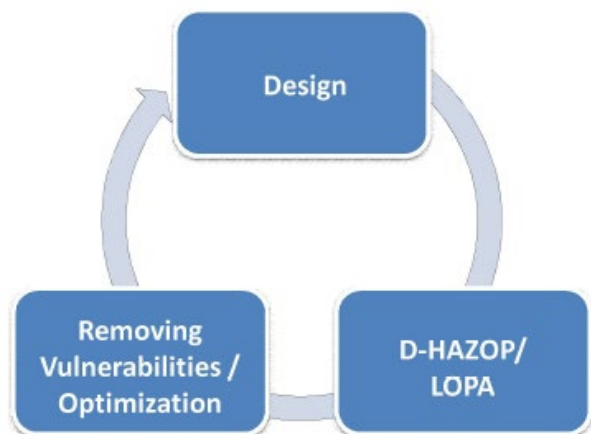


Figure 1: Interaction of Design and Hazard Review During the Central Phase of the Design

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allow for rapid feedback to the Process and Instrumentation Design engineers. The engineers can then evaluate critical design options and present them to the team for additional feedback and convergence as appropriate. A good facilitator can select scenarios likely to identify worthwhile design options or high-risk scenarios, providing critical feedback that may have an impact on capital costs and project schedule, and can materialize changes sooner to have the best positive impact. For a fast-paced project, the momentum associated with the team being together provides an opportunity to resolve issues that support modifications or resolution of issues quickly. Using a “parking lot” on a flipchart allows and incentivizes the design team to assign the non-HAZOP participants to dig up missing information or resolve design issues and report back to the team so they can make updates as necessary to resolve and close out critical issues.

**D-HAZOP also promotes interaction between design engineers and owner-operator personnel**, which allows operations issues to be infused early in the design to meet the needs of the end-user. D-HAZOP acts as a platform to resolve critical issues during the design phase of a project, supporting maintenance of schedule and budget while satisfying both project management and engineering objectives. With proper leadership and technical resources, D-HAZOP can be used to benefit:

- Project Control
  - Forces engineers and other team members to complete their efforts so that they are suitable for sharing
  - Forces resolution of information bottlenecks
  - Drives the D-HAZOP participant to think beyond the structured keyword approach and anticipate what can be lacking in the design that may result in unforeseen hazards
  - Neutralizes the “I’m waiting for…” syndrome
- Maintaining project schedules
- Maintaining project budget
- Teamwork - Providing a forum for resolving design disputes between the owner-operator and the designer that doesn’t require continuous escalation to project management

**For more information**, see the GCPS co-published by Steve Maher, PE CSP titled [Assimilating Design Formulation and Design Review into a HAZOP](#), published in 2012.

## Resources

1. OSH Act of 1970, Section 5, “Duties” - <https://www.osha.gov/laws-regs/oshact/section5-duties>
2. United States Environmental Protection Agency, The General Duty Clause, EPA 550-F-20-002, April 2020 - [2.EPA General Duty Clause Guidance](#)
3. [“Assimilating Design Formulation and Design Review into a HAZOP”](#), Steve Maher, PE CSP, March 2012.

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