Building an effective process safety management program

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The process industries are governed by and required to comply with OSHA's Process Safety Management (PSM) of Highly Hazardous Chemicals standard (29 CFR 1910.119). Per OSHA, the standard emphasizes the management (identification, evaluation and control) of hazards associated with highly hazardous chemicals.

The PSM challenge for many companies is that it is a performance-based standard that doesn't define detailed compliance steps but instead allows for tailored safety programs based on the specific operations of a company's facilities. For this reason, many organizations struggle with how to create and maintain an effective PSM program.

To compound the problem, many standards committees are now led by industry consultants emphasizing compliance requirements that provide them with more work. This can increase the costs to end-user companies and not really show material improvement to fundamental safety, which is the real goal of the standard.

PSM is a comprehensive management program that integrates technologies, procedures and management practices. Most programs use work processes and checklists from recognized and generally accepted good engineering practices (RAGAGEP).

Two primary engineering activities are process safety valves (PSV) and safety instrumented systems (SIS). Process safety valve (PSV) sizing must be done properly, and a maintenance program must be in place to ensure they continue operating per design. Likewise, fail-safe elements and shutdown systems must be correctly designed, programmed, installed and regularly checked.

Beyond engineering, another key step is thorough risk evaluation with process hazards analysis (PHA), layer of protection analysis (LOPA) and independent protection layer (IPL) assessments.

A walk, crawl, run approach to PSM is pragmatic and the best use of end-user money. Some key compliance steps are below and include implementation considerations for each component.

1. Safety lifecycle management (SLM) manual. Most companies have an effective PSM/LOPA manual, SIS design guide and PHA work process. But it is important to "say what you do and do what you say." The SLM manual is a single umbrella document that defines the end-users' views of RAGAGEP. Without this, regulators can define it.

2. Layer of protection analysis (LOPA) validation. While most companies have a robust LOPA/PHA process, the results are in a large document format without thought of the need to mine the key data after the hazard and operability study (HAZOP). A database mindset can be extremely valuable. For example, a spreadsheet with the asset's name in one column and the descriptor in a second (versus all in one field) enables pulling reports out of the list of IPLs to assist in managing gap closure.

Having a good challenge system to evaluate alternatives to control options and lower the number of SIL 2 and SIL 3 assets can dramatically reduce costs and still maintain safety. Many companies take the first results of the PHA that are too conservative in nature and overprotect the process unit. Optimizing costs along with safety allows more devices to be covered for the same investment.

3. Independent protection layer (IPL) assessment. Each IPL needs a checklist and capabilities for tracking compliance, testing and monitoring. Database programs have emerged to help automate this. These can be worth the money for a more sustainable system in the future.

4. Documentation deficiency resolution. Some IPLs are installed correctly and safely but just do not have the right documentation. An acceptance test dated and signed or a functional safety assessment at the right stage gate is required. Having a team and program to systematically step through these and close gaps is the most effective use of capital.

5. LOPA gap analysis. Once a physical gap is discovered, having modular type designs for the standard SIL 2/SIL 3 gaps will ensure a faster, more cost-effective approach to these installations. Don't re-engineer each solution.

PSM programs can be complex. While we have covered the basics, there are PSM topics we have not discussed. Ultimately, however PSM is executed, its main goal of safe management of process hazards must be at the forefront.

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