Beyond-Compliance Uses of HAZOP/LOPA Studies

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Abstract

Recent years have seen a convergence of scenario-based Hazard and Operability (HAZOP) Studies, Layer of Protection Analyses (LOPAs), and Safety Integrity Level (SIL) determinations. These can all be performed using order-of-magnitude estimates for the initiating cause frequency, the effectiveness of protection layers, the severity of loss event consequences, and the inclusion of other risk-reduction factors. Conducting a HAZOP Study or a HAZOP/LOPA Study in this manner makes it possible to extend the study results to not only determine required SILs, but also to aggregate risk by study segment and show the quantitative benefit of implementing risk reduction measures. The aggregated risk can be compared to process-wide tolerable risk criteria, in addition to comparing each scenario to a risk matrix or risk magnitude. This presentation demonstrates how a true risk-based HAZOP Study can be performed with little additional effort over that required for commonly performed cause-by-cause HAZOP Studies, and how facility managers and engineers can then use the results when deciding on and implementing risk-reduction measures.