The Maximum Design Leak (MDL) Approach to Leak Size Selection

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ABSTRACT

When performing consequence-based facility siting analyses, determining the Maximum Credible Events (MCEs) to evaluate is one of the most important decisions to make. In defining MCEs, the assumed leak size is arguably the single most important decision made but also has a high degree of subjectivity. Various publications and practices provide industry with some guidance on this matter. Some references recommend leak sizes as a percentage of pipe cross-sectional area but the most common practice is to use a constant maximum leak size for all scenarios. These approaches are sound for screening-level analyses if sufficiently large leak sizes are assumed, but may result in large overestimations of consequences and remedial actions or conversely run the risk of being unconservative if the leak size is too small. According to API RP 752, any simplifying assumptions made in facility siting hazard studies must be conservative, demanding relatively large leak sizes. Following these studies, more detailed evaluations are commonplace to remove conservatism and better understand the risks. One area worthy of more detailed evaluations is the leak size selection. This paper presents a methodology using existing risk-based tools to determine leak sizes of different MCEs in a consequence-based study. The resulting leak size is the Maximum Design Leak (MDL) which would be used in determining potential consequences and remedial actions. This approach provides much greater confidence that the predicted consequences are realistic to both a specific industry and plant and that money spent for remedial actions addresses actual risks to that plant. This is not a new science, but a new application of existing science, providing greater confidence in the results. An example case using actual refining industry data is presented in this paper as an example of its application and expected results in a refining application.