Screening Atmospheric Relief Devices for Unacceptable Risks

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Abstract

Recent industry incidents have highlighted the need to carefully consider the risks associated with relief devices and where they are routed. That is especially true for those that are routed to the atmosphere. It’s easy to establish a policy stating that the relief device must be routed to a flare, recover, or treatment system when the risks are too high. The hard part is to find an effective way to apply this to actual designs. API 521 contains specific guidance for minimizing flammability hazards, but specifics are lacking in the section on toxic vapors. When pressure relief devices are checked, what is the process for objectively determining whether or not it’s safe to route it to the atmosphere?

Dow has developed a practical work process for screening relief device effluent streams for flammability and toxicity risks. Its objective is to apply safe and consistent screening criteria for relief streams routed to the atmosphere.

The process includes two levels of screening. The first screening tests use simplified spreadsheet calculations that are less rigorous but more conservative. Relief devices that pass this conservative test are compliant with Dow’s risk criteria for atmospheric venting. A re-design is attempted for devices that fail this first test. For example, the outlet velocity might be increased, or the design might be re-engineered to reduce the required flowrate. If the device cannot be re-designed to pass the first-level test, then the user proceeds to the second-level tests which use rigorous dispersion modeling and/or Layers of Protection Analysis (LOPA).

This paper presents that work process and discusses how it is applied in Dow.