Mitigate the Hazards of Emergency Atmospheric Venting by Steam Injection

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ABSTRACT

During major plant upsets, it is often necessary to safely relieve the process fluids contained in process equipment. The relieved vapors may be flammable and/or toxic, and the vapor clouds may be within the explosive range. There are several ways to control the hazards associated with the release of process fluids from process equipment. If process fluids are hazardous and environmentally persistent and if releases are common, then the cost of containment and treatment systems are usually justified. If process fluids are potentially hazardous, but not environmentally persistent, and if releases are rare, then atmospheric dispersion is not only less expensive, but also a wiser use of resources. However, if atmospheric dispersion is the disposal method of choice for vented vapors, then a brief quantitative consequence analysis should be conducted to assure safe venting.

Safe atmospheric dispersion can be achieved using very tall vents, but a much more practical approach is to inject steam into the vented vapors. This paper outlines a method to determine if atmospheric venting is safe. Where it is not, a method is described for the design of steam injection systems to achieve safe atmospheric dispersion of vapors vented from a pressure relief system. The consequence analysis method, the design method for steam injection, and the advantages of steam injection are then demonstrated with a practical example.