

# Pressure Relief Study and Evergreening - Why it is Important?

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*Are there documentations available on all the design basis of each of your pressure relief devices? Are these documents evergreen or up to date?*

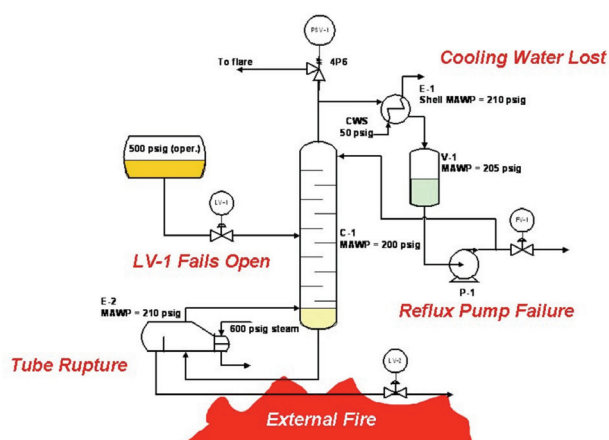
*Do you review, evaluate and update the pressure relief design basis for every change (MOC), expansion or debottleneck projects made to your plant?*

*Are you aware of the impact to the flare disposal system each time you add new relief devices to the flare header, or increased throughput of a unit beyond its original design?*

## Why these questions are important for a plant/facility and what are the safety implications?

A pressure relief device is typically the last line of defense (or last layer of protection) for an overpressure event. In some facilities, these are also termed safety critical devices. The consequences of an overpressure event can be severe or even catastrophic - safety, environmental, business interruption or even company closure impacts. Therefore, it is important to ensure that the pressure relief device is properly designed (in terms of size, type and location) and maintained (evergreen documents and periodic testing) to serve its purpose.

A pressure relief study comprises of detailed analyses and documentation of all the potential overpressure scenarios and its applicability, followed by the sizing calculations for each scenarios. This is also termed pressure relief design basis documentation. The following table lists a few examples of overpressure scenarios described in API 521 that one needs to consider in the analyses.



**Table 1: Examples of Overpressure Scenarios per API 521**

Cooling failure	Reflux failure
Closed outlet	Hydraulic expansion
External pool fires	Opening manual valves
Electric power failure	Heat-transfer equipment failure
Entry of volatiles	Instrument Air Failure

In the United States, pressure relief system design basis documentation is part of the process safety information (PSI), which is one of the fourteen OSHA Process Safety Management (PSM) elements. Even though most Asia countries do not have PSM or similar process safety regulations on pressure relief design basis, there are valid and beneficial reasons to implement this pressure relief study and maintain an evergreen document:

- It is Recognized and Generally Accepted Good Engineering Practice (RAGAGEP)
- It the Right thing to do for the Safety of the plant when making changes

Pressure relief study shall apply to both a newly designed and existing operating facility. For a newly designed facility, this can be done either at the FEED or detailed designed phase, and at the as-built phase to incorporate final installation changes.

For an existing operating facility, this study and documentation serves two purposes:

- To identify any potential overpressure hazards and deficiencies because the existing facility is not designed and built to the latest design codes, practices and regulations. The facility can then do a risk assessment to implement the retrofits or upgrades.
- To review safety impacts when making subsequent changes to the facility as part of MOC or hazard risk assessment. For example, a simple change such as installing a bypass line around a control valve may have an impact on the pressure relief design basis flowrate (or relief sizing) if control valve failure is one of the potential overpressure causes. Even if there is no final impact to the pressure relief sizing from the higher flowrate through the bypass line and control valve, the analysis and calculations need to be documented for future record and reference.

Pressure relief study documentation needs to be kept up to date or evergreen throughout the plant life as it is part of process safety information.