How Process Safety Information Affects the Quality of a Process Hazard Analysis

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1. Introduction

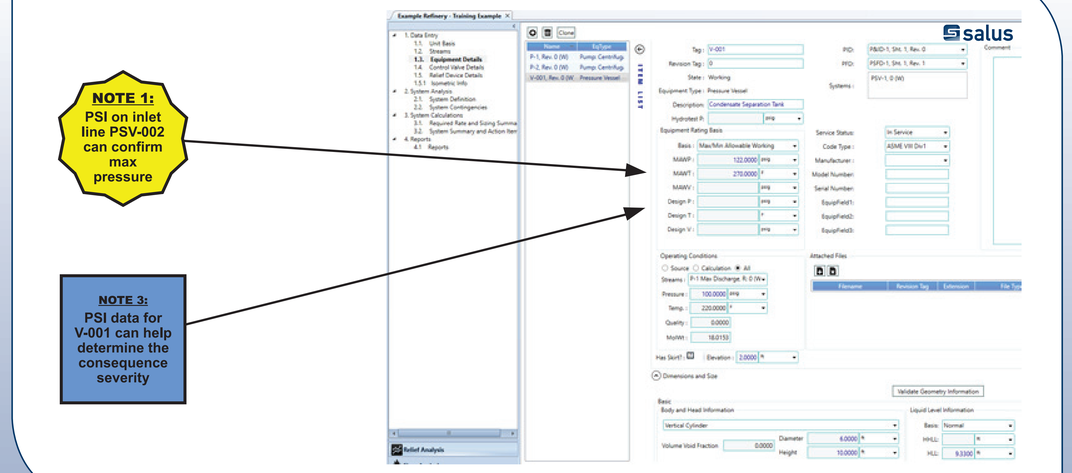
From defining the Causes, developing the Consequence scenarios and ending with Safeguards, accurate PSI information is required to provide the most credible assessment of risk. The best practice of minimizing the assumptions used during a PHA study has two significant benefits:

- Management can be assured (feel good) that the PHA process utilized all relevant and up-to-date PSI information thereby reducing potential inaccurate assumptions
- It will reduce time spent for discussions between participants to come to common conclusions and speed up the PHA process while maintaining the integrity of the study.

As learned from many PSM audits, PSI information is typically spread throughout many locations and maintained by numerous groups:

- PSV files - Engineering
- Mechanical Equipment Data/Inspection reports - Engineering, Maintenance, Inspection Departments
- Critical Instrument Logs - Engineering or Controls

In a perfect world, maintaining a common database to store all up-to-date PSI information would be ideal, but the delegation of maintaining and access would be cumbersome. There are many people involved with PSI information and each has their own responsibilities and actions for validating the data. One way to reduce the roadmap for locating PSI data is to maintain relief systems documentation in such a way that it provides most all relevant data in a simplified format and links to other sources of PSI information. This poster will walk through the PHA process and how readily available PSI information can be located with robust relief systems documentation.



3. Causes

Typically, the detailed cause of a PHA would not reference back to any PSI data. The failure or misalignment of valves are always credible occurrences that are documented. Where PSI information becomes relevant is in the cause category. The example shown below indicates the following:

- Inlet PCV-001 on methane supply to V-001 reactor fails open

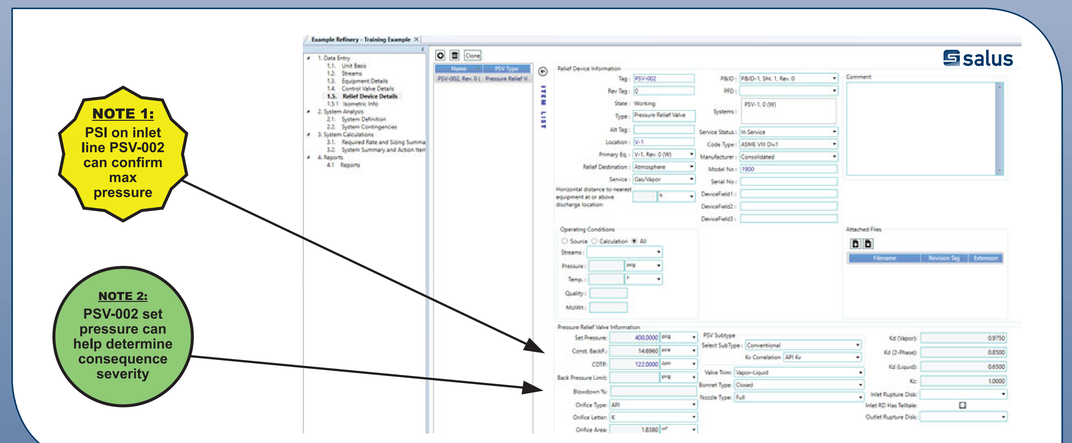
Cross-referencing to the PID, it is noted there is a PSV-002 upstream of PCV-001, a vessel, V-001 with its own relief device, PSV-001. A quick check during the PHA study of the relief systems documentation for PSV-002 will show that the set pressure of 400 psig is indeed above the MAWP of V-001, 285psig.

This validates the cause category of high pressure. Had the set pressure of PSV-002 been documented at 250 psig, this cause probably belongs in another category, i.e. more flow.

Processes: 1) V-001 Reactor **Nodes: 1)** Feed Streams

DEVIATION	CAUSES	CONSEQUENCES	RISK S	RISK L	RISK RR	SAFEGUARD
1) High Pressure	1) Inlet PCV-001 on methane supply to V-001 reactor fails open	1) Potential for high pressure in V-001 reactor, potential flange leak, loss of containment, explosion, jet fire, employee injury, damage to equipment and loss of production				1) PSV-001 on V-001 reactor
		2) Potential for high pressure in V-001 reactor, potential rupture, loss of containment, explosion, jet fire, employee injury, damage to equipment and loss of production				

NOTE 1: PSI on inlet line PSV-002 can confirm max pressure



4. Consequences

The consequences developed during the PHA can benefit greatly from accurate and readily accessible PSI information. In the high pressure deviation we can use the PSI information in establishing the overpressure ratio to assist in pinpointing the consequence severity levels. Using the PSI information for PSV-002, a 400 psig supply into vessel V-001 with a MAWP of 285 psig, results in an overpressure ratio of 1.404. Based on your client's guidelines for overpressure and probabilities, this could result in either a flange leak or vessel rupture.

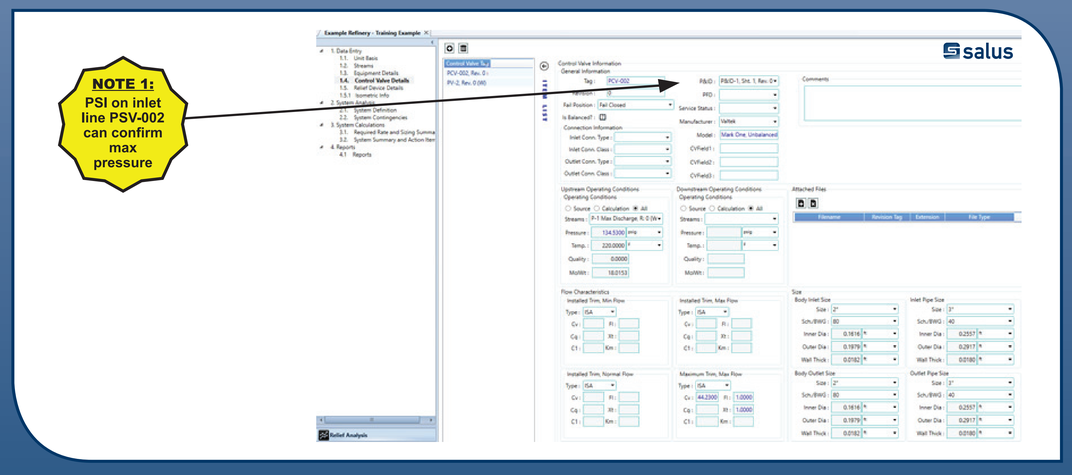
The consequence severity of these two scenarios is quite different but with the PSI data well documented and easily obtained, accurate severities can be obtained during the PHA.

Processes: 1) V-001 Reactor **Nodes: 1)** Feed Streams

DEVIATION	CAUSES	CONSEQUENCES	RISK S	RISK L	RISK RR	SAFEGUARD
1) High Pressure	1) Inlet PCV-001 on methane supply to V-001 reactor fails open	1) Potential for high pressure in V-001 reactor, potential flange leak, loss of containment, explosion, jet fire, employee injury, damage to equipment and loss of production				1) PSV-001 on V-001 reactor
		2) Potential for high pressure in V-001 reactor, potential rupture, loss of containment, explosion, jet fire, employee injury, damage to equipment and loss of production				

NOTE 2: PSV-002 set pressure can help determine consequence severity

NOTE 3: PSI data for V-001 can help determine the consequence severity



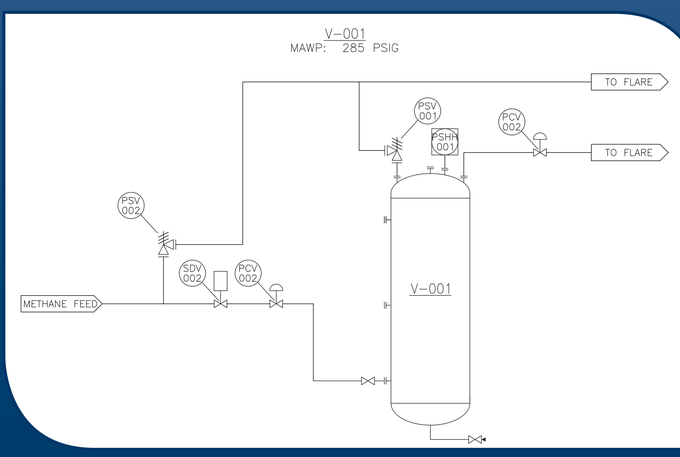
5. Safeguards

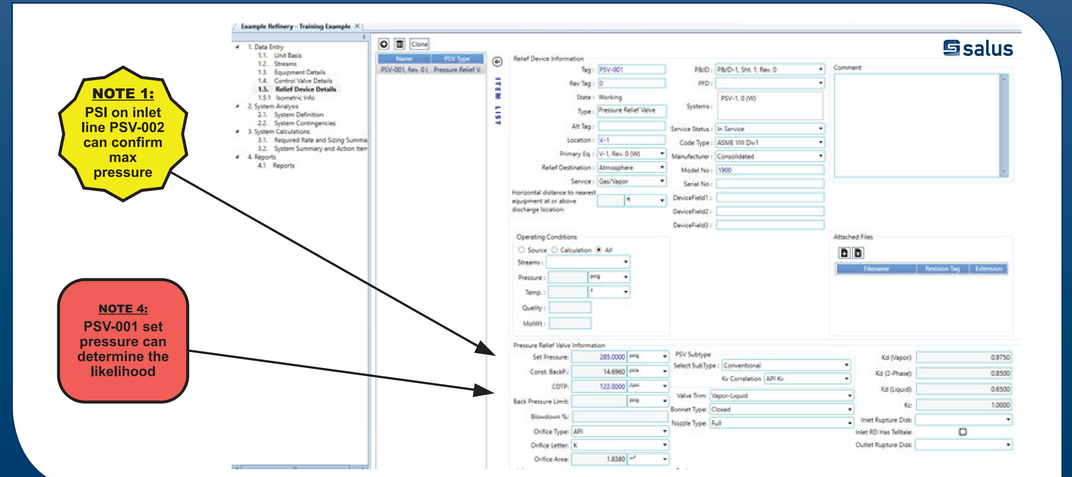
The safeguards listed during a PHA have the most critical requirement for validation and accuracy during a PHA. They are the protection layers that mitigate or prevent major accidents from occurring and thus leave no room for assumptions or quantitative assessments. PSI information in relief system documentation should be current and accurate for the current operating parameters. A well-documented and arranged system will allow for easy access during the PHA. Information from other PSI data such as PID's does not always reflect the purpose of the safeguard. For example, many PID's show the governing case of a pressure relief device, which may or may not satisfy the scenario release. (Fire case vs overpressure)

Processes: 1) V-001 Reactor **Nodes: 1)** Feed Streams

DEVIATION	CAUSES	CONSEQUENCES	RISK S	RISK L	RISK RR	SAFEGUARD
1) High Pressure	1) Inlet PCV-001 on methane supply to V-001 reactor fails open	1) Potential for high pressure in V-001 reactor, potential flange leak, loss of containment, explosion, jet fire, employee injury, damage to equipment and loss of production				1) PSV-001 on V-001 reactor set at XXX
		2) Potential for high pressure in V-001 reactor, potential rupture, loss of containment, explosion, jet fire, employee injury, damage to equipment and loss of production				

NOTE 4: PSV-001 set pressure can determine the likelihood





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