

Before You Fix the Relief Valve Problem

Careful considerations when mitigating
inadequate relief systems designs

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Presenter Biography

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Overview

- Introduction
- Risk Assessments
- Types of Concern Mitigations
- Understanding the Problem
- Planning Ahead
- Case Studies
- Conclusion
- Questions

Introduction

- Numerous concerns are generated from relief systems studies, PHAs, etc.
- Most obvious solution may not be the best
- Consider
 - Operational impact
 - Financial impact
 - Risk & Consequence

Risk Assessments

- Not a type of concern mitigation
- Used to prioritize mitigations
- Hazards of installing mitigation plan may be worse than leaving as-is
- Regardless of a mitigations safety impact, rules and regulations must be followed

Types of Mitigations

Administrative Controls & Procedures

- ***Car seals***
 - Negligible up front cost
 - Operational restrictions
 - Consider consequence
- ***Safe Operating Limits***
 - Negligible up front cost
 - Can unit physically operate at original design?
 - Will hinder future throughput increase

Types of Mitigations (Cont'd)

Set Pressure Adjustments

- Minimal up front cost
- Lowering set pressure
 - Avoid set too close to operating
 - Ensure complete operating pressure envelope is considered
- Raising set pressure
 - Ensure all upstream/downstream equipment still protected

Vessel Re-rates

- Minimal cost if only paper work is required
- May be difficult with older, corroded equipment

Types of Mitigations (Cont'd)

Control Valve Modifications

- Price varies
- Less frequently a viable option
- Use caution with limit stops

Relief Valve Changes

- If same dimensions, essentially cost of the PSV
- Know limitations of each type
 - Conventional
 - Bellows
 - Pilot operated

Types of Mitigations (Cont'd)

Safety Instrumented Systems

- Becoming more common and less expensive to install
- Must be maintained properly for lifetime of process

Piping Modifications

- Generally, highest up front installation costs
- Lower on-going costs

Understanding the Problem

- The relief valve isn't always the problem
- Consider
 - Initiating event
 - Pressure source
 - Pressure limitations
- Discussions with operations personnel are essential

Planning Ahead

- Multiple groups / people will touch project
 - Process, design, construction ,etc.
 - Put yourself in their shoes
- Allow enough time to implement change
 - Special material specifications
 - May need to iterate plan
- Consider relief valve type, set pressure, location, and discharge
- Know the rules

Planning Ahead Cont'd

For PSV installations or modifications, ASME Sec. VIII states :

ASME Sec. VIII §UG-135 (f)

“Pressure relief devices shall be constructed, located, and installed so that they are readily accessible...”

ASME Sec. VIII §UG-135 (f)

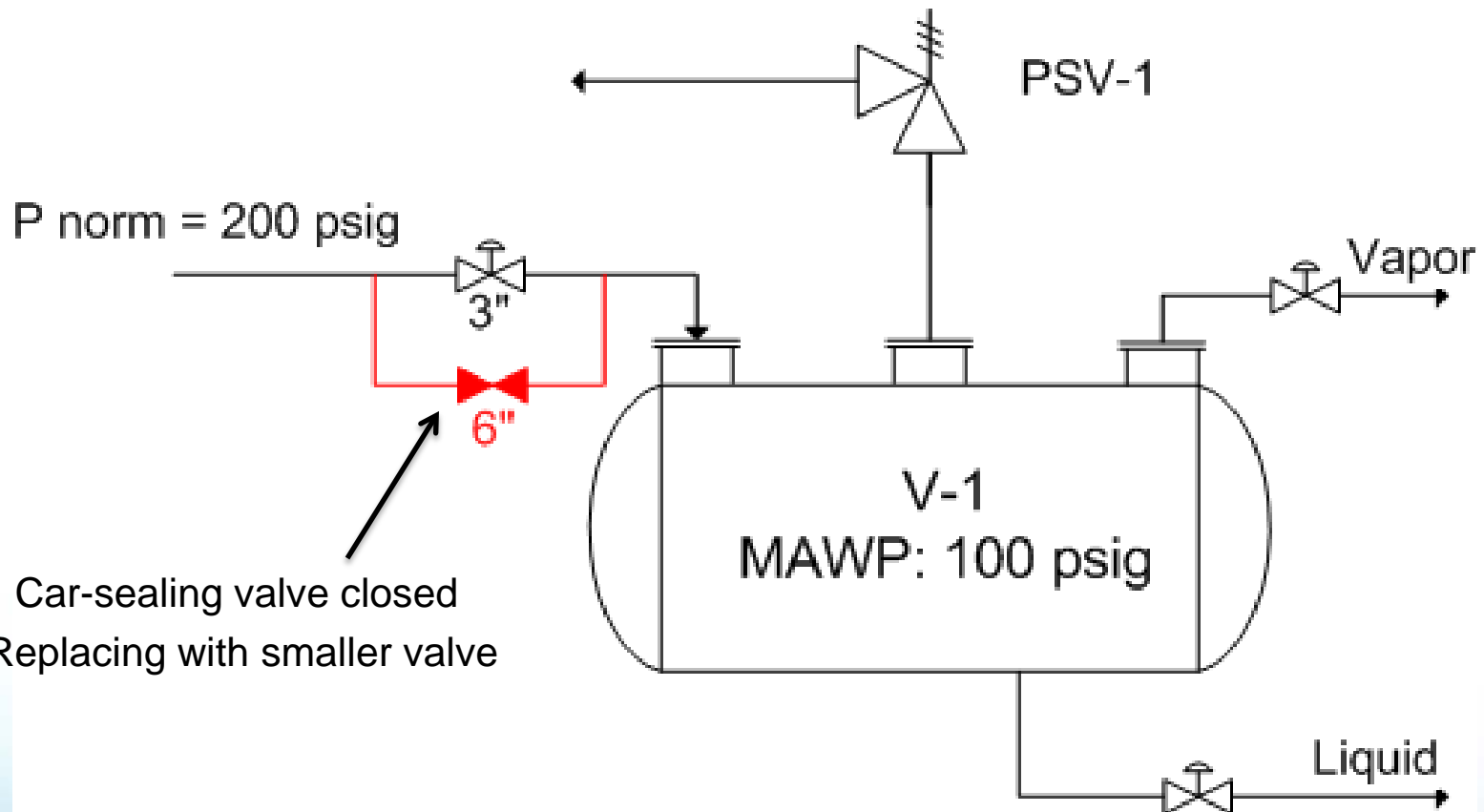
“Discharge lines from pressure relief devices shall be designed to facilitate drainage...”

ASME Sec. VIII Appendix M §M-6 (a)

“...all non-recoverable inlet losses shall not exceed 3% of the device set pressure.”

Situation Example 1

Concern: PSV undersized for opening of control valve bypass

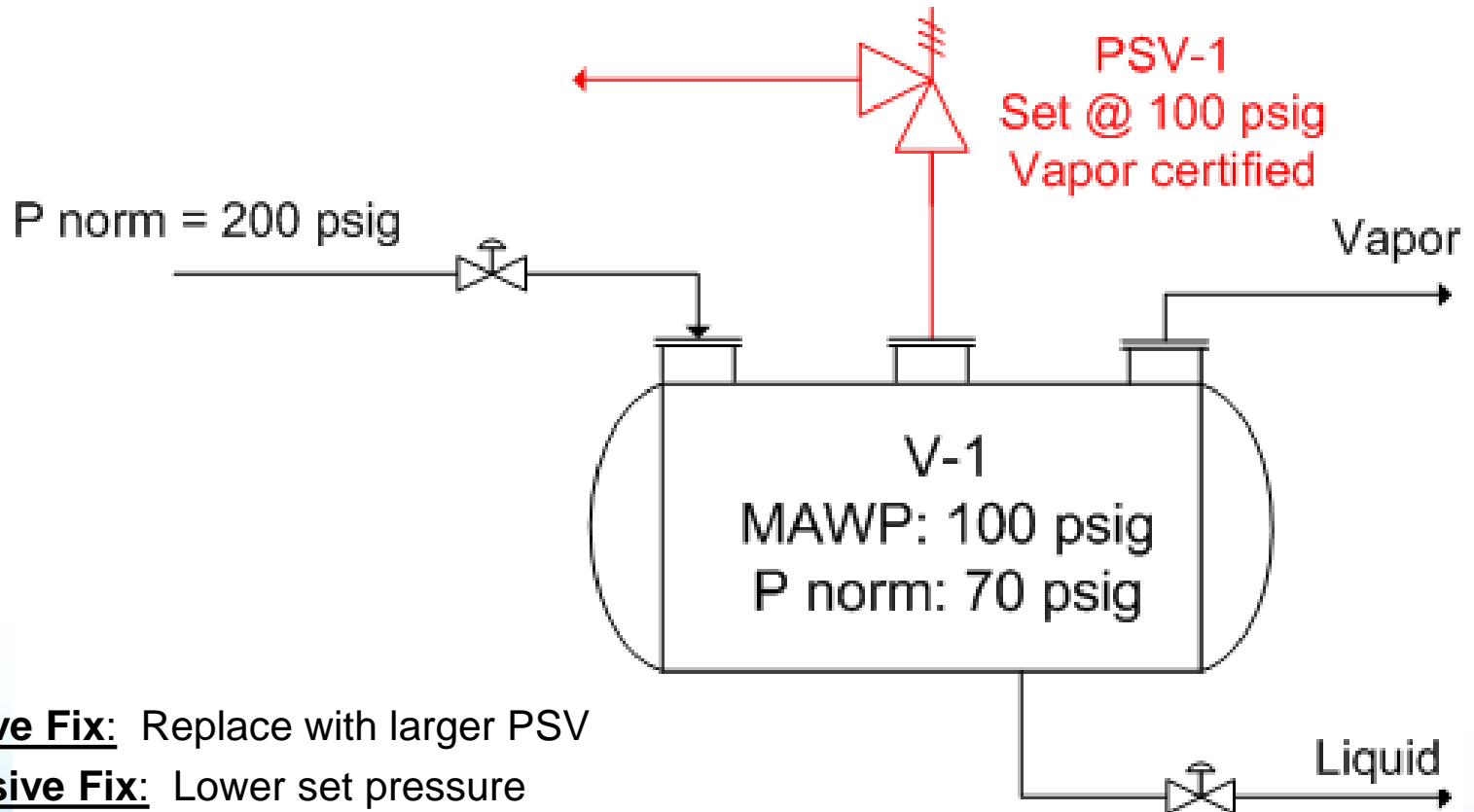


Incorrect Fix: Car-sealing valve closed

Correct Fix: Replacing with smaller valve

Situation Example 2

Concern: PSV slightly undersized for liquid overfilling

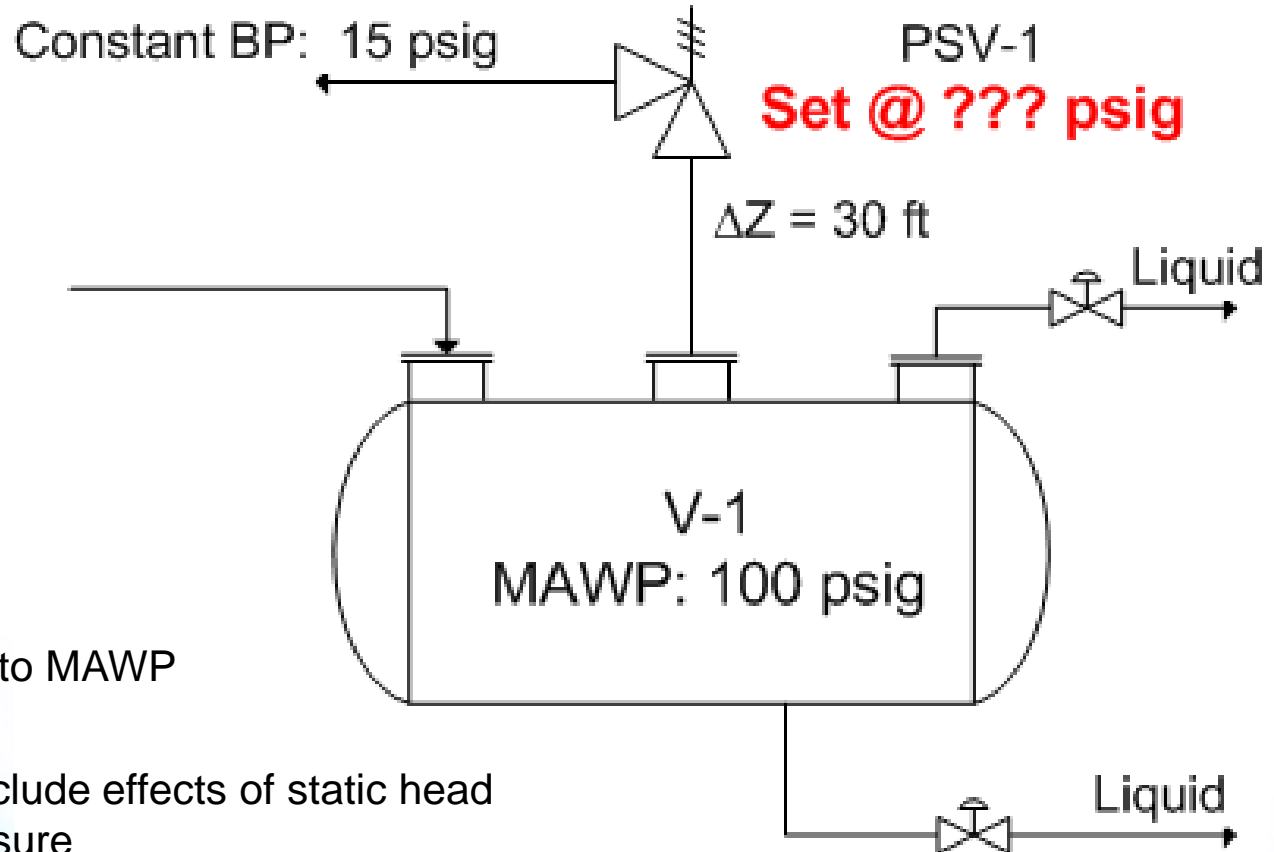


Expensive Fix: Replace with larger PSV

Inexpensive Fix: Lower set pressure

Situation Example 3

Situation: New PSV installation. What should set pressure be?

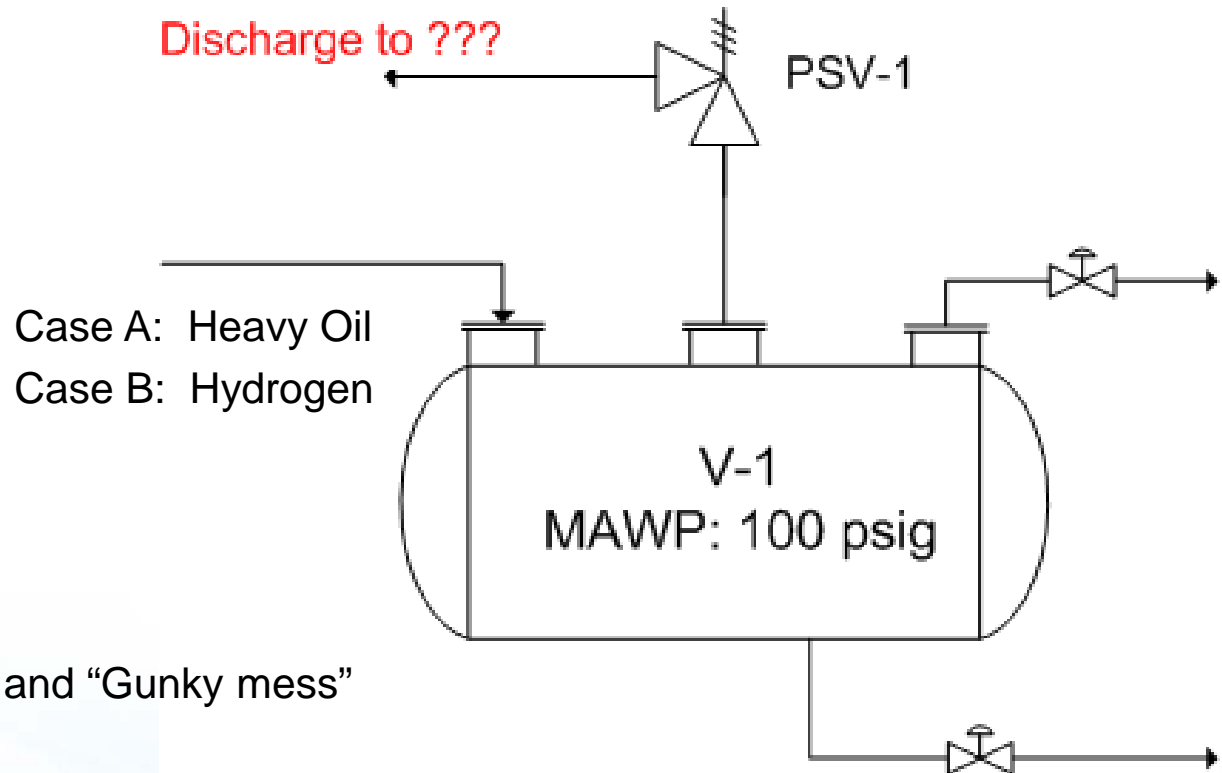


Incorrect set P: equal to MAWP

Correct set P: Must include effects of static head and constant back pressure

Situation Example 4

Situation: New PSV installation. Where should PSV discharge be?

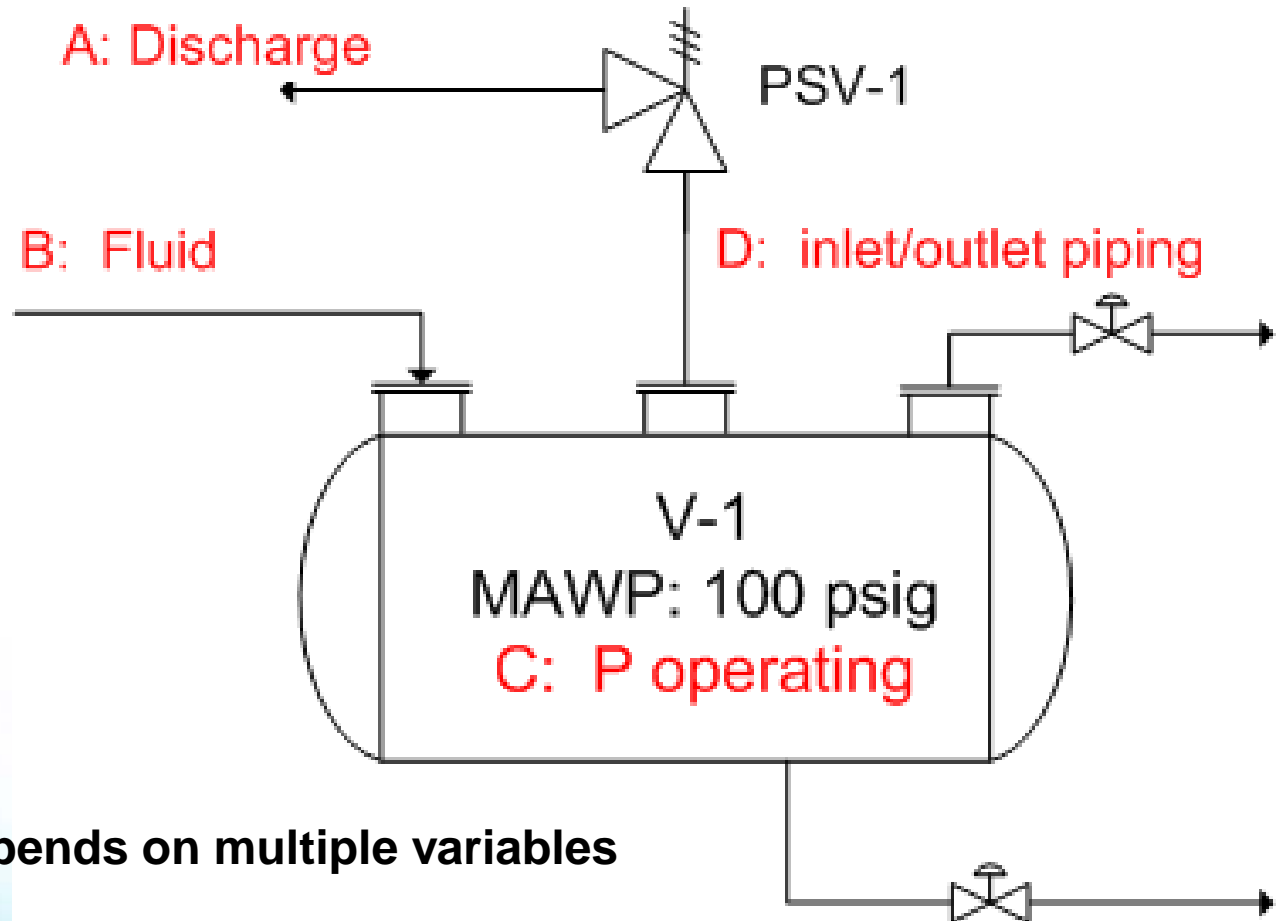


Case A: Avoid flare header and “Gunky mess”

Case B: Can be vented to atmosphere at safe location

Situation Example 5

Situation: New PSV installation. Where type PSV (Conventional / Bellows / Pilot) to use?



The PSV type depends on multiple variables

Conclusion

It is very important to

- Understand the problem
- Consider all operational, financial, and safety impacts
- Know the rules
- Plan ahead

By practicing these principles, safer mitigations can be implemented that will potentially more time and money

Questions?