

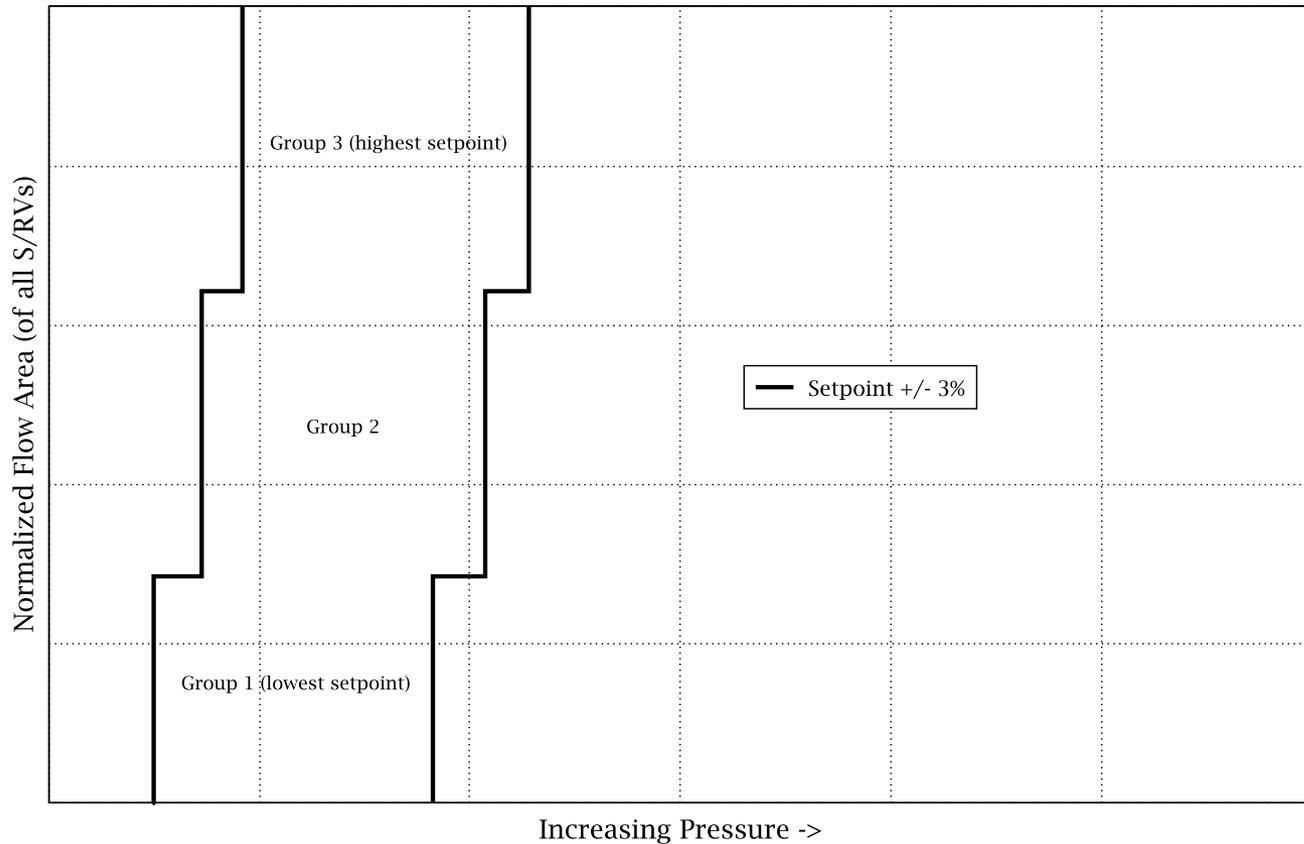
Public workshop related to TSTF-576, “Revise Safety/Relief Valve Requirements”

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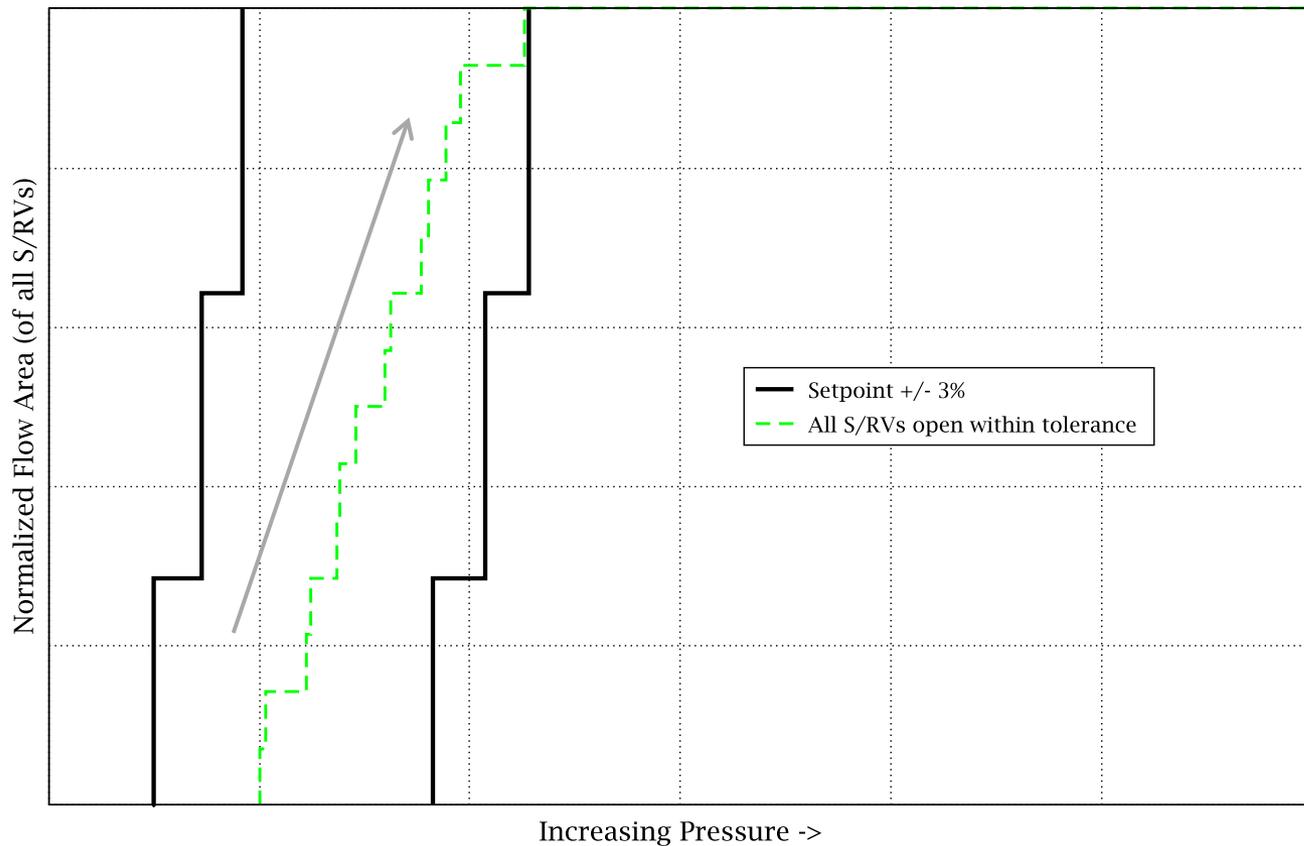
Objective

- To present suggested changes to BWR Standard Technical Specification 3.4.3, Safety/Relief Valves (S/RVs) to resolve an ongoing TS compliance issue.
- The suggested changes are still in the conceptual stage and are presented for discussion only at this time as the idea has not been thoroughly developed.
- Some examples are presented which are based on actual plant data, however, they are not specific to any particular plant.

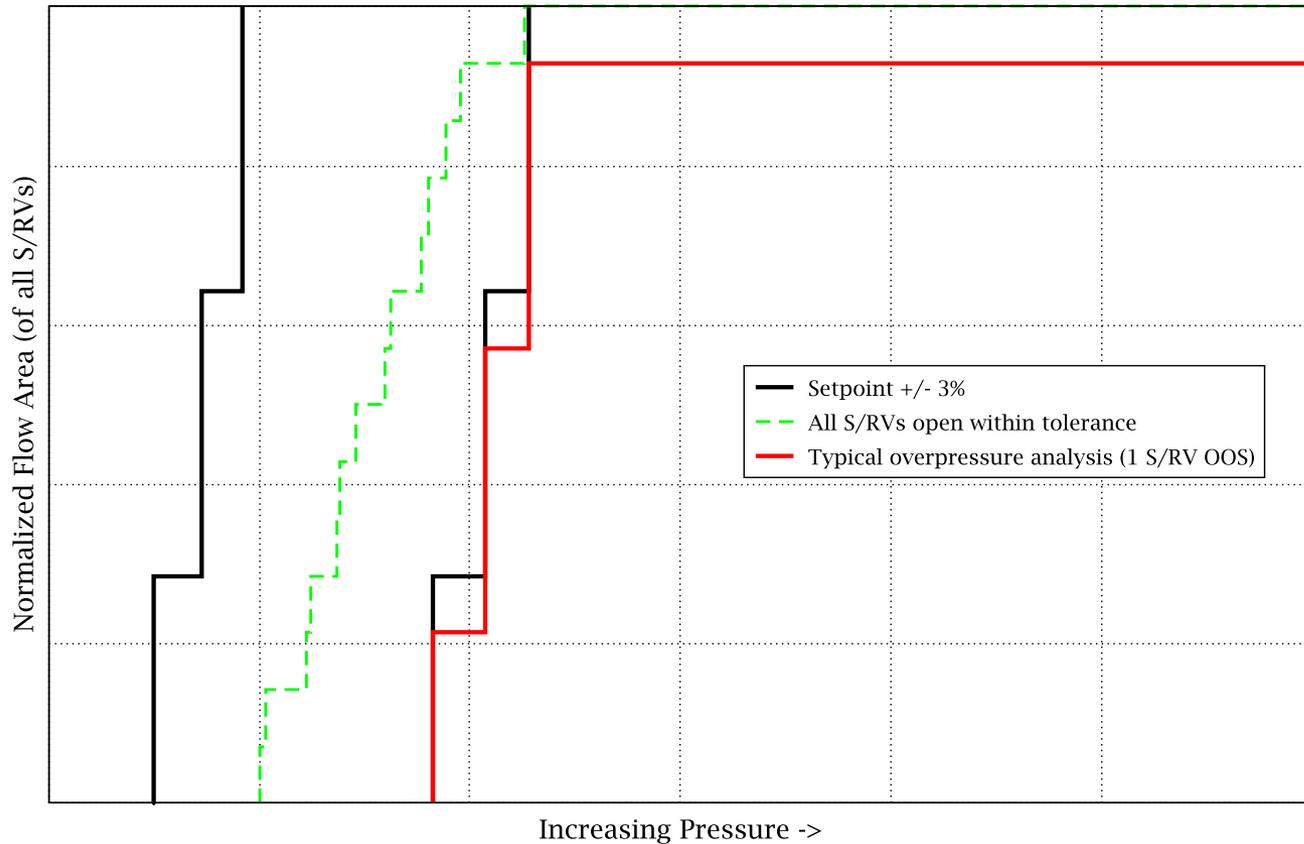
The following example is based on a plant using three setpoints with multiple S/RVs in each group. The X-axis shows system pressure and the Y-axis shows total flow area of all S/RVs.



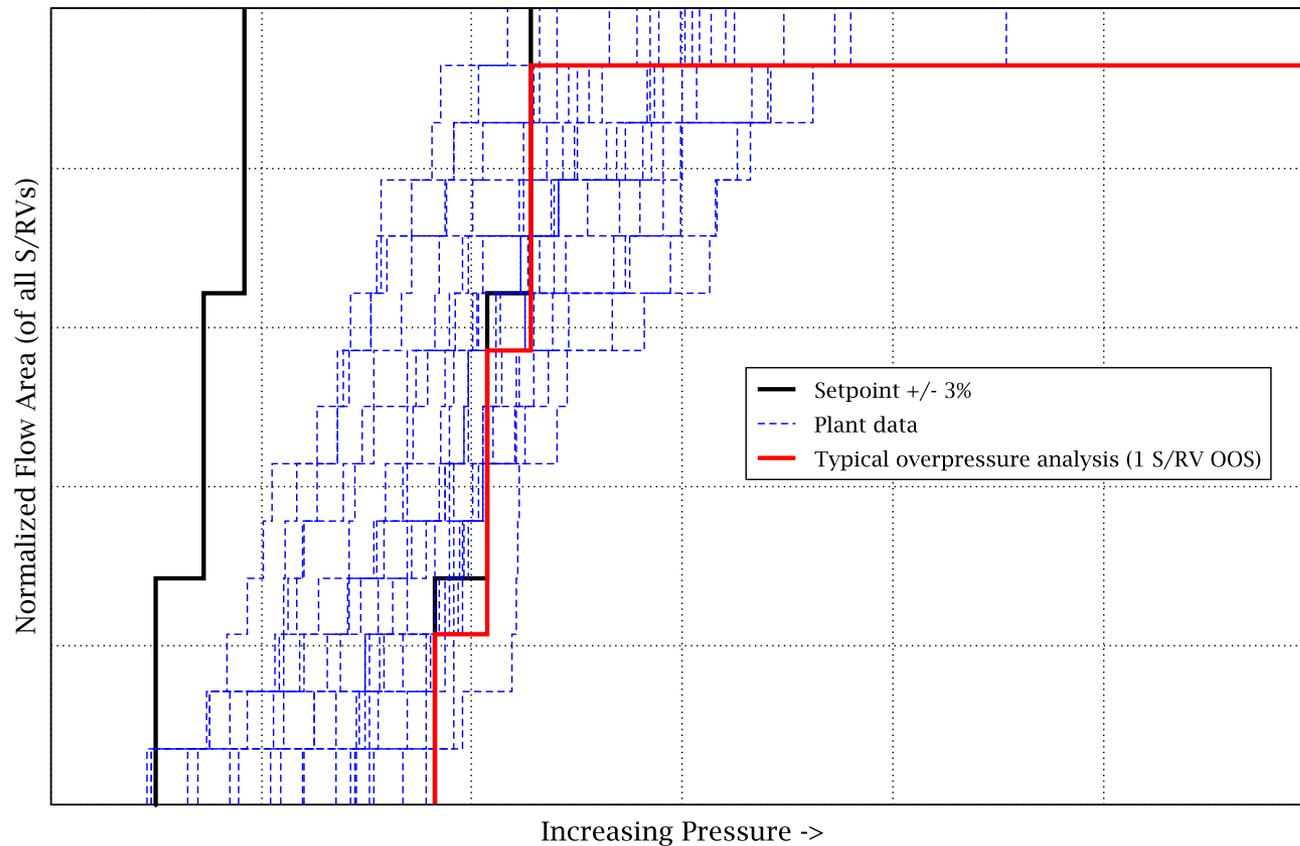
The green line shows how the S/RVs would open during an overpressure event, assuming they all operate within their allowable tolerance. As seen in the Figure, as the pressure increases, more and more S/RVs open until they are all open.



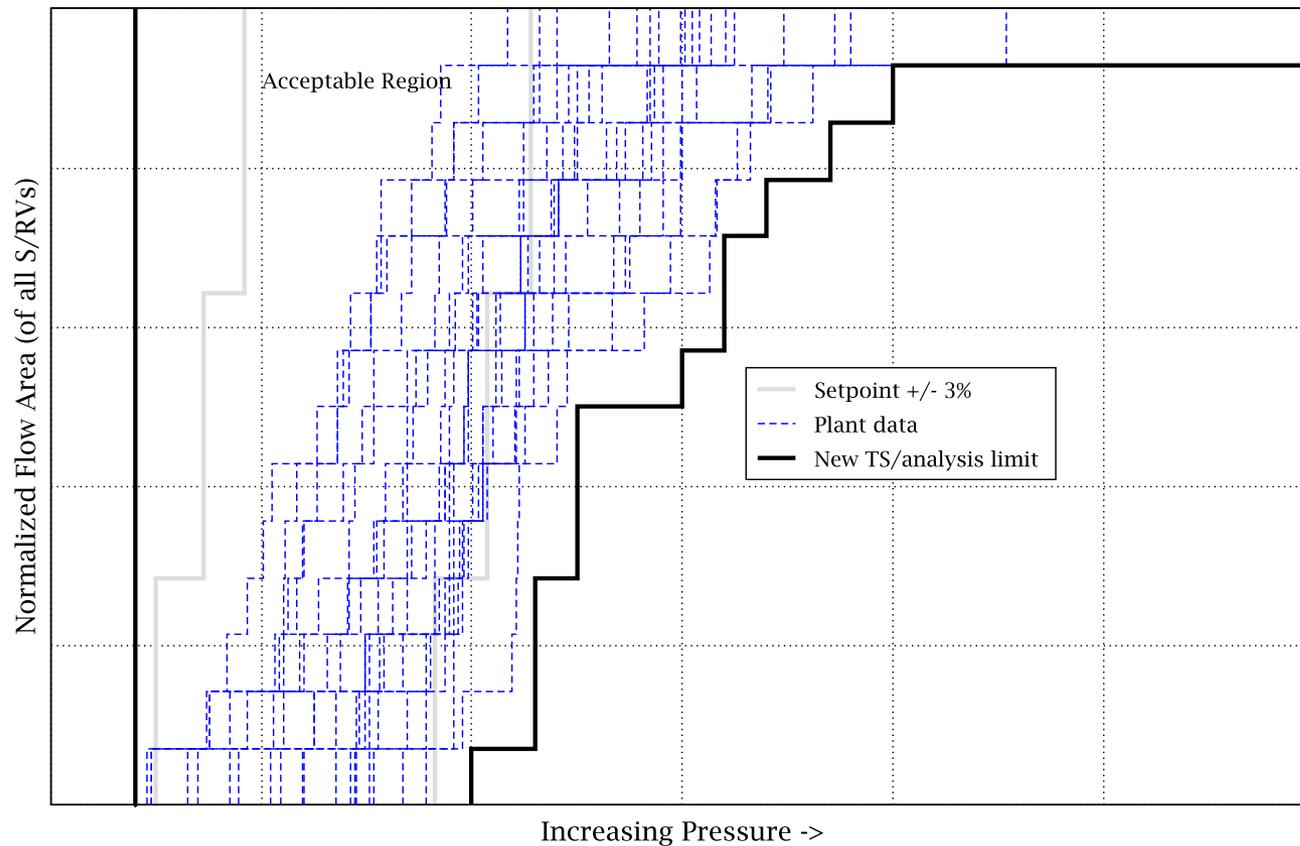
The red line shows the S/RV opening pressures assumed for a typical overpressure analysis. In this example case, one S/RV is assumed out-of-service (OOS) and all others open at their maximum allowable opening pressure (currently +3% above the setpoint). As can be seen below, if all S/RVs open within their allowed tolerances, the analysis is bounding.



The blue lines are representative of actual plant data over multiple cycles. As seen below, in many cases, the S/RVs did not open within their allowed tolerance. In these instances, the actual plant response would not be bounded by the example overpressure analysis.



To maintain compliance with the TS given the actual S/RV performance, the current $\pm 3\%$ tolerance should be expanded. The black curve below is an example that could be used as the new TS limit and in the safety analysis.



Sample TS

LCO 3.4.3 The safety function of [11] S/RVs shall be OPERABLE with the following as-left setpoints:

<u>Number of S/RVs</u>	<u>As-left setpoints (psig)</u>
[4]	[1090.0 ± 10.9]
[4]	[1100.0 ± 11.0]
[4]	[1110.0 ± 11.1]

The as-left setpoints and tolerances remain in TS and cannot be changed w/o NRC approval. The as-left tolerance of ±1% is not changed. Having the setpoints in TS meets the requirements in 50.36(c)(1)(ii)(A) regarding Limiting Safety System Settings (LSSS). Note that in this example, while only 11 S/RVs are required to be OPERABLE, there are 12 S/RVs in the plant and the setpoints for all 12 are provided.

Sample TS (continued)

SR 3.4.3.1 Verify the safety function lift setpoints of the S/RVs are within the bounds as specified [in the licensee-controlled document]:

Number of <u>S/RVs</u>	Allowable as-found <u>opening pressures(psig)</u>
[1]	[≤ 1250.0 and ≥ 1067.0]
[3]	[≤ 1225.0 and ≥ 1067.0]
[3]	[≤ 1200.0 and ≥ 1067.0]
[2]	[≤ 1175.0 and ≥ 1067.0]
[2]	[≤ 1150.0 and ≥ 1067.0]

The allowable as-found values would: 1) be plant specific and reflect how the S/RVs actually perform, 2) be consistent with the reload analysis, and 3) allow the overall system of S/RVs to maintain system pressure below the Safety Limit 2.1.2.

The allowable range is defined such that it doesn't matter which S/RV is used for each set of pressures (i.e., an S/RV at the lowest setpoint could open at the highest pressure and still meet the Surveillance Requirement).

Sample TS (continued)

The allowable ranges used in SR 3.4.3.1 would then be used in the plant/cycle specific reload analysis. Assuming Chapter 15 of the Safety Analysis Report (SAR) makes reference to the reload analysis, this would meet the requirements of 50.36(b) in regard to the technical specifications being derived from the analyses and evaluation included in the SAR. Some SARs already reference the reload analysis as follows:

The presentation of the results for the limiting events or reload events are presented in Appendix X. This information represents the reload licensing analysis for the current cycle. The appropriate sections of chapter 15 reference Appendix X.

S/RV testing requirements would continue to be controlled by the ASME OM Code and Inservice Testing (IST) Program.

Sample TS (continued)

Since the revised allowable ranges will most likely result in a larger predicted peak RCS pressure than that already in a plants design bases, other items need to be considered. These items are those that were examined when setpoint tolerances were increased from $\pm 1\%$ to $\pm 3\%$ back in the 1990s⁽¹⁾. Some of these items include:

- Containment evaluation
 - Peak containment pressure and temperature response
 - Dynamic/structural loads on the S/RV piping (from steam line to suppression pool)
 - In some cases, there is little available margin so there may need to be additional limits set on specific S/RVs
- High pressure system performance
 - Is performance acceptable at the revised peak system pressure?
 - High Pressure Coolant Injection (HPCI), Reactor Core Isolation Cooling (RCIC), Standby Liquid Control System (SLCS)
- Fuel thermal limits
 - Minimum critical power ratio (MCPR)

(1) See GE Topical Report, NEDC-31753P, "BWROG In-Service Pressure Relief Technical Specification Revision Licensing Topical Report," February 1990.

As-Found Values in a Licensee-Controlled Document?

The example SR also considers that the allowable ranges may be put into a licensee-controlled document similar to the Core Operating Limits Report (COLR) or Pressure and Temperature Limits Report (PTLR).

This would allow licensees to update, without the need for a LAR, as new information becomes available (S/RV performance improves/declines, S/RVs replaced with different style, etc.) while allowing NRC to remain aware of what is being used. Any changes would need to be made ahead of any applicable surveillances, and not updated to justify a prior, failed surveillance.

There are several items that would need to be addressed to put the allowable ranges into a licensee-controlled document.

- Justification for why this information should be allowed in a licensee-controlled document
- Methodology used to determine why the proposed allowable as-found values are acceptable
 - NEDC-31753P, “BWROG In-Service Pressure Relief Technical Specification Revision Licensing Topical Report,” February 1990
 - NEDE-24011-P-A, “General Electric Standard Application for Reactor Fuel (GESTAR-II)”

Questions?