



**Evaluation of Degraded and Nonconforming Conditions
for ASME III Div.1 and B31.1 Structures, Systems, and Components**
A Structured-Correct-Complete Approach

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Becht Engineering Co.

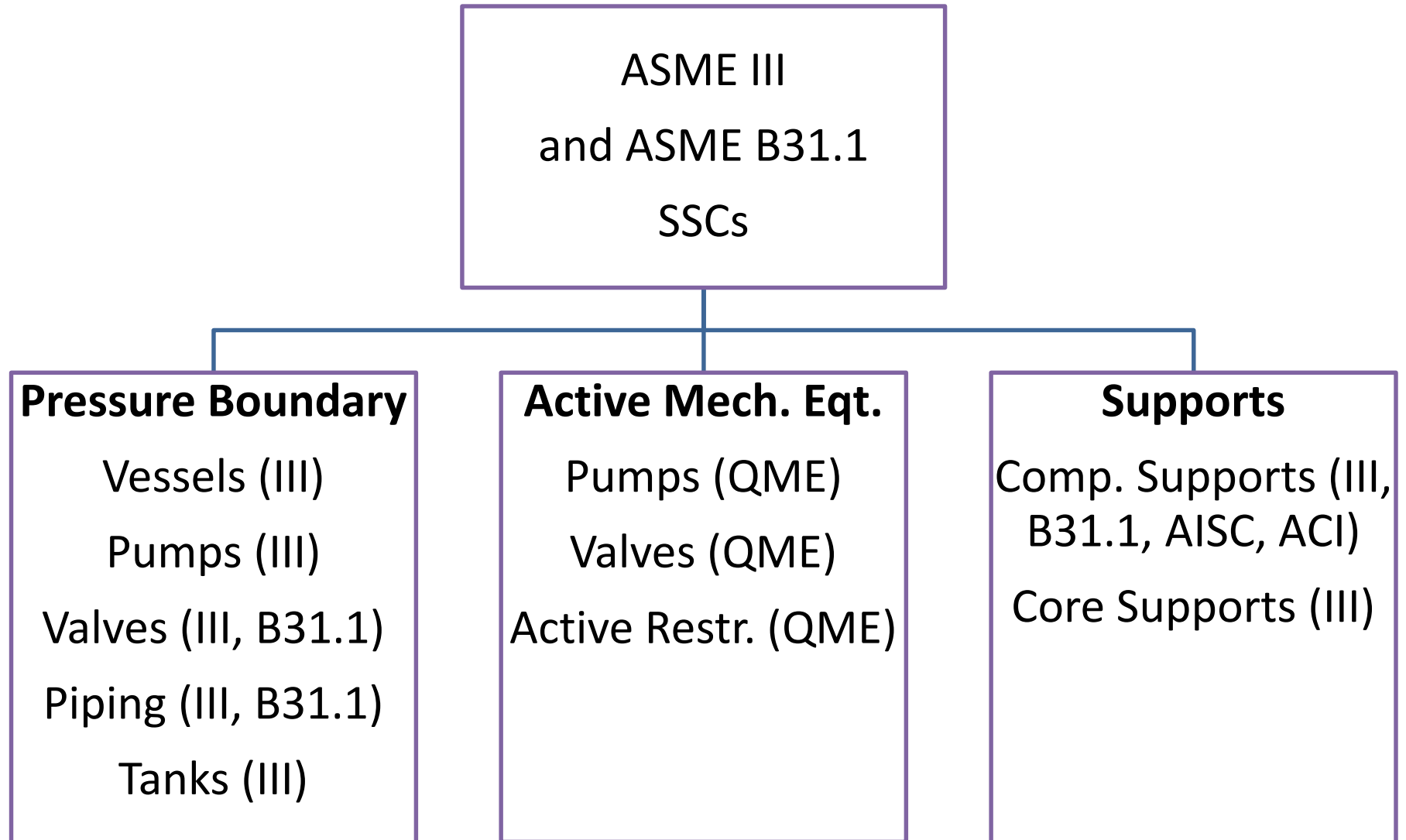
5224 Woodside Executive Court

Aiken SC 29803

Comments submitted to the NEI-NRC public meeting of Feb. 15, 2019

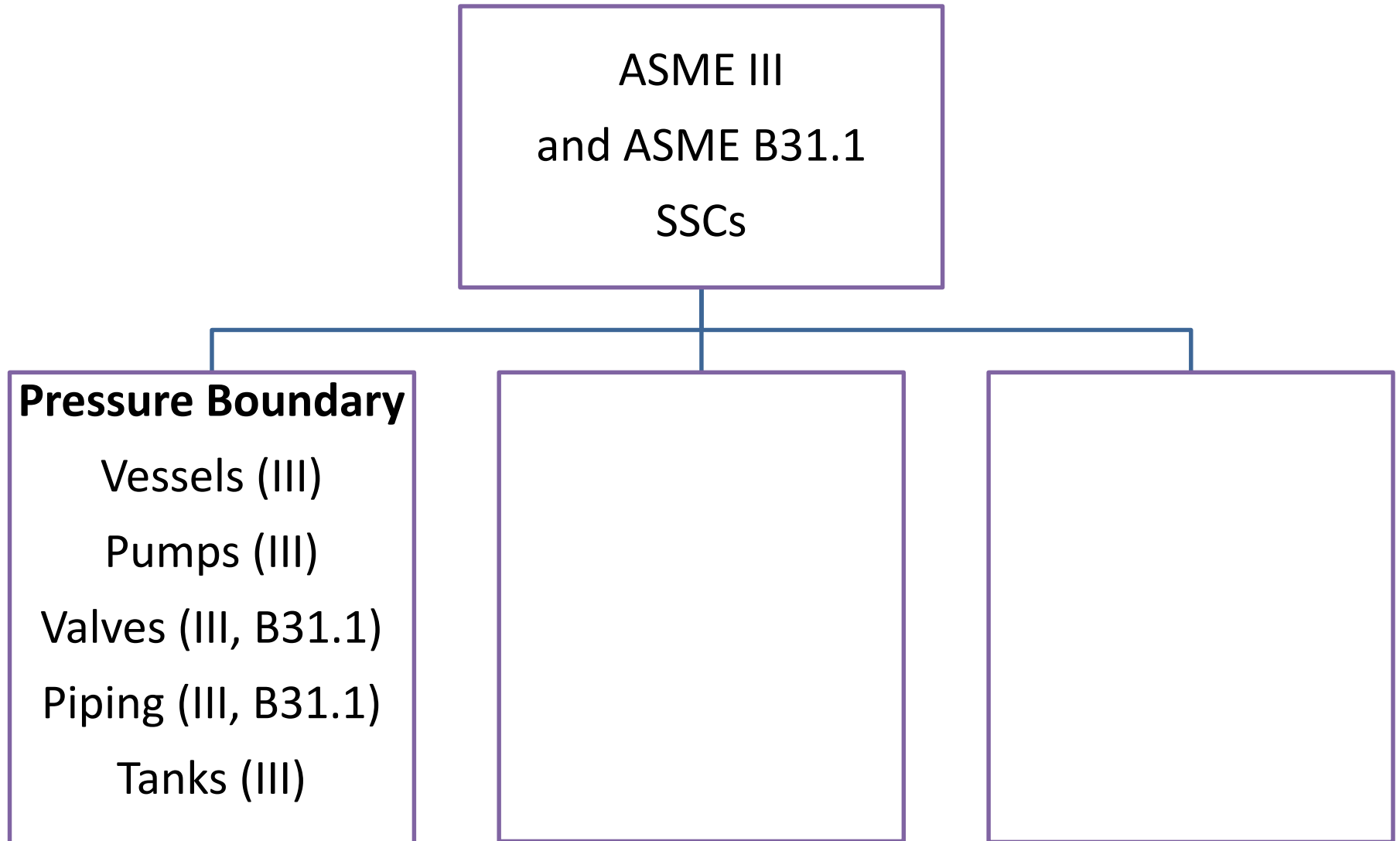


Scope: ASME III Div.1 and B31.1 SSCs





This Presentation: Pressure Boundary Components



Grouping of Degraded or Nonconforming Conditions

Wall Thinning

Corrosion - Erosion - Both

Crack-Like Flaws

Weld flaw - Fatigue -
Corrosion

Embrittlement

Loss or metallurgical,
physical, mechanical
properties

Overload

Op. or Postulated Load >
Design
Structural damage



Pr. Boundary: Degraded or Nonconforming

Wall Thinning
Corrosion - Erosion - Both



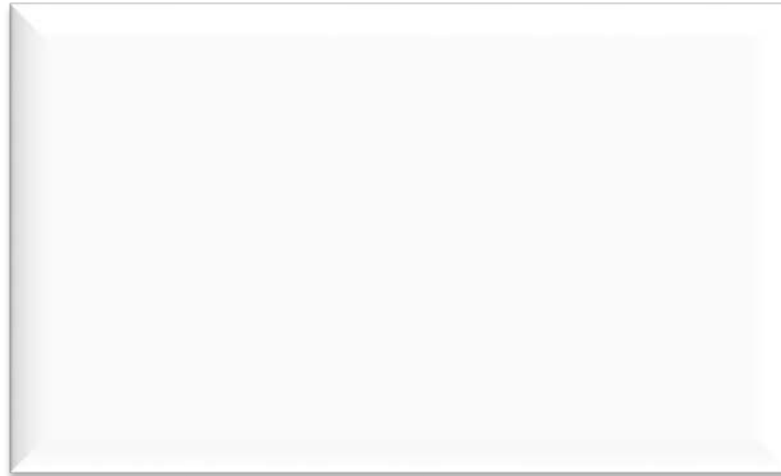
Wall Thinning

1. ASME XI CC N-513* (piping, moderate energy, pinhole leak) + RG 1.147
2. ASME XI CC N-597 (piping, high energy, without leak) + RG 1.147
3. ASME XI CC N-705 (vessel/tank, moderate energy, pinhole leak) + RG 1.147
4. ASME XI CC N-806 (buried pipe, high energy, without leak) not yet in RG 1.147
5. ASME III Ap. XIII (all components, was NB-3200 pre-2017) + 10CFR50.55(a)
6. ASME III Ap. XXVII (all components, was Ap. F* pre-2017) + 10CFR50.55(a)
7. ASME XI Ap. U (piping, vessel/tank, moderate energy, pinhole)

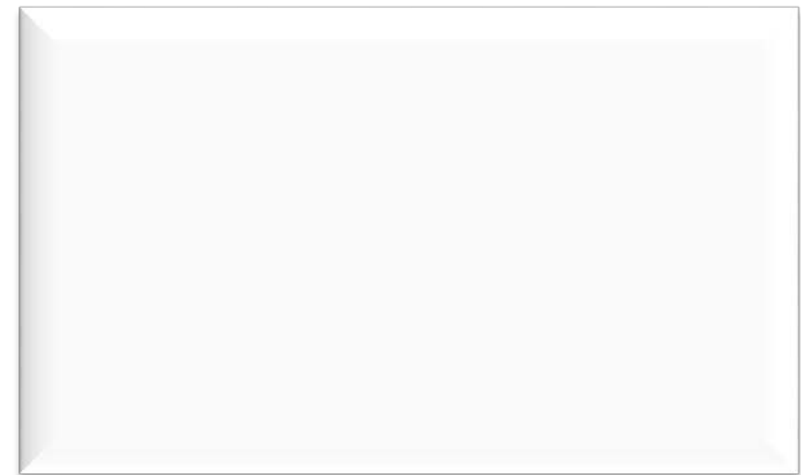
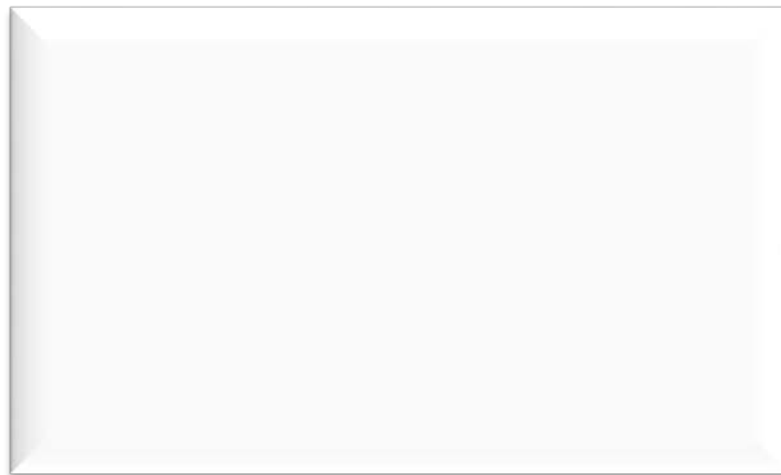
* Acknowledged in current IMC-0326.



Pr. Boundary: Degraded or Nonconforming



Crack-Like Flaws
Weld flaw - Fatigue -
Corrosion





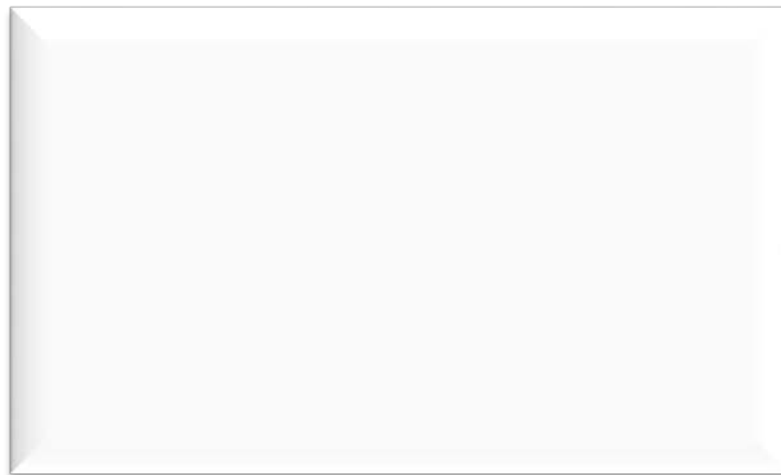
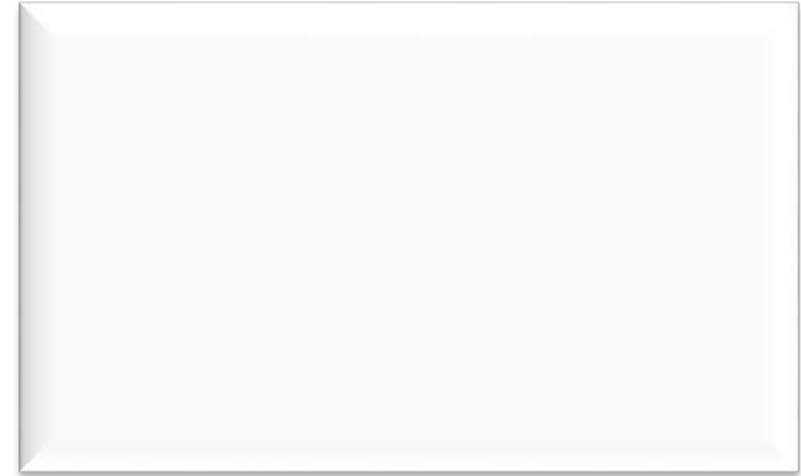
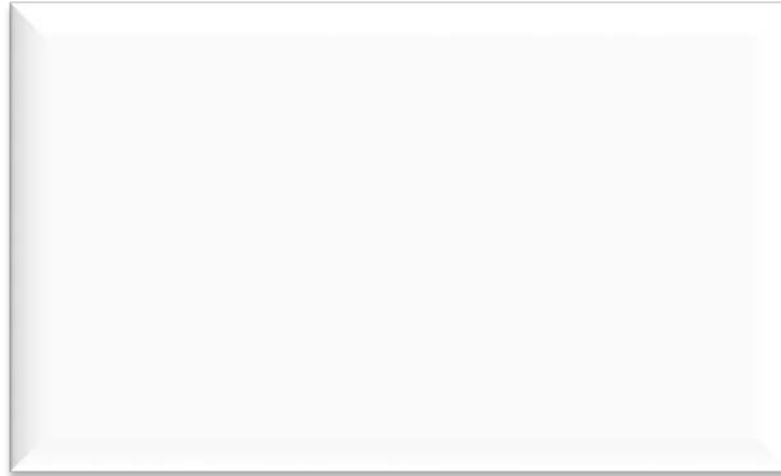
Crack-Like

1. ASME XI IWA-3000* (pre-qualified flaws) + 10CFR50.55(a)
2. ASME XI Ap. A (analytical evaluation of flaws)
3. ASME XI Ap. C (analytical evaluation of flaws in piping)
4. ASME XI Ap. H (analytical evaluation of flaws in piping, using FAD method)
5. ASME XI Ap. L (operating plants fatigue assessment)
6. ASME XI Ap. O (flaws in reactor vessel head penetrations)

* Acknowledged in current IMC-0326.



Pr. Boundary: Degraded or Nonconforming



Overload
Op. or Postulated Load >
Design
Structural damage



Overload

- *Overload: An actual or postulated load that exceeds the design-basis of the SSC, or that was not analyzed at the design stage.*
 - Examples:
 - Accidental over-pressure or accidental over-temperature
 - Flow-induced vibration in service
 - Locked snubber or physical interference
 - Seismic event exceeds OBE or SSE
 - Flood level exceeds design
 - etc.
- Some overloads have been addressed through formal programs (seismic exceedance, flood exceedance, etc.)
- Other overloads are addressed ad-hoc (accidental over-pressure, over-temp.)
- ASME XI Task Group Beyond-Design-Basis has just started to look at overloads.



Conclusions

1. It is essential to take a **Structured-Correct-Complete approach** to operability criteria for ASME SSCs. Such an approach is proposed here.
2. Methods and criteria **already exist in the ASME Codes** for the evaluation of several types of degraded and nonconforming conditions of pressure boundary components.
3. Other degraded and nonconforming conditions are addressed in an **ad-hoc manner**, as explained here. They need to be developed. ASME is taking first steps regarding overloads.
4. A similar structured-correct-complete approach exists for **active components**, and **support structures** (not addressed here.)