

## Pressure Temperature Limits

### Issue

**RAI:** In Revision 4 of the DCD Tier 2, Section 5.3.1.5, the applicant stated, “An updated Pressure Temperature Limits Report (PTLR) is developed-----” ----the applicant needs to clearly identify who (COL Applicant or GEH) will prepare the PTLR and when it will be submitted for NRC review and approval.

**RAI Response:** GEH response to RAI, “ ---COL Holder --- will furnish the plant specific reactor pressure vessel P/T curves in a PTLR after shipment of the reactor pressure vessel, since the reactor pressure vessel material properties are known at that time.”

### Regulatory Findings

10 CFR Part 50, Appendix G requires P/T limit curves for the reactor vessel be at least as conservative as those obtained by applying the methodology of Appendix G to Section XI of the ASME Code.

10 CFR 52.79(a) states: The final safety analysis report shall include ---at a level of information sufficient to enable the commission to reach a final conclusion on all safety matters that must be resolved by the Commission before issuance of a combined license.

Therefore, the P/T limits or PTLR must be provided to the NRC prior to issuing the COL. GEH proposed that COL Holder would provide PTLR. Per 10 CFR 52.79, that is not acceptable.

In summary, NRC requires having the bounding P/T limits or PTLR prior to issuing the license.

### Alternatives

- a. GEH provide a PTLR or P/T limits using the bounding material properties for the NRC review and approval,

Or

- b. COL applicants will provide the P/T limit or PTLR for the NRC review and approval. COL Holder needs to verify the applicability of P/T limit or PTLR for the specific plant.

Note: P/T limits in the current ESBWR DCD are qualitative limit curves only. These limit curves were not reviewed and approved by the NRC.

### Scenario 1: GEH submits the PTLR Pros/Cons:

- One major purpose of Design certification is to have a standardized design. It makes sense to have a PTLR for the entire ESBWR COL applicants. For example, AP1000 is following that path.
- GEH did not submit PTLR methodology for NRC review. Hence, the PTLR application will go through detailed NRC review when received.
- Once PTLR for ESBWR developed and approved by the NRC, COL applicant will refer the PTLR in the application. COL holder will verify the applicability of the PTLR considering plant-specific material properties and cumulative fluence.

**Scenario 2: COL applicants submit the PTLR Pros/Cons:**

- This will be very time consuming for the NRC staff to review. Significant time needs to be allotted for each PTLR review.
- Schedules could be impacted if each applicant submits a PTLR
- It does not serve the purpose of standardization effort of ESBWR.
- One other option: RCOL submits PTLR and SCOL references the document

**Background and Information on PTLR**

- NRC GL 96-03: Relocation of the P/T limit curves and Low Temperature Over Pressurization Set points (LTOPs)
- The purpose was to take out P/T limits and LTOP from tech. spec. to the administrative control
- Once PTLR approved for a plant, the P/T limits and LTOPS do not need to be reviewed by the NRC staff until and unless the methodology changed. If there were no change of methodology, the licensee(s) simply need to inform NRC about the updating the P/T limits and LTOPs.
- Subsequent changes in the methodology must be approved by a license amendment; 10 CFR 50.59 does not apply.

**Example of information needed for PTLR submittal per GL 96-03 (not a complete list)**

- Methodology shall describe how neutron fluence is calculated. Describes transport calculation methods including computer codes and formulas used to calculate neutron fluence
- Briefly describe surveillance capsule program including capsule withdrawal schedule etc
- Describe method for calculating Adjusted Reference Temperature (ART)
- Describe the application of fracture mechanics in constructing P/T limits
- Provide P/T limits for heatup, cooldown, criticality, and hydrostatic and leak rate testing
- Describe how the data from multiple surveillance capsule are used in the calculation of ART
- Provide supplemental data and calculations of the chemistry factor in the PTLR if the RPV surveillance data are used

**Usage of PTLR in Operating Reactors**

- Several current operating PWRs are using PTLRs
- No BWRs currently use the PTLR

**Conclusion:**

- Most effective and efficient way to address this issue is to develop generic PTLR for ESBWR using the bounding material properties and projected fluence for NRC review.
- COL Holder needs only to verify the applicability of these limit curves upon receipt of final material properties of the respective reactor vessels.