

Steam Generator Program Structural Integrity Performance Criterion

SGTF / NRC

September 4, 2003

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Presentation Topics

- History
 - Jim Riley (NEI)
- Catawba Submittal
 - Morris Sample (Duke)
- SIPC Impact Study
 - Russ Cipolla (Aptech)
- Summary
 - Jim Riley (NEI)



Structural Integrity Performance Criterion

Historical Overview

- Original revisions to SIPC to resolve industry and NRC comments on NEI 97-06 and related guidelines (Mid 2001)
- Changes to SIPC began in early 2002 to address comments
- White paper written on SIPC changes in October 2002 in support of Catawba TS submittal and GLCP
- Catawba TS submittal presented to NRC in March 2003 with additional comments and RAIs from NRC
- Series of discussions with NRC to resolve RAIs on SIPC through May 2003 without complete resolution.

Structural Integrity Performance Criterion

Historical Overview

- Qualitative position on impact of new SIPC prepared in May 2003
- SIPC revised again to address Catawba RAIs with proposed SIPC submitted in June 2003
- Formal Impact Study initiated in July 2003 by SGMP IIG to evaluate quantitatively the effect of safety factors on combined accident loadings on existing and future evaluations
- The Catawba submittal of July 30 revised the SIPC to require adherence to the licensing basis and decouple the technical issue of safety factors from the licensing issue of technical specifications

Catawba Submittal (SIPC)

Morris Sample (Duke)



Structural Integrity Performance Criterion

Catawba Submittal July 30, 2003

All inservice steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, and cooldown and all anticipated transients included in the design specification) and design basis accidents. This includes retaining a safety factor of 3.0 against burst under normal steady state full power operation primary-to-secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary-to-secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst. In the assessment of tube integrity, those loads that do significantly affect burst shall be determined and assessed in combination with the loads due to primary to secondary pressure differential using safety factors that are consistent with the licensing basis design criteria.

Licensing Position

- The industry believes that the Catawba submittal provides the necessary regulatory framework to ensure licensees maintain tube integrity
- Proposed technical specifications provide significant improvement over the current regulatory requirements

SGMP Impact Study

Russ Cipolla (Aptech)



Impact Study on the Effect of Combined Loads Safety Factors on Structural Limits

Objectives

- Provide quantitative results for structural limits determined by the safety factors applied to loading combinations
 - Comparison to 3NODP
- Establish the impact of defined structural integrity safety factors to determine if new guidance is required
- Assess the impact of safety factors on existing analyses

Impact Study on the Effect of Combined Loads Safety Factors on Structural Limits

Approach

- General review to identify plants that could be most affected by the accident load safety factors
- Study to cover existing and replacement steam generators for RSG and OTSG designs (W, FANP, and B&WC)
- Calculations and/or comparative reviews for a “limiting” plant design and possibly a “typical” plant design to identify:
 - *contributing non-pressure loads and sources*
 - *impact to structural calculations under combined loads*
 - *design factors that would make a plant more susceptible to reanalysis (transients, high seismic, type of tube degradation, etc.)*

Impact Study on the Effect of Combined Loads Safety Factors on Structural Limits

Expected Use of Results

- Provide a comparative evaluation of selected plant designs and design/licensing basis
- Provide example assessments
- Provide input for the development of improved guidance for structural integrity evaluations to be incorporated in the SGMP Guidelines
 - Help in the development of guidance on defining significant contributing loads to tube burst
 - Identification of degradation mechanisms and locations that may be susceptible to contributing non-pressure loads
 - Provide the technical basis for selection of loads when applying the safety factors

Impact Study on the Effect of Combined Loads Safety Factors on Structural Limits

- The goal is not to change the licensing basis, but
 - Licensing basis may be different than ASME Code
 - Licensing bases differ between plants
- Impact study scheduled to be complete in October
- Propose a meeting after completion to discuss results and next actions

Summary

Jim Riley (NEI)



Summary

- Industry believes that the issue of explicit safety factors should be dealt with as a technical issue in the Steam Generator Program and not the Technical Specifications
 - The industry believes that the Catawba submittal provides the necessary regulatory framework to ensure licensees maintain tube integrity
 - Industry will submit a revised TSTF based on the “licensing bases” approach
- Impact Study
 - Propose a meeting after completion to discuss results and next actions