

ENCLOSURE 4

Westinghouse Presentation Materials from WESTEMSTM Topical Report Pre-Submittal Meeting Held on
September 13, 2012

(Non-Proprietary)

WESTEMS™ Computer Program
Version 4.5.6 for ASME Section III
Fatigue Analysis on AP1000 Piping

Pre-Submittal Meeting

9-13-12

Background / Overview

- NRC on-site review of piping analysis documentation held on October 20, 2008 in Monroeville
- NRC requested audit of the code and related documentation, which was held in Monroeville on May 26-28, 2009. 4 RAIs were issued as a result of NRC findings at the audit
 - Two of these resulted in open items in the AFSER
- In July of 2010 WEC made available a total of 13 documents in the WEC Twinbrook Office which were either created or revised in order to enhance the level of procedural use of the code
- The NRC audit report (ML110250634) on WESTEMS was released on April 1, 2011
 - Audit report included 3 options as path forward to address NRC concerns: correct the issues and release new code version, perform spreadsheet calculations, perform a significant revision of the fatigue analysis and verification procedure

Background / Overview

- Meetings were held with the NRC to discuss WESTEMS as a part of the Piping DAC scope on May 24, 2011 and September 21, 2011
- Pre-submittal meeting for the WESTEMS Topical Report (TR) was held on January 18, 2012 where WEC and consultants discussed two independent endorsements of the enhanced procedure
- WCAP-17577 submitted to the NRC for review on February 29, 2012
- NRC indicated there were “information gaps” in the TR on a call between WEC and NRC on May 3, 2012
- WEC sent letter to NRC to request the withdrawal of WCAP-17577 on May 9, 2012
- NRC acknowledged receipt of withdrawal request via letter sent to WEC on June 1, 2012
 - Attachment to this letter contained NRC identified “information gaps” in WCAP-17577

Background / Overview

- Determined that changes were needed to fully address NRC identified issues with the program
 - Release of new program version to address NRC concerns
 - Update to program documentation and to the topical report was needed in order to satisfactorily address the documentation issues identified by the staff

Plan to Address NRC Comments on Initial Submittal

- Release New WESTEMS™ Version 4.5.6
- Update Documentation
 - Program Documentation (User’s Manual, V&V, etc) revised in accordance with new program version
 - Topical Report revised to include additional detail pertaining to NRC identified “gaps” in initial submittal
 - NB-3600 Analysis Procedure revised to reflect the use of the new program version
- Submit TR for safety evaluation

Details of New Program Version

- NB-3600 peak and valley selection algorithm has been modified:

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Details of New Program Version

- Moment inputs revised
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- Fatigue usage calculation reflects revised input methodology
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- Calculation iterations permitted with revised peak and valley inputs.
 - Method is described in detail in the NB-3600 fatigue analysis procedure

Details of New Program Version

- Highlights of Revised Approach:

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Details of New Program Version

- Highlights of Revised Approach (continued):
 - Requires fewer scenarios for testing the algorithm, procedure steps to be considered, and benchmarking
 - Complexity of the NB-3600 analysis procedure reduced by eliminating user input options

NRC Issues with Program

- FSER Issue #1 (AFSER OI-SRP3.9.1-EMB-05)
 - Algebraic summation option for moment histories used in peak/valley selection
- FSER Issue #2 (AFSER OI-SRP3.9.1-EMB-07)
 - User editing of peak/valley inputs
- Identified gaps in initial TR submittal
 - Five issues as detailed in attachment to NRC letter acknowledging withdrawal of initial version of TR

FSER Issue #1 / Resolution

- FSER Issue #1 (AFSER OI-SRP3.9.1-EMB-05):
 - The staff reviewed the WESTEMS basis documents and identified that the stress peak/valley selection option using the stress evaluated with algebraic summation of three orthogonal moment components requires justification.
- Resolution:
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FSER Issue #2 / Resolution

- FSER Issue #2 (AFSER OI-SRP3.9.1-EMB-07):
 - The WESTEMS program provided an option to eliminate peak/valley points during calculation. The staff requested that the applicant provide the configuration control and limitations of the program for this option.
- Resolution:
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Identified Gaps in Initial TR Submittal / Resolution

- Gap #1: TR does not clearly address the purpose of using algebraic summation; clarify when this option is performed.

- Resolution: [

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Rev. 1 of the topical report describes the new algorithm and process flow in Section 4.1.

Identified Gaps in Initial TR Submittal / Resolution

- Gap #2: The TR does not describe how WESTEMS™ yields repeatable results when user intervention is necessary.
- Resolution: The technical basis of the decision points in the peak selection process is described in detail in Section 4.1.5 of the revised TR. An example of this process being applied is provided in this section of the report in Section 5.3.9. All decision points in the evaluation are subject to independent verification in accordance with Westinghouse QA procedures.

Identified Gaps in Initial TR Submittal / Resolution

- Gap #3: The description in TR does not provide computer program flowchart and description for NB-3200 and NB-3600.
- Resolution: The description and flowchart of the fatigue calculations performed by the program are provided in the revised TR in Figure 4-1 (NB-3600) and Figure 4-8 (NB-3200). The steps are described in detail in Section 4.1 of the report.

Identified Gaps in Initial TR Submittal / Resolution

- Gap #4: Design limitations and input adjustment requirements of the ASME Code not discussed in TR.
- Resolution: Design limitations of the WESTEMS™ software have been added to Section 3.3 of the revised TR. There are no input adjustment requirements of the ASME Code in version 4.5.6 of the software.

Identified Gaps in Initial TR Submittal / Resolution

- Gap #5: Validation and verification of the computer program is not discussed.
- Resolution: The V&V process used for WESTEMS™ version 4.5.6 is explained in detail in Section 5.0 of the revised TR. It includes descriptions of test problems, variables tested, method of validation, and results compared.

Proposed Schedule for TR Submittal / Review

- Pre-Submittal Meeting – 9/13/12
- Submit TR to NRC for Acceptance Review – 9/30/12
- Request expedited review of TR
- First Class 1 piping currently scheduled for installation in July 2013.
 - Impacts Construction

Summary

- Changes were made to the WESTEMS™ software in order to be responsive to NRC issues identified with the program.
- Fatigue calculations performed using WESTEMS™ meets ASME Section III requirements for fatigue.
- WEC has simplified the application of WESTEMS™ to reduce the complexity of user inputs and confirmation of results to improve the fatigue evaluation and documentation process.

Questions / Feedback

