PMSTPCOL NPEmails

From: Umana, Jessica
Sent: Monday, December 16, 2013 11:47 AM
To: STPCOL
Subject: FW: Stabilty WCAP_17137 Draft RAI .docx
Attachments: ABWR WCAP_17137 1st RAI .docx

From: Tai, Tom
Sent: Tuesday, December 03, 2013 9:44 AM
To: Tomkins, James (jetomkins@STPEGS.COM)
Cc: Umana, Jessica
Subject: Stabilty WCAP_17137 Draft RAI .docx

Jim,

Attached for your information is the draft of the first round of RAIs on the stability topical report (WCAP 17137). If you have any questions/clarification, please contact Jessica to arrange a telephone conference. We may issue these RAIs before I return on the 20th, or we may wait until then to formally issue them.

Regards

Tom Tai

Hearing Identifier: SouthTexas34NonPublic_EX
Email Number: 5254

Mail Envelope Properties (6F9E3C9DCAB9E448AAA49B8772A448C5017CAD3BF97C)

Subject: FW: Stabilty WCAP_17137 Draft RAI .docx
Sent Date: 12/16/2013 11:47:25 AM
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From: Umana, Jessica

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First Round of RAIs for WCAP-17137-P (Stability Methodology for ABWR)

RAI-1. COMPUTER CODES

Section 6.1 "Computer Codes" of the LTR describes two codes: RAMONA-3 and POLCA-T and states that "*The methodology described below is applicable to both computer codes*." However, the POLCA-T SER (ML091610251) only approved POLCA-T for decay ratio (DR) calculations. The POLCA-T SER specifically states that "*POLCA-T is used only to predict the decay ratio at certain reactor conditions ... certain licensing analyses relevant to establishing cycle specific long term stability solution parameters, such as set points, are performed using historical methods (namely RAMONA-3B/BISON/SLAVE).*"

Confirm which methods are used for ABWR Solution III setpoint calculations. Specifically describe what methods are used for the DIVOM slope calculation. If the "historical methods" (RAMONA-3B/BISON/SLAVE) are used, provide justification why these methods are approved for use in ABWR.

RAI-2. CPR CORRELATIONS

What CPR correlations were used for the examples presented in WCAP-17137P? Have these correlations been reviewed by the staff?

RAI-3. APPLICABILITY OF CPR CORRELATION TO OSCILLATORY FLOW CONDITIONS

To define a DIVOM slope, the methodology must calculate the degradation of CPR margin caused by oscillatory power-flow conditions. Provide a validation of the use of the applicable CPR correlation under oscillatory power-flow conditions.

RAI 4. TREATMENT OF UNCERTAINTIES

WCAP-17137P does not seem to provide a complete documentation of the treatment of uncertainties for setpoint evaluations. Provide a summary description of the treatment of uncertainties for: (1) DIVOM slope calculation, (2) setpoint determination. Specify the statistical basis for the uncertainties provided (i.e., one-sigma, 95/95, or other)

RAI-5. BSP SCRAM REGION UNCERTAINTY

Section 6.3 "BSP Methodology" provides an acceptance criteria for the BSP Scram Region of "*1.0 minus the uncertainty factor specified in approval documents for the method being applied.*" Provide the values and basis for the approved uncertainty factors for each methodology. Is this uncertainty a one-sigma, 95/95, or other?

RAI-6. BYPASS VOID

The formation of voids in the bypass during flow reduction transients may affect the LPRM calibration, which is normally performed at full power. Provide an estimate of the level of bypass voiding in ABWR during instability events. How is bypass voiding accounted for in the OPRM setpoint methodology?

RAI 7. NODALIZATION

WCAP-17137P does not seem to provide the axial and/or radial nodalization used for the DIVOM calculations. Provide the axial and radial nodalization scheme used for each method. Is the scheme consistent with the code validation basis against experimental data?

RAI 8. TECH SPEC IMPLEMENTATION

Provide a synopsis of the ABWR Technical Specification sections related to stability. Provide operability requirements and operator actions required to transition to BSP. Are the BSP regions enforced only when the primary OPRM solution is operable? Or are they enforced at all times? Is there a relation between the BSP regions and the SCRRI region?

RAI 9. TIME HISTORY DISPLAY

Fig 4-3 of WCAP-17137P shows a "Regional Core-Wide Time History Display" block, but the text does not seem to mention it. Provide a description of this function.

RAI 10. NMP2 EVENT LESSONS LEARNED

The Nine Mile Point 2 stability event (10 CFR Part 21 report 2003-025) showed that, under some conditions, the OPRM hardware can exhibit confirmation resets that may fail or delay the scram. Please, describe how the lessons learned from the NMP2 event have been incorporated in the ABWR design.

RAI 11. ABA/GRA

Section 5.1 of WCAP-17137P describes the ABA and GRA. Will ABWR use the BWROG generic setpoints for these functions? Provide the ABWR setpoints for these defense-in-depth algorithms.

RAI 12. CYCLE SPECIFIC DIVOM

Section 6.2.3 "[DIVOM] Methodology" of WCAP-17137P seems to specify the calculation of cycle-specific DIVOM slopes that involves a transient calculation of a 3-RIPs trip from initial conditions with 9 RIPs at minimum speed. However, Step 2 of Section 6.2.3 appears to indicate that the transient initiation is an asymmetric control rod perturbation.

12.a Define what is the DIVOM transient used. It would appear that two transient calculations are involved: one to calculate the initial ΔCPR increase caused by the flow reduction and a second to establish the oscillations.

12.b How are initial conditions set? Section 6.2.1 "[DIVOM] Background" states that the conditions are not to be OLMCPR limiting. Describe the procedure and implications in more detail. Does the choice of initial condition affect significantly the DIVOM slope of the HCOM factor?

12.c If the asymmetric control rod perturbation induces growing unstable power oscillations, the DR is >1. How is the steady state solution converged if the steady state conditions are unstable? Does the steady state solver use a numerical method with artificial damping? If the initial transient is a pump trip, how is a steady state reached for the rod perturbations?

12.d What is the procedure if the asymmetric rod perturbation results in a growing core-wide oscillation? (i.e., $DR_{CW}>1$, while $DR_{OOP}<1$)

12.e What is the procedure if the prescribed transient does not result in any oscillation? Will the Generic BWROG slope be used?

RAI 13. EXAMPLE DIVOM CALCULATION

Provide a well-documented example DIVOM calculation from start to finish. Include input assumptions and plots of the intermediate and final results.

RAI 14. Channel Losses

Provide the assumed channel inlet, spacer and outlet loss coefficients, including any core pressure losses due to the core support plate, inlet nozzle, outlet nozzle and other local losses for the stability calculations performed using POLCA-T as reported in Table 7-1 of WCAP-17137-P. If different from loss coefficients derived from FRIGG pressure drop measurements, provide a thorough listing of the differences.

RAI 15. Analysis Conditions

Provide detailed information about the initial conditions for the POLCA-T stability calculations performed using POLCA-T as reported in Table 7-1 of WCAP-17137-P. Specifically provide the radial power peaking factors, active core flow rate, core outlet pressure, representative gap conductance, and core inlet enthalpy.