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MFN 05-096

Project 717

September 20, 2005

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Summary of September 9, 2005 NRC/GE Conference Call on TRACG LOCA SER Confirmatory Items**

On September 9, 2005, GE and the NRC staff discussed in a telephone conference call the 20 confirmatory items and 6 model description report items in the NRC's SER on NEDC-33083P, "TRACG Application for ESBWR." The items have been or will be addressed as follows:

A. SER items 2, 7, 8, 9, 10, 11, 12, 15, 17, 18, and 20 were addressed in the DCD (Tier 2) or in execution of the evaluated DCD cases, as summarized during the conference call, and listed below.
B. Items 3, 4, 16, 19, and model description report items 1 through 6 will be addressed in Rev. 3 of NEDE-32176P, "TRACG Model Description," currently scheduled for Fall 2005.
C. Items 1, 14 and 20 will be included in additional transmittals responding to the individual items.
D. Item 13 will be provided in a separate qualification paper addressing International Standard Problems, one separate effect test, and one integral containment test.
E. Items 5 and 6 are IC test items and will be addressed in a separate transmittal.
F. Item 19 is an NRC Staff action.

In addition to the discussion of the SER confirmatory items, GE agreed to send the NRC a TRACG input file for one of the DCD cases (which uses the nodalization developed to address the NRC confirmatory items), to allow the NRC to start independent assessment

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of the DCD submittal. The current schedule for this item as well as items listed above is as follows:

October 3, 2005 – GE transmittal of LOCA input file, the long term PIRTs, water level results for 12 hr cases, and design changes and TRACG applicability (Items 1 and 20).

November 30, 2005 – Rev. 3 of NEDE-32176P.

April 1, 2006 – TRACG comparison to International Standard problems

ESBWR SER Confirmatory Items

NRC SER Item #	Summary of Item	Reference	GE Action
1	The PIRT at the design certification stage should include the long-term cooling phase of the LOCA	Separate Transmittal to NRC	GE will provide a PIRT for the long term cooling phase of the LOCA
2	Refine application procedure for ECCS/containment to include long term response. Provide supporting analyses for a spectrum of break locations to demonstrate that there is no core uncovery for the possible break locations.	During phone call NRC expressed interest in reviewing these cases. GE will provide 12 hr cases to the NRC in separate transmittal,.	Provided additional break location. Ran code to long term cooling for all 4 break locations determine minimum level is not lower in long term, 12 hrs vs. short term 2000s/0.56h. No 2nd minimum in any case.
3	Incorporate the missing definition for Ef, and new equations for the transition criterion between churned turbulent and annular flow, including the drift velocity term in updated code model description documentation.	Rev. 3 of NEDE-32176P, "TRACG Model Description"	Included in Rev.3 of TRACG Model Report
4	The description of the	Rev. 3 of NEDE-	Will be addressed by Rev.3 of

	TRACG model, Reference 10, will be updated to reflect all current models and correlations, thereby providing a level of detail consistent with a stand-alone document.	32176P, "TRACG Model Description"	TRACG Model Report
5	Determine the sound in the PANTHERS-IC testing that may have been due to water hammer, and confirm its prevention in the ESBWR	Detailed IC design documents	Piping configuration control (slope) to prevent collection of water in the inlet steam line to the IC unit. Opening of the condensate return valve will be controlled to prevent fast opening of the valve.
6	Leakage is an IC structural integrity issue that needs to be resolved for the ESBWR design certification	Detailed IC design documents.	The O-ring design is changed to a Helicoflex self energizing o-ring design that is more resilient to distortion. Closing of the condensate return valve will be controlled to limit the gradients associated with shutdown and cooldown of the IC heat exchanger.
7	ECCS baseline model should include the scram delay time and the 2 percent power measurement uncertainty	DCD	Scram time delay incorporated in Chapter 6 cases. 2% power uncertainty included in the bounding case.
8	Separate modeling of the vessel shield, the reflective thermal insulation layer, and the air gap from the lumped heat structure will be necessary.	DCD	Modeling included in the combined nodalization (combines maximum detail from the LOCA water level and LOCA containment P&T separate nodalization)
9	Nodalization studies will be necessary to calculate the minimum water level in the chimney partition	DCD	Nodalization includes individual chimney partitions.
10	The assumption of the loss of feedwater flow should be resolved	DCD	Detailed modeling of the FW system included to consider effect on containment pressure
11	Bounding containment peak pressure and temperature need to be evaluated after the feedwater heater	DCD	Detailed modeling of the FW system included to consider effect on containment pressure

	system design is finalized		
12	Evaluate possible effect of quick closure of the MSIVs on LOCA power transient.	DCD	No effect – RPS always trips before MSIV closure.
13	Analyze containment standard problems for separate effects and integral tests.	Separate Transmittal to NRC	GE will provide TRACG results for 1 separate effects International Standard Problem, and 1 integral containment International Standard Problem.
14	GDCS gas space and the wetwell vent nodalization	DCD (section 6.2), In a Letter to the NRC, GE will also provide a separate summary of nodalization changes which are related to NRC SER items, and which are due to design changes.	The GDCS gas space is now opened to DW, and the vents to DW are correctly modeled in the DCD cases. List of improvements to the TRACG combined nodalization 1. Total of 5 chimneys to calculated the minimum water level. Two of these simulate the individual chimney partition. 2. Lower drywell simulated by VSSL component cells. 3. Air gap and reactor shield wall modeled in the combined nodalization. 4. Drywell head air space modeled in the combined nodalization. 5. One additional axial level added at an elevation near the top of wetwell. 6. Separate regions to model the expansion pool and the dryer/separator
15	Improve nodalization for long term ECCS calculations	DCD	The nodalization is now consistent between the ECCS and containment analyses. In the long term (post 2000 s) ECCS evaluation additional detail has been added to the containment, consistent with that used in the containment nodalization in the LTR. Similarly the RPV in the containment P&T evaluation has additional detail consistent with the ECCS evaluation in the LTR.
16	Perform a review of the appropriateness of the	Rev. 3 of NEDE-32176P,	

	Sparrow-Uchida degradation factors and the liquid/vapor interface heat transfer used in the containment modeling.	"TRACG Model Description"	
17	Perform a thorough evaluation of the ESBWR design records and TRACG ESBWR model development records to substantiate that the TRACG models and correlations are consistent with the final design requirements and intended application	DCD and Rev. 3 of NEDE-32176P, "TRACG Model Description"	The design records for ESBWR and TRACG model development are consistent with GE's QA system. The application range of the correlations in the final design is within the reviewed application range.
18	Examine whether or not an uncertainty analysis can be performed on the combined reactor coolant system/containment system calculation rather than treating the containment aspect of the ECCS LOCA calculation in a bounding way.	DCD, GE will remove the statement in section 6.3.7.9 on a specific confidence level, and replace it with a discussion of the justification in the LTR, which was reviewed by NRC.	Since there is no core heatup in ESBWR, an uncertainty analysis on the figure of merit (PCT) would not provide useful results. GE provided a bounding evaluation for the LOCA water level, to document that there is margin to core uncovery and heatup in the DCD design.
19	Staff will confirm that steam entering the SP through the PCCS vent, as designed, will perform as expected to condense steam entering the SP	NRC Staff action	
20	GENE should demonstrate that the reference design as described in Reference 15 has not been altered in such a way as to affect the staff's conclusions of this report.	Letter to NRC	GE will provide a list of design changes and applicability of the TRACG model. For example: GDCS airspace vents to DW, IC larger, PCC smaller, IC, SLCS & HCU's modeled in LOCA evaluation.
M1	Rewet model is not well described and	Rev. 3 of NEDE-32176P,	Included in Rev.3 of TRACG Model Report

	should be expanded in the revised report.	"TRACG Model Description"	
M2	The use of the same subscript 'f' in Equation 7.5-35 to refer to two different materials, gas in fuel column and fuel pellet, is confusing.	Rev. 3 of NEDE-32176P, "TRACG Model Description"	Included in Rev.3 of TRACG Model Report
M3	The description of the TRACG dynamic gap model will be updated by GENE by incorporating all responses to the RAIs in the approved version of Reference 10, thereby providing a level of detail consistent with a stand-alone document.	Rev. 3 of NEDE-32176P, "TRACG Model Description"	Included in Rev.3 of TRACG Model Report
M4	The time step control algorithms are not described for heat conduction and need to be included in the revised documentation.	Rev. 3 of NEDE-32176P, "TRACG Model Description"	Included in Rev.3 of TRACG Model Report
M5	The accuracies or uncertainties of these material property routines are not stated, and should be clearly stated and referenced in the revised report	Rev. 3 of NEDE-32176P, "TRACG Model Description"	Included in Rev.3 of TRACG Model Report
M6	Interfacial heat transfer at free surface: Replace empirical Holman free convection model with an appropriate physical model.	Rev. 3 of NEDE-32176P, "TRACG Model Description"	Included in Rev.3 of TRACG Model Report

If you have any questions about the information provided here, please let me know.

Sincerely,

David H. Hinds
Manager, ESBWR

cc: WD Beckner USNRC
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