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Mr. Jack Guttmann
Reactor Systems Branch
Division of Systems Integration
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: FIN A2311 Task I Exxon PTSPWR2 Code Review

Dear Mr. Guttmann:

We have completed the review of the recent draft of the reissue of the Exxon methodology report, XN-74-5(P) Rev. 2, Suppl. 2, which Exxon intends to use as documentation of its conservative usage of the Chapter 15 transient analysis code PTSPWR2. This draft has not altered our conclusions conveyed to you in the letter of January 25, 1984, summarizing the review of the original report. The report is still too general for an evaluation of the conservatisms Exxon claims to employ through appropriate usage of the input to guarantee conservative results. It lacks specific details regarding biases in initial conditions, boundary conditions and those internal parameters which have to be input for each class of transients.

We have prepared a list of questions and comments on the section in the report (Section 4.0) which describes the evaluation of specific transients. This may be of help to Exxon in preparing a document which involves more specifics rather than generalities.

If you or your colleagues have any questions regarding this review, please contact us.

Yours sincerely,

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First Round Questions: Exxon Methodology Report for PTSPWR2, XN-74-5(P), Rev. 2, Supp. 2

1:0 §4.1.1 Feedwater Malfunctions Leading to Increased Heat Removal and Excess Load Transients

"Conservatism in the ENC analyses is assessed on the basis that PTSPWR2 is conservative relative to the FSAR with respect to primary side cooldown. Where this is not possible, due to lack of FSAR information, the PTSPWR2 power increases are compared to FSAR power increases." This is the only place where conservatisms are mentioned and its only implication is that Exxon is justifying the results on the basis of comparison to prior vendor FSAR analysis. Contrary to the stated purpose of this report the conservatisms in the methodology are not mentioned at all. What is required is information regarding the Exxon specific conservatisms used in the Exxon specific methodology to obtain conservative results with the Exxon Code PTSPWR2.

(a) What conservatisms in the methodology are used? List the specific biases in:

Initial Conditions	Boundary Conditions	Internal Parameters
Power	Spray	Heat Transfer Coefficients
Pressure	Pumps	Pressurizer Constants
Temperature		Reactivity Coefficients
Level		
Flow		
Setpoints		

This list is not entirely comprehensive and is provided for illustrative purposes.

(b) If Exxon methodology is to replicate vendor methodology as described in the FSARs then Exxon should list vendor assumptions, ascertain comprehensiveness and justify the

applicability of vendor assumptions to the Exxon models in PTSPWR2.

2.0 §4.1.2 Secondary Safety or Relief Valve Opening (Small Steam Line Break)

"Conservatism of the PTSPWR2 analysis is verified by comparing the ENC calculated cooldown against FSAR results for comparable conditions."

Same comment/question as in 1.0.

3.0 §4.1.3 Large Steam Line Breaks

(a) "In view of these factors, it is important to establish acceptability of the FSAR analysis prior to making comparisons of PTSPWR2 results for system response to the FSAR results."

Does Exxon intend to use prior FSAR results for justifying the conservatisms in its analysis? If so, they will need to demonstrate a comprehensive understanding of the limitations of the FSAR analysis itself.

(b) "The basis for conservatism has been to compare PTSPWR2 results for core power, pressure and temperature to FSAR results for comparable conditions."

What are the conservatisms used in the methodology to generate these PTSPWR2 results?

4.0 §4.2.1 Loss of External Load, Turbine Trip, Loss of Condenser Vacuum and Steam Pressure Regulator Failure Events

(a) "and other applicable conservatisms detailed in Tables 3.3 and 3.4."

What are these other applicable conservatisms? Tables 3.3 and 3.4 are so general, cover both heatups and cooldowns, and do not give details.

(b) "ENC uses an isentropic pressurizer model (Reference 1) in PTSPWR2 to conservatively bound pressurizer pressure response to the primary coolant expansion that characterizes this event."

How does Exxon select its input data to make an isentropic model of the non equilibrium pressurizer model described in the reference? This is an example of internal model parameters which have to be selected by input. Another example is the initial core heat transfer coefficient. Exxon should make a list of these internal parameters and indicate how values are chosen for each class of transients.

5.0 §4.2.3 Loss of Normal Feedwater

"PTSPWR2 has been applied to examine or confirm the short term (1-2 min.) consequences of the loss of normal feedwater flow event."

The conservatisms have not been specified at all. This section only confirms that PTSPWR2 is used for this event. Same question as (1.0).

6.0 §4.2.4 Feedwater Pipe Break

How is Exxon going to address the overpressure consequences of the feedwater line break?

7.0 §4.3.1 Flow Coastdown

"The flow coastdown is developed to be consistent with the FSAR or applicable plant coastdown data."

Same question as (1.0).

8.0 §4.3.2 Seized Pump Rotor

"along with conservative FSAR trip delays and trip uncertainties as detailed in Table 3.3."

This is too general. Same comment/question as in (1.0) and (4.0a).

9.0 §4.4.1 Uncontrolled Control Rod Bank Withdrawal from a Subcritical or Low Power Condition

"Conservatism in PTSPWR2 analyses is assured by using conservatively low doppler feedback and conservative scram characteristics."

What does conservatively low mean? Same question as in (1.0).

10.0 §4.4.2 Uncontrolled Control Rod Bank Withdrawal at Power

(a) "To ensure conservatism in the PTSPWR2 analyses, it is important to avoid overestimating primary to secondary heat transfer since this would lead to larger hot-to-cold leg temperature differences, high sensed ΔT power and premature reactor trip."

How is the overestimate avoided? Same comment/question as in (1.0).

(b) "It is also important not to underestimate transport and instrumentation delays."

How are the input biases selected?

11.0 §4.4.3 Control Rod Misoperation

"A conservatively bounding large EOC negative moderator temperature coefficient is used to not underestimate the maximum return to power."

What other biases are applied? Same comment/question as (1.0).

12.0 §4.6.1 Inadvertent Opening of a Pressurizer Relief or Safety Valve

"Pressurizer inventory is maximized to give the highest rate of depressurization."

What about the other initial conditions? Same question as (1.0).

13.0 §4.6.2 Steam Generator Tube Rupture Event

"Adverse consequences of this event do not generally threaten DNB because of reactor scram on either the low pressurizer pressure trip or the thermal margin trip."

This event is considered for reasons of dose rate consequences. If PTSPWR2 is used for this event, what biases are applied to maximize the releases?