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Waterford 3

W3F1-2001-0087
A4.05
PR

September 24, 2001

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D. C. 20555

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Response to Request for Additional Information Regarding
Realignment of Refueling Water Storage Pool (RWSP)
Boundary Isolation Valves to RWSP Purification System

Gentlemen:

By letter dated April 2, 2001, Entergy proposed changes to the Waterford 3 design basis as described in the Final Safety Analysis Report. As previously determined by Entergy, NRC Staff review and approval is required per 10CFR50.59. The change concerns design requirements for the alignment of the RWSP boundary isolation valves in the line to the refueling water storage pool purification system. This letter responds to the NRC Staff request for additional information dated August 31, 2001. The response to this request for additional information is provided in the attachment.

The original changes were evaluated in accordance with 10CFR50.91(a)(1), using the criteria in 10CFR50.92(c), and were determined to not involve any significant hazards consideration. The attached responses do not impact that determination.

There are no commitments contained in this submittal. Should you have any questions or comments concerning this request, please contact D. Bryan Miller at (504) 739-6692.

A001

I declare under penalty of perjury that the foregoing is true and correct. Executed on September 24, 2001.

Very truly yours,

Alan J. Harris
Director,
Nuclear Safety Assurance

AJH/dbm/cbh
Attachment

cc: E.W. Merschoff, NRC Region IV
N. Kalyanam, NRC-NRR
J. Smith
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NRC Resident Inspectors Office
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ATTACHMENT

TO

W3F1-2001-0087

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING REALIGNMENT OF REFUELING WATER STORAGE POOL (RWSP) BOUNDARY ISOLATION VALVES TO RWSP PURIFICATION SYSTEM

IN THE MATTER OF AMENDING

LICENSE NO. NPF-38

ENTERGY OPERATIONS, INC.

Docket No. 50-382

Plant Systems Branch Questions

Question 1:

Please explain how the margin of 1.29 ft. in the following statement on page 7 of the submittal is derived:

> *"A margin exists between the actual volume available to ensure NPSH* [Net Positive Suction Head] *and the manufacturer's required NPSH. This NPSH margin of approximately 1.29 ft. SIS* [Safety Injection Sump] *level more than accounts for the combined instrument uncertainty for the RWSP water level...."*

Also, please explain the rationale for the assumption in this paragraph stating that instrument uncertainty is implicitly accounted for in the RWSP analytical level 76.4% due to NPSH conservatism.

Response 1:

The emergency core cooling systems (ECCS) (i.e., containment spray & high pressure safety injection) pump NPSH calculation documents the NPSH margin when the pumps are taking suction from the safety injection sump (SIS). The available NPSH for the pumps is calculated using a saturated sump model. The containment is conservatively assumed to be at the saturation pressure corresponding to the containment sump temperature. The calculation methodology used to determine the NPSH margin available is described in Final Safety Analysis Report (FSAR) Section 6.2.2.3.2.1. The calculation concludes that the ECCS pumps have adequate NPSH margin, at least 1.29 ft, for all expected pumped fluid temperatures without reliance on containment over pressure. This complies with the NPSH design requirements for ECCS pumps given in Regulatory Guide 1.1 (11/2/70).

An NPSH margin of 1.29 ft SIS level equates to more than 73,000 gallons of additional refueling water storage pool (RWSP) volume in the SIS, or approximately 12% RWSP indicated level. The maximum expected instrument uncertainty for RWSP indicated level is approximately 6%. Therefore, the actual process NPSH margin (12%) considerably exceeds the maximum expected amount of RWSP level instrument uncertainty (6%). Since the documented margin is at least twice the instrument uncertainty, the uncertainty may be implicitly considered in the analysis (i.e., a rigorous instrument uncertainty calculation is not required). This is consistent with Entergy Operations, Inc. graded approach to instrument uncertainty.

Question 2:

In Case 1 and 3, should pipe break be assumed for non-seismic piping during a seismic event instead of pipe crack?

Response 2:

No. The RWSP purification system is defined as a moderate energy system in Branch Technical Position (BTP) MEB 3-1 (2/75). Per BTP MEB 3-1 & FSAR 3.6.2.1.3 cracks have to be assumed in moderate energy lines where the maximum stress range is greater than a threshold value. The stress range predicted for the portions of the RWSP purification system that were seismically analyzed are below the threshold value that require a crack be postulated. Additionally, the non-seismic portions of the system are designed in accordance with ANSI B31.1, "Code for Power Piping, B31.1", similar to the design of the non-safety seismic portion of the system. As stated in the submittal, a detailed walkdown was conducted to ensure the non-seismic portions of the system were supported similarly to the seismic portion. Based on the design of the non-seismic portion of the system and field walkdowns confirming the non-seismic portions are adequately supported it is concluded that the non-seismic portion of the system would not rupture. Therefore only a crack is assumed for all Cases described in the submittal.

Question 3:

On page 14 of submittal regarding flooding outside containment: What is the maximum postulated leak from the RWSP purification system piping? If pipe break should be assumed instead of pipe crack, re-evaluate flooding analysis outside containment.

Response 3:

As stated on page 7 of the submittal, the flow from the RWSP purification piping crack, located at the discharge of the RWSP purification pump, is approximately 48 gpm. As stated in the response to question 2 above, the RWSP purification piping is an adequately supported moderate energy line, therefore only a pipe crack need be assumed and a break is not required to be postulated.

Question 4:

On page 14 of submittal under Jet Impingement: Are there any high energy line break effects on the RWSP purification system to consider such as turbine missiles, etc.?

Response 4:

The only high energy piping in the vicinity of the RWSP purification system is the steam generator blowdown line, which was evaluated and discussed in the Jet Impingement section of the submittal on page 14. The RWSP purification system is in the reactor auxiliary building, which protects it from external missiles such as turbine missiles.

Question 5:

Are any other regulatory analyses (Station Black Out, Anticipated Transients Without Scram, Fire) affected by Case 1-4 scenarios?

Response 5:

No other regulatory analyses are affected. The RWSP is required to mitigate the consequences of loss of reactor coolant system inventory events (e.g., loss of coolant accident (LOCA), steam generator tube rupture, main steam line break, and the natural circulation cooldown event.) The LOCA is the most limiting since it requires the most RWSP volume to mitigate the accident consequences. Therefore, the evaluation contained in the submittal is based on the LOCA.

Question 6:

In Cases 1 and 3, is there any impact on spent fuel pool inventory due to RWSP purification system pipe break or crack?

Response 6:

The fill line from the RWSP to the spent fuel pool (SFP) discharges at the top of the SFP through an opened-ended pipe just below the surface well above the elevation of the SFP cooling system suction line. Therefore, if a leak in the RWSP purification line were to occur, the SFP will not drain down below the elevation of the end of the fill line from the RWSP. SFP cooling system operation will therefore not be impacted.

Question 7:

On page 14 of submittal, the paragraph on flooding outside containment states: *"a leak from the RWSP Purification System piping would not prohibit operation of any safety-related equipment located in the area."* Please expound on why this is so.

Response 7:

See response to Probabilistic Risk Analysis questions.

Probabilistic Risk Analysis Questions

Questions:

On page 14 of your application, it is stated that

> *"The results* [of the flooding analysis] *indicate that a leak from the RWSP Purification System piping would not prohibit operation of any safety-related equipment located in the area."*

Please provide the following:

1. A brief description of the approach and major assumptions (e.g., maximum postulated leak) of the flooding analysis;

2. A list of important safety-related equipment located in flooding areas considered in the analysis; and

3. A summary of the results of the flooding analysis which have formed the basis for determining that safety equipment would not be affected.

Response:

The assumptions for the Waterford 3 flooding analysis are specified in FSAR section 3.6A.6.4. The flooding analysis demonstrates that components located in areas outside the containment required to safely shutdown and maintain the reactor in a cold shutdown condition are adequately protected from area flooding due to postulated piping cracks, breaks, and/or postulated actuation of fire protection sprinklers, if any, in those areas.

The flooding analysis divides the plant areas into flooding "zones". The RWSP purification piping originates in Zone 1 (Safeguards Pump Room A). Zone 1 contains the ECCS Train A (high pressure safety injection, low pressure safety injection, and containment spray) and Train A/B (high pressure safety injection) pumps. The RWSP purification piping is also located in Zone 35 (Reactor Auxiliary Building Wing Area). Zone 35 includes the -4' floor elevation and the –35' floor elevation that is directly connected to the -4' floor elevation by way of an open stairwell. The auxiliary component cooling water pumps and the ECCS flow control valves are major safety related equipment located within Zone 35.

The flow (48 gpm) from the postulated crack in the RWSP purification piping is enveloped by the flow from a crack postulated for other pipes located in the flood zones. In Zone 1, there are 20" and 24" ECCS pipes. In Zone 35, there are 10" and 16" circulating water pipes and 3" demineralized water pipes. The flooding

analysis shows that the flooding rate from cracks in these systems is more limiting (>300 gpm for Zone 1 and >100 gpm for Zone 35). Based on the flooding rates given for these systems, the flooding analysis concludes that the plant can be safely shutdown and be maintained in a safe shutdown condition. Thus, the plant can be safely shutdown and maintained in a safe shutdown condition for the crack postulated in the RWSP purification piping.