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W3F192-0020
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QA

April 24, 1992

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

Subject: Waterford 3 SES
Docket No. 50-382
License No. NPF-38
Technical Specification Change Request NPF-38-123

Gentlemen:

Entergy Operations, Incorporated requests a modification to Waterford 3 Technical Specification 4.7.1.5, "Main Steam Isolation Valves", Surveillance Requirements and Table 3.3-5, "Engineered Safety Features Response Time".

This change is proposed to reduce stress on the Main Steam Isolation Valves (MSIVs) due to fast closure (i.e., a maximum of 3.0 seconds). We feel that this site specific change will help preclude problems experienced in the past which in part were due to high stress subjected to MSIV's during surveillance testing.

The attached description and safety analysis provides assurance that the current limiting analyses presented in the Waterford 3 Final Safety Analysis Report are sufficiently conservative to bound a 4.0 second MSIV closure time combined with a 1.0 second delay.

A plant modification necessary to support the changes identified herein is currently planned for refueling outage number five which is scheduled to begin September 1992. However, this action is dependent upon your approval within an appropriate time frame. Therefore, Entergy Operations Incorporated, respectfully requests a timely review.

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Entergy Operations, Inc. feels these plant specific changes would result in improved reliability and plant safety. Please direct any questions or comments to Paul Caropino at (504) 739-6692.

Very truly yours,

RPB/PLC/dc
Attachment: Affidavit
NPF-38-123
cc: R.D. Martin, NRC Region IV
D.L. Wigginton, NRC-NRR
R.B. McGehee
N.S. Reynolds
NRC Resident Inspectors Office
Administrator Radiation Protection Division
(State of Louisiana)
American Nuclear Insurers

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the matter of)
)
Entergy Operations, Incorporated) Docket No. 50-382
Waterford 3 Steam Electric Station)

AFFIDAVIT

R.P. Barkhurst, being duly sworn, hereby deposes and says that he is Vice President Operations - Waterford 3 of Entergy Operations, Incorporated; that he is duly authorized to sign and file with the Nuclear Regulatory Commission the attached Technical Specification Change Request NPF-38-123; that he is familiar with the content thereof; and that the matters set forth therein are true and correct to the best of his knowledge, information and belief.

R.P. Barkhurst
Vice President Operations - Waterford 3

STATE OF LOUISIANA)
) ss
PARISH OF ST. CHARLES)

Subscribed and sworn to before me, a Notary Public in and for the Parish and State above named this 24TH day of APRIL, 1992.

Steven E. Fabre
Notary Public

My Commission expires WITH LIFE.

DESCRIPTION AND SAFETY ANALYSIS
OF PROPOSED CHANGE NPF-38-123

This proposal justifies a change to Waterford 3 Technical Specification 4.7.1.5, "Main Steam Isolation Valves," Surveillance Requirements and Table 3.3-5: Engineered Safety Features Response Time.

Existing Specification

See Attachment A

Proposed Specification

See Attachment B

Description

The proposed change revises Surveillance requirement 4.7.1.5 of Technical Specification 3.7.1.5, Main Steam Isolation Valves (MSIVs). This specification requires the plant to demonstrate the operability of each MSIV by verifying the operation and full closure of each MSIV within three seconds when tested pursuant to Specification 4.0.5. The proposed change revises the full closure time from three to four seconds. This change is proposed to reduce the stress on the MSIV due to fast closure during surveillance testing.

MSIVs isolate the steam generators (SG) from one another and the remaining portions of the secondary system in response to a variety of transients and postulated accidents, e.g., main steam line break. The MSIV closure time is an important parameter in calculating the consequences of an event which involves MSIV closure. Closure time affects SG inventory, primary system cooldown rate, peak containment temperature and pressure and secondary system inventory release to the environment.

The limiting analyses for the MSIV closure time are the FSAR Section 6.2 Main Steam Line Break (MSLB) analyses performed to determine the containment peak temperature and pressure. MSLB discharges steam generator secondary inventory into the containment. Before the MSIV closes both SGs feed the break through the cross connect pipe. MSIV closure isolates the intact SG, thereby limiting release of mass and energy into containment.

The existing analyses (FSAR Section 6.2 Main Steam Line Break) assume that the MSIV remains fully open and then closes instantaneously three seconds after receiving a signal to close. The resulting mass and energy release to containment were used to determine peak containment pressure and temperature.

ABB/CE has reanalyzed the mass and energy released to containment for the three most limiting, in terms of peak containment temperature and pressure, MSLB cases with a longer (four seconds)

MSIV closure time. These analyses use a more detailed representation of the steam line piping and pressure drop from SG to MSIV. In addition, more realistic MSIV closure characteristics were used. Instead of an instantaneous closure, the MSIV flow area was decreased as shown in Figure 1.

Table 1 shows the results for mass and energy release for the existing MSLB analyses and for the revised four second MSIV closure time. For all cases the revised more realistic mass and energy release with a four second closure time is less than that used for current peak containment pressure and temperature analyses in the FSAR. An analysis of containment peak pressure and temperature using the revised mass and energy would result in lower peak values. Therefore, the current MSLB analyses in the FSAR conservatively bound the peak containment pressure and temperature that would be calculated with the revised four seconds MSIV closure time.

MSIV closure time is also important for several events analyzed in FSAR Chapter 15. These analyses can be categorized into two groups based on the assumed MSIV closure time being greater than or less than four seconds. The events analyzed with a MSIV closure time greater than four seconds and therefore not affected by this change are: (1) Full Power Double Ended Steam Line Break (SLB) Inside Containment With Concurrent Loss of Offsite Power, (2) Double Ended SLB Inside and outside Containment During Mode 3 Operation With Concurrent Loss of Offsite Power, and (3) Steam System Piping Failure: Pre-Trip Power Excursion Analysis Outside Containment With Loss of Offsite Power. The analyses that use less than a four second MSIV closure time, are discussed below:

1. Increased Main Steam Flow Due To Fail Open of One Turbine Bypass Valve (FSAR Section 15.1.1.3):

   This transient causes increased steam flow and, in turn, excess heat removal from the reactor coolant system (RCS). The excess heat removal reduces RCS temperature and pressure, and increases core power due to a negative moderator temperature coefficient (MTC).

   The increase in core power decreases DNBR such that at 18.2 seconds after the initiating event, a low DNBR reactor trip signal is generated. At 255.2 seconds the low SG pressure generates a main steam isolation signal (MSIS) which closes the MSIVs three seconds later.

   In this transient, the MSIV closure occurs long after the time of interest for this event, i.e., minimum DNBR and reactor trip. Therefore, increasing the closure time from three to four seconds will not affect plant response. The impact of this change on the radiological consequences of this event is expected to be negligible since the mass flow through the MSIVs is released to the condenser and is not directly released to the environment.

2. A Steam Line Break At Hot Zero Power Outside Containment With Concurrent Loss of Offsite Power (FSAR Section 15.1.3):

In this transient the main steam line ruptures upstream of MSIV shortly after a shutdown from full power operation. This transient causes a large SG mass release and radiological consequences. However, the consequences of this event are bounded by the full power steam piping failure event outside containment: Pre-Trip Power Excursion With Loss of Offsite Power (FSAR Section 15.1.3.3). This latter event is analyzed with an MSIV closure time of almost 11 seconds, which bounds the four second closure time.

3. Feedwater System Pipe Break With Loss of Offsite Power (FSAR 15.2.3.1):

This transient causes critical flow of saturated liquid from the affected SG through the break and instantaneous loss of feedwater to the intact SG. This causes a gradual heatup of the primary and secondary systems. The ruptured steam generator empties and this causes a rapid increase in RCS temperature and pressure. At 15.4 seconds into the transient a high pressurizer pressure trip condition is reached.

The primary concern about the consequences of this transient is the RCS peak pressure which occurs due to the loss of heat sink and loss of reactor coolant pump flow. An increase in MSIV closure time increases the primary and secondary systems temperature difference which, in turn, causes higher primary system cooldown rate and lower peak pressure. Therefore, increasing the MSIV closure time from three to four seconds will not adversely affect the consequences of this transient.

4. Loss of Normal Feedwater Flow With an Active Failure In The Steam Bypass System (FSAR Section 15.2.3.2):

The loss of feedwater flow increases SG pressure and temperature. This opens the turbine bypass valves and increases steam flow and RCS cool down rate. The bypass control valves fail to close even in the presence of closure signal. The cooldown of the primary system causes core power to increase due to negative MTC. The heat flux increases to its maximum possible value before the reactor trips at 42.6 seconds on low SG water level. At 77.3 seconds a MSIS is generated due to low SG pressure, which causes MSIVs to close three seconds later.

Changing the MSIV closure time from three to four seconds will not affect the transient results in terms of: (1) core damage due to high heat flux and (2) radiological consequences. This is because: (1) MSIV closure occurs long after the timing of the maximum heat flux in the core and reactor trip and (2) the secondary mass release through the MSIV is not discharged to the environment. The extra one second flow through MSIV however, causes a slight reduction in RCS temperature which will have a negligible effect on the course of the transient.

5. Single Reactor Coolant Pump Shaft Seizure With A Stuck Open Secondary Safety Valve (FSAR Section 15.3.3.2):

This transient causes a rapid reduction in core coolant flow and an increase in core average temperature. The low DNBR signal generates a reactor trip signal at about one second into the transient. The main turbine trip and reduction in feedwater flow causes SG pressure to increase which, in turn, opens the SG safety valves. It is assumed that one of the safety valves remains open throughout the transient. The steam flow through the valve reduces the pressure in the SG. At about 700 seconds into the transient the low SG pressure generates a MSIS which causes the MSIV to close 3 seconds later. Closure of the MSIV isolates the intact SG from discharging steam through the affected SG open safety valve.

Changing the closure time from three to four seconds: (1) will not have an effect on the primary system behavior since the minimum DNBR occurs long before MSIV closure and (2) the radiological consequences of the extra one second contribution of the intact SG to safety valve flow is insignificant.

Safety Analysis

The proposed change described above shall be deemed to involve a significant hazards consideration if there is a positive finding in any of the following areas:

1. Will the operation of the facility in accordance with these proposed changes involve a significant increase in the probability or consequence of any accident previously evaluated?

   Response: No

   The limiting mass and energy released into containment for the longer MSIV closure time has been reanalyzed. Other previously analyzed accidents that are affected by this change have been reviewed. This change has no impact on probability of occurrence of these accidents. The consequences of this change are either bounded by current plant safety analyses or have a negligible impact. Therefore, this change does not increase the probability or consequence of any accident previously evaluated.

2. Will the operation of the facility in accordance with these proposed changes create the possibility of a new or different kind of accident from any accident previously evaluated?

   Response: No

   The MSIVs close automatically upon main steam isolation signal. The proposed change increases the closure time from three to four seconds. This change will not alter the function or operability of the MSIV. However, it may increase the reliability of the MSIV. Based on above discussion, this change does not create the possibility of a new or different kind of accident previously evaluated.

3. Will the operation of the facility in accordance with these proposed changes involve a significant reduction in the margin of safety?

Response: No

Revised analyses for the events with greatest potential impact due to this change, show a decrease in mass and energy release into the containment from a MSLB. This would result in lower peak containment pressure and temperature values than currently presented in the FSAR. Thus the margin of safety would increase for these analyses. No other accident analyses or margins of safety are affected by this change.

The Commission has provided guidance concerning the application of standards for determining weather a significant hazards consideration exists by providing certain examples (48 FR 14870) of amendments that are considered not likely to involve significant hazards considerations. The changes identified in this submittal closely match example (V).

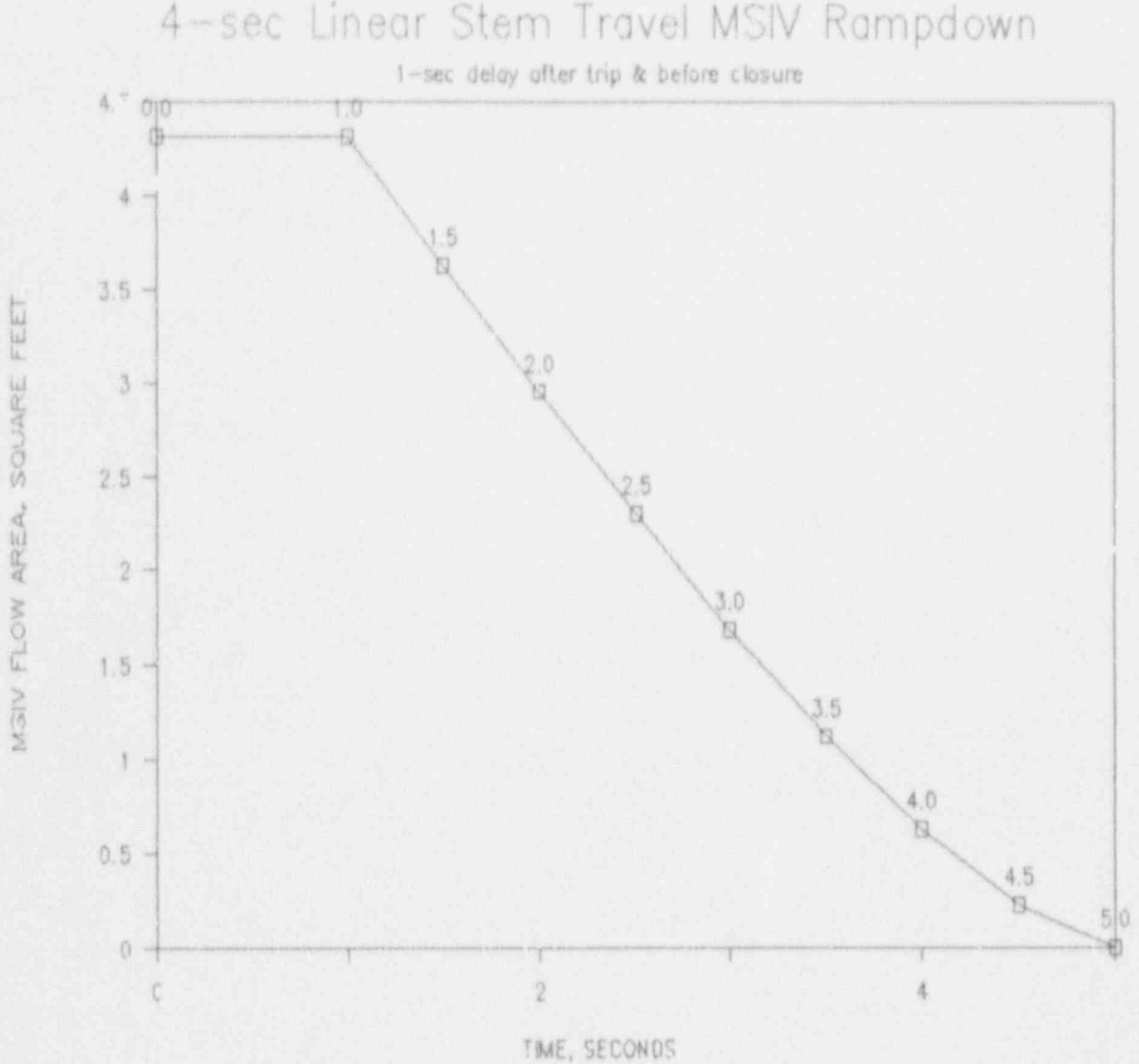
"(V) A change which either may result in some increase to the probability or consequences of a previously-analyzed accident or may reduce in some way a safety margin, but where the results of the change are clearly within all acceptance criteria with respect to the system or component specific in the Standard Review Plan; for example, a change resulting from the application of a small refinement of a previously used calculational model or design method;"

Safety and Significant Hazard Determination

Based on the above safety analysis, it is concluded that: (1) the proposed change does not constitute a significant hazards consideration as defined by 10 CFR 50.92; and (2) there is a reasonable assurance that the health and safety of the public will not be endangered by the proposed change; and (3) this action will not result in a condition which significantly alters the impact of the station on the environment as described in the NRC Final Environmental Statement.

Figure 1

Illustration of the MSIV Linear Stem Stroke Rate Closure



Relative Time (seconds)	Event
0.0	Trip setpoint condition is reached - steam generator pressure = 678 psia
1.0	MSIVs begin to close
5.0	MSIVs are fully closed

Table 1

Comparison of Reanalysis and Case Results the WSES FSAR

	Mass release to Containment at End of Blowdown for WSES-3 (lbm)		Energy Release to Containment at End of Blowdown for WSES-3 (Btu)	
Description of Limiting Case	WSES FSAR Case	1-sec Delay After Trip Followed by a 4-sec MSIV Closure Case	WSES FSAR Case	1-sec Delay After Trip Followed by a 4-sec MSIV Closure Case
75% Power MSLB Containment Cooling Train Failure	2.431 E5	2.430 E5	291.444 E6	291.1 E6
102% Power MSLB Containment Cooling Train Failure	2.273 E5	2.269 E5	272.685 E6	272.1 E6
75% Power MSLB Failure of One MSIV to Close	2.604 E5	2.565 E5	312.220 E6	306.4 E6