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October 16, 1996

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-38-183

Gentlemen:

The attached description and safety analysis support a change to the Waterford 3 Technical Specifications. This submittal requests a change to Technical Specification Action Requirements 3.2.1 and 3.2.4 and their Surveillance Requirements. The purpose of this Technical Specification Change Request is extend the allowable time for the Core Operating Limit Supervisory System out of service by monitoring for adverse trends.

The proposed change is intended to prevent unnecessary power reductions. The proposed change will result in significant operational benefits while continuing to maintain a high degree of confidence that the core conditions remain well within the range of values assumed in the safety analysis.

This proposed change has been evaluated in accordance with 10CFR50.91(a)(1), using the criteria in 10CFR50.92(c), and it has been determined that this request involves no significant hazards consideration.

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The circumstances surrounding this change do not meet the NRC's criteria for exigent or emergency review. However, due to the potential impact on plant operations, we respectfully request an expeditious review. Entergy Operations requests the effective date for this change be within 60 days of approval.

Should you have any questions or comments concerning this request, please contact Mr. James Fisicaro at (504)739-6242.

Very truly yours,

Mike Sellman

M.B. Sellman
Vice President, Operations
Waterford 3

MBS/CWT/ssf
Attachment: Affidavit
NPF-38-183

cc: L.J. Callan, NRC Region IV
C.P. Patel, 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

M.B. Sellman, 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-38-183; 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.

M.B. Sellman

M.B. Sellman
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 16TH day of OCTOBER, 1996.

Steven R. Fo

Notary Public

My Commission expires WITH LIFE.

DESCRIPTION AND SAFETY ANALYSIS
OF PROPOSED CHANGE NPF-38-183

This submittal requests a change to Technical Specification Action Requirements 3.2.1 and 3.2.4 and their Surveillance Requirements. The purpose of this Technical Specification Change Request is as follows:

1) Action "a" contains no change other than simplifying the verbiage for clarity.

2) Action "b" is revised to extend the allowable time for the Core Operating Limit Supervisory System out of service by monitoring for adverse trends.

3) Surveillance Requirements are revised to correct the channel nomenclature and add monitoring for adverse trends.

Existing Specification

See Attachment A

Proposed Specification

See Attachment B

Background

The Core Operating Limits Supervisory System (COLSS) is designed to assist the plant operators in implementing Technical Specification requirements for monitoring various LCOs. Specifically, COLSS uses inputs from various plant sensors (core inlet temperature, in-core detector signals, reactor coolant pump speeds and ΔPs, RCS pressure, etc.) to calculate a core power which corresponds to the LCO on DNBR margin. This power level is the DNBR power operating limit (POL). Concurrently, COLSS performs a similar calculation (as a function of the in-core power distribution) to determine the LHR power operating limit. These calculations are performed by the Plant Monitoring Computer (PMC). These two power operating limits, in conjunction with the licensed core power level, represent the highest power level at which the core can safely, or legally, operate. Maintaining the actual core power below these COLSS calculated POLs ensures that no anticipated operational occurrence (AOO) will result in a violation of Specified Acceptable Fuel Design Limits (SAFDLs) and no postulated accident will result in consequences more severe than those analyzed in Chapter 15 of the FSAR.

Since COLSS operation is not required for plant safety (i.e., it does not initiate any direct safety-related function during AOOs or accidents) it is permissible to continue power operation when COLSS is out of service provided an alternate means of monitoring the approach to the specified limits can be substituted. Under such circumstances, the Tech Specs allow the Core Protection Calculators (CPCs) to be utilized to maintain the salient parameters within specified limits. However, because the CPCs cannot perform the required LHR and DNBR calculations as accurately as COLSS, the Tech Spec limits based on the CPC's monitoring capability are more restrictive than the Tech Spec limits based on the COLSS monitoring capabilities.

Current Operational Constraints

Due to the restrictive nature of the CPC limits, the current LCOs cannot be satisfied without a reduction in the core power level (i.e, full power operation is dependent on COLSS being operable). The actual degree of power reduction depends upon the cycle specific core design and the specific conditions that exist when COLSS execution is lost; however, typically a power reduction of 5-10% will be necessary if COLSS operation is interrupted at the beginning of a fuel cycle. The magnitude of the required power reduction may increase near the end of the fuel cycle due to changes in the axial core power distribution.

Power reductions of this magnitude could subject the plant to large transients and increase the probability that an avoidable challenge to the reactor protection system would occur. In addition, maneuvers such as this are difficult to perform during the last third of an operating cycle due to the reduced capability of rapidly deborating the reactor coolant system to offset the buildup of xenon. Together these considerations contribute to reduced plant reliability and the potential for increased reactor protection system actuations.

Out of Service Time Intervals

Increasing to eight hours the time available to return COLSS to service would reduce the number and rate of power reductions thereby decreasing the likelihood of challenges to the reactor protection system (RPS). While decreasing the probability of RPS actuations, the proposed change would not significantly increase the probability of exceeding the core power operating limits based on LHR and DNBR. During the relatively short time period that COLSS is out of service, detection of changes in LHR and DNBR is made easier by maintaining steady-state conditions and by increasing the monitoring frequency of the CPC calculated values of LHR and DNBR. If interruption of COLSS execution exceeds the proposed eight hour time limit, then the ensuing power reduction can be performed in a slow, controlled manner.

In the unlikely event that the CPC LHR or DNBR limits cannot be restored within the proposed 8 hours, the ACTION requires a power reduction to "less than or equal to 20% of Rated Thermal Power" within 6 hours.

Description

The current ACTION "a" of Technical Specification 3/4.2.1 and 3/4.2.4 for Linear Heat Rate and DNBR Margin with COLSS in service requires that, if the linear hear rate or DNBR Margin are not being maintained, one the following actions be performed within 15 minutes:

1. Restore the LHR/DNBR within its limits within 1 hour, or
2. Reduce THERMAL POWER to less than or equal to 20% of RATED THERMAL POWER within the next 6 hours.

This ACTION is unchanged except for being rephrased for clarity.

The current ACTION "b" for Linear Heat Rate and DNBR Margin with COLSS out of service requires, that if the linear hear rate or DNBR Margin are not being maintained, one the following actions be performed:

1. Restore COLSS within 2 hours
2. Restore linear heat rate/DNBR margin within 2 hours
3. Reduce thermal power to $\leq$ 20% within the next 6 hours

The proposed change would provide the following actions:

1. Upon identification of an adverse trend, initiate corrective action within 15 minutes to restore linear heat rate/DNBR margin within 1 hour
2. With no adverse trend restore linear heat rate/DNBR margin within 8 hours
3. Reduce thermal power to $\leq$ 20% within the next 6 hours

Adverse trend monitoring will be utilized to detect changes in LHR and DNBR Margin. Since without COLSS the continuous monitoring of azimuthal tilt is not practical, a DNBR and LPD adverse change monitoring is necessary to support the time extension to eight hours. Adverse change monitoring identifies changes in the monitored parameters which implies that the margins existing at the beginning of the event may be eroding, mainly due to core power distribution, and, therefore, corrective action needs to be taken.

The COLSS out of service time extension is based on the principle that it is more beneficial to maintain existing operating conditions than to move to a different operating power level only to return to the previous power level after a short time interval. In the absence of the Plant Monitoring Computer (PMC), i.e. COLSS, monitoring to ensure that operating conditions meet the LCO requirements is based on Core Protection Calculator (CPC) information. As long as power, DNBR and LPD do not change significantly on any CPC channel, it is appropriate to conclude that the plant operating margins are being maintained.

In order to detect an adverse trend in DNBR, the procedural limit calculation will be modified to limit the DNBR change to less than expected for 8 hours in addition to limiting it to the available DNBR margin, which is part of the current COLSS out of service procedure. The change limits are based on an ABB Combustion Engineering evaluation of the Cycles 7 and 8 monitoring data. The Cycle 8 data, which contains hourly measurements for the first part of cycle, were evaluated for the maximum 8 hour change of DNBR and LPD when reactor power is stable. The vast majority of the maximum DNBR change values was less than 0.10 units. A sample of the changes exceeding this value was examined and each was traced to changes in power. The maximum 8 hour change of DNBR during a xenon oscillation is approximately 0.08 units. From these normal variation ranges it can be concluded that no corrective action is required either if the primary limit of -0.1 before middle of cycle or, if this limit is exceeded, the change is less than the secondary limit of -.15 after middle of cycle and the plant is in a xenon oscillation mode.

In order to detect a change in LPD, a limit calculation and monitoring steps will be added to the COLSS out of service procedure. Similar to the DNBR, limits on the permissible LPD change were determined based on the evaluation of the Cycles 7 and 8 monitoring data. The vast majority of the maximum LPD change values was found to be less than 0.25 kW/ft. A sample of the changes exceeding this value was examined and each was traced to changes in power. From these normal variation ranges it can be concluded that no corrective action is required if either the change is less than 0.25 kW/ft for beginning of cycle to middle of cycle or, if this limit is exceeded, the change is less than 0.40 kW/ft for middle of cycle to end of cycle and the plant is in a xenon oscillation mode.

The above information is documented in CE NPSD-1055-P, "Extended Time For COLSS Out Of Service Operation For Entergy Operations Waterford Unit 3," a proprietary report prepared by ABB Combustion Engineering.

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 operation of the facility in accordance with this proposed change involve a significant increase in the probability or consequences of an accident previously evaluated?

   Response: No

   The proposed change does not modify the requirement to operate within the alternate LHR and DNBR limits nor does it modify the actual LHR or DNBR limits themselves. In the case of exceeding a COLSS calculated POL, Entergy agrees

that corrective action should be initiated promptly to bring the LHR and DNBR within their respective limits and, in this case, a 15 minute time limit is appropriate. However, in the case of exceeding a CPC calculated operating limit following the loss of COLSS, it is clear that simply because COLSS execution was lost does not mean that the plant is operating outside the range of conditions assumed in the Chapter 15 Safety Analysis and, in this case, a 15 minute time limit is not appropriate. An increase from 2 hours to 8 hours to regain the monitoring capabilities of COLSS would not significantly increase the probability of exceeding the actual LHR or DNBR power operating limits since the increase in COLSS out-of-service time will be compensated for by monitoring for adverse trends of the important CPC calculated parameters (DNBR Margin and LHR). Further, since the proposed change will result in maintaining steady-state conditions while monitoring for adverse trends, it will be easier for the operators to detect any abnormal occurrence that has the potential to degrade either the LHR or the DNBR.

The primary consideration in extending the COLSS out of service time limit is the remote possibility of a slow, undetectable transient that degrades the LHR and/or DNBR slowly over the 8 hour period and is then followed by an AOO or an accident. The parameters normally monitored by COLSS which have the potential for degrading the LHR and DNBR if no corrective action is taken are: Reactor Coolant System (RCS) flow rate, axial and radial power distributions, core inlet temperature, core power, RCS pressure and azimuthal tilt. Of these parameters, core inlet temperature, core power, and RCS pressure are easily monitored by the plant operators using various safety-grade, redundant Control Room indications and, therefore, changes in these parameters are readily apparent. Further, operating experience at Waterford 3 and other CE nuclear steam supply systems using the same reactor coolant pumps (RCPs) as Waterford has shown that measurable changes in RCP ΔPs (which COLSS uses to calculate RCS flow) are very rare and when they do occur, involve abrupt step changes in flow which are readily apparent; hence, the probability of a slow degradation in the RCS flow rate is exceedingly small. Thus, the parameters that comparatively (although still remote) pose the most potential for a degradation in the core thermal margin when COLSS is out of service relate to the axial and radial core power distributions and the azimuthal tilt. These parameters are discussed below.

Axial xenon oscillations are a normal consequence of the Waterford 3 core design, particularly near the end of core life. As a result, Waterford 3 operations personnel are instructed, per operating procedure OP-10-001, General Plant Operations, to maintain strict control over the axial power shape in the core.

Although the primary reason for axial shape control is to maintain an even fuel burnup throughout the core, it also results in maintaining the axial power shapes well within the limits assumed in the safety analysis. Typically, axial shape control practiced at Waterford 3 maintains the axial shape index (ASI) within 0.05 ASI units of the equilibrium shape index (ESI), which is normally very near 0.0

Hypothetically, the most severe situation which could be postulated to occur, although again remote, would be if COLSS execution was lost just when the plant operators were ready to take manual action to return the ASI value to within the ESI + 0.05 control band. Since a full xenon oscillation takes approximately 26 hours, there would be about 6 hours from the time that control action would normally be taken to the time that the ASI reached its peak value (i.e., it takes one quarter cycle for the ASI to travel from its ESI value to its peak value). Since abnormal operating procedure OP-901-501, PMC or Core Operating Limit Supervisory System Inoperable, will be revised to require the CPC calculated LHR and DNBR trends to be monitored every 15 minutes (see below), any significant change in the axial shape index will be apparent through a change in these CPC calculated values. Hence, due to the attention given the axial power distribution, both when COLSS is in service as well as when COLSS is out of service it is very improbable that a change in ASI during eight hours of steady-state operation with COLSS out of service could be either undetected or lead to a condition that placed the reactor outside the range of initial conditions that were assumed in the safety analysis.

With regards to azimuthal tilt, there is very rarely any significant change in this parameter as long as all CEAs are properly aligned. The only real contributor to a rapid increase in azimuthal tilt would be an inadvertent CEA drop; however, since the probability of a CEA drop is very low, the likelihood of this event occurring within the eight hour time limit is even lower. In the unlikely event that a CEA drop did occur, the Control Element Assembly Calculators (CEACs) provide a safety-grade, redundant means of alerting the operators that corrective action is necessary. Thus, the potential for a degradation in azimuthal tilt during eight hours of steady-state operation following the loss of COLSS is both highly unlikely and relatively easy to detect using instrumentation already available in the Control Room.

As previously stated, upon approval of the proposed change plant personnel will revise abnormal operating OP-901-501, PMC or Core Operating Limit Supervisory System Inoperable, to monitor for adverse trends of the CPC calculated values of LHR and DNBR. Currently, this procedure requires that the monitoring frequency for LHR and DNBR be increased to once every 15 minutes on a loss of COLSS.

Extending the time to restore the CPC calculated LHR and DNBR to within the acceptable operating range from 2 hours to 8 hours is being proposed to assure that COLSS can be restored thus decreasing the probability of an avoidable challenge to the reactor protection system (RPS) during a power reduction. It is possible that the required power reductions may exceed 25% near the end of the fuel cycle. These large power reductions result in a rapid increase in xenon concentration, changes in ASI, and a subsequent decrease in cold leg temperature (T-cold) that may be difficult to control. Accordingly, given the potential for power reductions of this magnitude, it is appropriate to extend the time allowed to restore COLSS so that a power reduction may be unnecessary.

Taken in total, the proposed changes will reduce the number of potentially unnecessary power reductions by allowing more time for COLSS to be restored along with the advantages of trend monitoring in detecting an adverse trend expeditiously. The proposed change will result in significant operational benefits while continuing to maintain a high degree of confidence that the core conditions remain well within the range of values assumed in the safety analysis.

Therefore, the proposed change will not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. Will operation of the facility in accordance with this proposed change create the possibility of a new or different type of accident from any accident previously evaluated?

Response: No.

The proposed change does not alter the current power operating limits nor does it involve any changes to COLSS or CPC software. There has been no physical change to plant systems, structures or components nor will the proposed change affect the ability of any of the safety-related equipment required to mitigate AOOs or accidents. The only significant change associated with the proposed amendment involves changes to the operating procedures used when COLSS is out-of-service. All revisions to operating procedures will be reviewed and approved by appropriate plant personnel as required by the Administrative Controls (Section 6) in the Waterford 3 Technical Specifications. Therefore, the proposed change will not create the possibility of a new or different kind of accident from any accident previously evaluated.

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

Response: No

The intent of LCOs 3.2.1 and 3.2.4 is to maintain the reactor within the range of initial conditions that was assumed in the Safety Analysis. Maintaining the LHR within the specified range ensures that in the event of a LOCA, the fuel cladding temperature will not exceed the 2200°F limit imposed by 10CFR46. Maintaining the DNBR within the specified range ensures that no AOO will result in a violation of the SAFDLs and that no postulated accident will result in consequences more severe than those described in Chapter 15 of the FSAR. Since there has been no change to the requirement to operate the reactor within the LHR and DNBR limits and no change to the actual LHR and DNBR limits themselves, the accident analyses described in Chapter 15 of the FSAR will not be affected and will therefore remain bounding.

The proposed change will reduce the number of potentially unnecessary power reductions along with the rate at which the power reductions are accomplished. Maintaining steady-state conditions for up to eight hours after the loss of COLSS while monitoring the CPC LHR/DNBR for trends, provides plant personnel with a reasonable period of time to return COLSS to service while continuing to maintain a high degree of confidence that the core conditions remain well within the range of values assumed in the safety analysis. In fact, monitoring for trends in LHR and DNBR Margin increases the margin of safety by allowing the anticipation of degradation in LHR or DNBR Margin. Moreover, by reducing the number of plant transients there will be an attendant reduction in probability of an AOO and subsequent RPS actuation. Therefore, the proposed change will not involve a significant reduction in a margin of safety.

Safety and Significant Hazards 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 10CFR50.92; 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.