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W3F1-98-0172
A4.05
PR

September 23, 1998

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
Emergency Technical Specification Change
Request NPF-38-210

Gentlemen:

On September 18, 1998, Waterford 3 submitted a revision to Technical Specification Change Request NPF-38-210 in letter W3F1-98-0168. The request addressed the functional requirements of the 10^{-4} % Bistable of the Reactor Protective System. Based on new information obtained from the industry and the definitions of THERMAL POWER and RATED THERMAL POWER given in Technical Specifications 1.34 and 1.24, Waterford 3 has determined that these terms are not accurate in describing the reactor power input used by the operating bypass permissive and trip enable of the 10^{-4} % Bistable. Thus, Waterford is superceding the revised Technical Specification Change Request in letter W3F1-98-0168 with the attached request. The attached change replaces the September 18, 1998 request in its entirety. Information has been added to the proposed change to clarify the application of THERMAL POWER and RATED THERMAL POWER.

As discussed in the previous revision, Waterford 3 placed the plant in Mode 4 on September 18, 1998, as a result of unexpected leakage from a pressurizer safety relief valve. As degradation of this valve could not be anticipated, this is an unplanned outage. Approval of this change is required for the plant to restart from this forced outage. Based on this need and the criteria provided in 10 CFR 50.91a.5, Entergy Operations requests that this submittal be processed as an Emergency Change. Entergy Operations requests the effective date for this change be upon receipt of the amendment.

The attached description and safety analysis supports a change to the Waterford 3 Technical Specifications. The change originally proposed in the September 18, 1998, submittal modifies the Notes in Table 2.2-1 (Reactor Protective Instrumentation Trip Setpoints Limits) and Table 3.3-1 (Reactor Protective Instrumentation). The Reactor Protective System as designed and built is not capable of simultaneously meeting the Logarithmic Power Level, Local Power Density, Departure from Nucleate Boiling Ratio, and Core Protection Calculator bypass setpoints as described in Technical Specifications 2.2.1 and 3.3.1. The proposed change revises the Technical Specifications such that the existing design will be capable of satisfying the Technical Specification requirements.

Additional changes to clarify the application of the terms THERMAL POWER and RATED THERMAL POWER are added by this revision. For the identified applications, the power level of interest is the power level as indicated by the logarithmic power channels rather than the actual THERMAL POWER of the core (which includes a contribution from decay heat).

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. Without the above changes the Reactor Protective System at Waterford 3 will not meet the entry requirements for Mode 2 upon plant restart.

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

Very truly yours,

R.F. Burch for

T.R. Leonard
General Manager of Plant Operations
Waterford 3

TRL/BVR/rtk
Attachments: Affidavit
NPF-38-210

(w/Attachments)

cc: E.W. Merschoff, NRC Region IV
C.P. Patel, NRC-NRR
J. Smith,
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

Raymond F. Burski, being duly sworn, hereby deposes and says that he is Director of Site Support - 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-38-210; 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.

Raymond F. Burski

Raymond F. Burski
Director of Site Support – 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 23rd day of September, 1998.

Notary Public

My Commission expires at death.

DESCRIPTION AND NO SIGNIFICANT HAZARDS EVALUATION
OF PROPOSED CHANGE NPF-38-210

The proposed change modifies Note "1" of Table 2.2-1 and Note "a" of Table 3.3-1 to better describe the performance of the 10^{-4} % Bistable by specifically addressing its hysteresis characteristics. Additionally, this change provides information to specify that the setpoints for the 10^{-4} % Bistable are based upon output from the logarithmic power channels of the excore nuclear instrumentation, which does not include the contributions of decay heat produced by the core. Specifically, footnotes are added to the terms RATED THERMAL POWER and THERMAL POWER in Table 2.2-1, the notes to Table 2.2-1, Table 3.3-1, the notes to Table 3.3-1, the notes to Table 4.3-1 and the Log Power Level -- High basis.

Existing Specification

See Attachment A

Proposed Specification

See Attachment B

Background

The Reactor Protective System (RPS) consists of sensors, calculators, logic, and other equipment necessary to monitor selected Nuclear Steam Supply System (NSSS) and containment conditions and to effect reliable and rapid Control Element Assembly (CEA) insertion (reactor trip) if any or a combination of the monitored conditions approach specified safety system settings. The system's functions are to protect the core and Reactor Coolant System (RCS) pressure boundary for defined anticipated operational occurrences (AOOs) and also to provide assistance in limiting the consequences for certain postulated accidents. Four measurement channels with electrical and physical separation are provided for each parameter used in the direct generation of trip signals, with the exception of CEA position. A two-out-of-four coincidence of like trip signals is required to generate a reactor trip signal. The fourth channel is provided as an installed spare and allows bypassing of one channel while maintaining a two-out-of-three system. Manual reactor trip is also provided.

Some reactor trip signals are provided with bypasses that are required to allow reactor startup. The High Logarithmic Power (HLP) trip and the Core Protection Calculators (CPC) generated High Local Power Density (LPD) and Low Departure from Nucleate

Boiling Ratio (DNBR) trips are bypassed at prescribed power levels since these trips would generate an unnecessary trip signal during reactor startup and power increase.

Description and Safety Considerations

The Notes in Table 2.2-1 and Table 3.3-1 are being changed. Specifically, the proposed change modifies Note "1" of Table 2.2-1 and Note "a" of Table 3.3-1 to accurately describe the value for automatic bypass removal to allow the reset value for the 10^{-4} % Bistable to be below the setpoint by 3.0×10^{-5} % RATED THERMAL POWER to account for hysteresis.

The high logarithmic power level trip is provided to trip the reactor when indicated neutron flux power reaches a preset value. The flux signal used is the logarithmic power signal originating from the excore detectors in each nuclear instrument safety channel. The nominal trip setpoint is $\leq$ 0.257 % of full power. This trip provides protection against inadvertent CEA withdrawals initiated from subcritical conditions (less than 10^{-4} % power) as described in FSAR Section 15.4.1.1. The high logarithmic power level bypass is provided to allow reactor power to be increased above 0.257 % power into Mode 1 during a controlled reactor startup. Without the bypass in place a reactor trip is generated when the trip setpoint is reached, thereby preventing further power increases. The bypass may be manually inserted above 10^{-4} % power and is automatically removed when the 10^{-4} % Bistable is reset at a power below 10^{-4} %. For example, when power increases during a reactor startup to the 10^{-4} % Bistable setpoint, a permissive signal is generated to allow the operator to bypass the HLP trip function. The manual bypass by the operator will occur only during a controlled power increase and not if the increase is due to an inadvertent CEA withdrawal. When power decreases to the 10^{-4} % Bistable reset value, the bypass is automatically removed. The automatic bypass removal ensures that the trip will be available in the event of a CEA withdrawal from subcritical conditions (below 10^{-4} % power).

Additionally, safety analyses described in FSAR section 15.4.1.2 assume that a CEA withdrawal from critical conditions can be initiated from the lowest power level (the most limiting initial condition) at which the HLP trip is not available. In this case, since the HLP trip is not available, a reactor trip is generated by the CPC variable overpower trip function. The initial power level could theoretically be just above the 10^{-4} % Bistable reset value during a shutdown if the power decrease were stopped at this power level which is highly improbable. Furthermore, since Waterford 3's standard practice is to trip the reactor between 5% – 10% power during a shutdown, it is extremely unlikely that this condition would occur.

The CPC provides reactor trips on DNBR and LPD when core power is above 10^{-4} %. The CPC also generates a reactor trip signal when RCS conditions are outside the range for which CPC is applicable (e.g., all RCPs not running, shutdown CEA banks not fully withdrawn, etc.). The CPC bypass, which bypasses the low DNBR and high LPD trips, is provided to allow reactor trip breakers to be closed in preparation for reactor startup before all of the CPC range checks are met. If these range checks are not met, the CPC generates a reactor trip, thereby preventing CEA withdrawal and reactor startup. Safety analyses credit a CPC trip at the 10^{-4} % Bistable setpoint when conditions do not meet the CPC range checks (e.g., shutdown bank withdrawal). The bypass may be manually inserted if power is below 10^{-4} % and is automatically removed when the power level increases to the 10^{-4} % Bistable setpoint. For example, when power increases during a reactor startup to the 10^{-4} % Bistable setpoint, the CPC bypass is automatically removed. This ensures that the CPC is available under conditions where LPD and DNBR are of concern. If conditions do not meet the CPC range limits, as in the case of a CEA shutdown bank not fully withdrawn, a reactor trip signal is immediately generated. When power decreases to the 10^{-4} % Bistable reset value, as after a reactor trip, a permissive signal is generated to allow the operator to bypass the CPCs.

The bypass permissive function and automatic bypass removal function are reflected in notes "1" and "5" of Table 2.2-1 and notes "a" and "c" of Table 3.3-1. The setpoint for both the CPC and HLP functions is given as 10^{-4} % of RATED THERMAL POWER. However, a single bistable is used to initiate both the permissive and automatic bypass removal for both the CPC and HLP trip functions. A single bistable cannot both energize and de-energize at the same value as required by the Technical Specifications due to hysteresis. The CPC automatic bypass removal and permissive for the HLP trip bypass occur at the bistable setpoint (nominally 10^{-4} % power). However, the HLP automatic bypass removal and permissive for CPC trip bypass occur at the reset value of the bistable, which is slightly below 10^{-4} % power. The demonstrated hysteresis is within 1.5% of a 0-10 volt range, which is within 3.0×10^{-5}% of RATED THERMAL POWER of the 10^{-4}% Bistable setpoint. Therefore, the reset value will be within a power of 3.0×10^{-5} % below the bistable setpoint value. Thus, literal compliance with the Technical Specifications, which require both to occur at 10^{-4} % power, is not possible.

If the bistable is set so that the High Log Power automatic trip bypass removal occurs at 10^{-4} % power, the CPC automatic trip bypass removal will be slightly above the required 10^{-4} % power Technical Specification value. If the bistable is set so that the CPC automatic trip bypass removal occurs at 10^{-4} % power, the High Log Power automatic trip bypass removal will be slightly below the required 10^{-4} % power Technical Specification value. Waterford 3 procedures follow the latter case with the CPC automatic trip bypass removal set at 10^{-4} % power.

In addition to the above, this change will provide information to specify that the setpoints for the 10^{-4} % Bistable are based upon output from the logarithmic power channels of the excore nuclear instrumentation. This indication for reactor power does not include decay heat produced by the core.

Technical Specifications 2.2.1 and 3.3.1 use the terms THERMAL POWER and RATED THERMAL POWER to specify the setpoints of the 10^{-4} % Bistable. THERMAL POWER and RATED THERMAL POWER are defined in Technical Specifications 1.34 and 1.24 in terms of the total amount of heat transferred from the core to the reactor coolant system. This includes a contribution from decay heat produced by the core.

Contrary to this definition, the logarithmic power channels that provide input into the 10^{-4} % Bistable do not include contributions from decay heat. Decay heat contributions would prevent the actual thermal power of the core from reaching the level of the setpoints for the 10^{-4} % Bistable for the duration of a normal shutdown. This contradicts the purpose of the LPD and DNBR bypass capability in the 10^{-4} % Bistable. The intent of the original wording is to describe the power level as indicated by the logarithmic power channel. The proposed revisions annotate the references to RATED THERMAL POWER and THERMAL POWER to clarify that the parameter of interest is the power level as indicated by the logarithmic power channel. This change is provided to eliminate any confusion regarding decay heat on these parameters.

The changes indicated in Appendix B will resolve this condition. The changes make the wording in the Technical Specification consistent with the Bases of the Technical Specification.

No Significant Hazards Evaluation

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 changes modify the table notations for the 10^{-4} % Bistable in Technical Specifications 2.2.1 and 3.3.1. The proposed changes to these trip bypass removal functions do not adversely impact any system, structure, or component design or operation in a manner that would result in a change in the frequency or occurrence of accident initiation. The reactor trip bypass removal functions are not accident initiators. System connections and the trip setpoints themselves are not affected by trip bypass removal setpoint variations.

   Since the hysteresis for the 10^{-4} % Bistable is small, there is a negligible impact on the CEA withdrawal analyses. Revised analyses, accounting for slightly different bypass removal power levels caused by the bistable hysteresis, would result in negligible changes to the calculated peak power and heat flux for the pertinent CEA withdrawal events. Therefore, the consequences of any accident previously evaluated will not significantly change.

   With respect to the clarification proposed for the THERMAL POWER input to the bypass capability of the affected reactor trips for the 10^{-4} % Bistable, the proposed change does not alter the manner of operation of the operating bypasses and automatic bypass removals. This change corrects a discrepancy between the formal definition of this terminology and its use in the context of the applicable Technical Specifications.

   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 trip bypass removal functions in question protect against possible reactivity events. The power, criticality levels, and possible bank withdrawals associated with these trip functions have already been evaluated. Therefore, all pertinent reactivity events have previously been considered. Slight differences in the power level at which the automatic trip bypass removal occurs can not cause a different kind of accident.

The proposed changes to Note "1" of Table 2.2-1 and Note "a" of Table 3.3-1 do not alter any plant system, structure, or component. Furthermore, these changes do not reduce the capability of any safety-related equipment to mitigate AOOs.

In addition, no new or different accidents result from clarifying the THERMAL POWER input to the operating bypasses and automatic bypass removals of the affected reactor trips. The results of previously performed accident analyses remain valid. Therefore, this change does not create the possibility of a new or different kind of accident.

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

Response: No

The safety function associated with the CPC and HLP trip functions are maintained. Since the hysteresis for the 10^{-4} % Bistable is small, there is a negligible impact on the CEA withdrawal analyses. Calculated peak power and heat flux are not significantly changed as a result of the bistable hysteresis. All acceptance criteria are still met for these events. There is no change to any margin of safety as a result of this change.

Clarification of the THERMAL POWER input to the operating bypasses and automatic bypass removals of the 10^{-4} % Bistable does not alter the operation of the operating bypasses and automatic bypass removals of the affected reactor trips. This change corrects a discrepancy between the formal definition of this terminology and its use in the context of the applicable Technical Specifications. Therefore, the proposed change will not involve a significant reduction in a margin of safety.

Safety and Significant Hazards Determination

Based on the above No Significant Hazards Evaluation, 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.