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PLUNKETT,T.F. Florida Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION
Document Control Branch (Document Control Desk)

SUBJECT: Application for amends to Licenses DPR-31 & DPR-41,modifying TS Table 2.2-1, "Reactor Trip Sys Instrumentation Trip Setpoints" to remove lead/lag compensator term on measured delta T from overtemp delta T & overpower delta T.

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APR 2 0 1993

L-93-081
10 CFR 50.90

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

Gentlemen:

Re: Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251
Proposed License Amendments -
Removal of Lead/Lag Compensator Term on measured ΔT in
Overtemperature ΔT and Overpower ΔT Reactor Trip Functions

In accordance with 10 CFR 50.90, Florida Power and Light Company (FPL) requests that Appendix A of Facility Operating Licenses DPR-31 and DPR-41 be amended to modify Turkey Point Units 3 and 4 Technical Specifications Table 2.2-1, Reactor Trip System Instrumentation Trip Setpoints. The purpose of these amendments is to revise Technical Specification Table 2.2-1, Reactor Trip System Instrumentation Trip Setpoints, to remove the lead/lag compensator term on measured ΔT from the overtemperature ΔT and overpower ΔT reactor trip functions. This is accomplished by setting the time constants, τ_1 and τ_2, to zero seconds.

FPL has determined that the proposed license amendments do not involve a significant hazard pursuant to 10 CFR 50.92. A description of the amendments request is provided in Attachment 1. The no significant hazards determination in support of the proposed Technical Specification change is provided in Attachment 2. Attachment 3 provides the proposed revised Technical Specification changes.

In accordance with 10 CFR 50.91 (b)(1), a copy of these proposed license amendments are being forwarded to the State Designee for the State of Florida.

The proposed amendments have been reviewed by the Turkey Point Plant Nuclear Safety Committee and the FPL Company Nuclear Review Board.

Should there be any questions on this request, please contact us.

Very truly yours,

T. F. Plunkett
Vice President
Turkey Point Nuclear Plant

TFP/RJT/rt

Attachments

cc: Stewart D. Ebneter, Regional Administrator, Region II, USNRC
R. C. Butcher, Senior Resident Inspector, USNRC, Turkey Point
Mr. W. A. Pasetti, Florida Department of Health and Rehabilitative Services

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1/1

STATE OF FLORIDA)
) ss.
COUNTY OF DADE)

T. F. Plunkett being first duly sworn, deposes and says:

That he is Vice President, Turkey Point Nuclear Plant, of Florida Power and Light Company, the Licensee herein;

That he has executed the foregoing document; that the statements made in this document are true and correct to the best of his knowledge, information and belief, and that he is authorized to execute the document on behalf of said Licensee.

T. F. Plunkett

Subscribed and sworn to before me this

5 day of APRIL, 1993.

Cheryl A Kelly

Name of Notary Public (Type or Print)

NOTARY PUBLIC, in and for the County of Dade, State of Florida.

CHERYL A. KELLY
MY COMMISSION # CC 223781
EXPIRES: September 27, 1996
Bonded Thru Notary Public Underwriters

My Commission expires: _____
Commission No. _____

T. F. Plunkett is personally known to me.

ATTACHMENT 1

DESCRIPTION OF AMENDMENTS REQUEST

DESCRIPTION OF AMENDMENTS REQUEST

Introduction

To reduce the potential for a spurious turbine runback or reactor trip, Florida Power and Light Company (FPL) proposes a change to the Technical Specifications reactor trip functions. The proposed change is requested to alleviate the effects of existing temperature oscillations which became significant when the primary reactor coolant system Resistance Temperature Devices (RTDs) were relocated from the bypass lines to the main loops at Turkey Point. FPL has concluded that this proposed change will not compromise the health and safety of the public. The basis of FPL's conclusion is discussed below.

The proposed amendments revise the Turkey Point Units 3 & 4 Technical Specifications Table 2.2-1, Reactor Trip System Instrumentation Setpoints, to remove the lead/lag compensator term on the measured reactor coolant system (RCS) loop temperature difference (ΔT) from the overtemperature ΔT and overpower ΔT reactor trip functions. This is accomplished by changing the time constants, τ_1 and τ_2, from 8 and 3 seconds respectively, to zero seconds each.

Issue

After experiencing several spurious overtemperature ΔT turbine runback alarms on the Unit 3 Eagle-21 system, FPL determined that the cause of these alarms was the oscillations of the Loop B reactor coolant system hot leg temperature. These temperature oscillations reached 2-3 °F peak to peak amplitude at a frequency between .067 Hz and 1 Hz.

These oscillations have been experienced at other Westinghouse plants that have eliminated the RTD bypass loops and are attributed to phenomena resulting from such factors as power level, core loading, fuel burnup, hot channel factors (F_q, $F_{\Delta H}$), and core exit flow characteristics. Current evidence supported by the Nuclear Steam Supply System vendor, Westinghouse, suggests that the amplitudes of these oscillations decrease with core burnup. Westinghouse presented a summary of the hot leg streaming issue to the NRC staff on September 17, 1991.

Based upon industry information provided by Westinghouse, and a review of Turkey Point's plant data, FPL concluded that the elimination of the lead/lag compensator term on measured ΔT from the overtemperature ΔT and overpower ΔT reactor trip functions would reduce the potential for a spurious turbine runback or reactor trip signal.

Current Requirements

Turkey Point Units 3 and 4 Technical Specification 2.2, LIMITING SAFETY SYSTEM SETTINGS, specifies the REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS for Overtemperature ΔT (NOTE 1) and Overpower ΔT (NOTE 3). Both the Overtemperature ΔT and the Overpower ΔT reactor trip functions include a term on the left hand-side of the expression, referred to as the lead/lag compensator term on measured ΔT. This term is expressed as follows:

$$\text{Lead/Lag Compensator term} = \frac{1 + \tau_1 S}{1 + \tau_2 S}$$

where τ_1 = 8 seconds,
τ_2 = 3 seconds, and
S = Laplace transform operator, sec^{-1}

These values were chosen based on Westinghouse experience and are typical for a lead/lag compensator function. The basis for the lead/lag compensator term on measured ΔT in both the overtemperature ΔT and overpower ΔT reactor trip functions is discussed below.

Discussion

Overtemperature ΔT Reactor Trip Function:

The overtemperature ΔT reactor trip function is defined in NOTE 1 of Turkey Point Technical Specifications Table 2.2-1. This reactor trip function provides core protection to prevent Departure from Nucleate Boiling (DNB) for all combinations of pressure, power, coolant temperature, and axial power distribution, provided the transient is slow with respect to piping transit delays from the core to the temperature detectors and pressure is within the range between the Pressurizer High and Low Pressure trips. The setpoint is automatically varied with: (1) coolant temperature to correct for temperature induced changes in density and heat capacity of water, and includes dynamic compensation for piping delays from the core to the loop temperature detectors, (2) pressurizer pressure, and (3) axial power distribution.

The measured ΔT is multiplied by the lead/lag compensator term discussed above, and the product is compared to the continuously calculated overtemperature ΔT setpoint. If the product exceeds the calculated setpoint in 2 out of 3 channels, a reactor trip signal is generated.

Overpower ΔT Reactor Trip Function:

The overpower ΔT reactor trip function is defined in NOTE 3 of Turkey Point Technical Specifications Table 2.2-1. This reactor trip function is designed specifically to ensure operation within the fuel centerline temperature design basis. This is accomplished by controlling the gross core thermal power within a prescribed limit (118 percent of nominal full power). This provides assurance of fuel integrity (i.e., no fuel pellet melting and less than 1% cladding strain) under all creditable overpower conditions, limits the required range for overtemperature ΔT trip, and provides a backup to the High Neutron Flux trip. The setpoint is automatically varied with: (1) coolant temperature to correct for temperature induced changes in density and heat capacity of water, and (2) rate of change of temperature for dynamic compensation of piping delays from the core to the loop temperature detectors to ensure that the allowable heat generation rate (kw/ft) is not exceeded.

The measured ΔT is multiplied by the lead/lag compensator, and the product is compared to the continuously calculated overpower ΔT setpoint. If the product exceeds the calculated setpoint in 2 out of 3 channels, a reactor trip signal is generated.

Lead/Lag Compensator Term on measured ΔT in the Overtemperature ΔT and Overpower ΔT Reactor Trip Functions:

The function of the lead/lag compensator term is to amplify changes in measured ΔT for comparison to the overtemperature ΔT and overpower ΔT reactor trip functions. The lead/lag compensator term on measured ΔT is used at some plants in instances where a faster response to a change in measured ΔT is required earlier to satisfy the plant's safety analyses.

The lead/lag compensator on measured ΔT was added to FPL's Turkey Point Units 3 and 4 Technical Specifications in Amendments 140 and 135. The Technical Specification change was due to the RTD Bypass Elimination project and the installation of the Eagle-21 digital protection system. The Eagle-21 digital protection system gives Turkey Point the capability to have a lead/lag compensator term on the measured ΔT signal and is used as input to the overtemperature ΔT and overpower ΔT reactor trip functions. The predecessor to Eagle-21, the Westinghouse Hagan 7100 analog protection system as installed at Turkey Point, did not have a lead/lag compensator term on measured ΔT. FPL verified that the lead/lag compensator term on measured ΔT for the overtemperature ΔT and overpower ΔT reactor trip functions are not required or assumed for accident mitigation in any of the safety analyses that comprise the Turkey Point licensing basis.

Other plants of Turkey Point's vintage currently do not have the lead/lag compensator term on measured ΔT in the overtemperature ΔT and overpower ΔT reactor trip functions.

Licensing Basis:

During the reload design process, the overtemperature ΔT and overpower ΔT reactor trip setpoints are reverified each cycle based on the reload core and reactor coolant system parameters.

FPL performed a review of the Turkey Point licensing basis accident analyses to determine the analyses in which either overtemperature ΔT or overpower ΔT reactor trips were used as the primary method for system protection. This review included the following accident analyses:

- Dropped Rod Cluster Control Assembly (RCCA) with and without Turbine Runback,
- RCCA Bank Withdrawal at Power,
- Feedwater Enthalpy Reduction,
- Boron Dilution Analysis for Density Compensation Correction,
- Steamline Break for Continued Feedwater Addition from Standby Feedwater Pumps,
- Loss of Flow,
- Locked Rotor,
- Rod Ejection,
- Loss of Load, and
- Startup of an Inactive Loop.

The overtemperature ΔT reactor trip is used as the primary protection for three Updated Final Safety Analysis Report (UFSAR) Chapter 14 accident scenarios:

- Rod Withdrawal at Power (UFSAR Chapter 14.1.2),
- Dropped Rod at Power (UFSAR Chapter 14.1.3), and
- Boron Dilution Mode 1 (UFSAR Chapter 14.1.5).

The overpower ΔT reactor trip is not used as the primary protection for any UFSAR Chapter 14 accident scenario; however it is assumed in the overpower kw/ft analysis performed by Westinghouse for each fuel cycle.

This review verified that the lead/lag compensator term on measured ΔT for the overtemperature ΔT and overpower ΔT reactor trip functions are not required or assumed for accident mitigation in any of the safety analyses that comprise the Turkey Point licensing basis. The proposed amendments will not change the trip setpoints for the overpower ΔT and overtemperature ΔT reactor trip functions.

Proposed Technical Specification Changes

1. FPL proposes to change the values in the Overtemperature ΔT reactor trip function in Technical Specification Table 2.2-1, REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS, NOTE 1.

   Specifically, the proposed change involves changing the time constants τ_1 and τ_2, from 8 and 3 seconds respectively, to 0 seconds each.

   Justification:

   The lead/lag compensator term on measured ΔT in the overtemperature ΔT reactor trip function serves to amplify a change in measured ΔT. By setting the time constants τ_1 and τ_2 equal to zero, this amplifier term (lead/lag compensator term) is removed while still maintaining the ability to trip prior to exceeding the Departure from Nucleate Boiling Ratio (DNBR) limit. FPL's safety analyses for UFSAR Chapter 14 events do not require the lead/lag compensator term on measured ΔT in the overtemperature ΔT reactor trip function.

   Within the results of the UFSAR Chapter 14 safety analyses, FPL can change the lead/lag compensator term on measured ΔT as long as the reactor is tripped prior to reaching the DNBR and fuel centerline temperature limits. Changing the time constants τ_1 and τ_2 to 0 seconds, provides a gain of unity and thus ensures the reactor will trip on a valid input signal, while reducing the potential for a turbine runback or reactor trip on a spurious (invalid) input signal.

2. FPL proposes to change the values in the Overpower ΔT reactor trip function in Technical Specification Table 2.2-1, REACTOR TRIP SYSTEM INSTRUMENTATION TRIP SETPOINTS, NOTE 3.

Specifically, the proposed change involves changing the time constants τ_1 and τ_2, values from 8 and 3 seconds respectively, to 0 seconds each.

Justification:

The lead/lag compensator term on measured ΔT in the overpower ΔT reactor trip function serves to amplify a change in measured ΔT. By setting the time constants τ_1 and τ_2 equal to zero, this amplifier term (lead/lag compensator term) is removed while still maintaining the ability to trip prior to exceeding the fuel centerline temperature limit. Turkey Point's safety analyses for UFSAR Chapter 14 events does not require the lead/lag compensator term on measured ΔT in the overpower ΔT reactor trip function.

Within the results of the UFSAR Chapter 14 safety analyses, FPL can change the lead/lag compensator term on measured ΔT as long as the reactor is tripped prior to exceeding the DNBR and fuel centerline temperature limits. Changing the time constants τ_1 and τ_2 to 0 seconds, provides a gain of unity and thus ensures the reactor will trip on a valid input signal, while reducing the potential for a turbine runback or reactor trip on a spurious (invalid) input signal.

Summary

FPL has confirmed that the lead/lag compensator term on the measured ΔT in the overtemperature ΔT and overpower ΔT reactor trip functions are not required or assumed as a basis for the Turkey Point UFSAR safety analyses. As a result, this proposed amendment does not either create the possibility of a new or different kind of accident from any accident previously evaluated, or impact the margin of safety as calculated in the licensing basis analyses. FPL proposes to remove the lead/lag compensator term on measured ΔT from the overtemperature ΔT and overpower ΔT reactor trip functions by setting the time constants τ_1 and τ_2 to zero seconds each, from 8 and 3 seconds, respectively.

ATTACHMENT 2

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

DETERMINATION OF NO SIGNIFICANT HAZARDS CONSIDERATION

Description of Proposed License Amendments

Turkey Point Units 3 and 4 Technical Specification Table 2.2-1, Reactor Trip System Instrumentation Trip Setpoints, specifies the overtemperature ΔT and overpower ΔT reactor trip functions. Both the overtemperature ΔT and overpower ΔT reactor trip functions include terms on the left hand-side of the expression, referred to as the lead/lag compensator term on measured ΔT. The lead/lag compensator term is expressed as $(1 + \tau_1 \text{ times } S)$ divided by $(1 + \tau_2 \text{ times } S)$ where τ_1 and τ_2 are time constants (seconds) and S is the Laplace transform operator (seconds^{-1}). Currently in Turkey Point's Units 3 and 4 Technical Specifications, the time constants τ_1 and τ_2 are set to 8 and 3 seconds, respectively.

Florida Power and Light Company (FPL) proposes to revise the lead/lag compensator term on the measured ΔT in the overtemperature ΔT and overpower ΔT reactor trip functions by setting the time constants, τ_1 and τ_2, equal to zero seconds.

Introduction

The NRC has provided standards for determining whether a significant hazards consideration exists (10 CFR 50.92(c)). A proposed amendment to an operating license for a facility involves no significant hazards consideration, if operation of the facility in accordance with the proposed amendment would not (1) involve a significant increase in the probability or consequences of an accident previously evaluated; or (2) create the possibility of a new or different kind of accident from any accident previously evaluated; or (3) involve a significant reduction in a margin of safety. Each standard is discussed below for the proposed license amendments.

Discussion

(1) **Operation of the facility in accordance with the proposed amendment would not involve a significant increase in the probability or consequences of an accident previously evaluated.**

The amendment will not increase the probability or consequences of an accident previously evaluated since the lead/lag compensator term on measured ΔT in the overtemperature ΔT and overpower ΔT reactor trip functions are not required or assumed for accident mitigation in any of the UFSAR safety analyses that comprise the Turkey Point licensing basis. In addition, the reactor protection system will continue to perform its intended design function of ensuring that the core and reactor coolant system do not exceed their safety limits during normal operation or design basis anticipated operational occurrences.

(2) **Operation of the facility in accordance with the proposed amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated.**

The overtemperature ΔT reactor trip function is used as the primary protection for three UFSAR Chapter 14 accident scenarios: Rod Withdrawal at Power (UFSAR Chapter 14.1.2), Dropped Rod at Power (UFSAR Chapter 14.1.3), and Boron Dilution Mode 1 (UFSAR Chapter 14.1.5). The overpower ΔT reactor trip function is not used as the primary protection for any UFSAR Chapter 14 accident scenario; however it is assumed in the overpower kw/ft analysis performed by Westinghouse for each fuel reload. The lead/lag compensator term on measured ΔT in the overtemperature ΔT and overpower ΔT reactor trip functions are not required or assumed for accident mitigation in any of the UFSAR safety analyses that comprise the Turkey Point licensing basis.

The proposed amendments will not create the possibility of a new or different kind of accident from any accident previously analyzed, since the operating modes, plant configuration and safety analysis assumptions will not be changed from those previously analyzed in the UFSAR.

(3) **Operation of the facility in accordance with the proposed amendment would not involve a significant reduction in a margin of safety.**

The margin of safety for the proposed amendment is defined in the licensing basis safety analysis. The overtemperature ΔT reactor trip function is used as the primary protection for three UFSAR Chapter 14 accident scenarios: Rod Withdrawal at Power (UFSAR Chapter 14.1.2), Dropped Rod at Power (UFSAR Chapter 14.1.3), and Boron Dilution Mode 1 (UFSAR Chapter 14.1.5). The overpower ΔT reactor trip is not used as the primary protection for any UFSAR Chapter 14 accident scenario; however it is assumed in the overpower kw/ft analysis performed by Westinghouse for each fuel reload. The lead/lag compensator term on measured ΔT for the overtemperature ΔT and overpower ΔT reactor trip functions are not required or assumed for accident mitigation in any of the safety analyses that comprise the Turkey Point licensing basis.

The proposed amendments will not reduce the margin of safety since the plant operating and safety limits, the input assumptions to the safety analyses and the plant response to transients as analyzed in the Turkey Points Units 3 & 4 licensing basis will not be changed from those previously analyzed in the UFSAR.

Based on the above, FPL has determined that the amendment request does not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in a margin of safety; and therefore the proposed changes do not involve a significant hazards consideration as defined in 10 CFR 50.92.