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SUBJECT: Forwards response to Generic Ltrs 85-12 & 83-10d re
NUREG-0737,TMI Action Item II.K.3.5, "Automatic Trip of
Reactor Coolant Pumps."

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November 26, 1985

Mr. H. L. Thompson Jr., Director
Office of Nuclear Reactor Regulation
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D.C. 20555

Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
TAC #M49671
NUREG 0737 Item II.K.3.5 "Automatic Trip of Reactor Coolant Pumps"

Reference: 1) Letter from D. G. Eisenhut to all Licensees with Westinghouse designed Nuclear Steam Supply Systems (Generic Letter 83-10d) dated February 8, 1983

2) Letter from C. W. Giesler to D. G. Eisenhut dated June 20, 1984

3) Letter from H. L. Thompson Jr. to all Applicants and Licensees with Westinghouse designed Nuclear Steam Supply Systems (Generic Letter 85-12) dated June 28, 1985

Generic letter 83-10d outlined the criteria for resolution of TMI Action Item II.K.3.5, "Automatic Trip of RCP's." Our previous letter of June 20, 1984 informed you that the criteria for resolution of Generic letter 83-10d would be met by Westinghouse Owners Group (WOG) letters OG-117 dated March 12, 1984 and OG-110 dated December 1, 1984. Generic Letter 85-12 states that although the information provided by the WOG is acceptable on a generic basis, each Westinghouse Licensee is required to submit additional plant specific information for NRC review.

The attachment to this letter provides the information needed to complete the response to Generic Letter 83-10d and is in a format similar to section IV of Generic Letter 85-12.

A046
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Sincerely,

D. C. Hintz
Manager-Nuclear Power

PIS/jks

Attach.

cc - Mr. George Lear, US NRC
Mr. Robert Nelson, US NRC

N1-119.1

Response to Generic Letter 85-12

Regarding TMI Action Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps"

A. Determination of RCP Trip Criteria

1. Information Requested

Identify the instrumentation to be used to determine the RCP trip setpoint, including the degree of redundancy of each parameter signal needed for the criterion chosen.

WPSC Response: The parameter used to determine RCP trip at the Kewaunee Nuclear Power Plant (KNPP) is Reactor Coolant System (RCS) pressure. Two Foxboro Model No. N-E11GH-HIM2-E transmitters (PT419, PT420), powered from separate, battery backed instrument buses, transmit separate signals to the control room. The signals are displayed on separate real time displays and record on one trend recorder. Therefore, the instrumentation used to determine wide range RCS pressure is redundant.

2. Information Requested

Identify the instrumentation uncertainties for both normal and adverse containment conditions. Describe the basis for the selection of the adverse containment parameters. Address, as appropriate, local conditions such as fluid jets or pipe whip which might influence the instrumentation reliability.

WPSC Response: The instrumentation uncertainties for both normal and adverse containment conditions are 79 PSIA and 310 PSIA respectively. These values were added to the calculated RCP trip setpoint and provide the needed conservatism to account for instrument uncertainty.

The instrumentation uncertainties were calculated with the guidance of WOG letter TMI-OG-132, "Justification of Instrument Setpoints

Used in Emergency Operating Instruction Guidelines" dated December 27, 1979. This letter provides several example calculations which are considered representative of typical Westinghouse plants. Plant specific instrumentation data has been substituted in each calculation where required.

The results from a LOCA environment test on a Foxboro transmitter were used in calculating the instrumentation uncertainty for adverse containment conditions. During this test an unaged Foxboro transmitter exhibited a maximum error of 8% full span. For added conservatism an error of 10% full span was used in calculating the instrumentation uncertainty for adverse containment conditions at KNPP.

Local conditions are not expected to have any effect on the reliability of the pressure transmitters when needed to determine the RCP trip setpoint. The transmitters have been given the highest level of qualification in Kewaunee's Environmental Qualification Plan and satisfy all requirements of 10 CFR 50.49. Although the transmitters are located near a main feedwater line, this line will be automatically isolated during any transient requiring the use of the wide range pressure channels to determine the RCP trip setpoint.

3. Information Requested

In addressing the selection of the criterion, consideration to uncertainties associated with the WOG supplied analyses values must be provided. These uncertainties include both uncertainties in the computer program results and uncertainties resulting from plant specific features not representative of the generic data group.

WPSC Response: The Loftran computer code was used by the WOG to perform the original RCP trip criteria analyses for the KNPP. An additional WOG analysis concludes that there is a -60 to +200 PSIG uncertainty in the original WOG analyses of the RCP trip set point for the KNPP (minimum RCS pressure).

Loftran is a Westinghouse licensed code used for FSAR SGTR and Non-LOCA analyses. Loftran has been validated against the January 1982 SGTR event at the Ginna plant and has been shown to accurately predict RCS pressure in the first ten minutes of the transient -- the critical time period when minimum RCS pressure is determined.

The following are considered to have the most impact on the uncertainty associated with the determination of the RCP trip criteria in the WOG analyses:

1. Break Flow
2. Safety Injection (SI) Flow
3. Decay Heat
4. Auxiliary Feedwater (AFW) Flow

Break flow and decay heat are separate models that are used in the Loftran computer code, while SI flow and AFW flow are direct inputs. The following sections provide an evaluation of the uncertainties associated with each item.

1. <u>Break Flow</u>

The break flow model used to simulate a double ended SGTR in the original WOG analyses is conservative (i.e. predicts higher break flow than actually expected). Westinghouse developed a more realistic break flow model that has been validated against the Ginna SGTR data. The more realistic break flow model predicts approximately a 30% lower break flow than the break flow model used in the original WOG analyses; therefore, the original WOG analyses predict a lower than expected minimum RCS pressure.

2. SI Flow

The SI flow inputs to Loftran were derived from best estimate calculations assuming all SI trains operating. An evaluation of calculations concludes that the SI inputs have a maximum uncertainty of ±10%.

3. Decay Heat

The decay heat model used in the original WOG analyses was based on the 1971 ANS 5.1 Standard. The more recent 1979 ANS 5.1 Standard decay heat inputs are approximately 5% lower. To determine the effect of the uncertainty due to the decay heat model, the WOG conducted a sensitivity study for a SGTR. The results from this study show that a 20% decrease in decay heat results in only a 1% decrease in RCS pressure for the first ten minutes of the transient.

4. AFW Flow

The AFW flow rate inputs used in the original WOG analyses are best estimate values, assuming that all AFW pumps are running, minimum pump start delay, and no throttling. To evaluate the uncertainties with the AFW flow rate, the WOG conducted a sensitivity study for a two loop plant. The results show that a 64% increase in AFW flow results in only an 8% decrease in minimum RCS pressure.

In summary, the effects of the uncertainties of the model and input parameters were evaluated, and it was concluded that the AFW flow and decay heat uncertainties do not significantly contribute to the overall WOG analyses uncertainty. Therefore, the calculated overall uncertainty associated with the WOG analyses is -60 to +200 PSIG and only considers the break flow model's conservatism and the SI uncertainty.

B. Potential Reactor Coolant Pump Problems

1. Information Requested

Assure that containment isolation, including inadvertent isolation, will not cause (RCP) problems if it occurs for non-LOCA transients and accidents.

WPSC Response: All water services needed for RCP operation (seal water injection, motor oil cooling, and thermal barrier cooling) are continued following a containment isolation signal; however, a SI signal - which initiates containment isolation - effects RCP seal water injection. When a SI signal is generated, the charging pumps, which provide seal water injection, are tripped.

The loss of seal water injection to the RCPs does not degrade the performance of the shaft seal assembly. Primary water from the RCS travels up the pump shaft, via the thermal barrier, and provides the necessary coolant to the shaft seal assembly. Component cooling water flow to the thermal barrier heat exchanger is not effected by containment isolation.

During an event requiring SI actuation, the Emergency Operating Procedures (EOPs) instruct the operators to restart the charging pumps after component cooling flow to the RCP is verified.

In summary, a containment isolation will not inhibit the operation of the RCPs.

2. Information Requested

Identify the components required to trip the RCPs, including relays, power supplies and breakers. Assure that RCP trip, when determined to be necessary, will occur. If necessary, as a result of the location of any critical component, include the effects of adverse containment conditions on RCP trip reliability. Describe the basis for the adverse containment parameters selected.

WPSC Response: The components required to trip the RCPs at Kewaunee are considered to be highly reliable. The RCP breakers are PSD McGraw-Edison air magnetic circuit breakers and are classified as QA1 in WPSC's nuclear safety related QA program. The breaker trip coils are DC powered from the station batteries and can be manually activated directly from the control room. No logic relays are involved in a manual trip from the control room. If needed, the breakers can be tripped locally.

There are no critical components that are required to trip the RCPs located inside containment; therefore, adverse containment conditions do not effect RCP trip reliability.

Although adverse containment conditons are not expected to effect RCP trip reliability, Kewaunee did experience an inadvertent RCP restart (LER 50-305/85-04) during the 1985 refueling outage, attributed to an inadvertent containment spray actuation (LER 50-305/85-01) prior to the outage.

The inadvertent RCP start was caused by a ground in the actuation circuitry. The ground was a result of water accumulation in a pressure switch attributed to the inadvertent containment spray.

To prevent a recurrence of the pump restart, the EOPs have been revised to instruct the operators to place the RCPs in pull out when the pumps are tripped due to low RCS pressure. Also, a hardware modification which would eliminate the potential for this event is being evaluated.

C. Operator Training and Procedures (RCP Trip)

1. Information Requested

Describe the operator training program for RCP trip. Include the general philosophy regarding the need to trip pumps versus the desire to keep pumps running.

WPSC Response: Operator training involving RCP trip is provided in the classroom and on the Kewaunee simulator. The classroom portion outlines the general philosophy regarding RCP trip, background information on why RCS pressure was chosen as the parameter used at Kewaunee, and how the RCP trip setpoint was calculated. EOPs incorporating RCP trip are followed on the Kewaunee simulator to train the operator in determining the need for RCP trip.

The general philosophy for RCP trip is that the RCPs will be tripped for all losses of primary coolant for which trip is considered necessary while permitting RCP operation to continue during most non-LOCA accidents.

It should be noted that the calculated RCP trip setpoint for Kewaunee is 2 PSI higher than the WOG calculated minimum RCS pressure for a double ended SGTR. WPSC has concluded that this difference is small in comparison to the uncertainty and conservatism in the WOG analysis, and the instrumentation uncertainties.

RCS pressure was chosen as the RCP trip parameter for the following reasons.

1) RCS pressure gives unambiguous indication for RCP trip.

2) The readability of RCS pressure instrumentation.

3) The frequent and familiar use of RCS pressure indication by the operator during normal plant operation.

2. Information Requested

Identify those procedures which include RCP trip related Operations.

WPSC Response: The following is a list of the Kewaunee Integrated Emergency Operating Procedures which include RCP trip related operations. Due to the nature of the procedures, (i.e. logic statements, contingency actions) RCP trip related operations may occur more than once in a procedure.

E-0	Reactor Trip or Safety Injection	Step 21.c
E-1	Loss of Reactor or Secondary Coolant	Step 1.c
	ES-1.2 Post-LOCA Cooldown and Depressurization	Steps 10.a, 13.b, 23.b
E-3	Steam Generator Tube Rupture	Steps 1.c, 18.d.1
	ES-3.1 Post-SGTR Cooldown Using Backfill	Step 10.b
	ES-3.2 Post-SGTR Cooldown Using Blowdown	Step 12.b
	ES-3.3 Post-SGTR Cooldown Using Steam Dump	Step 12.b
ECA-1.1	Loss of Emergency Coolant Recirculation	Step 20.b
ECA-2.1	Uncontrolled Depressurization of all Steam Generators	Step 3.c
ECA-3.1	SGTR with Loss of Reactor Coolant - Subcooled Recovery Desired	Steps 17.a, 20.b, 32.b
ECA-3.2	SGTR with Loss of Reactor Coolant - Saturated Recovery Desired	Steps 10.a, 13.b, 16.b
ECA-3.3	SGTR without Pressurizer Pressure Control	Step 33.b
FR-C.1	Response to Inadequate Core Cooling	Steps 12, 20.b
FR-C.2	Response to Degraded Core Cooling	Steps 5.10, 12, 16
FR-H.1	Response to Loss of Secondary Heat Sink	Step 3
FR-I.1	Response to High Pressurizer Level	Step 8.a