AUG 0 5 1987

Docket No. 50-305

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Dear Mr. Hintz:

SUBJECT: REVIEW OF THE SUBMITTAL AND RECOMMENDED FOLLOW-UP ACTIONS RELATING TO REACTOR COOLANT PUMP (RCP) TRIP (TMI ACTION ITEM II.K.3.5, GENERIC LETTER 85-12), TAC 49671

The staff reviewed your submittal dated November 26, 1985 on the above subject and prepared preliminary comments and questions. The preliminary information served as an agenda for a telephone conference call with Peter Sviatoslavsky of your staff and Warren Lyon representing NRC on December 9, 1986. The enclosure documents the staff understanding of the responses obtained during the conference call.

Note there is one area (Item A.) where additional information is necessary for completion of the review. You should be able to provide this information with no additional analyses since the staff is requesting estimates which should be available from previously performed investigations as opposed to precise values.

Within 60 days of the receipt of this letter, please confirm or correct as necessary our understanding of the information supplied for Kewaunee and also supply the information requested in Item A so that the staff can close out the RCP trip issue in a Safety Evaluation.

The information requested in this letter affects fewer than 10 respondents; therefore, OMB clearance is not required under Pub. L. 96-511.

Sincerely,

/s/

David L. Wigginton, Acting Director
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Enclosure:
As stated

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REPORT OF CONFERENCE CALL CONCERNING REACTOR COOLANT PUMP (RCP) TRIP AT THE KEWAUNEE NUCLEAR POWER PLANT DECEMBER 9, 1986

SUMMARY

We reported in Generic Letter (GL) 86-12 (Ref. 1) that the information provided by the Westinghouse Owners Group (WOG) in support of alternative Reactor Coolant Pump (RCP) trip was acceptable on a generic basis. The review noted that a number of considerations were assigned plant-specific status. Accordingly, we requested that operating reactor licensees and applicants select and implement an appropriate RCP trip criterion based upon the WOG methodology.

GL 85-12 required owners of Westinghouse Nuclear Steam Generating Systems to evaluate their plants with respect to RCP trip. The objective was to demonstrate that their proposed RCP trip setpoints assure pump trip for small break loss-of-coolant accidents (LOCA's) and, in addition, to provide reasonable assurance that RCP's are not tripped unnecessarily during non-LOCA events. A number of plant-specific items were identified which were to be considered by applicants and licensees, including the selected RCP trip parameter, instrumentation quality and redundancy, instrumentation uncertainty, possible adverse environments, calculational uncertainty, potential RCP and RCP associated problems, operator training, and operating procedures.

Wisconsin Public Service Corporation has addressed each of the GL 85-12 criteria. We have studied this information and have discussed RCP trip with the licensee's personnel. The only area where additional information appears necessary pertains to Item A., where estimated plant response including the influence of operator actions is requested.

The remainder of this report provides background pertinent to the RCP trip issue, the acceptance criteria, the basis for the discussion with the licensee, and our summary of the results of that discussion.

BACKGROUND AND INTRODUCTION

TMI Action Plan Item II.K.3.5 of NUREG-0737 (Ref. 2) required all licensees to consider solutions pertinent to tripping RCP's under transient and Loss-of-Coolant-Accident (LOCA) conditions. A summary of the industry and NRC programs concerning RCP trip was provided in SECY-82-475 (Ref. 3). SECY-82-475 also provided NRC guidance and criteria for resolution of II.K.3.5, and enclosed Generic Letter 83-10 (Ref. 4). The significant information provided by these references was summarized as follows:

> "... appropriate pump trip setpoints can be developed by the industry that would not require RCP trip for those transients and accidents where forced convection circulation and pressurizer pressure control is a major aid to the operators, yet would alert the operators to trip the RCP's for those small LOCA's where continued operation or delayed trip might result in core damage."
>
> "The resolution ... is intended to ensure that for whatever mode of pump operation a licensee elects,
>
> a) a sound technical basis for that decision exists;
>
> b) the plant continues to meet the Commission's rules and regulations; and
>
> c) as a minimum, the pumps will remain running for those non-LOCA transients and accidents where forced convection cooling and pressurizer pressure control would enhance plant control. This would include steam generator tube ruptures (SGTR) up to approximately the design basis event (one tube)."

During a small break accident in certain break size ranges, there exists a window in time during which tripping RCP's will make the accident worse. Therefore, in a small break situation, one must trip RCP's prior to entering the window. If one wishes to depend upon manual trip, two criteria are applicable:

1. One must show that at least 2 minutes exist within which to trip RCP's following "receipt of a trip signal" using licensing calculations as a basis.

2. One must show that at least 10 minutes exist within which to trip RCP's following "receipt of a trip signal" using best estimate calculations as a basis.

If, for some reason, the RCP's have not been tripped within 10 minutes of the time at which plant conditions indicate trip should be performed, they are to be left running until after the window is closed. Closure can be indicated by parameters such as regaining both adequate subcooling margin and pressurizer level after they have been lost.

Analyses are required to establish timing relative to items 1 and 2, as well as to establish the dimensions of the window.

It is desirable to leave pumps running for control purposes during other transients and accidents, including steam generator tube rupture accidents of sizes up to one tube broken. Therefore, insofar as is practical, procedures and criteria should be developed to attain this goal. Note that leaving pumps running during "non-break" transients and accidents is not a 100% requirement, as contrasted to the small break, where trip must be accomplished to remain in compliance with the regulations. (Failure to trip as required could lead to exceeding Appendix K specified temperatures for design basis accidents.) For "non-break" transients and accidents, RCP's may be tripped when desirable. If in doubt, the small break criteria are to be applied.

New plants coming on line should have dealt with RCP trip prior to power operation.

Note much of the work pertinent to the above criteria has been done on a generic basis, and is applicable to individual plants. Where this is the case, it is sufficient to establish applicability, and the generic work need not be repeated on a plant-specific basis.

The WOG developed a set of three alternative RCP trip criteria to meet the intent of GL 83-10 (Refs. 5 - 7):

1. Reactor Coolant System (RCS) pressure with normal instrument uncertainties. This criterion uses RCS pressure with normal instrument uncertainties as the criterion for RCP trip under normal containment conditions. The secondary pressure is assumed to be at the lowest secondary safety valve set pressure to provide conservatism. Instrument uncertainties associated with post-accident containment conditions are used for RCP trip under adverse containment conditions.

2. Reactor coolant subcooling. This method provides a direct indication for RCP trip since RCP's can continue to operate as long as sufficient subcooling margin is available. The trip criterion is established as zero subcooling in the RCS hot legs, with allowance for instrumentation uncertainties which exist for normal and abnormal containment conditions.

3. Secondary pressure dependent RCS pressure. This method differs from method 1 in that actual secondary side pressure is used in conjunction with RCS pressure. (The secondary side pressure may be significantly lower than the value obtained via method 1, such as when the atmospheric dump valve is open.) Instrumentation uncertainties are treated as in the other two methods.

A methodology was provided whereby each licensee or applicant could determine RCP trip setpoints for each of the three criteria. Each licensee or applicant

could then perform a plant-specific evaluation and could select a criterion which is best with respect to prevention of RCP trip for SGTR's and non-LOCA transients.

Overall, the staff found that for most plants, each of the criteria was adequate to provide an indication for RCP trip under small break LOCA conditions, and selection of an RCP trip criterion could be based on the capability to preclude pump trip for SGTR's and non-LOCA transients. However, the criteria may be marginal for some plants under some conditions since the uncertainty analysis provided by the WOG may not be bounding for all plants. Further, the RCS pressure set-point criterion appeared to have the least potential to reduce unnecessary RCP trips. Consequently, the staff determined that each licensee or applicant must consider the instrument and calculational uncertainties when selecting a criterion, and must be prepared to explain how they were considered during future inspections. The staff further described those plant-specific items required from each licensee or applicant in order to complete the response to GL 83-10. These are reproduced below, in some cases with additional guidance (provided in GL-85-12), and define the basis for the staff review.

The staff has completed a review of the licensee's November 26, 1986 submittal (Ref. 8) pertaining to RCP trip, and has discussed the results of the review during a telephone conference call with personnel representing the licensee. This report documents both the review and the results of the discussion with licensee personnel.

The purpose of the review was to evaluate the information provided in the original response to GL 85-12, to identify any areas where additional information was needed for the staff to complete its evaluation of RCP trip, and to provide guidance pertinent to submittal of additional information where appropriate. The telephone conference call was conducted to obtain

clarification and additional information. This call took place on December 9, 1986. The licensee was represented by Peter Sviatoslavsky and the NRC staff was represented by Warren Lyon.

RESPONSES AND EVALUATION

Organization of the remainder of this report is essentially identical to that of GL 85-12 to which the licensee responded. A statement is first presented which describes the GL 85-12 request. This is followed by a staff summary and critique. The staff understanding of the licensee response is then given, followed by an additional staff response where appropriate.

A. Determination of RCP Trip Criteria

Demonstrate and justify that proposed RCP trip setpoints are adequate for small break LOCA's but will not cause RCP trip for other non-LOCA transients and accidents such as SGTR's. This is to include performance of safety analyses to prove the adequacy of the setpoints.

Consider using partial or staggered RCP trip schemes.

Staff Evaluation. Reactor coolant system (RCS) pressure has been selected as the RCP trip criterion at Kewaunee. This was chosen for the following reasons:

1. RCS pressure gives unambiguous indication for RCP trip;

2. the readability of RCS pressure instrumentation; and

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

The calculated trip setpoint is stated to be 2 psi higher than the WOG-calculated minimum RCS pressure for a double-ended SGTR. The licensee

has concluded that this difference is small in comparison to the uncertainty and conservatism in the WOG analysis, and to that associated with the instrumentation uncertainties.

This parameter was previously determined by the staff as generally having the least sensitivity for differentiation between LOCA and non-LOCA events. In light of this previous determination, please provide background material pertinent to the selection and contrast the selected trip parameter with the others which were found to be generically acceptable.

The numerical value for RCP trip pressure is not provided. The staff requires this value to complete evaluation of the RCP trip issue. (Note we are not clear as to the relative values and the actual trip pressure.) The following information appears to be the total that has been provided:

1. The calculated trip setpoint is 2 psi higher than the WOG-calculated minimum RCS pressure for a double-ended SGTR.

2. Instrumentation uncertainty for normal containment conditions is 79 psi. These values were added to the calculated RCP trip setpoint.

3. The calculated overall uncertainty in the analyses is from -60 to +200 psi.

The WOG analyses for non-LOCA transients which provided the item 1 value are not specifically referenced, the limiting non-LOCA transient is not specifically identified, nor is a specific value provided. If we use a pressure of 1238 psig as the calculated value for the minimum pressure for a non-LOCA transient, then the calculated trip setpoint is 1240 psi. If the 79 psi instrumentation uncertainty for normal containment conditions is added, the actual RCP trip pressure would be about 1320

psig. If we take the 1238 psig calculated minimum non-LOCA transient pressure and incorporate the uncertainty range, the minimum pressure is 1178 psig and the maximum is 1438 psig. We have an RCP trip point of 1320 psig, and a minimum non-LOCA pressure of 1178 psig. If we have applied the supplied description correctly, this does not meet the objectives of separation of LOCA and non-LOCA.

We recognize there are conservatisms in the calculation of minimum non-LOCA pressure. We also recognize there may be conservatisms in the calculation of the LOCA pressure which corresponds to the pressure at which RCP's must be tripped. None of these have been described. Conversely, we also recognize there is a potentially wide range of uncertainty in the calculation of transient pressure with the Westinghouse licensed LOFTRAN code and we further recognize that not all uncertainties were included in consideration of the results of that code. None of the material of this type can be included in the decision process if it is not quantitatively described, and if a significant argument for acceptance of the trip criterion depends upon use of this type of information, then a complete picture must be provided.

Licensee Response. The setpoint was determined by following the WOG-recommended calculation technique. Trip is required at 1178 psia when there is a SBLOCA. Instrumentation uncertainty is +79 psi, which yields a trip requirement of 1242 psig, which has been rounded to 1240 psig.

This is judged to be an acceptable parameter because it is almost identical to that used at Prairie Island. The Prairie Island limiting non-LOCA transient pressure is higher than that for Kewaunee because two auxiliary feedwater (AFW) pumps were assumed to be running at Prairie Island, whereas for Kewaunee, three AFW pumps were assumed to be running throughout the transient in the WOG analyses because three are started automatically.

(Three are started automatically to meet the single failure criterion.) Under normal circumstances, the operators at Kewaunee will shut off one of the pumps, and will control flow to 200 gpm to each steam generator. Hence, the calculation assumption of three pumps running will result in a lower calculated pressure for the limiting accident than in the actual transient due to increased steam generator cooling which follows from the assumed behavior. The difference is 1348 - 1238 = 110 psi, which is totally due to the difference in AFW flow rate. This has been discussed with WOG representatives, and all agree that, with this exception, there are no other differences between the Kewaunee and Prairie Island plants which would influence the parameters which are of interest to RCP trip.

An additional consideration is the influence of the break flow model. If a better representation was used, the RCS pressure associated with the limiting SGTR accident would increase by an undetermined amount, while the indicated uncertainty would remain the same at +/- 60 psi, a value which describes the SI flow rate uncertainty.

Pressure was chosen as the trip criterion because the operator is familiar with this parameter and wide range pressure is displayed on the control board. Subcooling margin was rejected because it changes with RCS pressure and this was judged to be an unnecessary complication in the process of the operator reaching a trip decision. Similarly, use of pressure differential was judged to be an unnecessary complication due to the additional steps an operator would have to take to reach a decision.

The limiting non-LOCA transient was determined to be SGTR.

Staff Response. As we understand the description, the RCP trip setpoint is 1240 psig and the minimum calculated pressure during a one tube SGTR accident is roughly the same. However, if the calculation had been performed for two AFW pumps running rather than three, the minimum SGTR pressure would have been calculated to be 1348 psig. The licensee

position is that the latter should really be used since it more closely represents the results of operator control at Kewaunee.

We are inclined to accept the licensee position since the objective of TMI Action Item II.K.3.5 is to assure RCP trip for those LOCA accidents where trip is required, whereas it is desirable not to trip the RCP's for other accidents so that the benefits of RCP operation can be obtained. The only remaining question pertains to timing of operator actions and the resulting influence on RCS pressure. Clearly, if the AFW flow rate is decreased immediately, the pressure of interest is 1348 psig, and sufficient separation occurs for the objective to be achieved. Conversely, if the flow rate change is achieved late in the transient, the minimum pressure associated with the SGTR may be in the vicinity of the RCP trip point and, at least for this circumstance, the objective may not be achieved. We, therefore, request that the licensee provide an estimate of the timing of the parameters of interest and an estimate of the influence on RCS pressure. The licensee should also provide an appraisal of whether accidents other than SGTR can cause pressure to reach the vicinity of the trip point due to a high AFW flow rate and the expected effect of operator action on RCS pressure for these circumstances.

A1. Identify the instrumentation to be used to determine the RCP trip set-point, including the degree of redundance of each parameter signal needed for the criterion chosen. Establish the quality level for the instrumentation, identify the basis for the sensing instruments' design features, and identify the basis for the degree of redundance.

Staff Evaluation. The licensee has identified the pressure transmitters used for RCP trip as Foxboro Model No. N-E11GH-HIM2-E, numbers PT419 and PT420. These are powered from separate, battery-backed instrument buses, and transmit separate signals to the control room. The signals are stated to be displayed on separate real-time displays, and record on one trend recorder.

Please provide information pertinent to the quality level of the instrumentation.

Licensee Response. The transmitters are rated QA type 1 (mechanical) and QA type 2 (electrical). Power supplies are backed up with battery power. These ratings are the highest possible in the Kewaunee rating system.

A2. 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 instrumentation reliability.

Staff Evaluation. Instrumentation uncertainty for normal containment conditions is reported as 79 psi. Abnormal containment uncertainty is 310 psi. The licensee stated that these values were added to the calculated RCP trip setpoint and therefore provide the conservatism which accounts for instrument uncertainty.

Instrumentation uncertainty is stated to have been calculated by following the guidance provided in the WOG letter TMI-OG-132, "Justification of Instrumentation Setpoints Used in Emergency Operating Instruction Guidelines", dated December 27, 1979, and with use of Kewaunee-specific instrumentation data.

Results from a LOCA environmental test on an unaged Foxboro transmitter which exhibited a maximum error of 8% full span were used for uncertainty under adverse containment conditions. The licensee used 10% of full span to provide additional conservatism.

Local conditions are stated as not expected to have any effect on reliability of the pressure transmitters. These are stated to have been given the highest level of qualification in Kewaunee's environmental

qualification plan, and are stated to satisfy all requirements of 10 CFR 50.49. The transmitters are stated as being located near a main feedwater line, but this line is stated to be automatically isolated during any transient which requires use of the wide range pressure channels to determine the RCP trip setpoint.

The staff would like to discuss potential interaction of the pressure transmitters with the environment, particularly with regard to pipe whip and fluid jet considerations. We would further like to briefly discuss if there are any interactions outside of containment which could influence the instrumentation.

Licensee Response. All instrumentation is redundant and separated. Local piping has been examined, and there is only one instance where local piping could impact the instrumentation. There is a feedwater line close to the transmitters which has the potential to affect both transmitters. However, the transmitters are fully qualified and the judgement was made not to provide additional shielding for this reason. The transmitters are located inside containment. From there to the control room, the only items of potential concern are the electrical cables. These pass through the relay room in separate cable trays, and there are no high energy lines in the relay room.

The feedwater line identified above is automatically isolated following reactor trips on the basis of steam generator level in conjunction with RCS mean temperature. The isolation valve involved is located outside containment, and there is a check valve located essentially at the steam generator (far removed from the transmitters in question) that will prevent backflow from the steam generator in the event of a feedline break.

A3. In addressing criterion selection, provide consideration of uncertainties associated with the WOG-supplied analyses values. These uncertainties are to include uncertainties in computer program results and uncertainties

resulting from plant-specific features not representative of the generic data group.

If a licensee or applicant determines that the WOG alternative criteria are marginal for preventing unneeded RCP trip, it is recommended that a more discriminating plant-specific procedure be developed. Licensees or applicants should take credit for all equipment (instrumentation) available to the operators for which the licensee or applicant has sufficient confidence that it will be operable during the expected conditions.

Staff Evaluation. Generic analyses with the licensed Westinghouse LOFTRAN computer code are referenced as the analysis basis for the licensee's plant behavior under non-LOCA conditions.

The computer program result uncertainties evaluation is based on the assumption of no changes in initial plant conditions (such as full power, pressurizer level, all Safety Injection (SI) pumps running, and all AFW pumps running). The major contributors to uncertainty are stated to be break flow rate, SI flow rate, decay heat generation rate, and AFW flow rate. Parametric studies are summarized in which the major uncertainties are stated to be due to the break flow model and SI flow inputs. The calculated overall uncertainty in the analyses is stated to be from -60 to +200 psi. This value is attributed to a WOG analysis of the Kewaunee plant.

The licensee has not directly addressed such topics as the accuracy of the numerical solution scheme or of nodalization. Further, there is no determination of the influence of equipment or operational failures. Information pertinent to the former result from comparisons of the LOFTRAN code to operational and experimental data, and as a result should have been factored into the calculational basis and included in the uncertainty value. Determination of equipment or operational failures is not a necessity as long as the expected configuration of the plant is

addressed since the objective of RCP trip is to provide reasonable assurance of not tripping for transients for which a trip is undesirable. It is not necessary to establish that one will never trip unnecessarily since the plant is capable of being safely controlled if an unnecessary trip does occur. Thus, the licensee submittal is adequate with respect to these items.

B. Potential Reactor Coolant Pump Problems

B1. Assure that containment isolation, including inadvertent isolation, will not cause problems if it occurs for non-LOCA transients and accidents. Demonstrate that, if water services needed for RCP operations are terminated, they can be restored fast enough once a non-LOCA situation is confirmed to prevent seal damage or failure. Confirm that containment isolation with continued pump operation will not lead to seal or pump damage or failure.

Staff Evaluation. The licensee states that all RCP water services are continued after a containment isolation with the exception of the impact of charging pump trip. This causes loss of seal water injection, which is stated not to significantly affect RCP cooling due to continuation of thermal barrier heat exchanger operation. The Kewaunee Emergency Operating Procedures are stated to cover restoration of charging pump operation following verification of Component Cooling Water (CCW) flow to the RCP's.

We request further information regarding RCP support services and operations. Areas we wish to discuss include:

1. What operator actions are taken if CCW is not available to the RCP thermal barrier heat exchangers in the event that CCW is not verified as referenced in the previous paragraph?

2. Is RCP operation permitted without seal water injection? If so, under what conditions and for what times?

3. Is RCP operation permitted without CCW to the thermal barrier heat exchangers? If so, what restrictions apply?

4. Is RCP operation permitted with loss of both CCW to the thermal barrier heat exchangers and seal water injection?

5. Does containment isolation have any effect on seal water return routing?

6. What operator actions would be taken following total loss of RCP cooling and its eventual restoration and why?

Licensee Response. There is one containment isolation level at Kewaunee, and this is initiated in response to an SI signal or manual action. SI, in turn, is initiated by (among other things) 4 psig containment pressure. There is no effect on CCW due to containment isolation. The only items affected insofar as RCP's are concerned are seal injection water return, which is redirected to the pressurizer relief tank (PRT), and the charging pumps, which are turned off in response to load shedding associated with the SI actuation. Normally, charging would be restored, thereby providing continuation of seal injection.

If the plant were in a situation in which both CCW and charging had been lost, then charging would be isolated from the seals prior to restart of charging. Normally, a loss of both CCW and charging would be a situation in which all AC power had been lost, and this is covered in operator training and in procedures. Then, thermal barrier cooling would be established slowly so as to avoid thermal shock to RCP and RCP seal components. (Note this step would not be taken if the seals were already leaking at an excessive rate.) The licensee is confident that operators

would apply their training for this situation to situations which were not specifically covered in training and/or procedures. For example, to establish seal injection, the operators are aware that one must minimize thermal stresses and they are also aware that abnormal procedures cover restart of seal injection. Therefore, in an accident other than loss of all AC power (Loss of AC power is covered in emergency procedures.), they would apply that training and would follow the applicable abnormal procedures even though the specific situation was not covered in emergency procedures.

Typical variables of interest during loss of cooling to RCP seal events are bearing temperatures and elapsed time from initiation of the loss.

Note that RCP operation is not permitted following loss of both CCW to the thermal barrier heat exchangers and loss of seal injection.

B2. Identify the components required to trip the RCP's, including relays, power supplies and breakers. Assure that RCP trip, when necessary, will occur. Exclude extended RCP operation in a voided system where pump head is more than 10% degraded unless analyses or tests can justify pump and pump seal integrity when operating in voided systems. 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.

Staff Evaluation. The RCP breakers are PSD McGraw Edison air magnetic circuit breakers and are classified as QA1 in the licensee's nuclear safety-related QA program. Breaker trip coils are DC powered from station batteries and can be manually activated from the control room. No logic relays are involved in a manual trip from the control room. The breakers can also be tripped locally. No critical RCP trip components are located inside containment, and there is, therefore, no impact due to an adverse containment atmosphere.

The staff requests an estimated time to locally trip the breakers. We would also like to know if there are any high energy lines in the vicinity of the breakers or if there is any reasonable possibility of an adverse condition outside containment which could detrimentally influence RCP trip.

Licensee Response. RCP trip can be accomplished from the control board, via manual trip of the breakers, or by dropping a bus. The first technique is preferred and would normally be used. The second would require about 3 minutes while an individual left the control room and went to the breaker location. There are no mechanically-locked doors which require mechanical keys along the travel path that would be followed, and computer operated key cards would be used for access. Dropping a bus is not preferred, but could be used to stop RCP's. The only items loaded onto the bus in question are the RCP's and the feedwater pumps.

The only high energy lines in the vicinity of the breakers are one steam generator blowdown line and steam supply to the AFW pumps.

C. Operator Training and Procedures (RCP Trip)

C1. 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. Also, cover priorities for actions after engineered safety features actuation.

Assure that training and procedures provide direction for use of individual steam generators with and without operating RCP's.

Assume manual RCP trip does not occur earlier than 2 minutes after the RCP trip set point is reached.

Determine the time available to the operator to trip the RCP's for the limiting cases if manual RCP trip is proposed. Best estimate calculational procedures should be used. Most probable plant conditions should be identified and justified by the licensee, although NRC will accept conservative estimates in the absence of justifiable most probable conditions.

Justify that the time available to trip the RCP's is acceptable if it is less than the Draft ANSI Standard N660. If this is the case, then address the consequences if RCP trip is delayed. Also, develop contingency procedures and make them available for the operator to use in case the RCP's are not tripped in the preferred time frame.

Staff Evaluation. The licensee has identified that classroom and simulator training is provided to the operators on the philosophy of RCP trip and that background information is provided. The general philosophy is described as one in which RCP's 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.

We have the following questions:

1. What is considered to be a loss of primary coolant for which trip is necessary?

2. What operator actions would be taken if an accident were in progress in which RCP's should have been tripped, and they were not, and the mistake was discovered later?

3. What would be the operator response if the RCP trip pressure was reached, RCS pressure and inventory were continuing to decrease, and no safety injection was available?

Licensee Response. The criterion used to determine whether RCP trip was needed during analysis of the issue was to trip prior to initiation of voiding at the top of the steam generator tube bundle (in the RCS). As far as the operator is concerned, there is no need for a diagnosis. Trip is accomplished on RCS pressure.

If a trip should have been accomplished, and was not, the operator would verify SI flow and, provided there was SI flow, would then trip the RCP's. Similarly, if the trip setpoint was reached, and there was no SI flow, the RCP's would not be tripped.

C2. Identify those procedures which include RCP trip-related operation:

(a) RCP trip using WOG alternate criteria
(b) RCP restart
(c) Decay heat removal by natural circulation
(d) Primary system void removal
(e) Use of steam generators with and without RCP's operating
(f) RCP trip for other reasons

Ensure that emergency operating procedures exist for the timely restart of the RCP's when conditions warrant.

Staff Evaluation. Procedures are identified as requested.

REFERENCES

1. Thompson, Hugh L. Jr., "Implementation of TMI Action Item II.K.3.5, 'Automatic Trip of Reactor Coolant Pumps' (Generic Letter No. 85-12)," Letter from Director, Division of Licensing, NRC, to all applicants and licensees with Westinghouse (W) designed nuclear steam supply systems (NSSSs), June 28, 1985.

2. "Clarification of TMI Action Plan Requirements," NUREG-0737, US NRC, November 1980.

3. Dircks, William J., "Staff Resolution of the Reactor Coolant Pump Trip Issue," Policy Issue for the Commissioners from the Executive Director for Operations, NRC, SECY-82-475, November 30, 1982.

4. Eisenhut, Darrell G., "Resolution of TMI Action Item II.K.3.5, 'Automatic Trip of Reactor Coolant Pumps,' (GENERIC LETTER No. 83-10)," Letter to all applicants with (PWR vendor) designed nuclear steam supply systems from Director, Division of Licensing, NRC.

5. Westinghouse Owners Group, Letter OG-110, "Evaluation of Alternate RCP Trip Criteria," December 1, 1983.

6. Westinghouse Owners Group, Letter OG-117, "Justification of Manual RCP Trip for SBLOCA Events," March 9, 1984.

7. Westinghouse Owners Group, Letter OG-137, "Response to NRC Questions on RCP Trip," October 25, 1984.

8. Hintz, D. C., "NUREG 0737 Item II.K.3.5 'Automatic Trip of Reactor Coolant Pumps,' Letter from Wisconsin Public Service Corporation to H. L. Thompson, USNRC, NRC-85-173, November 26, 1985.