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SUBJECT: Forwards comments on plant-specific considerations relevant to reactor coolant pump trip criterion (TMI Action Item II. K. 3. 5).

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Carolina Power & Light Company

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United States Nuclear Regulatory Commission
ATTENTION: Document Control Desk
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H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2
DOCKET NO. 50-261/LICENSE NO. DPR-23
REACTOR COOLANT PUMP TRIP (TMI ITEM II.K.3.5)
CONFIRMATION OF CONFERENCE CALL REPORT

Gentlemen:

Your letter dated December 30, 1986 transmitted a report of our October 8, 1986 conference call during which specific areas of our September 30, 1985 response to Generic Letter 85-12 were discussed in detail. The subject of this discussion was the plant-specific considerations relevant to Reactor Coolant Pump Trip criterion (TMI Action Item II.K.3.5). Carolina Power & Light Company has reviewed the report and, for the most part, concurs with the NRC understanding of that conversation. However, some minor clarifications of our interpretation of the discussion are appropriate.

Carolina Power & Light Company comments on the subject report are enclosed. In order to help identify the specific changes proposed, the original report has been marked-up with pen-and-ink changes identified directly within the report. If there are any questions or further discussion required to resolve this issue, please contact Mr. R. W. Prunty at (919) 836-7318.

Yours very truly,

S. R. Zimmerman
Manager
Nuclear Licensing Section

SRZ/MDM/kts (5137MDM)

Enclosure

cc: Dr. J. Nelson Grace (NRC-RII)
Mr. H. Krug (NRC Resident Inspector - RNP)
Mr. G. Requa (NRC)

411 Fayetteville Street • P. O. Box 1551 • Raleigh, N. C. 27602

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ENCLOSURE

REPORT OF CONFERENCE CALL CONCERNING REACTOR COOLANT PUMP (RCP) TRIP AT CAROLINA POWER AND LIGHT COMPANY'S ROBINSON UNIT 2 PLANT, OCTOBER 8, 1986

SUMMARY

We reported in Reference 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.

Reference 1 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 LOCAs, and in addition to provide reasonable assurance that RCPs 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.

The licensee has addressed each of the Reference 1 criteria. We have studied this information and have discussed RCP trip with the licensee's personnel. The remainder of this Enclosure 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

TMI Action Plan Item II.K.3.5 of NUREG-0737 (Ref. 2) required all licensees to consider solutions pertinent to tripping RCPs 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). Reference 3 also provided NRC guidance and criteria for resolution of II.K.3.5, and enclosed Generic Letters 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 RCPs for those small LOCAs 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 RCPs will make the accident worse. Therefore, in a small break situation, one must trip RCPs 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 RCPs 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 RCPs following "receipt of a trip signal" using best estimate calculations as a basis.

If, for some reason, the RCPs 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, RCPs 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 Reference 4 (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 RCPs 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 SGTRs 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 SGTRs 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 Generic Letter 83-10. These are reproduced below, in some cases with additional guidance (provided in Ref. 1), and define the basis for the staff review.

Organization of the sections which follow is essentially identical to that of the Generic Letter (Ref. 1) to which the licensee responded. A statement is first presented which describes the Generic Letter request. This is followed by a staff prepared summary.

INTRODUCTION

The staff has completed a preliminary review of the Reference 8 submittal from the licensee pertaining to RCP trip, and has discussed the results of the preliminary review during a telephone conference call with personnel representing the licensee. This Enclosure documents both the preliminary review (Ref. 9) and the results of the discussion with the licensee's personnel.

The purpose of the review was 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. The call took place on October 8, 1986. The licensee was represented by ~~John~~ R.W. PRUNTY, M.D. MARSHALL, J.F. Benjamin, R.A. Rick ~~B~~D ayton, C.K. ~~Sam~~ Crizer, D.B. ~~Dale~~ Bates, and J.M. ~~Joe~~ Curley. The staff was represented by Bud Requa and Warren Lyon.

Organization of the remainder of this Enclosure is essentially identical to that of the Generic Letter (Ref. 1) to which the licensee responded. A statement is first presented which describes the Generic Letter request. This is followed by a staff summary and critique. The staff understanding of the licensee response is then given, followed by additional staff comments where appropriate.

A. Determination of RCP Trip Criteria

Demonstrate and justify that proposed RCP-trip setpoints are adequate for small-break LOCAs but will not cause RCP trip for other non-LOCA transients and accidents such as SGTRs. 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. Carolina Power and Light (CP&L) has selected Reactor Coolant System (RCS) subcooling as the criterion for tripping the Reactor Coolant Pumps (RCP). The subcooling option was previously identified by the staff as the second choice of the three options described by the Westinghouse Owners Group (WOG) in their evaluation of RCP trip. The staff requests brief background information pertinent to this selection.

The quantitative value associated with subcooling that is to be used as the trip criterion is identified as 25°F for normal containment conditions and 35°F for adverse containment conditions in the response pertaining to operator training. Is the staff correct in believing this is the plant criterion?

Licensee Response. The staff is correct in regard to the trip criteria.

* The selection was based on the Westinghouse Owners Group (WOG) ~~executive~~
* ~~volume information~~ Emergency Response Guidelines and recommendations. Plant specific calculations eliminated use of RCS pressure as a criterion due to insufficient
* separation of LOCA and non-LOCA events. A pressure of less than 123~~0~~2 psi was needed, and 1300 psi was obtained. Selection of RCS to steam

generator secondary pressure differential was rejected because this requires an operator calculation, which was judged to be an unnecessary complication since RCS subcooling met ~~all of~~ the criteria.

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. CP&L has elected to use subcooling as determined by a microprocessor which receives inputs from four primary system pressure transmitters, six loop RTDs, and 16 core exit thermocouples, and which outputs a margin to saturation. The subcooling monitor is stated to possess redundancy in that it is comprised of two channels which operate completely independently. Each channel is stated to be powered from a critical instrument bus which receives power from off site or emergency diesels. Testing capability is provided via front panel test switches which test the warning lights, alarms, meter movements, and associated electronics. Redundant control grade temperature inputs are used from each hot and cold leg RTD. These are backed up by multiple core exit thermocouples. Each channel is provided with three pressure signals, one narrow range safety grade pressure and two wide range control grade pressures. All safety grade sensors are isolated from the subcooling monitor by isolation amplifiers. References are provided to further information concerning the reactor coolant subcooling monitor.

Some pressure instrumentation in some plants involves long pipe runs, typically with isolation devices and with transmitters located outside containment. Please provide a brief comment on system response time for H. B. Robinson with respect to pressure in light of the above comment.

Are procedures in place for a back up approach if the subcooling monitor is inoperative? If so, please describe.

* Licensee Response. Control grade instrumentation was ~~is~~ permitted for the existing subcooling monitoring system since much of the applicable work was performed prior to issuance of Regulatory Guide 1.97. Further information can be obtained in the Carolina Power and Light Company response to Supplement 1 of NUREG-0737.

Staff Reviewer Comment. No further licensee action on this item is believed necessary. We will review the referenced information.

* Licensee Response (continued). All instrumentation and transmitters associated with the subcooling calculations are located within containment.

There are two subcooling monitors. Operating procedures are in place which cover response if these are inoperative. These include calculation methods which are based upon in-core thermocouples or loop resistance temperature detectors (RTD's) and pressurizer pressure. Note that narrow range pressurizer pressure involves safety related instrumentation, whereas wide range pressure does not. Narrow range pressure would be used in the range of applicability, which ranges from ~~approximately~~ 1700 to 2500 psi. The thermocouples will be ~~safety grade after the next refueling~~ upgraded to comply with the HBR2 Reg Guide 1.97 commitments during the 1987 refueling outage.

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 and adverse containment environmental conditions is stated to be 25°F and 35°F, respectively. References are provided for information pertinent to the determination.

A brief discussion of the basis for selection of adverse containment parameters should be provided. This should include definition of the parameters (which is not provided in the CP&L submittal). Local conditions should be addressed, as identified in the first paragraph of A2, above. Consideration should also be given to conditions outside containment that

may influence uncertainty. For example, has CP&L surveyed the wiring and connections between pressure transmitters and the control room to assure that a steam line break inside or outside of containment will not introduce problems with the pressure information received in the control room?

Licensee Response. An adverse containment condition is assumed to exist if containment pressure is greater than 4 psig.

* Following the 1987 refueling outage, the ~~All applicable~~ instrumentation associated with the subcooling calculation will meet~~s~~ Regulatory Guide 1.97 separation criteria. The monitors are separated consistent with the requirements for safety related equipment. The two wide range pressure transmitters are widely separated, and their relative locations are similar to ~~reactor protection~~ Engineered Safety Features instrumentation.

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. Calculations of instrument uncertainties are summarized, and comparisons are discussed between plant data and calculations in the Westinghouse Owners Group (WOG) information. CP&L states that the calculated overall uncertainty for H. B. Robinson is from $+1^{o}F$ to $+5^{o}F$ for the subcooling trip point.

The licensed Westinghouse LOFTRAN computer code is referenced for performance of the non-LOCA analyses. 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 Auxiliary Feed Water (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 uncertainty appears low, and is lower than submitted for any other plant the staff has reviewed. Please confirm these values and provide brief backup information to further substantiate that they are correct. Also discuss how the values associated with the information contained in this section of the response are factored into the previously identified uncertainties in determining the RCP trip point.

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.

Licensee Response. The uncertainty range is a Westinghouse provided value which covers the variation between the generic calculations and the Robinson Unit 2 plant.

The WOG performed bounding calculations and studied plant information to be certain Robinson Unit 2 was within the bounds of the generic calculations. We have reviewed the WOG work, and have determined that the information is directly applicable to Robinson Unit 2. No changes or modifications to the calculations are necessary.

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 CP&L response is that no essential services to the RCPs are lost in a Phase A containment isolation, but that some essential services are lost as a result of a Phase B containment isolation. CP&L policy is to trip RCPs if essential services are lost unless RCP operation is required to prevent core damage. RCP restart requires that essential services be available.

It is not clear from this response whether RCP trip is required in response to a Phase B isolation signal because it is not clear whether RCPs are tripped upon loss of some essential services or upon loss of all essential services. Please clarify.

The staff requests additional information pertinent to RCP cooling and RCP restart. For example, do the conditions which lead to containment isolation result in termination of any portion of the Chemical and Volume Control System (CVCS) and is there an indirect effect upon RCP seal injection? If CCW pump operation is terminated, how long does it take for the pump to be restarted and flow restored to the thermal barrier heat exchangers and other RCP associated components? What are the implications?

Information should be provided pertinent to restart of RCPs following restoration of services leading to a trip. Items such as trip parameters, operator response and timing of operations should be identified. The staff concerns pertain to (1) protection of the RCPs under containment isolation conditions, particularly Phase B, (2) assurance that satisfactory Reactor Coolant System (RCS) and RCP conditions exist prior to RCP restart, and (3) that restart does not damage the RCPs. The staff does not need a large volume of material on these topics, but does need a brief discussion with perhaps reference to procedures in a list provided with the submittal.

Licensee Response. No actions occur which affect RCP operation in response to a containment phase A isolation. A phase B containment isolation signal causes rerouting of the seal water return to the pressurizer relief tank as well as isolation of Component Cooling Water
* (CCW). Seal injection is maintained. INSERT 1 (next page) RCPs are tripped in response to a complete
* loss of CCW to the RCP's, which provides cooling to both the thermal barrier heat exchangers and ~~indirectly~~ to other pump components. RCP operation is
* allowed if seal injection is lost, but CCW continues to be available. INSERT 2 (next page)

Restart of CCW and/or seal injection after its termination is covered by plant procedures. The major concern is avoidance of thermal shock, which could damage pump components as well as ~~could~~ lead to seal leakage.

Staff Reviewer Comment. Discussion of RCP operation and operator actions clearly established a depth of knowledge on the part of plant personnel with respect to this topic.

B2. Identify the components required to trip the RCPs, 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

INSERT 1

unless a loss of offsite power has occurred. If a loss of offsite power occurs, the RCPs stop (trip) since they are powered from offsite power. Two of the three charging pumps (which provide seal injection) are powered from the emergency buses but do not restart automatically on the emergency buses following offsite power loss

INSERT 2

Conversely, if CCW is lost to only the RCP thermal barrier and seal injection remains available, RCP operation is allowed

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 major components associated with RCP trip are identified, as is their location.

A brief consideration should be given to the potential for adverse conditions outside containment and the implications, if any. For example, can a steam line break outside of containment introduce difficulties with respect to the equipment of interest here?

The timing of operations associated with alternate operator actions required to trip the RCPs should be mentioned. For example, if the operator attempts a trip from the control room and fails, how long will it take to trip from an alternate location, including travel time?

RCP operation in a voided system is not mentioned.

Licensee Response. Separation and interaction with high energy lines is consistent with the prior discussion on these topics.

The RCP trip breakers are located near the control room, and can be readily tripped. Two of the RCPs could additionally be tripped by de-energizing buses. The third RCP could be tripped by de-energizing its respective bus, but critical equipment is also supplied from that bus.
* Loss of bus voltage on that bus would result in the start of a diesel generator~~s~~, which in
* turn would re-energize the affected emergency bus so that critical equipment would be
* supplied with electrical power. This last option ~~The last path~~ would not normally be used to trip RCPs.

RCP trip criteria are designed to avoid RCP operation under voided conditions. (Note there is an exception under response to inadequate core cooling conditions, where RCPs could be operated regardless of the RCS inventory condition.)

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 RCPs.

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

Determine the time available to the operator to trip the RCPs 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 RCPs 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 RCPs are not tripped in the preferred time frame.

Staff Evaluation. The total CP&L response is:

"The HBR2 operators have been trained to trip the RCPs as soon as RCS subcooling reaches 25°F (35°F for adverse containment conditions) during a depressurization event unless it is a planned and controlled depressurization during the longer term recovery actions. This training was accomplished during the implementation training for the new EOPs conducted in 1984. This training is reinforced during regularly scheduled simulator retraining."

This does not address the points requested in Item C1. For example, the background philosophy is not described. What is the general need to trip RCPs as contrasted to keeping them running? What is the RCP restart philosophy? If one has tripped RCPs, and desires to restart them for control purposes and to aid in plant cooldown, what requirements must be met?

Licensee Response. The background information pertinent to the need for RCP trip as contrasted to RCP operation is covered in both training and simulator operation.

If RCP trip were required in response to an event, and the operators were to miss the trip, then the RCPs would ordinarily be tripped when the mistake was identified. Plant response and necessary operator actions from that point are covered in the plant emergency operating procedures.

An additional qualifier on RCP trip is that safety injection must be available. RCPs are left running if there is no safety injection capability.

Staff Reviewer Comment. Discussion of the training and use of plant simulators clearly established an understanding of plant behavior and interaction with RCP operation.

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 RCPs operating
(f) RCP trip for other reasons

Ensure that emergency operating procedures exist for the timely restart of the RCPs when conditions warrant.

Staff Evaluation. CP&L has listed three procedures and references the reader to the Robinson Plant Specific Emergency Operating Procedures for further information. The staff does not consider this responsive to Item C2.

Licensee Response. The Robinson procedures are available to the NRC staff at the plant site.

Staff Reviewer Comment. This is an acceptable response since the intent was to assure that adequate procedures exist. This was established during discussion of Item C1. Availability of the procedures to the staff assures that further investigation can be performed at any time this is desired.

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. Zimmerman, S. R., "H. B. Robinson Steam Electric Plant, Unit No. 2, Docket No. 50-261/License No. DPR-23, Response to TMI Action Item II.K.3.5, Generic Letter 85-12," Letter to Hugh L. Thompson, Jr., NRC, from Carolina Power & Light Company, Serial: NLS-85-335, NRC TAC # 49690, Sep 30, 1985.

9. Berlinger, Carl H., "RCP Trip, Robinson Unit 2," NRC Memorandum for Bud Requa, April 3, 1986.