Consumers Power Company

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July 2, 1985

Director,
Nuclear Reactor Regulation
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -
CORRECTION TO LETTER DATED JUNE 14, 1985 CONCERNING NUREG 0737 ITEM II.K.3.5
AUTOMATIC TRIP OF REACTOR COOLANT PUMPS

Consumers Power Company letter dated June 14, 1985 contained information that was erroneous with respect to tripping of the Primary Coolant Pumps. The Palisades plant staff has determined that the Primary Coolant Pumps cannot be tripped using the hand switch on the individual pump breaker panels. Our letter (page 3 of attachment, answer 4.a.1) indicated that this method could be used to trip the Primary Coolant Pumps. As a result of this correction, a revised response to information on NUREG 0737 Item II.K.3.5, Automatic Trip of Reactor Coolant Pumps is attached herewith.

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Attachment

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ATTACHMENT

Consumers Power Company
Palisades Plant
Docket 50-255

RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION
NUREG-0737 ITEM II.K.3.5
AUTOMATIC TRIP OF REACTOR COOLANT PUMPS

July 2, 1985

4 Pages

Question

(1) Does any containment isolation signal result in the termination of systems essential for continued operation of the reactor coolant pumps? If so, identify the signals and systems effected.

Answer

At Palisades, component cooling water (CCW) is an essential system for continued operation of the Primary Coolant Pumps. Prior to the last refueling outage at Palisades, the CCW system would isolate coincident with a containment isolation signal only. However, the component cooling water system now will not isolate on containment isolation unless a low discharge pressure on the CCW system is also received. It is unlikely that the condition of low CCW discharge pressure and a containment isolation signal will occur simultaneously. Therefore, primary coolant pumps should normally be available during LOCA events which would cause containment isolation at Palisades.

Question

(2) If essential water services are terminated, provide a description of the operator guidelines, training, and procedures in place (or to be implemented) which assume that these services are restored in a timely manner to prevent seal damage or failure, once a non-LOCA situation has been confirmed.

Answer

Emergency Procedure Guidelines (CEN-152, Rev. 2), developed by C-E for the CEOG and which have been approved for implementation by the NRC, provide guidance with respect to maintenance of auxiliary systems which support RCP operation. This guidance, in combination with associated training materials and operating procedures, meets the operators' information needs concerning RCP seal protection. The following excerpt was obtained from CEN-152 training material prepared for the CEOG:

> " ... the RCP operating strategy results in tripping the final two RCPs if RCP operating limits are not satisfied. The RCPs may be operating in a pressure-reduced RCS and, in some cases, degraded containment conditions are also possible. This could result in the loss of vital RCP auxiliaries. The operator must continuously monitor RCP operating limits (e.g., temperatures, seal flow, oil pressures, NPSH, motor amperage, vibration) and trip the remaining two RCPs if concerned about RCP operating equipment integrity. Plant specific RCP operating limits should appear in this step, either directly or by referencing the applicable operating instruction."

A Containment Isolation Actuation Signal (CIAS) is typically associated with LOCA events and sometimes non-LOCA situations such as Steam Generator Tube Rupture (SGTR) or Main Steam Line Break (MSLB). For these types of events,

Standard Post Trip Actions in the EPGs include guidance for tripping two RCPs in opposite loops if pressurizer pressure decreases below a specified value. For a LOCA situation, operators are instructed to trip all four RCPs (i.e., the remaining two RCPs).

Once a non-LOCA situation has been confirmed (e.g., SGTR, indicated by excess steam demand), the operators are instructed to ensure that two of four RCPs are tripped in opposite loops if pressurizer pressure decreases below a specified value. Additional instructions associated with operating RCPs include the following guidance:

> "If RCP operating limits are not satisfied, Then trip the remaining two RCPs."

This step is performed continuously. Plant specific RCP operating limits (for operating pumps) include a specified time period (typically ten minutes) during which CCW may be unavailable for seal cooling. If seal cooling cannot be re-established, the pumps are tripped to preclude any potential impact on future seal performance. Plant specific operating limits are developed from, and consistent with, guidelines provided by C-E and the pump manufacturer.

If all RCPs were stopped, the EPGs provide guidance for RCP restarts, provided all restart criteria are satisfied. For example, the following step appears in the SGTR emergency procedure guideline:

> "If the RCPs were stopped, then one in each loop should be restarted if possible. Determine whether RCP restart criteria are met by the following:
>
> (a) the unaffected steam generator (or the least affected, if both steam generators have leaks) is available (feed and steam flow) for removing heat from the RCS.
>
> (b) pressurizer level is greater than [200°] and not decreasing.
>
> (c) the RCS is at least [20°F] subcooled (Figure 6-1).
>
> (d) [other criteria satisfied per RCP operating instructions.]"

This step is performed continuously. As discussed earlier, training materials indicate what parameters constitute operating limits.

In conclusion, in the context of the RCP trip-two/leave-two strategy, if an operator is unable to maintain or restore RCP measured parameters within operating limits (e.g., seal temperature), the RCPs will be tripped or remain tripped. The effects of this situation are addressed in the EPGs and are bounded by FSAR safety analyses which do not credit RCP operation. Sufficient guidance is therefore provided to the operator to preclude pump operation outside the pump operating limits. In addition, C-E plant operating experience and pump tests support assurance of seal integrity in the event of loss of CCW to an idle pump. In operating C-E plants, there has never been a complete loss of seal function. Complete loss of seal function is defined as failure of all three full pressure seals and the vapor seal, the result being the inability of the multi-stage seal package to hold system pressure, and is not considered to be a credible event.

Question

(3) Provide confirmation, including the technical basis, that containment isolation and continued RCP operation will not lead to seal or pump damage or failure.

Answer

As discussed in the response to Question 2, operator instructions in the EPGs and associated training materials preclude a situation where a plant would be operating its RCPs outside the RCP operating limits. However, in the highly improbable event that the operator inadvertently fails to follow RCP operating instructions and maintains RCP operation outside operating limits (e.g., without seal cooling), it should be realized that these limits were developed with the intent of being conservative with respect to seal reliability and performance. In addition, operating experience and the results of a thirty-minute loss of seal cooling water test with the pump running substantiate the position that RCPs can operate without loss of seal function for time periods significantly in excess of the time periods defined in plant specific RCP operating limits.

Question

(4) Since RCP trip will be required for LOCA events, assurance must be provided that RCP trip, when required, will occur. To address this concern, provide the following information:

(a) Identify the components required to trip the RCPs. Include relays, power supplies and breakers. Address reliability and alternate trip methods.

(b) 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.

Answer

(4a) The components required to trip the RCPs at Palisades are the four individual 4160 volt RCP motor breakers or the two 4160 volt bus feeder breakers, all located at the 590' elevation in the Palisades turbine building.

The RCPs are normally tripped individually by controlling the RCP motor breakers using hand switches located in the control room.

If this manual operation in the control room is not successful, the operator may trip the RCPs individually by manually tripping the RCP motor breakers with a breaker trip lever located inside the RCP motor breaker box.

Also, the pumps may trip individually if any of the following RCP motor breaker trip relays are energized:

(a) The undervoltage relay
(b) The overcurrent relay, or
(c) The current phase differential relay

Another method to trip RCPs is tripping the 4160 volt bus feeder breakers. There are two RCPs on each 4160 volt bus. These feeder breakers can be tripped manually using hand switches located in the control room, or as an alternative by:

(1) A manual trip of the breakers with a hand switch located on the outside of the bus feeder breaker box door, or

(2) Manual trip of the breakers with a breaker trip lever located inside the 4160 volt bus feeder box.

The 4160 volt bus feeder breakers will automatically trip if any of the following relays are energized:

(a) The overcurrent relay, or
(b) The ground overcurrent relay, or
(c) The current phase differential relay.

Consumers Power Company has determined based upon an industry data search that the normal method of tripping RCPs via manual control in the Control Room is extremely reliable.

Answer

(4.b) None of the required RCP trip components are located within containment, and therefore this question is not applicable to Palisades.