

SAFETY EVALUATION
PILGRIM UNIT 1
PROPOSED TECHNICAL SPECIFICATIONS
FOR
ATWS RPT/ARI

Introduction

Boston Edison Company (BEC), by letter dated April 7, 1980, submitted proposed Technical Specification changes in response to the January 8, 1979, NRC letter on anticipated transients without scram (ATWS). The BECo. submittal addressed the staff requirements in volume 3 of NUREG 0460 for a recirculation pump trip system as a means of substantially reducing maximum reactor vessel pressure in the unlikely event of a failure to scram. In addition, the licensee proposed an alternate rod insertion system to provide a deverse means for initiation of control rod insertion.

This safety evaluation report addresses the proposed Technical Specification changes and the differences between the Pilgrim Unit 1 RPT/ARI and the staff accepted Monticello RPT/ARI design.

A safety evaluation for the ATWS Recirculation Pump Trip and Alternate Rod Insertion systems ATWS RPT/ARI was submitted on the docket for the Monticello Nuclear Generating Plan (Docket No. 50-263, License No. DPR-22). This evaluation was reviewed by the NRC staff and a favorable Safety Evaluation Report was issued on February 23, 1977 for the RPT function. Since the RPT/ARI systems proposed for the Pilgrim Nuclear Power Station are essentially identical to that described in the Monticello evaluation only the minor differences unique to the technical specifications will be considered.

Proposed Technical Specification Changes

Page 44a Add a new LCO as follows:

"G. Recirculation Pump Trip/Alternate Rod Insertion Initiation

Whenever the reactor is in the RUN mode, the limiting conditions for operation for the instrumentation listed in Table 3.2.G shall be met."

Add a new Surveillance Requirement as follows:

"G. Recirculation Pump Trip/Alternate Rod Insertion

Surveillance for instrumentation which initiates Recirculation Pump Trip and Alternate Rod Insertion shall be as specified in Table 4.2-G."

- Page 59a - Insert a new page as shown in Exhibit B*. This page includes Table 3.2.G and notes pertaining to the table.
- Page 66a - Insert an additional item in table 4.2.G as shown in Exhibit B which provides RPT/ARI instrumentation surveillance requirements.
- Page 67 - Modify notes to include Table 4.2.G.
- Page 73 - Insert the paragraphs shown in Exhibit B which state the bases for the recirculation pump trip and alternate rod insertion systems and the limiting conditions for operation. Additionally, three references are added.
- Page 77 - Insert the paragraph shown in Exhibit B which states the bases for the surveillance frequency of the recirculation pump trip and alternate rod insertion instrumentation.

The proposed limiting condition for operation requires the recirculation pump trip system to be operable when the reactor is in the RUN mode and the alternate rod insertion system to be operable in all modes except REFUELING. Since the capacity of the safety/relief valves is far in excess of the steam generation rate achievable in any other mode, there is no potential for vessel overpressurization in modes other than RUN. Restricting the LCO to the RUN mode for the RPT function is therefore appropriate.

The proposed operability requirements are similar to those of like systems. These requirements were assumed in the design and reliability analysis of the trip system.

The proposed surveillance requirements incorporate the fact that analog transmitters are used in ATWS RPT/ARI systems. These devices are a new, improved line of BWR instrumentation. The calibration frequency is therefore proposed to be once per operating cycle which is consistent with both the equipment capabilities and the requirements for similar equipment used by other reactor vendors. The calibration frequency for the trip units is proposed to be quarterly, the same as other similar protective instrumentation. Likewise, the test frequency is specified as monthly like that of other protective instrumentation. A sensor check is proposed once per day; this is considered to be an appropriate frequency, commensurate with the design applications and the fact that the recirculation pump trip/alternate rod insertion systems are backups to existing protective instrumentation.

SEE REF. (A)

Differences Between Pilgrim and Monticello RPT/ARI

The Monticello RPT design includes a "Manual Initiation" push button on the operator control console. The proposed RPT/ARI design removes this push button but does provide manual control of the ARI function from the operator control console. Manual initiation of RPT at the console is unnecessarily redundant due to the variety of means already available to the operator for manually tripping the recirculation pumps or otherwise reducing recirculation flow.

The addition of the ARI function results in additional crowding of the operator control console. In order to reduce this crowding the manual reset push buttons have been eliminated and automatic reset logic substituted. Although the Monticello RPT design included a seal-in logic with manual reset it is unnecessarily redundant. Once a trip signal actuates the field breakers, it can be removed without affecting the state of the field breakers. The field breakers must be manually reset. Therefore, the automatic reset feature only reduces the manual actions required to reset the pumps for operation and does not affect the trip function. The ARI automatic reset logic includes a seal-in logic for a 30 second interval to assure sufficient time to blow down the pilot air header and insure complete rod insertion. The automatic reset cannot function, however, if the trip signal is still present. In this case an additional 30 seconds of delay will occur before reset and this sequence will continue until the trip signal is removed.

The high pressure setpoint for ATWS RPT/ARI (1160 psig) as proposed, is higher than the specification for the Monticello RPT (1150 psig). The licensee's analysis indicates that the raised setpoint will result in a 25 psi increase in the peak pressure during an ATWS event. The peak pressure would still be more than 150 psi below the ATWS criteria of 1500 psig. The results of this analysis appear reasonable based on comparisons with the calculations for the Monticello plant (NEDO 25016).

With the current plant configuration, initiation of the ATWS RPT function is predicted during certain pressurization transients if the ATWS RPT setpoint is not raised from 1150 psig to the proposed value of 1160 psig. Since the initiation of ATWS RPT causes an increase in severity of the transients this is an undesirable condition. Raising the setpoint decouples the more frequent pressurization transients from ATWS RPT effects. With the proposed setpoint, the only events which will initiate ATWS RPT are the turbine/generator trip with bypass failure and the ASME overpressure protection event (MSIV closure with trip scram failure). The turbine/generator trip events will not result in exceeding the vessel pressure limit despite the increased severity due to ATWS RPT initiation and the limiting event will remain the MSIV closure with trip scram failure.

The design of each ATWS cabinet includes two qualified 24 VDC power supplies. One power supply is sourced by offsite 115 VAC which transfers to onsite generator power in the event of loss of offsite power. The second power supply is sourced by the station batteries (125 VDC) through an inverter (125 VDC to 115 VAC). The uninterruptible power supplied by the inverter allows the system logic to remain energized during the event of loss of offsite power until the transfer to onsite generators occurs. The present systems will require manual action to initiate a pump trip and ARI during a loss of offsite power event. The presently installed ATWS RPT/ARI systems include one non-qualified power supply per ATWS cabinet sourced by offsite 115 VAC. The qualified DC power supplies and DC to AC inverter specified for the ATWS RPT/ARI systems are onsite and will be installed as the final system during the first seven-day outage after April 1, 1981 and not later than October 1981.

Conclusions

Based on our review of the licensee's proposed Technical Specification changes, we conclude that they are in conformance with the requirements of volume 3 of NUREG-0460. The differences between the Pilgrim and Monticello RPT/ARI systems are also acceptable. However, we recommend that the licensee be required to install the qualified DC power supplies and DC to AC inverter specified for the ATWS RPT/ARI systems. The present systems require manual action to initial a recirculation pump trip and ARI during a loss of offsite power event. The present system is acceptable as an interim measure, only until the next scheduled refueling (October 1981).