

Point Beach Auxiliary Feedwater Pump/Loss of Instrument Air Issue

Concern

In specific scenarios, the auxiliary feedwater pumps could be without a discharge flow path allowing damage to the pumps to occur in a short period of time (on the order of 1 to 2 minutes). The specific scenarios are applicable to all 4 AFWPs at Point Beach. The licensee made a 50.72 notification on this concern on 11/29 at 1538.

System Configuration

The Auxiliary Feedwater Pump (AFWP) recirculation valves at Point Beach are air operated valves. The AFWP recirculation valves fail closed on loss of instrument air (IA). This is a unique configuration since in most applications, recirculation valves fail open when IA is lost. This has been the case since original construction. There are no backup air or nitrogen accumulators associated with the AFWP recirculation valves.

The instrument air compressors are powered from the safeguards busses. However, on a safeguards bus undervoltage event (i.e. Loss of offsite power) with an EDG start, the instrument air compressors are automatically stripped from the safeguards bus. It takes manual operator action to restore the instrument air compressor.

Accident Scenarios of Concern

- 1) Loss of Offsite Power where the instrument air compressors are stripped from the safeguards bus and not automatically reloaded.
- 2) Random loss of instrument air due to equipment failure without the potential for short term recovery (eg. Loss of non-essential service water cooling to compressors which would cause the compressors to trip on high discharge temperature and would not likely be easily returned to service).

Specific Application of Accident scenarios

During either of the two scenarios, the plant trips. The AFWPs start injecting into the steam generators. Early in the EOP's the operator is directed to control flow to the steam generators to maintain desired level (29 to 65% on narrow range S/G level indication). This may include shutting off flow to one or both steam generators if level is above or approaching the high end of the desired band. If flow from the AFWP is reduced too low (as would occur when the auxiliary feedwater regulating valves are closed) without functional recirculation valves (remember the recirculation valves fail closed on loss of instrument air), the AFWPs fail in a short period of time. This common mode failure (common loss of instrument air and common response to high steam generator level) could result in simultaneous failure of all AFWPs.

Initial Control Room Operability Screening of Condition Report and Subsequent Resident Inspector Involvement

This condition was initially identified during a licensee PRA staff review of the recirculation valve importance on or about 11/28/01. The Condition Report documenting this issue listed the time of discovery as 11/29/01 at 14:45. The inspectors received a call at home informing them of the licensee 50.72 notification on the evening of 11/29. Early in the morning of 11/30 after arriving on site and touring the control room, the inspectors read the initial condition report which concluded in the SRO screening section of the CR form that, "AFW system has passed all required testing and is operable." The inspectors disagreed with this assessment and, without delay, sought out the Shift Manager and Operations Manager to discuss operability concerns with the AFWPs. The inspectors told the Shift Manager and Operations Manager that

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they did not have confidence that the AFWPs were fully operable. After some discussion and explanation about the uncertainty of the ability of the AFWPs to respond to a loss of offsite power event or loss of instrument air, the Operations Manager conceded that an operability determination (OD) was necessary. The OD is in progress and is expected to be complete sometime on the evening of 11/30/01.

Licensee Initial Compensatory Actions

After making the 50.72 notification, the licensee instituted two compensatory actions;

- 1) Just-in-time control room crew briefings were held for all oncoming operators to ensure AFW was not damaged under Loss of IA conditions.
- 2) Temporary Information tags were placed on the main control boards in the vicinity of the AFWP controls. The tags provided instructions for securing the AFWPs if discharge flow was reduced below 75 gpm for the turbine-driven AFWPs and 50 gpm for the motor-driven AFWPs.

Questions Being Pursued with Licensee

There are several lines of questioning being pursued with the licensee. They include, but are not limited to;

- As S/G levels rise and AFWPs must be secured, what is the effect of cycling on the MDAFWP, the TDAFWP, and the TDAFWP steam admission valves? What are the rated duty cycles for these components?
- With respect to procedures, how is the potential for cycling of AFWPs addressed? Are all AFWPs secured when S/G level reaches 65% NR? Are the MDAFWPs run preferentially? What is the propensity of the TDAFWPs to overspeed situations when cycling the steam admission valves (the terry turbine trip and throttle valve would have to be locally reset in this condition)?
- Have any compensatory actions/procedure changes been validated on the simulator?
- Did previous generic letter studies (GL 88-14) previously address or have an opportunity to previously address the current issue?
- The time sequence of events needs to be closely defined. How quickly do the S/Gs reach 65% NR level? How quickly (with a dual unit trip on Loss of Offsite Power) will the operators key into the loss of instrument air and the restoration of the IA compressors? Will this occur before the S/Gs reach a level at which the AFWPs must be secured?
- What does the revised PRA analysis show for the loss of offsite power event and loss of instrument air with this new issue? What does this mean for the risk profile for upcoming and planned work? Are there certain combinations of equipment OOS that should no longer be allowed or that require specific compensatory actions or dedicated operators to ensure equipment availability?

Point Beach Resident Staff
11/29/01 1700 CST