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SUBJECT: Responds to GL 89-19 re resolution of USI A-47, "Safety Implications of Control Sys in LWR Nuclear Power Plants."

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March 19, 1990

10 CFR 50.54(f)

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555

Gentlemen:

Docket 50-305
Operating License DPR-43
Kewaunee Nuclear Power Plant
Response to Generic Letter 89-19

References: 1) "Evaluation of Safety Implications of Control Systems in LWR Nuclear Power Plants," NUREG-1217 dated June 1989.

2) "Regulatory Analysis for Resolution of USI A-47," NUREG-1218 dated July 1989.

3) Request for Action Related to Resolution of Unresolved Safety Issue A-47, "Safety Implication of Control Systems in LWR Nuclear Power Plants," pursuant to 10 CFR 50.54(f). Generic Letter 89-19 dated September 20, 1989.

As part of the U.S. Nuclear Regulatory Commission's (NRC) evaluation of Unresolved Safety Issue (USI) A-47 (reference 1), the potential failure modes, the resultant events and their associated probability were identified for control system failures. That information was then used to evaluate the value/impact of different alternatives for resolution of USI A-47 and recommendations were provided to decrease the risk of the identified events (Reference 2). The NRC subsequently issued Generic Letter 89-19 (Reference 3) to ensure licensee implementation of the applicable recommendations of NUREG-1218. This letter and attachment serve as Wisconsin Public Service Corporation's (WPSC) 180-day response to Generic Letter 89-19.

The Kewaunee Nuclear Power Plant (KNPP) is a Westinghouse designed PWR with a 2-out-of-3 high steam generator narrow range level initiating logic for overfill protection. As such, the KNPP has two requirements specified by Generic Letter 89-19. First, the overfill protection system must be sufficiently separate from

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the control portion of the main feedwater (MFW) control system. Secondly, plant procedures and technical specifications should include requirements to periodically verify operability of the overfill protection system. The attachment to this letter describes WPSC's proposed implementation and/or current provisions which fulfill these requirements. If there are any questions on this response or you require additional information, please contact a member of my staff.

Sincerely,

C. R. Steinhardt
Assistant Vice President-Nuclear Power

ALH/jms

Attach.

cc - Mr. Patrick Castleman, US NRC
US NRC, Region III

Subscribed and Sworn to
Before Me This 19th Day
of March 1990

Notary Public, State of Wisconsin

My Commission Expires:
June 23, 1991

Attachment

To

Letter from C. R. Steinhardt (WPSC) to Document Control Desk (NRC)

Dated

March 19, 1990

The Kewaunee Nuclear Power Plant (KNPP) falls under the following description and requirements for Westinghouse PWRs quoted from Generic Letter 89-19.

> Group I: Plants that have an overfill-protection system initiated on a steam generator high-water-level signal based on a 2-out-of-4 initiating logic which is safety grade, or a 2-out-of-3 initiating logic which is safety grade but uses one out of the three channels for both control and protection. The system isolates MFW by closing the MFW isolation valves and tripping the MFW pumps.
>
> The staff concludes that the design is acceptable, provided that (1) the overfill protection system is sufficiently separate from the control portion of the MFW control system so that it is not powered from the same power source, not located in the same cabinet, and not routed so that a fire is likely to affect both systems, and (2) the plant procedures and technical specifications include requirements to periodically verify operability of this system.

The following is a discussion of each requirement and WPSC's associated response. Note that requirement 1 has been separated into three distinct parts.

Requirement 1A

The overfill protection system is sufficiently separate from the control portion of the MFW control system so that it is not powered from the same power source.

Response

The KNPP overfill protection system consists of three channels of steam generator (S/G) narrow range level instrumentation per S/G as shown in Figure 1. Each channel consists of a transmitter loop portion (safeguards protection) and a control circuit portion (non-safeguards). The transmitter loop portion of each channel includes the level transmitter, power supply, bistables, and electrical isolation device. The three transmitter loops are powered by different instrument buses. The control circuit portion supplies inputs to the control room indication and the plant process computer. Two of the channels also provide inputs to the ATWS mitigating systems actuation circuitry (AMSAC) while the third channel feeds the S/G level control circuitry. The S/G level control circuitry is powered by the same instrument bus as one of the non-control feeding level channels.

This design is sufficiently separate for two reasons. First, the isolation device will prevent a postulated control circuitry failure from disabling its associated level channel. These isolation devices are used for both the Safety Parameter Display System (SPDS) and AMSAC and as such, they were reviewed and approved by the NRC (References 1 and 2). Second, the overfill protection bistables are of a de-energize to actuate design. If a S/G level control circuitry failure propagates back to its instrument bus supply due to improper fuse coordination, it will de-energize that bus. This will de-energize one of the non-controlling level channels including the associated high level bistable and will thereby trip in one of the two required inputs for FW isolation.

Requirement 1B

The overfill protection system is sufficiently separate from the control portion of the MFW control system so that it is not located in the same cabinet.

Response

The KNPP S/G level channel output signal cabling enters the relay room and runs to the Foxboro analog racks designated as RR107, 109, 113, and 115. The S/G high level bistables and the isolation devices are located in these cabinets. The S/G overfill protection system is actuated by these bistables and is located in Engineered Safeguard cabinets designated as RR126 through RR129. The MFW control system is located in the Feedwater Loop A and B cabinet RR118 and receives its input from the isolation devices. Since the overfill protection system is not located in the same cabinet as the MFW control system the current configuration is acceptable.

Requirement 1C

The overfill protection system is sufficiently separate from the control portion of the MFW control system and not routed so that a fire is likely to affect both systems.

Note: As specified in GL 89-19, common mode failures that could disable overfill protection and the feedwater control system, but would still result in the feedwater pump trip, are considered acceptable failure modes.

Response

The design of the MFW system at KNPP provides for three methods of overfill protection. The most reliable of these is the closure of the main feedwater control valves and the bypass control valves. These valves are air-operated and fail closed on loss of air. The overfill protection system controls the solenoid valves which maintain air pressure on the control valve positioners. Loss of air pressure or electrical power to either redundant train of solenoid valves will result in closing the main feedwater control valves and bypass control valves. Any fire which affects the S/G level signal upstream of the high level bistables will fail the current signal either high or low. A high current will actuate the overfill protection system. A low current will trip the reactor and subsequently isolate main feedwater on low T average in the Reactor Coolant System (RCS). In either case, feedwater flow is effectively stopped. The MFW control valve system is designated as safety related and all components and cabling are installed/routed in such a manner as to provide the proper amount of train separation. Since no fire is likely to disable both the S/G level control system and the overfill protection function of the MFW control valves and bypass control valves, this system satisfies Requirement 1C.

The other two methods of overfill protection are the motor operated MFW isolation valves and the MFW pump trip. The MFW isolation valves are safeguards equipment with the appropriate power supplies and train separation. They fail "as is" on loss of power and are slower to close than the MFW control valves. The MFW pump trip circuitry, although nonsafeguards equipment, is highly reliable as demonstrated by its operating history. The MFW pump trip circuitry

is an energize to actuate design since the MFW pump breaker trip coil must be energized to trip the breaker. Although these systems may be less reliable than the MFW control valves in the fire scenario above, they provide redundancy and increase the overall reliability of the KNPP overfill protection system.

Requirement 2

The plant procedures and Technical Specifications include requirements to periodically verify operability of the overfill protection system.

Note: As specified in GL 89-19, the intent of this requirement is that the appropriate plant procedures be modified in the short-term to provide periodic verification and testing of the overfill protection system. As part of future upgrades to Technical Specifications, licensees should consider including appropriate limiting conditions of operation and surveillance requirements in future Technical Specification improvements.

Response

The operation of the KNPP overfill protection system is currently verified through the performance of seven surveillance procedures (SP). SP 87-125 calls for a channel check on S/G level each shift. SP 05A-027 requires a monthly channel functional test of S/G level. SP 55-155A and B call for a monthly logic channel test of the overfill protection logic train A and B. SP 05A-28A and B provide for the refueling calibration of the S/G level transmitter and the S/G level bistables respectively. In addition to the above instrumentation proce-

dures, main feedwater control valve and the bypass control valve closure times are checked during the implementation of SP 05A-202 when 2 of the 3 high S/G level bistables are placed in the test position. These procedures provide for proper verification and testing of the overfill protection system.

WPSC is committed to the continuing improvement of Technical Specifications and is making a concerted effort with the rest of the nuclear industry toward this goal. As part of this effort, WPSC will consider including appropriate limiting conditions of operation and surveillance requirements for the overfill protection system in future Technical Specification upgrades.

References

1) NRC safety evaluation of proposed Kewaunee AMSAC design. Letter from J. G. Giitter (NRC) to D. C. Hintz (WPSC) dated August 25, 1988.

2) NRC safety evaluation of proposed Kewaunee SPDS system. Letter from M. B. Fairtile (NRC) to D. C. Hintz (WPSC) dated April 8, 1987.

Figure 1

Simplified Overfill Protection Channels