



Palisades Nuclear Plant: 27780 Blue Star Memorial Highway, Covert, MI 49043

September 11, 1995

U S Nuclear Regulatory Commission
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DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT
LOSS OF ONE CHANNEL OF REACTOR VESSEL LEVEL SYSTEM REPORT REQUIRED BY
TECHNICAL SPECIFICATION 3.17.4.7

The Palisades Technical Specifications require a report to the NRC within 30 days when one channel of the Reactor Vessel Water Level Monitoring System is inoperable and not restored within 7 days when the reactor is above 300°F. The report is to contain an outline of the actions taken, the cause of the inoperability, and the plans and schedules for restoring the channel to operable status. That report is attached.

SUMMARY OF COMMITMENTS

This letter contains one new commitment to replace reactor water level instrument, LE-0101A, during the next refueling outage. There are no revisions to existing commitments.

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Manager, Licensing

CC Administrator, Region III, USNRC
Project Manager, NRR, USNRC
NRC Resident Inspector - Palisades

Attachment

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ATTACHMENT

CONSUMERS POWER COMPANY
PALISADES PLANT
DOCKET 50-255

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EVENT

Control/Power Cable Connector

On August 1, 1995, with the plant in cold shutdown after the completion of refueling operations and during testing of the Reactor Vessel Level System (RVLS), the terminal block connecting the RVLS probe (Radcal Level Instrument or RLI probe), LE-0101A, to the signal/power cable was discovered damaged. Two connector pins (#31 and #32) on the cable side of the environmentally qualified connector block were discovered missing from the block. Pins #31 and #32 are the ground connections for the heater circuit inside the RLI probe. Pin #31 was found broken from the cable side connector block and engaged in the RLI probe side of the connector block. Pin #32 could not be located, and may have been forced into the cable side connector block.

Radcal Level Instrument (RLI) Internal Pressure Boundary Degradation

During the reinstallation of the reactor head, it was discovered that the jacket tube of the RLI probe, LE-0101A, exhibited a 360° circumferential through-wall crack below the lower seal plug-to-RLI weld. This flaw has compromised the instrument's internal pressure boundary and does not provide a reliable leak-tight instrument.

ANALYSIS

Each RLI probe consists of a string of eight heated junction thermocouples encased in a stainless steel core tube resembling a steel rod and compressed into a stainless steel jacket. This assembly is inserted into the upper guide structure. A signal-and-power cable assembly from the RLI probe connects the probe to the refueling disconnect panel via an environmentally qualified connector block.

The electrical connector block at the RLI end of the signal-and-power cable assembly is damaged and non-functional. The apparent cause of the damage to the connector pins is misalignment of the EEQ connector block halves during assembly or disassembly. Pins #31 and #32 are significantly smaller in length and diameter than the other pins in the connector and fatigue induced through previous assembly and disassembly may have been a contributing factor. A review of the records showed both channels of RVLS operable prior to the 1995 refueling outage. The damage to the pins is believed to have been incurred during the refueling operations.

Repair of the electrical connector is not recommended due to the risk of damaging the thermocouple signal wires during field disassembly. The signal-and-power cable assembly and associated electrical connector must be replaced. Manufacture of a replacement cable assembly is expected to require 6 to 8 weeks on an expedited schedule.

The RLI probe has been damaged such that the instrument's internal pressure boundary is degraded. The apparent cause of the failure of the jacket tube is cyclic fatigue stress at the base of the seal weld induced by repeated positioning of the stiff RLI probe during reactor assembly and disassembly.

The RLI probe is not repairable and must be replaced. A replacement is available on site; however, the probe is designed to be installed into the upper guide structure with the reactor head removed. To install the probe with the reactor head on the vessel increases the likelihood of damaging the probe during installation. This also requires development of special tooling to minimize the probability of damaging the probe as it is inserted. The alternative is to remove the reactor head in order to install the probe. This alternative has been evaluated from a radiological safety perspective. The estimated radiological dose to remove the reactor head, install the probe into the upper guide structure and reinstall the reactor head is 35 person-rem.

Given the unavailability of a cable assembly and the significant radiological exposures resulting from RLI probe replacement, the decision was made to operate during the present fuel cycle with Channel A of RVLS inoperable.

The reactor vessel level system is an indicating system only and is not used for reactor control. The system has no safety function in preventing an accident which has been evaluated in the FSAR; therefore, the consequences of a LOCA will not be affected by the unavailability of one channel of RVLS.

Alternate methods of monitoring the reactor core cooling are available and described in Technical Specification Bases and Standing Order 62: Subcooling Margin Monitor, Qualified Exit Core Thermocouples, and Pressurizer Level.

Technical Specification 3.17.4.5(a) and 3.17.4.7(d) and Table 3.17.4 apply to the present situation with one channel of RVLS inoperable. Operation is allowed without alternate monitoring through the next refueling outage.

ACTION TAKEN

The lower portion of LE-0101A, the RLI probe, remains installed in the upper guide structure incore instrument guide tube. The RLI probe has been separated from the seal plug. The seal plug, terminations, and connector block assembly (that portion of the instrument outside of the PCS pressure boundary) have been removed. A standard dummy seal plug, part of originally supplied plant equipment, has been installed in the incore instrument flange to establish the PCS pressure boundary. The installation of the dummy seal plug will assure the reactor pressure boundary remains intact. A bend in the In-Core Instrumentation (ICI) tube in which the remainder of the disabled probe is inserted ensures the probe does not migrate farther down the ICI guide tube. The end of the probe remaining inside the reactor head has been crimped to prevent impurities (copper and aluminum) from entering the Primary Coolant System. A safety evaluation was performed and concluded that this configuration does not create an Unreviewed Safety Question.

The reactor water level instrument, LE-0101A, and its signal-and-power cable will be replaced during the next Palisades Refueling Outage.