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October 23, 1989

Nuclear Regulatory Commission Document Control Desk Washington, DC 20555

DOCKET 50-255 - LICENSE DPR-20 - PALISADES PLANT -LICENSEE EVENT REPORT 89-TS2 (INOPERABLE REACTOR VESSEL LEVEL MONITORING SYSTEM CHANNEL)

Licensee Event Report (LER) 89-TS2 (Inoperable Reactor Vessel Level Monitoring System Channel) is attached. This is a Technical Specification (TS) Special Report that is being submitted pursuant to T.S. Table 3.17.4 Action K which requires the minimum operable channels to be restored within seven days or a Special Report be submitted within the following 30 days outlining the action taken, the cause of the inoperability and the plans for returning the system to operable status. The report is being submitted in LER format with a Special Report number, i.e. TS2, even though it is not reportable per 10CFR50.73. It does, however, provide information that can be utilized in the NRC trending process.

Brian D Johnson Staff Licensing Engineer

CC Administrator, Region III, USNRC NRC Resident Inspector - Palisades

Attachment



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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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Description

NRC Form 366A (9-83)

> At approximately 1300 on March 14, 1989 Control Room operators identified that one channel (LTRI-0101B) of the reactor vessel level monitoring system (RVLMS) [*;LI] recorder was indicating lower than would be expected. At this time it was also identified that the "B" channel level sensor thermocouple heater power supply [*;EHTR] had changed from current mode to voltage mode. Subsequently, the "B" channel was declared inoperable. The reactor was critical with the Plant operating at 80 percent of rated power.

> The RVLMS was installed to provide indication for detection of inadequate core cooling conditions. The system provides indication of level in the primary coolant system (PCS) covering a range from near the top of the reactor vessel head to just above the reactor core. The RVLMS consists of two independent, physically separated, redundant and identical channels. Each channel includes one radcal level instrument (RLI), LE-0101 A&B, which extends from the incore instrument nozzle closure flange down through the guide tube attached to the control rod shroud, ending just above the fuel assemblies. The RLIs are inserted into existing incore instrument guide Two 1E qualified in-containment cable assemblies, connected in tubes. series, are provided for each channel from the RLI connector to the containment penetration. Outside of containment, lE qualified cable is provided for each channel to transmit signals and supply power between the containment penetration and the level and temperature recording indicator (LTRI) located in the main Control Room.

> Each RVLMS channel is composed of a manometer tube and a RLI containing eight sensors. The manometer is created by cutting ports in the existing incore instrument guide tube and is divided into regions with hydraulic isolators which are part of the RLI. Two separate regions, the head region and the upper guide structure (UGS) region, are monitored by four sensors each. The head region extends from the reactor head instrument nozzle flange down approximately 5.5 feet to the first hydraulic isolator. The UGS region extends from the first hydraulic isolator to the second hydraulic isolator located approximately at the top of the fuel alignment plate.

> The RLI is a stainless steel rod containing sensors which consist of differentially connected thermocouple pairs. One thermocouple junction is electrically heated and the other is not. In water the heat transfer from the junctions is high so that the differential temperature indication is low. In steam the heat transfer rate is reduced and the heated junction gets hotter, increasing the differential temperature indication. High differential temperature is the indication of water uncovery of the sensor.

Indication for the RVLMS is provided by two identical LTRI units, one for each channel, located in the Control Room. The level indication consists of two strings of vertical light-emitting diodes (LEDs). A green LED indicates covered and a red LED indicates uncovered for each sensor in the RLI. The

NRC Form 346A (9-83) LICENSEE EVENT REPORT (LER) TEXT CONTINUATION APPROVED OMB NO. 311 EXPIRES: 8/31/85												
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sensors are numbered and their distance above the fuel is indicated. Level information is also displayed on adjacent strip chart recorders, one for the head region and one for the UGS region. The recorders display differential temperature information from the RLI sensors which can be used to diagnose potential degradation or failure of the sensors and aid in interpretation of level information.

Cause Of The Event

When it was identified that recorder indications provided by LE-0101B were not as expected, initial thoughts were that the differential thermocouple heater power supply had failed. However, immediate troubleshooting identified the problem to be in the heater circuitry. Heater cable resistance measured from the Control Room to the containment indicated resistance levels higher than the expected range of 20 to 100 ohms. Further troubleshooting of the heater power supply identified satisfactory performance when a simulated load was imposed. Also, resistance measurements taken at the containment penetration identified the problem to be inside the Containment Building. On October 14, 1989 associated cables for LE-0101B were inspected and resistance measured from the reactor vessel head to the Control Room. No anomalies were noted. Resistance measurements were also taken from the reactor head into the probe LE-0101B. The heater circuit and one sensor were found to be open internal to the probe.

Based on troubleshooting to-date, the failure of the heater circuit is believed to be an open circuit within LE-0101B which resides within the reactor vessel. The exact cause cannot be determined until at least such time as LE-0101B is accessed.

Corrective Actions

Troubleshooting has been performed as indicated above. LE-0101B will be replaced when the reactor head is removed during the 1990 Refueling Outage.

Analysis Of The Event

At the time LE-0101B was declared inoperable, Technical Specifications (TS) covering RVLMS operation had not been issued, however, administrative controls were inplace. On September 15, 1989 Amendment 129 was issued by the NRC. This license amendment was effective the date of issuance and associated actions to be implemented not later than October 30, 1989. A part of this amendment, TS Table 3.17.4 Item 18 was added. The item provides that when the PCS is heated above 325 degrees, both channels of the RVLMS shall be operable. TS Table 3.17.4 Action J of this TS provides that

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a RVLMS channel is operable if two or more of the upper four sensors and two or more of the lower four sensors are operable. TS Table 3.17.4, Action K provides that if one channel is inoperable, the system shall be restored to operable status within seven days if repairs are feasible without shutting down, or submit a Special Report within 30 days outlining actions taken, the cause of inoperability and the plans and schedule for restoring the system to operable status. This Special Report is being submitted to satisfy TS Table 3.17.4 Action K.

During the period in which LE-0101B was inoperable, the redundant RVLMS channel remained operable, all other TS requirements for monitoring the condition of the PCS were met and all applicable actions of this Amendment were satisfied. Therefore, no threat to the health and safety of the public was present.

Additional Information

NRC Form 386A (9-83)

NRC FORM 366A (9-83) LER 89-TS2-L101

* Denotes no available code per IEEE 805/1984