



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

CONFORMANCE TO REGULATORY GUIDE 1.97

CONSUMERS POWER COMPANY

PALISADES NUCLEAR PLANT

DOCKET NO. 50-255

1.0 INTRODUCTION

The staff's Safety Evaluation Report on Palisades' "Conformance to Regulatory Guide (RG) 1.97" (Reference 1), included Consumers Power Company's (CPCo) commitment to upgrade the condensate storage tank (CST) water level monitoring instrumentation power supply with seismically qualified components to meet the RG 1.97 ["Instrumentation for Light Water Cooled Nuclear Power Plants To Assess Plant Conditions During and Following an Accident"] criteria. By letter dated October 31, 1994, CPCo confirmed completion of this upgrade and requested NRC approval of the installed cabling for both channels of CST level monitoring instrumentation which is routed through the non-seismic Category 1 turbine building and thus does not fully meet criteria for seismic qualification. In response to the staff request for additional information, CPCo provided analysis and justification for this deviation in its letter dated March 2, 1995. The staff evaluation of the licensee's submittals is provided below.

2.0 EVALUATION

RG 1.97 states that CST water level is to be monitored by redundant Category 1 (environmentally and seismically qualified circuit and power supply) instrumentation. To be considered seismic Category 1, the instrumentation is normally located in a seismic Category 1 structure. However, in case of instrumentation located in a non-seismic Category 1 structure, Section B of RG 1.97 states, "it is desirable that accident-monitoring instrumentation components and their mounts that cannot be located in seismically qualified buildings be designed to continue to function, to the extent feasible, following seismic events."

At Palisades, the CST level instrumentation (transmitters) are located in a mild environment (adjacent to the CST), are installed in accordance with seismic Category 1 criteria, and have Class 1E power supplies. Therefore, the redundant instrumentation for monitoring CST level meets the RG 1.97 qualification criteria except that the cables for both channels are routed

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through the non-seismic Category 1 turbine building, and thus are subject to a potential common mode failure in a postulated seismic event. The licensee reviewed the consequences of this deviation and provided the following justification for its acceptability:

The Palisades FSAR [Final Safety Analysis Report] Section 5.7.3.1.2, states that the turbine building is designed to remain intact (no collapse) following the plant specific safe shutdown earthquake (SSE) except for the block walls, that may collapse. To further reduce the potential for a common mode failure, the cables for the redundant CST level monitoring channels take different routes through the turbine building. Drawings show that one channel is routed in standard cable trays while the other has been walked down and verified to be routed in its own conduit. The conduit has been selectively routed to preclude damage in a seismic event by mounting the conduit on the web of heavy I beams of the building steel and by routing the conduit away from a potential block wall to protect it from a potential block wall collapse.

The licensee's review of the conduit routing concluded that it is seismically adequate and well protected from adverse seismic interactions such that it is highly unlikely that a design-basis seismic event would disable this channel of CST level instrumentation. The staff has reviewed the licensee's deviation justification and finds the licensee's conclusion acceptable.

In addition to the common mode failure concerns, RG 1.97 states that the Category 1 post-accident monitoring instrumentation, including CST level monitoring instrumentation, should also meet the single-failure criterion such that the loss of function (indication of CST level for control room operating personnel) should not occur due to a single-failure of the channel routed in the conduit. However, because the protected conduit consists of only a single channel, it does not satisfy the single-failure criterion.

To address the single-failure concern, in the event that the CST is unavailable or its inventory cannot be relied upon for accident mitigation because of loss of both channels of CST instrumentation, the licensee has in place emergency operating procedures which direct plant operators to take actions that provide an alternate seismically qualified source of auxiliary feedwater from the primary system makeup tank, service water system, firewater system, or the condensate pumps. There is sufficient time for plant operators to respond to a loss of CST level indication. The licensee's calculations indicate that in response to a station blackout event, which results in a similar challenge to the plant as the postulated seismic event with loss of CST level indication, the plant operators have 4 hours to take action to ensure adequate CST inventory. Per Section 9.7.2.1 of the Palisades FSAR, a separate level switch (in addition to the RG 1.97 redundant level instrumentation) alarms in the control room on CST low level at a setpoint of 88,300 gallons while an inventory of only 55,964 gallons of water is needed to remove decay heat for 4 hours. Similarly, for the primary system makeup tank

(an alternate source of auxiliary feedwater), a low level switch alarms at a setpoint of 65,600 gallons to ensure sufficient inventory is maintained. The licensee stated, therefore, that in the unlikely event that both channels of CST level indication are lost, there are procedures in place and sufficient time is available for operator action to assure that an auxiliary feedwater source for decay heat removal is maintained. The staff finds the licensee's conclusion acceptable.

3.0 CONCLUSION

Based on the review of the licensee's submittals, the staff concludes that sufficient justification has been provided for the deviation in seismic qualification of the CST level instrumentation channel cable which is routed in conduit through the non-seismic turbine building. The staff concludes that this channel will continue to function following a seismic event and there are adequate procedures in place and sufficient time for operators to take action to maintain decay heat removal in the unlikely event that both channels of CST level indication is lost. The staff, therefore, finds the licensee's RG 1.97 deviation for seismic Category 1 CST level monitoring instrumentation to be acceptable.

4.0 REFERENCES

- (1) NRC letter (Thomas V. Wambach) to CPCo (Kenneth W. Berry) dated October 20, 1987.

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