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February 14, 1972

Dr. Peter A. Morris, Director  
Division of Reactor Licensing  
United States Atomic Energy  
Commission  
Washington, DC 20545

Re: Docket No 50-255  
License No DPR-20

Dear Dr. Morris:

This is written to inform you of an unusual event that occurred at the Palisades Plant on February 3, 1972 involving control rod drive mechanism (CRDM) No 17.

On February 3, a feed-water system transient caused a low steam generator water level in one steam generator which resulted in a reactor trip. The CRDM display matrix was observed within five seconds after the trip and indicated that all CRDM (except the part length rods which do not trip) were fully inserted. CRDM No 17 was observed to have a white light (indicating a CRDM is in the operating band) as well as a green light (indicates full insertion of a CRDM). Both the primary and secondary rod position indications showed CRDM No 17 to be fully inserted. An attempt was made to drive CRDM No 17 a few inches but was not successful.

A containment entry was made to determine the reason that CRDM No 17 would not respond to withdrawal signals. Steam was observed to be leaking in the area of the CRDM No 17 motor package.

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The primary system was cooled down to the cold shutdown condition to replace known leaking CRDM mechanical seals and investigate the cause and effects of the steam observed leaking from CRDM No 17 motor package.

The pressurizer relief valves had been leaking at known rate slightly in excess of one gallon per minute. This leakage drains to the quench tank and as a result about 25 psig pressure was on the quench tank. The leak off from the CRDM mechanical seals is also routed through a check valve and loop seal to the quench tank. The pressure in the quench tank caused the CRDM mechanical seal leak off headers to operate under pressure.

Prior to reactor shutdown, approximately six CRDM (including No 17) mechanical seal units were known to be leaking. The

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known leakage from these seals was about two gallons per minute. The back pressure on the mechanical seal leak off cavities combined with the known CRDM seal leak off caused a pressure to be exerted on the vapor seal between the CRDM mechanical seal housings and the motor packages. This resulted in steam (and probably some water) leakage into some of the CRDM motor packages.

All CRDM motor packages and mechanical seal housings were removed and inspected. The mechanical seal housings were tested on a test stand. Four of these seal housings (including No 17) leaked at rates that were definitely in excess of the specification limits. Seven more of these seal housings leaked at rates that were slightly in excess of specification limits. All eleven of these mechanical seal assemblies are being replaced. The inspection of the CRDM No 17 motor package revealed boron deposits on the bearings, limit switch assembly and the terminal board.

The lingering white light and inability to drive CRDM No 17 after the reactor trip were attributed to the boron deposits on the limit switch assembly and terminal board. Inspection of the other motor packages revealed some trace of boron deposits on motor bearings. All of the motor packages have been thoroughly cleaned. The bearings showing signs of boron deposits will be replaced prior to returning the plant to operation.

The piping configuration of the seal leak off header is being modified so that the seal leak off will no longer drain to the quench tank. It is being rerouted to a floor drain. Leak off collected in the floor drain will be ultimately processed by the liquid radwaste system for reuse in the plant. This modification corrects the cause of the incident by insuring that the CRDM mechanical seal leak off cavities will not be operated against a back pressure.

The insulation on the reactor vessel head was inspected for evidence of water spotting due to leakage from the CRDM. Two minor indications of water spotting were detected.

Samples of the insulation have been taken in these areas to determine the extent of penetration of boron deposits. If the results of these samples show that boron has penetrated to the reactor vessel head, the insulation in these areas will be removed and the affected portions of the head cleaned and inspected prior to returning the plant to operation.

The back pressure on the mechanical seal leak off resulted in the CRDM motor packages being operated under environmental conditions more severe than anticipated in their design. Under these conditions, the CRDM performed all required reactor safety functions.

Dr. Peter A. Morris  
February 14, 1972

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The rerouting of the mechanical seal leak off line to a floor drain will preclude further operation of the CRDM with pressure on the mechanical seal leak off cavity.

Yours very truly,

Ralph B. Sewell (Signed)

RBS/dmb

Ralph B. Sewell  
Nuclear Licensing Administrator

CC: BAGrier,  
USAEC