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September 8, 1972

Mr. John F. O'Leary, Director
Directorate of Licensing
United States Atomic Energy
Commission
Washington, DC 20545

Re: Docket No 50-255
License DPR-20

Dear Mr. O'Leary:

Late in the evening of August 29 and the morning of August 30, 1972, four control rods (No 8, No 20, No 33 and No 37) failed to drop during routine control rod drive mechanism (CRDM) trip testing. This trip testing was being conducted prior to returning the Palisades Plant to service following a scheduled four-day outage. Three (No 8, No 33 and No 37) of the four CRDM motor packages (includes the clutch mechanism) were subsequently replaced with spare units and an extensive test program was conducted on the fourth (No 20) to determine the cause of the failure.

The clutch mechanism of one of the removed motor packages was disassembled and inspected. This inspection revealed nothing that would cause the clutch halves to fail to separate, although some personnel felt that there might be a slight wear pattern in the baked on lubricant on the clutch spline. The other two motor packages were not disassembled prior to shipment to the NSSS vendor for further detailed examination and testing.

Further detailed trip testing was conducted on the No 20 CRDM motor package. Trips were initiated from varying elevations. Trip time traces were obtained. The clutch was visually verified to be engaged when it was de-energized. It was verified, based on this testing, that the cause of the failure to trip was due to the clutch halves failing to separate.

It appeared that these malfunctions were similar to that experienced with CRDM No 5 on June 2, 1972 and reported by our letter dated June 12, 1972. This clutch assembly was inspected and tested in detail by the NSSS vendor with no conclusive results obtained. It was trip tested over 150 times and the failure could not be repeated. The inspection revealed a slight brass coloring of the lubricated spline surface, possibly due to ratcheting of the clutch halves, but the condition of the lubricant appeared to be favorable.

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Review of the clutch design yielded two possible failure mechanisms. One was associated with removal of the shim which maintained a 15 mil gap between the clutch halves. This shim had been removed during 1971 to correct a rod dropping occurrence experienced during the zero power physics tests. The second was the possibility of a lubrication breakdown on the clutch spline.

The No 20 motor package was removed, the shim installed and the motor package reinstalled. Trip testing was resumed. The No 20 clutch mechanism was trip tested 63 times. The CRDM failed to trip nine times.

The No 20 motor package was again removed and the clutch spline was lubricated with a dry molybdenum disulfide powder lubricant. This is the same type of lubrication that is baked on the spline by the NSSS vendor. The motor package was reinstalled and trip tested 60 more times. The trip traces revealed all trip times to be normal. The motor package was again removed and the shim was removed from the clutch mechanism. The motor package was reinstalled and trip tested another 25 times. Again, the trip traces revealed all trip times to be normal.

Based on the above described testing, it was concluded that failures to trip of the four CRDMs were caused by degradation of the lubrication on the spline surfaces. The Palisades Safety Audit and Review Board concluded that a high degree of reliability could be ascribed to the CRDMs and the plant be returned to service if:

1. A lubrication procedure was developed and all clutch splines were relubricated in an identical manner.
2. The motor package that was originally installed on CRDM No 20 be relubricated and reinstalled in a position in which the effect of its being routinely tripped would minimize power perturbations.
3. All CRDMs be trip tested prior to the initial return of the plant to service.
4. The CRDM on which the No 20 motor package was installed be trip tested daily during plant operation.
5. All other CRDMs be trip tested weekly during plant operation.

This solution and testing program was considered temporary. It will remain in effect until a modification can be developed and tested for the clutch mechanism which embodies a more positive means of separating the clutch halves. At this time several possible modifications are being evaluated by the NSSS vendor and the tentative schedule for completion of this evaluation, testing and installation at the plant is approximately two months.

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The plant was returned to service under the conditions prescribed above by the Safety Audit and Review Board on Sunday, September 3, 1972. All trip testing performed since this return to service has been normal.

We will keep your representatives informed as to the progress with respect to proposed modifications. These modifications will be reviewed prior to installation at the plant and reported in accordance with the provisions 10 CFR 50.59 and the Technical Specifications.

Yours very truly,

Ralph B. Sewell (Signed)

RBS/smm

CC: BHGrier
USAEC

Ralph B. Sewell
Nuclear Licensing
Administrator