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Power
Company**

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General Offices: 212 West Michigan Avenue, Jackson, Michigan 49201 • Area Code 517 788-0550

June 12, 1972

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

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

Dear Mr. O'Leary:

This letter is written to apprise you of a malfunction that occurred June 2, 1972, at the Palisades Plant, pertaining to the clutch assembly of Control Rod Drive Mechanism (CRDM) No 5.

After the safety check sheets had been completed, it was observed that CRDM No 5 had not dropped from the Lower Electrical Limit (LEL) which should have occurred due to an inadvertent reactor trip during the safety system check. The test panel trip switch was placed in the clutch power "off" position and CRDM No 5 did not respond. CRDM No 5 was then raised to 8 inches and again to 9 inches and did not respond when the test switch was actuated. CRDM No 5 was withdrawn above the LEL and successfully tripped when the drive was run back in to the LEL with the test switch in the "on" position.

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CRDM No 5 was successfully drop-tested five times and a torque trace was performed with no abnormalities noted. The investigation of CRDM No 5 did not indicate the cause for misoperation; therefore, it was determined that additional drop tests would be performed. CRDM No 5 was fully withdrawn and would not drop when the test switch was operated. The operation of the No 5 motor drive was observed at the reactor head and it was visually verified that the clutch faces did not separate. Plant personnel verified that the voltage to the drive was correct and that the test switch was operable. Plant personnel then removed the control cable from the drive package and the CRDM clutch still failed to separate. The CRDM clutch lower jaw was tapped with the handle of a screwdriver and the jaws disengaged, dropping the rod.

The CRDM No 5 drive package was removed and the clutch assembly replaced with a spare unit. This drive package was reinstalled and successfully drop-tested six times and the clutch separation was normal in all respects. The CRDM torque trace was also normal.

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The faulty clutch assembly was disassembled and inspected at the plant. This inspection did not reveal the cause for the improper operation of the clutch; therefore, it was decided to ship the unit back to Combustion Engineering for a detailed examination.

The clutch assembly was inspected by Combustion Engineering at their Windsor facility and this detailed inspection did not indicate an obvious cause for the failure to disengage on June 2, 1972. The clutch assembly was then subjected to over 150 trips which included different operating temperatures and loads and included misoperation as described below. This clutch assembly operated satisfactorily in all respects.

This clutch assembly was subjected to one unusual operating condition at the Palisades Plant immediately before it failed to disengage, which was a ratcheting operation that occurred when the drive mechanism was inadvertently driven against the upper mechanical hardstop during post-maintenance checkout due to a limit switch-synchro assembly being out of adjustment. The CRDM are normally prevented from driving into the hardstop by an Upper Electrical Limit (UEL). This is the most severe operation which the clutch can experience and testing programs have demonstrated that repeated extensive ratcheting can ultimately cause failure. We, therefore, conclude that the ratcheting operation, although the detailed inspection could not definitely corroborate it, was the cause of the malfunction. Driving a CRDM into the upper hardstop is normally prevented by two means, the synchro system and a limit switch. Both of these systems are checked out prior to operation.

The ratcheting of a CRDM is a very unlikely occurrence and because this is the only abnormal operation that CRDM No 5 had experienced prior to the misoperation, we must conclude at this time that this caused the failure to disengage. We will institute a procedure that will require replacement of a clutch assembly that has been subjected to ratcheting. The clutch mechanism will be carefully inspected, refurbished if necessary and tested prior to reuse.

During a reactor trip signal, the CRDM receive a "Rod Rundown" signal which would drive in any rod whose clutch does not separate. This backup feature will assist the clutch jaws in disengaging, in addition to driving the rod to the "full in" limit.

We have concluded that the misoperation of CRDM No 5 was probably caused by the ratcheting of the clutch assembly because the drive was driven into the upper hardstop. In the future, if a drive is subjected to ratcheting, the clutch assembly will be replaced.

Mr. John F. O'Leary
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We further concluded that the reactor could be operated safely and, therefore, it was returned to service.

Yours very truly,

Robert L. Haueter (Signed)

RLH/map

Robert L. Haueter
Electric Production Superintendent -
Nuclear