Consumers Power Company

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April 25, 1972

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

Re: Docket 50-155
License No DPR-6

Dear Dr. Morris:

This letter is written to provide supplemental information concerning investigations performed and corrective action taken with regard to the failures to withdraw control rod drives B-6 and C-3. These failures were reported by our letters dated March 26, 1971 and June 7, 1971, respectively.

Following the February-March 1971 refueling outage (the outage in which B-6 had failed to withdraw - refer to March 26, 1971 letter), a roller and pin were removed from one of the 16 control blades that had been replaced during the outage. A visual inspection of this roller and pin revealed no abnormal signs of wear.

During the refueling outage that is currently in progress, a roller was found lodged in between the index tube and the conical thimble end of control rod drive C-3 (could not be moved in outward direction on May 26, 1971 - refer to June 7, 1971 letter).

As a result of these two events, an inspection of the 16 outer periphery control blades was conducted to determine which had missing rollers. The inspection revealed that control blades C-6 and D-6 each had one roller missing (both being from the bottom end of the blades).

The rollers are pinned in a socket near the outer edge of the sheath and are designed primarily to allow the control blade to ride vertically on the fuel bundle support-tube-and-channel assembly.

Visual inspection of control blade D-6 revealed that considerable wear had occurred in and around the roller socket. The inside pinhole was ground away completely and a groove was worn into the exterior surface of the lower inside portion of the socket. The roller pin had sheared off leaving approximately a 1/8-inch segment protruding into the socket from the welded end. Apparently either

a vibration or a wobbling action by the roller on the inside of the socket wore away enough material to allow the roller to become dislodged and eventually shear off. The other three bottom roller assemblies were intact, although the pin located in the sheath directly opposite to that of the missing roller showed slight wear.

An inspection of control blade C-6 revealed a different wear pattern in the roller socket than that of D-6. The inside edges of the socket were enlarged at the top and bottom caused, probably, by a cantilever type motion about the welded end of the roller and pin assembly. The pinhole was enlarged at the inside of the socket or the free end, while at the exterior or welded end, the pin was sheared flush with the socket. The other three bottom roller assemblies were found to be intact with essentially no wear.

No rub marks as a result of riding on the support-tube-and-channel assembly were found on either of the rollerless control blade sheaths. All roller assemblies at the top of the control blades were intact and showed little wear.

In the 1965 refueling outage (when the outer sixteen control blades were replaced), C-6 and D-6 also had rollers missing. These similarities seem to indicate that the conditions for losing the rollers are unique to the locations of C-6 and D-6. Further investigation has revealed that C-6 and D-6 are centrally located between the two recirculation pump flow nozzles. The primary coolant is discharged into a 360° flow distributor assembly which is attached to the core support plate. The purpose of the flow distributor is to insure that the recirculating water will flow across the core support plate and then upward through the core. However, it appears that where the two flows meet in the distributor, a localized flow turbulence is created and directed outward toward blades C-6 and D-6 in the vicinity of the bottom rollers when the blades are in a fully withdrawn condition. The periphery control blades are normally operated in a fully withdrawn position.

As a result, periphery blades A-5, F-5, B-6 and E-6 (which are in the vicinity of C-6 and D-6) and A-2 were inspected for signs of excessive wear. All roller assemblies were intact with no visible wear noted. The coupling sockets were also inspected for signs of possible wear caused by the flow turbulence but showed no wear. Control blades B-5, C-5 and E-5 which had been located in the vicinity of C-6 and D-6, but within the inner ring of control blades, were also inspected for wear with no adverse effects found. (These three blades had been removed during the 1971 refueling outage and were located in the spent fuel pool.)

Operations will be resumed with one control blade roller missing from a blade on each of C-6 and D-6. These control rods will be inserted in their original positions and the rollerless sheaths positioned toward the southeast and southwest sections of

the core, respectively. With this orientation, there should be no additional losses of roller assemblies due to flow-induced effects.

The history gained by operating the plant during the past year with a roller missing from each of these two blades shows no adverse effects. The results of all scram time testing performed during this period of time were normal. This testing will be continued at six-month intervals as required by the Technical Specifications. In addition, no signs of wear were detected during the inspection following approximately one year's operation. However, we will continue to inspect these two control blades during each refueling to detect indications of wear.

Yours very truly,

Ralph B. Sewell
Nuclear Licensing
Administrator

JSR/dmb

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