

CONSUMERS POWER COMPANY  
Docket 50-155  
Request for Change to the Technical Specifications  
License DPR-6

For the reasons hereinafter set forth, it is requested that the Technical Specifications contained in Facility Operating License DPR-6, Docket 50-155, issued to Consumers Power Company on May 1, 1964 for the Big Rock Point Plant be changed as described in Section I below:

I. Change

Add a new paragraph to Section 7.3.2.(d) reading:

"In the event that neutron source strength is insufficient to produce the required count rate, an approach to criticality for reactor start-up shall be allowed provided that the following conditions are met. This procedure shall also be used for any subsequent start-ups as may be necessary until sufficient power operation has been accumulated to irradiate the antimony-beryllium sources sufficiently to produce the required count rate.

- (i) Prior to the first start-up after development of the low source strength condition, a critical approach(es) with the reactor vessel head off shall be performed to evaluate the out-of-vessel low-level detector response and the control rod withdrawal sequence. Two additional low-level detectors shall be temporarily inserted in the vessel to monitor this head-off critical approach(es). These additional detectors shall indicate a minimum of 3 counts per second with a signal-to-noise ratio of 3 to 1.
- (ii) Evaluation of instrument responses during the head-off critical approach(es) shall demonstrate that, by the time the estimated  $k_{eff}$  of the core reaches 0.995, each low-level out-of-core start-up detector is reading at least 3 cps with a 3 to 1 signal-to-noise ratio.
- (iii) Critical approaches with the head on and without the temporary in-vessel low-level detectors in service shall be permitted provided that the instrument response requirements of (ii) above have been demonstrated and provided that these same requirements are also met during each critical approach with the head on. Normal start-up may continue any time start-up count rate is at least 3 counts per second with a minimum signal-to-noise ratio of 3 to 1.
- (iv) The procedure of (i) and (ii) above shall be repeated by conducting additional head-off critical approach(es) in the event of either a core configuration change or a significant change in that part of the control rod withdrawal sequence for which the minimum count rate and signal to noise ratio specified above are not attainable.

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- (v) The site reactor engineer or his alternate will be on site during all head-off critical approaches and instrument response evaluations and during the initial head-on start-up following head-off evaluations.

## II. Discussion

The Big Rock Point Plant was shut down in early February 1979 for maintenance and refueling. The shutdown was extended to repair a control rod drive penetration leak and to replace recirculation inlet diffusers. (REF LER 79-18 and 79-20). Start-up from this shutdown is estimated for early October 1979.

Start-up count rates obtained during initial critical approaches in April 1979 were 13 counts per second with a 4 to 1 signal-to-noise ratio. The control rod drive penetration leak and inlet diffuser problems were identified within the first several hours of reactor operation, thus the antimony-beryllium start-up sources were not subjected to significant irradiation during April 1979 critical operations. Based upon this experience and the 60 day half life of the antimony-beryllium sources, Consumers Power Company estimates that start-up count rates may be as low as 2 counts per second during the scheduled October 1979 start-up. This low count rate may also make the required 3 to 1 signal-to-noise ratio unattainable.

Several criticals are proposed for the start-up planned for October. The first will be a head-off critical and will begin with reactor conditions as follows:

- (a) 84 fuel assemblies in the core loaded in a configuration nearly identical to the initial Cycle 16 core loaded in April.
- (b) Primary neutron sources located in Positions 0252 and 0959, auxiliary neutron sources in core locations defined by Technical Specifications Section 5.1.6.
- (c) Additional fission chambers temporarily inserted in the vessel located near the core reading 3 cps minimum with a signal-to-noise ratio greater than or equal to 3 to 1.
- (d) All seven out of core instruments (two start-up range, two intermediate range, and three power range monitors) in service.
- (e) Reactor water temperature at ambient.
- (f) All rods fully inserted and core initial  $k_{eff}$  near .93.

This critical approach will be performed using a control rod withdrawal sequence developed to stay within Technical Specifications control rod and notch worth limits. The temporary in-core fission chambers will be used to monitor flux increase during the start-up and the seven out-of-core instruments will be in service to provide their normal safety functions. Based on count rates encountered during the initial critical in April, it is

expected that the count rate on the out-of-core start-up monitors will meet both the 3 cps and the 3 to 1 signal-to-noise ratio before reaching a core  $k_{eff}$  of .995. Records of count rate vs control rod configuration and  $k_{eff}$  will be maintained throughout this critical approach. By the time the estimated .995  $k_{eff}$  configuration is attained, the out-of-core start-up range monitors will be tested to assure required counts and signal-to-noise ratio will be available during subsequent start-ups.

The first head-on critical during the coming start-up will be at the same conditions described for the head-off critical except that the vessel head will be in place and the temporary fission chambers will no longer be in the vessel. Reactor water temperature will be greater than or equal to 190°F as required by Technical Specification 4.1 and 10CFR50 App G.

Signal-to-noise ratio and gross count rate with all rods inserted are expected to be near but possibly less than the specified minimum values. If start-up range monitor count rate and signal-to-noise ratio do not meet the requirements of Technical Specifications Section 7.3.2.(d), the control rods will be withdrawn in a pattern identical to that for the head-off critical and start-up range monitor l/m plots as a function of  $k_{eff}$  will be compared to those generated for the head-off critical. If, prior to or at the time of the estimated .995  $k_{eff}$  control rod configuration established during the head-off critical approach is attained, a minimum signal-to-noise ratio of 3 to 1 and a gross count rate of greater than or equal to 3 cps are displayed by the start-up range monitors, normal start-up will continue. All rods will be returned to their fully inserted positions should these instrumentation requirements not be met by the time the head-off .995  $k_{eff}$  control rod configuration is attained.

The head-off .995  $k_{eff}$  control rod configuration has been chosen as the point at which start-up can continue for the following reasons:

1. Start-up count rate is expected to be acceptable at this configuration.
2. .5%  $\Delta K$  margin is available prior to going critical. This is more than twice the maximum predicted notch worths to be encountered during this part of the withdrawal sequence and .2% greater than the Technical Specification limit for notch worth. Additional margin will exist at 190°F due to the negative effect of the water temperature on reactivity.

Subsequent start-ups with marginal start-up count rates may be necessary due to shutdowns which may be encountered during the early part of the cycle. Until such time as the strength of the neutron sources has been reestablished, similar start-up procedures will be followed. That is, control rods may be pulled as far as the .995  $k_{eff}$  control rod configuration established for the head-off critical approach observing

nuclear instrumentation and comparing 1/m plots. Start-up may continue any time the start-up range monitors exhibit at least a 3 to 1 signal-to-noise ratio and a minimum 3 cps count rate. To establish a new .995  $k_{eff}$  rod pattern or to alter the withdrawal sequence prior to obtaining acceptable start-up monitor count rates or to alter the core configuration, a new head off critical with in-vessel low-level detectors meeting these start-up signal requirements will be performed.

This situation of low neutron source strength has been experienced twice before at Big Rock Point after lengthy shutdowns. This proposed Technical Specifications change is substantially identical to that approved by the Atomic Energy Commission for start-up during a similar situation which existed following a lengthy outage in 1964-1965. The 1965 approval was limited to a single cycle only (AEC letter dated April 2, 1965). Since this condition has been experienced three times in seventeen years of reactor operation, Consumers Power Company considers it prudent to incorporate the proposed change on a permanent basis.

III. Conclusions

Based on the foregoing, both the Big Rock Point Plant Review Committee and the Safety and Audit Review Board have concluded that this change is acceptable from a safety standpoint.

CONSUMERS POWER COMPANY

By *R B DeWitt*  
R B DeWitt, Vice President  
Nuclear Operations

Sworn and subscribed to before me this 7th day of September, 1979.

*Dorothy H Bartkus*  
Dorothy H Bartkus  
Notary Public, Jackson County, Michigan  
My commission expires March 26, 1983.