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 the 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. Changes

1. In Section 6.1.2 (Page 51) change scram setting and tolerance for Low Reactor Water Level (4 Level Switches) to "≥ 2'9" Above Top of Active Fuel (Tolerance Limit -1")(1)."

2. On Table 11.3.1.4a (Page 132) change limiting set point for Low Reactor Water Level to "≥ 2'9" Above Top of Active Fuel (Tolerance Limit -1")(c)."

3. On Table 3.5.2.H (Page 138) change limiting set point for Low Reactor Water Level to "≥ 2'9" Above Top of Active Fuel (Tolerance Limit -1")(1)."

II. Discussion

The above proposed Technical Specifications changes are requested to reinstate the original Low Reactor Water Level Trip Set Point of "≥ 2'9" above top of active fuel (tolerance limit -1")."

Low Reactor Water Level (LRL) actuates reactor scram and containment isolation. In coincidence with low reactor pressure it also actuates core spray; and in coincidence with low drum level and high fire header pressure signals, it actuates Reactor Depressurization System (RDS). The only analyzed accident for which credit is taken for safety systems actuation on LRL is the LOCA. The entire break size and location spectrum was analyzed in 1975 using the GE SAFE Code. The analysis methodology and SAFE code input is documented in Consumers Power Company's "10CFR50 ECCS Evaluation Book," and results were submitted to the NRC by letter dated July 25, 1975. The large cold leg breaks were subsequently reanalyzed by Exxon using their version of RELAP4. These results are documented in Exxon reports XN-NF-78-25, XN-NF-78-53, and XN-NF-79-21.

The actual LRL trip set point is not as important for large break LOCAs as it is for small break LOCAs. Large breaks do not require RDS actuation to assure adequate core spray flow and, except for the very large cold leg breaks, the SAFE code predicts that LRL occurs before low pressure (200 psia); therefore, core spray actuation is almost independent of LRL trip set point. RELAP4, on the other hand, predicts

the occurrence of LRL before low pressure for all breaks including the large cold leg breaks. RELAP4 assumes homogeneous mixing of phases in the vessel outlet plenum and risers, whereas SAFE assumes a degree of phase separation and permits water to drain back from the risers. Therefore, RELAP4 predicts significant voiding in the vessel outlet plenum with liquid still remaining in the risers. This voiding results in an earlier occurrence of LRL as predicted by RELAP4 than by SAFE, and is probably more representative of the actual plant response in very large LOCAs. Even for SAFE though, the level in the risers and vessel is decreasing very rapidly (from tens of feet per second in the largest cold leg break to between 4 and 5 inches per second for the smallest break which may not require RDS; the 0.1 ft^2 break) when the trip level is reached; therefore, a several inch difference in trip set point would have a negligible impact on safety system actuation time.

Small break LOCAs require RDS actuation; therefore, the LRL set point is more critical for small breaks. The RDS actuation level determines to some extent the time of inception, the depth, and the duration of core uncovery. The small breaks were analyzed in 1975 using SAFE and found to be nonlimiting as compared to the large breaks. This is because the core remains covered longer for the small breaks, which results in the core heat rate being lower when the core finally does uncover.

Since the 1975 small break analysis, nothing has happened to either the fuel design, the mode of plant operation or the safety analysis methodology which would change this conclusion; hence, the small breaks were not reanalyzed in 1978/79 by Exxon. The LRL set point is therefore derived on the basis of the 1975 small break analysis.

The instrument tap and core elevations as well as the trip set point assumed in the 1975 SAFE analysis are given below. All elevations are referenced to the elevation of the inside bottom of the lowest section of recirculation piping (which is actually 578.703 ft above sea level).

Elevation of Top of Active Fuel = 29.11 Ft (p 41/178 of SAFE Code Input Description)

Elevation of Lower Instrument Tap = 30.797 Ft (p 9/39 of Update #1 to SAFE Code Input Description)

Set Point = 0.3029 Psid Above Lower Tap (p 4/39 of Update #1 to SAFE Code Input Description)

Thus, a lower instrument tap location of 1'8-1/4" above the top of the active fuel and a constant set point differential pressure above the lower instrument tap were assumed in the analysis. Pressure compensation would correct the indicated level for coolant density changes resulting in a constant trip elevation for all pressures. Without pressure compensation the actual trip level would fall with falling pressure, but in a manner identical to that assumed in the analysis. Thus, pressure

compensation is not required to comply with the assumptions made in the safety analysis, although it would provide a better indicator for the operator to use during accidents.

Therefore, the BRP vessel level instrumentation should be calibrated to trip at a pressure differential of .3029 psid (plus tolerances) above the lower instrument tap. At 1350 psia reactor pressure, this represents a level of approximately 2'8" above the top of the active fuel or 12" above the lower instrument tap.

Prior to start-up of the present cycle, the low reactor vessel level trip set point had been 2'9" (2'8" plus 1" for instrumentation tolerances) above the top of the active fuel. Following discovery of a deficiency in the instrumentation that would have allowed the instrument reference column to flash during a rapid depressurization, it was deemed necessary to modify the instruments as discussed in Technical Specifications Amendment No 31, dated November 2, 1979. The modifications included removing the instrument jacket and the heat transfer clamps connecting the reference leg to the variable leg of LRL sensor so as to allow the reference leg to cool to less than 250°F. In doing so, the pressure compensating feature of the instrument that the jacket and clamps had provided was lost. In order to accommodate this loss of pressure compensation, it was deemed necessary to raise the trip set point to assure tripping at 2'9" above the core for all reactor pressures. This set point change resulted in a 4" increase in the trip level (to 3'1" above the core) for a reactor pressure of 1350 psia, and in no change in trip level for low reactor pressures.

This increase in the trip level for 1350 psia operation has led to numerous spurious instrument alarms when operating near full power. These alarms are not valid during times of power operation because the instruments do not measure the collapsed height of all the liquid above the core (ie, in the vessel and risers) but only that within the reactor vessel itself. The alarm frequency is highest at high power levels because vessel outlet plenum void fraction increases with power level. In order to avoid the numerous alarms and the potential for eventual operator neglect of them, power has been limited to less than that which the fuel limits would allow. A derate of as much as 18 MWe or approximately 25% of rated power output has resulted at times.

This proposed change reinstates the old trip set point of 2'9" above the core based on a thorough review of the assumptions made in the safety analysis regarding the reactor vessel level trip set point. Based on this review, it has been concluded the reactor vessel level instrumentation should be calibrated to trip at 2'9" above the core for a reactor pressure of 1350 psia because pressure compensation of the instrument is not required as the applicable safety analysis assumed an uncompensated instrument.

III. Conclusion

Based on the foregoing, both the Big Rock Point Plant Review Committee and the Safety and Audit Review Board have reviewed these changes and find them acceptable.

CONSUMERS POWER COMPANY

By R C Youngdahl
R C Youngdahl,
Executive Vice President

Sworn and subscribed to before me this 25th day of August 1980.

Linda K Carstens
Linda K Carstens, Notary Public
Jackson County, Michigan
My commission expires June 10, 1981.