Consumers Power Company

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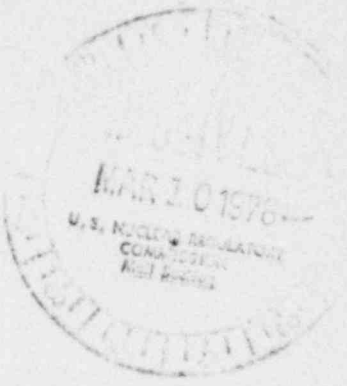
March 7, 1978



Director, Nuclear Reactor Regulation
Att: Mr Dennis L Ziemann, Chief
Operating Reactors Branch No 2
US Nuclear Regulatory Commission
Washington, DC 20555

DOCKET 50-155 - LICENSE DPR-6 - BIG ROCK POINT PLANT - RESPONSE TO LETTER DATED FEBRUARY 1, 1978: HIGH LEVEL FEED PUMP TRIP

By letter dated February 1, 1978, Consumers Power Company was requested to provide the staff with a schedule for installation of an automatic reactor feed-water pump trip based upon high reactor vessel water level for the Big Rock Point Plant. Upon evaluation of the necessity and desirability of such a modification, Consumers Power Company has concluded that the installation of this trip is inappropriate and unnecessary for Big Rock Point. This evaluation is based upon the following considerations: (1) The high reliability of the feed-water control system, (2) the existence of a steam drum at Big Rock Point and the large feed volume it affords, and (3) the unusually high availability required of the reactor feed-water system under specific LOCA conditions.

The Big Rock Point feed-water control system has operated reliably for 15 years with no known problems relating to inadvertent flooding of the primary steam drum. In general, the feed-water control system is a three-element controller utilizing steam flow, feed flow, and steam drum water level signals. The system is designed to maintain drum level within ± 1 inch of programmed level during steady state operation, and to handle all normal plant load swings without resulting in reactor trip on low drum level (8.5 inches below normal level). Steam flow is the primary element in the controller. A mismatch between steam flow and feed flow is anticipatory of an impending drum level deviation and will result in appropriate controller action. For example, a step increase in steam flow, and the resulting reduction in drum pressure, causes an immediate swelling of the drum level due to flashing. The controller, however, will cause an increase in feed-water flow in anticipation of the eventual fall in drum level as the primary system fluid inventory is depleted based upon the steam flow/feed flow mismatch. In the unlikely event of a large reduction in steam flow (ie, caused by a turbine trip without bypass, for example) the drum level would rapidly fall due to the collapse of voids in the primary system. The operation of the controller would be to initially reduce feed-water flow in response to the high steam flow/feed flow mismatch and thus avoid overfilling of the drum. The controller would then continue to supply some water to the drum until normal level was reached.

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Due to the high free volume of the primary steam drum, the potential for completely filling the drum and overpressurizing the primary system is remote. The steam drum which contains the steam separators and dryers, as well as the feed-water spargers, has a free volume of about 1,100 cf. During normal operation the drum is half full. Failure of the control system could result in filling of the drum beyond the normal water level. Assuming such a failure, high drum level alarms would be initiated at 4" and 13" above drum midplane. The alarm at 13" is part of the reactor depressurization system, is four-channel redundant, and is environmentally qualified. Under the worst conditions, with the reactor tripped and assuming a very high feed-water flow rate of 2,200 gpm, the operation would have at least 2.4 minutes after the first alarm to terminate the transient before the drum would fill. However, if the amount of available condensate is considered, the feed pumps can be shown to trip on low suction pressure before the drum fills. For other cases, the drum would fill more slowly, thus allowing adequate time for operator action to terminate the transient.

It should be noted that aside from the primary safety valves, no safety-related equipment or equipment required for the orderly shutdown of the reactor would be affected by the filling of the steam drum and that the filling of the drum cannot inhibit initiation of any required safety features. A solid drum condition would inhibit the actuation of the reactor depressurization system (required for small break LOCAs), however, the availability of feedwater can only improve the consequences of the LOCA (ie, core uncovery is not possible if water remains in the steam drum). Filling of the drum may result in damage to the primary safety relief valves. However, as noted above, there will exist adequate time after the high drum level alarm is actuated before operator action is required to terminate the level rise. Thus, the possibilities of this even occurring is considered remote.

One other aspect of reactor feed-water system performance must be addressed. For operating Cycle 15, Big Rock Point is exempt from the requirements of 10 CFR 50.46 and Appendix K, when applied to a LOCA caused by a break in the redundant core spray line. This exemption was granted, in part, based on the reliability displayed by the reactor feed-water system both in operation and capacity. Clearly, any modification to install additional trips to the reactor feed-water pumps would only serve to lessen the overall reliability of the system to perform under LOCA conditions and, therefore, would be an unnecessary risk.

In summary, based upon the proven reliability of the feed-water control system, the excess capacity of the steam drum when compared to the normal feed-water flow rate, and the required availability of the reactor feed-water system for the unlikely event of a LOCA caused by a break in the redundant core spray line, Consumers Power Company concludes that the installation of an automatic high reactor water level trip for the reactor feed-water pumps is an unnecessary and undesirable modification and, therefore, will not be made.

William S Skibitsky
Senior Licensing Engineer

CC: JGKeppler, USNRC

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SUBJECT:
RESPONSE TO LTR DTD FEB. 1, 1978 RE: HIGH LEVEL FEED PUMP TRIP.

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