

Specification LCO 4.4-1

TABLE 4.4-3

INSTRUMENT OPERATING REQUIREMENTS FOR PLANT PROTECTIVE SYSTEM, CIRCULATOR TRIP

NO.	FUNCTIONAL UNIT	TRIP SETTING	MINIMUM OPERABLE CHANNELS	MINIMUM DEGREE OF REDUNDANCY	PERMISSIBLE BYPASS CONDITIONS
1.	Circulator Speed-Low (r)	1910 rpm Below Normal as Programmed by FW Flow	2 (f)	1	Less than 30% Rated Power
2a.	Loop 1, Fixed Feedwater Flow-Low (Both Circulators)	20% of Rated Full Load	2 (f)	1	Less than 30% Rated Power
2b.	Loop 2, Fixed Feedwater Flow-Low (Both Circulators)	20% of Rated Full Load	2 (f)	1	Less than 30% Rated Power
3.	Loss of Circulator Bearing Water (r)	>475 psid	2 (f)	1	None
4.	Circulator Penetration Trouble (r)	<810 psig	2 (f)	1	None
5.	Circulator Drain Malfunction (r)	>5 psid	2 (f)	1	None
6.	Circulator Speed-High Steam (r)	<11,700 rpm	2 (f)	1	None
7.	Manual	-----	1	0	None
8.	Circulator Seal Malfunction (r)	>-10"H ₂ O, or <80"H ₂ O d	2 (f)	1	Opposite loop shutdown <u>or</u> circulator seal malfunction trip or other circulator in same loop
9.	Circulator Speed-High Water	<8,800 rpm	2 (f)	1*	None

*Minimum operable channels and minimum degree of redundancy must be maintained on at least one helium circulator per loop. If the minimum number of channels and the minimum degree of redundancy are not maintained as required, reactor power shall be reduced to 50% of rated thermal power within 12 hours.

ATTACHMENT 2

SIGNIFICANT HAZARDS CONSIDERATIONS

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I. EVALUATION

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As stated in FSAR Section 7.1.2.b, "Circulator overspeed is an indication of speed control or other failure necessitating rapid shutdown of the circulator. The speed sensing system response and trip setting are chosen so that under the maximum overspeed situation possible (loss of restraining torque) the circulator will remain within design capabilities." FSAR Section A.1.13.5 identifies the maximum "credible" overspeed condition as 135% of rated, resulting from a rupture of the reheat steam pipe downstream of the circulator, combined with failures of both the control system and the overspeed trip system. Therefore, the circulator trip setting should be conservative with respect to this maximum credible overspeed condition.

The proposed increase in maximum trip setting, from 11,000 rpm (115% of rated) to 11,700 rpm (123% of rated), would still provide the automatic protective actions conservatively prior to the credible overspeed condition (135%) as designed. Due to the almost instantaneous overspeed reaction under postulated control or piping failures, the proposed increase would be insignificant from a system sensing and time response standpoint.

In considering the impact on the design capabilities of the circulators, the postulated maximum credible overspeed accident assumes control and trip system failures resulting in 135% rated speed with no effect on circulator components or efficiency. This conclusion is verified by FSAR Section A.1.13.5, which references the circulator disc and blade testing program that required actual individual testing and inspection of each component at 140% of design speed prior to assembly. This section also identified the tested blade shedding speed as 170% of design, which would constitute the maximum design capability of the circulators.

The only event which could result in a damaging circulator speed ($\geq 170\%$) would be an instantaneous depressurization of the primary loop at full load simultaneous with speed control and high speed trip failures (FSAR Section 5.10.2.2). This accident, although considered extremely unlikely, assumes rotor or disc failures without damage to the primary closure or penetration liner. Therefore, only circulator operability would be affected. This accident evaluation further justifies the ability of the new trip setting (123%) to perform its design function of maintaining the circulator within design capabilities (170%), while avoiding unnecessary trips caused by normal plant transients.

II. CONCLUSION

Based on the above evaluation, it is concluded that operation of Fort St. Vrain in accordance with the proposed changes will not (1) involve a significant increase in the probability or consequences of an accident previously evaluated, (2) create the possibility of a new or different kind of accident from any accident previously evaluated, or (3) involve a significant reduction in any margin of safety.

Therefore, these changes will not increase the risk to the health and safety of the public nor to they involve any significant hazards considerations.