UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

January 24, 1986

Docket No.: 50-267

Mr. R. F. Walker, President
Public Service Company of Colorado
P. O. Box 840
Denver, Colorado 80201

Dear Mr. Walker:

SUBJECT: FORT ST. VRAIN - PLANT PROTECTION SYSTEM TRIP SETPOINTS

We are reviewing your submittal dated June 21, 1985 proposing Technical Specification changes for Fort St. Vrain. The proposed changes are in response to concerns that the trip setpoints specified in the present Technical Specifications are non-conservative. The present setpoints reflect the value of the measured parameters at which the safety analysis assumed that safety actions would be initiated. These values do not include consideration of instrumentation uncertainties. This could result in safety actions being initiated at measured parameter values which are less conservative than were assumed in the safety analyses.

In addition, the proposed Technical Specifications include changes in the format of the limiting conditions for operation and surveillance requirements for the plant protection system instrumentation. At this time, the staff has a number of concerns related to the proposed format change and we have addressed these separately in Enclosure 4.

We have reviewed the proposed changes related to trip setpoints. Since these changes are safety-significant, the current Technical Specifications should be revised to reflect the setpoint changes at the earliest opportunity.

Our findings concerning these proposed changes are addressed in the enclosed draft Safety Evaluation (SE) (Enclosure 1). We request that you review this draft SE and provide comments on its accuracy and completeness. Enclosure 2 provides a markup of the existing Technical Specifications with the appropriate changes to reflect your current proposal. We request that you evaluate this markup as a basis for an interim Technical Specification until the problems with the format can be resolved. The staff is ready to meet with you to discuss this approach for changing the Technical Specifications for trip setpoints.

Specific areas of your submittal that we are highlighting for your attention are as follows:

1. Your submittal proposed that the trip setpoint for the reactor scram and control rod withdrawal prohibit be eliminated and replaced with a note that would permit specific values to be established for each fuel cycle upon the approval of the Nuclear Facility Safety Committee, followed by NRC notification within 30 days of approval. The staff finds this to be unacceptable. Therefore, the setpoints established for fuel cycle 4 have been incorporated in the enclosed Technical Specification requirements as guidance for your subsequent submittal.

2. As a consequence of the re-evaluation of the trip setpoints, you concluded that an adequate margin did not exist between trip setpoints and normal operating conditions for some parameters. Accordingly, new safety analyses were performed to justify trip setpoints to provide a greater operating margin and thereby reduce the potential for inadvertent safety actions. The revised safety analyses should be incorporated in the FSAR in accordance with updating requirements following the issuance of the revised Technical Specifications.

3. For all cases analyzed, except for the fixed low feedwater flow trip, the staff found that the revised analyses were acceptable. Therefore, a change to the fixed low feedwater flow trip setpoints cannot currently be approved. However, there may be a valid justification for a lower value than currently specified. Although the present value does not include an allowance for instrument error, we would not recommend a change at this time since a more conservative limit might have an impact on inadvertent trips and this could be more safety-significant than the absence of an allowance for instrument uncertainty. Enclosure 3 provides additional staff comments on your analysis of the fixed low feedwater flow trip setpoint.

Enclosure 4 contains staff comments on the balance of your proposed changes. These changes include an upgrade in the format of the limiting conditions for operation and surveillance requirements for the Plant Protection System instrumentation. We recommend that the enclosed comments be used as an agenda for further discussions to facilitate the resolution of the format upgrade.

We propose that you resubmit modifications to the existing Technical Specifications to reflect the acceptable setpoint changes within 45 days of the date of this letter. This would allow the setpoint changes to be implemented for near-term plant operations. Your submittal should include comments on our draft SE and reflect our markup (Enclosure 2). Trip setpoints for reactor scram and control rod withdrawal prohibits should be included as per Enclosure 2.

We also request that you submit within 45 days of the date of this letter a separate schedule for the balance of your proposed changes. This schedule should allow time to resolve difficulties with the low feedwater flow trip setpoint (Enclosures 1 and 3) and the format of the Technical Specifications (Enclosure 4). This schedule also should be compatible with the overall schedule of the Technical Specification Upgrade Program.

The information requested in this letter affects fewer than 10 respondents; therefore OMB clearance is not required under P.L. 96-511.

Sincerely,

Original signed by
Herbert N. Berkow, Director
Standardization and Special
Projects Directorate
Division of PWR Licensing - B

Enclosures:
1. Draft Safety Evaluation on FSV Setpoint changes
2. Markup of current FSV Technical Specifications
3. Staff Comments on FSV low feedwater flow setpoint
4. Staff Comments on Format of Proposed Technical Specification Changes (P-85214)

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cc w/enclosures:
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Fort St. Vrain

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Enclosure 1

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Safety Evaluation ~~Report~~

Fort St Vrain Nuclear Generating Station

Background: By letter dated June 21, 1985, the Public Service Company of Colorado (the licensee) proposed changes to Technical Specifications for the Fort St Vrain Nuclear Generating Station. The primary purpose of the proposed changes was to modify the trip setpoints for the Plant Protection Systems (PPS) such that the values specified included a sufficient allowance for uncertainties associated with the instrument systems. Currently, the setpoints for the PPS are specified at the values for which the safety analyses assumed mitigative actions would be initiated. The proposed changes result in revised trip setpoints that include an additional margin of conservatism to account for instrumentation uncertainties. The revised trip setpoints were determined using Instrument Society of America Standard S67.04-1982, "Setpoints for Nuclear Safety-Related Instrumentation Used in Nuclear Power Plants", as guidance.

As a result of the licensee's evaluation program to determine appropriate values for instrumentation trip setpoints, the ~~resulting~~ values for some trip functions were found to offer the potential for increased inadvertent scrams, loop shutdowns, or circulator trips. In these cases, the results of a reanalysis were provided to justify the use of trip setpoints that provide a greater margin between the trip setpoint value and normal operating conditions.

This safety evaluation report provides the staff's conclusions on the acceptability of the proposed trip setpoints and the reanalysis provided to reduce the potential for inadvertent safety actions.

Evaluation: By letter dated March 9, 1984, the licensee provided a copy of a ~~work~~ specification outlining the reevaluation of Plant Protection System setpoints. This document incorporates the requirements of ISA Standard S67.04-1982, which the staff has previously found acceptable as defining a methodology for establishing trip setpoint values. Therefore, the staff finds that the licensee has established a methodology which is acceptable for determining trip setpoints

based on safety analysis for the Fort St Vrain Nuclear Generating Station as documented in the FSAR.

Attachment 3 to the licensee's letter of June 21, 1985, provided a Significant Hazards Consideration Analysis that addresses the results of new analyses for selected safety functions. The conclusions of this analysis and the staff findings are provided as follows:

A. Primary Coolant Pressure-Low

The setpoint for the low primary coolant pressure scram is programmed with load (circulator inlet temperature) such that a scram is initiated when reactor coolant pressure is 50 psi below normal. The low primary coolant pressure scram provides protection for inadequate core cooling that could result in temperature limits being exceeded. For rapid depressurization accidents, a scram would occur instantaneously such that changes in the low pressure setpoint would not have an impact on the consequences of the accident.

Two cases were reanalyzed based on the assumption that a scram occurs at a pressure of 90 psi below normal. The first is the offset rupture of a two inch line in the helium purification regeneration piping as currently analyzed in FSAR Sections 4.3.3 and 14.8. For this accident, which is assumed to occur at 100 percent power, a scram occurs at 50 psi below normal pressure in about 120 seconds. At this time, primary coolant flow is 97% of rated and the peak core average temperature is 13°F above normal. Under the assumption that a scram does not occur until primary coolant pressure is 90 psi below normal, in 220 seconds primary coolant flow will have been reduced to 92.5 percent ~~below~~ of rated and the core average outlet-temperature peaks at 44°F above normal. After the reactor scram, core average outlet temperature ~~reduces~~ decreases with continued core cooling.

The second case analyzed is the effect of continued plant operation at 100 and at 25 percent power with reduced primary coolant pressure just above the assumed scram value of 90 psi below normal. For these two conditions, circulator speed increases in response to the decreased helium inventory; however the core power –

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to-flow ratio only changes by 0.01 at both 25 and 100 percent power. The impact on helium temperature at the inlet to the steam generators is ~~a small~~ an increase of 9°F at 100 percent power and 40°F at 25 percent power.

Therefore, it was concluded that since neither a safety limit or equipment design limit is exceeded, the assumption of a lower primary coolant pressure for initiation of a reactor scram is ~~not safety-significant.~~ acceptable. Based on the review of these results, the staff concludes that this analysis provides an acceptable basis to justify a lower trip setpoint for this safety function. With the allowance for instrument uncertainty the new trip setpoint is 64.6 psi below normal primary coolant pressure.

B. Primary Coolant Pressure - High

The setpoint for the high primary coolant pressure scram is programmed with load (circulator inlet temperature) such that a scram is initiated when the reactor coolant pressure is 7.5 percent (approximately 53 psi) above normal. The high primary coolant pressure scram and preselected steam generator dump is a backup for the primary coolant moisture monitor scram and dump of a leaking steam generator. The FSAR safety analyses address six accident cases related to steam ingress with various postulated failures of the protection systems. Of the six accident cases analyzed only four involve safety actions initiated on high primary coolant pressure. Each case was reanalyzed as follows based on the assumption of a high pressure scram at 70 psi above normal.

(1) Wrong Loop Dump. For this case it is assumed that the moisture monitors initiate a scram, however the wrong loop is dumped. The only safety action initiated on high pressure is the initiation of the steam generator depressurization program which reduces steam ingress by lowering steam generator pressure. For this case the current analysis results in the safety action being initiated after about 80 seconds with a total steam ingress of 14,580 lbs of which 180 lbs react with core graphite. With the assumption of a higher pressure trip, 70 psi above normal, the depressurization program is initiated at 120 seconds with a total steam ingress of 15,000 lbs and no change in the amount that reacts with core graphite.

(2) Moisture Monitor Failure and Correct Loop Dump. For this case it is assumed that no safety actions are initiated by the moisture monitors. On high primary coolant pressure, a reactor scram is initiated and the preselected loop dump isolates the leaking steam generator. For this case the current analysis results in a scram and steam generator dump in 95 seconds with a total steam ingress of 2,160 lbs of which 855 lbs react with core graphite. With the assumption of a higher pressure trip, 70 psi above normal, safety action is initiated in 157 seconds with a total steam ingress of 3,200 lbs of which 1,112 lbs react with core graphite.

(3) Moisture Monitor Failure and Incorrect Loop Dump. This case is the same as (2) above, however, it is assumed that the intact loop is dumped. For this case the current analysis results in a total steam ingress of 15,740 lbs of which 894 lbs react with core graphite. With the assumption of a higher pressure trip, the total steam ingress is 15,600 lbs of which 1,162 lbs react with core graphite.

Although the reanalysis shows a lower total steam ingress, it was noted that the original analysis was conservative since it assumed that the leakage was terminated 30 minutes after the time a scram was initiated rather than 30 minutes after the time of the accident.

(4) Moisture Monitor Failure with Correct Loop Isolation and Failure to Dump. This case is the same as (2) above; however, it is assumed that the faulty steam generator is only isolated and not dumped. Thus the only difference in this case and case (2) above is that the entire 6,000 lbs inventory of the steam generator is assumed to enter the primary coolant system. For the current analysis the total steam ingress is 8,080 lbs of which 919 lbs react with core graphite. With the assumption of a higher value for the high pressure trip, the total steam ingress is 9,200 lbs of which 1,200 lbs reacts with core graphite.

The overall impact of the change from 50 to 70 psi above normal for the high primary coolant pressure trip is an increase of 30 percent in amount of moisture that reacts with core graphite for those cases for which multiple failures of the protection systems are assumed. While the impact of increased steam/graphite

reaction was not specifically analyzed, the present analysis of steam graphite reactions as noted in FSAR Section 14.5.2.2 demonstrates that these effects are not safety-significant with regard to the structural integrity of graphite core support posts, bottom reflector blocks or core support blocks. Further, there would not be a safety-significant change in the effect on fuel particles or potential fission product release to the primary coolant system. More importantly the consequences of increased steam ingress do not result in any significant change in the peak primary coolant pressure which could challenge the primary coolant system safety valves. Therefore, based on the review of these results, the staff concludes that this analysis provides an acceptable basis to justify a higher value to establish the setpoint for the higher primary coolant pressure scram. With the allowance for instrument uncertainty, the new trip setpoint is 44 psi above normal primary coolant pressure.

C. Superheat Header Temperature - Low

Low superheat header temperature initiates a loop shutdown at a setpoint of 800°F coincident with high differential temperature between loop 1 and loop 2 at a setpoint of 50°F. This provides protection to preclude a flood out of the steam generators due to an increase in feedwater flow or a reduction in helium flow to a loop. For this analysis, it is assumed that the trip on core superheat temperature is initiated at a superheat temperature of 780°F with a differential between loops of 65°F or greater. The impacts of these assumptions were considered for two cases; 30% and 100% power.

There are two basic considerations that are applicable to this safety function. The first is that the trip should be initiated prior to reaching flood out temperatures. Since the saturation temperature at normal operating pressure of 2400 psig is 660°F, the assumption of 780°F for mitigative action provides an adequate margin of safety. The second consideration is that loop shutdown should occur before a turbine trip is initiated on low main steam temperature. This turbine protection is initiated when the main steam temperature, i.e. the temperature of the combined loop steam flow, falls to 800°F.

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Since the superheat header temperature for each loop is maintained by controlling primary coolant flow in that loop, a malfunction in one loop which would result in low superheat temperature for that loop would not result in a change in superheat temperature for the other loop. At 30% power, steam temperature is controlled at 880°F. Therefore, if a loop isolation occurs at a superheat header temperature of 780°F, the temperature difference will be 100°F and the main steam temperature will be 830°F. This is sufficient to assure that the loop temperature difference is sufficient to satisfy that portion of the trip logic and that loop isolation will occur prior to the occurrence of a turbine trip on low main steam temperature. At 100% power, steam temperature is controlled at 1000°F. For this case the temperature difference between loops is 230°F and the main steam temperature is 890°F when the trip occurs. Thus, the available margins are greater than at 30% power.

Therefore, based on this review, the staff concludes that this analysis provides an acceptable basis to justify a change in the bases for determining the setpoint for these protection system channels. With the allowance for instrument uncertainty, the new trip setpoints are 798°F for low superheat header temperature at a 44.8°F differential temperature between loops.

D. Circulator Speed-Low.

The setpoint for the low circulator speed circulator trip is 1910 rpm below normal, as programmed by load (feedwater flow). The circulator trip results in a reduction in plant load when operating at full load conditions. Also the low feedwater flow setpoint which is programmed by circulator speed is lowered to preclude a trip of the operating circulator. Under conditions for single circulator operation the ratio of circulator speed to feedwater flow is about a factor of two greater than normal operation.

For a malfunction which would result in a loss of circulator speed, the coast-down of the circulator is only a matter of a few seconds. For the reanalyzed case it was assumed that a trip does not occur until a reduction of circulator speed to 2390 rpm below normal. At part load conditions, the time to reach this value is about four seconds. In addition, the trip includes a fixed 5 second

delay to avoid spurious trips due to changes in circulator speed during normal operation. In contrast, the response of the steam generator superheat header temperature to changes in helium flow is about 30 seconds. Therefore, it was concluded that the assumption of a circulator trip at 2390 rpm below normal is ~~not safety significant.~~ acceptable.

Based on this review, the staff concludes that this analysis provides an acceptable basis to justify a change in the bases for determining the trip setpoint for these protection system channels. With the allowance for instrumentation uncertainties the trip setpoint is 1850 rpm below normal as programmed by feedwater flow.

E. Fixed Feedwater Flow - Low

The setpoint for the fixed low feedwater flow circulator trip is 20% of rated feedwater flow. Since both circulators in a loop are tripped on low flow, this results in a loop shutdown. This provides protection against steam generator operation at tube temperatures above design values.

Two basic operating conditions were addressed in the revised analysis to support an assumption that the fixed low feedwater flow trip occurs at 5% of rated feedwater flow. The first condition addressed a sudden total loss of feedwater flow to a steam generator and to both loops. Under this condition feedwater flow is reduced to zero flow instantaneously. Due to a built-in five second delay, loop isolation occurs five seconds following the occurrence of these events. Under this condition the consequences of these events are the same as the original FSAR analysis and tube temperatures remain below design limits.

The second condition addressed was continued operation at reduced feedwater flow. However, under this condition, the minimum feedwater flow rate considered was 14 percent of rated flow. Further, with regard to static boiling stability conditions, it is noted that even if unstable boiling conditions are encountered at flow rates below 18.6 percent, the maximum helium temperature available at the Superheater II inlet would be less than 957°F and thus could not result in significantly exceeding the maximum allowable temperature of 952°F at the limiting

tube location. While it is noted that this analysis is conservative, since it postulates that a hot gas streak could penetrate the entire EES bundle from top to bottom with no mixing, the staff cannot conclude that this analysis justifies an assumption of loop isolation at feedwater flows as low as 5 percent of rated flow.

Therefore, based on this analysis, the staff concludes that an acceptable basis has not been set forth to support the proposed change in the low feedwater flow trip setpoint.

F. <u>Loss of Circulator Bearing Water</u>.

The circulator trip on the loss of bearing water is initiated when the bearing water pressure with respect to primary coolant pressure is reduced to a low differential pressure of 475 psid. This provides protection for the circulator bearings on a loss of the normal and backup bearing water supply systems. In addition to a trip of the helium circulator, the protective action includes the firing of the bearing water accumulators to provide a source of bearing water during circulator coast down and operation of the circulator brake and seal system, as well as isolation of the circulator auxiliary system service lines. The latter insures the integrity of the primary coolant system when the dynamic seal provided by the bearing water system is not available.

The reanalysis of the operation of the loss of bearing water protection was undertaken based on the assumption that the safety action is initiated at a differential pressure of 450 psid. From prior testing of the bearing water system, the minimum differential pressure during a transient response of the system was 375 psid. From this data it is concluded that a 25 psid reduction in the trip setpoint would result in transient minimum differential pressures of 350 psid. Based on this value analysis demonstrate that the bearing acceptance criteria of a minimum clearance of 0.001 inches will be maintained.

Therefore, based on this review, the staff concludes that an acceptable basis has been provided to justify a lower setpoint for this safety action. With an allowance for instrument uncertainty, the new trip setpoint is 459 psid.

G. Circulator Speed - High

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The setpoint for the trip of the helium circulator steam turbine drive is 11,000 rpm. This provides protection to assure that the circulator does not exceed the design speed limit of 13,500 rpm. For steam line ruptures downstream of the circulator steam turbine, the maximum speed is 13,264 rpm with no control action or overspeed trip. Therefore, this event does not establish a limit for an acceptable high speed setpoint.

With the presently assumed overspeed trip value, the maximum transient overspeed for a loss of restraining torque event (blade shedding) is 13,050 rpm. Reanalysis with an assumed overspeed trip value of 11,500 rpm results in a maximum transient overspeed of 13,267 rpm. Based on these analyses, it is extrapolated that an assumed overspeed trip at 11,750 rpm would result in a maximum transient overspeed of 13,370 rpm or less.

Therefore, based on this analysis the staff concludes that an assumed overspeed trip value of 11,750 rpm provides an acceptable basis for determining the trip setpoint for this protection function. With the allowance for instrument uncertainty, the overspeed trip setpoint is 11,495 rpm.

H. Neutron Flux-High

The setpoint for the high neutron flux scram is 140 percent of rated thermal power. As a consequence of uncertainties in the reactor power measurement, the setpoint for the high neutron flux scram has been administratively controlled and adjusted at conservative values based on indicated reactor power. The licensee provided curves that are currently being used to control the setpoint for the high neutron flux scram as well as the high neutron flux rod withdrawal prohibit. Further, the licensee proposed to delete the values for the trip setpoints for the protective actions and to note that these settings are to be established for each fuel cycle and implemented based upon the approval of the Nuclear Facility Safety Committee. The staff finds that this proposal is unacceptable; therefore the curves which define these setpoints ~~have been included~~ must be retained in the Technical Specification requirements. [since these changes could potentially be an unreviewed safety question.]

Summary
~~Conclusion:~~

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In addition to the proposed changes for the trip setpoints for the plant protection system, a number of additional changes were proposed in the format of the Technical Specifications. These changes are primarily a part of an overall upgrade program to provide an improved statement of requirements consistent with the format of Technical Specifications for light water reactors. At this time the staff has a number comments on the specifics of these proposed changes that require resolution before action can be taken on these proposed changes. However, those changes related to trip setpoints are safety-significant in that the current specification requirements do not include adequate margins for instrumentation uncertainty. Therefore, these changes are being incorporated in Appendix A of Facility Operating License, No. DPR-34 at this time. Based on this review, the staff concludes that the proposed changes related to the trip setpoints for the plant protection systems are acceptable, with the exception of Fixed Feedwater Flow - Low. This change will be addressed in a seperate review.

 Enclosure 2

3.3 LIMITING SAFETY SYSTEM SETTINGS

Applicability

Applies to the trip settings for instruments and devices which provide for monitoring of reactor power, hot reheat temperature, reactor internal pressure, and moisture content of the helium coolant.

Objective

To provide for automatic protective action such that the principal process variables do not exceed a safety limit as a result of transients.

Specification LSSS 3.3 - Limiting Safety System Settings

The Limiting Safety System Settings for trip shall be as specified in Table 3.3.1.

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Specification LSSS 3.3

Table 3.3-1

LIMITING SAFETY SYSTEM SETTINGS

PARAMETER	FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
1. Reactor Core Limiting Safety System Settings			
a) Linear Channel-High (Neutron Flux)	Scram	Varies as a Function of Indicated Thermal Power ~~(%)~~ per Figure 3.3-1	Varies as a Function of Indicated Thermal Power ~~(%)~~ per Figure 3.3-1
b) Reheat Steam Temperature-High	Scram	≤ 1055 degree F	≤ 1061 degree F
c) Primary Coolant Pressure-Programmed Low	Scram	≤ 64.6 psi below normal, programmed with Circulator Inlet Temperature. Upper TRIP SETPOINT of ≥ 635.4 psia.	≤ 67 psi below normal, programmed with Circulator Inlet Temperature per Figure 3.3-2. Upper limit to produce trip at ≥ 633 psia.

Specification LSSS 3.3

Table 3.3-1 (Continued)

LIMITING SAFETY SYSTEM SETTINGS

PARAMETER	FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
2. Reactor Vessel Pressure Limiting Safety System Settings			
a) Primary Coolant Pressure-Programmed High	Scram and Preselected Loop Shutdown and Steam/Water Dump	≤ 44 psi above normal, programmed with Circulator Inlet Temperature. Upper TRIP SETPOINT of ≤ 744 psia. Lower TRIP SETPOINT of ≤ 536 psia.	≤ 47 psi above normal, programmed with Circulator Inlet Temperature per Figure 3.3-2. Upper limit to produce trip at ≤ 747 psia. Lower limit to produce trip at ≤ 539 psia.
b) Primary Coolant Moisture-High	Scram, Loop Shutdown, and Steam/Water Dump	≤ 60.5 degree F dewpoint temperature	≤ 60.5 degree F dewpoint temperature
c) PCRV Pressure:	Pressure Relief		
Rupture Disc (Low Set Safety Valve)		812 psig plus or minus 8 psi	820 psig

Specification LSSS 3.3

Table 3.3-1 (Continued)

LIMITING SAFETY SYSTEM SETTINGS

PARAMETER	FUNCTION	TRIP SETPOINT	ALLOWABLE VALUE
Low Set Safety Valve		796 psig plus or minus 8 psi	804 psig
Rupture Disc (High Set Safety Valve)		832 psig plus or minus 8 psi	840 psig
High Set Safety Valve		812 psig plus or minus 8 psi	820 psig
d) Helium Circulator Penetration Interspace Pressure:	Pressure Relief		
Rupture Disc (2 Per Penetration)		825 psig plus or minus 17 psi	842 psig
Safety Valve (2 Per Penetration)		805 psig plus or minus 24 psi	829 psig
e) Steam Generator Penetration Interspace Pressure:	Pressure Relief		
Rupture Disc (2 For Each Steam Generator)		825 psig plus or minus 17 psi	842 psig
Safety Valve (2 For Each Steam Generator)		475 psig plus or minus 14 psi	489 psig

~~Attachment~~ 5
~~P-85214~~

Fort St Vrain #1
Technical Specifications
Amendment No.
Page 3.3-3a

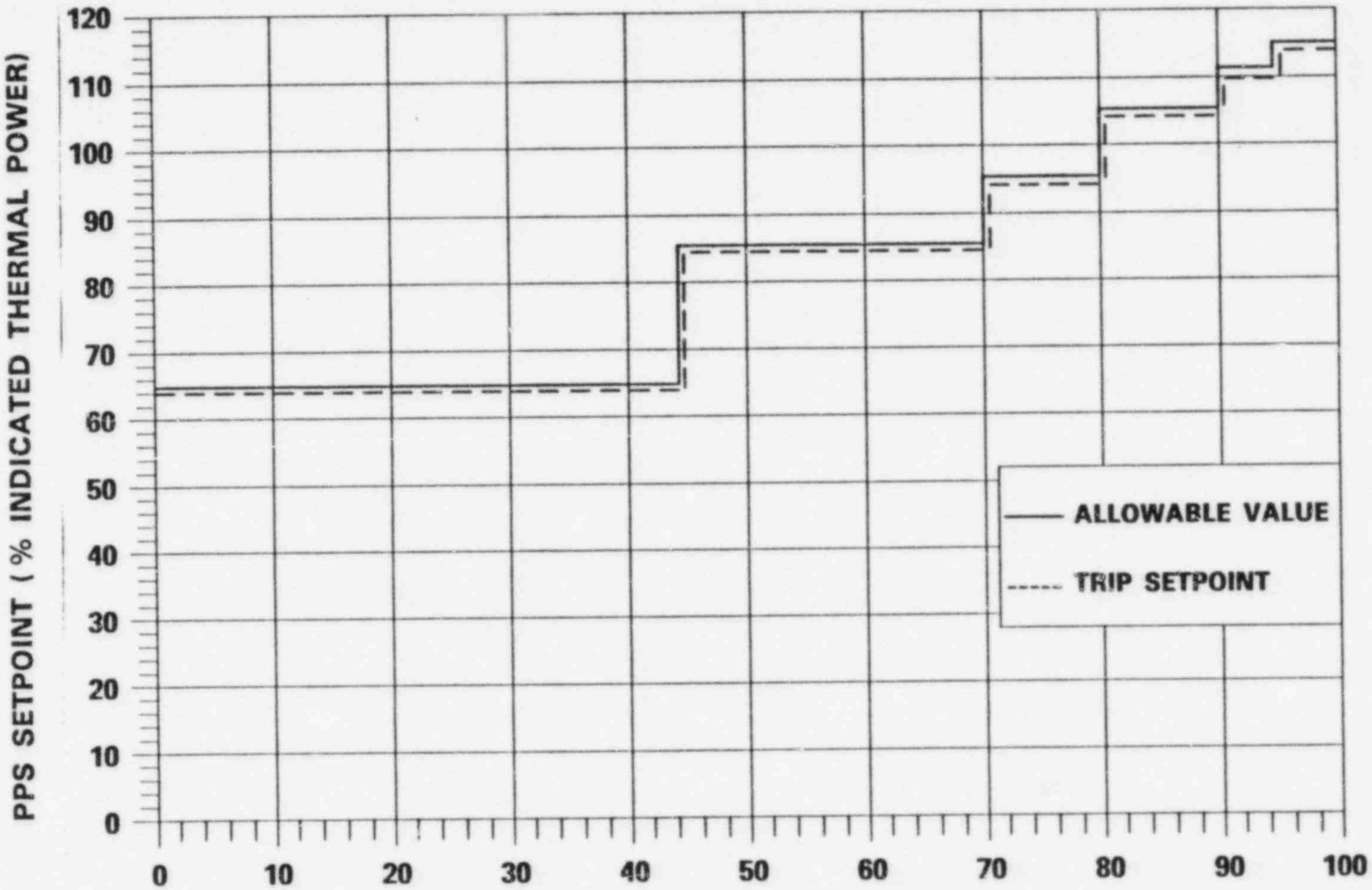

Figure 3.3-1

HIGH NEUTRON FLUX SCRAM DETECTOR DECALIBRATION CURVES FOR CYCLE 4

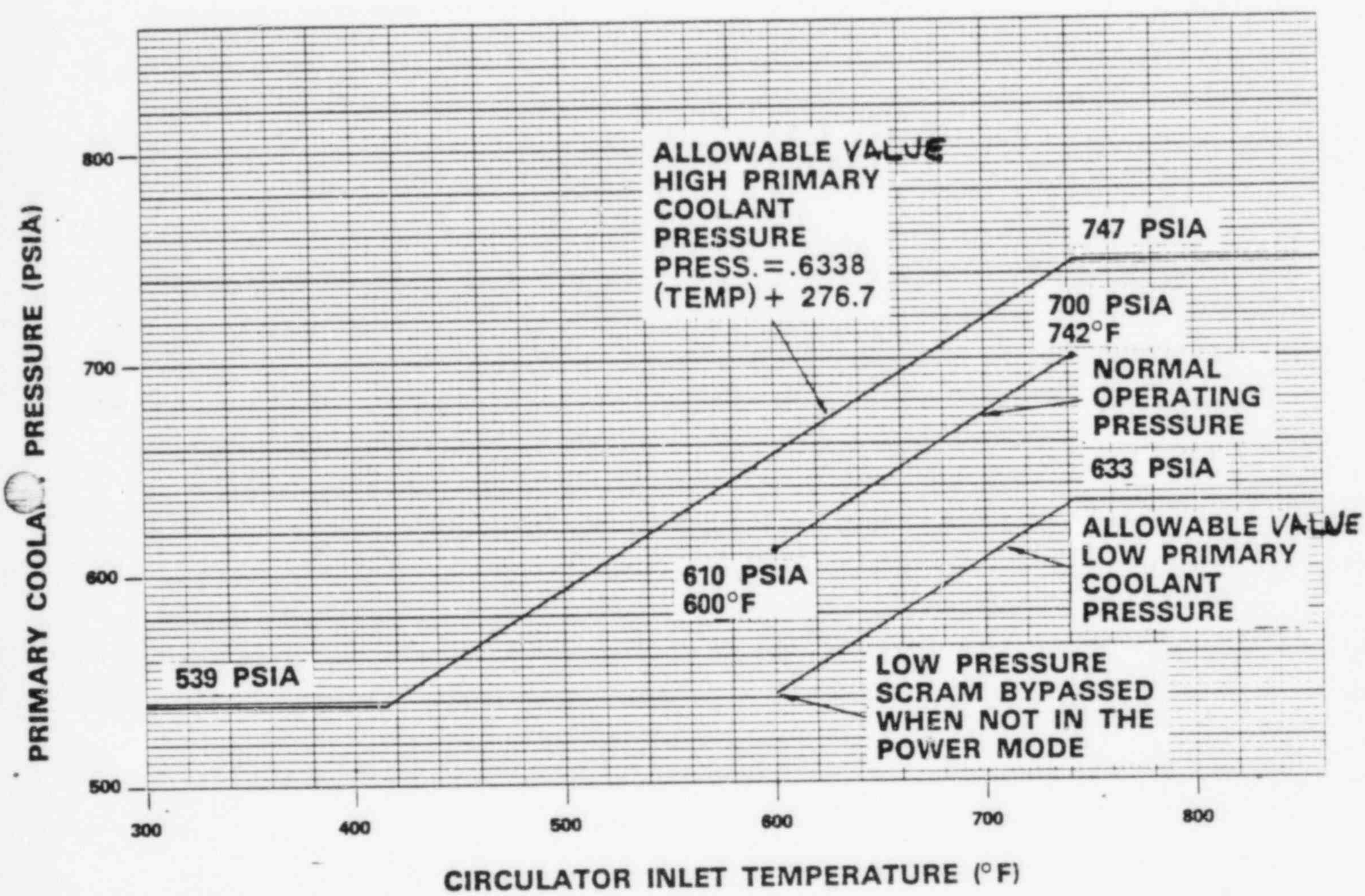

FIGURE 3.3-2

PRIMARY COOLANT PRESSURE vs. CIRCULATOR INLET TEMPERATURE

ALLOWABLE OPERATION

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Specification LSSS 3.3 - Limiting Safety System Settings

TABLE 3.3.1

Parameter	Function	Trip Setting
1. Reactor Core Limiting Safety System Settings		
a) High Neutron Flux	Scram	≤ 140% of rated thermal power
b) High Reheat Steam Temperature	Scram	≤ 1075°F
c) Low Primary Coolant Pressure	Scram	≤ 50 psi below rated, programmed with load
2. Reactor Vessel Pressure Limiting Safety System Settings		
a) High Primary Coolant Pressure	Scram and Preselected Loop Shutdown and Steam/Water Dump	≤ 53 psi above rated, programmed with load. Upper programmed limit set to produce trip at ≤ 775 psia
b) High Moisture in the Primary Coolant	Scram, Loop Shutdown and Steam/Water Dump	≤ 67°F dewpoint temperature (corresponds to ≤ 500 ppmv H_2O @ 700 psia pressure)
c) PCRV Pressure	Pressure Relief	
Rupture Disc (Low Set Safety Valve)		1 @ 812 psig ± 1%
Low Set Safety Valve		1 @ 796 psig ± 1%
Rupture Disc (High Set Safety Valve)		1 @ 832 psig ± 1%
High Set Safety Valve		1 @ 812 psig ± 1%
d) Helium Circulator Penetration Interspace Pressure	Pressure Relief	
Rupture Disc (2 per penetration)		825 psig ± 2%

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TABLE 3.3.1 (continued)

	Parameter	Function	Trip Setting
	Safety Valve (2 per penetration)		805 psig ± 3%
e)	Steam Generator Penetration Interspace Pressure	Pressure Relief	
	Rupture Disc (2 for each steam generator)		825 psig ± 2%
	Safety Valve (2 for each steam generator)		475 psig ± 3%

(NO CHANGE THIS PAGE)

4.4 INSTRUMENTATION AND CONTROL SYSTEMS - LIMITING CONDITIONS FOR OPERATION

Applicability

Applies to e plant protective system and other critical instrumentation and controls.

Objective

To assure the operability of the plant protective system and other critical instrumentation by defining the minimum operable instrument channels and trip settings.

Specification LCO 4.4.1 - Plant Protective System Instrumentation, Limiting Conditions for Operation

The limiting conditions for the plant protective system instrumentation are shown on Tables 4.4-1 through 4.4-4. These tables utilize the following definitions:

Degree of Redundancy - Difference between the number of operable channels and the minimum number of operable channels which when tripped will cause an automatic system trip.

Operable Channel - A channel is operable if it is capable of fulfilling its design functions.

Inoperable Channel - Opposite of operable channel.

Tables 4.4-1 through 4.4-4 are to be read in the following manner: If the minimum operable channels or the minimum degree of redundancy for each functional unit of a table cannot be met or cannot be bypassed under the stated permissible bypass conditions, the following action shall be taken:

For Table 4.4-1, the reactor shall be shut down within 12 hours, except that to facilitate maintenance on the Plant Protective System (PPS) moisture monitors, the moisture monitor input trip functions to the Plant Protective System which cause scram, loop shutdown, circulator trip, and steam water dump may be disabled for up to 72 hours. During the time that the Plant Protective System moisture monitor trips are disabled, an observer in direct communication with the reactor operator shall be positioned in the control room in the location of pertinent instrumentation. The observer shall continuously monitor the primary coolant moisture levels indicated by at least two moisture monitors and the primary coolant pressure indications and shall alert the reactor operator to any indicated moisture or pressure change.

For Table 4.4-2, the affected loop shall be shut down within 12 hours.

(NO CHANGE THIS PAGE)

For Table 4.4-3, the affected helium circulator shall be shut down within 12 hours.

For Table 4.4-4, the reactor shall be shut down within 24 hours.

If, within the indicated time limit, the minimum number of operable channels and the minimum degree of redundancy can be reestablished, the system is considered normal and no further action needs to be taken.

Specification LCO 4.4-1

Table 4.4-1 (Part 1)

INSTRUMENTATION SETPOINTS FOR PLANT PROTECTIVE SYSTEM, SCRAM

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
1a.	Manual Scram (Control Room)	Not Applicable	Not Applicable
1b.	Manual Scram (Outside Control Room)	Not Applicable	Not Applicable
2a.	STARTUP Channel High	≤8.3E+04 cps	≤9.3E+04 cps
2b.	Wide Range Channel Rate of Change- High	≤4.5 dpm	≤4.5 dpm
3a.	Linear Channel-High Channels 3,4,5 (Neutron Flux) (b)	See Table 3.3-1 Varies as a Function of Indicated Thermal Power (a)	See Table 3.3-1 Varies as a Function of Indicated Thermal Power (a)
3b.	Linear Channel-High Channels 6,7,8 (Neutron Flux) (b)	See Table 3.3-1 Varies as a Function of Indicated Thermal Power (a)	See Table 3.3-1 Varies as a Function of Indicated Thermal Power (a)
4.	Primary Coolant Moisture (b) a) High Level Monitor	≤60.5 degree F dewpoint	≤60.5 degree F dewpoint
	b) Loop Monitor	≤20.4 degree F dewpoint	≤20.4 degree F dewpoint
5.	Reheat Steam Temperature -High (b)	≤1055 degree F	≤1061 degree F

Specification LCO 4.4-1

Table 4.4-1 (Part 1) (Continued)

INSTRUMENTATION SETPOINTS FOR PLANT PROTECTIVE SYSTEM, SCRAM

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
6.	Primary Coolant Pressure -Programmed Low	See Table 3.3-1 ≤64.6 psi below normal, programmed with Circulator Inlet Temperature. Upper TRIP SETPOINT ≥ 635.4 psia.	See Table 3.3-1 ≤67.0 psi below normal, programmed with Circulator Inlet Temperature per Figure 3.3-1. Upper limit to produced trip at ≥ 633 psia.
7.	Primary Coolant Pressure -Programmed High	See Table 3.3-1 ≤44 psi above normal, programmed with Circulator Inlet Temperature. Upper TRIP SETPOINT of ≤ 744 psia. Lower TRIP SETPOINT of ≤ 536 psia.	See Table 3.3-1 ≤47 psi above normal, programmed with Circulator Inlet Temperature per Figure 3.3-1. Upper limit to produce trip at ≤ 747 psia. Lower limit to trip at ≤ 539 psia.
8.	Hot Reheat Header Pressure -Low	≥44 psig	≥44 psig
9.	Main Steam Pressure-Low	≥1529 psig	≥1529 psig
10.	Plant Electrical System-Loss	>278V ≥ 31.5 Seconds	>278V ≥ 35 Seconds
11.	Two Loop Trouble Scram Logic	Not Applicable	Not Applicable
12.	High Reactor Building Temperature (Pipe Cavity)	≤161 degree F	≤165 degree F

Specification LCO 4.4.1

Table 4.4-2 (Part 1)

INSTRUMENTATION TRIP SETPOINTS FOR THE PLANT PROTECTIVE SYSTEM, LOOP SHUTDOWN

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
1a.	Steam Pipe Rupture Under PCRV, Loop 1	$\leq$ 8.68 VDC	$\leq$ 8.86 VDC
1b.	Steam Pipe Rupture Under PCRV, Loop 2	$\leq$ 8.68 VDC	$\leq$ 8.86 VDC
1c.	Steam Pipe Rupture, North Pipe Cavity Loop 1	$\leq$ 8.68 VDC	$\leq$ 8.86 VDC
1d.	Steam Pipe Rupture, South Pipe Cavity Loop 1	$\leq$ 8.68 VDC	$\leq$ 8.86 VDC
1e.	Steam Pipe Rupture, North Pipe Cavity Loop 2	$\leq$ 8.68 VDC	$\leq$ 8.86 VDC
1f.	Steam Pipe Rupture, South Pipe Cavity Loop 2	$\leq$ 8.68 VDC	$\leq$ 8.86 VDC
2a.	High Pressure, Pipe Cavity	$\leq$ 1.3" H2O	$\leq$ 1.3" H2O
2b.	High Temperature, Pipe Cavity	$\leq$ 125 degree F	$\leq$ 125 degree F
2c.	High Pressure, Under PCRV	$\leq$ 1.3" H2O	$\leq$ 1.3" H2O
2d.	High Temperature, Under PCRV	$\leq$ 125 degree F	$\leq$ 125 degree F
3a.	Loop 1 Shutdown Logic	Not Applicable	Not Applicable
3b.	Loop 2 Shutdown Logic	Not Applicable	Not Applicable
4a.	Circulator 1A and 1B Shutdown - Loop Shutdown Logic	Not Applicable	Not Applicable

Specification LCO 4.4.1

Table 4.4-2 (Part 1)

INSTRUMENTATION TRIP SETPOINTS
FOR THE PLANT PROTECTIVE SYSTEM, LOOP SHUTDOWN

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
4b.	Circulator 1C and 1D Shutdown - Loop Shutdown Logic	Not Applicable	Not Applicable
5a.	Steam Generator Penetration Overpressure Loop 1	$\leq$ 796 psig	$\leq$ 796 psig
5b.	Steam Generator Penetration Overpressure Loop 2	$\leq$ 796 psig	$\leq$ 796 psig
6a.	High Reheat Header Activity, Loop 1	$\leq$ 3.2 mrem/hr Above Background	$\leq$ 3.2 mrem/hr Above Background
6b.	High Reheat Header Activity, Loop 2	$\leq$ 3.2 mrem/hr Above Background	$\leq$ 3.2 mrem/hr Above Background
7a.	Low Superheat Header Temperature, Loop 1	$\geq$ 798 degree F	$\geq$ 798 degree F
7b.	Low Superheat Header Temperature, Loop 2	$\geq$ 798 degree F	$\geq$ 798 degree F
7c.	High Differential Temperature Between Loop 1 and Loop 2	$\leq$ 44.8 degree F	$\leq$ 44.8 degree F
8.	Primary Coolant Moisture		
	a) High Level Monitor	----------------See Table 4.4-1	---------------
	b) Loop Monitor	----------------See Table 4.4-1	---------------

Specification LCO 4.4.1

Table 4.4-3 (PART 1)

INSTRUMENTATION TRIP SETPOINTS FOR THE PLANT PROTECTION SYSTEM, CIRCULATOR TRIP

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
1.	Manual Trip (Steam)	Not Applicable	Not Applicable
2.	Circulator Speed - High (Steam)	≤11,495 rpm	≤11,570 rpm
3.	Circulator Drain Malfunction	≥8 psid	≥8 psid
4.	Manual Trip (Water)	Not Applicable	Not Applicable
5.	Circulator Speed - High (Water)	≤8,589 rpm	≤8,670 rpm
6.	Circulator Speed - Low Programmed	<1850 rpm Below Normal As Programmed by Feedwater Flow (4 circulators)	<1974 rpm Below Normal As Programmed by Feedwater Flow (4 circulators) per Figure 4.4-1a
7a.	Loop 1, Fixed Feedwater Flow - Low (Both Circulators)	>~~177,500~~ 230,500 lb/hr (~~15.4%~~ 20% of normal Full Load)	(later) ~~>171,750 lb/hr (14.9% of normal Full Load~~)
7b.	Loop 2, Fixed Feedwater Flow - Low (Both Circulators)	~~>177,500~~ 230,500 lb/hr (~~15.4%~~ 20% of normal Full Load)	(later) ~~>171,750 lb~~/hr ~~(14.9% of normal Full Load)~~

Specification LCO 4.4.1

Table 4.4-3 (PART 1)

INSTRUMENTATION TRIP SETPOINTS FOR THE PLANT PROTECTION SYSTEM, CIRCULATOR TRIP

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
8a.	Loop 1, Programmed Feedwater Flow - Low (Both Circulators)	≤211,000 lb/hr (18.3%) Below normal as programmed by Circulator Speed. (4 circulators)	≤230,530 lb/hr (20%) Below normal as programmed by Circulator Speed. (4 circulators) per Figure 4.4-1a
8b.	Loop 1, Programmed Feedwater Flow - Low (One Circulator)	≤211,000 lb/hr (18.3%) Below normal as programmed by Circulator Speed. (2 circulators)	≤230,530 lb/hr (20%) Below normal as programmed by Circulator Speed. (2 circulators) per Figure 4.4-1b
9a.	Loop 2, Programmed Feedwater Flow - Low (Both Circulators)	≤211,000 lb/hr (18.3%) Below normal as programmed by Circulator Speed. (4 circulators)	≤230,530 lb/hr (20%) Below normal as programmed by Circulator Speed. (4 circulators) per Figure 4.4-1a
9b.	Loop 2, Programmed Feedwater Flow - Low (One Circulator)	≤211,000 lb/hr (18.3%) Below normal as programmed by Circulator Speed. (2 circulators)	≤230,530 lb/hr (20%) Below normal as programmed by Circulator Speed (2 circulators) per Figure 4.4-1b

Specification LCO 4.4.1

Table 4.4-3 (PART 1)

INSTRUMENTATION TRIP SETPOINTS FOR THE PLANT PROTECTION SYSTEM, CIRCULATOR TRIP

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
10a.	Circulator Seal Malfunction-Low	$\geq$-5.2" H_2O,	$\geq$-6" H_2O,
10b.	Circulator Seal Malfunction-High	$\leq$+74.8" H_2O	$\leq$+75.6" H_2O
11.	Loss of Circulator Bearing Water	$\geq$459 psid	$\geq$459 psid
12.	Circulator Penetration Overpressure	$\leq$796 psig	$\leq$796 psig

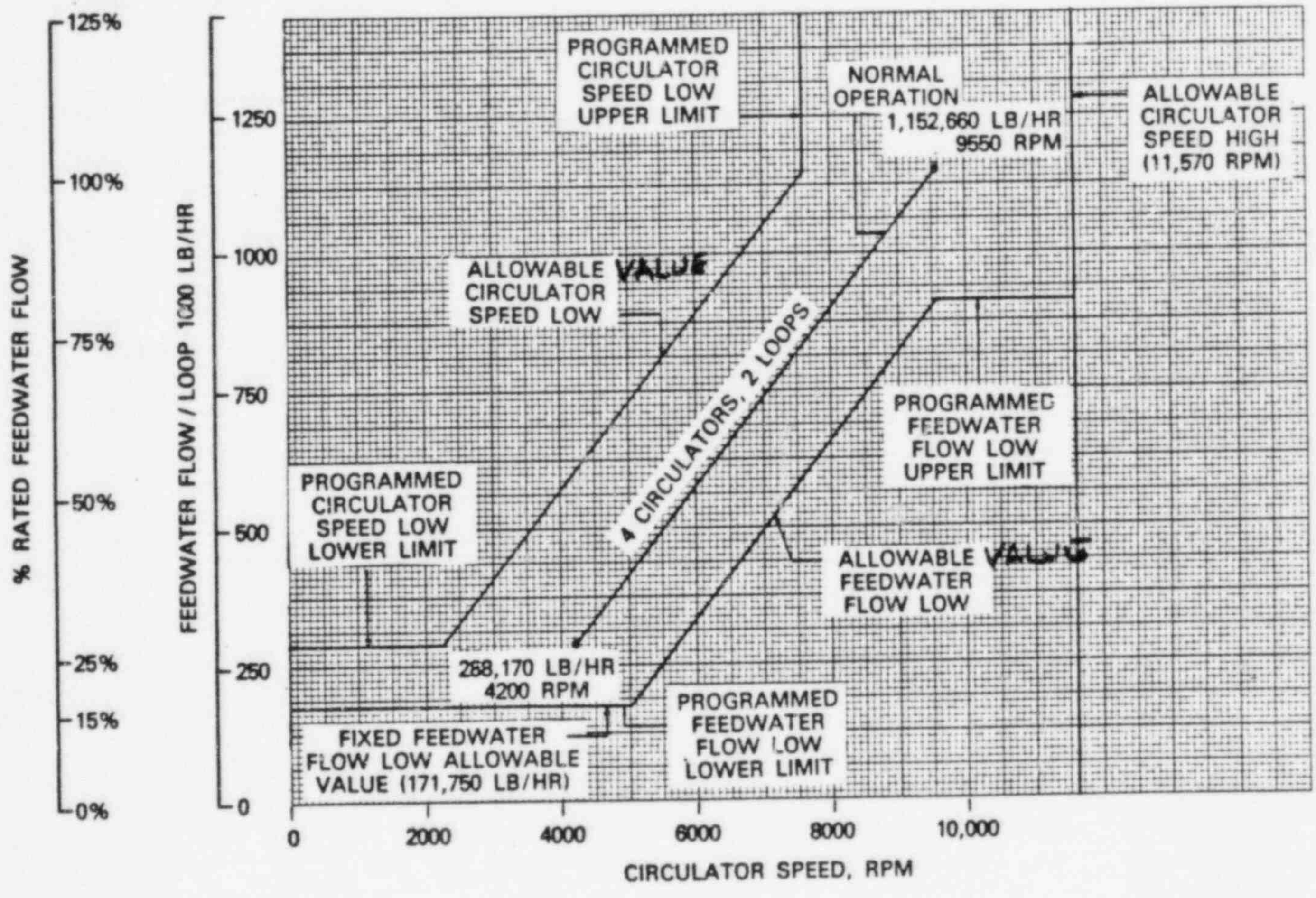

Figure 4.4 - 1a

FEEDWATER FLOW vs. CIRCULATOR SPEED FOR OPERATION IN THE POWER MODE

(4 CIRCULATORS)

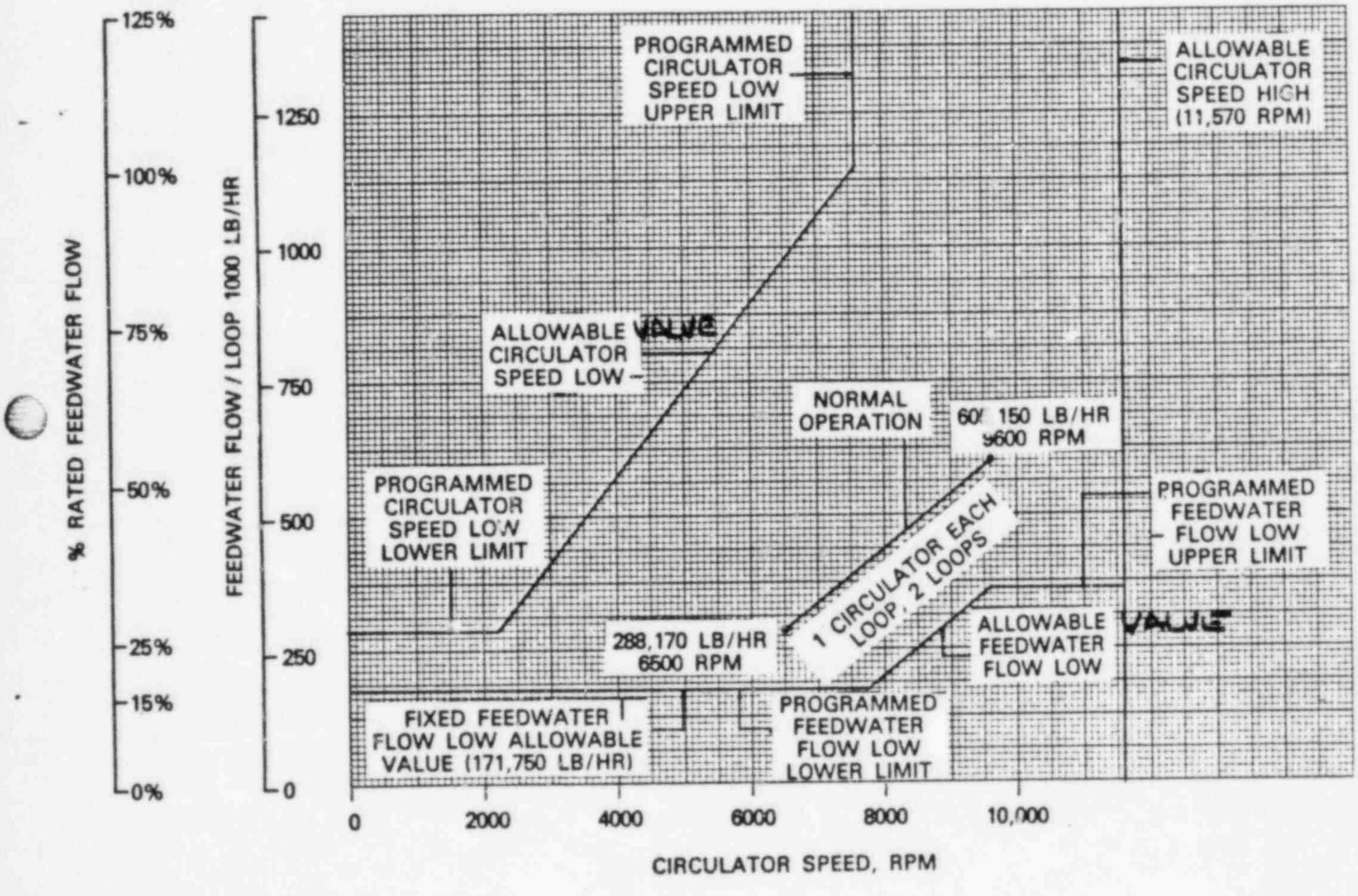

Figure 4.4 - 1b

FEEDWATER FLOW vs. CIRCULATOR SPEED
FOR OPERATION IN THE POWER MODE

(2 CIRCULATORS)

Specification LCO 4.4.1

Table 4.4-4 (Part 1)

INSTRUMENTATION TRIP SETPOINTS FOR THE PLANT PROTECTIVE SYSTEM, ROD WITHDRAWAL PROHIBIT (RWP)

NO.	FUNCTIONAL UNIT	TRIP SETPOINT	ALLOWABLE VALUE
1.	STARTUP channel-Low Count rate (Channels 1 and 2)	$\geq$ 4.2 cps	$\geq$ 3.2 cps
2a.	Linear Channel-5% RWP* (Channels 3, 4 and 5)	$\leq$ 5% (x)	$\leq$ 5%
2b.	Linear Channel-5% RWP* (Channels 6, 7 and 8)	$\leq$ 5% (x)	$\leq$ 5%
3a.	Linear Channel-30% RWP* (Channels 3, 4 and 5)	$\leq$ 30% (y)	$\leq$ 30%
3b.	Linear Channel-30% RWP* (Channels 6, 7 and 8)	$\leq$ 30% (y)	$\leq$ 30%
4a.	Wide Range Channel Rate of Change - High (Channels 3, 4 and 5)	$\leq$ 1.5 dpm	$\leq$ 2 dpm
4b.	STARTUP Channels Rate of Change - High (Channels 1 and 2)	$\leq$ 1.5 dpm	$\leq$ 2 dpm
5a.	Linear Channel-High power RWP (Channels 3, 4 and 5)	Varies as a Function of Indicated Thermal Power ~~(z)~~ per Figure 4.4-2	Varies as a Function of Indicated Thermal Power ~~(z)~~ per Figure 4.4-2

* % of RATED THERMAL POWER

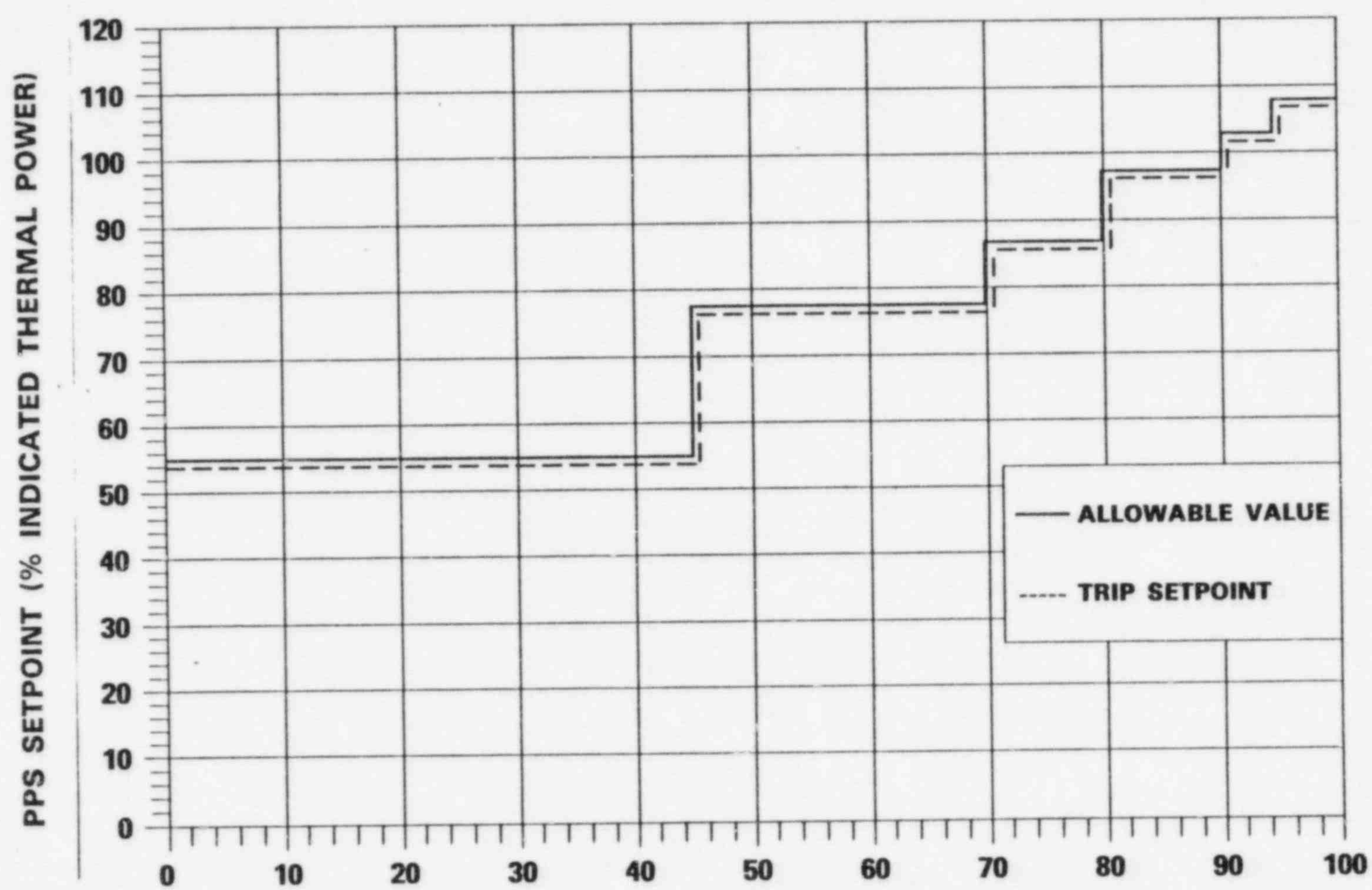

Figure 4.4-2

HIGH NEUTRON FLUX ROD WITHDRAWAL PROHIBIT

DETECTOR DECALIBRATION CURVES FOR CYCLE 4

Specification LCO 4.4-1

TABLE 4.4-1

INSTRUMENT OPERATING REQUIREMENTS FOR PLANT PROTECTIVE SYSTEM, SCRAM

NO.	FUNCTIONAL UNIT	~~TRIP SETTING~~	MINIMUM OPERABLE CHANNELS	MINIMUM DEGREE OF REDUNDANCY	PERMISSIBLE BYPASS CONDITIONS
1a.	Manual (Control Room)	--	1	0	None
1b	Manual (Emergency Board)	--	2 (f)	1	None
2.	Startup Channel-High	$\leq 10^5$ cps	2	1	Reactor Mode Sw. in "RUN"
3a.	Linear Channel-High, Channels 3, 4, 5	≤ 140% power (a)	2 (f)	1	None
3b.	Linear Channel-High, Channels 6, 7, 8	≤ 140% power (a)	2 (f)	1	None
4.	Primary Coolant Moisture High Level Monitor Loop Monitor	 ≤67°F Dewpoint ≤27°F Dewpoint	 1 (f,t) 2/Loop (f,t)	 1 (c) 1/Loop	 None (h)
5.	Reheat Steam Temperature - High (b)	≤ 1075°F (a)	2 (b) (f)	1	None
6.	Primary Coolant Pressure - Low	≤ 60 psig below normal, load programmed (a)	2 (f) (k)	1	Less than 30% rated power
7.	Primary Coolant Pressure - High	≤ 7.5% above normal rated, load programmed (a)	2 (f) (k)	1	None
8.	Hot Reheat Header Pressure - Low	≥ 35 psig	2 (f)	1	Less than 30% rated power
9.	Main Steam Pressure - Low	≥ 1500 psig	2 (f)	1	Less than 30% rated power
10.	Plant Electrical System-Loss	(d)	2 (e) (f)	1	None
11.	Two Loop Trouble	--	2	1	Reactor mode switch in "Fuel Loading"
12.	High Reactor Building Temperature (Pipe Cavity)	≤ 325°F	2 (f)	1	None

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Specification LCO 4.4-1

TABLE 4.4-2

INSTRUMENT OPERATING REQUIREMENTS FOR PLANT PROTECTIVE SYSTEM, LOOP SHUTDOWN

NO.	FUNCTIONAL UNIT	~~TRIP SETTING~~	MINIMUM OPERABLE CHANNELS	MINIMUM DEGREE OF REDUNDANCY	PERMISSIBLE BYPASS CONDITIONS
1a.	Steam Pipe Rupture Under PCRV, Loop 1 (j)	≤ 9 v. dc.	2 (f)(s)	1	None
1b.	Steam Pipe Rupture Under PCRV, Loop 2 (j)	≤ 9 v. dc.	2 (f)(s)	1	None
1c.	Steam Pipe Rupture, North Pipe Cavity Loop 1 (j)	≤ 9 v. dc.	2 (f)	1	None
1d.	Steam Pipe Rupture, South Pipe Cavity Loop 1 (j)	≤ 9 v. dc.	2 (f)	1	None
1e.	Steam Pipe Rupture, North Pipe Cavity Loop 2 (j)	≤ 9 v. dc.	2 (f)	1	None
1f.	Steam Pipe Rupture, South Pipe Cavity Loop 2 (j)	≤ 9 v. dc.	2 (f)	1	None
2a.	High Pressure, Pipe Cavity (j)	≤ 2.5" w.g.	2 (f)	1	None
2b.	High Temperature, Pipe Cavity (j)	≤ 130°F	2 (f)	1	None
2c.	High Pressure, Under PCRV (j)	≤ 2.5" w.g.	2 (f)	1	None
2d.	High Temperature, Under PCRV (j)	≤ 130°F	2 (f)	1	None
3a.	Loop 1 Shutdown Logic	--	2	1	None
3b.	Loop 2 Shutdown Logic	--	2	1	None
4a.	Circulator 1A and 1B Shutdown -Loop Shutdown Logic	Circ. 1A & 1B Shutdown	2	1	None
4b.	Circulator 1C and 1D Shutdown -Loop Shutdown Logic	Circ. 1C & 1D Shutdown	2	1	None

Specification LCO 4.4-1

TABLE 4.4-2 (continued)

NO.	FUNCTIONAL UNIT	~~TRIP SETTING~~	MINIMUM OPERABLE CHANNELS	MINIMUM DEGREE OF REDUNDANCY	PERMISSIBLE BYPASS CONDITIONS
5a.	Steam Generator Penetration Overpressure, Loop 1	≤ 810 psig	2 (f)	1	None
5b.	Steam Generator Penetration Overpressure Loop 2	≤ 810 psig	2 (f)	1	None
6a.	High Reheat Header Activity, Loop 1	≤ 5 mr/hr Above Background	2 (f)	1	None
6b.	High Reheat Header Activity, Loop 2	≤ 5 mr/hr Above Background	2 (f)	1	None
7a.	Low Superheat Header Temperature, Loop 1 (p)	≥ 800°F	2 (f)	1	Less than 30% Rated Power
7b.	Low Superheat Header Temperature, Loop 2 (p)	≥ 800°F	2 (f)	1	Less than 30% Rated Power
7c.	High Differential Temp. Between Loop 1 and Loop 2 (p)	≤ 50°F	2 (f)	1	None

Specification LCO 4.4-1

TABLE 4.4-4

INSTRUMENT OPERATING REQUIREMENTS
FOR REACTOR PROTECTIVE SYSTEM, ROD WITHDRAWAL PROHIBIT (RWP)

NO.	FUNCTIONAL UNIT	~~TRIP SETTING~~	MINIMUM OPERABLE CHANNELS	MINIMUM DEGREE OF REDUNDANCY	PERMISSIBLE BYPASS CONDITIONS
1.	Startup Channel-Low count rate	~~≥ 2.5 cps~~	2	1	Above 10^{-3}% Rated Power
2a.	Linear Channel-Low power RWP (Channels 3, 4 and 5)	~~≥ 5% (m)~~	2	1	(g)
2b.	Linear Channel-Low power RWP (Channels 6, 7 and 8)	~~≥ 5% (m)~~	2	1	(g)
3a.	Linear Channel-High power RWP (Channels 3, 4 and 5)	~~≤ 30% (n)~~	2 (f)	1	None
3b.	Linear Channel-High power RWP (Channels 6, 7 and 8)	~~≤ 30% (n)~~	2 (f)	1	None

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)	≤ 11,000 rpm	2 (f)	1	None
7.	Manual	------------	1	0	None
8.	Circulator Seal Malfunction (r)	≥ -10"H_2O, or ≤ 80"H_2O d	2 (f)	1	Opposite loop shutdown or circulator seal malfunction trip of 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.

Amendment No. 18

OCT 2 8 1977

Enclosure 3

Staff Comments on P-85214, Attachment 3 Significant Hazards Consideration

In the analysis of the loss of feedwater flow events, it is noted that the circulator trips on fixed feedwater flow-low provides protection against steam generator operation at tube temperatures above design values. Further, it is noted that this protection is applicable for a sudden loss of feedwater flow as well as reduced feedwater flow events. With regard to the latter it is important to recognize that this protection is only active during the power mode of operation due to the bypass interlock of the interlock sequence switch. As a consequence, the safety analysis for this trip function should demonstrate that for loss of or reduced feedwater flow events at less than 30 percent power, this protection is not required. If this is not possible, the fixed low feedwater flow trip should not be bypassed in the low power mode of operation.

Enclosure 4(a)

Staff Comment on P-85214, Attachment 2

1. (p2-1) Definitions should be stated in the present tense to be consistent with current technical specification definition, e.g., 2.1a: ACTION is that part...

2. The definition of Allowable Value should be revised to: The ALLOWABLE VALUE is the least conservative "as found" value for a channel to be considered OPERABLE.

   This clarifies the proposed use of "acceptable" in terms of operability and avoids the use of another defined term (TRIP SETPOINT) in this definition.

3. Definition 2.1c and 2.1f should be deleted since they do not provide any additional clarification of the defined terms.

4. The definition of Minimum Operable Channels should be revised to delete the second sentence. What actions may usually be required are not relevant to the definition.

5. The definition of Trip Setpoint should be revised to: The TRIP SETPOINT is the least conservative "as left" value for a channel to be considered OPERABLE.

6. (p 3.3-1) The applicability should be revised to: As shown in Part 2 of Table 4.4-1 for PPS instrumentation and Specificaton 4.2.7 for PCRV Pressurization.

   This is consistent with the applicability stated in Specification 4.4.1 as well or includes the appropriate specification reference for PCRV Pressurization.

   Likewise the Action should be revised to: ...declare the PPS channel or PCRV Pressurization device inoperable and apply the applicable ACTION requirement of LCO 4.4.1 for PPS channels or LCO 4.2.7 for PCRV Pressurization devices.

7. (p 3.3-6) The upper and lower curves should be identified as the ALLOWABLE VALUES for the respective channel.

8. (p 4.0-2) Specification 4.0.1 and 4.0.2 do not establish any specific requirements and should be deleted. Information such as this should be included in a Bases section if it is desired to retain it.

9. LCO 4.4.1 should be revised to: ...the values shown in Part 1 of Tables 4.4-1 through 4.4-5. Consistent word useage: shown rather than displayed.

10. The second part of the Action for LCO 4.4.1 should be deleted. The intent of Specification 4.0.6 is to preclude mode changes without reliance on Action requirements. As noted in 4.0.6, exceptions are stated in the

individual specifications and the intent is that this be noted for each Functional Unit and not for all of LCO 4.4.1. The exceptions should be indicated as a footnote under the ACTION column for the Functional Unit to which it applies. The footnote should state: The provisions of Specification 4.0.6 are not applicable.

The staff would find this acceptable for the following:

Table 4.4-1, Functional Units: 2b,3a, 3b, 4b, 5, 6, 7, 8, 9, 10, 11, 12.
Table 4.4-2, Functional Units: la thru lf, 2a thru 2d, 5a, 5b, 6a, 6b, 7a, 7b, 7c.
Table 4.4-3, Function Units: 2, 3, 5, 6, 7a, 7b, 8a, 8b, 9a, 9b, 10a, 10b, 11, 12.
Table 4.4-4, Functional Units: 2a, 2b, 3a, 3b, 4a, 5a, 5b.
Table 4.4-5, Functional Units: 2, 3, 4.

11. (p 4.4-2a) The Trip Setpoint and Allowable Values for Functional Unit 10, Plant Electrical System-Loss, should include the time delay settings of less than or equal to 31.5 and 35 seconds respectively, consistent with Table 4.4-5. However, it is preferable to only specify these values in one Table only and use a cross reference to that Table which states those values. Thus the preferred alternative is to reference Table 4.4-5 rather than to duplicate this information. This general comment applies to all duplication of trip setpoints and allowable values for Tables 3.3-1 and Tables 4.4-1 thru 4.4-5.

12. (p 4.4-2b) It is not clear why S/D is indicated as an Applicable Mode for functional unit la, Manual Scram, since the reactor mode switch must be in the OFF position and therefore a Reactor Scram exists. If there is a basis for requiring operability in S/D, then Action 1 should be revised to note an appropriate remedial measure if the LCO is not met in the S/D mode.

13. Footnote (f) is used for the primary coolant moisture monitors. If this footnote has a designation other than (t), the Bases for LCO 4.4.5 will have to be revised at the same time this change is made since it references footnote (t).

14. (p 4.4-2d) Footnote (c) should be revised to include: All undervoltage relays for one channel must be OPERABLE for the channel to be considered OPERABLE.

    However, if it is desired that one inoperable undervoltage relay may be tripped in lieu of having to place that channel in trip, a new action statement should be proposed to indicate that this is a required action.

15. (p 4.4-2e) For footnote (g) item III should be deleted since the special test exemption as stated in LCO 4.9.2 has expired and is no longer applicable.

16. Footnote (k) as presently stated is unacceptable. First, it is assumed that with a refueling surveillance interval for the moisture monitors, the calibration of the moisture monitors would be performed in the refueling, shutdown, or startup mode in which case the operability requirements do not apply. Secondly, it is inappropriate for the technical specification to address future actions such as the installation and testing new moisture monitors as conditions under which it would be acceptable to disable the moisture monitor trip functions. It is, however, recognized that moisture ingress has presented problems during startup when moisture levels may increase due to heatup of the primary coolant system. Further it is desirable to preclude the potential for inadvertent scram and steam/water dump under these conditions until such time that dry out and removal of residual moisture levels is accomplished by the helium purification system.

    Therefore footnote (k) should be revised to state: "In the event that abnormal levels of moisture exists in the primary coolant system during plant startup, the moisture monitor trip functions may be bypassed for up to 72 hours in either the Low Power (LP) or Power (P) operating modes to permit cleanup of residual moisture by the helium purification system. During the time...."

17. (p 4.4-2f) There are a couple of problems with ACTION 2 that are typical of many of the action statements.

    The first is that the Action would allow 12 hours for restoration of two or more inoperable channels to operable status. This is contrary to the intent of specifying the minimum operable channels as two and that when this requirement is not met, Specification 4.0.5 applies. As stated, this Action would allow 12 hours to restore channels to operable status when no safety actions could be initiated by those channels.

    The second is that when an inoperable channel is placed in trip, it is to remain in this condition until it is restored to operable status or the plant is in a mode where the LCO no longer applies. If the action does not indicate that it is permissable to subsequently place the inoperable channel in bypass, the surveillance requirements for the remaining channel could not be performed since they necessitate placing the channel under test in a trip condition to verify its operability. Thus the action statements for such channels should be stated in the following format:

    > With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 12 hours or place the inoperable channel in a tripped condition in the next hour. The inoperable channel may be bypassed for up to 2 hours for surveillance testing of other channels per SR 5.4.1.

    When only one channel is inoperable, placing it in trip does not result in initiation of a safety action. If two channels are inoperable the minimum channels operable requirement would not be met and since this

condition is not addressed by the action statement, Specification 4.0.5 requires a plant shutdown or placing the plant in a mode where the requirements do not apply. Thus it is not necessary for these action requirements to address a situation where placing a channel in trip would cause a safety action.

With regard to functional Unit 1b, Manual Scram, an action statement in the above format could be used, however, the time limit to restore the channel to operable status could be increased to 48 hours if desired since it would be consistent with the allowable out of service time noted in Action 1 for a manual trip channel.

With regard to the 2 hours allowed for surveillance testing in the above action, there may be some cases where this time limit would not provide sufficient time to complete the surveillance requirement. If this is the case, a new action statement should be proposed with a suitable time limit. However, to facilitate the staff's review of such proposals, a justification should be provided to indicate why additional surveillance time is required. The above comment applies also to ACTIONs 5,8,9,10 and 12.

18. LCO 4.5.2 and 4.7.1 require at least two neutron flux monitors capable of continuously indicating the neutron flux level in the core. Action 3 for the two startup channels is stated such that these channels are required to be operable in order to satisfy LCO 4.5.2 or 4.7.1. The intent of the action for the startup channels is that these channels are operable in the Refueling mode and as clarified by note (d), when the reactor scram is reset and the control rod drive system is capable of rod withdrawl. When these conditions do not exist, the LCO is not applicable including the Action requirements. Thus, Action 3 should be revised to state: ...suspend all operations involving control rod withdrawal.

If it is desired to retain a reference to LCO 4.5.2 and 4.7.1, then the following may be added to the action statement: Conform to LCOs 4.5.2 and 4.7.1 if applicable.

Conformance to these LCOs would only be required if the startup channels are the only available neutron flux monitors which are capable of continuouly indicating the neutron flux level within the core.

19. Consistent with comment 17 above, Action 4 should be revised to state:

> With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 12 hours or place the inoperable channel in a tripped condition within the next hour. In the event of abnormal levels of moisture in the primary coolant system, known to be due to an upset in the operation of the bearing water supply or seal systems, the moisture monitor input trip functions to the PPS which cause scram, loop, shutdown, circulator trip, and steam/water dump may be disabled for up to 72 hours. During the time that the mositure monitors

are inoperable an adequate number of observers in direct communication with th reactor operator shall be positioned within in the control room in the location of pertinent instrumentation. The observer(s) shall continuously monitor the primary coolant moisture levels indicated by at least two OPERABLE moisture monitors (PPS or Analytical Monitors) and the primary coolant pressure indications and shall alert the reactor operator of any indicated moisture or pressure change. During the time in which the moisture monitors are inoperable, the requirement of LCOs 4.2.10 and 4.2.11 shall be met and primary coolant shall not exceed a moisture concentration of 100 ppmv.

The only justification for bypassing the trip functions of the moisture monitors would be abnormal levels of moisture in the primary coolant system due to upset in bearing water supply or seal systems. If the moisture monitors are inoperable they should be restored to operable service in 12 hours or the unit should be shutdown until the required repairs are made.

20. The location of footnotes in Tables 4.4-1 through 4.4-5 should follow a consistent format. For example, footnote (e) is used to describe the combination of channels required to initiate a scram and is located next to the stated number of channels to trip on page 4.4-2b. It is not used to clarify the Functional Unit description. However, footnotes (l) and (m) in table 4.4-2 are a similar type of clarification and are used under the Functional Unit column for both Part 1 and Part 2 of the table. Footnotes (1) and (m) should only be used in Part 2 under the Channels to Trip Column.

Some footnotes clarify those components which comprise a channel as well as the operation of those components which produce a trip. Other footnotes indicate Permissible Bypass Conditions. These footnotes have been placed under the Minimum Channels Operable column, however, they do not provide clarifications with regard to the number of channels specified as the minimum operable. Rather these clarifications are applicable to each channel and should be noted under the Total Number of Channels column. Further this notation applies when all channnels are operable and not just when the minimum specified are operable.

21. (p4.4-2e) Footnotes (h) and (i) define conditions under which operation may proceed when less than all components comprising a channel are operable. This should be addressed by an action statement and not by footnotes. Footnotes may be used to clarify those components which comprise the channel, however, appropriate action requirements should address operation with inoperable channel components.

For example for footnote (h) the second sentence should be deleted and the following Action statement should be noted and added to the ACTION column for Functional Unit 5, Reheat Steam Temperature-High:

ACTION - With the number of OPERABLE thermocouples one less than the total number of thermocouples for each channel, POWER and/or LOW POWER operation may proceed provided the following conditions are satisfied: (a) two thermocouples are OPERABLE in at least one operating loop, and (b) the inoperable thermocouples are restored to operable status during the next REFUELING.

Footnote (i) should be revised to state: Two thermocouples constitute one channel.

The following Action statement should be noted and added to the ACTION column for Functional Units 6 and 7:

ACTION - With the number of OPERABLE thermocouples one less that the total number of thermocouples per channel, POWER and/or LOW POWER operation may proceed provided the following conditions are satisfied:

(a) One thermocouple is OPERABLE for each channel in at least one operating loop, and

(b) The inoperable thermocouples are restored to OPERABLE status during the next REFUELING.

22. (p 4.4-3e) In footnote (1) the word indication should be replaced with trip. Safety action is initiated by the trip of the associated channels and not as indication of monitored parameters.

23. Footnote (o) should be revised to state: Logic associated with each channel must be OPERABLE for those MODES for which the channel is required to be OPERABLE.

24. (p. 4.4-4c) Footnote (r) should be deleted as a reference for Functional Units 1 and 2. This LCO applies for all modes regardless of whether or not the circulator is required to be operable by LCO 4.2.1. Since LCO 4.2.1 only requires one operable circulator in each loop, the implication of note (r) is that LCO 4.4.1 for these channels only applies to one circulator. Footnote(s) should be used for Functional Units 1 and 2 since it more appropriately defines the conditions under which these channels must be operable. Also the note (r) reference to LCO 4.2.2 only establishes requirements for systems which must be operable in order for the circulator to be considered operable. LCO 4.4.1 establishes additional operability requirements for an operable circulator that are in addition to the requirements of LCO 4.2.2.

25. (p. 4.4-4d) For Functional Units 10a, 10b, 11 and 12, footnotes (r) and (s) both are appropriate for defining the applicable modes for which operability is required. Footnote(s) should be added.

26. (p. 4.4-4g) With regard to the use of the letter (t) for a footnote, see comment 13 above.

27. (p4.4-5d) Footnotes (x) and (y) provide clarifications of the reset of bistables and are used as footnotes to the trip setpoints in table 4.4-4, part 1. These notes are also used in Part 2 under the Applicable Mode column. The latter is redundant and does not provide any clarification that is directly related to applicable modes and should be deleted.

28. (p4.4.5e) Consistent with Comment 18 above, ACTION 10 should be revised to state:

    (a) Suspend all operations involving control rod withdrawl, and

    (b) Restore the inoperable channel to OPERABLE status in 12 hours or actuate the rod withdrawal prohibit in the next hour.

    Since this action is only applicable in the S/U or R modes, the proposed action to be in S/U in 12 hours is not appropriate.

29. For Action 11, that portion of the statement beginning with "terminate incore maintenance" and the reset of the statement should be deleted. Action 11 is only applicable in the S/U, or P modes of operation at which time incore maintenance would not be performed.

30. (p4.4-8) The bases for Linear Channel - High (neutron flux) states: See Technical Specification LSSS 3.3. This should be revised to state See Bases for Specification LSSS 3.3. This comment also applies where these same words were used for other channels.