ATTACHMENT 2

To

Proposed Amendment No. 98A

Letter from C. R. Steinhardt (WPSC)

To

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Affected TS Pages

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3.5 INSTRUMENTATION SYSTEM

APPLICABILITY

Applies to reactor protection and engineered safety features instrumentation systems.

OBJECTIVE

To provide for automatic initiation of the engineered safety features in the event that principal process variable limits are exceeded, and to delineate the conditions of the reactor protection instrumentation and engineered safety features circuits necessary to ensure reactor safety.

SPECIFICATIONS

a. Setting limits for instrumentation which initiate operation of the engineered safety features shall be as stated in Table TS 3.5-1.

b. For on-line testing or in the event of failure of a subsystem instrumentation channel, plant operation shall be permitted to continue at RATED POWER in accordance with Tables TS 3.5-2 through TS 3.5-5.

c. If for Tables TS 3.5-2 through TS 3.5-5, the number of channels of a particular subsystem in service falls below the limits given in Column 3, or if the values in Column 4 cannot be achieved, operation shall be limited according to the requirement shown in Column 6, as soon as practicable.

d. In the event of subsystem instrumentation channel failure permitted by TS 3.5.b, Tables TS 3.5-2 through TS 3.5-5 need not be observed during the short period of time (approximately 4 hours) the operable subsystem channels are tested, where the failed channel must be blocked to prevent unnecessary reactor trip.

e. The accident monitoring instrumentation in Table TS 3.5-6 shall be OPERABLE whenever the plant is above HOT SHUTDOWN. In the event the limits given in Columns 1 and 2 cannot be maintained, operator action will be in accordance with the respective notes. A change in operational MODES or conditions is acceptable with an inoperable accident monitoring instrumentation channel(s).

BASIS - Instrumentation System (TS 3.5)

Instrumentation has been provided to sense accident conditions and to initiate operation of the engineered safety features.[1] Section 2.3 of these specifications describes the LIMITING SAFETY SYSTEM SETTINGS for the protective instrumentation.

Safety Injection

Safety Injection can be activated automatically or manually to provide additional water to the Reactor Coolant System or to increase the concentration of boron in the coolant.

Safety Injection is initiated automatically by (1) low pressurizer pressure, (2) low main steam line pressure in either loop and (3) high containment pressure. Protection against a loss-of-coolant accident is primarily through signals (1) and (3). Protection against a steam line break is primarily by means of signal (2).

Manual actuation is always possible. Safety Injection signals can be blocked during those OPERATING MODES where they are not "required" for safety and where their presence might inhibit operating flexibility; they are generally restored automatically on return to the "required" OPERATING MODE.

Reactor Trip Breakers

With the addition of the automatic actuation of the shunt trip attachment, diverse features exist to effect a reactor trip for each reactor trip breaker. Since either trip feature being OPERABLE would initiate a reactor trip on demand, the flexibility is provided to allow plant operation on a reactor trip breaker (with either trip feature inoperable) for up to 72 hours. This specification also requires the plant to proceed to the HOT SHUTDOWN condition in accordance with the Kewaunee STANDARD SHUTDOWN SEQUENCE if a reactor trip breaker is bypassed for greater than 8 hours.

Containment Spray

Containment sprays are also actuated by a high containment pressure signal (Hi-Hi) to reduce containment pressure in the event of a loss-of-coolant or steam line break accident inside the containment.

The containment sprays are actuated at a higher containment pressure (approximately 50% of design containment pressure) than is Safety Injection (10% of design). Since spurious actuation of containment spray is to be avoided, it is initiated only on coincidence of high containment pressure (Hi-Hi) sensed by three sets of one-out-of-two containment pressure signals provided for its actuation.

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[1] USAR Section 7.5

Containment Isolation

A containment isolation signal is initiated by any signal causing automatic initiation of Safety Injection or may be initiated manually. The containment isolation system provides the means of isolating the various pipes passing through the containment walls as required to prevent the release of radioactivity to the outside environment in the event of a loss-of-coolant accident.

Steam Line Isolation

In the event of a steam line break, the steam line isolation valve of the affected line is automatically isolated to prevent continuous, uncontrolled steam release from more than one steam generator. The steam lines are isolated on Hi-Hi containment pressure or high steam flow in coincidence with Lo-Lo T_{avg} and Safety Injection or Hi-Hi steam flow in coincidence with Safety Injection. Adequate protection is afforded for breaks inside or outside the containment even under the assumption that the steam line check valves do not function properly.

Setting Limits

1. The high containment pressure limit is set at about 10% of the maximum internal pressure. Initiation of Safety Injection protects against loss-of-coolant[2] or steam line break[3] accidents as discussed in the safety analysis.

2. The Hi-Hi containment pressure limit is set at about 50% of the maximum internal containment pressure for initiation of containment spray and at about 30% for initiation of steam line isolation. Initiation of containment spray and steam line isolation protects against large loss-of-coolant or steam line break accidents as discussed in the safety analysis.

3. The pressurizer low-pressure limit is set substantially below system operating pressure limits. However, it is sufficiently high to protect against a loss-of-coolant accident as shown in the safety analysis.

4. The steam line low-pressure signal is lead/lag compensated and its setpoint is set well above the pressure expected in the event of a large steam line break accident as shown in the safety analysis.

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[2] USAR Section 14.3

[3] USAR Section 14.2.5

5. The high steam line flow limit is set at approximately 20% of nominal full-load flow at the no-load pressure and the high-high steam line flow limit is set at approximately 120% of nominal full-load flow at the full-load pressure in order to protect against large steam line break accidents. The coincident Lo-Lo T_{avg} setting limit for steam line isolation initiation is set below its HOT SHUTDOWN value. The safety analysis shows that these settings provide protection in the event of a large steam line break.

6. The setpoints and associated ranges for the undervoltage relays have been established to always maintain motor voltages at or above 80% of their nameplate rating and to prevent prolonged operation of motors below 90% of their nameplate rating. All safeguard motors were designed to accelerate their loads to operating speed with 80% nameplate voltage, but not necessarily within their design temperature rise. Prolonged operation below 90% of nameplate voltage may result in shortening of motor insulation life, but short-term operation below 90% of nameplate voltage will not result in unacceptable effects due to the service factor provided in the motors and the conservative insulation system used on the motors.

   The primary safeguard buses undervoltage trip (85.0% of nominal bus voltage) is designed to protect against a loss of voltage to the safeguard bus and assures that safeguard protection action will proceed as assumed in the USAR. The associated time delay feature prevents inadvertent actuation of the undervoltage relays from voltage dips, while assuring that the diesel generators will reach full capacity before the Safety Injection pump loads are sequenced on.

   The safeguard buses second level undervoltage trip (92.5% nominal bus voltage) is designed to protect against prolonged operation below 90% of nameplate voltage of safeguard pumps. The time delay of less than 5 minutes allows the operator time to restore voltage by minimizing or balancing loads on the safeguard buses while maintaining the preferred source of power. Up to 5 minutes of operation of safeguard pumps between 80% and 90% of nameplate voltage is acceptable due to the service factor and conservative insulation designed into the motors.

   Each relay in the undervoltage protection channels will fail safe and is alarmed to alert the operator to the failure.

   A blackout signal which occurs during the sequence loading following a Safety Injection signal will result in a re-initiation of the sequence loading logic at time step 0 as long as the Safety Injection signal has not been reset. The Kewaunee Emergency Procedures warn the operators that a Blackout Signal occurring after reset of Safety Injection will not actuate the sequence loading and instructs to re-initiate Safety Injection if needed.

Instrument OPERATING Conditions

During plant OPERATIONS, the complete protective instrumentation systems will normally be in service. Reactor safety is provided by the Reactor Protection Systems, which automatically initiates appropriate action to prevent exceeding established limits. Safety is not compromised, however, by continuing OPERATION with certain instrumentation channels out of service since provisions were made for this in the plant design. This specification outlines LIMITING CONDITIONS FOR OPERATION necessary to preserve the effectiveness of the Reactor Control and PROTECTION SYSTEM when any one or more of the channels is out of service.

Almost all reactor protection channels are supplied with sufficient redundancy to provide the capability for CHANNEL CALIBRATION and test at power. Exceptions are backup channels such as reactor coolant pump breakers. The removal of one trip channel on process control equipment is accomplished by placing that channel bistable in a tripped mode; e.g., a two-out-of-three circuit becomes a one-out-of-two circuit. The source and intermediate range nuclear instrumentation system channels are not intentionally placed in a tripped mode since these are one-out-of-two trips, and the trips are therefore bypassed during testing. Testing does not trip the system unless a trip condition exists in another channel.

The OPERABILITY of the instrumentation noted in Table TS 3.5-6 assures that sufficient information is available on these selected plant parameters to aid the operator in identification of an accident and assessment of plant conditions during and following an accident. In the event the instrumentation noted in Table TS 3.5-6 is not OPERABLE, the operator is given instruction on compensatory actions.

TABLE TS 3.5-6

ACCIDENT MONITORING INSTRUMENTATION OPERATING CONDITIONS FOR INDICATION

		1	2
NO.	FUNCTIONAL UNIT	REQUIRED TOTAL NO. OF CHANNELS	MINIMUM CHANNELS OPERABLE[1]
1	Auxiliary Feedwater Flow to Steam Generators (Narrow Range Level Indication Already Required OPERABLE by Table TS 3.5-2, Item 12)	1/steam generator[2]	1/steam generator
2	Reactor Coolant System Subcooling Margin	2[2]	1
3	Pressurizer Power Operated Relief Valve Position (One Common Channel Temperature, One Channel Limit Switch per Valve)	2/valve[2]	1/valve
4	Pressurizer Power Operated Relief Block Valve Position (One Common Channel Temperature, One Channel Limit Switch per Valve)	2/valve[2]	1/valve
5	Pressurizer Safety Valve Position (One Channel Temperature, and One Acoustic Sensor per Valve)	2/valve[2]	1/valve
6	Containment Water Level (Wide Range)	2[2]	1
7	Containment Hydrogen Monitor	2[3]	1
8	Containment Pressure Monitor (Wide Range)	2[2]	1

[1] With the number of OPERABLE accident monitoring instrumentation channels less than the minimum channels OPERABLE requirements, either restore the minimum number of channels to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and HOT SHUTDOWN within the following 6 hours.

[2] With the number of OPERABLE accident monitoring instrumentation channels less than the required total number of channels shown, either restore the inoperable channels to OPERABLE status within 14 days, or be in at least HOT STANDBY within the next 6 hours and HOT SHUTDOWN within the following 6 hours.

[3] With the number of OPERABLE accident monitoring instrumentation channels less than the required total number of channels shown, either restore the inoperable channels to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours and HOT SHUTDOWN within the following 6 hours.

TABLE TS 3.5-6

ACCIDENT MONITORING INSTRUMENTATION OPERATING CONDITIONS FOR INDICATION

		1	2
NO.	FUNCTIONAL UNIT	REQUIRED TOTAL NO. OF CHANNELS	MINIMUM CHANNELS OPERABLE[4]
9	Reactor Vessel Level Indication	2[5]	1
10.	Core Exit Thermocouples[6]	4 thermocouple/core quadrant[5]	2 thermocouple/core quadrant[7]

[4]With the number of OPERABLE accident monitoring instrumentation channels less than the minimum channels OPERABLE requirements, either restore the minimum number of channels to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and HOT SHUTDOWN within the following 6 hours.

[5]With the number of OPERABLE accident monitoring instrumentation channels less than the required total number of channels shown, either restore the inoperable channels to OPERABLE status within 14 days, or be in at least HOT STANDBY within the next 6 hours and HOT SHUTDOWN within the following 6 hours.

[6]Refer also to TS 3.11.c and TS 3.11.d.

[7]For the purposes of accident monitoring instrumentation, thermocouples on the axis may be included in either adjacent quadrant.

TABLE TS 4.1-1

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
1. Nuclear Power Range	Each shift(a) Effective Full Power Month(c)	Daily(a) Effective Full Power Quarter(c)	Monthly(b) Quarterly(d)	(a) Heat balance (b) Signal to ΔT; bistable action (permissive, rod stop, trips) (c) Upper and lower chambers for axial off-set using incore detectors. The check and calibration for axial offset shall also be performed prior to > 75% power following any core alteration. (d) Permissives P8 and P10 and the 25% reactor trip are tested quarterly.
2. Nuclear Intermediate Range	Each shift(a)*	Not applicable	Prior to each startup if not done previous week(b)	(a) Once/shift when in service (b) Log level; bistable action (permissive, rod stop, trips)
3. Nuclear Source Range	Each shift(a)*	Not applicable	Prior to each startup if not done previous week(b)	(a) Once/shift when in service (b) Bistable action (alarm, trips)
4. Reactor Coolant Temperature	Each shift*	Each refueling cycle not to exceed 18 months	Monthly(a) Monthly(b)	(a) Overtemperature ΔT (b) Overpower ΔT
5. Reactor Coolant Flow	Each shift	Each refueling cycle not to exceed 18 months(a)	Monthly	(a) Only if test indicates calibration required

*** Reference TS 4.1.d**

TABLE TS 4.1-1

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
6. Pressurizer Water Level	Each shift	Each refueling cycle not to exceed 18 months(a)	Monthly	(a) Only if test indicates calibration required
7. Pressurizer Pressure	Each shift	Each refueling cycle not to exceed 18 months(a)	Monthly	(a) Only if test indicates calibration required
8. a. 4-KV Voltage and Frequency	Not applicable	Each refueling cycle not to exceed 18 months	Monthly	Reactor protection circuits only
b. 4-KV Voltage (Loss of Voltage)	Not applicable	Each refueling cycle not to exceed 18 months	Monthly	Safeguards buses only
c. 4-KV Voltage (Degraded Grid)	Not applicable	Each refueling cycle not to exceed 18 months	Each refueling cycle not to exceed 18 months	Safeguards buses only
9. Analog Rod Position	Each shift(a)(b)	Each refueling cycle not to exceed 18 months(c)	Each refueling cycle not to exceed 18 months	(a) With step counters (b) Following rod motion in excess of 24 steps when computer is out of service (c) Only if test indicates calibration required

*** Reference TS 4.1.d**

TABLE TS 4.1-1

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
10. Rod Position Bank Counters	Each shift(a)(b)	Not applicable	Each refueling cycle not to exceed 18 months	(a) With analog rod position (b) Following rod motion in excess of 24 steps when computer is out of service
11. Steam Generator Level	Each shift	Each refueling cycle not to exceed 18 months(a)	Monthly	(a) Only if test indicates calibration required
12. Steam Generator Flow Mismatch	Each shift	Each refueling cycle not to exceed 18 months(a)	Monthly	(a) Only if test indicates calibration required
13. Charging Flow	Each shift	Each refueling cycle not to exceed 18 months	Not applicable	
14. Residual Heat Removal Pump Flow	Each shift (when in operation)	Each refueling cycle not to exceed 18 months	Not applicable	
15. Boric Acid Tank Level	Daily	Each refueling cycle not to exceed 18 months	Monthly	
16. Refueling Water Storage Tank Level	Weekly	Annually	Not applicable	

*** Reference TS 4.1.d**

TABLE TS 4.I-I

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS ANO TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
17. Volume Control Tank Level	Each shift	Each refueling cycle not to exceed 18 months	Not applicable	
18. a. Containment Pressure (SIS signal)	Each shift	Each refueling cycle not to exceed 18 months(b)	Monthly(a)	(a) Isolation Valve Signal (b) Only if test indicates calibration required
b. Containment Pressure (Steamline Isolation)	Each shift(a)	Each refueling cycle not to exceed 18 months(a)(b)	Monthly(a)	(a) Narrow range containment pressure (-3.0, +3.0 psig excluded) (b) Only if test indicates calibration required
c. Containment Pressure (Containment Spray Act)	Each shift	Each refueling cycle not to exceed 18 months(a)	Monthly	(a) Only if test indicates calibration required
d. Annulus Pressure (Vacuum Breaker)	Not applicable	Each refueling cycle not to exceed 18 months(a)	Each refueling cycle not to exceed 18 months	(a) Only if test indicates calibration required
19. Radiation Monitoring System	Daily*	Each refueling cycle not to exceed 18 months	Monthly	Includes only channels R11 thru R15, R17, R19, R21, and R23
20. Boric Acid Make-Up Flow Channel	Not applicable	Each refueling cycle not to exceed 18 months	Not applicable	

*** Reference TS 4.1.d**

TABLE TS 4.1-1

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
21. Containment Sump Level	Not applicable	Not applicable	Each refueling cycle not to exceed 18 months	
22. Accumulator Level and Pressure	Each shift	Each refueling cycle not to exceed 18 months	Not applicable	
23. Steam Generator Pressure	Each shift	Each refueling cycle not to exceed 18 months	Monthly	
24. Turbine First Stage Pressure	Each shift	Annually(a)	Monthly	(a) Only if test indicates calibration required
25. Portable Radiation Survey Instruments	Monthly*	Annually	Quarterly	
26. Protective System Logic Channel Testing	Not applicable	Not applicable	Monthly	Includes auto load sequencer
27. Deleted				

*** Reference TS 4.1.d**

TABLE TS 4.1-1

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
28. Turbine Overspeed Protection				
a. Electro-Hydraulic System	Not applicable	Not applicable	Each refueling cycle not to exceed 18 months	
b. Mechanical System	Not applicable	Each refueling cycle not to exceed 18 months(a)	Monthly	(a) A calibration check is performed for the Mechanical System once per refueling cycle; repairs are made if necessary
c. Redundant Overspeed Trip System	Not applicable	Each refueling cycle not to exceed 18 months	Monthly	
29. Seismic Monitoring System	Each refueling cycle not to exceed 18 months	Each refueling cycle not to exceed 18 months	Not applicable	
30. Fore Bay Water Level	Not applicable	Each refueling cycle not to exceed 18 months(a)	Each refueling cycle not to exceed 18 months	(a) Only if test indicates calibration required
31. AFW Flow Rate	(a)	Each refueling cycle not to exceed 18 months	Not applicable	(a) Flow rate indication will be checked at each unit startup and shutdown

*** Reference TS 4.1.d**

TABLE TS 4.1-1

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
32. PORV Position Indication	Monthly	Each refueling cycle not to exceed 18 months	Not applicable	
a. Back-up (Temperature)	Monthly	Each refueling cycle not to exceed 18 months	Not applicable	
33. PORV Block Valve Position Indicator	Monthly	Each refueling cycle not to exceed 18 months	Not applicable	
34. Safety Valve Position Indicator (Acoustic)	Monthly	Each refueling cycle not to exceed 18 months	Not applicable	
a. Back-up (Temperature)	Monthly	Each refueling cycle not to exceed 18 months	Not applicable	
35. FW Pump Trip (AFW Initiation)	Not applicable	Not applicable	Each refueling cycle not to exceed 18 months	
36. Reactor Coolant System Subcooling Monitor	Monthly	Each refueling cycle not to exceed 18 months(a)	Each refueling cycle not to exceed 18 months	(a) Only if test indicates calibration required

*** Reference TS 4.1.d**

TABLE TS 4.1-1

MINIMUM FREQUENCIES FOR CHECKS, CALIBRATIONS AND TEST OF INSTRUMENT CHANNELS

CHANNEL DESCRIPTION	CHECK	CALIBRATE	TEST	REMARKS
37. Containment Pressure (Wide Range)	Daily	Each refueling cycle not to exceed 18 months	Not applicable	
38. Containment Hydrogen Monitors	Daily	Each refueling cycle not to exceed 18 months	Monthly	
39. Containment Water Level (Wide Range)	Not applicable	Not applicable	Each refueling cycle not to exceed 18 months	
40. Reactor Vessel Level Indication	Monthly	Each refueling cycle not to exceed 18 months	Not applicable	
41. Core Exit Thermocouples	Monthly	Each refueling cycle not to exceed 18 months	Not applicable	

* Reference TS 4.1.d