

CONSUMERS POWER COMPANY  
PROPOSED TECHNICAL SPECIFICATION CHANGE REQUEST  
PALISADES PLANT

8204290338

### 3.17 INSTRUMENTATION AND CONTROL SYSTEMS

#### Applicability

Applies to plant instrumentation systems.

#### Objective

To delineate the conditions of the plant instrumentation and control systems necessary to assure reactor safety.

#### Specifications

- 3.17.1 The operability of the plant instrument and control system shall be in accordance with Tables 3.17.1 through 3.17.3.
- 3.17.2 As a minimum, the Reactor Protection System instrumentation channels and bypasses shall be OPERABLE as defined in Table 3.17.1.
- 3.17.3 As a minimum, the Engineered Safety Features instrumentation channels and bypasses shall be OPERABLE as defined in Table 3.17.2.
- 3.17.4 In the event that the number of channels of a particular system listed in Table 3.17.3 "Other Safety Features Functions Instrumentation" falls below the limits given in the columns entitled "Minimum Operable Channels" or "Minimum Degree of Redundancy", except as conditioned by the column entitled "Permissible Bypass Conditions", the reactor shall be placed in a hot shutdown condition within 12 hours. If minimum conditions are not met within 24 hours, the reactor shall be placed in a cold shutdown condition within 24 hours.

#### Easis

During plant operations, the complete instrumentation systems will normally be in service. Reactor safety is provided by the reactor protection system, 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 are out of service.

Almost all reactor protection and engineered safeguards channels are supplied with sufficient redundancy to provide the capability for channel test at power. Exceptions are back-up channels such as loss-of-load trip.

When one of the four channels is taken out of service for maintenance, the protective system logic can be changed to a two-out-of-three coincidence by bypassing the removed channel for a limited time.

### 3.17 INSTRUMENTATION AND CONTROL SYSTEMS (Continued)

If the bypass is not affected, the out-of-service channel (Power Removed) assumes a tripped condition (except high rate-of-change of power, high power level and high pressurizer pressure),<sup>(1)</sup> which results in a one-out-of-three channel logic. If, in the 2 of 4 logic system of either the reactor protective system or the engineered safeguards system, one channel is bypassed and a second channel manually placed in a tripped condition, the resulting logic is 1 of 2. At rated power, the minimum operable high-power level channels is 3 in order to provide adequate flux tilt detection. If only two channels are operable, the reactor power level is reduced to 70% rated power which protects the reactor from possibly exceeding design peaking factors due to undetected flux tilts and from exceeding dropped rod peaking factors in the event that a turbine runback signal is required from the power range channels.

The engineered safeguards system provides a 2 of 4 logic on the signal used to actuate the equipment connected to each of the two emergency diesel generator units.

Two start-up channels are available any time reactivity changes are deliberately being introduced into the reactor and the neutron power is not visible on the log-range nuclear instrumentation or above  $10^{-4}\%$  of rated power. This ensures that redundant start-up instrumentation is available to operators to monitor effects of reactivity changes when neutron power levels are only visible on the start-up channels. In the event only one start-up range channel is available and the neutron power level is sufficiently high that it is being monitored by both channels of log-range instrumentation, a start-up can be performed in accordance with footnote (d) of Table 3.17.4.

#### References

- (1) FSAR, Section 7.2.7.

TABLE 3.17.1

REACTOR PROTECTIVE INSTRUMENTATION

<u>FUNCTIONAL UNIT</u>	<u>TOTAL NO. OF CHANNELS</u>	<u>CHANNELS TO TRIP</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>NOTES</u>	<u>APPLICABLE MODES (f)</u>	<u>ACTION</u>
1. Manual Reactor Trip	2	1	2	---	1, 2	1
2. Power Level - High	4	2	3	(e)	1, 2	2
3. Primary Coolant Flow - Low	4	2	3	(a),(d)	1, 2	2
4. Pressurizer Pressure - High	4	2	3	---	1, 2	2
5. Containment Pressure - High	4	2	3	---	1, 2	2
6. Steam Generator Pressure - Low	4/SG	2/SG	3/SG	(a),(d)	1, 2	2
7. Steam Generator Water Level - Low	4/SG	2/SG	3/SG	---	1, 2	2
8. Thermal Margin/Low Pressure	4	2	3	(a),(d)	1, 2	2
9. Loss of Load--Hydraulic Fluid Pressure - Low	1	1	1	(b)	1	2
10. Log Range Channels	2	1	2	(c),(d)	1, 2	1

TABLE 3.17.1 (Continued)

TABLE NOTATION

- (a) Trip may be bypassed below  $10^{-4}\%$  of RATED POWER: bypass shall be automatically removed when POWER is greater than or equal to  $10^{-4}\%$  of RATED POWER.
- (b) Trip may be bypassed below 15% of RATED POWER. Trip bypass is automatically removed above 15% RATED POWER.
- (c) Trip is automatically bypassed below  $10^{-4}\%$  and above 15% of RATED POWER. Two channels required if TM/LP, low steam generator or primary coolant flow channels are bypassed.
- (d) For low power physics testing,  $10^{-4}\%$  may be increased to  $10^{-1}\%$ .
- (e) If only two channels are operable (see Action 2.C), load shall be reduced to 70% or less of RATED POWER.
- (f) Definition of Operational Modes:

MODE

1. POWER OPERATION
2. HOT STANDBY
3. HOT SHUTDOWN
4. COLD SHUTDOWN
5. REFUELING

TABLE 3.17.1 (Continued)

TABLE NOTATION

ACTION STATEMENTS

ACTION 1 - With the number of channels OPERABLE one less than required by the Minimum Channels OPERABLE requirement, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT SHUTDOWN within the next 12 hours.

ACTION 2 - With the number of OPERABLE channels one less than the Total Number of Channels, STARTUP and/or POWER OPERATION may proceed provided the following conditions are satisfied:

- a. The inoperable channel is placed in either the bypassed or tripped condition. For the purposes of testing and maintenance, the inoperable channel may be bypassed for up to seven days (168 hours) from time of initial loss of OPERABILITY; however, the inoperable channel shall then be either restored to OPERABLE status or placed in the tripped condition.
- b. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 48 hours while performing tests and maintenance on that channel provided the other inoperable channel is placed in the tripped condition.

TABLE 3.17.2

ENGINEERED SAFETY FEATURE ACTUATION SYSTEM INSTRUMENTATION

<u>FUNCTIONAL UNIT</u>	<u>TOTAL NO OF CHANNELS</u>	<u>CHANNELS TO TRIP</u>	<u>MINIMUM CHANNELS OPERABLE</u>	<u>NOTES</u>	<u>APPLICABLE MODES (d)</u>	<u>ACTION</u>
1. SAFETY INJECTION						
a. Manual (Trip Buttons)	2	1	2	---	1,2	3
b. Containment Pressure - High	4	2	3	(a)	1,2	4
c. Pressurizer Pressure - Low	4	2	3	(b)	1,2	4
2. CONTAINMENT SPRAY						
a. Manual (Control Switches)	2	1	2	---	1,2,3	3
b. Containment Pressure - High	4	2	3	(a)	1,2,3	4
3. CONTAINMENT ISOLATION						
a. Manual (Hand Switches)	2	1	2	---	1,2,3	3
b. Containment Pressure - High	4	2	3	(a)	1,2,3	4
c. Containment Radiation - High	4	2	3	---	1,2,3	4
4. MAIN STEAM LINE ISOLATION						
a. Manual (Control Switches)	1/steam generator	1/steam generator	1/steam generator	---	1,2,3	3
b. Steam Generator Pressure - Low	4/steam generator	2/steam generator	3/steam generator	(c)	1,2,3	4
5. RECIRCULATION ACTUATION SYSTEM						
a. Manual (Hand Switches)	2	1	2	---	1,2,3	3
b. SIRW Tank - Low	4	2	3	---	1,2,3	4

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TABLE 3.17.2 (Continued)

TABLE NOTATION

- (a) Bypass of containment high pressure channels is permissible during containment leak tests.
- (b) Trip function may be bypassed in this MODE when pressurizer pressure is less than 1700 psia; bypass shall be automatically removed prior to pressurizer pressure exceeding 1700 psia.
- (c) Trip function may be bypassed in this MODE below 550 psia; bypass shall be automatically removed prior to exceeding 550 psia.
- (d) Definition of Operational Modes:

MODE

1. POWER OPERATION
2. HOT STANDBY
3. HOT SHUTDOWN
4. COLD SHUTDOWN
5. REFUELING

TABLE 3.17.2 (Continued)

TABLE NOTATION

ACTION STATEMENTS

- ACTION 3 - With the number of OPERABLE channels one less than the Total Number of Channels, restore the inoperable channel to OPERABLE status within 48 hours or be in at least HOT STANDBY within the next 12 hours.
- ACTION 4 - With the number of OPERABLE channels one less than the Total Number of Channels, operation may proceed provided the following conditions are satisfied:
- a. The inoperable channel is placed in either the bypassed or tripped condition. For the purposes of testing and maintenance, the inoperable channel may be bypassed for up to seven days (168 hours) from time of initial loss of OPERABILITY; however, the inoperable channel shall then be either restored to OPERABLE status or placed in the tripped condition.
  - b. The Minimum Channels OPERABLE requirement is met; however, one additional channel may be bypassed for up to 48 hours while performing tests and maintenance on that channel provided the other inoperable channel is placed in the tripped condition.

TABLE 3.17.3

OTHER SAFETY FEATURE FUNCTIONS INSTRUMENTATION

<u>NO</u>	<u>FUNCTIONAL UNIT</u>	<u>MINIMUM OPERABLE CHANNELS</u>	<u>MINIMUM DEGREE OF REDUNDANCY</u>	<u>PERMISSIBLE BYPASS CONDITIONS</u>
1	ΔT - Power Comparator	3(b)	1	None
2	Air Cooler Service Water Flow Instr	1	None	None
3	Primary and Secondary Rod Insertion and Out-of-Sequence Monitors	1	None	N/A
4	Fuel Pool Bldg Crane Interlocks	1	None	As Requested Under Administrative Control (a)
5	Start-up Channels	2	1(c)	Not Required Above 10 <sup>-4</sup> % of Rated Power

- (a) Crane shall not be used to move material past the fuel storage pool unless the interlocks are available.
- (b) If only two channels are operable, load shall be reduced to 70% or less of rated power.
- (c) Minimum operable channels shall be one (1) and minimum degree of redundancy is zero (0) if shutdown neutron power levels indicated on the log-range channels are greater than three times the lowest decade in which neutron visibility can be confirmed. Neutron visibility will be confirmed through observation of reactivity changes on neutron power level (including a 1/M plot during reactor start-up) and comparing the observed changes to the changes noted on previous similar start-ups. Instrumentation operability will also be verified by comparison among the three operable channels to ensure their individual responses are in agreement.

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