ATTACHMENT 1

Consumers Power Company
Palisades Plant
Docket 50-255

TECHNICAL SPECIFICATIONS CHANGE REQUEST
INSTRUMENT & CONTROL SYSTEMS

PROPOSED TECHNICAL SPECIFICATIONS PAGES

March 18, 1991

8 Pages

3.17 INSTRUMENTATION AND CONTROL SYSTEMS

Applicability

The instrumentation and control systems shall be operable under the following conditions:

Table 3.17.1	-	When the PCS has less than Refueling Boron Concentration and more than one control rod is capable of being withdrawn, except as allowed by the permissible bypass conditions.
Table 3.17.2	-	When the PCS temperature is ≥ 325°F, except as allowed by the permissible bypass conditions.
Table 3.17.3	-	When the PCS is above Cold Shutdown, except as allowed by the permissible bypass conditions.
Table 3.17.4	-	At all times, except as allowed by the permissable bypass conditions.

Objective

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

Specifications

3.17.1 Deleted

3.17.2 In the event the number of channels of a particular system in service 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.

Basis

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.

The Reactor Protective System is not required to be operable if there is no fuel in reactor vessel or PCS boron concentration is at Refueling Boron Concentration or if only one control rod is capable of being withdrawn.

3.17 INSTRUMENTATION AND CONTROL SYSTEMS (Cont'd)

Refueling boron concentration requires a 5% shutdown margin with all the control rods removed from the core. Therefore, there is no need for automatic control rod insertion.

When all CRDM clutches are de-energized, no control rods can be withdrawn, and the RPS function has been accomplished. The safety analyses and the Shutdown Margin definition use the assumption that one control rod will fail to insert on a trip. Therefore if only one control rod is capable of withdrawal, the safety analyses assumptions and shutdown margin requirements will be met.

When the reactor power level indication reaches a nominal 15% of rated power, a bistable in the power range nuclear instrument circuitry deactivates the Wide Range Channel Rate of Power Change reactor trip and activates the Loss of Load reactor trip. When indicated power decreases below a nominal 15% of rated power, the Loss of Load trip is deactivated and the Rate of Power Change is reinstated. These switching actions occur automatically. The bistable which actuates the switching of these two trips is adjusted so that it actuates at an indicated power of 15±2%. This allows for tolerances in setting and for hysteresis in the bistable action. Neither the Rate of Power Change trip nor the Loss of Load trip are relied upon in the safety analyses.

Almost all reactor protection and engineered safeguards channels are supplied with sufficient redundancy to provide the capability for channel test at power. Exceptions are backup 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 for a reactor trip by bypassing the removed channel.

If the bypass is not effected, the out-of-service channel (Power Removed) assumes a tripped condition (except high rate-of-change power, variable high power and high pressurizer pressure),[1] 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 variable high power level channels is 3 in order to provide adequate flux tilt detection. If only 2 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.

The engineered safeguards system provides a 2 out of 4 logic on the signal used to actuate the equipment connected to each of the 2 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 wide-range nuclear instrumentation or above 10^{-4}% of rated power. This ensures that redundant source-range instrumentation is available to operators to monitor effects of reactivity changes when neutron power levels are only visible on the source-range channels. In the event only one source-range channel is available and the neutron power level is sufficiently high that it is being monitored by both channels of wide-range instrumentation, a startup can be performed in accordance with footnote (d) of Table 3.17.4.

The Recirculation Actuation System (RAS) initiates on a 1 out of 2 taken twice logic scheme. Any one channel declared inoperable shall be placed in a bypass condition to ensure protection from an inadvertent RAS actuation. Since the bypassing of a channel introduces the possibility for a failure to receive an automatic RAS actuation signal, the time period in the bypassed condition is limited.

The Zero Power Mode Bypass can be used to bypass the low flow, steam generator low pressure, and TM/LP trips for all four Reactor Protective system channels to perform control rod testing or to perform low power physics testing below normal operating temperatures. The requirement to maintain cold shutdown boron concentration when in the bypass condition provides additional assurance that an accidental criticality will not occur. To allow low power physics testing at reduced temperature and pressure, the requirement for cold shutdown boron concentration is not required and the allowed power is increased to 10^{-1}%.

References

(1) Updated FSAR, Section 7.2.7.
(2) Updated FSAR, Section 7.2.5.2

Table 3.17.1
Instrumentation Operating Requirements for Reactor Protective System

No.	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1.	Manual (Trip Buttons)	1	None	None
2.	Variable High Power Level	2[b,d]	1[d]	None
3.	Wide Range Channels	2	1	Below 10^{-4}%[e] or Above 13% of Rated Power[a] except as noted in (c)
4.	Thermal Margin/ Low-Pressurizer Pressure	2[b,f]	1	Below 10^{-4}%[e] of Rated Power[a] and greater than cold shutdown boron concentration
5.	High-Pressurizer Pressure	2[b]	1	None
6.	Low Flow Loop	2[b]	1	Below 10^{-4}%[e] of Rated Power[a] and greater than cold shutdown boron concentration.
7.	Loss of Load	1	None	Below 17% of Rated Power[a]
8.	Low Steam Generator Water Level	2/Steam Gen[b]	1/Steam Generator	None
9.	Low Steam Generator Pressure	2/Steam Gen[b]	1/Steam Generator	Below 10^{-4}%[e] of Rated Power[a] and greater than cold shutdown boron concentration.
10.	High Containment Pressure	2[b]	1	None

(a) Bypass automatically removed.
(b) One of the inoperable channels must be in the tripped condition.
(c) Two channels required if TM/LP, low steam generator, or low-flow channels are bypassed.
(d) If only two channels are operable, load shall be reduced to 70% or less of rated power.
(e) For low power physics testing, 10^{-4}% may be increased to 10^{-1}% and cold shutdown boron concentration is not required.
(f) Axial Offset operability requirements are given in Specification 3.11.2.

Amendment No. 118, 130, 136,

Table 3.17.2

Instrumentation Operating Requirements for Engineered Safety Feature Systems

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1	Safety Injection			
a.	Manual (Trip Buttons)	1	None	None
b.	High Containment Pressure	2[a,c]	1	None
c.	Pressurizer Low Pressure	2[c]	1	Primary Pressure Less Than 1700 Psia[b]
2.	Containment Spray			
a.	Manual	2	None	None
b.	High Containment Pressure	2[a,c]	1	None

(a) Right and left actuation circuits each have 2 channels.
(b) Auto removal of bypass above 1700 psia.
(c) One of the inoperable channels must be in the tripped condition.

Table 3.17.3

Instrument Operating Conditions for Isolation Functions

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1	Containment Isolation			
a.	Containment High Pressure	2[a,c]	1	None
b.	Containment High Radiation	2[c]	1	None
c.	Manual	1	None	None
2	Steam Line Isolation			
a.	Low Steam Gen Pressure	2/Steam Gen[c]	1	Below 550 psia[b]
b.	Manual	1/Steam Gen	None	None

(a) Right and left actuation circuits each have 2 channels.
(b) Bypass automatically reinstated above 550 psia.
(c) One of the inoperable channels must be in the tripped position.

Table 3.17.4

Instrumentation Operating Requirements for Other Safety Feature Functions

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1	SIRWT Low-Level Switches	4	NA[b]	Not required below 325°F. One channel may be inoperable for a period of 7 days[b]
2	ΔT - Power Comparator	3[c]	1	Not required at or below Hot Shutdown
3	(Deleted)			
4	Air Cooler Service Water Flow Instruments	1	None	Not required at or below Hot Shutdown
5	Primary and Secondary Rod Insertion and Out-of-Sequence Monitors	1	None	NA
6	Fuel Pool Building Crane Interlocks	1	None	As Requested Under Administrative Controls[a]
7	Start-Up Channels	2	1[d]	Not Required Above 10^{-4}% of Rated Power or with no fuel in the reactor.

(a) Crane shall not be used to move material past the fuel storage pool unless the interlocks are available.

(b) If a channel is declared inoperable, it shall be placed in a bypass condition. Minimum degree of redundancy is not applicable to the SIRWT low-level switches.

(c) If only two channels are operable, load shall be reduced to 70% or less of rated power.

(d) Minimum operable channels shall be one (1) and minimum degree of redundancy is zero (0) if shutdown neutron power levels indicated on the wide 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.

Change/Mod/13
Amendment No. 121, 124, 130,

Table 3.17.4 (Cont'd)

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
8.	Pressurizer Wide Range Water Level Indication	2 (m, p, q)	None	Not required in Cold or Refueling Shutdown
9.	Pressurizer Code Safety Relief Valves Position Indication (Acoustic Monitor or Temperature Indication)	1 per Valve	None	Not Required below 325°F
10.	Power Operated Relief Valves Position Indication (Acoustic Monitor or Temperature Indication)	1 per	None	Not required in cold shutdown or when PORV isolation valve is closed and its indication system is operable
11.	PORV Isolation Valves Position Indication	1 per Valve	None	Not required when reactor is depressurized and vented through a vent ≥1.3 sq.in.
12.	Subcooling Margin Monitor	1	None	Not required below 325°F
13.	Auxiliary Feed Flow Rate Indication	1 per flow(h) Control Valve	None	Not required below 325°F
14.	Auxiliary Feedwater Actuation System Sensor Channels	2 per steam generator(e)	1	Not required below 325°F
15.	Auxiliary Feedwater Actuation System Actuation Channels	2(f)	1	Not required below 325°F
16.	Excore Detector Deviation Alarms	1(g)	None	Not Required Below 25% of Rated Power
17.	Axial Shape Index Alarm	2(i)	1	Not Required Below 25% of Rated Power
18.	Reactor Vessel Water Level	2(j,k,l,m)	None	Not Required Below 325°F

Amendment No. 67, 68, 98, 113, 118, 129,

ATTACHMENT 2

Consumers Power Company
Palisades Plant
Docket 50-255

TECHNICAL SPECIFICATIONS CHANGE REQUEST
INSTRUMENT & CONTROL SYSTEMS

MARKED UP EXISTING TECHNICAL SPECIFICATIONS PAGES

March 18, 1991

7 Pages

3.17 INSTRUMENTATION AND CONTROL SYSTEMS

Applicability

INSERT A → ~~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 Deleted ~~The operability of the plant instrument and control systems shall be in accordance with Tables 3.17.1 through 3.17.4.~~

3.17.2 In the event the number of channels of a particular system in service 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.

Basis

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.

INSERT B →

Almost all reactor protection and engineered safeguards channels are supplied with sufficient redundancy to provide the capability for channel test at power. Exceptions are backup 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 for a reactor trip by bypassing the removed channel.

CONTROLLED

A

The instrumentation and control systems shall be operable under the following conditions:

Table 3.17.1 - When the PCS has less than Refueling Boron Concentration and more than one control rod is capable of being withdrawn, except as allowed by the permissible bypass conditions.

Table 3.17.2 - When the PCS temperature is $\geq$ 325°F, except as allowed by the permissible bypass conditions.

Table 3.17.3 - When the PCS is above Cold Shutdown, except as allowed by the permissible bypass conditions.

Table 3.17.4 - At all times, except as allowed by the permissible bypass conditions.

B

The Reactor Protective System is not required to be operable if there is no fuel in the reactor vessel, or when the PCS boron concentration is at Refueling Boron Concentration or if only one control rod is capable of being withdrawn.

Refueling boron concentration requires a 5% shutdown margin with all the control rods removed from the core. Therefore, there is no need for automatic control rod insertion.

When all CRDM clutches are de-energized, no control rods can be withdrawn and the RPS function has been accomplished. The safety analyses and the Shutdown Margin definition use the assumption that one control rod will fail to insert on a trip. Therefore, if only one control rod is capable of withdrawal, the safety analyses assumptions and shutdown margin requirements will be met.

When the reactor power level indication reaches a nominal 15% of rated power, a bistable in the power range nuclear instrument circuitry deactivates the Wide Range Channel Rate of Power Change reactor trip and activates the Loss of Load reactor trip. When indicated power decreases below a nominal 15% of rated power, the Loss of Load trip is deactivated and the Rate of Power Change is reinstated. These switching actions occur automatically. The bistable which actuates the switching of these two trips is adjusted so that it actuates at an indicated power of 15±2%. This allows for tolerances in setting and for hysteresis in the bistable action. Neither the Rate of Power Change trip nor the Loss of Load trip are relied upon in the safety analyses.

3.17 INSTRUMENTATION AND CONTROL SYSTEMS (Contd)

If the bypass is not effected, the out-of-service channel (Power Removed) assumes a tripped condition (except high rate-of-change power, variable high power and high pressurizer pressure),[1] 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 variable high power level channels is 3 in order to provide adequate flux tilt detection. If only 2 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.

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

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

The Recirculation Actuation System (RAS) initiates on a 1 out of 2 taken twice logic scheme. Any one channel declared inoperable shall be placed in a bypass condition to ensure protection from an inadvertent RAS actuation. Since the bypassing of a channel intro-duces the possibility for a failure to receive an automatic RAS actuation signal, the time period in the bypassed condition is limited.

The Zero Power Mode Bypass can be used to bypass the low flow, steam generator low pressure, and TM/LP trips for all four Reactor Protective system channels to perform control rod testing or to perform low power physics testing below normal operating temperatures. The requirement to maintain cold shutdown boron concentration when in the bypass condition provides additional assurance that an accidental criticality will not occur. To allow low power physics testing at reduced temperature and pressure, the requirement for cold shutdown boron concentration is not required and the allowed power is increased to 10^{-1}%.

References

(1) Updated FSAR, Section 7.2.7.
(2) Updated FSAR, Section 7.2.5.2

Amendment No. 118, 124, 136
February 15, 1991

No change for continuity

Table 3.17.1

Instrumentation Operating Requirements for Reactor Protective System

No.	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1.	Manual (Trip Buttons)	1	None	None
2.	Variable High Power Level	2[b,d]	1[d]	None
3.	Wide Range Channels	2	1	Below 10^{-4}% [e] or Above 13 ~~15~~% Rated Power [a] Except as Noted in [c]
4.	Thermal Margin/ Low-Pressurizer Pressure	2[b,f]	1	Below 10^{-4}% [e] of Rated Power[a] and greater than cold shutdown boron concentration
5.	High-Pressurizer Pressure	2[b]	1	None
6.	Low Flow Loop	2[b]	1	Below 10^{-4}%[e] of Rated Power[a] and greater than cold shutdown boron concentration.
7.	Loss of Load	1	None	~~None~~ Below 17% Rated Power [a]
8.	Low Steam Generator Water Level	2/Steam Gen[b]	1/Steam Generator	None
9.	Low Steam Generator Pressure	2/Steam Gen[b]	1/Steam Generator	Below 10^{-4}%[e] of Rated Power[a] and greater than cold shutdown boron concentration.
10.	High Containment Pressure	2[b]	1	None

(a) Bypass automatically removed.
(b) One of the inoperable channels must be in the tripped condition.
(c) Two channels required if TM/LP, low steam generator pressure or low-flow channels are bypassed.
(d) If only two channels are operable, load shall be reduced to 70% or less of rated power.
(e) For low power physics testing, 10^{-4}% may be increased to 10^{-1}% and cold shutdown boron concentration is not required.
(f) Axial Offset operability requirements are given in Specification 3.11.2.
~~(g) Required operable if any clutch power supply is energized.~~
~~(h) Automatically bypassed below 15% power.~~

Amendment No. 118, 130, ~~138~~
~~February 15, 1991~~

Table 3.17.2

Instrumentation Operating Requirements for Engineered Safety Feature Systems

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1	Safety Injection			
a.	Manual (Trip Buttons)	1	None	None
b.	High Containment Pressure	2(a,c)	1	~~During Leak Test~~ None
c.	Pressurizer Low Pressure	2(c)	1	Primary Pressure Less Than 1700 Psia(b)
2	Containment Spray			
a.	Manual	2	None	None
b.	High Containment Pressure	2(a,c)	1	~~During Leak Test~~ None

(a) Right and left actuation circuits each have 2 channels.
(b) Auto removal of bypass above 1700 psia.
(c) One of the inoperable channels must be in the tripped condition.

Amendment No

Table 3.17.3

Instrument Operating Conditions for Isolation Functions

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1	Containment Isolation			
a.	Containment High Pressure	2(a,c)	1	~~During Leak Test~~ None
b.	Containment High Radiation	2(c)	1	None
c.	Manual	1	None	None
2	Steam Line Isolation			
a.	Low Steam Gen Pressure	2/Steam Gen(c)	1	Below 550 Psia(b)
b.	Manual	1/Steam Gen	None	None

(a) Right and left actuation circuits each have 2 channels.
(b) Bypass automatically reinstated above 550 psia.
(c) One of the inoperable channels must be in the tripped position.

Amendment No

Table 3.17.4

Instrumentation Operating Requirements for Other Safety Feature Functions

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
1	SIRWT Low-Level Switches	4	NA[b]	~~Not~~ required below 325°F One channel may be inoperable for a period of 7 days[b]
2	ΔT - Power Comparator	3[c]	1	~~None~~ Not required at or below Hot Shutdown
3	(Deleted)			
4	Air Cooler Service Water Flow Instruments	1	None	~~None~~ Not required below 325°F
5	Primary and Secondary Rod Insertion and Out-of-Sequence Monitors	1	None	~~NA~~ Not required at or below Hot Shutdown
6	Fuel Pool Building Crane Interlocks	1	None	As Requested Under Administrative Controls[a]
7	Source-Range Channels	2	1[d]	Not Required Above 10^{-4}% of Rated Power or with no fuel in the reactor

(a) Crane shall not be used to move material past the fuel storage pool unless the interlocks are available.

(b) If a channel is declared inoperable, it shall be placed in a bypass condition. Minimum degree of redundancy is not applicable to the SIRWT low-level switches.

(c) If only two channels are operable, load shall be reduced to 70% or less of rated power.

(d) Minimum operable channels shall be one (1) and minimum degree of redundancy is zero (0) if shutdown neutron power levels indicated on the wide 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.

Change/MØ1/3
Amendment No. 121, 124, 186
~~February 15, 1991~~

Table 3.17.4 (Cont'd)

No	Functional Unit	Minimum Operable Channels	Minimum Degree of Redundancy	Permissible Bypass Conditions
8.	Pressurizer Wide Range Water Level Indication	2 (m, p, q)	None	Not required in Cold or Refueling Shutdown
9.	Pressurizer Code Safety Relief Valves Position Indication (Acoustic Monitor or Temperature Indication)	1 per Valve	None	Not Required below 325°F
10.	Power Operated Relief Valves (Position Indication) (Acoustic Monitor or Temperature Indication)	1 per Valve	None	Not required in cold shutdown or when PORV isolation valve is closed and its indication system is operable
11.	PORV Isolation Valves Position Indication	1 per Valve	None	Not required when reactor is depressurized and vented through a vent ≥1.3 sq.in.
12.	Subcooling Margin Monitor	1	None	Not required below 325°F
13.	Auxiliary Feed Flow Rate Indication	1 per flow[h] Control Valve	None	Not required below 325°F
14.	Auxiliary Feedwater Actuation System Sensor Channels	2 per steam generator[e]	1	Not required below 325°F
15.	Auxiliary Feedwater Actuation System Actuation Channels	2[f]	1	Not required below 325°F
16.	Excore Detector Deviation Alarms	1[g]	None	Not Required Below 25% of Rated Power
17.	Axial Shape Index Alarm	2[i]	1	Not Required Below 25% of Rated Power
18.	Reactor Vessel Water Level	2[j,k,l,m]	None	Not Required Below 325°F

Amendment No. 67, 88, 96, 113, 118, 129
~~September 15, 1989~~