CHAPTER 7

INSTRUMENTATION AND CONTROLS

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CHAPTER 7

INSTRUMENTATION AND CONTROLS

7.1 INTRODUCTION

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

7.1.6.1 Setpoint Calculations for Protective Functions

STD COL 7.1-1 The Setpoint Program described in Technical Specifications Section 5.5 provides the appropriate controls for update of the instrumentation setpoints following completion of the calculation of setpoints for protective functions and the reconciliation of the setpoints against the final design.

7.2 REACTOR TRIP

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.3 ENGINEERED SAFETY FEATURES

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

7.3.1.2.14 Boron Dilution Block

LNP DEP 7.3-1

Revise the last two sentences of the fourth paragraph of DCD Subsection 7.3.1.2.14 to read:

This source range flux doubling signal may be manually blocked to permit plant startup and normal power operation when reactor coolant average temperature is above the P-8 setpoint. It is automatically reinstated when reactor power is decreased below the P-6 power level during shutdown or reactor coolant average temperature decreases below the P-8 setpoint.

Add a new fifth paragraph of DCD Subsection 7.3.1.2.14 to read as follows:

The Flux Doubling function can also be manually blocked during shutdown conditions when below the P-8 reactor coolant average temperature. When blocked during shutdown conditions, the CVS demineralized water system isolation valves are automatically closed to prevent inadvertent boron dilution.

7.3.1.2.17 Main Control Room Isolation, Air Supply Initiation, and Electrical Load Deenergization

LNP DEP 6.4-1
LNP DEP 6.4-2

Revise the first, second, fifth, and sixth paragraphs of DCD Subsection 7.3.1.2.17 to read as follows:

Signals to initiate isolation of the main control room, to initiate the air supply, to open the main control room pressure relief isolation valves and to de-energize non-essential main control room electrical loads are generated from any of the following conditions:

1. High-2 control room air supply radioactivity level
2. Loss of ac power sources (low Class 1E battery charger input voltage)
3. Manual initiation

Condition 1 is the occurrence one of two main control room air supply radioactivity monitors detecting the iodine or particulate radioactivity level above the High-2 setpoint.

Condition 3 consists of two momentary controls. Manual actuation of either of the two controls will result in main control room isolation, air supply initiation, and electrical load de-energization.

The functional logic relating to main control room isolation, air supply initiation, and electrical load de-energization is illustrated in Figure 7.2-1, Sheet 13.

LNP DEP 7.3-1

Table 7.3-201 (Sheet 1 of 2)
Engineered Safety Features Actuation Signals

Actuation Signal	No. of Divisions/ Controls	Actuation Logic	Permissives and Interlocks
12. Passive Residual Heat Removal (Figure 7.2-1, Sheet 8)			
a. Manual initiation	2 controls	1/2 controls	None
b. Low narrow range steam generator water level coincident with	4/steam generator	2/4-BYP[1] in either steam generator	None
Low startup feedwater flow	2/feedwater line	1/2 in either feedwater line	None
c. Low steam generator wide range water level	4/steam generator	2/4-BYP[1] in either steam generator	None
d. Core makeup tank injection		(See Items 6a through 6e)	
e. Automatic reactor coolant system depressurization (first stage)		(See Items 3a through 3c)	
f. High-3 pressurizer level	4	2/4-BYP[1]	Manual block permitted below P-19 Automatically unblocked above P-19
13. Block of Boron Dilution (Figure 7.2-1, Sheets 3 and 15)			
a. Flux doubling calculation	4	2/4-BYP[1]	Manual block permitted above P-8. Automatically unblocked (momentary) below P-6 or below P-8. Demineralized water system isolation valves closed if blocked below P-8
b. Undervoltage to Class 1E battery chargers[(8)]	2/charger	2/2 per charger and 2/4 chargers[5]	None
c. Reactor trip (P-4)	1/division	2/4	None
14. Chemical Volume Control System Isolation (See Figure 7.2-1, Sheets 6 and 11)			
a. High-2 pressurizer water level	4	2/4-BYP[1]	Manual block permitted below P-19 Automatically unblocked above P-19
b. High-2 steam generator narrow range level	4/steam generator	2/4-BYP[1] in either steam generator	None
c. Automatic or manual safeguards actuation signal coincident with		(See Items 1a through 1e)	

LNP DEP 6.4-2

Table 7.3-201 (Sheet 2 of 2)
Engineered Safety Features Actuation Signals

Actuation Signal	No. of Divisions/ Controls	Actuation Logic	Permissives and Interlocks
High-1 pressurizer water level	4	2/4-BYP[1]	None
d. High-2 containment radioactivity	4	2/4-BYP[1]	None
e. Manual initiation	2 controls	1/2 controls	None
f. Flux doubling calculation	4	2/4-BYP[1]	Manual block permitted above P-8. Automatically unblocked (momentary) below P-6 or below P-8. Demineralized water system isolation valves closed if blocked below P-8
g. High steam generator narrow range level coincident with	4/steam generator	2/4-BYP[1] in either steam generator	None
Reactor trip (P-4)	1/division	2/4	None
15. Steam Dump Block (Figure 7.2-1, Sheet 10)[(8)]			
a. Low reactor coolant temperature (Low-2 T_{avg})	2/loop	2/4-BYP[1]	None
b. Mode control	2 controls	1/division	None
c. Manual stage 1 cooldown control	2 controls	1/division	None
d. Manual stage 2 cooldown control	2 controls	1/division	None
16. Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization (Figure 7.2-1, Sheet 13)			
a. High-2 main control room supply air radiation	2	1/2	None
b. Undervoltage to Class 1E battery chargers[(8)]	2/charger	2/2 per charger and 2/4 chargers[5]	None
c. Manual initiation[(8)]	2 controls	1/2 controls	None
17. Auxiliary Spray and Purification Line Isolation (Figure 7.2-1, Sheet 12)			
a. Low-1 pressurizer level	4	2/4-BYP[1]	Manual block permitted below P-12 Automatically unblocked above P-12
b. Manual initiation of chemical and volume control system isolation		(See item 14e)	

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LNP DEP 6.4-2

Table 7.3-202
System-Level Manual Input to the Engineered Safety Features Actuation System

Manual Control	To Divisions				Figure 7.2-1 Sheet
Manual passive containment cooling actuation #1	A	B	C	D	13
Manual passive containment cooling actuation #2	A	B	C	D	13
Manual passive containment isolation actuation #1	A	B	C	D	13
Manual passive containment isolation actuation #2	A	B	C	D	13
Manual depressurization system stages 1, 2, and 3 actuation #1 & #2	A	B	C	D	15
Manual depressurization system stages 1, 2, and 3 actuation #3 & #4	A	B	C	D	15
Manual depressurization system stage 4 actuation #1 & #2	A	B	C	D	15
Manual depressurization system stage 4 actuation #3 & #4	A	B	C	D	15
Manual IRWST injection actuation #1 & #2	A	B	C	D	16
Manual IRWST injection actuation #3 & #4	A	B	C	D	16
Manual containment recirculation actuation #1 & #2	A	B	C	D	16
Manual containment recirculation actuation #3 & #4	A	B	C	D	16
Manual main control room isolation, air supply initiation and electrical load de-energization #1	A	B	C	D	13
Manual main control room isolation, air supply initiation and electrical load de-energization #2	A	B	C	D	13
RCS pressure CVS/PRHR block control #1	A				6
RCS pressure CVS/PRHR block control #2		B			6
RCS pressure CVS/PRHR block control #3			C		6
RCS pressure CVS/PRHR block control #4				D	6
Normal residual heat removal system isolation safeguards block control #1	A				13
Normal residual heat removal system isolation safeguards block control #2		B			13
Boron dilution block control #1	A				3
Boron dilution block control #2		B			3
Boron dilution block control #3			C		3
Boron dilution block control #4				D	3
Manual RNS isolation #1 & #3	A	B		D	18
Manual RNS isolation #2 & #4	A	B		D	18
CVS letdown isolation block control #1	A				16
CVS letdown isolation block control #2				D	16
Manual containment vacuum relief actuation #1	A		C		19
Manual containment vacuum relief actuation #2	A		C		19

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LNP DEP 7.3-1

Table 7.3-203
Interlocks for Engineered Safety Features Actuation System

Designation	Derivation	Function
P-3	Reactor trip breaker open	Permits manual reset of safeguards actuation signal to block automatic safeguards actuation
$\overline{\text{P-3}}$	Reactor trip breakers closed	Automatically resets the manual block of automatic safeguards actuation
P-4	Reactor trip initiated or reactor trip breakers open	(a) Isolates main feedwater if coincident with low reactor coolant temperature (b) Trips turbine (c) Blocks boron dilution
$\overline{\text{P-4}}$	No reactor trip initiated and reactor trip breakers closed	Removes demand for isolation of main feedwater, turbine trip and boron dilution block
P-6	Intermediate range neutron flux channels above setpoint	None
$\overline{\text{P-6}}$	Intermediate range neutron flux channels below setpoint	Automatically resets the manual block of flux doubling actuation of the boron dilution block
P-8	Reactor coolant average temperature above setpoint	Permits manual block of flux doubling actuation of the boron dilution block
$\overline{\text{P-8}}$	Reactor coolant average temperature below setpoint	(a) Automatically resets (momentary) the manual block of flux doubling actuation of the boron dilution block (b) Closes demineralized water system isolation valves if flux doubling actuation of the boron dilution block is blocked below P-8.
P-11	Pressurizer pressure below setpoint	(a) Permits manual block of safeguards actuation on low pressurizer pressure, low compensated steam line pressure, or low reactor coolant inlet temperature (b) Permits manual block of steam line isolation on low reactor coolant inlet temperature (c) Permits manual block of steam line isolation and steam generator power-operated relief valve block valve closure on low compensated steam line pressure (d) Coincident with manual actions of (b) or (c), automatically unblocks steam line isolation on high negative steam line pressure rate (e) Permits manual block of main feedwater isolation on low reactor coolant temperature

7.4 SYSTEMS REQUIRED FOR SAFE SHUTDOWN

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

LNP DEP 3.2-1

Revise the fifth paragraph of DCD Section 7.4 to read as follows:

The long-term safe shutdown conditions are the same as the short-term conditions except that the coolant temperature shall be less than 420°F. This long-term condition must be achieved within 36 hours and following a non-LOCA event using the PRHR HX as shown in Chapter 19E. These safe shutdown conditions can be maintained by the PRHR HX for greater than 14 days based on a non-bounding, conservative analysis that only credits using safety-related equipment. In addition, these safe shutdown conditions can be maintained indefinitely using the ADS and passive injection and recirculation as discussed in 7.4.1.1. Also refer to Subsection 6.3.1.1 for additional discussion on safe shutdown requirements.

7.4.1.1 Safe Shutdown Using Safety-Related Systems

LNP DEP 6.3-1

Revise the second sentence of the sixth paragraph of DCD Subsection 7.4.1.1 to read as follows:

This prevents loss of water inventory from containment and permits operation of the passive residual heat removal heat exchanger and the in-containment refueling water storage tank for greater than 14 days.

LNP DEP 3.2-1
LNP DEP 6.3-1

Revise the last sentence of the eighth paragraph of DCD Subsection 7.4.1.1 to read as follows:

The system provides core decay heat removal in this configuration for greater than 14 days with a limited increase in the containment water level.

LNP DEP 3.2-1

Revise the ninth paragraph of DCD Subsection 7.4.1.1 to read as follows:

Once the reactor coolant system and the safety systems are in this configuration, the plant is in a stable shutdown condition. The reactor coolant system temperatures and pressures continue to slowly decrease. The passive residual heat removal heat exchanger has the capacity to maintain a safe, stable reactor coolant system condition during a design basis event for at least 72 hours in a closed-loop mode of operation. A non-bounding, conservative analysis of extended operation in this mode shows the passive residual heat removal heat exchanger cools the reactor coolant system to 420°F in 36 hours.

Revise the last three sentences of the eleventh paragraph of DCD Subsection 7.4.1.1 to read as follows:

The operator assessment includes consideration for a visible refueling water storage tank level, full core makeup tanks, a high and stable pressurizer level, and decreasing or stable reactor coolant system temperature. If automatic depressurization is not needed, the operator is directed to de-energize all loads on the Class 1E dc batteries. This action preserves the capability for the operator to initiate automatic depressurization at a later time based on assessment of the same parameters.

7.5 SAFETY-RELATED DISPLAY INFORMATION

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

7.5.2 VARIABLE CLASSIFICATIONS AND REQUIREMENTS

Add the following paragraph at the end of DCD Subsection 7.5.2.

STD COL 7.5-1

FSAR Table 7.5-201 supplements DCD Table 7.5-1 and provides variable data shown in the DCD Table as “site-specific.”

7.5.3.5 Type E Variables

Add the following paragraphs at the end of DCD Subsection 7.5.3.5.

STD COL 7.5-1

FSAR Table 7.5-202 supplements DCD Table 7.5-8 and provides variable data shown in the DCD Table as “site-specific.”

7.5.5 COMBINED LICENSE INFORMATION

STD COL 7.5-1
LNP COL 7.5-1

This COL item is addressed in Subsection 7.5.2 and Table 7.5-201, and in Subsection 7.5.3.5 and Table 7.5-202.

LNP COL 7.5-1

Table 7.5-201
Post-Accident Monitoring System[a]

Variable	Range/Status	Type/ Category	Qualification		Number of Instruments Required	Power Supply	QDPS Indication	Remarks
			Environmental	Seismic				
Boundary environs radiation • Airborne Radiohalogens and Particulates (portable sampling with onsite analysis capability) • Radiation (portable instrumentation) • Radioactivity (portable instrumentation)	10^{-9} to 10^{-3} µCi/cc 10^{-3} to 10^{4} R/hr, photons; 10^{-3} to 10^{4} rads/hr, beta and low-energy photons Multichannel gamma ray spectrometer	C3, E3	None	None	N/A	Non-1E	No	taken from RG 1.97 Revision 3
Meteorological parameters • Wind speed • Wind Direction • Differential Temperature	See Remarks	E3	None	None	2 (1 @ 10 m and 1 @ 60 m) 2 (1 @ 10 m and 1 @ 60 m) 2 (10 – 60 m)	Non-1E	No	See FSAR Subsection 2.3.3 and Tables 2.3.3-201, 2.3.3-202

a) This Table supplements DCD Table 7.5-1 and provides the site specific information in the remarks column of DCD Table 7.5-1.

Table 7.5-202
Summary of Type E Variables[(a)]

LNP COL 7.5-1

Function Monitored	Variable	Type/ Category
Environs Radiation and Radioactivity	Plant Environs radiation levels and airborne radioactivity	E3
Meteorology	Wind speed, wind direction, and estimation of atmospheric stability (based on vertical temperature difference)	E3

a) This Table supplements DCD Table 7.5-8 and provides the site specific information noted in the variable column of DCD Table 7.5-8.

LNP DEP 6.4-2

Table 7.5-203
Post-Accident Monitoring System

Variable	Range/ Status	Type/ Category	Qualification Environmental	Qualification Seismic	Number of Instruments Required	Power Supply	QDPS Indication (Note 2)	Remarks
MCR air delivery isolation valve status	Open/ Closed	D2	Mild	Yes	1/valve (Note 7)	1E	Yes	
MCR Electrical Load status	Energized/ De-energized	D2	Mild	Yes	1/Contactor	1E	Yes	
Instrument air header pressure	0-125 psig	F3	None	None	1	Non-1E	No	
Service water flow	0-10,000 gpm	F3	None	None	1/pump	Non-1E	No	
Service water pump status	On/Off	F3	None	None	1/pump	Non-1E	No	
Service water pump discharge valve status	Open/ Closed	F3	None	None	1/valve	Non-1E	No	
Service water pump discharge temperature	50-150°F	F3	None	None	1/pump	Non-1E	No	
Main control room supply air radiation	Note 5	E3, F3	Mild	Yes	2 (Note 9)	1E	No	
Plant vent air flow	0-110% design flow	E2	Mild	None	1	Non-1E	No	
Turbine island vent discharge radiation level	10^{-6} - 10^{+5} µCi/cc	C2, E2	Mild	None	1	Non-1E	No	
Steam generator blowdown discharge radiation	10^{-6} - 10^{-1} µCi/cc	C2	Mild	None	1	Non-1E	No	
Steam generator blowdown brine radiation level	10^{-6} - 10^{-1} µCi/cc	C2	Mild	None	1	Non-1E	No	

LNP DEP 6.4-2

Table 7.5-204
Summary of Type D Variables

System	Variable	Type/Category
Containment Cooling	Containment temperature	D2
	PCS water storage tank series isolation valve status (MOV)	D2
	PCS water storage tank isolation valve status (non-MOV)	D2
	Passive containment cooling water flow	D2
	PCS storage tank water level	D2
HVAC System Status	MCR return air isolation valve status	D2
	MCR toilet exhaust isolation valve status	D2
	MCR supply air isolation valve status	D2
	MCR air delivery isolation valve status	D2
	MCR pressure relief isolation valve status	D2
	MCR Electrical Load Status	D2
	MCR air storage bottle pressure	D2
	MCR differential pressure	D2
	MCR air delivery flowrate	D2
Main Steam	Turbine stop valve status	D2
	Turbine control valve status	D2
	Condenser steam dump valve status	D2

7.6 INTERLOCK SYSTEMS IMPORTANT TO SAFETY

This section of the referenced DCD is incorporated by reference with no departures or supplements.

7.7 CONTROL AND INSTRUMENTATION SYSTEMS

This section of the referenced DCD is incorporated by reference with no departures or supplements.