CHAPTER 7
INSTRUMENTATION AND CONTROLS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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 the following departures and/or supplements.

WLS DEP 6.4-2 DCD Figure 7.2-1, Functional Diagram Containment and Other Protection, Sheet 13 of 21, is replaced with Figure 7.2-202.

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

Revise the fourth paragraph of DCD Subsection 7.3.1.2.14 to read:

WLS DEP 7.3-1 Condition 1 is an average of the source range count rate, sampled at least N times over the most recent time period T1, compared to a similar average taken at time period T2 earlier. If the ratio of the current average count rate to the earlier average count rate is greater than a preset value, a partial trip is generated in the division. On a coincidence of excessively increasing source range neutron flux in two of the four divisions, boron dilution is blocked. The Flux Doubling function is also delayed from actuating each time the source range detector's high voltage power is energized to prevent a spurious dilution block due to the short term instability of the processed source range values. 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.

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.

Revise DCD Subsection 7.3.1.2.17 as follows:

WLS DEP 6.4-2 ### 7.3.1.2.17 Main Control Room Isolation, Air Supply Initiation, and Electrical Load De-energization

WLS DEP 6.4-2 Signals to initiate isolation of the main control room, to initiate the air supply, and 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

WLS DEP 6.4-1
WLS DEP 6.4-2
Condition 1 is the occurrence of one of two main control room air supply radioactivity monitors detecting the iodine or particulate radioactivity level above the High-2 setpoint.

WLS DEP 6.4-2
Condition 2 results from the loss of all ac power sources. A preset time delay is provided to permit the restoration of ac power from the offsite sources or from the onsite diesel generators before initiation. The loss of all ac power is detected by undervoltage sensors that are connected to the input of each of the four Class 1E battery chargers. Two sensors are connected to each of the four battery charger inputs. The loss of ac power signal is based on the detection of an undervoltage condition by each of the two sensors connected to two of the four battery chargers. The two-out-of-four logic is based on an undervoltage to the battery chargers for divisions A or C coincident with an undervoltage to the battery chargers for divisions B or D.

In addition, the loss of all ac power sources coincident with main control room isolation will deenergize the main control room radiation monitors in order to conserve the battery capacity.

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 7.2-202.

TABLE 7.3-201 (Sheet 1 of 3)
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

WLS DEP 7.3-1

TABLE 7.3-201 (Sheet 2 of 3)
ENGINEERED SAFETY FEATURES ACTUATION SIGNALS

Actuation Signal	No. of Divisions/ Controls	Actuation Logic	Permissives and Interlocks
14. Chemical Volume Control System Isolation (Figure 7.2-1, Sheets 6 and 11)			
a. High-2 pressurizer water level	4	2/4-BYP[1]	Automatically unblocked above P-19 Manual block permitted below 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)		
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
WLS DEP 7.3-1 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

TABLE 7.3-201 (Sheet 3 of 3)
ENGINEERED SAFETY FEATURES ACTUATION SIGNALS

Actuation Signal	No. of Divisions/ Controls	Actuation Logic	Permissives and Interlocks
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 7.2-202)			
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 chargers5	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-BYP1	Manual block permitted below P-12 Automatically unblocked above P-12
b. Manual initiation of chemical and volume control system isolation	(See item 14e)		

TABLE 7.3-202
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
	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
	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
	P-6	Intermediate range neutron flux channels below setpoint	Automatically resets the manual block of flux doubling actuation of the boron dilution block
WLS DEP 7.3-1	P-8	Reactor coolant average temperature above setpoint	Permits manual block of flux doubling actuation of the boron dilution block
WLS DEP 7.3-1	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

TABLE 7.3-203
SYSTEM-LEVEL MANUAL INPUT TO THE ENGINEERED
SAFETY FEATURES ACTUATION SYSTEM

	Manual Control	To Division				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
WLS DEP 6.4-2	Manual main control room isolation, air supply initiation and electrical load de-energization #1	A	B	C	D	Figure 7.2-202
WLS DEP 6.4-2	Manual main control room isolation, air supply initiation and electrical load de-energization #2	A	B	C	D	Figure 7.2-202
	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

7.4 SYSTEMS REQUIRED FOR SAFE SHUTDOWN

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

Replace the fifth paragraph of DCD Section 7.4 to read:

WLS DEP 3.2-1

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 following a non-LOCA event using the passive residual heat removal heat exchanger as shown in Chapter 19E. These safe shutdown conditions can be maintained by the passive residual heat removal heat exchanger 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 ADS and passive injection / recirculation as discussed in Subsection 7.4.1.1.

7.4.1.1 Safe Shutdown Using Safety-Related Systems

Replace the first sentence of the first paragraph of DCD Subsection 7.4.1.1 as follows:

WLS DEP 3.2-1

The following describes the process that establishes safe shutdown conditions for the plant, based on a conservative, non-bounding analysis using the safety-related systems, and no operator action.

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

WLS DEP 6.3-1

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.

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

WLS DEP 3.2-1
WLS DEP 6.3-1

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

Revise the ninth paragraph of DCD Subsection 7.4.1.1 as follows:

WLS DEP 3.2-1 Once the reactor coolant system and the safety systems are in this configuration, the plant is in a safe, 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 as follows:

WLS DEP 3.2-1 The operator assessment considers core makeup tank level, RCS hot leg level, temperature, and pressure. 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 these 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 paragraph at the end of DCD Subsection 7.5.3.5.

STD COL 7.5-1 FSAR Table 7.5-201 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
WLS 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.

WLS COL 7.5-1

TABLE 7.5-201
POST-ACCIDENT MONITORING SYSTEMS[a]

Variable	Range/ Status	Number of Instruments Required	Remarks
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 radiations and low energy photons Isotopic Analysis	NA	Conforms to RG 1.97[b]
Meteorological parameters • Wind Speed • Wind Direction • Differential Temperature	See Remarks	NA	Conforms to RG 1.97[b] and RG 1.23; see FSAR Subsection 2.3.3 and Table 2.3-281

a) This table supplements DCD Tables 7.5-1 and 7.5-8 and provides the site specific information noted in the “Remarks” column of DCD Table 7.5-1 and in the “Variable” column of DCD Table 7.5-8.

b) Conformance to Regulatory Guide 1.97 is described in Appendix 1AA. Variables and ranges are defined consistent with Regulatory Guide 1.97, Revision 3.

TABLE 7.5-202
Deleted

TABLE 7.5-203
POST-ACCIDENT MONITORING SYSTEM

Variable	Range/ Status	Type/ Category	Qualification		Number of Instruments Required	Power Supply	QDPS Indication (Note 2)	Remarks
			Environ-mental	Seismic				
MCR air delivery isolation valve status	Open/Closed	D2	Mild	Yes	1/valve (Note 7)	1E	Yes	
WLS DEP 6.4-2 MCR Electrical Load status	Open/Closed	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	

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

WLS DEP 6.4-2

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.