

WSES-FSAR-UNIT-3
INSTRUMENTATION AND CONTROLS
CHAPTER 7
TABLE OF CONTENTS

Section	Title	Page
7.0	<u>INSTRUMENTATION AND CONTROLS</u>	7.1-1
7.1	<u>INTRODUCTION</u>	7.1-1
7.1.1	IDENTIFICATION OF SAFETY RELATED SYSTEMS	7.1-1
7.1.2	IDENTIFICATION OF SAFETY CRITERIA	7.1-5
7.2	<u>REACTOR PROTECTIVE SYSTEM</u>	7.2-1
7.2.1	DESCRIPTION	7.2-1
7.2.2	ANALYSIS	7.2-22
7.3	<u>ENGINEERED SAFETY FEATURES SYSTEMS</u>	7.3-1
7.3.1	DESCRIPTION	7.3-1
7.3.2	ANALYSIS	7.3-25
7.4	<u>SYSTEMS REQUIRED FOR SAFE SHUTDOWN</u>	7.4-1
7.4.1	DESCRIPTION	7.4-1
7.4.2	ANALYSIS	7.4-7
7.5	<u>SAFETY RELATED DISPLAY INSTRUMENTATION</u>	7.5-1
7.5.1	DESCRIPTION	7.5-1
7.5.2	ANALYSIS	7.5-8
7.5A	PLANT MONITORING COMPUTER	7.5A-1
7.6	<u>ALL OTHER INSTRUMENTATION SYSTEMS REQUIRED FOR SAFETY</u>	7.6-1
7.6.1	DESCRIPTION	7.6-1
7.6.2	ANALYSIS	7.6-5
7.7	<u>CONTROL SYSTEMS NOT REQUIRED FOR SAFETY</u>	7.7-1
7.7.1	DESCRIPTION	7.7-1

WSES-FSAR-UNIT-3

CHAPTER 7

TABLE OF CONTENTS (Cont'd)

Section	Title	Page
7.7.2	DESIGN COMPARISON	7.7-19
7.7.3	ANALYSIS	7.7-19
7.7	<u>REFERENCES</u>	7.7-19
7.7A	<u>PLANT SAFETY PARAMETER DISPLAY SYSTEM (SPDS)</u>	7.7A-i
7.7A.1	DESCRIPTION	7.7A-i
7.8	<u>ATWS MITIGATION SYSTEMS</u>	7.8-1
7.8.1	INTRODUCTION	7.8-1
7.8.2	DESIGN BASIS	7.8-1
7.8.3	SYSTEM DESCRIPTION	7.8-1
7.8.4	SAFETY EVALUATION	7.8-3
7.8.5	INSPECTION AND TESTING REQUIREMENTS	7.8-3

WSES-FSAR-UNIT-3

CHAPTER 7

INSTRUMENTATION AND CONTROLS

LIST OF TABLES

Table	Title
7.2-1	REACTOR PROTECTIVE SYSTEM BYPASSES
7.2-2	REACTOR PROTECTIVE SYSTEM MONITORED PLANT VARIABLE RANGES
7.2-3	REACTOR PROTECTIVE SYSTEM SENSORS
7.2-4	REACTOR PROTECTIVE SYSTEM DESIGN MARGINS
7.2-5	PLANT PROTECTION SYSTEM FAILURE MODE AND EFFECTS ANALYSIS
→(DRN 03-2061, R14) 7.2-6	DELETED
←(DRN 03-2061, R14)	
7.3-1	DESIGN BASIS EVENTS REQUIRING ESF SYSTEM ACTION
7.3-2	ESFAS SENSORS AND SETPOINTS
7.3-3	ESFAS BYPASSES
7.3-4	AUXILIARY SUPPORTING SYSTEMS REQUIREMENTS
7.3-5	COMPONENTS ACTUATED ON SIAS
7.3-6	COMPONENTS ACTUATED ON RAS
7.3-7	COMPONENTS ACTUATED ON CSAS
7.3-8	COMPONENTS ACTUATED ON CIAS
7.3-9	COMPONENTS ACTUATED ON MSIS
7.3-10	COMPONENTS ACTUATED ON EFAS
7.3-11	MONITORED VARIABLES REQUIRED FOR ESF SYSTEM PROTECTIVE ACTION
7.3-12	DRAWING COMPARISON
→(DRN 03-2061, R14) 7.3-13	DELETED
←(DRN 03-2061, R14)	
7.4-1	INDICATORS ON AUXILIARY CONTROL PANEL LCP-43
7.4-2	SDCS SUCTION LINE VALVES ACTION ON LOSS OF POWER SUPPLY
7.4-3	CONTROL STATIONS ON AUXILIARY CONTROL PANEL LCP-43
7.5-1	SAFETY RELATED PANEL MOUNTED DISPLAY INSTRUMENTATION
7.5-2	DELETED

WSES-FSAR-UNIT-3

LIST OF TABLES (Cont'd)

Table	Title
7.5-3	ACCIDENT MONITORING INSTRUMENTATION
7.7-1	COLSS MONITORED PLANT VARIABLES

WSES-FSAR-UNIT-3

CHAPTER 7

INSTRUMENTATION AND CONTROLS

LIST OF FIGURES

Figure	Title
7.1-1	SIMPLIFIED PPS CABINET LAYOUT (REAR VIEW)
7.1-2	TYPICAL PPS BAY LAYOUT
7.1-3	AUXILIARY RELAY CABINET A (FRONT VIEW)
7.2-1	TYPICAL MEASUREMENT CHANNEL FUNCTIONAL DIAGRAM (PRESSURIZER PRESSURE)
7.2-2	REED SWITCH POSITION TRANSMITTER CABLE ASSEMBLIES
7.2-3	CEA POSITION SIGNALS WITHIN REACTOR PROTECTION SYSTEM
7.2-4	CEA POSITION SYSTEMS BLOCK DIAGRAM
7.2-5	EXCORE NEUTRON FLUX MONITORING SYSTEM
7.2-6	CORE PROTECTION CALCULATOR SYSTEM BLOCK DIAGRAM
7.2-7	PLANT PROTECTION SYSTEM SIMPLIFIED FUNCTIONAL DIAGRAM
7.2-8	TYPICAL TRIP CHANNEL BYPASS
7.2-9	BASIC PPS TESTING SYSTEM (SHOWN FOR REACTOR PROTECTION SYSTEM)
7.2-10	PLANT PROTECTION SYSTEM INTERFACE LOGIC DIAGRAM
7.2-11	PPS BYPASS AND BLOCK SCHEMATIC
7.2-11a	PPS BYPASS AND BLOCK SCHEMATIC
7.2-12	PLANT PROTECTION SYSTEM FUNCTIONAL DIAGRAM
7.2-13	PPS 2/4 LOGIC MATRIX SCHEMATIC
7.2-14	RPS TRIP PATH
7.2-15	TYPICAL RAS-MSIS-EFAS TRIP PATH CIRCUIT
7.2-16	CSAS-SIAS-CIAS TRIP PATH CIRCUITS
7.2-17	ESFAS ACTUATION RELAY CABINET SCHEMATIC DIAGRAM FOR TYPICAL ACTUATION SIGNAL
7.2-18	ESFAS AUXILIARY RELAY CABINET SIMPLIFIED FUNCTIONAL DIAGRAM FOR MSIS AND EFAS

WSES-FSAR-UNIT-3

CHAPTER 7

LIST OF FIGURES (Cont'd)

Figure	Title
7.2-19	CHANNEL POWER DISTRIBUTION
7.2-20	PPS CALIBRATION AND TEST PANEL SCHEMATIC
7.3-1	PLANT PROTECTION SYSTEM FUNCTIONAL DIAGRAM (SHEETS 1 OF 3)
7.3-1	PLANT PROTECTION SYSTEM FUNCTIONAL DIAGRAM (SHEETS 2 OF 3)
7.3-1	PLANT PROTECTION SYSTEM FUNCTIONAL DIAGRAM (SHEETS 3 OF 3)
7.3-2	SAFETY INJECTION ACTUATION SYSTEM LOGIC DIAGRAM
7.3-3	CONTAINMENT ISOLATION ACTUATION SYSTEM LOGIC DIAGRAM
7.3-4	CONTAINMENT SPRAY AND SAFETY INJECTION SUMP RECIRCULATION ACTUATION SYSTEMS LOGIC DIAGRAM
7.3-5	NSSS ESFAS AUXILIARY RELAY CABINET SCHEMATIC DIAGRAM FOR A TYPICAL ACTUATION SIGNAL
7.3-6	TYPICAL NSSS ENGINEERED SAFETY FEATURES ACTUATION FUNCTIONAL DIAGRAM
7.3-7	MAIN STEAM ISOLATION ACTUATION SYSTEM LOGIC DIAGRAM
7.3-8	NSSS ESFAS AUXILIARY RELAY CABINET SCHEMATIC DIAGRAM MSIS INITIATION CIRCUIT
7.3-9	EMERGENCY FEEDWATER ACTUATION SYSTEM LOGIC DIAGRAM
7.3-10	NSSS EFAS AUXILIARY RELAY CABINET SCHEMATIC DIAGRAM FOR EFAS-1 (EFAS-2) INITIATION CIRCUIT
7.3-11	SHIELD BUILDING VENTILATION SYSTEM-INSTRUMENT SCHEMATIC
7.3-12	EMERGENCY FEEDWATER PARAMETERS
7.3-13	EFAS/MSIS INTERFACE LOGIC DIAGRAM
7.4-1	SHUTDOWN COOLING SYSTEM SUCTION LINE VALVES INTERLOCKS BLOCK DIAGRAM
7.4-2	GENERAL ARRANGEMENT OF THE AUXILIARY CONTROL PANEL LCP-43
7.5-1	LOCAL INSTRUMENT RACKS OR CABINETS CONCEPTUAL LAYOUT
7.5-2	INSTRUMENT CABINET C-1A (LOCATION EL + 21'-0 MSL INSIDE CONTAINMENT)

WSES-FSAR-UNIT-3

CHAPTER 7

LIST OF FIGURES (Cont'd)

Figure	Title
7.5-3	INSTRUMENT CABINET C-1B (LOCATION EL + 21'-0 MSL INSIDE CONTAINMENT)
7.5-4	INSTRUMENT CABINET C-1C (LOCATION EL + 21'-0 MSL INSIDE CONTAINMENT)
7.5-5	INSTRUMENT CABINET C-1D (LOCATION EL + 21'-0 MSL INSIDE CONTAINMENT)
7.5-6	INSTRUMENT CABINET C-27A (LOCATION EL -35'-0 MSL INSIDE CONTAINMENT)
7.5-7	INSTRUMENT CABINET C-27B (LOCATION EL -35'-0 MSL REACTOR AUX BLD'G)
7.5-8	DELETED
7.5A-1	DELETED
7.5A-2	DELETED
7.5A-3	REMOTE MULTIPLEXER SITE
7.5A-4	DELETED
7.5A-5	LOCATION OF CRT DISPLAYS ON THE MAIN CONTROL BOARD
7.7-1	REACTOR REGULATING SYS. 1 AND 2 MEASUREMENT CHANNEL BLOCK DIAGRAM (TYPICAL)
7.7-2	CEDMCS-RPS INTERFACE BLOCK DIAGRAM
7.7-3	PRESSURIZER PRESSURE CONTROL MEASUREMENT CHANNEL BLOCK DIAGRAM (TYPICAL)
7.7-4	PRESSURIZER LEVEL CONTROL MEASUREMENT CHANNEL BLOCK DIAGRAM (TYPICAL)
7.7-5	FEEDWATER CONTROL SYSTEM 1 MEASUREMENT CHANNEL BLOCK DIAGRAM (TYPICAL)
7.7-6	FEEDWATER CONTROL SYSTEM 2 MEASUREMENT CHANNEL BLOCK DIAGRAM (TYPICAL)
7.7-7	STEAM BYPASS CONTROL SYSTEM SIMPLIFIED BLOCK DIAGRAM
7.7-8	FUNCTIONAL DIAGRAM OF THE CORE OPERATING LIMIT SUPERVISORY SYSTEM
7.7-9	REACTOR POWER CUTBACK SYSTEM SIMPLIFIED BLOCK DIAGRAM
7.7-10	INTENTIONALLY DELETED
7.8-1	DIVERSE REACTOR TRIP SCHEMATIC
7.8-2	DIVERSITY BETWEEN THE EXISTING REACTOR TRIP SYSTEM AND THE DIVERSE REACTOR TRIP SYSTEM/DIVERSE TURBINE TRIP
7.8-3	DIVERSE EMERGENCY FEEDWATER ACTUATION SYSTEM (DEFAS) SYSTEM
7.8-4	DIVERSITY BETWEEN THE EXISTING EFW SYSTEM AND THE DIVERSE EFW SYSTEM
7.8-5	ATWS POWER SUPPLY INTERFACE

WSES-FSAR-UNIT-3
UPDATE REFERENCE LIST
Chapter 7

<u>Section</u>	<u>Cross References</u>
<u>Revision 12-B</u>	
Section 7.2.1.1.1.12	ER-W3-2000-0249-000/DRN 03-7
Table 7.5-3 Sht. 15	ER-W3-2002-0352-002/DRN 02-1634
<u>Revision 12-C</u>	
Table 7.5-3 Sht. 20	ER-W3-2003-0296-000/DRN 03-839
<u>Revision 13</u>	
Appendix 7.5A	ER-W3-2002-0560-000/DRN 03-287
Table 7.5-3 Sht 1	ER-W3-1999-0372-000/DRN 03-517
Table 7.5-3 Sht 32	
Table 7.5-3 Sht 33	
Table 7.5-3 Sht 34	
Section 7.4.1.3	ER-W3-2003-0505-000/DRN 03-1275
Table 7.5-3 Sht 26	ER-W3-2003-0508-000/DRN 03-1276
Table 7.5-3 Sht 27	
Table 7.5-3 Sht 28	
Table 7.5-3 Sht 29	
Section 7.7.1.7	ER-W3-2003-0585-000/DRN 03-1609
Table 7.3-13 Sht 2	ER-W3-2002-0585-000/DRN 03-1617
Section 7.7.1.7	ER-W3-2003-0681-000/DRN 03-1873
Table 7.5-3 Sht 4	
Table 7.5-3 Sht 38	
Table 7.7-1	
Section 7.7.1.4.1	ER-W3-2003-0755-000/DRN 03-2155
Section 7.4.2.5	
<u>Revision 13-A</u>	
Section 7.5.2.7.1.1	ER-W3-2004-0382-000/DRN 04-991
Table 7.5-3 Sht 21	
Table 7.5-3 Sht 37	
<u>Revision 13-B</u>	
Section 7.7.1.5.3.2	ER-W3-2004-0767-001/DRN 04-934

WSES-FSAR-UNIT-3

UPDATE REFERENCE LIST

Chapter 7

<u>Section</u>	<u>Cross References</u>
<u>Revision 14</u>	
Table Of Contents	ER-W3-2001-1149-000/DRN 03-2061
Section 7.2.1.1.2.4	
Section 7.2.1.2	
Section 7.2.2.2.1	
Section 7.2.2.2.4	
Section 7.2.2.3.3	
Section 7.3	
Section 7.3.1.1.1.9.6	
Section 7.3.1.2.1	
Section 7.3.2.1.3	
Section 7.4.1.2	
Section 7.4.2.1	
Reference 7.7	
Table 7.2-2	
Table 7.2-6	
Table 7.3-2	
Table 7.3-13	
Section 7.2.1.1.1.3	ER-W3-2002-0110-001/DRN 04-1097
Section 7.2.2.2	
Section 7.2.2.2.3	
Section 7.7.1.5.3.3	
Section 7.2.1.1.1.13	ER-W3-2003-0055-000/DRN 04-384
Section 7.2.1.1.5	
Table 7.2-1	
Table 7.5-3 sh 21	ER-W3-2003-0055-000/DRN 04-744
Table 7.5-3 sh 38	
Table 7.7-1	
Section 7.2.1.1.1.8	ER-W3-2003-0353-000/DRN 05-130
Section 7.7.1.5.5.3.3	
Table 7.2-4	
Table 7.3-2	
Section 7.5.2.7.1.1	ER-W3-2004-0276-000/DRN 04-1967
Table 7.5-3 sh 33	
Figure 7.3-12	ER-W3-2005-0019-000/DRN 05-408
<u>Revision 14-A</u>	
Section 7.7.1.4.3	ER-W3-2005-0436-000/DRN 05-1393
<u>Revision 14-B</u>	
Section 7.3.1.1.9	ER-W3-2004-0373-001/DRN 05-1382
Section 7.5.2.7.1.1	
Table 7.5-3 sh 16	

WSES-FSAR-UNIT-3

UPDATE REFERENCE LIST

Chapter 7

<u>Section</u>	<u>Cross References</u>
<u>Revision 15</u>	
Table 7.3-2 Table 7.5-3 Sh. 7 Table 7.5-3 Sh. 16 Table 7.5-3 Sh. 30	ER-W3-2006-0282-000/DRN 06-884
Table 7.5-3 Sh. 8	ER-W3-2006-0223-000/DRN 06-909
Section 7.3.1.1.6.2	ER-W3-2007-0010-000/DRN 07-43
<u>Revision 301</u>	
Section 7.7.1.4.1	EC-1037
Table 7.5-3 Sh. 33 Table 7.5-3 Sh. 34	EC-2768
<u>Revision 302</u>	
Section 7.6.1.1.1 Table 7.4-2 Figure 7.4-1	EC-935
<u>Revision 303</u>	
Table 7.5-3 Sh. 33 Table 7.5-3 Sh. 34	EC-12583
<u>Revision 304</u>	
Section 7.2.1.1.1.4 Section 7.7.1.5.3.5	EC-13881
Section 7.7.1.1.1	EC-18522
Section 7.7.1.7 Table 7.7-1 Table 7.5-3 Sh. 3	EC-18688
<u>Revision 305</u>	
Section 7.4.1.3 Section 7.6.1.1.1 Section 7.6.2.1 Table 7.4-2 Table 7.4-3 Sheet 3 of 11 Table 7.4-3 Sheet 6 of 11 Table 7.5-3 Sheet 13 of 40	EC-14765
Section 7.2.1.1.5	EC-22790
Section 7.6.2.1	EC-23616

WSES-FSAR-UNIT-3

UPDATE REFERENCE LIST

Chapter 7

<u>Section</u>	<u>Cross References</u>
<u>Revision 306</u>	
Table 7.5-1 (Sheet 2 of 27)	EC-12329
Table 7.5-1 (Sheet 7 of 27)	
Table 7.5-1 (Sheet 16 of 27)	
Table 7.5-1 (Sheet 22 of 27)	
Table 7.5-1 (Sheet 23 of 27)	
<u>Revision 307</u>	
Section 7.1.1.7	EC-2800
Appendix 7.5A	
Table 7.2-2	EC-8460
Table 7.2-4	
Table 7.3-2	
Figure 7.3-12	
Table 7.5-3 Sheet 37 of 40	
Table 7.5-3 Sheet 38 of 40	
Section 7.7 References	
Section 7.3.1.1.6.1	EC-33720
Appendix 7.5A	EC-36174
Section 7.3.1.1.6.1	EC-41355
Section 7.4.1.2	
Section 7.4.2.3	
<u>Revision 308</u>	
Table 7.5-3 Sh. 1 of 40	EC 46532
<u>Revision 309</u>	
Section 7.5A	LBDCR 15-041
Table 7.2-5 Sheet 75 of 119	LBDCR 14-021
Figure 7.8-5	LBDCR 15-008
Figure 7.8-5	LBDCR 15-009