CHAPTER 7— INSTRUMENTATION AND CONTROLS
LIST OF FIGURES

Figure 7.1-1—Chapter 7 Symbol Legend 7.1-145
Figure 7.1-2—Distributed Control System Functional Architecture 7.1-161
Figure 7.1-3—Safety Information and Control System Architecture (QDS Portion) 7.1-162
Figure 7.1-4—Deleted 7.1-163
Figure 7.1-5—Deleted 7.1-164
Figure 7.1-6—Protection System Architecture 7.1-165
Figure 7.1-7—Safety Automation System Architecture 7.1-166
Figure 7.1-8—Priority and Actuator Control System Architecture 7.1-167
Figure 7.1-9—Deleted 7.1-168
Figure 7.1-10—Reactor Control, Surveillance, and Limitation System Architecture 7.1-169
Figure 7.1-11—Process Automation System Architecture (Nuclear Island) 7.1-170
Figure 7.1-12—Process Automation System Architecture (Turbine Island and Balance of Plant) 7.1-171
Figure 7.1-13—Diverse Actuation System Architecture 7.1-172
Figure 7.1-14—Measuring Ranges of Excore Instrumentation 7.1-173
Figure 7.1-15—Excore Instrument Detector Locations 7.1-174
Figure 7.1-16—Boron Concentration Measurement System Arrangement 7.1-175
Figure 7.1-17—Deleted 7.1-176
Figure 7.1-18—Deleted 7.1-176
Figure 7.1-19—Implementation of Independence Between Redundant Divisions 7.1-177
Figure 7.1-20—Implementation of Independence Between Safety and Non-Safety I&C 7.1-178
Figure 7.1-21—Deleted 7.1-179
Figure 7.1-22—Distributed Control System Physical Architecture 7.1-180
Figure 7.1-23—Signal Conditioning and Distribution System Architecture 7.1-181
Figure 7.1-24—Self Powered Neutron Detector Functional Arrangement 7.1-182

Figure 7.1-25—Rod Position Measurement System Arrangement 7.1-183
Figure 7.1-26—Control Rod Drive Control System Arrangement 7.1-184
Figure 7.1-27—Turbine Trip Logic within Turbine Generator I&C 7.1-185
Figure 7.2-1—Typical RT Actuation 7.2-30
Figure 7.2-2—Deleted 7.2-31
Figure 7.2-3—Manual RT 7.2-32
Figure 7.2-4—Safety Related RT Devices 7.2-33
Figure 7.2-5—Rod Drop Detection 7.2-34
Figure 7.2-6—Low DNBR 7.2-35
Figure 7.2-7—High Linear Power Density 7.2-36
Figure 7.2-8—High Neutron Flux Rate of Change 7.2-37
Figure 7.2-9—High Core Power Level & Low Saturation Margin 7.2-38
Figure 7.2-10—Low RCS Flow Rate 7.2-39
Figure 7.2-11—Low - Low RCS Flow Rate 7.2-40
Figure 7.2-12—Low RCP Speed 7.2-41
Figure 7.2-13—High Neutron Flux 7.2-42
Figure 7.2-14—Low Doubling Time 7.2-43
Figure 7.2-15—Low Pressurizer Pressure & High Pressurizer Pressure 7.2-44
Figure 7.2-16—High Pressurizer Level 7.2-45
Figure 7.2-17—Low Hot Leg Pressure 7.2-46
Figure 7.2-18—SG Pressure Drop 7.2-47
Figure 7.2-19—Low SG Pressure 7.2-48
Figure 7.2-20—High SG Pressure 7.2-49
Figure 7.2-21—Low SG Level 7.2-50
Figure 7.2-22—High SG Level 7.2-51
Figure 7.2-23—High Containment Pressure 7.2-52
Figure 7.2-24—RT Signal Generation 7.2-53
Figure 7.2-25—P2 Permissive Logic 7.2-54
Figure 7.2-26—P3 Permissive Logic 7.2-55
Figure 7.2-27—P5 Permissive Logic 7.2-56
Figure 7.2-28—P6 Permissive Logic 7.2-57
Figure 7.2-29—Deleted 7.2-58

Figure 7.2-30—P8 Permissive Logic 7.2-59
Figure 7.2-31—P12 Permissive Logic 7.2-60
Figure 7.2-32—P13 Permissive Logic 7.2-61
Figure 7.2-33—P14 Permissive Logic 7.2-62
Figure 7.2-34—P15 and P7 Permissive Logic 7.2-63
Figure 7.2-35—P16 Permissive Logic 7.2-64
Figure 7.2-36—P17 Permissive Logic 7.2-65
Figure 7.2-37—P18 Permissive Logic 7.2-66
Figure 7.3-1—ESF Actuation 7.3-36
Figure 7.3-2—SIS Actuation 7.3-41
Figure 7.3-3—EFWS Actuation 7.3-42
Figure 7.3-4—EFWS SG Level Control and Pump Flow Protection 7.3-43
Figure 7.3-5—EFWS Isolation 7.3-44
Figure 7.3-6—EFWS Actuators (Div. 1&2) 7.3-45
Figure 7.3-7—EFWS Actuators (Div. 3&4) 7.3-46
Figure 7.3-8—Partial Cooldown Actuation 7.3-47
Figure 7.3-9—MSRT Setpoint Formation 7.3-48
Figure 7.3-10—MSRIV Opening (Div. 1&2) 7.3-49
Figure 7.3-11—MSRIV Opening (Div. 3&4) 7.3-50
Figure 7.3-12—MSRCV Control 7.3-51
Figure 7.3-13—MSRT Isolation 7.3-52
Figure 7.3-14—Main Steam Isolation (Div. 1&2) 7.3-53
Figure 7.3-15—Main Steam Isolation (Div. 3&4) 7.3-54
Figure 7.3-16—MFWS Isolation - Full Load 7.3-55
Figure 7.3-17—MFWS Isolation - SSS 7.3-56
Figure 7.3-18—MFW Actuators (Div. 1&2) 7.3-57
Figure 7.3-19—MFW Actuators (Div. 3&4) 7.3-58
Figure 7.3-20—Containment Isolation 7.3-59
Figure 7.3-21—CVCS Charging Isolation 7.3-60
Figure 7.3-22—CVCS Isolation for Anti-Dilution 7.3-61
Figure 7.3-23—EDG Actuation 7.3-62
Figure 7.3-24—PSRV Opening (Brittle Fracture Protection) 7.3-63

Figure 7.3-25—SG Isolation (Div. 1&2) 7.3-64
Figure 7.3-26—SG Isolation (Div. 3&4) 7.3-65
Figure 7.3-27—RCP Trip 7.3-66
Figure 7.3-28—MCR Air Conditioning System Isolation and Filtering 7.3-67
Figure 7.3-29—Turbine Trip on Reactor Trip Initiation 7.3-68
Figure 7.3-30—Hydrogen Mixing Dampers Opening. 7.3-69
Figure 7.6-1—CCWS Switchover Valves Interlock 7.6-12
Figure 7.6-2—CCWS Containment Isolation Valves Interlock 7.6-13
Figure 7.6-3—Detection of RHR Connected 7.6-14
Figure 7.7-1—Average Coolant Temperature Control Logic 7.7-30
Figure 7.7-2—Rod Speed Control Program 7.7-31
Figure 7.7-3—RCS Pressure Setpoints 7.7-32
Figure 7.7-4—Pressurizer Level Setpoints 7.7-33
Figure 7.7-5—Steam Generator Level Setpoints 7.7-34
Figure 7.7-6—Signal Flow from SCDS through CU 7.7-35

Next File