

1.7 Drawings and Other Detailed Information

1.7.1 Electrical and Instrumentation and Control Drawings

Table 1.7-1—I&C Functional and Electrical One Line Diagrams, contains a list of instrumentation and control functional diagrams and electrical one-line diagrams. The legends for electrical and instrumentation and control functional diagrams are provided in Figure 8.3-1—Electrical Single Line Drawing Legend and Figure 7.1-1—Chapter 7 Symbol Legend, respectively.

A COL applicant that references the U.S. EPR design certification will list additional site specific instrumentation and control functional diagrams and electrical one-line diagrams included in the COL FSAR in Table 1.7-1 and supplement the figure legends, if applicable.

1.7.2 Piping and Instrumentation Diagrams

Where appropriate, piping and instrumentation diagrams (P&ID) are provided throughout the FSAR. The P&IDs provide needed design information or demonstrate how the subject systems and components perform their associated safety function(s). A list of systems and their corresponding FSAR figure numbers is provided in Table 1.7-2—U.S. EPR System Designators and System Diagrams. The U.S. EPR subscribes to the Kraftwerks Kennzeichen System (KKS) for coding and nomenclature of structures, systems, and components. The KKS designators are also used in the P&IDs. Figures appear at the end of the respective text section. The P&ID legend is provided in Figure 1.7-1. The P&ID legend provides an explanation of U.S. EPR symbols and characters used in these FSAR figures.

A COL applicant that references the U.S. EPR design certification will list additional site specific P&IDs included in the COL FSAR in Table 1.7-2 and supplement the figure legend, if applicable.

**Table 1.7-1—I&C Functional and Electrical One Line Diagrams
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FSAR Figure Number	Title
1.7-1	Simplified P&ID Symbol Legend
7.1-1	Chapter 7 Symbol Legend
7.1-2	US EPR I&C Architecture
7.1-3	Safety Information and Control System Architecture (Safety-Related Portion)
7.1-4	Safety Information and Control System Architecture (Non-Safety-Related Portion)
7.1-5	Process Information and Control System Architecture
7.1-6	Protection System Architecture
7.1-7	Safety Automation System Architecture
7.1-8	Priority and Actuator Control System Architecture
7.1-9	Severe Accident I&C System Architecture
7.1-10	Reactor Control, Surveillance, and Limitation System Architecture
7.1-11	Process Automation System Architecture (Nuclear Island Subsystem)
7.1-12	Process Automation System Architecture (Turbine Island and Balance of Plant Subsystem)
7.1-13	Process Automation System Architecture (Diverse Actuation Subsystem)
7.1-14	Measuring Ranges of Excore Instrumentation
7.1-15	Excore Instrument Detector Locations
7.1-16	Boron Concentration Measurement System Arrangement
7.1-17	Implementation of Defense-In-Depth
7.1-18	Implementation of Diversity
7.1-19	Implementation of Independence Between Redundant Divisions
7.1-20	Implementation of Independence Between Safety and Non-Safety I&C
7.1-21	Levels of Defense for Cybersecurity
7.2-1	Typical RT Actuation
7.2-2	Typical SPND-based RT Actuation
7.2-3	Manual RT
7.2-4	Safety Related RT devices
7.2-5	Low DNBR (1 of 2)
7.2-6	Low DNBR (2 of 2)
7.2-7	High Linear Power Density
7.2-8	High Neutron Flux Rate of Change
7.2-9	High Core Power Level & Low Saturation Margin
7.2-10	Low RCS Flow

**Table 1.7-1—I&C Functional and Electrical One Line Diagrams
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FSAR Figure Number	Title
7.2-11	Low - Low RCS flow
7.2-12	Low RCP Speed
7.2-13	High Neutron Flux
7.2-14	Low Doubling Time
7.2-15	High Pressurizer Pressure & Low Pressurizer Pressure
7.2-16	High Pressurizer Level
7.2-17	Low Hot Leg Pressure
7.2-18	SG Pressure Drop
7.2-19	Low SG Pressure
7.2-20	High SG Pressure
7.2-21	Low SG Level
7.2-22	High SG Level
7.2-23	High Containment Pressure
7.2-24	RT Signal Generation
7.2-25	Permissive P2
7.2-26	Permissive P3
7.2-27	Permissive P5
7.2-28	Permissive P6
7.2-29	Permissive P7
7.2-30	Permissive P8
7.2-31	Permissive P12
7.2-32	Permissive P13
7.2-33	Permissive P14
7.2-34	Permissive P15
7.2-35	Permissive P16
7.2-36	Permissive P17
7.3-1	Typical ESF Actuation
7.3-2	SIS Actuation
7.3-3	EFWS Actuation
7.3-4	EFWS SG Level Control and Pump Flow Protection
7.3-5	EFWS Isolation
7.3-6	EFWS Actuators (Div. 1&2)
7.3-7	EFWS Actuators (Div. 3&4)
7.3-8	Partial Cooldown Actuation
7.3-9	MSRT Setpoint Formation

**Table 1.7-1—I&C Functional and Electrical One Line Diagrams
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FSAR Figure Number	Title
7.3-10	MSRT Opening (Div. 1&2)
7.3-11	MSRT Opening (Div. 3&4)
7.3-12	MSRCV Control
7.3-13	MSRT Isolation
7.3-14	MSIV Isolation (Div. 1&2)
7.3-15	MSIV Isolation (Div. 3&4)
7.3-16	MFWS Isolation - Full Load
7.3-17	MFWS Isolation - SSS
7.3-18	MFW Actuators (Div. 1&2)
7.3-19	MFW Actuators (Div. 3&4)
7.3-20	Containment Isolation
7.3-21	CVCS Isolation
7.3-22	Anti-Dilution
7.3-23	EDG Actuation
7.3-24	PSV Opening
7.3-25	SG Isolation (Div. 1&2)
7.3-26	SG Isolation (Div. 3&4)
7.3-27	RCP Trip
7.3-28	MCR Isolation and Filtering
7.3-29	Turbine Trip on Reactor Trip Confirmation
7.6-1	CCWS Switchover Valves Interlock
7.6-2	CCWS Containment Isolation Valves Interlock
7.7-1	Average Coolant Temperature Control Logic
7.7-2	Rod Speed Control Program
7.7-3	RCS Pressure Setpoints
7.7-4	Pressurizer Level Setpoints
7.7-5	Steam Generator Level Setpoints
7.8-1	RT on High Neutron Flux
7.8-2	Safety Injection Actuation
7.8-3	EFW Actuation
7.8-4	Containment Isolation
8.3-1	Electrical Single Line Drawing Legend
8.3-2	Emergency Power Supply System Single Line Drawing
8.3-3	Normal Power Supply System Single Line Drawing
8.3-4	Typical Station Grounding Grid

Table 1.7-1—I&C Functional and Electrical One Line Diagrams
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FSAR Figure Number	Title
8.3-5	Class 1E Uninterruptible Power Supply System Single Line Drawing
8.3-6	12-Hour Uninterruptible Power Supply System Single Line Drawing
8.3-7	Non-Class 1E Uninterruptible Power Supply System Single Line Drawing

Table 1.7-2—U.S. EPR System Designators and System Diagrams
Sheet 1 of 5

KKS Designator	System	FSAR Section	FSAR Figure
JA, JDA, JE	RCS Schematic Flow Diagram	5.1	5.1-1
JA, JDA, JE	RCS Piping and Instrumentation Diagram	5.1	5.1-4
KLB	Annulus Normal Operation Train	6.2	6.2.3-1
KLB	AVS Accident Trains	6.2	6.2.3-2
JNA, JND, JNG	Safety Injection System Overview	6.3	6.3-1
JNA, JND, JNG	Safety Injection/Residual Heat Removal System Train (Typical)	6.3	6.3-2
JNK	IRWST Layout	6.3	6.3-3
JDH	Extra Borating System	6.8	6.8-1
FAK	Fuel Pool Cooling System	9.1	9.1.3-1
FAL	Fuel Pool Purification System	9.1	9.1.3-2
PEB	Essential Service Water System Piping & Instrumentation Diagram	9.2	9.2.1-1
KA	Component Cooling Water System Trains 1 through 4	9.2	9.2.2-1
KA	Component Cooling Water System Common Loop 1	9.2	9.2.2-2
KA	Component Cooling Water System Common Loop 2	9.2	9.2.2-3
KA	Component Cooling Water System Dedicated CCWS Trains	9.2	9.2.2-4
PE	Ultimate Heat Sink Piping and Instrumentation Diagram	9.2	9.2.5-1
GHW	Seal Water Supply System	9.2	9.2.7-1
QK	Safety Chilled Water System Diagram	9.2	9.2.8-1
KU	Nuclear Sampling System	9.3	9.3.2-1
KUL	Severe Accident Sampling System	9.3	9.3.2-2
KT	Nuclear Island Drain and Vent System	9.3	9.3.3-1
KBA, KBD, JEW	Chemical and Volume Control System	9.3	9.3.4-1
KBE	Coolant Purification System	9.3	9.3.4-2
KBG	Coolant Degasification System	9.3	9.3.4-3
KBC	Reactor Makeup and Inventory Control System	9.3	9.3.4-4

Table 1.7-2—U.S. EPR System Designators and System Diagrams
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KKS Designator	System	FSAR Section	FSAR Figure
KBB	Coolant Supply and Storage System	9.3	9.3.4-5
KBF	Coolant Treatment System	9.3	9.3.4-6
SAB	Control Room Air Intake and Iodine Filtration Train Subsystems	9.4	9.4.1-1
SAB	Control Room Recirculation Air Handling Subsystem	9.4	9.4.1-2
SAB	Control Room Envelope Air Supply and Recirculation Subsystem	9.4	9.4.1-3
KLL	Fuel Building Ventilation System	9.4	9.4.2-1
KLE	Nuclear Auxiliary Building Supply Air Filtration and A/C Trains	9.4	9.4.3-1
KLE	Nuclear Auxiliary Building Air Supply and Exhaust Subsystem	9.4	9.4.3-2
KLE	Nuclear Auxiliary Building Exhaust Filtration Trains Subsystem	9.4	9.4.3-3
KLE	Nuclear Auxiliary Building Exhaust Iodine Filtration Train Subsystem	9.4	9.4.3-4
KLE	Nuclear Auxiliary Building Laboratory Iodine Exhaust Filtration Train	9.4	9.4.3-5
KLC	Safeguard Buildings Air Supply Subsystem	9.4	9.4.5-1
KLC	Safeguard Buildings Exhaust Air Subsystem	9.4	9.4.5-2
KLC	Safeguard Building Electrical Divisions 1 and 4 Air Intake	9.4	9.4.6-1
KLC	Safeguard Building Electrical Divisions 1 and 4 Air Supply and Exhaust	9.4	9.4.6-2
KLC	Safeguard Building Electrical Divisions 2 and 3 Air Intake	9.4	9.4.6-3
KLC	Safeguard Building Electrical Divisions 2 and 3 Air Supply and Exhaust	9.4	9.4.6-4
KLA	Containment Building Low Flow and Full Flow Purge Supply Subsystem	9.4	9.4.7-1
KLA	Containment Building Low Flow and Full Flow Purge Exhaust Subsystem	9.4	9.4.7-2
KLA	Containment Building Internal Filtration Subsystem	9.4	9.4.7-3
KLA	Containment Building Cooling Subsystem	9.4	9.4.7-4

Table 1.7-2—U.S. EPR System Designators and System Diagrams
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KKS Designator	System	FSAR Section	FSAR Figure
KLA	Containment Building Service Compartments Cooling Subsystem	9.4	9.4.7-5
KLF	Radioactive Waste Building Ventilation System Air Supply	9.4	9.4.8-1
KLF	Radioactive Waste Building Ventilation System Exhaust Air Station	9.4	9.4.8-2
SAD	Emergency Power Generating Building Ventilation System	9.4	9.4.9-1
SAQ	Essential Service Water Pump Building Ventilation System	9.4	9.4.11-1
SAM3	Main Steam and Feedwater Valve Room Ventilation System	9.4	9.4.12-1
SAD	Typical Configuration of Smoke Confinement System	9.4	9.4.13-1
SAD	Smoke Confinement System Interconnecting Passageway	9.4	9.4.13-2
KLD	Access Building Ventilation System – Supply Air Subsystem	9.4	9.4.14-1
KLD	Access Building Ventilation System – Supply and Exhaust Air Subsystem	9.4	9.4.14-2
SGA, SGB	Fire Water Distribution System Inside Nuclear Island	9.5	9.5.1-1
SGC	Spray Deluge Systems Layout	9.5	9.5.1-2
SGE	Sprinkler Systems Layout	9.5	9.5.1-3
SGJ	Gaseous Fire Extinguishing Systems Layout	9.5	9.5.1-4
XJN	Emergency Diesel Generator Fuel Oil Storage and Transfer System	9.5	9.5.4-1
XJG	Emergency Diesel Generator Cooling Water System	9.5	9.5.5-1
XJX	Emergency Diesel Generator Starting Air System	9.5	9.5.6-1
XJV	Emergency Diesel Generator Lubricating Oil System	9.5	9.5.7-1
XJR	Emergency Diesel Generator Air Intake and Exhaust System	9.5	9.5.8-1
MAH	Design Heat Balance for Steam and Power Conversion System Cycle	10.1	10.1-1

Table 1.7-2—U.S. EPR System Designators and System Diagrams
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KKS Designator	System	FSAR Section	FSAR Figure
MAH	Valves Wide Open Heat Balance for Steam and Power Conversion System Cycle	10.1	10.1-2
MAH	Design Heat Balance for Steam and Power Conversion System Cycle	10.1	10.1A-1
MAH	Valves Wide Open Heat Balance for Steam and Power Conversion System Cycle	10.1	10.1A-2
N/A	Turbine Generator System	10.2	10.2-1
N/A	Turbine Generator System	10.2	10.2A-1
LBA	Main Steam Supply System	10.3	10.3-1
MAJ	Main Condenser Evacuation System	10.4	10.4.2-1
MAQ	Vent System for Air Removal	10.4	10.4.2-2
MAW	Turbine Gland Sealing System	10.4	10.4.3-1
PA	Circulating Water System Flow Diagram	10.4	10.4.5-1
LD	Condensate Polishing System Flow Diagram	10.4	10.4.6-1
LCA	Condensate and Feedwater System	10.4	10.4.7-1
LCA	Condensate and Feedwater System	10.4	10.4.7A-1
LCA	Feedwater Full Load Isolation Valve Hydraulic Actuators	10.4	10.4.7-2
LCQ	Steam Generator Blowdown System Discharge and Cooling	10.4	10.4.8-1
GDA	Steam Generator Blowdown System Flow Diagram	10.4	10.4.8-2
LAR	Emergency Feedwater System Flow Diagram	10.4	10.4.9-1
KPK	Liquid Waste Storage System	11.2	11.2-1
KPF	Liquid Waste Processing System, Evaporator System	11.2	11.2-2
KPF	Liquid Waste Processing, Demineralizer System	11.2	11.2-03
KPL	Gaseous Waste Processing System – Normal Operation	11.3	11.3-1
KPL	Gaseous Waste Processing System – Gaseous Waste Sources	11.3	11.3-2
KPC	Solid Waste Management Flow Diagram	11.4	11.4-1
KPL	Radioactive Effluent Flow Paths With Process and Effluent Radiation Monitors	11.5	11.5-1

**Table 1.7-2—U.S. EPR System Designators and System
Diagrams
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KKS Designator	System	FSAR Section	FSAR Figure
KPG	Simplified Flow Diagram for the Primary Coolant Degasification System Degasifier	12.2	12.2-3
JYK	Main Control Room Airborne Monitoring	12.3	12.3-72
JYK	Reactor and Fuel Buildings Airborne Monitoring	12.3	12.3-73