

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). Valve position indications shown on these figures do not represent a specific operational state. 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.

For continuation labels on the figures, the sheet number in the label refers to the native file name shown in the lower right corner of the figures, not to the sheet number listed above the figure with the figure title. The native file name consists of three parts—the system designation (normally the KKS system name), followed by the native sheet number, followed by an indication of either Tier 1 or Tier 2. For example, native file name FAL02T1 refers to the fuel pool purification system (FAL), native sheet 02, for Tier 1. If a continuation label refers to a figure of a different system, it is identified in the continuation label, with the system designation preceding the native sheet number of the continuation figure. If the continuation is on a native sheet number within the same system, the system designation on the continuation label is not included.

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 | P&ID Symbol Legend |
| 7.1-1 | Chapter 7 Symbol Legend |
| 7.1-2 | U.S. 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 Rod Drop Detection |
| 7.2-6 | Low DNBR |
| 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 |

**Table 1.7-1—I&C Functional and Electrical One Line Diagrams
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| FSAR Figure Number | Title |
|---------------------------|--|
| 7.2-10 | Low RCS Flow |
| 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 | P2 Permissive Logic |
| 7.2-26 | P3 Permissive Logic |
| 7.2-27 | P5 Permissive Logic |
| 7.2-28 | P6 Permissive Logic |
| 7.2-29 | P7 Permissive Logic |
| 7.2-30 | P8 Permissive Logic |
| 7.2-31 | P12 Permissive Logic |
| 7.2-32 | P13 Permissive Logic |
| 7.2-33 | P14 Permissive Logic |
| 7.2-34 | P15 Permissive Logic |
| 7.2-35 | P16 Permissive Logic |
| 7.2-36 | P17 Permissive Logic |
| 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) |

**Table 1.7-1—I&C Functional and Electrical One Line Diagrams
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| FSAR Figure Number | Title |
|---------------------------|---|
| 7.3-7 | EFWS Actuators (Div. 3&4) |
| 7.3-8 | Partial Cooldown Actuation |
| 7.3-9 | MSRT Setpoint Formation |
| 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 Charging Isolation |
| 7.3-22 | CVCS Isolation for Anti-Dilution |
| 7.3-23 | EDG Actuation |
| 7.3-24 | PSRV Opening (Brittle Fracture Protection) |
| 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 |
| 7.6-3 | Detection of RHR Connected |
| 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 | Reactor Trip on Excore High Neutron Flux |
| 7.8-2 | Safety Injection Actuation |

**Table 1.7-1—I&C Functional and Electrical One Line Diagrams
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| FSAR Figure Number | Title |
|---------------------------|--|
| 7.8-3 | EFW Actuation |
| 7.8-4 | Containment Isolation on SIS Actuation |
| 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]] |
| 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
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| 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 | AVS 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 | 6.2 | 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 Boron and Water Makeup System | 9.3 | 9.3.4-4 |
| KBB | Coolant Supply and Storage System | 9.3 | 9.3.4-5 |

Table 1.7-2—U.S. EPR System Designators and System Diagrams
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| KKS Designator | System | FSAR Section | FSAR Figure |
|-----------------------|--|---------------------|--------------------|
| 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 |
| KLA | Containment Building Service Compartments Cooling Subsystem | 9.4 | 9.4.7-5 |

Table 1.7-2—U.S. EPR System Designators and System Diagrams
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| KKS Designator | System | FSAR Section | FSAR Figure |
|-----------------------|---|---------------------|--------------------|
| 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 | 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 |
| MAH | Valves Wide Open Heat Balance for Steam and Power Conversion System Cycle | 10.1 | 10.1-2 |
| N/A | Turbine Generator System | 10.2 | 10.2-1 |

Table 1.7-2—U.S. EPR System Designators and System Diagrams
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| KKS Designator | System | FSAR Section | FSAR Figure |
|-----------------------|--|---------------------|--------------------|
| 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 | 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 Demineralizing 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 | 11.2-3 |
| 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 |
| 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 |

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