4.0 EMERGENCY and ABNORMAL PLANT EVOLUTIONS

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4.1 EMERGENCY PLANT EVOLUTIONS

Emergency Operating Procedures

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Reactor Trip or Safeguards Actuation and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.3
EK 1.02	Steam Generator Blowdown System	2.4
EK 1.03	Compressed and Instrument Air Systems	2.3
EK 1.04	Component Cooling Water System	2.5
EK 1.05	Condensate System	2.1
EK 1.06	Chemical and Volume Control System	2.8
EK 1.07	Diverse Actuation System	3.6
EK 1.08	Digital Rod Control System	2.6
EK 1.09	Main AC Power System	2.5
EK 1.10	Engineered Safeguards Actuation System	4.2
EK 1.11	Main and Startup Feedwater System	2.7
EK 1.12	Main Steam System	2.7
EK 1.13	Main Turbine System	2.1
EK 1.14	Passive Containment Cooling System	3.9
EK 1.15	Pressurizer Level Control System	2.9
EK 1.16	Pressurizer Pressure Control System	2.8
EK 1.17	Passive Residual Heat Removal System	3.7
EK 1.18	Passive Core Cooling System	4.0
EK 1.19	Reactor Coolant Pump	2.8
EK 1.20	Reactor Coolant System	3.2
EK 1.21	Radiation Monitoring System	3.0
EK 1.22	Normal Residual Heat Removal System	2.8
EK 1.23	Rod Position Indication System	2.6
EK 1.24	Reactor Trip System	3.7
EK 1.25	Steam Dump Control System	2.6
EK 1.26	Steam Generator System	2.5
EK 1.27	Service Water System	2.1

EK	1.28	Main Turbine Control and Diagnostics System	1.9
EK	1.29	Containment Recirculation Cooling System	2.7
EK	1.30	Central Chilled Water System	2.1
EK	1.31	Transmission Switchyard and Offsite Power System	2.1
EK	1.32	Onsite Standby Power System	2.4
EK	1.33	Nuclear Instrumentation System	4.1

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Reactor Trip or Safeguards Actuation: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Establishing startup feedwater flow to a steam generator that is depressurized	3.1
EK	2.02	Not maintaining Reactor Coolant System temperature stable	3.1
EK	2.03	Faulted steam generator	3.3
EK	2.04	Steam generator tube rupture	3.6
EK	2.05	Adverse containment conditions	3.6
EK	2.06	Unavailability of either the startup feedwater pumps or Passive Residual Heat Removal System	3.6
EK	2.07	Loss of coolant accident outside of containment	3.8
EK	2.08	Natural circulation indications	3.3
EK	2.09	Downcomer voiding effects on Nuclear Instrumentation System	3.2
EK	2.10	Failure to diagnose a faulted steam generator	3.4
EK	2.11	Failure to diagnose a steam generator tube rupture event (PRA related)	3.7
EK	2.12	Failure to depressurize the reactor coolant system during a small loss of coolant accident (PRA related)	3.9

EK 3 Knowledge of the reasons for the following actions as they apply to Reactor Trip or Safeguards Actuation: (CFR: 41.5 / 41.10 / 45.6 / 45.13)

EK	3.01	Tripping the reactor	4.0
EK	3.02	Tripping the turbine	3.6
EK	3.03	Safeguards Actuation	4.2
EK	3.04	Main Feedwater Isolation Actuations	3.4
EK	3.05	Core Makeup Tank Actuation	3.9
EK	3.06	Stopping the reactor coolant pumps	3.6
EK	3.07	Passive Residual Heat Removal System Actuation	3.9
EK	3.08	Normal Residual Heat Removal System Isolation Actuation	3.2
EK	3.09	Steam Line Isolation Actuation	3.3
EK	3.10	Steam Generator Relief Isolation Actuation	3.2
EK	3.11	Passive Containment Cooling System Actuation	3.9
EK	3.12	Tripping the pressurizer heaters due to Core Makeup Tank Actuation	3.1
EK	3.13	Boron Dilution Block Actuation	3.1
EK	3.14	Containment Isolation Actuation	3.7
EK	3.15	Closing the automatic depressurization system valve discharge header drain isolation valve	3.2
EK	3.16	Verifying/restoring power to one or both nuclear island switchgear buses	2.7
EK	3.17	Starting and aligning the startup feedwater pumps to feed the steam generators	2.7
EK	3.18	Checking level and/or feedwater flow for both steam generators	2.8
EK	3.19	Checking Passive Residual Heat Removal System flow	3.2
EK	3.20	Reducing Reactor Coolant System Tcold equal to or less than the no-load value	2.9
EK	3.21	Stabilizing steam generator pressures at no load value	2.7
EK	3.22	Placing Service Water System in service	2.6
EK	3.23	Placing Component Cooling Water System in service	2.7
EK	3.24	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	2.6
EK	3.25	Operating the reactor containment recirculation fans in low speed	2.7

EK	3.26	Checking for steam generator pressure lowering in an uncontrolled manner or completely depressurized	3.1
EK	3.27	Checking radiation monitors for abnormal steam generator blow down, main steam, and/or turbine island vent radiation	3.2
EK	3.28	Checking for steam generator level rising in an uncontrolled manner	3.2
EK	3.29	Checking for abnormal or rising containment radiation, pressure, level, and/or sump level	3.3
EK	3.30	Checking for abnormal plant vent radiation	3.2
EK	3.31	Passive safety system termination	3.2
EK	3.32	Automatic Depressurization System Actuation	4.2
EK	3.33	Resetting Containment Isolation Actuation	3.2
EK	3.34	Establishing instrument air to containment	2.8
EK	3.35	Placing Central Chilled Water System in service and/or restoring chilled water to containment	2.5

EA	**1**	**Ability to operate and monitor the following as they apply to a Reactor Trip or Safeguards Actuation: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Automatic Depressurization System	4.3
EA	1.02	Steam Generator Blowdown System	2.6
EA	1.03	Compressed and Instrument Air System	2.3
EA	1.04	Component Cooling Water System	2.6
EA	1.05	Condensate System	2.1
EA	1.06	Chemical and Volume Control System	2.7
EA	1.07	Diverse Actuation System	3.8
EA	1.08	Digital Rod Control System	2.7
EA	1.09	Engineered Safeguards Actuation System	4.3
EA	1.10	Main and Startup Feedwater System	2.9
EA	1.11	Main Steam System	2.7
EA	1.12	Passive Containment Cooling System	3.9
EA	1.13	Pressurizer Level Control System	2.8
EA	1.14	Pressurizer Pressure Control System	2.8

EA	1.15	Passive Residual Heat Removal System	3.6
EA	1.16	Passive Core Cooling System	4.0
EA	1.17	Reactor coolant pump	3.1
EA	1.18	Reactor Coolant System	3.2
EA	1.19	Normal Residual Heat Removal System	2.8
EA	1.20	Reactor Trip System	3.9
EA	1.21	Steam Dump Control System	2.7
EA	1.22	Steam Generator System	2.7
EA	1.23	Service Water System	2.4
EA	1.24	Main Turbine Control and Diagnostics System	2.0
EA	1.25	Containment Recirculation Cooling System	2.7
EA	1.26	Central Chilled Water System	2.2
EA	1.27	Nuclear Instrumentation System	4.1

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Reactor Trip or Safeguards Actuation: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Rod position indications	3.0	2.9
EA	2.02	Reactor trip breaker status	3.4	3.4
EA	2.03	Reactor power	3.6	3.4
EA	2.04	Reactor Coolant System pressure, temperature, and/or pressurizer level	3.2	3.6
EA	2.05	Steam Generator level, Feedwater flow, steam flow, and/or pressure	2.8	3.0
EA	2.06	Core exit temperatures and/or subcooling	3.8	3.8
EA	2.07	Passive Residual Heat Removal System flow	3.4	3.4
EA	2.08	Containment pressure, level, and/or radiation level	3.6	3.7
EA	2.09	Core makeup tank level	3.2	3.7
EA	2.10	Secondary radiation	3.4	2.7
EA	2.11	In-containment refueling water storage tank level	3.2	3.6

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Reactor Trip Response and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Condensate System	2.1
EK 1.02	Chemical and Volume Control System	2.5
EK 1.03	Main AC Power System	2.4
EK 1.04	Engineered Safeguards Actuation System	3.6
EK 1.05	Digital Rod Control System	3.2
EK 1.06	Main and Startup Feedwater System	2.9
EK 1.07	Class 1E DC and UPS System	2.9
EK 1.08	Main Steam System	2.8
EK 1.09	Main Turbine System	2.6
EK 1.10	Nuclear Instrumentation System	3.4
EK 1.11	Pressurizer Level Control System	3.1
EK 1.12	Pressurizer Pressure Control System	3.1
EK 1.13	Passive Residual Heat Removal System	3.2
EK 1.14	Passive Core Cooling System	3.1
EK 1.15	Reactor Coolant Pump	2.9
EK 1.16	Reactor Coolant System	2.9
EK 1.17	Rod Position Indication System	3.3
EK 1.18	Reactor Trip System	3.8
EK 1.19	Steam Dump Control System	3.1
EK 1.20	Steam Generator System	3.1
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Reactor Trip Response: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Safeguards Actuation	3.8
EK 2.02	Loss of reactor coolant system subcooling or inability to maintain pressurizer level	3.7

EK	2.03	Loss of Compressed and Instrument Air System	2.6
EK	2.04	Loss of Main AC Power System	2.5
EK	2.05	Loss of Class 1E DC and UPS System	3.3
EK	2.06	Feedwater flow changes on Reactor Coolant System pressure, temperature, and/or level	3.1
EK	2.07	Feedwater flow changes on steam generator level and/or pressure	3.0
EK	2.08	Depressurizing a steam generator if secondary makeup is not available (PRA related)	3.2
EK	2.09	Core Makeup Tank Actuation	3.4
EK	2.10	Inability to stabilize Reactor Coolant System at no load Tcold temperature	3.3
EK	2.11	Configuration and speed of running reactor coolant pumps effect on Passive Residual Heat Removal System	3.1
EK	2.12	Configuration and speed of running reactor coolant pumps effect on Pressurizer spray flow	3.2
EK	2.13	Failure to recognize the need and failure to manually trip the reactor through Protection and Safety Monitoring System given anticipated transient without scram (PRA related) (OE related)	4.3

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Reactor Trip Response: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Tripping the reactor (OE related)	4.2
EK	3.02	Tripping the turbine (OE related)	3.8
EK	3.03	Checking safeguards not actuated	3.8
EK	3.04	Stabilizing Reactor Coolant System Tcold, pressurizer pressure, and/or pressurizer level at the no-load values	3.4
EK	3.05	Stabilizing steam generator pressures and/or levels at the no-load values	3.3
EK	3.06	Checking all switchgear buses energized from offsite power	2.6
EK	3.07	Checking main feedwater is in the Low Power Operation Mode	2.8
EK	3.08	Aligning Chemical and Volume Control System makeup pumps suction to the boric acid tank and operate to maintain pressurizer level	2.8

EK	3.09	Borating the Reactor Coolant System if two or more control rods are not fully inserted	3.4
EK	3.10	Aligning Reactor Coolant System head vent or Chemical and Volume Control System purification and letdown to maintain pressurizer level	2.8
EK	3.11	Core Makeup Tank Actuation	3.3
EK	3.12	Maintaining saturated conditions in the pressurizer	3.2
EK	3.13	Transferring the Steam Dump Control System to the Pressure Control Mode	2.9
EK	3.14	Returning Passive Residual Heat Removal System to standby or Actuating Passive Residual Heat Removal System	3.2
EK	3.15	Operating the reactor coolant pumps (OE related)	2.9
EK	3.16	Energizing the source range nuclear instrumentation	3.2
EK	3.17	Aligning Normal Residual Heat Removal System for cooling the In-containment refueling water storage tank and/or the core makeup tank	2.8
EK	3.18	Performing a natural circulation cooldown (OE related)	3.2

EA 1 Ability to operate and monitor the following as they apply to a Reactor Trip Response: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Condensate System	2.2
EA	1.02	Core Makeup Tank	3.3
EA	1.03	Chemical and Volume Control System	2.9
EA	1.04	Digital Rod Control System	3.1
EA	1.05	Engineered Safeguards Actuation System	3.9
EA	1.06	Main and Startup Feedwater System	3.1
EA	1.07	Main Steam System	3.0
EA	1.08	Main Turbine System	2.9
EA	1.09	Nuclear Instrumentation System	3.3
EA	1.10	Pressurizer Level Control System	3.1
EA	1.11	Pressurizer Pressure Control System	3.1
EA	1.12	Passive Residual Heat Removal System	3.4
EA	1.13	Reactor coolant pump	2.9

EA	1.14	Reactor Coolant System	2.9
EA	1.15	Rod Position Indication System	3.2
EA	1.16	Reactor Trip System (OE related)	3.9
EA	1.17	Steam Dump Control System	3.2
EA	1.18	Steam Generator System	3.1

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Reactor Trip Response: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Neutron flux	3.4	3.7
EA	2.02	Control rod position	3.4	3.8
EA	2.03	Reactor trip breaker position (OE related)	3.4	4.1
EA	2.04	Main turbine stop valve position	3.0	3.7
EA	2.05	Engineered Safeguards Actuation System actuations status	3.4	4.0
EA	2.06	Reactor Coolant System pressure, temperature, and/or pressurizer level	3.4	3.6
EA	2.07	Steam generator feedflow, level, and/or pressure	3.2	3.3
EA	2.08	Boron required to compensate for rods not fully inserted	3.6	3.3

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Natural Circulation Cooldown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurizaton System	3.8
EK 1.02	Control rod drive mechanism cooling fans	3.0
EK 1.03	Chemical and Volume Control System	2.8
EK 1.04	Engineered Safeguards Actuation System	3.7
EK 1.05	Main and Startup Feedwater System	3.1
EK 1.06	Main Steam System	2.8
EK 1.07	Pressurizer Pressure Control System	3.2
EK 1.08	Pressurizer Level Control System	3.2
EK 1.09	Passive Residual Heat Removal System	3.5
EK 1.10	Passive Core Cooling System	3.4
EK 1.11	Reactor coolant pump	2.6
EK 1.12	Reactor Coolant System	3.1
EK 1.13	Normal Residual Heat Removal System	2.8
EK 1.14	Steam Dump Control System	3.1
EK 1.15	Steam Generator System	3.2
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Natural Circulation Cooldown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Excessive cycling of First Stage Automatic Depressurizaton System valves	3.6
EK 2.02	Allowing Reactor Coolant System pressure to rise above 1970 psig after safeguards are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK 2.03	Depressurizing the steam lines at a high rate after Steamline / Feedwater Isolation Actuations are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.3

EK	2.04	Failure to maintain Reactor Coolant System temperature and pressure within the acceptable operating region of the applicable cooldown curve	3.3
EK	2.05	Having less than 1 control rod drive mechanism fan running in each plenum	3.1
EK	2.06	Reducing Reactor Coolant System pressure below the minimum before the soak time has elapsed per the applicable cooldown curve	3.2
EK	2.07	Depressurizing the Reactor Coolant System before entire Reactor Coolant System is cooled	3.3
EK	2.08	Steam flow and/or Feedwater flow effects on Reactor Coolant System natural circulation	3.2
EK	2.09	Starting a reactor coolant pump with a steam bubble in the reactor head	3.1
EK	2.10	Configuration and speed of running reactor coolant pumps effect on Passive Residual Heat Removal System	3.0
EK	2.11	Configuration and speed of running reactor coolant pumps effect on pressurizer spray flow	3.0
EK	2.12	Inability to isolate the safety injection accumulators	3.3
EK	2.13	Borating the Reactor Coolant System with no forced Reactor Coolant System flow	3.2
EK	2.14	Cooling down the Reactor Coolant System with Passive Residual Heat Removal System	3.5

EK 3 Knowledge of the reasons for the following actions as they apply to Natural Circulation Cooldown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)

EK	3.01	Restarting reactor coolant pumps	3.2
EK	3.02	Running control rod drive mechanism cooling fans	3.1
EK	3.03	Borating the Reactor Coolant System to ensure shutdown margin	3.2
EK	3.04	Aligning Chemical and Volume Control System for blended makeup and operate to maintain pressurizer level	2.8
EK	3.05	Aligning Reactor Coolant System head vent or Chemical and Volume Control System purification and letdown to maintain pressurizer level	2.8
EK	3.06	Isolating or Actuating core makeup tank	3.4
EK	3.07	Maintaining saturated conditions in the pressurizer	3.2

EK	3.08	Returning Passive Residual Heat Removal System to standby or Actuating Passive Residual Heat Removal System	3.4
EK	3.09	Aligning startup feedwater to maintain steam generator levels or flow	2.9
EK	3.10	Aligning Normal Residual Heat Removal System for cooling the in-containment refueling water storage tank and/or the core makeup tank	2.9
EK	3.11	Ensuring the Reactor Coolant System Thot is less than 550°F before depressurizing the Reactor Coolant System below P-11, Pressurizer Pressure Below 1970 psig	3.3
EK	3.12	Lowering Reactor Coolant System pressure below P-11, Pressurizer Pressure Below 1970 psig	3.1
EK	3.13	Terminating the Reactor Coolant System depressurization below P-11, Pressurizer Pressure Below 1970 psig	3.2
EK	3.14	Blocking Steamline / Feedwater Isolation Actuations and/or Safeguards Actuation below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	3.15	Cooldown the Reactor Coolant System at a rate not to exceed the limit in any 60 minute period and operate inside the acceptable operating region of the applicable cooldown curve	3.3
EK	3.16	After cooling down, waiting for time to elapse before reducing Reactor Coolant System pressure per the applicable cooldown curve	3.2
EK	3.17	Reducing Reactor Coolant System pressure to minimum allowable	3.1
EK	3.18	Terminating the Reactor Coolant System depressurization to minimum allowable	3.1
EK	3.19	Repressurizing the Reactor Coolant System if voiding is indicated	3.4
EK	3.20	Isolating the safety injection accumulators	3.2
EK	3.21	Placing Normal Residual Heat Removal System in service in the Shutdown Cooling Mode	2.9
EK	3.22	Cooling down the inactive portions of the Reactor Coolant System	2.9
EK	3.23	Depressurizing the Reactor Coolant System to atmospheric pressure	2.8

EA	**1**	**Ability to operate and monitor the following as they apply to a Natural Circulation Cooldown: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Automatic Depressurizaton System	4.0
EA	1.02	Control Rod Drive Mechanism Cooling Fans	3.2
EA	1.03	Chemical and Volume Control System	2.9
EA	1.04	Engineered Safeguards Actuation System	3.8
EA	1.05	Main and Startup Feedwater System	3.1
EA	1.06	Main Steam System	2.8
EA	1.07	Pressurizer Pressure Control System	3.1
EA	1.08	Pressurizer Level Control System	3.2
EA	1.09	Passive Residual Heat Removal System	3.5
EA	1.10	Passive Core Cooling System	3.4
EA	1.11	Reactor Coolant Pump	2.8
EA	1.12	Reactor Coolant System	3.1
EA	1.13	Normal Residual Heat Removal System	2.9
EA	1.14	Steam Dump Control System	3.2
EA	1.15	Steam Generator System	3.1

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Natural Circulation Cooldown: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Core exit temperatures and/or subcooling	3.4	3.8
EA	2.02	Reactor Coolant System temperature, pressure, and/or pressurizer level	3.4	3.8
EA	2.03	Steam generator level, feedwater flow, and/or pressure	2.8	3.3

E-1 Loss of Coolant Accident

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Loss of Coolant Accident and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.3
EK 1.02	Steam Generator Blowdown System	2.4
EK 1.03	Compressed and Instrument Air Systems	2.3
EK 1.04	Chemical and Volume Control System	2.8
EK 1.05	Diverse Actuation System	3.6
EK 1.06	Main AC Power System	2.5
EK 1.07	Engineered Safeguards Actuation System	4.2
EK 1.08	Main and Startup Feedwater System	2.7
EK 1.09	Main Steam System	2.7
EK 1.10	Passive Containment Cooling System	3.9
EK 1.11	Passive Residual Heat Removal System	3.7
EK 1.12	Primary Sampling System	2.1
EK 1.13	Passive Core Cooling System	4.0
EK 1.14	Reactor Coolant System	3.2
EK 1.15	Radiation Monitoring System	3.0
EK 1.16	Normal Residual Heat Removal System	2.8
EK 1.17	Steam Dump Control System	2.6
EK 1.18	Steam Generator System	2.5
EK 1.19	Containment Recirculation Cooling System	2.7
EK 1.20	Central Chilled Water System	2.1
EK 1.21	Transmission Switchyard and Offsite Power System	2.1
EK 1.22	Onsite Standby Power System	2.4

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Coolant Accident: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Faulted steam generator	3.1
EK	2.02	Steam generator tube rupture	3.1
EK	2.03	Adverse containment conditions	3.3
EK	2.04	Depressurizing a steam generator to cool the Reactor Coolant System if no makeup water is available to the secondary side of the Steam Generator (PRA related)	3.6
EK	2.05	Unavailability of either the startup feedwater pumps or Passive Residual Heat Removal System	3.6
EK	2.06	Loss of coolant accident outside of containment	3.5
EK	2.07	Reducing steam generator pressure below Reactor Coolant System pressure if fuel damage is suspected (high core exit thermocouple or primary coolant sample)	3.6
EK	2.08	Changes in core cooling mechanisms between normal operations and Loss of Coolant Accident	3.8
EK	2.09	Changes in core cooling mechanisms between normal operations and faulted steam generator	3.6
EK	2.10	Natural circulation indications	3.4
EK	2.11	Downcomer voiding effects on Nuclear Instrumentation System	3.2
EK	2.12	Reactor Coolant System pressure remains above Normal Residual Heat Removal System shutoff head and Automatic Depressurization System is not actuated	3.5
EK	2.13	Failure to diagnose a steam generator tube rupture event (PRA related)	3.7
EK	2.14	Failure to depressurize the Reactor Coolant System during a small loss of coolant accident (PRA related)	3.9
EK	2.15	Failure to open the in-containment refueling water storage tank containment recirculation valves during a loss of coolant accident (PRA related)	3.8

EK 3 Knowledge of the reasons for the following actions as they apply to Loss of Coolant Accident: (CFR: 41.5 / 41.10 / 45.6 / 45.13)

EK	3.01	Passive Containment Cooling System Actuation	3.9
EK	3.02	Verifying/restoring power to one or both nuclear island switchgear buses	2.7
EK	3.03	Checking level and/or feedwater flow for both steam generators	2.8
EK	3.04	Checking Passive Residual Heat Removal System flow	3.2
EK	3.05	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	2.6
EK	3.06	Operating the reactor containment recirculation fans in low speed	2.7
EK	3.07	Checking for steam generator pressure lowering in an uncontrolled manner or completely depressurized	3.1
EK	3.08	Checking radiation monitors for abnormal steam generator blow down, main steam, and/or turbine island vent radiation	3.2
EK	3.09	Checking for steam generator level rising in an uncontrolled manner	3.2
EK	3.10	Passive Safety System termination	3.2
EK	3.11	Automatic Depressurization System Actuation	4.2
EK	3.12	Resetting Containment Isolation Actuation	3.2
EK	3.13	Establishing instrument air to containment	2.8
EK	3.14	Placing Central Chilled Water System in service and/or restoring chilled water to containment	2.5
EK	3.15	Checking level and/or feedwater flow for only the intact steam generators	2.7
EK	3.16	Performing periodic activity samples for both steam generators and/or performing local surveys of the steam lines	2.5
EK	3.17	Checking for both steam generators pressures stable or rising and Reactor Coolant System pressure stable or lowering	2.8
EK	3.18	Periodic sampling of the Reactor Coolant System for boron, hydrogen, and activity	2.3
EK	3.19	Placing in-containment refueling water storage tank cooling in service	3.0
EK	3.20	In-containment Refueling Water Storage Tank Injection Actuation	3.8
EK	3.21	In-Containment Refueling Water Storage Tank Containment Recirculation Actuation	3.8
EK	3.22	Depressurizing the intact steam generators	3.1

EK	3.23	Venting the reactor vessel head	3.0
EK	3.24	Checking containment water level	2.9

EA 1 Ability to operate and monitor the following as they apply to a Loss of Coolant Accident: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Automatic Depressurization System	4.3
EA	1.02	Steam Generator Blowdown System	2.6
EA	1.03	Compressed and Instrument Air System	2.3
EA	1.04	Chemical and Volume Control System	2.7
EA	1.05	Diverse Actuation System	3.8
EA	1.06	Engineered Safeguards Actuation System	4.3
EA	1.07	Main and Startup Feedwater System	2.9
EA	1.08	Main Steam System	2.7
EA	1.09	Passive Containment Cooling System	3.9
EA	1.10	Passive Residual Heat Removal System	3.6
EA	1.11	Passive Core Cooling System	4.0
EA	1.12	Reactor Coolant System	3.2
EA	1.13	Normal Residual Heat Removal System	2.8
EA	1.14	Steam Dump Control System	2.7
EA	1.15	Steam Generator System	2.7
EA	1.16	Containment Recirculation Cooling System	2.7
EA	1.17	Central Chilled Water System	2.2

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Coolant Accident: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Reactor Coolant System pressure, temperature, and/or pressurizer level	3.2	3.6
EA	2.02	Steam generator level, feedwater flow, steam flow, and/or pressure	2.8	3.0
EA	2.03	Core exit temperature and/or subcooling	3.8	3.8
EA	2.04	Passive Residual Heat Removal System flow	3.4	3.4
EA	2.05	Containment pressure, level, and/or radiation level	3.6	3.7
EA	2.06	Core makeup tank level	3.2	3.7
EA	2.07	Secondary radiation	3.4	2.7
EA	2.08	In-containment refueling water storage tank level	3.2	3.6

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Passive Safety System Termination and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.0
EK 1.02	Steam Generator Blowdown System	2.3
EK 1.03	Compressed and Instrument Air System	2.3
EK 1.04	Component Cooling Water System	2.5
EK 1.05	Chemical and Volume Control System	2.5
EK 1.06	Engineered Safeguards Actuation System	3.9
EK 1.07	Main and Startup Feedwater System	2.8
EK 1.08	Main Steam System	2.6
EK 1.09	Nuclear Instrumentation System	2.8
EK 1.10	Passive Containment Cooling System	3.6
EK 1.11	Pressurizer Level Control System	2.9
EK 1.12	Pressurizer Pressure Control System	2.8
EK 1.13	Passive Residual Heat Removal System	3.7
EK 1.14	Passive Core Cooling System	3.9
EK 1.15	Reactor Coolant System	3.1
EK 1.16	Reactor Coolant Pump	2.6
EK 1.17	Normal Residual Heat Removal System	2.7
EK 1.18	Rod Position Indication System	2.2
EK 1.19	Steam Dump Control System	2.5
EK 1.20	Spent Fuel Pool Cooling System	1.9
EK 1.21	Steam Generator System	2.6
EK 1.22	Service Water System	2.1
EK 1.23	Nuclear Island Nonradioactive Ventilation System	1.9
EK 1.24	Containment Recirculation Cooling System	2.3
EK 1.25	Main Control Room Emergency Habitability System	2.7
EK 1.26	Central Chilled Water System	1.9

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Passive Safety System Termination: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Excessive cycling of First Stage Automatic Depressurization System valves	3.6
EK	2.02	Depressurizing the Reactor Coolant System with no Reactor Coolant Pumps running	3.3
EK	2.03	Allowing Reactor Coolant System pressure to rise above 1970 psig after safeguards are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	2.04	Depressurizing the steam lines at a high rate after safeguards are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.3
EK	2.05	Establishing feedwater flow to a steam generator that is depressurized	3.2
EK	2.06	Starting a reactor coolant pump with a steam bubble in the reactor head	3.1
EK	2.07	Configuration and speed of running reactor coolant pumps effect on Passive Residual Heat Removal System	3.4
EK	2.08	Configuration and speed of running reactor coolant pumps effect on pressurizer spray flow	3.1

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Passive Safety System Termination: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Resetting Safeguards Actuation	3.7
EK	3.02	Resetting Containment Isolation Actuation	3.7
EK	3.03	Energize all switchgear buses from offsite power	2.8
EK	3.04	Establishing instrument air to containment	2.9
EK	3.05	Terminating core makeup tank injection	3.8
EK	3.06	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	2.8
EK	3.07	Reinitiating core makeup tank injection	3.8
EK	3.08	Maintaining saturated conditions in the pressurizer	3.3
EK	3.09	Reinitiating safeguards	3.9

EK	3.10	Reactor Coolant System Depressurization to P-11, Pressurizer Pressure Below 1970 psig and Termination Criteria	3.4
EK	3.11	Blocking Steamline / Feedwater Isolation Actuations and/or Safeguards Actuation below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	3.12	Starting and aligning the startup feedwater pumps to feed the steam generators	3.1
EK	3.13	Controlling level and/or feedwater flow only to intact steam generators	3.1
EK	3.14	Stabilizing steam generator pressures at no load value	2.9
EK	3.15	Transferring the Steam Dump Control System to the Pressure Control Mode	2.6
EK	3.16	Terminating Passive Residual Heat Removal System flow	3.4
EK	3.17	Energizing the source range nuclear instrumentation	3.2
EK	3.18	Borating the Reactor Coolant System if two or more control rods are not fully inserted	3.4
EK	3.19	Restoring Component Cooling Water System flow to containment	2.9
EK	3.20	Maintaining pressurizer level less than the high level setpoint	2.9
EK	3.21	Operating the reactor containment recirculation fans in low speed or high speed	2.8
EK	3.22	Placing central chilled water in service and/or restoring chilled water to containment	2.4
EK	3.23	Terminating Passive Containment Cooling System flow	3.5
EK	3.24	Restoring Main Control Room HVAC to normal alignment	2.8
EK	3.25	Starting reactor coolant pumps	2.7
EK	3.26	Aligning Chemical and Volume Control System makeup pumps to maintain pressurizer level	2.8
EK	3.27	Maintaining stable plant conditions	3.0
EK	3.28	Reinitiating core makeup tank injection	3.9
EK	3.29	Reinitiating safeguards	4.0
EK	3.30	Aligning Normal Residual Heat Removal System for cooling the in-containment refueling water storage tank and/or the core makeup tank	3.0
EK	3.31	Realigning equipment to pre-safeguards configuration	3.1

EA 1 Ability to operate and monitor the following as they apply to a Passive Safety System Termination: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Automatic Depressurization System	4.1
EA	1.02	Steam Generator Blowdown System	2.4
EA	1.03	Compressed and Instrument Air System	2.3
EA	1.04	Component Cooling Water System	2.6
EA	1.05	Chemical and Volume Control System	2.6
EA	1.06	Engineered Safeguards Actuation System	4.0
EA	1.07	Main and Startup Feedwater System	2.8
EA	1.08	Main Steam System	2.4
EA	1.09	Passive Containment Cooling System	3.7
EA	1.10	Pressurizer Level Control System	3.1
EA	1.11	Pressurizer Pressure Control System	3.1
EA	1.12	Passive Residual Heat Removal System	3.6
EA	1.13	Passive Core Cooling System	3.8
EA	1.14	Reactor Coolant System	3.2
EA	1.15	Reactor coolant pump	2.9
EA	1.16	Normal Residual Heat Removal System	3.1
EA	1.17	Rod Position Indication System	2.4
EA	1.18	Steam Dump Control System	2.9
EA	1.19	Spent Fuel Pool Cooling System	2.0
EA	1.20	Steam Generator System	2.6
EA	1.21	Service Water System	2.1
EA	1.22	Nuclear Island Nonradioactive Ventilation System	2.1
EA	1.23	Containment Recirculation Cooling System	2.4
EA	1.24	Main Control Room Emergency Habitability System	2.9
EA	1.25	Central Chilled Water System	2.3

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Passive Safety System Termination: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Reactor Coolant System pressure, temperature, and pressurizer level	3.2	3.7
EA	2.02	Steam generator level, feedwater flow, and pressure	3.2	3.3
EA	2.03	Core exit temperatures and/or subcooling	3.8	3.7
EA	2.04	Containment pressure and/or temperature	3.2	3.7

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Post Loss of Coolant Accident Cooldown and Depressurization and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.1
EK 1.02	Component Cooling Water System	2.6
EK 1.03	Chemical and Volume Control System	2.8
EK 1.04	Engineered Safeguards Actuation System	3.9
EK 1.05	Main and Startup Feedwater System	2.8
EK 1.06	Main Steam System	2.6
EK 1.07	Passive Containment Cooling System	3.3
EK 1.08	Pressurizer Level Control System	3.1
EK 1.09	Pressurizer Pressure Control System	3.1
EK 1.10	Primary Sampling System	2.1
EK 1.11	Passive Core Cooling System	3.9
EK 1.12	Reactor Coolant Pump	2.8
EK 1.13	Reactor Coolant System	3.1
EK 1.14	Radiation Monitoring System	2.6
EK 1.15	Normal Residual Heat Removal System	3.0
EK 1.16	Passive Residual Heat Removal System	3.6
EK 1.17	Steam Dump Control System	2.8
EK 1.18	Spent Fuel Pool Cooling System	2.3
EK 1.19	Steam Generator System	2.8
EK 1.20	Service Water System	2.3
EK 1.21	Containment Air Filtration System	2.3

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Post Loss of Coolant Accident Cooldown and Depressurization: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Allowing Reactor Coolant System pressure to rise above 1970 psig after safeguards are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	2.02	Depressurizing the steam lines at a high rate after Steamline / Feedwater Isolation Actuations are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.3
EK	2.03	Establishing feedwater flow to a steam generator that is depressurized	3.1
EK	2.04	Excessive cycling of First Stage Automatic Depressurization System valves	3.6
EK	2.05	Depressurizing the Reactor Coolant System with no reactor coolant pumps running	3.1
EK	2.06	Starting a reactor coolant pump with a steam bubble in the reactor head	3.1
EK	2.07	Configuration and speed of running reactor coolant pumps effect on Passive Residual Heat Removal System	3.3
EK	2.08	Configuration and speed of running reactor coolant pumps effect on pressurizer spray flow	3.1
EK	2.09	Inability to isolate the safety injection accumulators	3.3
EK	2.10	Depressurizing a steam generator to cool the Reactor Coolant System if no makeup water is available to the secondary side of the steam generator (PRA related)	3.3

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Post Loss of Coolant Accident Cooldown and Depressurization: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	2.8
EK	3.02	Blocking Steamline / Feedwater Isolation Actuations and/or Safeguards Actuation below P-11, Pressurizer Pressure Below 1970 psig	3.2
EK	3.03	Starting and aligning the startup feedwater pumps to feed the steam generators	3.0

EK	3.04	Controlling level and/or feedwater flow for only the intact steam generators	2.9
EK	3.05	Initiating a cooldown to cold shutdown	3.1
EK	3.06	Lowering Reactor Coolant System pressure to a minimum subcooling value	3.3
EK	3.07	Terminating the Reactor Coolant System depressurization to a minimum subcooling value	3.4
EK	3.08	Terminating core makeup tank injection	3.5
EK	3.09	Reinitiating core makeup tank injection	3.8
EK	3.10	Maintaining saturated conditions in the Pressurizer	3.0
EK	3.11	Terminating Passive Residual Heat Removal System flow	3.5
EK	3.12	Checking for abnormal plant vent radiation	2.9
EK	3.13	Sampling the Reactor Coolant System for boron, hydrogen, and/or activity	2.4
EK	3.14	Placing in-containment refueling water storage tank cooling in service	3.1
EK	3.15	Restoring Component Cooling Water System flow to containment	2.8
EK	3.16	Maintaining pressurizer level less than the high level setpoint	3.0
EK	3.17	Starting reactor coolant pumps	2.8
EK	3.18	Isolating the safety injection accumulators	3.1
EK	3.19	Terminating Passive Containment Cooling System flow	3.4
EK	3.20	Stopping the reactor coolant pumps	2.9

EA	**1**	**Ability to operate and monitor the following as they apply to a Post Loss of Coolant Accident Cooldown and Depressurization: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Automatic Depressurization System	4.0
EA	1.02	Component Cooling Water System	2.7
EA	1.03	Chemical and Volume Control System	2.6
EA	1.04	Engineered Safeguards Actuation System	3.9
EA	1.05	Main and Startup Feedwater System	2.9
EA	1.06	Main Steam System	2.6
EA	1.07	Passive Containment Cooling System	3.6

EA	1.08	Pressurizer Level Control System	3.2
EA	1.09	Pressurizer Pressure Control System	3.1
EA	1.10	Primary Sampling System	2.1
EA	1.11	Passive Core Cooling System	3.8
EA	1.12	Reactor coolant pump	2.8
EA	1.13	Reactor Coolant System	2.9
EA	1.14	Radiation Monitoring System	2.6
EA	1.15	Normal Residual Heat Removal System	3.1
EA	1.16	Passive Residual Heat Removal System	3.7
EA	1.17	Steam Dump Control System	2.9
EA	1.18	Spent Fuel Pool Cooling System	2.1
EA	1.19	Steam Generator System	2.7
EA	1.20	Service Water System	2.3
EA	1.21	Containment Air Filtration System	2.3

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Post Loss of Coolant Accident Cooldown and Depressurization: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Plant vent radiation	2.6	2.9
EA	2.02	Reactor Coolant System pressure, temperature, level, and/or pressurizer level	3.2	3.7
EA	2.03	Reactor Coolant System cooldown rate	3.2	3.6
EA	2.04	Steam generator level, feedwater flow, and/or pressure	2.6	3.0
EA	2.05	Core exit temperature	3.6	3.4
EA	2.06	Core makeup tank level	3.0	3.6
EA	2.07	Containment pressure	3.2	3.7

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Loss of Coolant Accident Outside Containment and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Chemical and Volume Control System	3.2
EK 1.02	Diverse Actuation System	3.7
EK 1.03	Engineered Safeguards Actuation System	4.2
EK 1.04	Reactor Coolant System	3.4
EK 1.05	Normal Residual Heat Removal System	3.5
EK 1.06	Liquid Radwaste System	2.4
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Coolant Accident Outside Containment: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	N/A	
EK 3	**Knowledge of the reasons for the following actions as they apply to Loss of Coolant Accident Outside Containment: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Isolating Normal Residual Heat Removal System from the Reactor Coolant System	3.5
EK 3.02	Isolating the containment sumps	3.4
EK 3.03	Chemical and Volume Control System Isolation Actuation	3.3
EK 3.04	Starting a Chemical and Volume Control System makeup pump and checking flow	3.0
EK 3.05	Aligning Chemical and Volume Control System makeup pumps to maintain pressurizer level	3.2

EA	**1**	**Ability to operate and monitor the following as they apply to a Loss of Coolant Accident Outside Containment: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Chemical and Volume Control System	3.2
EA	1.02	Diverse Actuation System	3.6
EA	1.03	Engineered Safeguards Actuation System	4.1
EA	1.04	Reactor Coolant System	3.2
EA	1.05	Normal Residual Heat Removal System	3.4
EA	1.06	Liquid Radwaste System	2.4

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Coolant Accident Outside Containment: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Chemical and Volume Control System flow	3.0	3.3
EA	2.02	Plant vent radiation	3.2	3.1
EA	2.03	Pressurizer level and/or pressure	3.2	3.3

K/A NO.	KNOWLEDGE	
EK 1	**Knowledge of the relationship between the Faulted Steam Generator Isolation and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Steam Generator Blowdown System	2.9
EK 1.02	Engineered Safeguards Actuation System	4.2
EK 1.03	Main and Startup Feedwater System	3.5
EK 1.04	Main Steam System	3.4
EK 1.05	Main Turbine System	2.6
EK 1.06	Passive Residual Heat Removal System	3.4
EK 1.07	Radiation Monitoring System	3.2
EK 1.08	Steam Generator System	3.6
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Faulted Steam Generator: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Steam generator pressure lowering in an uncontrolled manner or completely depressurized	3.9
EK 2.02	Faulted steam generator that also has a steam generator tube rupture (PRA related)	4.2
EK 2.03	Failure to close the main steam isolation valve to isolate the faulted steam generator, given a steam generator tube rupture event (PRA related)	4.0
EK 2.04	Un-isolating a faulted steam generator	3.6
EK 2.05	Abnormal steam generator blow down, main steam, and/or turbine island vent radiation	3.4

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Faulted Steam Generator: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Closing the main steam isolation valves and bypass steam isolation valves	3.6
EK	3.02	Closing the main turbine stop valves and control valves, and the turbine bypass control valves, and the main steam to MSR 2nd stage motor-operated valves	3.2
EK	3.03	Isolating the main feedwater lines to the faulted steam generators	3.8
EK	3.04	Checking Passive Residual Heat Removal System is available prior to isolating the startup feedwater lines to the faulted steam generators	3.4
EK	3.05	Isolating the startup feedwater line to the faulted steam generator	3.7
EK	3.06	Closing the SG PORV and/or SG PORV block valve on the faulted steam generators	3.4
EK	3.07	Isolating steam generator blow down and/or steam lines drains on the faulted steam generators	3.3

EA	**1**	**Ability to operate and monitor the following as they apply to a Faulted Steam Generator: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Steam Generator Blowdown System	3.0
EA	1.02	Engineered Safeguards Actuation System	4.2
EA	1.03	Main and Startup Feedwater System	3.7
EA	1.04	Main Steam System	3.6
EA	1.05	Main Turbine System	3.0
EA	1.06	Passive Residual Heat Removal System	3.3
EA	1.07	Steam Generator System	3.6

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Faulted Steam Generator: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Steam generator pressure	3.6	3.8
EA	2.02	Passive Residual Heat Removal System flow	2.2	3.2
EA	2.03	Feedwater flow	3.4	3.3

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Steam Generator Tube Rupture and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.1
EK 1.02	Auxiliary Steam Supply System	2.4
EK 1.03	Steam Generator Blowdown System	2.8
EK 1.04	Compressed and Instrument Air System	2.2
EK 1.05	Component Cooling Water System	2.2
EK 1.06	Condensate System	2.2
EK 1.07	Condensate Polishing System	2.0
EK 1.08	Chemical and Volume Control System	2.5
EK 1.09	Diverse Actuation System	3.5
EK 1.10	Main AC Power System	2.4
EK 1.11	Engineered Safeguards Actuation System	4.2
EK 1.12	Main and Startup Feedwater System	3.4
EK 1.13	Main Steam System	3.2
EK 1.14	Passive Containment Cooling System	3.1
EK 1.15	Pressurizer Level Control System	2.9
EK 1.16	Pressurizer Pressure Control System	2.9
EK 1.17	Passive Residual Heat Removal System	3.4
EK 1.18	Primary Sampling System	2.3
EK 1.19	Passive Core Cooling System	3.3
EK 1.20	Reactor Coolant Pump	2.8
EK 1.21	Reactor Coolant System	3.3
EK 1.22	Radiation Monitoring System	3.3
EK 1.23	Normal Residual Heat Removal System	2.7
EK 1.24	Steam Dump Control System	2.9
EK 1.25	Steam Generator System	3.4
EK 1.26	Containment Air Filtration System	2.3
EK 1.27	Liquid Radwaste System	2.3

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Steam Generator Tube Rupture: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	SG PORV or main steam safety valve failing open on the ruptured steam generator	3.9
EK	2.02	Initiating a Reactor Coolant System cooldown by steaming the intact steam generator before isolating the ruptured steam generator	3.7
EK	2.03	Continuing to feed a ruptured steam generator after reaching the low level limit	3.6
EK	2.04	Establishing feedwater flow to a steam generator that is depressurized	3.6
EK	2.05	Allowing Reactor Coolant System pressure to rise above 1970 psig after safeguards are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.5
EK	2.06	Depressurizing the steam lines at a high rate after safeguards are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.5
EK	2.07	A loss of coolant accident in addition to a steam generator tube rupture	3.7
EK	2.08	Excessive cycling of First Stage Automatic Depressurization System valves	3.4
EK	2.09	Depressurizing the Reactor Coolant System with no reactor coolant pumps running	3.2
EK	2.10	Starting a reactor coolant pump with a steam bubble in the reactor head	3.1
EK	2.11	Configuration and speed of running reactor coolant pumps effect on Passive Residual Heat Removal System	3.3
EK	2.12	Configuration and speed of running reactor coolant pumps effect on pressurizer spray flow	3.2
EK	2.13	Starting the reactor coolant pumps in a loop with a ruptured steam generator effect on the steam generator	3.3
EK	2.14	Inability to isolate the safety injection accumulators	3.2
EK	2.15	Releasing steam from a steam generator that has water in the steam line	3.4
EK	2.16	Releasing steam from and/or initiating feedflow to a ruptured steam generator	3.7
EK	2.17	Intact steam generator level rising in an uncontrolled manner	3.6
EK	2.18	Failure of auxiliary spray (PRA related)	3.3

EK	2.19	Failure to close the main steam isolation valve to isolate the faulted steam generator, given a steam generator tube rupture event (PRA related)	3.7
EK	2.20	Failure to actuate Automatic Depressurization System during a steam generator tube rupture event coincident with a loss of coolant accident (PRA related)	3.7
EK	2.21	Changes in core cooling mechanisms between normal operations and steam generator tube rupture	3.4
EK	2.22	Responding to steam generator tube rupture when the Passive Residual Heat Removal System heat exchanger is not available	3.8

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Steam Generator Tube Rupture: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Adjusting ruptured SG PORV controller to 1160 psig and in automatic (OE related)	3.3
EK	3.02	Isolating the ruptured steam generator steam lines and blowdown lines	3.6
EK	3.03	Maintaining ruptured steam generator level greater than the low limit and/or less than high limit	3.6
EK	3.04	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	2.8
EK	3.05	Starting and aligning the startup feedwater pumps to feed the steam generators	2.9
EK	3.06	Controlling level and/or feedwater flow for only the intact steam generators	3.3
EK	3.07	Checking all switchgear buses energized from offsite power	2.5
EK	3.08	Resetting Containment Isolation Actuation	2.9
EK	3.09	Establishing instrument air to containment	2.7
EK	3.10	Lowering Reactor Coolant System pressure below P-11, Pressurizer Pressure Below 1970 psig	3.3
EK	3.11	Terminating the Reactor Coolant System depressurization to below P-11, Pressurizer Pressure Below 1970 psig	3.2
EK	3.12	Blocking Steamline / Feedwater Isolation Actuations and/or Safeguards Actuation below P-11, Pressurizer Pressure Below 1970 psig	3.3
EK	3.13	Initiating a Reactor Coolant System cooldown by dumping steam	3.4

EK	3.14	Initiating a Reactor Coolant System cooldown using the Passive Residual Heat Removal System	3.6
EK	3.15	Isolating hotwell overflow, condensate polishers, and placing auxiliary steam loads on the auxiliary boiler	2.7
EK	3.16	Energizing the source range nuclear instrumentation	2.7
EK	3.17	Lowering Reactor Coolant System pressure until Reactor Coolant System pressure, pressurizer level, or subcooling limits are met	3.6
EK	3.18	Actuating Automatic Depressurization System	3.8
EK	3.19	Isolating or reinitiating core makeup tank injection	3.4
EK	3.20	Maintaining saturated conditions in the pressurizer	3.2
EK	3.21	Maintaining pressurizer level less than the high level setpoint	3.2
EK	3.22	Borating to maintain shutdown margin	3.3
EK	3.23	Isolating Passive Residual Heat Removal System	3.1
EK	3.24	Checking for abnormal plant vent radiation	3.3
EK	3.25	Periodic sampling of the Reactor Coolant System and the ruptured steam generator for boron, hydrogen, and activity	2.6
EK	3.26	Placing in-containment refueling water storage tank cooling in service	3.1
EK	3.27	Restoring Component Cooling Water System flow to containment	2.6
EK	3.28	Operating the reactor coolant pumps (OE related)	2.7
EK	3.29	Isolating the safety injection accumulators (OE related)	3.2
EK	3.30	Terminating Passive Containment Cooling System flow	3.2
EK	3.31	Reducing ruptured steam generator pressure	3.4
EK	3.32	Cycling ruptured steam generator level between the low level and high level	3.4
EK	3.33	Placing Normal Residual Heat Removal System in service in the Shutdown Cooling Mode	2.8

EA 1 Ability to operate and monitor the following as they apply to a steam generator Tube Rupture: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Automatic Depressurization System	3.9
EA	1.02	Auxiliary Steam Supply System	2.3
EA	1.03	Steam Generator Blowdown System	2.7
EA	1.04	Compressed and Instrument Air System	2.2
EA	1.05	Component Cooling Water System	2.4
EA	1.06	Condensate System	2.3
EA	1.07	Condensate Polishing System	2.1
EA	1.08	Chemical and Volume Control System	2.7
EA	1.09	Diverse Actuation System	3.6
EA	1.10	Main AC Power System	2.5
EA	1.11	Engineered Safeguards Actuation System	4.1
EA	1.12	Main and Startup Feedwater System	3.1
EA	1.13	Main Steam System	2.9
EA	1.14	Passive Containment Cooling System	3.1
EA	1.15	Pressurizer Level Control System	2.9
EA	1.16	Pressurizer Pressure Control System	2.9
EA	1.17	Passive Residual Heat Removal System	3.6
EA	1.18	Primary Sampling System	2.1
EA	1.19	Passive Core Cooling System	3.4
EA	1.20	Reactor coolant pump	2.9
EA	1.21	Reactor Coolant System	3.1
EA	1.22	Normal Residual Heat Removal System	2.8
EA	1.23	Steam Dump Control System	3.1
EA	1.24	Steam Generator System	3.4
EA	1.25	Containment Air Filtration System	2.3
EA	1.26	Liquid Radwaste System	2.1

			RO	SRO
EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a steam generator Tube Rupture: (CFR: 41.7 / 43.5 / 45.6)**		
EA	2.01	Reactor Coolant System pressure, temperature, and/or pressurizer level	3.2	3.7
EA	2.02	Ruptured steam generator feedflow, level, and/or pressure	3.6	3.8
EA	2.03	Intact steam generator feedflow, level, and/or pressure	3.0	3.8
EA	2.04	Subcooling	3.4	3.8
EA	2.05	Shutdown margin	3.4	3.4

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between an Anticipated Transient Without Scram/Loss of Core Shutdown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Compressed and Instrument Air System	2.2
EK 1.02	Chemical and Volume Control System	2.9
EK 1.03	Diverse Actuation System	4.1
EK 1.04	Digital Rod Control System	3.6
EK 1.05	Engineered Safeguards Actuation System	3.9
EK 1.06	Main and Startup Feedwater System	3.2
EK 1.07	Main Steam System	2.8
EK 1.08	Main Turbine System	2.9
EK 1.09	Nuclear Instrumentation System	3.3
EK 1.10	Passive Core Cooling System	3.5
EK 1.11	Reactor Coolant Pump	3.1
EK 1.12	Rod Position Indicator System	3.2
EK 1.13	Reactor Trip System	4.0
EK 1.14	Steam Dump Control System	2.9
EK 1.15	Steam Generator System	2.9
EK 1.16	Main Turbine Control and Diagnostics System	2.6
EK 1.17	Containment Air Filtration System	2.1
EK 1.18	Liquid Radwaste System	1.9

K	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to an Anticipated Transient Without Scram/Loss of Core Shutdown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Failure of Protection and Safety Monitoring System and/or Diverse Actuation System to trip the reactor	4.5
EK	2.02	Failure of Protection and Safety Monitoring System and/or Diverse Actuation System to trip the turbine	4.1
EK	2.03	Failure to recognize the need and failure to manually trip the reactor through the Protection and Safety Monitoring System, given anticipated transient without scram (PRA related)	4.1
EK	2.04	Uncontrolled cooldown	3.5

EK	**3**	**Knowledge of the reasons for the following actions as they apply to an Anticipated Transient Without Scram/Loss of Core Shutdown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Ensuring the reactor is tripped (OE related)	4.5
EK	3.02	Ensuring the turbine is tripped	4.0
EK	3.03	Actuating Passive Residual Heat Removal System	3.8
EK	3.04	Closing the turbine bypass control valves	3.2
EK	3.05	Verifying startup feedwater flow available	3.5
EK	3.06	Verifying Core Makeup Tank actuation and/or reactor coolant pump trip	3.8
EK	3.07	Establishing or terminating Reactor Coolant System boration	3.6
EK	3.08	Establishing Chemical and Volume Control System letdown	2.8
EK	3.09	Isolation of containment air filtration system and containment sump	2.5
EK	3.10	Isolation of dilution flowpaths	3.4
EK	3.11	Controlling Passive Residual Heat Removal System flow, Tcold, and/or steam generator pressure	3.2
EK	3.12	Restoring instrument air to containment	2.7
EK	3.13	Check core exit temperature less than 1200°F	3.7

EA	**1**	**Ability to operate and monitor the following as they apply to a Anticipated Transient Without Scram/Loss of Core Shutdown: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Reactor trip controls on Protection and Safety Monitoring System and/or Diverse Actuation System (OE related)	4.3
EA	1.02	Digital Rod Control System	3.7
EA	1.03	Turbine trip controls	3.5
EA	1.04	Main Steam Line Isolation Actuation	3.6
EA	1.05	Passive Residual Heat Removal System actuation, reset, and/or flow control	3.6
EA	1.06	Steam Dump Control System	3.1
EA	1.07	Main and Startup Feedwater System	3.2
EA	1.08	Core Makeup Tank Actuation and reactor coolant pump operation	3.7
EA	1.09	Chemical and Volume Control System makeup and/or letdown	2.9
EA	1.10	Containment Air Filtration System and/or containment sump valves	2.2
EA	1.11	Compressed and Instrument Air System	2.3

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to an Anticipated Transient Without Scram/Loss of Core Shutdown: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Reactor trip breaker position (OE related)	4.0	4.3
EA	2.02	Turbine stop valve and/or Main Steam Line Isolation Actuation status	4.0	4.0
EA	2.03	Reactor power and startup rate	4.0	4.3
EA	2.04	Reactor Coolant System pressure	3.2	3.6
EA	2.05	M-G set voltage	2.8	3.4
EA	2.06	Control rod position and speed	3.6	3.5
EA	2.07	Steam Generator level and/or pressure	2.6	3.3
EA	2.08	Reactor Coolant System Thot, Tcold, and/or core exit temperatures	3.6	3.6
EA	2.09	Boration flow and/or makeup flow	3.4	3.6
EA	2.10	Passive Residual Heat Removal System flow	3.4	3.5

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Inadequate Core Cooling and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.3
EK 1.02	Component Cooling Water System	2.4
EK 1.03	Condensate System	2.3
EK 1.04	Core Makeup Tank	3.9
EK 1.05	Chemical and Volume Control System	3.2
EK 1.06	Diverse Actuation System	4.1
EK 1.07	Engineered Safeguards Actuation System	4.4
EK 1.08	Incore Instrumentation System	3.2
EK 1.09	Main Steam System	2.7
EK 1.10	Passive Residual Heat Removal System	4.2
EK 1.11	Passive Core Cooling System	4.2
EK 1.12	Reactor coolant pump	3.3
EK 1.13	Reactor Coolant System	3.3
EK 1.14	Radiation Monitoring System	2.7
EK 1.15	Normal Residual Heat Removal System	3.5
EK 1.16	Steam Dump Control System	3.1
EK 1.17	Spent Fuel Pool Cooling System	4.1
EK 1.18	Startup Feedwater	3.3
EK 1.19	Steam Generator System	3.3
EK 1.20	Containment Hydrogen Control System	3.1

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Inadequate Core Cooling: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Reactor coolant pump operation on Passive Core Cooling System operation	3.3
EK	2.02	Loss of coolant accident	4.1
EK	2.03	Loss of secondary heat sink	4.1
EK	2.04	Loss of Passive Residual Heat Removal System	4.1
EK	2.05	Loss of Normal Residual Heat Removal System	3.5
EK	2.06	Reactor Coolant System hot leg level response to Automatic Depressurization System Actuation	3.5
EK	2.07	Depressurizing the steam lines at a high rate after Steamline / Feedwater Isolation Actuations are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	2.08	Depressurizing a ruptured steam generator	3.7
EK	2.09	Maintaining Emergency Core Cooling System design criteria	3.7
EK	2.10	Effect of timely Normal Residual Heat Removal System injection on 4th stage Automatic Depressurization System	4.0
EK	2.11	Running Normal Residual Heat Removal System pumps on time to reach cask loading pit low level	3.3
EK	2.12	Core exit temperature 1200°F and rising	4.4

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Inadequate Core Cooling: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	In-Containment Refueling Water Storage Tank Containment Recirculation Actuation	4.2
EK	3.02	Actuating containment hydrogen igniters	3.7
EK	3.03	Core Makeup Tank Actuation	4.2
EK	3.04	Stopping the reactor coolant pumps	3.6
EK	3.05	Passive Residual Heat Removal System Actuation	4.2
EK	3.06	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	3.1

EK	3.07	Opening the safety injection accumulator isolation valves	3.9
EK	3.08	Checking core exit temperature, hot leg level response, and/or Reactor Coolant System Thot	3.8
EK	3.09	Terminating reactor cavity flooding	3.4
EK	3.10	Automatic Depressurization System actuation	4.3
EK	3.11	Placing Normal Residual Heat Removal System in service in the Low Pressure Reactor Coolant System Makeup Mode	3.6
EK	3.12	In-containment Refueling Water Storage Tank Injection Actuation	4.1
EK	3.13	Checking level and/or feedwater flow for only the intact steam generators	3.4
EK	3.14	Blocking Steamline / Feedwater Isolation Actuations below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	3.15	Using Passive Residual Heat Removal System to depressurize the Reactor Coolant System	4.0
EK	3.16	Depressurizing the intact steam generators to 110 psig	3.6
EK	3.17	Isolating the safety injection accumulators	3.3
EK	3.18	Depressurizing the intact steam generators to atmospheric pressure	3.6

EA 1 Ability to operate and monitor the following as they apply to Inadequate Core Cooling: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Automatic Depressurization System	4.4
EA	1.02	Component Cooling Water System	2.8
EA	1.03	Condensate System	2.6
EA	1.04	Core makeup tank	3.9
EA	1.05	Chemical and Volume Control System	3.1
EA	1.06	Diverse Actuation System	4.0
EA	1.07	Engineered Safeguards Actuation System	4.3
EA	1.08	Main Steam System	2.8
EA	1.09	Passive Residual Heat Removal System	4.0
EA	1.10	Passive Core Cooling System	4.1
EA	1.11	Reactor coolant pump	3.1

EA	1.12	Reactor Coolant System	3.3
EA	1.13	Normal Residual Heat Removal System	3.6
EA	1.14	Steam Dump Control System	2.9
EA	1.15	Spent Fuel Pool Cooling System	2.4
EA	1.16	Startup feedwater	3.3
EA	1.17	Steam Generator System	3.3
EA	1.18	Containment Hydrogen Control System	3.2

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to Inadequate Core Cooling: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Core exit temperature and/or Reactor Coolant System wide range Thot	4.3	4.0
EA	2.02	Reactor Coolant System subcooling	3.7	3.5
EA	2.03	Reactor Coolant System wide range pressure and/or pressurizer pressure	3.7	3.4
EA	2.04	Pressurizer level and/or Reactor Coolant System hot leg level	3.7	3.5
EA	2.05	Core makeup tank level	3.7	3.8
EA	2.06	In-containment refueling water storage tank level	3.8	4.0
EA	2.07	Steam generator level and/or pressure	3.2	3.4
EA	2.08	Normal Residual Heat Removal System flow	3.2	3.5

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Degraded Core Cooling and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.3
EK 1.02	Component Cooling Water System	2.6
EK 1.03	Condensate System	2.3
EK 1.04	Core makeup tank	3.9
EK 1.05	Chemical and Volume Control System	3.1
EK 1.06	Diverse Actuation System	3.9
EK 1.07	Engineered Safeguards Actuation System	4.3
EK 1.08	Incore Instrumentation System	3.4
EK 1.09	Main Steam System	2.8
EK 1.10	Passive Residual Heat Removal System	4.1
EK 1.11	Passive Core Cooling System	4.1
EK 1.12	Reactor coolant pump	3.1
EK 1.13	Reactor Coolant System	3.4
EK 1.14	Radiation Monitoring System	2.6
EK 1.15	Normal Residual Heat Removal System	3.5
EK 1.16	Steam Dump Control System	2.9
EK 1.17	Spent Fuel Pool Cooling System	2.4
EK 1.18	Startup feedwater	3.2
EK 1.19	Steam Generator System	3.2
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Degraded Core Cooling: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Reactor Coolant Pump operation on Passive Core Cooling System operation	3.5
EK 2.02	Loss of coolant accident	4.1
EK 2.03	Loss of secondary heat sink	4.1

EK	2.04	Loss of Passive Residual Heat Removal System	4.2
EK	2.05	Loss of Normal Residual Heat Removal System	3.6
EK	2.06	Reactor Coolant System hot leg level response to Automatic Depressurization System Actuation	3.8
EK	2.07	Depressurizing the steam lines at a high rate after Steamline / Feedwater Isolation Actuations are blocked below P-11, Pressurizer Pressure Below 1970 psig	3.5
EK	2.08	Effect of timely Normal Residual Heat Removal System injection on 4th stage Automatic Depressurization System	3.9
EK	2.09	Running Normal Residual Heat Removal System pumps on time to reach cask loading pit low level	3.2

EK 3 Knowledge of the reasons for the following actions as they apply to Degraded Core Cooling: (CFR: 41.5 / 41.10 / 45.6 / 45.13)

EK	3.01	Core Makeup Tank Actuation	4.0
EK	3.02	Stopping the reactor coolant pumps	3.3
EK	3.03	Passive Residual Heat Removal System Actuation	4.1
EK	3.04	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	3.1
EK	3.05	Checking core exit temperature, hot leg level response, and/or Reactor Coolant System Thot	3.8
EK	3.06	Opening the safety injection accumulator isolation valves	3.7
EK	3.07	Automatic Depressurization System actuation	4.2
EK	3.08	Placing Normal Residual Heat Removal System in service in the Low Pressure Reactor Coolant System Makeup Mode	3.6
EK	3.09	In-Containment Refueling Water Storage Tank Injection Actuation	4.1
EK	3.10	In-Containment Refueling Water Storage Tank Containment Recirculation Actuation	4.0
EK	3.11	Checking level and/or feedwater flow for only the intact steam generators	3.1
EK	3.12	Blocking Steamline / Feedwater Isolation Actuations below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	3.13	Depressurizing the intact steam generators to 110 psig	3.6

EK	3.14	Checking Normal Residual Heat Removal System flow in the Low Pressure Reactor Coolant System Makeup Mode	3.4
EK	3.15	Isolating the safety injection accumulators	3.2
EK	3.16	Depressurizing the intact steam generators to atmospheric pressure	3.5

EA	**1**	**Ability to operate and monitor the following as they apply to a Degraded Core Cooling: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Automatic Depressurization System	4.4
EA	1.02	Component Cooling Water System	2.7
EA	1.03	Condensate System	2.4
EA	1.04	core makeup tank	3.9
EA	1.05	Chemical and Volume Control System	3.2
EA	1.06	Diverse Actuation System	3.9
EA	1.07	Engineered Safeguards Actuation System	4.2
EA	1.08	Main Steam System	2.8
EA	1.09	Passive Residual Heat Removal System	4.0
EA	1.10	Passive Core Cooling System	4.0
EA	1.11	Reactor coolant pump	3.2
EA	1.12	Reactor Coolant System	3.4
EA	1.13	Normal Residual Heat Removal System	3.5
EA	1.14	Steam Dump Control System	2.9
EA	1.15	Spent Fuel Pool Cooling System	2.5
EA	1.16	Startup feedwater	3.2
EA	1.17	Steam Generator System	3.2

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to Degraded Core Cooling: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Core exit temperature and/or Reactor Coolant System wide range Thot	4.3	4.0
EA	2.02	Reactor Coolant System subcooling	3.3	3.8
EA	2.03	Reactor Coolant System wide range pressure and/or pressurizer pressure	3.5	3.5
EA	2.04	Pressurizer level and/or Reactor Coolant System hot leg level	3.5	3.8
EA	2.05	Core makeup tank level	3.7	3.8
EA	2.06	In-containment refueling water storage tank level	3.5	3.9
EA	2.07	Steam generator level and/or pressure	3.0	3.4
EA	2.08	Normal Residual Heat Removal System flow	3.2	3.1
EA	2.09	Cask loading pit level	2.8	2.6

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Saturated Core Cooling and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Core makeup tank	3.6
EK 1.02	Chemical and Volume Control System	2.9
EK 1.03	Diverse Actuation System	3.7
EK 1.04	Engineered Safeguards Actuation System	4.1
EK 1.05	Incore Instrumentation System	3.4
EK 1.06	Passive Residual Heat Removal System	3.8
EK 1.07	Reactor coolant pump	3.1
EK 1.08	Reactor Coolant System	3.1
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Saturated Core Cooling: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Reactor coolant pump operation on Passive Core Cooling System operation	3.4
EK 2.02	Loss of coolant accident	3.8
EK 2.03	Loss of secondary heat sink	3.5
EK 2.04	Loss of Passive Residual Heat Removal System	3.9
EK 2.05	Loss of Normal Residual Heat Removal System	3.5
EK 3	**Knowledge of the reasons for the following actions as they apply to Saturated Core Cooling: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Core Makeup Tank Actuation	3.8
EK 3.02	Stopping the reactor coolant pumps	3.2
EK 3.03	Passive Residual Heat Removal System Actuation	3.7
EK 3.04	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	3.1

EA 1 Ability to operate and monitor the following as they apply to Saturated Core Cooling:
(CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Core makeup tank	3.8
EA	1.02	Chemical and Volume Control System	3.0
EA	1.03	Diverse Actuation System	3.8
EA	1.04	Engineered Safeguards Actuation System	4.1
EA	1.05	Passive Residual Heat Removal System	3.9
EA	1.06	Reactor coolant pump	3.1
EA	1.07	Reactor Coolant System	3.1

EA 2		**Ability to evaluate the following parameters and/or conditions as they apply to Saturated Core Cooling:** **(CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Core exit temperatures and/or subcooling	3.7	4.0
EA	2.02	Pressurizer level	2.7	3.4

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between a Loss of Heat Sink and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	4.2
EK 1.02	Steam Generator Blowdown System	2.7
EK 1.03	Condensate System	3.1
EK 1.04	Chemical and Volume Control System	2.7
EK 1.05	Diverse Actuation System	3.8
EK 1.06	Demineralized Water Transfer and Storage System	2.6
EK 1.07	Engineered Safeguards Actuation System	4.2
EK 1.08	Main and Startup Feedwater System	3.6
EK 1.09	Incore Instrumentation System	3.4
EK 1.10	Main Steam System	3.1
EK 1.11	Passive Containment Cooling System	3.8
EK 1.12	Passive Residual Heat Removal System	4.1
EK 1.13	Passive Core Cooling System	4.1
EK 1.14	Reactor Coolant System	3.6
EK 1.15	Reactor coolant pump	3.2
EK 1.16	Normal Residual Heat Removal System	3.4
EK 1.17	Startup feedwater	3.8
EK 1.18	Steam Generator System	3.6
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to a Loss of Heat Sink: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Loss of secondary heat sink effect on Reactor Coolant System temperature, pressure, ΔT, and/or pressurizer level	4.1
EK 2.02	Onset of natural circulation effect on Reactor Coolant System temperature, pressure, ΔT, and/or pressurizer level	4.0
EK 2.03	Changes in core cooling between normal operations and loss of heat sink event	3.8

EK	2.04	Excessive cycling of First Stage Automatic Depressurization System valves	3.8
EK	2.05	Establishing feedwater flow to a steam generator that is depressurized	3.6
EK	2.06	Failure to initiate bleed and feed when required	4.3

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Loss of Heat Sink: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Stopping the reactor coolant pumps	3.6
EK	3.02	Passive Residual Heat Removal System Actuation	4.1
EK	3.03	Checking startup feedwater control valves open	3.6
EK	3.04	Checking if secondary heat sink is required	3.7
EK	3.05	Monitoring for loss of secondary heat sink conditions	4.0
EK	3.06	Ensuring steam generator blowdown is isolated	2.9
EK	3.07	Blocking Steamline / Feedwater Isolation Actuations and Safeguards Actuation below P-11, Pressurizer Pressure Below 1970 psig	3.4
EK	3.08	Checking condensate storage tank level	3.1
EK	3.09	Establish startup feedwater flow to at least one steam generator	3.9
EK	3.10	Establish main feedwater flow to at least one steam generator	3.9
EK	3.11	Monitoring core exit temperature and steam generator narrow range level	4.0
EK	3.12	Safeguards Actuation	4.2
EK	3.13	Core Makeup Tank Actuation	4.0
EK	3.14	Automatic Depressurization System Actuation	4.4
EK	3.15	Placing Normal Residual Heat Removal System in service in the Low Pressure Reactor Coolant System Makeup Mode	3.6
EK	3.16	Aligning Chemical and Volume Control System for Reactor Coolant System makeup	3.1
EK	3.17	Passive Containment Cooling System Actuation	3.9

EA	**1**	**Ability to operate and monitor the following as they apply to a Loss of Heat Sink: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Automatic Depressurization System	4.3
EA	1.02	Steam Generator Blowdown System	2.8
EA	1.03	Condensate System	3.1
EA	1.04	Chemical and Volume Control System	2.9
EA	1.05	Diverse Actuation System	3.9
EA	1.06	Demineralized Water Transfer and Storage System	2.7
EA	1.07	Engineered Safeguards Actuation System	4.3
EA	1.08	Main and Startup Feedwater System	3.8
EA	1.09	Main Steam System	3.1
EA	1.10	Passive Containment Cooling System	3.9
EA	1.11	Passive Residual Heat Removal System	4.1
EA	1.12	Passive Core Cooling System	4.1
EA	1.13	Reactor Coolant System	3.5
EA	1.14	Reactor coolant pump	3.1
EA	1.15	Normal Residual Heat Removal System	3.4
EA	1.16	Startup feedwater	3.7
EA	1.17	Steam Generator System	3.5

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Heat Sink: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Passive Residual Heat Removal System flow	3.6	3.7
EA	2.02	Reactor Coolant System pressure and/or temperature	3.8	3.7
EA	2.03	Steam generator wide range level, pressurizer level, and/or Reactor Coolant System ΔT	3.8	3.6
EA	2.04	Pressurizer pressure	3.2	3.6
EA	2.05	Feedwater flow and/or steam generator narrow range level	3.4	3.6
EA	2.06	Core exit temperature	4.2	3.9

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between a steam generator Overpressure and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Main and Startup Feedwater System	2.9
EK 1.02	Main Steam System	2.9
EK 1.03	Reactor Coolant System	3.2
EK 1.04	Steam Dump Control System	2.7
EK 1.05	Steam Generator System	3.4
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to a steam generator Overpressure: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Maintaining feedwater flow isolated until a steam release path is established	3.1
EK 2.02	Steam generator overfill	3.2
EK 3	**Knowledge of the reasons for the following actions as they apply to a steam generator Overpressure: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Isolating main feedwater	3.1
EK 3.02	Verifying C-9, Condenser Available is active and steam lines are not isolated	2.9
EK 3.03	Verifying SG PORVs are not isolated	3.2
EK 3.04	Releasing steam using Steam Dump Control System or SG PORV	3.4
EK 3.05	Maintaining Reactor Coolant System Thot less than 542°F	3.3

EA	**1**	**Ability to operate and monitor the following as they apply to a steam generator Overpressure: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Main and Startup Feedwater System	2.9
EA	1.02	Main Steam System	2.9
EA	1.03	Steam Dump Control System	3.1
EA	1.04	Steam Generator System	3.4

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a steam generator Overpressure: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Steam generator pressure and/or level	3.0	3.6
EA	2.02	Reactor Coolant System temperature	2.7	3.3

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between High Pressurizer Level and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	3.5
EK 1.02	Compressed and Instrument Air System	2.2
EK 1.03	Component Cooling Water System	2.1
EK 1.04	Chemical and Volume Control System	3.0
EK 1.05	Engineered Safeguards Actuation System	3.3
EK 1.06	Pressurizer Level Control System	3.1
EK 1.07	Pressurizer Pressure Control System	2.9
EK 1.08	Passive Core Cooling System	3.3
EK 1.09	Reactor Coolant System	3.0
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to High Pressurizer Level: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Establishing Chemical and Volume Control System letdown with high Reactor Coolant System activity level	2.9
EK 2.02	Failure to maintain the pressurizer liquid in saturated conditions	2.9
EK 2.03	Loss of pressurizer heaters	2.7
EK 2.04	Establishing Chemical and Volume Control System letdown flow without cooling flow to the regenerative heat exchanger	2.7
EK 3	**Knowledge of the reasons for the following actions as they apply to High Pressurizer Level: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Isolating Chemical and Volume Control System makeup	3.0
EK 3.02	Isolating Automatic Depressurization System	3.3
EK 3.03	Placing letdown in manual and closed	2.8
EK 3.04	Resetting Containment Isolation Actuation	3.0

EK	3.05	Establishing instrument air to containment	2.6
EK	3.06	Restoring Component Cooling Water System to containment	2.6
EK	3.07	Resetting Chemical and Volume Control System Isolation Actuation	2.9
EK	3.08	Placing Chemical and Volume Control System letdown in service	3.0
EK	3.09	Opening reactor head vents	2.8
EK	3.10	Closing normal pressurizer spray and auxiliary spray lines	2.8
EK	3.11	Maintaining saturated conditions in the pressurizer	2.9

EA 1 Ability to operate and monitor the following as they apply to High Pressurizer Level:
(CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Automatic Depressurization System	3.4
EA	1.02	Compressed and Instrument Air System	2.4
EA	1.03	Component Cooling Water System	2.5
EA	1.04	Chemical and Volume Control System	3.0
EA	1.05	Engineered Safeguards Actuation System	3.3
EA	1.06	Pressurizer Level Control System	3.2
EA	1.07	Pressurizer Pressure Control System	2.9
EA	1.08	Passive Core Cooling System	3.1
EA	1.09	Reactor Coolant System	2.9

		EA 2 Ability to evaluate the following parameters and/or conditions as they apply to High Pressurizer Level: **(CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Pressurizer level, temperature, and pressure	2.8	3.5
EA	2.02	Chemical and Volume Control System letdown flow and temperature	2.8	3.1
EA	2.03	Chemical and Volume Control System makeup flow	2.8	3.0

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between Pressurized Thermal Shock and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	3.6
EK 1.02	Compressed and Instrument Air System	2.3
EK 1.03	Chemical and Volume Control System (auxiliary spray, makeup, letdown)	2.7
EK 1.04	Engineered Safeguards Actuation System	3.5
EK 1.05	Passive Core Cooling System	3.5
EK 1.06	Reactor coolant pumps	3.0
EK 1.07	Reactor Coolant System (head vents, pressurizer normal spray and/or heaters)	2.9
EK 1.08	Normal Residual Heat Removal System	2.8
EK 1.09	Steam Dump Control System	2.9
EK 1.10	Steam Generator System (main steam isolation valves, bypass steam isolation valves, SG PORV)	3.1
EK 1.11	Startup Feedwater System	2.9
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Pressurized Thermal Shock: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Reactor Coolant System loss of coolant accident, faulted steam generator, or steam generator tube rupture effect on Reactor Coolant System temperature	3.5
EK 2.02	Excessive makeup or core makeup tank injection and recirculation effect on Reactor Coolant System pressure	3.3
EK 2.03	Operating outside the acceptable operating region of the reactor coolant system pressure/temperature cooldown limit curves	3.7
EK 2.04	Adverse containment conditions on Chemical and Volume Control System makeup	3.1
EK 2.05	Loss of subcooling or pressurizer level	3.2

EK	2.06	Reactor Coolant System heatup after steam generator dryout during faulted steam generator	3.4
EK	2.07	Reducing Reactor Coolant System pressure below the minimum subcooling value during subcooling minimization (head voiding)	3.1
EK	2.08	Failure to maintain Reactor Coolant System pressure and temperature stable during Reactor Coolant System temperature Soak	3.4
EK	2.09	Failure to maintain pressurizer saturated conditions	2.8
EK	2.10	Excessive cycling of Automatic Depressurization System valves	3.3

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Pressurized Thermal Shock: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Stopping all reactor coolant pumps	3.2
EK	3.02	Isolating main steam lines and feedwater lines	3.2
EK	3.03	Reducing Passive Residual Heat Removal System flow	3.4
EK	3.04	Ensuring Chemical and Volume Control System makeup pumps are Maintaining pressurizer level	2.7
EK	3.05	Restoring instrument air to containment	2.6
EK	3.06	Isolating the core makeup tanks	3.2
EK	3.07	Stabilizing Thot and/or Tcold	3.4
EK	3.08	Maintaining minimum subcooling	3.2
EK	3.09	Stopping Reactor Coolant System depressurization if pressurizer level is high	3.1
EK	3.10	Reactor Coolant System temperature soak	3.5
EK	3.11	Cooldown limits	3.5

EA	**1**	**Ability to operate and monitor the following as they apply to Pressurized Thermal Shock: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Reactor coolant pump controls	2.9
EA	1.02	SG PORV and/or block valve controls	3.3
EA	1.03	Steam Dump Control System controls	3.3
EA	1.04	Startup feedwater controls	3.1
EA	1.05	Normal Residual Heat Removal System actuation reset and/or outlet flow controls	3.2
EA	1.06	Main steam line isolation valve and/or main steam line isolation bypass valve controls	3.1
EA	1.07	Chemical and Volume Control System makeup, letdown, and/or auxiliary spray controls	3.1
EA	1.08	Safeguards Actuation reset	3.6
EA	1.09	Containment Isolation reset	3.3
EA	1.10	Dilution Block reset	3.1
EA	1.11	Core makeup tank actuation reset and/or isolation	3.5
EA	1.12	1st, 2nd, and/or 3rd Automatic Depressurization System reset	3.5
EA	1.13	Auxiliary spray Isolation actuation block	3.1
EA	1.14	Accumulator isolation valves	3.2
EA	1.15	Pressurizer heaters and spray valves	3.0

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to Pressurized Thermal Shock: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Reactor Coolant System cold leg temperature change in any 60 minute period	3.6	3.6
EA	2.02	Reactor Coolant System Thot and/or Tcold temperatures	3.4	3.6
EA	2.03	Reactor Coolant System pressure and trend	3.6	3.4
EA	2.04	Subcooling	3.1	3.3

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K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between High Containment Pressure and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Diverse Actuation System	3.7
EK 1.02	Demineralized Water Transfer and Storage System	2.2
EK 1.03	Engineered Safeguards Actuation System	3.9
EK 1.04	Fire Protection System	2.5
EK 1.05	Main Steam System	3.0
EK 1.06	Passive Containment Cooling System	3.9
EK 1.07	Passive Residual Heat Removal System	3.2
EK 1.08	Steam Generator System	3.2
EK 1.09	Containment Recirculation Cooling System	2.9
EK 1.10	Containment Hydrogen Control System	3.2
EK 1.11	Central Chilled Water System	2.6
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to High Containment Pressure: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Effect of containment pressure on instrumentation located inside containment (Emergency Operating Procedure adverse containment values)	3.5
EK 2.02	Hydrogen concentration limits	3.1
EK 3	**Knowledge of the reasons for the following actions as they apply to High Containment Pressure: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Containment Isolation Actuation	3.8
EK 3.02	Passive Containment Cooling System Actuation	3.8
EK 3.03	Makeup to the passive containment cooling water storage tank	3.3
EK 3.04	Start all reactor containment recirculation fans in low speed	3.1

EK	3.05	Restore chilled water flow to containment	2.9
EK	3.06	Main Steam Isolation Actuation	3.4
EK	3.07	Feedwater Isolation Actuations Actuation	3.4
EK	3.08	Checking Passive Residual Heat Removal System is available	3.1
EK	3.09	Actuating containment hydrogen igniters	3.1

EA 1 Ability to operate and monitor the following as they apply to High Containment Pressure:
(CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Diverse Actuation System	3.8
EA	1.02	Demineralized Water Transfer and Storage System	2.5
EA	1.03	Engineered Safeguards Actuation System	3.9
EA	1.04	Main and Startup Feedwater System	3.1
EA	1.05	Main Steam System	3.1
EA	1.06	Passive Containment Cooling System	3.8
EA	1.07	Passive Residual Heat Removal System	3.3
EA	1.08	Steam Generator System	3.1
EA	1.09	Containment Recirculation Cooling System	3.1
EA	1.10	Containment Hydrogen Control System	3.2
EA	1.11	Central Chilled Water System	2.7

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to High Containment Pressure:** **(CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Containment pressure and/or temperature	3.6	3.9
EA	2.02	Passive Containment Cooling System flow	3.2	3.6
EA	2.03	Containment hydrogen concentration	3.4	3.5

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between Containment Flooding and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Component Cooling Water System	2.9
EK 1.02	Chemical and Volume Control System	2.9
EK 1.03	Demineralized Water Transfer and Storage System	2.6
EK 1.04	Fire Protection System	2.6
EK 1.05	Normal Residual Heat Removal System	2.8
EK 1.06	Spent Fuel Pool Cooling System	2.9
EK 1.07	Central Chilled Water System	2.7
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Containment Flooding: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Containment water level greater than design flood level	3.5

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Containment Flooding: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Stopping the Chemical and Volume Control System makeup pumps	2.8
EK	3.02	Stopping the Normal Residual Heat Removal System pumps and isolating the spent fuel pool cooling system cask loading pit	3.1
EK	3.03	Stopping the Spent Fuel Pool Cooling System pumps and closing the Spent Fuel Pool Cooling System containment isolation valves	3.1
EK	3.04	Stopping the reactor coolant pumps, isolating Chemical and Volume Control System purification, and/or closing the Component Cooling Water System containment isolation valves	3.2
EK	3.05	Closing the Central Chilled Water System, Demineralized Water Transfer and Storage System, Fire Protection System, and/or Normal Residual Heat Removal System suction from spent fuel pool isolation valves	3.1
EK	3.06	Sampling the water in containment	2.7

EA	**1**	**Ability to operate and monitor the following as they apply to Containment Flooding: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Component Cooling Water System	2.9
EA	1.02	Chemical and Volume Control System	3.1
EA	1.03	Demineralized Water Transfer and Storage System	2.8
EA	1.04	Fire Protection System	2.9
EA	1.05	Normal Residual Heat Removal System	3.1
EA	1.06	Spent Fuel Pool Cooling System	3.1
EA	1.07	Central Chilled Water System	2.8

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to Containment Flooding: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Containment sump level, and/or containment water level	3.4	3.6

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between High Containment Radiation and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Chemical and Volume Control System	2.4
EK 1.02	Engineered Safeguards Actuation System	3.4
EK 1.03	Radiation Monitoring System	3.3
EK 1.04	Containment Air Filtration System	3.0
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to High Containment Radiation: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Effect of containment radiation on instrumentation located inside containment (Emergency Operating Procedure adverse containment values)	3.3
EK 3	**Knowledge of the reasons for the following actions as they apply to High Containment Radiation: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Containment Air Filtration System Isolation actuation	3.3
EK 3.02	Chemical and Volume Control System Isolation actuation	2.8
EK 3.03	Normal Residual Heat Removal System Isolation actuation	2.8
EA 1	**Ability to operate and monitor the following as they apply to High Containment Radiation: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA 1.01	Chemical and Volume Control System	2.9
EA 1.02	Engineered Safeguards Actuation System	3.6
EA 1.03	Containment Air Filtration System	3.1

			RO	SRO
EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to High Containment Radiation: (CFR: 41.7 / 43.5 / 45.6)**		
EA	2.01	Containment radiation	3.0	3.6

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Response to Loss of Reactor Coolant System Inventory During Shutdown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System	3.8
EK 1.02	Containment System	3.4
EK 1.03	Chemical and Volume Control System	3.1
EK 1.04	Diverse Actuation System	3.6
EK 1.05	Engineered Safeguards Actuation System	3.8
EK 1.06	Main and Startup Feedwater System	2.7
EK 1.07	Passive Containment Cooling System	3.4
EK 1.08	Passive Residual Heat Removal System	3.4
EK 1.09	Passive Core Cooling System	3.7
EK 1.10	Reactor Coolant System	3.4
EK 1.11	Radiation Monitoring System	3.2
EK 1.12	Normal Residual Heat Removal System	3.3
EK 1.13	Spent Fuel Pool Cooling System	2.9
EK 1.14	Steam Generator System	2.6
EK 1.15	Liquid Radwaste System	2.3
EK 1.16	Radiologically Controlled Area Ventilation System	2.6
EK 1.17	Containment Recirculation Cooling System	3.0
EK 1.18	Containment Hydrogen Control System	2.6

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Response to Loss of Reactor Coolant System Inventory During Shutdown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Reactor Coolant System open strategy	3.6
EK	2.02	Reactor Coolant System closed strategy	3.5
EK	2.03	Reactor Coolant System makeup boron concentration less than Reactor Coolant System boron concentration	3.6
EK	2.04	Reactor Coolant System hot leg level less than Low 2 setpoint	3.7
EK	2.05	Gas binding of Normal Residual Heat Removal System pump (OE)	3.6
EK	2.06	Interfacing system loss of coolant accident	3.5
EK	2.07	Core exit temperature greater than 1200°F	3.9
EK	2.08	Starting a Normal Residual Heat Removal System pump in the Shutdown Cooling Mode	3.2
EK	2.09	Discharging a pressurized accumulator into the Reactor Coolant System	3.2

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Response to Loss of Reactor Coolant System Inventory During Shutdown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Stopping all reactor coolant pumps	3.3
EK	3.02	Stopping Normal Residual Heat Removal System pumps and/or reducing Normal Residual Heat Removal System flow	3.3
EK	3.03	Establishing containment closure	3.8
EK	3.04	Starting the containment recirculation cooling fans	2.9
EK	3.05	Opening Automatic Depressurization System valves/Automatic Depressurization System Actuation	3.6
EK	3.06	Using core makeup tanks, accumulators, or in-containment refueling water storage tank for Reactor Coolant System makeup	3.6
EK	3.07	Ensuring adequate hot leg level before placing Normal Residual Heat Removal System in the Shutdown Cooling Mode	3.3
EK	3.08	Containment Recirculation Actuation	3.4
EK	3.09	Initiating Passive Containment Cooling System flow	3.4
EK	3.10	Core Makeup Tank Actuation	3.6

EK	3.11	Passive Residual Heat Removal System Actuation	3.6
EK	3.12	Aligning Normal Residual Heat Removal System for low pressure reactor coolant system makeup	3.4
EK	3.13	Establishing a Reactor Coolant System heat sink using the steam generators	3.2
EK	3.14	Establishing a Reactor Coolant System heat sink using Passive Residual Heat Removal System	3.6
EK	3.15	Establishing passive feed and bleed	3.7
EK	3.16	Energizing the containment hydrogen igniters	2.8
EK	3.17	Order of preference for Reactor Coolant System makeup sources	3.1

EA 1 Ability to operate and monitor the following as they apply to a Response to Loss of Reactor Coolant System Inventory During Shutdown:
(CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Automatic Depressurization System	3.8
EA	1.02	Containment System	3.6
EA	1.03	Chemical and Volume Control System	3.2
EA	1.04	Diverse Actuation System	3.6
EA	1.05	Engineered Safeguards Actuation System	4.0
EA	1.06	Main and Startup Feedwater System	2.9
EA	1.07	Passive Containment Cooling System	3.5
EA	1.08	Passive Residual Heat Removal System	3.6
EA	1.09	Passive Core Cooling System	3.6
EA	1.10	Reactor Coolant System	3.3
EA	1.11	Normal Residual Heat Removal System	3.4
EA	1.12	Spent Fuel Pool Cooling System	2.9
EA	1.13	Steam Generator System	2.7
EA	1.14	Liquid Radwaste System	2.1
EA	1.15	Radiologically Controlled Area Ventilation System	2.5
EA	1.16	Containment Recirculation Cooling System	2.9
EA	1.17	Containment Hydrogen Control System	2.6

			RO	SRO
EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Response to Loss of Reactor Coolant System Inventory During Shutdown procedures: (CFR: 41.7 / 43.5 / 45.6)**		
EA	2.01	Reactor Coolant System pressure and/or temperature,	3.4	3.9
EA	2.02	Pressurizer level and/or Reactor Coolant System hot leg level	3.4	3.9
EA	2.03	Core exit temperature	3.6	3.6
EA	2.04	Normal Residual Heat Removal System flow and/or pump amps	3.6	3.3
EA	2.05	Containment temperature	3.0	3.1

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Response to Loss of Normal Residual Heat Removal System During Shutdown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Automatic Depressurization System (OE related)	3.8
EK 1.02	Containment System (OE related)	3.5
EK 1.03	Chemical and Volume Control System (OE related)	3.0
EK 1.04	Diverse Actuation System (OE related)	3.6
EK 1.05	Engineered Safeguards Actuation System(OE related)	3.6
EK 1.06	Fuel Handling and Refueling System (OE related)	2.6
EK 1.07	Main and Startup Feedwater System (OE related)	2.7
EK 1.08	Passive Residual Heat Removal System (OE related)	3.6
EK 1.09	Passive Core Cooling System (OE related)	3.5
EK 1.10	Reactor Coolant System (OE related)	3.1
EK 1.11	Radiation Monitoring System (OE related)	2.7
EK 1.12	Normal Residual Heat Removal System (OE related)	3.6
EK 1.13	Steam Dump Control System (OE related)	2.7
EK 1.14	Spent Fuel Pool Cooling System (OE related)	2.7
EK 1.15	Steam Generator System (OE related)	2.8
EK 1.16	Radiologically Controlled Area Ventilation System (OE related)	2.4
EK 1.17	Containment Recirculation Cooling System (OE related)	2.7
EK 1.18	Liquid Radwaste System (OE related)	2.2
EK 1.19	Radioactive Waste Drain System (OE related)	2.3

EK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Response to Loss of Normal Residual Heat Removal System During Shutdown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK	2.01	Reactor Coolant System open strategy (OE related)	3.5
EK	2.02	Reactor Coolant System closed strategy (OE related)	3.5
EK	2.03	Reactor Coolant System makeup boron concentration less than Reactor Coolant System boron concentration (OE related)	3.5
EK	2.04	Reactor Coolant System hot leg level less than Low 2 setpoint (OE related)	3.7
EK	2.05	Gas binding of Normal Residual Heat Removal System pump (OE related)	3.7
EK	2.06	Interfacing system loss of coolant accident (OE related)	3.6
EK	2.07	Core exit temperature greater than 1200°F (OE related)	3.9
EK	2.08	Starting a Normal Residual Heat Removal System Pump in the Shutdown Cooling Mode (OE related)	3.4
EK	2.09	Discharging a pressurized accumulator into the Reactor Coolant System (OE related)	3.1

EK	**3**	**Knowledge of the reasons for the following actions as they apply to Response to Loss of Normal Residual Heat Removal System During Shutdown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK	3.01	Determining refueling cavity level (OE related)	3.1
EK	3.02	Placing Normal Residual Heat Removal System in Shutdown Cooling Mode (OE related)	3.4
EK	3.03	Establishing containment closure (OE related)	3.7
EK	3.04	Starting containment fan coolers (OE related)	2.9
EK	3.05	Maintaining Reactor Coolant System hot leg level (OE related)	3.7
EK	3.06	Opening Automatic Depressurization System stages 1, 2, and 3 (OE related)	3.7
EK	3.07	Opening core makeup tank isolation valves, accumulator isolation valves, or establishing in-containment refueling water storage tank gravity feed (OE related)	3.4

EK	3.08	Closing Automatic Depressurization System 4th stage and Reactor Coolant System head vent valves (OE related)	3.5
EK	3.09	Maintaining pressurizer level (OE related)	3.3
EK	3.10	Establishing a Reactor Coolant System heat sink using the steam generators (OE related)	3.4
EK	3.11	Establishing a Reactor Coolant System heat sink using the Passive Residual Heat Removal System heat exchanger (OE related)	3.7

EA	**1**	**Ability to operate and monitor the following as they apply to a Response to Loss of Normal Residual Heat Removal System During Shutdown: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Automatic Depressurization System (OE related)	3.8
EA	1.02	Containment System (OE related)	3.4
EA	1.03	Chemical and Volume Control System (OE related)	3.1
EA	1.04	Diverse Actuation System (OE related)	3.4
EA	1.05	Engineered Safeguards Actuation System (OE related)	3.7
EA	1.06	Fuel Handling and Refueling System (OE related)	2.6
EA	1.07	Main and Startup Feedwater System (OE related)	2.9
EA	1.08	Passive Residual Heat Removal System (OE related)	3.8
EA	1.09	Passive Core Cooling System (OE related)	3.7
EA	1.10	Reactor Coolant System (OE related)	3.1
EA	1.11	Radiation Monitoring System (OE related)	2.6
EA	1.12	Normal Residual Heat Removal System (OE related)	3.6
EA	1.13	Steam Dump Control System (OE related)	2.8
EA	1.14	Spent Fuel Pool Cooling System (OE related)	2.5
EA	1.15	Steam Generator System (OE related)	2.9
EA	1.16	Radiologically Controlled Area Ventilation System (OE related)	2.4
EA	1.17	Containment Recirculation Cooling System (OE related)	2.6
EA	1.18	Liquid Radwaste System (OE related)	2.3
EA	1.19	Radioactive Waste Drain System (OE related)	2.1

			RO	SRO
EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Response to Loss of Normal Residual Heat Removal System During Shutdown: (CFR: 41.7 / 43.5 / 45.6)**		
EA	2.01	Reactor Coolant System pressure and/or temperature, (OE related)	3.8	3.6
EA	2.02	Pressurizer level and/or Reactor Coolant System hot leg level (OE related)	3.8	3.9
EA	2.03	Core exit temperature (OE related)	3.8	3.6
EA	2.04	Normal Residual Heat Removal System flow and/or pump amps (OE related)	3.8	3.3
EA	2.05	Containment temperature (OE related)	2.8	3.3

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Response to Rising Nuclear Flux During Shutdown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Core makeup tank	2.9
EK 1.02	Chemical and Volume Control System	3.4
EK 1.03	Engineered Safeguards Actuation System	3.5
EK 1.04	Nuclear Instrumentation System	3.7
EK 1.05	Primary Sampling System	2.3
EK 1.06	Radiation Monitoring System	2.4
EK 1.07	Normal Residual Heat Removal System	2.9
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Response to Rising Nuclear Flux During Shutdown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Movement of irradiated fuel near source range nuclear instrumentation detectors	3.5
EK 3	**Knowledge of the reasons for the following actions as they apply to Response to Rising Nuclear Flux During Shutdown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Isolating demin water and dilution paths and/or aligning makeup pumps to the boric acid tank (OE related)	3.5
EK 3.02	Suspending core alterations (OE related)	3.8
EK 3.03	Borating the Reactor Coolant System (OE related)	3.8
EK 3.04	Using the core makeup tank for boration (OE related)	3.7

EA 1 Ability to operate and monitor the following as they apply to a Response to Rising Nuclear Flux During Shutdown: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

EA	1.01	Core makeup tank	3.8
EA	1.02	Chemical and Volume Control System	3.6
EA	1.03	Engineered Safeguards Actuation System	3.8
EA	1.04	Normal Residual Heat Removal System	3.4

EA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Response to Rising Nuclear Flux During Shutdown: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Reactor Coolant System boron and/or shutdown margin (OE related)	3.6	3.9
EA	2.02	Reactor Coolant System temperature	3.0	3.1
EA	2.03	Source Range Nuclear Instrumentation (OE related)	3.8	3.9
EA	2.04	Reactor Coolant System boration flow	3.6	3.7
EA	2.05	Containment radiation	2.6	2.9

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Response to Reactor Coolant System Cold Overpressure During Shutdown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Chemical and Volume Control System	3.5
EK 1.02	Passive Core Cooling System	3.6
EK 1.03	Reactor Coolant System	3.6
EK 1.04	Reactor coolant pumps	3.4
EK 1.05	Normal Residual Heat Removal System	3.4
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Response to Reactor Coolant System Cold Overpressure During Shutdown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Starting a reactor coolant pump when a steam generator is hotter than the Reactor Coolant System	3.5
EK 2.02	Reactor Coolant System pressure greater than 450 psig	3.5
EK 3	**Knowledge of the reasons for the following actions as they apply to Response to Reactor Coolant System Cold Overpressure During Shutdown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Stopping Reactor Coolant System makeup and placing Chemical and Volume Control System letdown in service	3.4
EK 3.02	Using Auxiliary spray to lower Reactor Coolant System pressure	3.3
EK 3.03	Stopping all reactor coolant pumps	3.4
EK 3.04	Isolating or venting the accumulators	3.2
EK 3.05	Opening Normal Residual Heat Removal System suction isolation valves	3.4
EK 3.06	Opening the Reactor Coolant System head vents	3.2

EA	**1**	**Ability to operate and monitor the following as they apply to a Response to Reactor Coolant System Cold Overpressure During Shutdown: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
EA	1.01	Chemical and Volume Control System	3.4
EA	1.02	Passive Core Cooling System	3.5
EA	1.03	Reactor Coolant System	3.5
EA	1.04	Reactor coolant pumps	3.1
EA	1.05	Normal Residual Heat Removal System	3.3

EA	**2**	**Ability to evaluate the following parameters and/or conditions to determine the effectiveness of implementing the Response to Reactor Coolant System Cold Overpressure During Shutdown procedures: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
EA	2.01	Reactor Coolant System level, pressure, and/or temperature	3.4	3.9

K/A NO.	KNOWLEDGE	IMPORTANCE
EK 1	**Knowledge of the relationship between the Response to Unexpected Reactor Coolant System Temperature Changes During Shutdown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
EK 1.01	Component Cooling Water System	2.8
EK 1.02	In-containment refueling water storage tank	2.9
EK 1.03	Reactor Coolant System	3.1
EK 1.04	Normal Residual Heat Removal System	3.5
EK 1.05	Service Water System	2.9
EK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Response to Unexpected Reactor Coolant System Temperature Changes During Shutdown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
EK 2.01	Flooding the reactor cavity with in-containment refueling water storage tank water	3.3
EK 2.02	Adjusting Normal Residual Heat Removal System heat exchanger outlet flow	3.4
EK 2.03	Service Water System failure	3.1
EK 2.04	Component Cooling System failure	3.3
EK 3	**Knowledge of the reasons for the following actions as they apply to Response to Unexpected Reactor Coolant System Temperature Changes During Shutdown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
EK 3.01	Implementing SDP-2 Response to Loss of Normal Residual Heat Removal System During Shutdown	3.4

SDP-6 Response to Unexpected Reactor Coolant System Temperature Changes During Shutdown

EA 1	**Ability to operate and monitor the following as they apply to a Response to Unexpected Reactor Coolant System Temperature Changes During Shutdown: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**		
EA 1.01	Component Cooling Water System	3.1	
EA 1.02	Normal Residual Heat Removal System	3.4	
EA 1.03	Service Water System	3.0	

		RO	SRO
EA 2	**Ability to evaluate the following parameters and/or conditions as they apply to a Response to Unexpected Reactor Coolant System Temperature Changes During Shutdown: (CFR: 41.7 / 43.5 / 45.6)**		
EA 2.01	Reactor Coolant System and/or Normal Residual Heat Removal System heat exchanger outlet temperature	3.6	3.7

4.2 ABNORMAL PLANT EVOLUTIONS

Abnormal Operating Procedures

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Rapid Power Reduction and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Auxiliary Steam System	1.9
AK 1.02	Online Power Distribution Monitoring System	2.9
AK 1.03	Chemical and Volume Control System	2.8
AK 1.04	Digital Rod Control System	3.4
AK 1.05	Engineered Safeguards Actuation System	3.3
AK 1.06	Main and Startup Feed Water System	3.0
AK 1.07	Main Steam System	2.9
AK 1.08	Pressurizer Level Control System	3.1
AK 1.09	Pressurizer Pressure Control System	3.2
AK 1.10	Reactor Trip System	3.4
AK 1.11	Steam Dump Control System	3.1
AK 1.12	Steam Generator Water Level Control System	3.1
AK 1.13	Main Turbine Control and Diagnostics System	2.8
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Rapid Power Reduction: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Reducing turbine load at rate less than 1%/min or greater than 5%/min	3.0
AK 2.02	Over-boration or excessive control rod insertion	3.4
AK 2.03	Under-boration or inadequate rod motion	3.6
AK 2.04	Failure of P-10, Power Range Neutron Flux to reset	3.3
AK 2.05	P-6, Intermediate Range Neutron Flux resetting before Source Range Nuclear Instrumentation power is below the Source Range Nuclear Instrumentation reactor trip setpoint	3.2
AK 2.06	Failure of the source range nuclear instrumentation to energize	3.0

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Rapid Power Reduction: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Consulting Online Power Distribution Monitoring System	2.9
AK	3.02	Energizing pressurizer backup heaters	2.6
AK	3.03	Placing Steam Dump Control System in the Steam Pressure Mode	2.9
AK	3.04	Placing Digital Rod Control System in Low Power Mode	3.0
AK	3.05	Verifying P-10, Power Range Neutron Flux permissive status	3.2
AK	3.06	Verifying Source Range Nuclear Instrumentation status	3.0
AK	3.07	Performing reactor trip breaker trip actuating device operational test and/or source range nuclear instrumentation reactor trip channel operational test	2.7
AK	3.08	Performing Reactor Coolant System sampling	2.3
AK	3.09	Resetting C-7, Steam Dump Control System Load Reject Arming Signal	2.8
AK	3.10	Operating Digital Rod Control System in manual	3.2

AA	**1**	**Ability to operate and monitor the following as they apply to a Rapid Power Reduction: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Chemical and Volume Control System makeup and letdown	2.9
AA	1.02	Digital Rod Control System and Rod blocks	3.2
AA	1.03	Engineered Safeguards Actuation System and Reactor Trip System interlocks and blocks (P-10, P-6)	3.5
AA	1.04	Main and Startup Feed Water System	2.9
AA	1.05	Heater Drain System	2.3
AA	1.06	Main generator output breakers	2.6
AA	1.07	Main Steam System	2.7
AA	1.08	Pressurizer Level Control System	3.1
AA	1.09	Pressurizer Pressure Control System	3.1
AA	1.10	Reactor Trip System	3.4
AA	1.11	Steam Dump Control System and/or C-7, Steam Dump Control System Load Reject Arming Signal	3.0

AA	1.12	Steam generator water level control	3.1
AA	1.13	Main Turbine Control and Diagnostics System	2.6

			RO	SRO
AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Rapid Power Reduction: (CFR: 41.7 / 43.5 / 45.6)**		
AA	2.01	Control rod positions and Control rod insertion limits	3.2	3.7
AA	2.02	Reactor Coolant System boron addition volume and rate	3.0	3.1
AA	2.03	Reactor Coolant System Tavg and/or Tavg – Tref deviation	2.8	3.0
AA	2.04	AFD and/or power margin	2.7	3.2
AA	2.05	Turbine load and/or steam dump demand	2.5	3.0
AA	2.06	Pressurizer pressure and or level	3.0	3.2
AA	2.07	Feedwater flow and/or steam generator levels	3.0	3.1
AA	2.08	Reactor power (Nuclear Instrumentation System, ΔT, calorimetric)	3.3	3.6
AA	2.09	Condenser vacuum	1.8	2.7

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A-302 Emergency Boration

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between Emergency Boration and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Chemical and Volume Control System	3.1
AK 1.02	Digital Rod Control System	3.0
AK 1.03	Engineered Safeguards Actuation System	3.2
AK 1.04	Nuclear Instrumentation System	2.8
AK 1.05	Primary Sampling System	2.1
AK 1.06	Reactor Coolant System	2.9
AK 1.07	Normal Residual Heat Removal System	2.5
AK 1.08	Steam Generator System	2.2
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Emergency Boration: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Reactor Coolant System Tavg rising in an uncontrolled manor	3.3
AK 2.02	Reactor power rising in an uncontrolled manor	3.6
AK 2.03	Reactor critical with excessive control rod motion	3.4
AK 2.04	Reactor critical with control rods inserted below the rod insertion limit	3.6
AK 2.05	Failure of 2 or more rods to insert following a reactor trip	3.5
AK 2.06	Inadequate shutdown margin	3.6
AK 2.07	Reactor subcritical with neutron count rising in an uncontrolled manner	3.6
AK 2.08	High flux at shutdown alarm	3.1
AK 2.09	Rapid Reactor Coolant System boration mandated by Tech Specs or another procedure	3.2
AK 2.10	Establishing boration flow	3.4
AK 2.11	Failure of Pressurizer Level Control System	2.8
AK 2.12	Stopping boration flow	2.9
AK 2.13	High steam generator level	2.5

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Emergency Boration: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Checking Chemical and Volume Control System makeup and/or purification lines are aligned	3.1
AK	3.02	Checking pressurizer level in normal control band	2.7
AK	3.03	Energizing pressurizer backup heaters	2.7
AK	3.04	Sampling Reactor Coolant System and/or pressurizer boron	2.3

AA	**1**	**Ability to operate and monitor the following as they apply to Emergency Boration: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Chemical and Volume Control System controls and indications and/or Normal Residual Heat Removal System controls and indications	3.1
AA	1.02	Safeguards Actuation	3.4
AA	1.03	Chemical and Volume Control System Isolation Actuation	3.1
AA	1.04	Boron Dilution Block	3.3
AA	1.05	Pressurizer heater controls and indications	2.7
AA	1.06	Reactor vessel vent controls and indications	2.6
AA	1.07	Control rod motion controls and indications	3.3

			RO	SRO
AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Emergency Boration: (CFR: 41.7 / 43.5 / 45.6)**		
AA	2.01	Pressurizer level and/or pressure	2.8	3.0
AA	2.02	Pressurizer and/or Reactor Coolant System boron concentrations	3.0	3.0
AA	2.03	Reactor coolant pump and/or Reactor Coolant System flow indications	2.7	2.8
AA	2.04	Reactor Coolant System Tavg and Tref	3.0	3.3
AA	2.05	Reactor power	3.3	3.7
AA	2.06	Control rod position and speed	3.2	3.7
AA	2.07	Shutdown margin	3.2	3.6
AA	2.08	Boron and/or charging flow	3.0	3.2
AA	2.09	Purification and/or letdown flow	2.7	2.7

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between a steam generator Tube Leak and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Auxiliary Steam System	1.9
AK 1.02	Blow Down System	2.9
AK 1.03	Component Cooling Water System	2.2
AK 1.04	Condensate System	2.5
AK 1.05	Condensate Polishing System	2.3
AK 1.06	Chemical and Volume Control System	2.8
AK 1.07	Digital Rod Control System	2.6
AK 1.08	Engineered Safeguards Actuation System	3.4
AK 1.09	Main and Startup Feedwater System	2.9
AK 1.10	Main Steam System	2.9
AK 1.11	Main Turbine System	2.4
AK 1.12	Nuclear Instrumentation System	2.6
AK 1.13	Pressurizer Level Control System	3.2
AK 1.14	Pressurizer Pressure Control System	3.1
AK 1.15	Passive Core Cooling System	3.0
AK 1.16	Reactor Coolant System	3.1
AK 1.17	Radiation Monitoring System	3.3
AK 1.18	Normal Residual Heat Removal System	2.6
AK 1.19	Reactor Trip System	3.1
AK 1.20	Steam Dump Control System	3.0
AK 1.21	Steam Generator System	3.1
AK 1.22	Turbine Building Ventilation System	2.5
AK 1.23	Liquid Radwaste System	2.3

AK 2 Knowledge of the operational implications or cause and effect relationships of the following as they apply to a steam generator Tube Leak:
(CFR: 41.5 / 41.7 / 45.7 / 45.8)

AK	2.01	Inability to maintain pressurizer level using normal makeup	3.3
AK	2.02	SG PORV failing open on the leaking steam generator	3.9
AK	2.03	Magnitude of tube leak	3.4
AK	2.04	Removing the SG PORV from service on the leaking steam generator	3.4
AK	2.05	Failing to isolate the leaking steam generator	3.8
AK	2.06	Under-filling or overfilling a leaking steam generator	3.4
AK	2.07	Exceeding the cooldown limit in any 60 minute period	3.2
AK	2.08	Using Passive Residual Heat Removal System for Reactor Coolant System cooldown	3.2
AK	2.09	Leaking steam generator pressure lowering to less than or equal to intact steam generator pressure	3.2
AK	2.10	Releasing steam from a steam generator that has water in the steam line	3.4
AK	2.11	Backfill method of reducing leaking steam generator pressure	3.2
AK	2.12	Steam generator blow down method of reducing leaking steam generator pressure	3.1
AK	2.13	Steam release method of reducing leaking steam generator pressure	3.2
AK	2.14	Auxiliary spray line not being available for Reactor Coolant System depressurization (PRA related)	3.1
AK	2.15	Using the intact steam generator to cool the Reactor Coolant System with insufficient water available to secondary prior to depressurization (PRA related)	3.3
AK	2.16	Failure to maintain steam generator water level above steam generator tubes (PRA related)	3.6
AK	2.17	Failure to have the Startup Feedwater System available (PRA related)	3.2

AK	**3**	**Knowledge of the reasons for the following actions as they apply to a steam generator Tube Leak: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Maintaining pressurizer level above minimum program level	3.1
AK	3.02	Isolating condenser hotwell overflow, condensate polishers, and/or transferring auxiliary steam loads to the auxiliary boiler	2.9
AK	3.03	Checking reactor shutdown before depressurizing the Reactor Coolant System	3.6
AK	3.04	Depressurizing the Reactor Coolant System to minimize subcooling	3.4
AK	3.05	Choosing different methods of depressurizing Reactor Coolant System in order of preference (normal pressurizer spray, auxiliary spray, and 1st Stage Automatic Depressurization System)	3.2
AK	3.06	Stopping the Reactor Coolant System depressurization if upper head voiding is indicated.	3.3
AK	3.07	Maintaining pressurizer pressure below P-11, Pressurizer Pressure Below 1970 psig after blocking Steam Line Isolation Actuation, Feedwater Isolation Actuations, and/or Safeguards Actuations	3.1
AK	3.08	Blocking Steam Line Isolation Actuation, Feedwater Isolation Actuations, and/or Safeguards Actuations	3.2
AK	3.09	Maintaining Reactor Coolant System temperature stable until beginning the cooldown	3.1
AK	3.10	Borating to cold shutdown and continuously monitoring shutdown margin	3.2
AK	3.11	Using pressurizer heaters and sprays to maintain subcooling at 20°F after the Reactor Coolant System depressurization	3.2
AK	3.12	Isolating secondary side of the leaking steam generator before cooling the Reactor Coolant System	3.5
AK	3.13	Raising leaking SG PORV setpoint to 1160 psig	3.4
AK	3.14	Maintaining leaking steam generator level between 26% and 82%	3.3
AK	3.15	Maintaining total feedwater flow to the intact steam generator greater than 400 gpm until level is greater than 26%	3.2
AK	3.16	Reducing leaking steam generator pressure during Reactor Coolant System cooldown	2.9
AK	3.17	Cycling leaking steam generator level between 26% and 77%	3.0

AA	**1**	**Ability to operate and monitor the following as they apply to a steam generator Tube Leak: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Chemical and Volume Control System makeup, letdown, and/or auxiliary spray	2.8
AA	1.02	Reactor Trip System and Engineered Safeguards Actuation System	3.4
AA	1.03	Hotwell level	2.3
AA	1.04	Condensate Polishing System	2.1
AA	1.05	Passive Residual Heat Removal System	3.1
AA	1.06	Normal Residual Heat Removal System	2.7
AA	1.07	Steam Dump Control System and/or SG PORV	3.1
AA	1.08	Pressurizer heater and/or spray	3.0
AA	1.09	Reactor Coolant Pump	2.9
AA	1.10	Main Steam Line Isolation Actuation Block	3.2
AA	1.11	Feedwater Isolation Actuations Block	3.1
AA	1.12	Lo Pressurizer Pressure Safeguards Block	3.1
AA	1.13	Automatic Depressurization System	3.3
AA	1.14	Component Cooling Water System	2.4
AA	1.15	Passive Core Cooling System	3.1
AA	1.16	Steam Generator System	3.1
AA	1.17	Main and Startup Feedwater System	2.9
AA	1.18	Blow Down System	2.8

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a steam generator Tube Leak: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Pressurizer level and/or pressure	3.0	3.4
AA	2.02	Steam generator levels and/or pressures	3.3	3.7
AA	2.03	Steam generator leak rate	2.7	3.6
AA	2.04	Core exit temperatures and/or Reactor Coolant System subcooling	2.8	3.3
AA	2.05	Tcold and/or cooldown rate	3.0	3.3
AA	2.06	Main steam line radiation, steam generator blow down edi effluent radiation, and/or turbine island vent effluent radiation	3.2	3.3

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A-306 Evacuation of Control Room

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Evacuation Of Control Room and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Chemical and Volume Control System	2.7
AK 1.02	Diverse Actuation System	3.7
AK 1.03	Digital Rod Control System)	2.9
AK 1.04	Fuel Handling System	2.1
AK 1.05	Main and Startup Feedwater System	2.7
AK 1.06	Main Steam System	2.7
AK 1.07	Protection and Safety Monitoring System	3.6
AK 1.08	Reactor Coolant System	2.8
AK 1.09	Remote shutdown workstation	3.9
AK 1.10	Steam Dump Control System	2.9
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Evacuation Of Control Room: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Reactor trip or failure of the reactor to trip	3.9
AK 2.02	High control room radiation and/or airborne activity	3.7
AK 2.03	Toxic vapors in the control room	3.7
AK 2.04	Fire smoke or explosion in the control room	3.7
AK 3	**Knowledge of the reasons for the following actions as they apply to Evacuation Of Control Room: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Tripping the reactor prior to main control room evacuation	3.8
AK 3.02	Stopping any dilution and/or stabilizing Reactor Coolant System temperature prior to main control room evacuation	3.6
AK 3.03	Placing the remote shutdown workstation transfer switch to the remote position	3.8

AK	3.04	Placing the Diverse Actuation System disable switch to the disable position	3.8
AK	3.05	Establishing control of the plant using local Diverse Actuation System controls	3.7
AK	3.06	Initiating a Reactor Coolant System cooldown to less than 420°F	3.3

AA	**1**	**Ability to operate and monitor the following as they apply to a Evacuation Of Control Room: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Reactor trip controls	3.8
AA	1.02	Chemical and Volume Control System makeup controls	2.9
AA	1.03	Main and Startup Feedwater System controls	2.8
AA	1.04	Steam Dump Control System	2.9
AA	1.05	SG PORV controls	3.0
AA	1.06	Remote shutdown workstation controls	3.7
AA	1.07	Diverse Actuation System disable switch	3.6

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to an Evacuation Of Control Room: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Reactor trip breaker position, digital rod position indication control rod positions, and/or neutron flux	3.3	3.8
AA	2.02	Chemical and Volume Control System makeup system flows	2.8	2.9
AA	2.03	Reactor Coolant System temperature	3.3	3.0
AA	2.04	Pressurizer level	2.8	3.0

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Loss of Control Room Air Conditioning and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Ancillary diesel generator	2.6
AK 1.02	Main AC Power System	2.6
AK 1.03	Engineered Safeguards Actuation System (Main Control Room Isolation and Air Supply Initiation Actuation)	3.6
AK 1.04	Class 1E DC and UPS System	3.2
AK 1.05	Reactor Coolant System	2.4
AK 1.06	Radiation Monitoring System	2.9
AK 1.07	Nuclear Island Nonradioactive Ventilation System	2.6
AK 1.08	Main Control Room Emergency Habitability System	3.7
AK 1.09	Central Chilled Water System	2.6
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Control Room Air Conditioning: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Main Control Room Isolation and Air Supply Initiation Actuation	3.7
AK 2.02	Fire in the main control room or controls service area	3.6
AK 2.03	Placing the main control room ancillary fan in service and propping doors open	3.0

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Loss of Control Room Air Conditioning: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Verifying fire damper positions	2.8
AK	3.02	Verify Main Control Room Isolation and Air Supply Initiation Actuation has not been actuated	3.2
AK	3.03	Verifying no gaseous radiation in main control room air intake	3.3
AK	3.04	Providing alternate main control room cooling if normal cooling cannot be established with fresh air makeup	3.1
AK	3.05	Maintaining main control room temperature less than 75°F	3.2
AK	3.06	Limiting main control room occupancy when Main Control Room Emergency Habitability System is providing main control room cooling	3.3
AK	3.07	Placing the main control room ancillary fan in service and opening doors	2.9

AA	**1**	**Ability to operate and monitor the following as they apply to a Loss of Control Room Air Conditioning: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Ancillary diesel generator	2.6
AA	1.02	Main Control Room Isolation and Air Supply Initiation Actuation	3.4
AA	1.03	Nuclear Island Nonradioactive Ventilation System fire dampers, supply and return fans and dampers, and/or outside air supply dampers	2.8
AA	1.04	Main Control Room Emergency Habitability System	3.6
AA	1.05	Main control room ancillary fan	2.8

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Control Room Air Conditioning: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Main control room temperature, pressure, and/or main control room radiation	3.3	3.4
AA	2.02	Nuclear Island Nonradioactive Ventilation System flow	2.3	2.8

A-311 Rod Control System Malfunction

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Rod Control System Malfunctions and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Chemical and Volume Control System	2.8
AK 1.02	Digital Rod Control System	3.5
AK 1.03	Nuclear Instrumentation System	3.4
AK 1.04	On-line Power Distribution Monitoring System	3.3
AK 1.05	Reactor Coolant System	2.8
AK 1.06	Rod Position Indication System	3.4
AK 1.07	Reactor Trip System	3.6
AK 1.08	Main Turbine Control and Diagnostics System	2.7
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Rod Control System Malfunctions: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Turbine runback or load rejection	3.5
AK 2.02	Dropped rod effect on Nuclear Instrumentation System	3.6
AK 2.03	Dropped or misaligned rods effect on reactor poisons and/or fuel (OE related)	3.7
AK 2.04	Retrieval of dropped or misaligned rods effect on reactor poisons and/or fuel (OE related)	3.5
AK 2.05	Dropped control rod during reactor startup (OE related)	3.7
AK 2.06	Effect reducing power has on power margin	3.1
AK 2.07	Control banks not within insertion, sequence, and/or overlap limits specified in the Core Operating Limits Report	3.6
AK 2.08	Shutdown banks not within insertion limits specified in the Core Operating Limits Report	3.5
AK 2.09	Digital rod position indication failure	3.0
AK 2.10	Group demand indication failure	2.9
AK 2.11	Effect of inoperable (untrippable) rod on shutdown margin	3.3
AK 2.12	Rod control urgent alarm and/or rod control non-urgent alarm	3.1

AK	2.13	Failure of inputs to rod control system	3.2
AK	2.14	On-line Power Distribution Monitoring System operability	3.4

AK 3 Knowledge of the reasons for the following actions as they apply to Rod Control System Malfunctions: (CFR: 41.5 / 41.10 / 45.6 / 45.13)

AK	3.01	Determining if generator load is stable	3.1
AK	3.02	Checking On-line Power Distribution Monitoring System is operable	3.3
AK	3.03	Tripping the reactor	3.8
AK	3.04	Choosing to move the rod bank to the misaligned rod vs. the misaligned rod to the rod bank (OE related)	3.2
AK	3.05	Positioning rod control to the affected bank to recover dropped rods or when moving the misaligned rod to the bank (OE related)	2.9
AK	3.06	Maintaining power margin greater than zero during dropped rod recovery (OE related)	3.6

AA 1 Ability to operate and monitor the following as they apply to a Rod Control System Malfunctions: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

AA	1.01	Digital Rod Control System	3.3
AA	1.02	Reactor trip controls	3.7
AA	1.03	Chemical and Volume Control System makeup and letdown	2.6
AA	1.04	Turbine load	2.9

			RO	SRO
AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Rod Control System Malfunction: (CFR: 41.7 / 43.5 / 45.6)**		
AA	2.01	Digital rod position indication	2.8	3.4
AA	2.02	Group demand position indication	2.8	3.3
AA	2.03	Power margin	3.2	3.3
AA	2.04	Tavg and/or Tcold	3.0	3.1
AA	2.05	Reactor power and/or turbine power	3.5	3.6
AA	2.06	Axial flux difference and/or quadrant power tilt ratio	3.2	3.6

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A-313 Uncontrolled Cooldown

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Uncontrolled Cooldown and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Condensate System	2.5
AK 1.02	Containment System	2.5
AK 1.03	Chemical and Volume Control System	2.8
AK 1.04	Digital Rod Control System	2.7
AK 1.05	Engineered Safeguards Actuation System	3.4
AK 1.06	Main and Startup Feedwater System	3.4
AK 1.07	Main Steam System	3.5
AK 1.08	Heater Drain System	2.5
AK 1.09	Passive Core Cooling System	3.3
AK 1.10	Normal Residual Heat Removal System	2.9
AK 1.11	Steam Generator System	3.3
AK 1.12	Main Turbine Control And Diagnostic System	3.1
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Uncontrolled Cooldown: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Effect of changing steam demand on reactor power (Nuclear Instrumentation System, calorimetric, and ΔT)	3.6
AK 2.02	Effect of control rod insertion on reactor power (Nuclear Instrumentation System, calorimetric, and ΔT)	3.4
AK 2.03	Effect of changing feedwater temperature on reactor power (Nuclear Instrumentation System, calorimetric, and ΔT)	3.7
AK 2.04	Inadvertent Passive Residual Heat Removal Actuation	3.7
AK 2.05	Normal Residual Heat Removal System malfunction	3.2
AK 3	**Knowledge of the reasons for the following actions as they apply to Uncontrolled Cooldown: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Reducing steam demand	3.4
AK 3.02	Tripping the reactor	3.9

AK	3.03	Initiating Safeguards Actuation	3.9
AK	3.04	Ensuring no steam flow/feed flow mismatch exists	3.2
AK	3.05	Checking feedwater heater alignment	2.8
AK	3.06	Checking for Passive Residual Heat Removal Actuation	3.6
AK	3.07	Checking for Normal Residual Heat Removal System malfunction	3.1
AK	3.08	Initiating a boration	3.5

AA 1 Ability to operate and monitor the following as they apply to a Uncontrolled Cooldown: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

AA	1.01	Main Turbine load control	3.0
AA	1.02	Steam Dump Control System	3.4
AA	1.03	SG PORVs	3.5
AA	1.04	Main And Startup Feedwater System	3.6
AA	1.05	Reactor trip controls	3.9
AA	1.06	Safeguards Actuation	3.9
AA	1.07	Condenser hotwell makeup	2.3
AA	1.08	Main steam isolation valve controls	3.5
AA	1.09	Passive Residual Heat Removal System controls	3.4
AA	1.10	Chemical And Volume Control System Makeup Controls	2.9
AA	1.11	Normal Residual Heat Removal System controls	3.1

		AA 2 Ability to evaluate the following parameters and/or conditions as they apply to an Uncontrolled Cooldown: (CFR: 41.7 / 43.5 / 45.6)	**RO**	**SRO**
AA	2.01	Reactor power (Nuclear Instrumentation System, calorimetric, and ΔT)	3.3	3.8
AA	2.02	Pressurizer level and/or pressure	3.3	3.2
AA	2.03	Reactor Coolant System temperature	3.5	3.7
AA	2.04	Steam flow and/or feedwater flow	3.0	3.4
AA	2.05	Passive Residual Heat Removal System flow	3.3	3.2
AA	2.06	Steam dump valves and/or SG PORV positions	3.3	3.3
AA	2.07	Containment pressure and/or temperature	3.0	3.1

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Fuel Handling Incident and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Containment isolation valves	3.3
AK 1.02	Containment equipment and personnel hatches	3.2
AK 1.03	Containment Air Filtration System	3.1
AK 1.04	Chemical And Volume Control System makeup	2.7
AK 1.05	Fuel handling area normal HVAC	2.8
AK 1.06	Fuel Handling System	3.3
AK 1.07	Reactor containment fan coolers	2.7
AK 1.08	Radiation Monitoring System	3.6
AK 1.09	Spent fuel pool makeup	3.2
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Fuel Handling Incident: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Damage to irradiated fuel in the fuel handling building	3.7
AK 2.02	Damage to irradiated fuel in containment	3.7
AK 3	**Knowledge of the reasons for the following actions as they apply to Fuel Handling Incident: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Evacuation of non-essential personnel from containment and/or fuel handling building	3.7
AK 3.02	Maintaining pressurizer/reactor cavity level and/or spent fuel pool level	3.6
AK 3.03	Suspending core alterations and placing fuel in storage location	3.8
AK 3.04	Closing the fuel transfer tube gate valve, all containment penetrations, and/or open penetrations	3.7
AK 3.05	Running reactor containment fan cooler in low speed	2.8
AK 3.06	Shutting down and isolating the Containment Air Filtration System or fuel handling area normal HVAC	3.1

A-314 Fuel Handling Incident

AA	**1**	**Ability to operate and monitor the following as they apply to a Fuel Handling Incident: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Containment fan coolers	2.7
AA	1.02	Containment isolation valves	3.6
AA	1.03	Containment Air Filtration System	3.1
AA	1.04	Fuel handling area normal HVAC	2.9
AA	1.05	Fuel handling equipment	3.4

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Fuel Handling Incident: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Containment Bldg, fuel handling building, and/or plant vent radiation level	3.3	3.4

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Loss of Component Cooling Water and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Chilled Water System chillers	2.6
AK 1.02	Condensate pumps	2.2
AK 1.03	Compressed Air System	2.6
AK 1.04	Chemical and Volume Control System makeup pumps and/or letdown heat exchanger	2.9
AK 1.05	Reactor coolant pumps and variable frequency drives	3.2
AK 1.06	Normal Residual Heat Removal System	2.9
AK 1.07	Spent Fuel Pool Cooling System	2.9
AK 1.08	Reactor coolant drain tank heat exchanger	2.3
AK 1.09	Primary Sample System	2.3
AK 1.10	Radiation Monitoring System	2.7
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Component Cooling Water: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Leakage into or out of the Component Cooling Water System	3.0
AK 2.02	Loss of Service Water System to the Component Cooling Water System heat exchanger	3.1
AK 2.03	Chilled Water System Chillers	2.5
AK 2.04	Loss of Component Cooling Water System to Condensate Pumps	2.4
AK 2.05	Loss of Component Cooling Water System to Chemical And Volume Control System makeup pumps and/or letdown heat exchanger	2.9
AK 2.06	Loss of Component Cooling Water System to reactor coolant pumps and variable frequency drives	3.3
AK 2.07	Loss of Component Cooling Water System to Normal Residual Heat Removal System	3.0
AK 2.08	Loss of Component Cooling Water System to Spent Fuel Pool Cooling System	3.1
AK 2.09	Loss of Component Cooling Water System to reactor coolant drain tank heat exchanger	2.3
AK 2.10	Loss of Component Cooling Water System to Primary Sample System	2.2
AK 2.11	Loss of Component Cooling Water System to Compressed Air System	2.5

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Loss of Component Cooling Water: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Tripping the reactor	3.6
AK	3.02	Stopping all reactor coolant pumps and variable frequency drives	3.4
AK	3.03	Verifying adequate and stable Component Cooling Water System surge tank level	3.0
AK	3.04	Verifying the Component Cooling Water System heat exchanger outlet temperature is less than 110 °F	2.8
AK	3.05	Isolating the Chemical And Volume Control System purification loop	2.7
AK	3.06	Maintaining 50 gpm of makeup flow through the running Chemical And Volume Control System makeup pump	2.7
AK	3.07	Isolating the liquid sample lines	2.1
AK	3.08	Stopping the reactor coolant drain tank pumps	2.2

AA	**1**	**Ability to operate and monitor the following as they apply to a Loss of Component Cooling Water: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Reactor trip controls	3.4
AA	1.02	Reactor coolant pumps and variable frequency drives	3.3
AA	1.03	Component Cooling Water System	3.1
AA	1.04	Condensate System	2.3
AA	1.05	Compressed Air System	2.7
AA	1.06	Central Chilled Water System chiller pumps	2.4
AA	1.07	Normal Residual Heat Removal System	2.9
AA	1.08	Chemical And Volume Control System makeup, purification, and/or letdown	2.8
AA	1.09	Spent Fuel Pool Cooling System	2.9
AA	1.10	Liquid Radwaste System and Primary Sampling System	2.2

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Component Cooling Water: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Component Cooling Water System surge tank level	3.3	3.0
AA	2.02	Component Cooling Water System heat exchanger outlet temperature	3.3	2.9
AA	2.03	Reactor coolant pump and variable frequency drive temperatures	3.3	3.4
AA	2.04	Compressed Air System compressor temperatures	3.0	2.7
AA	2.05	Condensate pumps temperatures	3.3	2.2
AA	2.06	Spent fuel pool temperature	3.3	2.9

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Condensate System Malfunction and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Steam Generator Blowdown System	2.1
AK 1.02	Condenser Air Removal System	2.3
AK 1.03	Condensate Polishing System	2.2
AK 1.04	Demineralized Water Transfer And Storage System	2.0
AK 1.05	Main And Startup Feedwater System	2.9
AK 1.06	Gland Seal System	2.1
AK 1.07	Heater Drain System	2.4
AK 1.08	Main Steam System	2.6
AK 1.09	Main Turbine System	2.6
AK 1.10	Hotwell makeup control valve and/or hotwell overflow control valve	2.8
AK 1.11	Condensate pumps	3.1
AK 1.12	Booster/main feedwater pumps	2.9
AK 1.13	Deareator storage tank	2.6
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Condensate System Malfunction: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Loss of condensate pumps	3.3
AK 2.02	Deareator storage tank level outside of normal operating band	2.7
AK 2.03	Deareator storage tank recirculation valve/dump valve failure	2.8
AK 2.04	Condensate regulating valve failure	3.0
AK 2.05	Loss of cooling to gland sealing condenser	2.5
AK 3	**Knowledge of the reasons for the following actions as they apply to Condensate System Malfunction: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Maintaining hotwell level between the hi and/or lo limits	2.7
AK 3.02	Starting standby condensate pumps	2.8
AK 3.03	Tripping the turbine	3.0

AK	3.04	Performing a rapid power reduction	3.2
AK	3.05	Verifying both polisher vessels are in service and/or the bypass is open	2.3
AK	3.06	Isolating the condensate pump miniflow	2.2
AK	3.07	Maintaining deareator storage tank level between the hi and/or lo limits	2.5
AK	3.08	Isolating steam generator blowdown flow	2.5
AK	3.09	Verifying adequate Gland Sealing Steam condenser flow	2.1
AK	3.10	Stopping booster/main feedwater pumps	3.0

AA 1 Ability to operate and monitor the following as they apply to a Condensate System Malfunction: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

AA	1.01	Hotwell level control	2.9
AA	1.02	Turbine load and trip controls	3.1
AA	1.03	Condensate pump and/or miniflow controls	2.8
AA	1.04	Booster/Main Feedwater Pumps	3.2
AA	1.05	Condensate polisher vessel and/or bypass valve controls	2.5
AA	1.06	Deareator storage tank level control	2.7
AA	1.07	Feedwater heater controls	2.4
AA	1.08	Moisture separator reheater shell drain tank level controls	2.3
AA	1.09	Steam Generator Blowdown System controls	2.5
AA	1.10	Gland sealing steam condenser flow control	2.3

AA 2		**Ability to evaluate the following parameters and/or conditions as they apply to a Condensate System Malfunction: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Hotwell or deareator storage tank level	3.0	2.8
AA	2.02	Condensate pressure and/or flow	3.0	2.8
AA	2.03	Steam Generator Blowdown System heat exchanger outlet temperature and/or flow	2.3	2.2
AA	2.04	Gland sealing steam condenser flow	2.3	2.1
AA	2.05	Condensate polisher ΔP	2.7	2.3

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Loss of Circulating Water and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Condensate System	2.6
AK 1.02	Condenser Air Removal System	2.6
AK 1.03	Main Steam System	2.8
AK 1.04	Main Turbine System	3.0
AK 1.05	Turbine Building Closed Cooling Water System	2.4
AK 1.06	Liquid Radwaste System	2.4
AK 1.07	Turbine and/or auxiliary building sumps	2.2
AK 1.08	Circulating Water Pumps and/or discharge valves	2.7
AK 1.09	Circulating Water trash screens	2.6
AK 1.10	Circulating Water System cooling tower makeup sources	2.6
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Circulating Water: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Loss of Circulating Water System effect on Steam Dump Control System	3.0
AK 2.02	Effect or turbine load reduction at a rate that actuates C-7, Steam Dump Control System Load Reject Arming Signal and opens the steam dumps	3.3
AK 2.03	Loss of Circulating Water effect on Liquid Radwaste System discharge	2.9
AK 2.04	Loss of Circulating Water effect on Turbine Building Closed Cooling Water System	2.6
AK 3	**Knowledge of the reasons for the following actions as they apply to Loss of Circulating Water: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Terminating liquid waste releases	3.1
AK 3.02	Tripping the reactor and stopping all Circulating Water System pumps	3.3
AK 3.03	Checking turbine and/or auxiliary building sump levels	2.6
AK 3.04	Checking Turbine Building Closed Cooling Water System heat exchanger discharge flow rate	2.4

AK	3.05	Checking Circulating Water System to Condenser Air Removal System seal water heat exchanger flow	2.3
AK	3.06	Checking circulating water pump motor cooling water flow is adequate	2.6
AK	3.07	Reducing turbine load	3.3

AA	**1**	**Ability to operate and monitor the following as they apply to a Loss of Circulating Water: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Circulating water pump controls	2.9
AA	1.02	Reactor trip controls	3.3
AA	1.03	Turbine load controls	3.3
AA	1.04	Cooling tower level makeup and/or blowdown control	2.6
AA	1.05	Turbine Building Closed Cooling Water System heat exchanger strainer isolation valves and/or backwash controls	2.4
AA	1.06	Condenser Air Removal System seal water heat exchanger isolation valves	2.3
AA	1.07	Circulating water pump motor cooling water flow	2.6

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Circulating Water: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Circulating Water flow and/or pressure	3.0	2.9
AA	2.02	Condenser vacuum	3.3	3.1
AA	2.03	Turbine and/or auxiliary building sump level	2.3	2.3
AA	2.04	Cooling tower level	2.7	2.4
AA	2.05	Turbine Building Closed Cooling Water System heat exchanger flows and outlet temperatures	2.7	2.3
AA	2.06	Condenser Air Removal System seal water heat exchanger flows and/or temperatures	2.7	2.2
AA	2.07	Circulating water pump motor temperatures	2.7	2.4
AA	2.08	Trash screen ΔP	2.7	2.4

A-321 Malfunction of Data Display And Processing System

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Malfunction of Data Display And Processing System and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Computerized Procedure System	3.1
AK 1.02	Diverse Actuation System	3.5
AK 1.03	Qualified Dedicated Safety Panels	3.3
AK 1.04	Nuclear Application Programs	2.9
AK 1.05	Control room operator workstations	3.3
AK 1.06	Plant Control System	3.5
AK 1.07	Protection And Safety Monitoring System	3.5
AK 1.08	Remote shutdown workstation	2.1
AK 1.09	Wall Panel Information System	3.0
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Malfunction of Data Display And Processing System: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Data Display And Processing System controller failure	3.4
AK 2.02	Data Display And Processing System network failure	3.4
AK 2.03	Data Display And Processing System network failure coincident with a loss of more than two Protection And Safety Monitoring System channels	3.8
AK 3	**Knowledge of the reasons for the following actions as they apply to Malfunction of Data Display And Processing System: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Verifying normal operation of the Computerized Procedure System	3.1
AK 3.02	Taking manual or local control of individual components for a Data Display And Processing System controller failure	3.4
AK 3.03	Monitoring the plant using Diverse Actuation System and qualified dedicated safety panels	3.5
AK 3.04	Maintaining the plant stable during a Data Display And Processing System network failure	3.4

A-321 Malfunction of Data Display And Processing System

AA 1	**Ability to operate and monitor the following as they apply to a Malfunction of Data Display And Processing System: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**		
AA 1.01	Diverse Actuation System	3.7	
AA 1.02	Protection And Safety Monitoring System	3.8	

		RO	SRO
AA 2	**Ability to evaluate the following parameters and/or conditions as they apply to a Malfunction of Data Display And Processing System: (CFR: 41.7 / 43.5 / 45.6)**		
AA 2.01	Data Display And Processing System alarms and/or data quality codes	3.3	3.1

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Loss of 6.9KV or 480 Volt Bus Power and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Automatic Depressurization System	3.6
AK 1.02	Chemical and Volume Control System	2.7
AK 1.03	Standby Diesel and Auxiliary Boiler Fuel Oil System	2.8
AK 1.04	Non Class IE DC and UPS System	2.6
AK 1.05	Class IE DC and UPS System	3.6
AK 1.06	Passive Core Cooling System	3.5
AK 1.07	Nuclear Island Nonradioactive Ventilation System	2.4
AK 1.08	Main Control Room Emergency Habitability System	3.2
AK 1.09	Transmission Switchyard and Offsite Power System	2.7
AK 1.10	Onsite Standby Power System	2.9
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of 6.9KV or 480 Volt Bus Power: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Loss of AC power for greater than 72 hours	4.0
AK 2.02	Loss of power to Class IE DC and UPS System Distribution Panels on Automatic Depressurization System	3.9
AK 2.03	Loss of power to Class IE DC and UPS System Distribution Panels on Chemical and Volume Control System	3.0
AK 2.04	Loss of power to Standby Diesel and Auxiliary Boiler Fuel Oil System	2.8
AK 2.05	Loss of power to Non Class IE DC and UPS System	2.7
AK 2.06	Loss of power to Class IE DC and UPS System	3.8
AK 2.07	Loss of power to Class IE DC and UPS System Distribution Panels on Passive Core Cooling System	3.7
AK 2.08	Loss of power to Class IE DC and UPS System Distribution Panels on Nuclear Island Nonradioactive Ventilation System	2.6
AK 2.09	Loss of power to Class IE DC and UPS System Distribution Panels on Main Control Room Emergency Habitability System	3.5

AK	2.10	Loss of power to Transmission Switchyard and Offsite Power System	2.6
AK	2.11	Loss of power to Onsite Standby Power System	2.7

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Loss of 6.9KV or 480 Volt Bus Power: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Performing load management for any bus powered from its standby diesel generator	2.9
AK	3.02	Returning unloaded standby diesel generator to standby	2.4
AK	3.03	Ensuring an instrument air compressor is in service	2.7
AK	3.04	Ensuring a startup feedwater pump is in service	2.7
AK	3.05	Ensuring a train of service water pumps and fans are in service	2.8
AK	3.06	Ensuring a Component Cooling Water System pump is in service	2.8
AK	3.07	Ensuring an Normal Residual Heat Removal System pump is in service	2.9
AK	3.08	Operating the reactor containment recirculation fans in low speed	2.3
AK	3.09	Ensuring standby diesel generator support equipment is in service	2.5
AK	3.10	Ensuring battery chargers are in service	3.4
AK	3.11	Ensuring a Chemical and Volume Control System makeup pump is in service	2.6
AK	3.12	Verifying core makeup tank, pressurizer, and in-containment refueling water storage tank levels are stable	3.0
AK	3.13	Removing all loads from the Class IE DC and UPS System batteries	3.5
AK	3.14	Actuating Automatic Depressurization System stages 1-3	3.9
AK	3.15	Placing the ancillary diesel generator in service	2.9

AA	**1**	**Ability to operate and monitor the following as they apply to a Loss of 6.9KV or 480 Volt Bus Power: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	6.9KV and/or 480 Volt buses	2.9
AA	1.02	Class IE DC and UPS System and/or Non Class IE DC and UPS System equipment	3.4
AA	1.03	Loaded standby diesel generator and support equipment	3.0
AA	1.04	HVAC and chiller equipment	2.4
AA	1.05	Automatic Depressurization System Stages 1-3	3.9

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of 6.9KV or 480 Volt Bus Power: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	6.9KV and/or 480 Volt Bus status and/or voltage	2.4	3.3
AA	2.02	Main step-up transformer, unit auxiliary transformer, and/or reserve auxiliary transformer status and/or voltage	2.0	3.0
AA	2.03	Standby diesel generator load	2.4	3.4
AA	2.04	Battery, battery charger, and battery bus status and/or voltage	3.2	3.7

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Startup Feedwater System and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Condensate storage tank	2.8
AK 1.02	Makeup sources to the condensate storage tank	2.5
AK 1.03	Main Main and Startup Feedwater System	2.9
AK 1.04	Steam Generator System	2.9
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Startup Feedwater System Malfunctions: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Startup feedwater pump high discharge temperature	2.5
AK 2.02	Startup feedwater pump low or high flow rate	2.6
AK 2.03	Startup feedwater pump trip due to causes other than Startup Feedwater Isolation Actuation	2.7
AK 3	**Knowledge of the reasons for the following actions as they apply to Startup Feedwater System: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Checking startup feedwater pump discharge temperature less than the high temperature alarm setpoint	2.3
AK 3.02	Checking each running startup feedwater pump flow is between minimum and maximum flowrates to support pump operation	2.8
AA 1	**Ability to operate and monitor the following as they apply to Startup Feedwater System Malfunctions: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA 1.01	Startup feedwater pumps and associated discharge valves	2.9
AA 1.02	Startup feedwater control and isolation valves	3.0

			RO	SRO
AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Startup Feedwater System Malfunction: (CFR: 41.7 / 43.5 / 45.6)**		
AA	2.01	Steam generator level	2.8	3.5
AA	2.02	Startup feedwater pump status (on/off)	2.4	3.0
AA	2.03	Startup feedwater pump discharge temperature	2.0	2.6
AA	2.04	Condensate storage tank level	2.4	3.1
AA	2.05	Startup feedwater flow and/or valve positions	2.4	3.3

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Malfunction of Feedwater Heaters and Extraction Steam and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Steam Generator Blowdown System	2.0
AK 1.02	Condensate System	2.4
AK 1.03	Main and Startup Feedwater System	2.6
AK 1.04	Heater Drain System	2.5
AK 1.05	Main Steam System	2.4
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Malfunction of Feedwater Heaters and Extraction Steam: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Loss of feedwater heater	2.9
AK 2.02	Abnormal feedwater heater level	2.6
AK 2.03	Abnormal level in moisture separator reheater, moisture separator reheater shell drain tank, moisture separator reheater first stage reheater drain tank, or moisture separator reheater second stage reheater drain tank	2.6
AK 2.04	Abnormal level in deaerator storage tank	2.6
AK 2.05	Effect of changing feedwater temperature on reactor power (Nuclear Instrumentation System, calorimetric, and ΔT)	3.5

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Malfunction of Feedwater Heaters and Extraction Steam: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Ensuring reactor power is below maximum power limit	3.5
AK	3.02	Ensuring feedwater heaters are in service	2.5
AK	3.03	Ensuring deaerator storage tank level is in normal band and stable	2.5
AK	3.04	Ensuring moisture separator reheater shell drain tank, moisture separator reheater first stage reheater drain tank, or moisture separator reheater second stage reheater drain tank levels are in normal band and stable	2.5
AK	3.05	Ensuring feedwater heater levels are in normal band and stable	2.5

AA	**1**	**Ability to operate and monitor the following as they apply to a Malfunction of Feedwater Heaters and Extraction Steam: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Reactor trip controls	3.6
AA	1.02	Main turbine load controls	3.0
AA	1.03	Deaerator recirculation control valve	2.4
AA	1.04	Booster/main feedwater pumps and/or miniflow control valves	2.4
AA	1.05	Extraction steam isolation and/or drain line valves	2.4
AA	1.06	Feedwater heater inlet valve, outlet valve, or bypass isolation valves	2.4
AA	1.07	Feedwater heater normal level control valves or alternate drain control valves	2.5
AA	1.08	Steam generator blowdown flow control valves and/or steam generator blowdown system heat exchanger outlet to deaerator control valves	2.5
AA	1.09	Moisture separator reheater shell drain tank or reheater drain tank level control	2.4

			RO	SRO
AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Malfunction of Feedwater Heaters and Extraction Steam: (CFR: 41.7 / 43.5 / 45.6)**		
AA	2.01	Feedwater heater levels	2.2	2.9
AA	2.02	Deaerator storage tank level	2.0	2.8
AA	2.03	Moisture separator reheater, moisture separator reheater shell drain tank, moisture separator reheater first stage drain tank, or moisture separator reheater second stage drain tank level	2.2	2.8
AA	2.04	Maximum Reactor Power vs. Pumps in Service (see procedure attachment)	3.4	3.4
AA	2.05	Maximum Reactor Power vs. Feedwaters Heater Out of Service (see procedure attachment)	3.2	3.4

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Loss of Instrument Air and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Component Cooling Water System cooling flow valves to Chemical and Volume Control System letdown heat exchanger (OE related)	2.6
AK 1.02	Component Cooling Water System cooling flow valves to reactor coolant pumps (OE related)	3.0
AK 1.03	Core makeup tank discharge isolation valves (OE related)	3.5
AK 1.04	Containment isolation valves (OE related)	3.3
AK 1.05	Chemical and Volume Control System valves (OE related)	2.7
AK 1.06	Deaerator storage tank level control and/or recirculation valves (OE related)	2.5
AK 1.07	Feedwater regulating and/or isolation valves (OE related)	2.9
AK 1.08	Feedwater heater normal and/or alternate level control valves (OE related)	2.5
AK 1.09	Fuel handling equipment (OE related)	2.3
AK 1.10	In-containment refueling water storage tank gutter isolation valves (OE related)	3.0
AK 1.11	Main feedwater pump miniflow valves (OE related)	2.6
AK 1.12	Main steam isolation valves, SG PORV, and/or steam dump valves (OE related)	3.2
AK 1.13	Passive containment cooling system discharge isolation valves (OE related)	3.4
AK 1.14	Passive Residual Heat Removal System heat exchanger flow control valves (OE related)	3.6
AK 1.15	Pressurizer normal spray valves (OE related)	3.1
AK 1.16	Steam generator blowdown valves (OE related)	2.4
AK 1.17	Normal Residual Heat Removal System heat exchanger outlet, bypass, and/or miniflow valves (OE related)	2.9

AK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Instrument Air: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK	2.01	Effect on Passive Containment Cooling System (OE related)	3.4
AK	2.02	Effect on Main Steam System (OE related)	2.7
AK	2.03	Effect on Normal Residual Heat Removal System (OE related)	2.9
AK	2.04	Effect during fuel movement (OE related)	2.7
AK	2.05	Effect on the core makeup tank, in-containment refueling water storage tank, and/or Passive Residual Heat Removal System (PRA related) (OE related)	3.4
AK	2.06	Effect on Heater Drain System, Condensate System, and/or Main and Startup Feedwater System (OE related)	2.5
AK	2.07	Effect on Chemical and Volume Control System (OE related)	2.4
AK	2.08	Effect on Normal Residual Heat Removal System (OE related)	2.8

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Loss of Instrument Air: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Shutdown/trip the reactor (OE related)	3.8
AK	3.02	Suspending core alterations and/or fuel movement (OE related)	3.2
AK	3.03	Locally controlling feedwater flow using flow control valve handwheel (OE related)	2.8
AK	3.04	Locally controlling steam flow using SG PORV handwheel (OE related)	2.8
AK	3.05	Aligning service air to the instrument air system (OE related)	2.8

AA	**1**	**Ability to operate and monitor the following as they apply to a Loss of Instrument Air: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Reactor trip controls (OE related)	3.9
AA	1.02	Instrument and/or service air compressors (OE related)	2.8
AA	1.03	Instrument and/or service air dryers (OE related)	2.5
AA	1.04	Instrument and/or service air loads (OE related)	2.6

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Instrument Air procedures: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Instrument and/or service air pressure (OE related)	3.0	3.1
AA	2.02	Instrument and/or service air flows (OE related)	2.2	2.7
AA	2.03	Instrument and/or service air dewpoint (OE related)	2.0	2.2
AA	2.04	Reactor Coolant System temperature, steam generator level, and/or steam generator pressure (OE related)	3.2	3.2

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Turbine Trip Without Reactor Trip and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Condensate System	2.5
AK 1.02	Chemical and Volume Control System	2.6
AK 1.03	Condenser Air Removal System	2.4
AK 1.04	Reactor Coolant System Digital Rod Control System	3.4
AK 1.05	Main and Startup Feedwater System	2.9
AK 1.06	Main Steam System	2.7
AK 1.07	Main Turbine System	2.8
AK 1.08	Pressurizer Level Control System	2.8
AK 1.09	Pressurizer Pressure Control System	2.8
AK 1.10	Reactor Coolant System	2.9
AK 1.11	Steam Dump Control System	3.3
AK 1.12	Steam Generator System	2.9
AK 1.13	Main Turbine Control and Diagnostics System	2.6
AK 1.14	Main Generation System	2.5
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Turbine Trip Without Reactor Trip: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Failure to maintain Reactor Coolant System heat removal	3.8
AK 2.02	Recovering control rods dropped by the rapid power reduction system	3.4
AK 2.03	Failure to control reactivity, i.e over-boration or rising Xenon concentration	3.6

AK 3 Knowledge of the reasons for the following actions as they apply to Turbine Trip Without Reactor Trip: (CFR: 41.5 / 41.10 / 45.6 / 45.13)

AK	3.01	Checking the turbine tripped	3.1
AK	3.02	Tripping the reactor and actuating main Steam Line Isolation Actuation	3.7
AK	3.03	Verifying the condenser steam dumps or SG PORVs are open	3.2
AK	3.04	Verifying steam generator levels are trending to program	2.8
AK	3.05	Verifying a booster/main feedwater pump is running	2.6
AK	3.06	Verifying feedwater is in the Low Power Mode	2.6
AK	3.07	Placing the Steam Dump Control System in the Steam Pressure Mode and resetting the Rapid Power Reduction Signal	2.9
AK	3.08	Placing Digital Rod Control System in the Low Power Control Mode	3.0
AK	3.09	Placing rod control in manual or bank select to perform dropped rod recovery	3.0
AK	3.10	Tripping the reactor if it becomes subcritical	3.7

AA 1 Ability to operate and monitor the following as they apply to a Turbine Trip Without Reactor Trip: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

AA	1.01	Main turbine trip	3.4
AA	1.02	Main Steam Isolation Actuation	3.6
AA	1.03	Steam Dump Control System or SG PORV	3.5
AA	1.04	Main and Startup Feedwater System	3.1
AA	1.05	Digital Rod Control System	3.5
AA	1.06	Chemical and Volume Control System makeup	2.9
AA	1.07	Reactor trip controls	3.8
AA	1.08	Condensate System	2.6
AA	1.09	Circulating Water System	2.4
AA	1.10	Steam Generator System	3.0

			RO	SRO
AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Turbine Trip Without Reactor Trip: (CFR: 41.7 / 43.5 / 45.6)**		
AA	2.01	Reactor Coolant System temperature	3.2	3.6
AA	2.02	Steam generator level and/or pressure	2.8	3.4
AA	2.03	Reactor power (Nuclear Instrumentation System, ΔT)	3.4	3.8
AA	2.04	Control rod positions	3.4	3.7

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A-333 Main Turbine Malfunction

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Main Turbine Malfunction and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Condensate System	2.5
AK 1.02	Condenser Air Removal System	2.6
AK 1.03	Circulating Water System	2.6
AK 1.04	Gland Seal System	2.6
AK 1.05	Main Turbine and Generator Lube Oil System	2.6
AK 1.06	Steam Dump Control System	2.9
AK 1.07	Main Turbine Control and Diagnostics System	2.8
AK 1.08	Main Generation System	2.5
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Main Turbine Malfunction: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Loss of condenser vacuum	2.8
AK 2.02	Effect opening steam dumps has on condenser vacuum	2.9
AK 2.03	Loss of C-9, Condenser Available	3.1
AK 2.04	Main Turbine Trip	3.1
AK 3	**Knowledge of the reasons for the following actions as they apply to Main Turbine Malfunction: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Tripping main turbine	3.4
AK 3.02	Ensuring the condenser shell vacuum breakers are closed and water sealed	2.4
AK 3.03	Ensuring all vacuum pumps are running	2.5

AA	**1**	**Ability to operate and monitor the following as they apply to a Main Turbine Malfunction: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Main turbine load and trip controls	3.4
AA	1.02	Condenser shell vacuum breakers and vacuum pumps	2.5
AA	1.03	Steam Dump Control System	3.3

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Main Turbine Malfunction: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Condenser vacuum	2.6	2.9
AA	2.02	C-9, Condenser Available Indications	2.6	3.1
AA	2.03	Turbine load	2.6	2.9
AA	2.04	Circulating Water System flow and temperature	1.8	2.5
AA	2.05	Turbine vibration	2.4	2.6
AA	2.06	Gland Seal System	1.8	2.5

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Malfunction of Protection and Safety Monitoring System and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Automatic Depressurization System	3.9
AK 1.02	Compressed and Instrument Air System	2.5
AK 1.03	Component Cooling Water System	2.4
AK 1.04	Chemical and Volume Control System	2.5
AK 1.05	Main AC Power System	2.4
AK 1.06	Engineered Safeguards Actuation System	4.0
AK 1.07	Main and Startup Feedwater System	2.7
AK 1.08	Main Steam System	2.6
AK 1.09	Post Accident Monitoring System	2.9
AK 1.10	Passive Containment Cooling System	3.4
AK 1.11	Primary Sampling System	2.1
AK 1.12	Passive Core Cooling System	3.6
AK 1.13	Reactor Coolant System	2.7
AK 1.14	Normal Residual Heat Removal System	2.7
AK 1.15	Reactor Trip System	4.0
AK 1.16	Spent Fuel Pool Cooling System	2.4
AK 1.17	Steam Generator System	2.6
AK 1.18	Nuclear Island Nonradioactive Ventilation System	2.1
AK 1.19	Main Control Room Emergency Habitability System	3.2
AK 1.20	Containment Air Filtration System	2.2
AK 1.21	Central Chilled Water System	2.1
AK 1.22	Liquid Radwaste System	2.0

AK	**2**	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Malfunction of Protection and Safety Monitoring System: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK	2.01	Failure of one or more Protection and Safety Monitoring System divisions	3.9
AK	**3**	**Knowledge of the reasons for the following actions as they apply to Malfunction of Protection and Safety Monitoring System: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Monitoring the plant using indications independent of Protection and Safety Monitoring System (Diverse Actuation System and Data Display and Processing System)	3.8
AK	3.02	Performing system level functions using Diverse Actuation System if two or more Protection and Safety Monitoring System divisions have failed	3.9
AK	3.03	Using a Protection and Safety Monitoring System component interface module to operate components	2.9
AK	3.04	Placing the Diverse Actuation System Master Enable Switch in ENABLE if less than two Protection and Safety Monitoring System divisions are operable	3.7
AK	3.05	Initiating a reactor trip coincident with a core makeup tank and/or Passive Residual Heat Removal System actuation	3.9
AK	3.06	Actuating Automatic Depressurization System	4.1
AK	3.07	Actuating the containment hydrogen igniters	3.1
AA	**1**	**Ability to operate and monitor the following as they apply to a Malfunction of Protection and Safety Monitoring System: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Automatic Depressurization System	4.1
AA	1.02	Compressed and Instrument Air System	2.6
AA	1.03	Component Cooling Water System	2.7
AA	1.04	Chemical and Volume Control System	2.6
AA	1.05	Main AC Power System	2.7

AA	1.06	Engineered Safeguards Actuation System	3.9
AA	1.07	Main and Startup Feedwater System	2.9
AA	1.08	Main Steam System	2.6
AA	1.09	Passive Containment Cooling System	3.6
AA	1.10	Primary Sampling System	2.2
AA	1.11	Passive Core Cooling System	3.9
AA	1.12	Reactor Coolant System	3.0
AA	1.13	Normal Residual Heat Removal System	2.9
AA	1.14	Reactor Trip System	4.0
AA	1.15	Spent Fuel Pool Cooling System	2.4
AA	1.16	Steam Generator System	2.7
AA	1.17	Nuclear Island Nonradioactive Ventilation System	2.3
AA	1.18	Main Control Room Emergency Habitability System	3.2
AA	1.19	Containment Air Filtration System	2.3
AA	1.20	Central Chilled Water System	2.1
AA	1.21	Liquid Radwaste System	2.1

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Malfunction of Protection and Safety Monitoring System:** **(CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Protection and Safety Monitoring System alarms, data quality codes, and/or displays updating	3.8	3.3
AA	2.02	Diverse Actuation System indications	4.0	3.7
AA	2.03	Post Accident Monitoring System indications	4.0	3.1

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Passive Residual Heat Removal System heat exchanger Leak and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	In-containment refueling water storage tank	3.6
AK 1.02	Passive Residual Heat Removal System isolation and/or flow control valves	3.3
AK 1.03	Reactor Coolant System	3.4
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Passive Residual Heat Removal System heat exchanger Leak: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Passive Residual Heat Removal System heat exchanger tube leak on in-containment refueling water storage tank parameters (such as temperature, level, radiological conditions, boron)	3.4
AK 2.02	Passive Residual Heat Removal System heat exchanger tube leak effect on containment radiation	3.1
AK 3	**Knowledge of the reasons for the following actions as they apply to Passive Residual Heat Removal System heat exchanger Leak: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Determining whether core makeup tank discharge isolation valves are open	3.3
AK 3.02	Determining whether in-containment refueling water storage tank level is rising	3.3
AK 3.03	Ensuring startup feedwater pumps and steam generators are operable	3.0
AK 3.04	Isolating the Passive Residual Heat Removal System heat exchanger	3.4
AK 3.05	Sampling the in-containment refueling water storage tank for activity and boron	2.6
AK 3.06	Trending Passive Residual Heat Removal System inlet temperatures and pressures	2.7

AK	3.07	Trending Passive Residual Heat Removal System inlet pressure over time	2.6
AK	3.08	Restoring the Passive Residual Heat Removal System heat exchanger to service	3.0
AK	3.09	Performing a Reactor Coolant System leakrate	2.9

AA	**1**	**Ability to operate and monitor the following as they apply to a Passive Residual Heat Removal System heat exchanger Leak: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Main and Startup Feedwater System	2.9
AA	1.02	Passive Residual Heat Removal System heat exchanger control valves and inlet valve	3.2
AA	1.03	Steam Dump Control System and/or SG PORV	3.1

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Passive Residual Heat Removal System heat exchanger Leak: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Passive Residual Heat Removal System inlet temperatures and/or pressures	3.2	3.1
AA	2.02	In-containment refueling water storage tank temperatures, level, activity, and/or boron concentration	3.2	3.1
AA	2.03	Reactor Coolant System leakrate	3.2	3.3
AA	2.04	Reactor Coolant System pressure	3.2	3.0
AA	2.05	Containment radiation	3.0	3.0

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Reactor Coolant Leak and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Steam Generator Blowdown System	2.6
AK 1.02	Component Cooling Water System	2.6
AK 1.03	Containment System	3.0
AK 1.04	Chemical and Volume Control System	3.0
AK 1.05	Engineered Safeguards Actuation System	3.6
AK 1.06	Primary Sampling System	2.5
AK 1.07	Passive Core Cooling System	3.3
AK 1.08	Radiation Monitoring System	3.1
AK 1.09	Normal Residual Heat Removal System	2.9
AK 1.10	Reactor Trip System	3.4
AK 1.11	Steam Generator System	3.1
AK 1.12	Turbine Island Vents, Drains and Relief System	2.4
AK 1.13	Liquid Radwaste System	2.2
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Reactor Coolant Leak: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Reactor Coolant System leakage greater than the capacity of the makeup system	3.6
AK 2.02	Leaking reactor vessel flange	3.0
AK 2.03	Leaking Automatic Depressurization System valve	3.5
AK 2.04	Leaking pressurizer safety valve	3.4
AK 2.05	Leaking Passive Residual Heat Removal System heat exchanger tube	3.4

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Reactor Coolant Leak: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Starting makeup pump and isolating Chemical and Volume Control System letdown	3.2
AK	3.02	Actuating Safeguards	3.9
AK	3.03	Determining if steam generator tubes are intact	3.7
AK	3.04	Determining total Reactor Coolant System leakrate	3.3
AK	3.05	Opening the in-containment refueling water storage tank gutter isolation valves	2.9
AK	3.06	Checking reactor vessel flange leakoff temperature, reactor vessel head vent temperature, Automatic Depressurization System valve temperatures, pressurizer safety valve temperatures, and/or Passive Residual Heat Removal System and in-containment refueling water storage tank temperatures	3.0
AK	3.07	Actuating Normal Residual Heat Removal System Isolation	3.0
AK	3.08	Performing a Chemical and Volume Control System leakage determination	3.1

AA	**1**	**Ability to operate and monitor the following as they apply to a Reactor Coolant Leak: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Reactor trip controls	3.9
AA	1.02	Safeguards actuation controls	4.0
AA	1.03	Chemical and Volume Control System	3.1
AA	1.04	Passive Core Cooling System	3.6
AA	1.05	Reactor head vent valves	3.1
AA	1.06	Automatic Depressurization System valves	3.9
AA	1.07	Normal Residual Heat Removal System	3.1

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Reactor Coolant Leak: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Containment radiation	3.4	3.0
AA	2.02	Pressurizer level	3.2	3.3
AA	2.03	Makeup frequency	3.2	3.1
AA	2.04	Reactor Coolant System leakrate	3.4	3.4
AA	2.05	Containment sump level	3.2	3.3
AA	2.06	Reactor vessel flange leakoff temperature, reactor vessel head vent temperature, Automatic Depressurization System valve temperatures, pressurizer safety valve temperatures, Passive Residual Heat Removal System temperatures and/or in-containment refueling water storage tank temperatures	3.2	2.9
AA	2.07	Reactor coolant drain tank level	3.0	2.9
AA	2.08	Effluent holdup tank level	2.8	2.7
AA	2.09	Auxiliary building sump level	2.8	2.7

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K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the reactor coolant pumps Malfunctions and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Component Cooling Water System	2.7
AK 1.02	Reactor Trip System	3.8
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Reactor Coolant Pump Malfunctions: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Reactor coolant pump trip in mode 1 or 2	3.8
AK 2.02	Reactor coolant pump trip in mode 3, 4, or 5	3.1
AK 3	**Knowledge of the reasons for the following actions as they apply to Reactor Coolant Pump Malfunctions: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Tripping the reactor if less than 4 reactor coolant pumps are running	3.8
AK 3.02	Tripping the reactor and stopping all reactor coolant pumps instead of restoring cooling flow to the reactor coolant pumps	3.5
AK 3.03	Tripping the reactor and stopping the affected reactor coolant pumps	3.7
AK 3.04	Reducing reactor coolant pump speed	3.0
AA 1	**Ability to operate and monitor the following as they apply to a Reactor Coolant Pump Malfunctions: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA 1.01	Reactor coolant pumps and variable speed controllers	3.1
AA 1.02	Reactor trip controls	3.9
AA 1.03	Component Cooling Water System pump controls	2.9

			RO	SRO
AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Reactor Coolant Pump Malfunction: (CFR: 41.7 / 43.5 / 45.6)**		
AA	2.01	Reactor coolant pump speed or vibration	2.8	3.0
AA	2.02	Reactor coolant pump bearing water or stator temperatures	2.6	3.1
AA	2.03	Component Cooling Water System flows and/or temperatures	2.6	3.0

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Loss of Normal Residual Heat Removal and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Automatic Depressurization System	3.6
AK 1.02	Compressed and Instrument Air System	2.8
AK 1.03	Component Cooling Water System	3.0
AK 1.04	Condensate System	2.2
AK 1.05	Containment System	3.1
AK 1.06	Chemical and Volume Control System	2.6
AK 1.07	Diverse Actuation System	3.4
AK 1.08	Engineered Safeguards Actuation System	3.6
AK 1.09	Main and Startup Feedwater System	2.6
AK 1.10	Passive Containment Cooling System	3.3
AK 1.11	Passive Core Cooling System	3.6
AK 1.12	Reactor Coolant System	3.4
AK 1.13	Spent Fuel Pool Cooling System	2.6
AK 1.14	Steam Generator System	2.8
AK 1.15	Containment Recirculation Cooling System	2.2
AK 1.16	Liquid Radwaste System	1.9
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Normal Residual Heat Removal: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	Transferring Reactor Coolant System heat load to the steam generators	3.4
AK 2.02	Transferring Reactor Coolant System heat load to the Passive Residual Heat Removal System heat exchanger	3.5
AK 2.03	Establishing passive feed and bleed	3.6

AK	**3**	**Knowledge of the reasons for the following actions as they apply to Loss of Normal Residual Heat Removal: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK	3.01	Checking Reactor Coolant System temperature greater than 200°F	3.1
AK	3.02	Maintaining Normal Residual Heat Removal System pump minimum flow	2.9
AK	3.03	Checking status of Normal Residual Heat Removal System Isolation Actuation	3.2
AK	3.04	Opening the Reactor Coolant System head vent valves if Reactor Coolant System pressure is greater than the normal pressure for placing Normal Residual Heat Removal System in service and Reactor Coolant System temperature is below low temperature overpressure protection setpoint	3.2
AK	3.05	Closing the Normal Residual Heat Removal System hot leg suction valves if Reactor Coolant System pressure is greater than the normal pressure for placing Normal Residual Heat Removal System inservice and Reactor Coolant System temperature is above low temperature overpressure protection setpoint	3.1
AK	3.06	Placing Normal Residual Heat Removal System in Shutdown Cooling mode	2.9
AK	3.07	Verifying Component Cooling Water System pump status and flows	2.8
AK	3.08	Establishing 1500 gpm Normal Residual Heat Removal System flow	3.0
AK	3.09	Adjusting the Normal Residual Heat Removal System heat exchanger outlet flow to control Reactor Coolant System temperature	2.9
AK	3.10	Removing Passive Residual Heat Removal System and/or Passive Containment Cooling System from service	2.9
AK	3.11	Stopping all reactor coolant pumps	3.2
AK	3.12	Placing Chemical and Volume Control System letdown in service and throttling flow to maintain letdown heat exchanger outlet temperature less than 140°F	2.6
AK	3.13	Placing emergency letdown in service	2.9
AK	3.14	Checking steam generators are intact, steam generator levels can be maintained in the normal band, and steam can be released using the SG PORV	3.1
AK	3.15	Actuating Passive Residual Heat Removal System	3.6
AK	3.16	Establishing containment closure	3.7

AK	3.17	Aligning Spent Fuel Pool Cooling System to cool the in-containment refueling water storage tank	2.9
AK	3.18	Operating the reactor containment recirculation fans in low speed	2.4
AK	3.19	Placing Passive Containment Cooling System in service	3.4
AK	3.20	Passive Residual Heat Removal System not being capable of maintaining Reactor Coolant System temperature less than 420°F	3.4
AK	3.21	Initiating passive feed and bleed	3.5
AK	3.22	Actuating safeguards	3.9
AK	3.23	Actuating Automatic Depressurization System stages 1, 2, and 3	3.9

AA 1 Ability to operate and monitor the following as they apply to a Loss of Normal Residual Heat Removal: (CFR: 41.5 / 41.7 / 45.5 to 45.8)

AA	1.01	Automatic Depressurization System	3.9
AA	1.02	Component Cooling Water System	2.9
AA	1.03	Condensate System	2.3
AA	1.04	Containment System	3.3
AA	1.05	Diverse Actuation System	3.9
AA	1.06	Engineered Safeguards Actuation System	4.0
AA	1.07	Chemical and Volume Control System	2.9
AA	1.08	Main and Startup Feedwater System	2.7
AA	1.09	Passive Containment Cooling System	3.3
AA	1.10	Passive Core Cooling System	3.6
AA	1.11	Reactor Coolant System	3.3
AA	1.12	Spent Fuel Pool Cooling System	2.4
AA	1.13	Steam Generator System	2.7
AA	1.14	Containment Recirculation Cooling System	2.2

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Normal Residual Heat Removal: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Reactor Coolant System temperature and/or pressure	3.6	3.3
AA	2.02	Normal Residual Heat Removal System pump flow	3.0	3.1
AA	2.03	Component Cooling Water System to Normal Residual Heat Removal System heat exchanger flow	2.8	2.7
AA	2.04	Containment pressure and/or temperature	3.4	3.3
AA	2.05	Pressurizer level	3.0	3.0
AA	2.06	Steam Generator level and/or Feedwater flow	3.2	2.7
AA	2.07	Chemical and Volume Control System letdown heat exchanger outlet temperature	2.6	2.6

K/A NO.	KNOWLEDGE	IMPORTANCE
AK 1	**Knowledge of the relationship between the Loss of Service Water and the following systems or components: (CFR: 41.8 / 41.10 / 45.3)**	
AK 1.01	Booster/main feedwater pumps	2.4
AK 1.02	Compressed and Instrument Air System	2.4
AK 1.03	Component Cooling Water System	2.7
AK 1.04	Condensate pumps	2.4
AK 1.05	Chemical and Volume Control System letdown heat exchanger and/or makeup pumps	2.4
AK 1.06	Reactor coolant pumps and/or variable frequency drives	2.6
AK 1.07	Normal Residual Heat Removal System	2.6
AK 1.08	Spent Fuel Pool Cooling System	2.6
AK 1.09	Central Chilled Water System chillers	2.2
AK 2	**Knowledge of the operational implications or cause and effect relationships of the following as they apply to Loss of Service Water: (CFR: 41.5 / 41.7 / 45.7 / 45.8)**	
AK 2.01	N/A	
AK 3	**Knowledge of the reasons for the following actions as they apply to Loss of Service Water: (CFR: 41.5 / 41.10 / 45.6 / 45.13)**	
AK 3.01	Stopping both Service Water System pumps	2.4
AK 3.02	Control Service Water System Cooling tower basin level and/or temperature	2.5
AK 3.03	Ensuring at least one Service Water System train is in service	2.9
AK 3.04	Checking pump discharge flow and/or pressure in normal band	2.4
AK 3.05	Checking backwash strainer operation	2.3
AK 3.06	Checking Component Cooling Water System heat exchanger alignment, flow, and temperatures	2.7

AK	3.07	Tripping the reactor and stopping the reactor coolant pumps	3.5
AK	3.08	Cycling the Compressed and Instrument Air System compressors off and on	2.6

AA	**1**	**Ability to operate and monitor the following as they apply to a Loss of Service Water: (CFR: 41.5 / 41.7 / 45.5 to 45.8)**	
AA	1.01	Booster/main feedwater pumps	2.4
AA	1.02	Compressed and Instrument Air System	2.6
AA	1.03	Component Cooling Water System	2.7
AA	1.04	Condensate pumps	2.4
AA	1.05	Chemical and Volume Control System	2.4
AA	1.06	Reactor coolant pumps	2.9
AA	1.07	Reactor coolant pump variable frequency drives	2.7
AA	1.08	Normal Residual Heat Removal System	2.7
AA	1.09	Spent Fuel Pool Cooling System	2.6
AA	1.10	Central Chilled Water System	2.2

AA	**2**	**Ability to evaluate the following parameters and/or conditions as they apply to a Loss of Service Water: (CFR: 41.7 / 43.5 / 45.6)**	**RO**	**SRO**
AA	2.01	Service Water System cooling tower basin level, system flow, pressure, and/or temperature	2.8	2.9
AA	2.02	Component Cooling Water System heat exchanger operating temperature (OE related)	2.8	3.0