

CHAPTER 15—ACCIDENT ANALYSES

LIST OF TABLES

Table 15.0-1	U.S. EPR Initiating Events	15.0-44
Table 15.0-2	Accident Analysis Acceptance Criteria	15.0-46
Table 15.0-3	Plant Operating Modes	15.0-47
Table 15.0-4	Nuclear Steam Supply System Power Levels Assumed in the Accident Analysis.....	15.0-48
Table 15.0-5	Plant Parameters Used in Accident Analyses.....	15.0-49
Table 15.0-6	Reactivity Coefficients, Scram Reactivity, and Computer Codes	15.0-50
Table 15.0-7	Reactor Trip Setpoints and Delays Used in the Accident Analysis.....	15.0-55
Table 15.0-8	Engineered Safety Features Actuation System (ESFAS) Functions Used in the Accident Analysis	15.0-57
Table 15.0-9	Pressurizer and Secondary Safety Relief Valve Settings Used in the Accident Analysis.....	15.0-62
Table 15.0-10	Plant Systems Used in the Accident Analysis.....	15.0-63
Table 15.0-11	Single Failures Assumed in the Accident Analysis	15.0-67
Table 15.0-12	Radiological Consequences of U.S. EPR Design Basis Accidents (rem TEDE)	15.0-72
Table 15.0-13	Parameters Used to Calculate Design Basis Core Radionuclide Inventory	15.0-73
Table 15.0-14	Design Basis Core Radionuclide Inventory.....	15.0-74
Table 15.0-15	U.S. EPR Primary Coolant Bounding Concentrations	15.0-76
Table 15.0-16	U.S. EPR Secondary Coolant Bounding Concentrations.....	15.0-77
Table 15.0-17	Iodine Appearance Rates into RCS from Defective Fuel.....	15.0-78
Table 15.0-18	Summary of MCR/TSC Characteristics	15.0-79
Table 15.0-19	Offsite Receptor Variables	15.0-80
Table 15.0-20	Design Input for Failure of Small Lines Carrying Primary Coolant Outside Containment.....	15.0-81
Table 15.0-21	Design Input for NSS and CVCS Break Locations and Flows	15.0-82
Table 15.0-22	MCR Composite χ/Q and Filter-Bypass Fractions for Small-Line Break Releases at the Vent Stack Base	15.0-83
Table 15.0-23	Small Line Break - Dose Results	15.0-84

Table 15.0-24	SGTR Accident Time Line	15.0-85
Table 15.0-25	SGTR Design Input.....	15.0-86
Table 15.0-26	SGTR Thermal-Hydraulic Variable Definitions.....	15.0-88
Table 15.0-27	Condensed Thermal-Hydraulic Data Arrays	15.0-89
Table 15.0-28	MCR Composite χ/Q and Filter-Bypass Fractions Post-SGTR Releases via the SG 3 Silencer	15.0-91
Table 15.0-30	MSLB Time Line	15.0-92
Table 15.0-29	SGTR Dose Summary	15.0-92
Table 15.0-31	MSLB Design Input.....	15.0-93
Table 15.0-32	MCR Composite (χ/Q)s and Filter-Bypass Fractions for Post-MSLB Releases via the SG 1, SG 2, and SG 3 Silencers	15.0-95
Table 15.0-33	MCR Composite χ/Q and Filter-Bypass Fractions (MSLB Releases via the MSL Break and Canopy Pt. 1)	15.0-96
Table 15.0-34	MLSB Dose Summary	15.0-97
Table 15.0-35	LRA Time Line	15.0-97
Table 15.0-36	Design Input for Locked Rotor Accident	15.0-98
Table 15.0-37	MCR Composite χ/Q and Filter-Bypass Fractions RCP Locked Rotor Accident Releases via the SG 3 Silencer	15.0-100
Table 15.0-38	RCP LRA Dose Summary.....	15.0-100
Table 15.0-39	Rod Ejection Accident Timeline	15.0-100
Table 15.0-40	Design Input for Rod Ejection Accident	15.0-101
Table 15.0-41	Correlations of PWR Effective Natural Deposition Decontamination Coefficients for Aerosols (NUREG/CR-6604, Reference 16, Section 2.2.2.1, Combined Powers and Henry models).. 15.0-104	
Table 15.0-42	MCR Composite χ/Q and Filter-Bypass Fractions, Post-REA Primary Containment Leakage Pathway	15.0-105
Table 15.0-43	MCR Composite (χ/Q)s and Filter-Bypass Fractions, Post-REA Secondary-Side Leakage Pathway.....	15.0-106
Table 15.0-44	REA Dose Summary.....	15.0-107
Table 15.0-45	Fuel Handling Accident Timeline	15.0-107
Table 15.0-46	Design Input for Fuel Handling Accident.....	15.0-108
Table 15.0-47	MCR Composite (χ/Q)s and Filter-Bypass Fractions for FHA Releases. 15.0-110	
Table 15.0-48	FHA Dose Summary	15.0-110

Table 15.0-49	LOCA Radiological Sequence of Events Post-LOCA	15.0-111
Table 15.0-50	LOCA Inputs	15.0-112
Table 15.0-51	MCR Composite χ/Q and Filter-Bypass Fractions LOCA Releases at the Vent Stack Base	15.0-115
Table 15.0-52	Effective Natural Deposition Decontamination Coefficients.....	15.0-116
Table 15.0-53	Radiological Consequences of U.S. EPR Design Basis Accidents (rem TEDE)	15.0-117
Table 15.0-54	IRWST pH Analysis Inputs.....	15.0-118
Table 15.0-55	H ⁺ Added to IRWST.....	15.0-119
Table 15.0-56	Mass of TSP vs. pH at 30 Days.....	15.0-119
Table 15.0-57	TMI Action Plan Items.....	15.0-120
Table 15.0-58	Unresolved Safety Issues	15.0-122
Table 15.0-59	Generic Safety Issues.....	15.0-123
Table 15.0-60	NRC Generic Letters.....	15.0-125
Table 15.0-61	NRC Bulletins.....	15.0-127
Table 15.0-62	Transient Analysis Limiting Cases	15.0-129
Table 15.0-63	Transient Analysis Limiting Case Conditions ⁹	15.0-133
Table 15.0-64	IRWST pH vs. Acid Added.....	15.0-137
Table 15.0-65	IRWST pH vs. Time	15.0-137
Table 15.1-1	Decrease in Feedwater Temperature - Key Input Parameters ...	15.1-27
Table 15.1-2	Decrease in Feedwater Temperature - Key Equipment Status ..	15.1-28
Table 15.1-3	Decrease in Feedwater Temperature - Sequence of Events.....	15.1-29
Table 15.1-4	Increase in Feedwater Flow - Key Input Parameters.....	15.1-30
Table 15.1-5	Increase in Feedwater Flow - Key Equipment Status	15.1-31
Table 15.1-6	Increase in Feedwater Flow - Sequence of Events	15.1-32
Table 15.1-7	Increase in Steam Flow - Key Input Parameters	15.1-33
Table 15.1-9	Increase in Steam Flow - Sequence of Events	15.1-34
Table 15.1-8	Increase in Steam Flow - Key Equipment Status.....	15.1-34
Table 15.1-10	Inadvertent Opening of an SG Relief or Safety Valve - Key Input Parameters	15.1-35
Table 15.1-11	Inadvertent Opening of an SG Relief or Safety Valve - Key Equipment Status.....	15.1-36
Table 15.1-12	Inadvertent Opening of an SG Relief or Safety Valve - Sequence of Events	15.1-37

Table 15.1-13	MSLB - Key Input Parameters for Limiting Case	15.1-38
Table 15.1-14	MSLB - Key Equipment Status for Limiting Case	15.1-39
Table 15.1-15	MSLB - Sequence of Events.....	15.1-40
Table 15.1-16	MSLB - Calculated Fuel Parameters	15.1-42
Table 15.2-1	Turbine Trip - Key Input Parameters.....	15.2-32
Table 15.2-2	Turbine Trip - Key Equipment Status.....	15.2-33
Table 15.2-3	Turbine Trip-RCS Overpressurization - Sequence of Events	15.2-34
Table 15.2-4	MSIVC Secondary Overpressurization - Key Input Parameters .	15.2-35
Table 15.2-5	MSIVC Overpressurization - Key Equipment Status.....	15.2-36
Table 15.2-6	MSIVC Secondary Overpressurization - Sequence of Events....	15.2-37
Table 15.2-7	LNFF - Key Input Parameters	15.2-38
Table 15.2-8	LNFF - Key Equipment Status	15.2-40
Table 15.2-9	LNFF - Sequence of Events.....	15.2-41
Table 15.2-10	Feedwater Line Break - Key Input Parameters.....	15.2-42
Table 15.2-11	Feedwater Line Break - Key Equipment Status	15.2-44
Table 15.2-12	Feedwater Line Break - Key Case Specific Assumptions.....	15.2-45
Table 15.2-13	Feedwater Line Break: Representative Small Break Case - Sequence of Events	15.2-46
Table 15.2-14	Feedwater Line Break: Maximum RCS Pressure Case - Sequence of Events	15.2-47
Table 15.2-15	Feedwater Line Break: Maximum Main Steam System Pressure - Sequence of Events.....	15.2-48
Table 15.3-1	Decrease in Reactor Coolant System Flow Rate Events - Key Input Parameters	15.3-15
Table 15.3-2	Decrease in Reactor Coolant System Flow Rate Events - Key Equipment Status.....	15.3-15
Table 15.3-3	Partial Loss of Forced Reactor Coolant Flow Event - Sequence of Events	15.3-15
Table 15.3-4	Complete Loss of Forced Reactor Coolant Flow Event - Sequence of Events	15.3-16
Table 15.3-5	Reactor Coolant Pump Rotor Seizure Event - Sequence of Events	15.3-16
Table 15.4-1	Uncontrolled Control Bank Withdrawal from a Subcritical or Low-Power Startup Condition - Key Input Parameters	15.4-41

Table 15.4-2	Uncontrolled Control Bank Withdrawal from a Subcritical or Low-Power Startup Condition - Equipment Status	15.4-41
Table 15.4-3	Uncontrolled Control Bank Withdrawal from a Subcritical or Low-Power Startup Condition - Sequence of Events.....	15.4-42
Table 15.4-4	Uncontrolled Control Bank Withdrawal at Power - Key Input Parameters	15.4-43
Table 15.4-5	Uncontrolled Control Bank Withdrawal at Power - Equipment Status	15.4-43
Table 15.4-6	Uncontrolled Control Bank Withdrawal at Power - Sequence of Events.	15.4-44
Table 15.4-7	Dropped RCCA - Key Input Parameters	15.4-44
Table 15.4-8	Dropped RCCA - Equipment Status	15.4-45
Table 15.4-9	Dropped RCCA - Sequence of Events.....	15.4-45
Table 15.4-10	Startup of an Inactive Reactor Coolant Pump at an Incorrect Temperature - Key Input Parameters	15.4-46
Table 15.4-11	Startup of an Inactive Reactor Coolant Pump at an Incorrect Temperature - Equipment Status.....	15.4-47
Table 15.4-12	Startup of an Inactive Reactor Coolant Pump at an Incorrect Temperature - Sequence of Events	15.4-47
Table 15.4-13	Chemical and Volume Control System Malfunction that Results in a Decrease in the Boron Concentration in the Reactor Coolant - Inputs for Anti-Dilution Analyses.....	15.4-48
Table 15.4-14	Rod Ejection Accident DNBR Analysis - Ejected Rod Analysis Limits for U.S. EPR.....	15.4-49
Table 15.4-15	Rod Ejection Accident Overpressurization Analysis - Key Input Parameters	15.4-50
Table 15.4-16	Rod Ejection Accident Overpressurization Analysis - Equipment Status	15.4-51
Table 15.4-17	Rod Ejection Accident DNBR Analysis - Ejected Rod Analysis Results for BOC.....	15.4-52
Table 15.4-18	Rod Ejection Accident DNBR Analysis - Ejected Rod Analysis Results for EOC.....	15.4-53
Table 15.4-19	Rod Ejection Accident Overpressurization Analysis - Sequence of Events	15.4-54
Table 15.5-1	Inadvertent Operation of the EBS - Key Input Parameters	15.5-12
Table 15.5-2	Inadvertent Operation of the EBS - Key Equipment Status	15.5-13
Table 15.5-3	Inadvertent Operation of the EBS - Sequence of Events	15.5-14

Table 15.5-4	CVCS Malfunction that Increases RCS Inventory - Key Input Parameters 15.5-15	
Table 15.5-5	CVCS Malfunction that Increases RCS Inventory - Key Equipment Status.....	15.5-16
Table 15.5-6	CVCS Malfunction that Increases RCS Inventory - Sequence of Events 15.5-17	
Table 15.6-1	IOPSRV Event - Key Input Parameters	15.6-45
Table 15.6-2	IOPSRV Event - Key Equipment Status	15.6-46
Table 15.6-3	IOPSRV Event - Sequence of Events.....	15.6-47
Table 15.6-4	SGTR Event - Key Input Parameters.....	15.6-48
Table 15.6-5	SGTR Event - Key Equipment Status.....	15.6-50
Table 15.6-6	SGTR Radiological Case - Sequence of Events.....	15.6-51
Table 15.6-7	RLBLOCA - Sampled Parameters (Phenomenological, Cycle 1 and Equilibrium Cycle).....	15.6-52
Table 15.6-8	RLBLOCA - Sampled Plant Parameters (Cycle 1 and Equilibrium Cycle) 15.6-53	
Table 15.6-9	RLBLOCA - Key Equipment Status	15.6-54
Table 15.6-10	RLBLOCA - Sequence of Events.....	15.6-55
Table 15.6-11	RLBLOCA - Summary of Maximum PCT Values.....	15.6-56
Table 15.6-12	RLBLOCA - Summary of PCT Values for All Hot Rods for Top PCT Cases.....	15.6-56
Table 15.6-13	RLBLOCA - Summary of 50/50 PCT Cases	15.6-56
Table 15.6-14	SBLOCA - U.S. EPR System Analyses Parameters.....	15.6-57
Table 15.6-15	SBLOCA - Axial Power Shape.....	15.6-59
Table 15.6-16	SBLOCA- Protection System Setpoints	15.6-60
Table 15.6-17	SBLOCA - Equipment Status.....	15.6-61
Table 15.6-18	SBLOCA - Minimum MHSI Flow	15.6-62
Table 15.6-19	SBLOCA- Minimum LHSI Flow	15.6-63
Table 15.6-20	SBLOCA - Break Spectrum Results with LOOP	15.6-64
Table 15.6-21	SBLOCA - Sequence of Events for 6.5 Inch Break with LOOP ..	15.6-65
Table 15.6-22	SBLOCA - Delayed Pump Trip (Without LOOP) Break Spectrum Results 15.6-66	
Table 15.6-23	SBLOCA - PCT Comparison between SBLOCA with RCPs Tripped at RT and RCPs Tripped on ΔP	15.6-67
Table 15.6-24	SGTR Overfill Case - Sequence of Events	15.6-68



Table 15.6-25	RLBLOCA - Summary of Maximum Local Oxidation Values for Top PCT Cases.....	15.6-69
Table 15.6-26	RLBLOCA - Summary of Maximum Total Oxidation Values for Top PCT Cases.....	15.6-69
Table 15.6-25	RLBLOCA - Summary of Maximum Local Oxidation Values for Top PCT Cases.....	15.6-69
Table 15.6-26	RLBLOCA - Summary of Maximum Total Oxidation Values for Top PCT Cases.....	15.6-69