

CHAPTER 9—AUXILIARY SYSTEMS

TABLE OF CONTENTS

9.0	AUXILIARY SYSTEMS	9.1-1
9.1	Fuel Storage and Handling.....	9.1-1
9.1.1	Criticality Safety of New and Spent Fuel Storage and Handling	9.1-1
9.1.1.1	Design Bases	9.1-1
9.1.1.2	Facilities Description	9.1-2
9.1.1.3	Safety Evaluation	9.1-2
9.1.1.4	References	9.1-3
9.1.2	New and Spent Fuel Storage	9.1-4
9.1.2.1	Design Bases	9.1-4
9.1.2.2	Facilities Description	9.1-6
9.1.2.3	Safety Evaluation	9.1-10
9.1.2.4	Inspection and Testing Requirements.....	9.1-12
9.1.2.5	Instrumentation Requirements	9.1-13
9.1.2.6	References	9.1-13
9.1.3	Fuel Pool Cooling and Purification System	9.1-24
9.1.3.1	Design Basis	9.1-24
9.1.3.2	System Description	9.1-26
9.1.3.3	System Operation.....	9.1-30
9.1.3.4	Safety Evaluation	9.1-32
9.1.3.5	Inspection and Testing Requirements.....	9.1-36
9.1.3.6	Instrumentation Requirements	9.1-36
9.1.4	Fuel Handling System	9.1-46
9.1.4.1	Design Bases	9.1-46
9.1.4.2	System Description	9.1-47
9.1.4.3	Safety Evaluation	9.1-66
9.1.4.4	Inspection and Testing Requirements.....	9.1-78
9.1.4.5	Instrumentation Requirements	9.1-79
9.1.4.6	References	9.1-82

9.1.5	Overhead Heavy Load Handling System	9.1-111
9.1.5.1	Design Bases	9.1-111
9.1.5.2	System Description	9.1-113
9.1.5.3	Safety Evaluation	9.1-119
9.1.5.4	Inspection and Testing Requirements.....	9.1-120
9.1.5.5	Instrumentation Requirements	9.1-120
9.1.5.6	References	9.1-121
9.2	Water Systems	9.2-1
9.2.1	Essential Service Water System	9.2-1
9.2.1.1	Design Bases	9.2-1
9.2.1.2	System Description	9.2-2
9.2.1.3	Component Description.....	9.2-3
9.2.1.4	Operation.....	9.2-11
9.2.1.5	Safety Evaluation	9.2-13
9.2.1.6	Inspection and Testing Requirements.....	9.2-13
9.2.1.7	Instrumentation Requirements	9.2-14
9.2.1.8	References	9.2-17
9.2.2	Component Cooling Water System	9.2-25
9.2.2.1	Design Bases	9.2-25
9.2.2.2	System Description	9.2-26
9.2.2.3	System Operation.....	9.2-37
9.2.2.4	Safety Evaluation	9.2-46
9.2.2.5	Inspection and Testing Requirements.....	9.2-47
9.2.2.6	Instrumentation Requirements	9.2-48
9.2.2.7	CCWS Failure Modes and Effects Analysis	9.2-58
9.2.2.8	References	9.2-59
9.2.3	Demineralized Water Distribution System	9.2-113
9.2.4	Potable and Sanitary Water Systems (PSWS).....	9.2-114
9.2.4.1	Design Bases	9.2-114
9.2.4.2	System Description	9.2-114
9.2.4.3	Safety Evaluation	9.2-116
9.2.4.4	Inspection and Testing Requirements.....	9.2-116
9.2.4.5	Instrumentation Requirements	9.2-116

9.2.5	Ultimate Heat Sink.....	9.2-117
9.2.5.1	Design Basis	9.2-117
9.2.5.2	System Description	9.2-118
9.2.5.3	Component Description.....	9.2-119
9.2.5.4	System Operation.....	9.2-122
9.2.5.5	Safety Evaluation	9.2-124
9.2.5.6	Inspection and Testing Requirements.....	9.2-126
9.2.5.7	Instrumentation Applications	9.2-127
9.2.5.8	References	9.2-127
9.2.6	Condensate Storage Facilities.....	9.2-136
9.2.7	Seal Water Supply System.....	9.2-137
9.2.7.1	Design Bases	9.2-137
9.2.7.2	System Description	9.2-137
9.2.7.3	System Operation.....	9.2-139
9.2.7.4	Safety Evaluation	9.2-140
9.2.7.5	Inspection and Testing Requirements.....	9.2-140
9.2.7.6	Instrumentation Requirements	9.2-140
9.2.7.7	References	9.2-141
9.2.8	Safety Chilled Water System.....	9.2-146
9.2.8.1	Design Bases	9.2-146
9.2.8.2	System Description	9.2-147
9.2.8.3	System Operation.....	9.2-150
9.2.8.4	Safety Evaluation	9.2-152
9.2.8.5	Inspection and Testing Requirements.....	9.2-153
9.2.8.6	Instrumentation Requirements	9.2-154
9.2.8.7	References	9.2-157
9.2.9	Raw Water Supply System.....	9.2-176
9.2.10	Turbine Building Closed Cooling Water System.....	9.2-178
9.2.10.1	Design Bases	9.2-178
9.2.10.2	System Description	9.2-178
9.2.10.3	System Operation.....	9.2-179
9.2.10.4	Safety Evaluation	9.2-180
9.2.10.5	Inspection and Testing Requirements.....	9.2-180

	9.2.10.6 Instrumentation Requirements	9.2-180
9.3	Process Auxiliaries	9.3-1
9.3.1	Compressed Air System	9.3-1
9.3.1.1	Design Bases	9.3-1
9.3.1.2	System Description	9.3-1
9.3.1.3	Safety Evaluation	9.3-4
9.3.1.4	Inspection and Testing Requirements.....	9.3-4
9.3.1.5	Instrumentation Requirements	9.3-4
9.3.1.6	References	9.3-4
9.3.2	Process Sampling Systems.....	9.3-7
9.3.2.1	Design Bases	9.3-7
9.3.2.2	System Description	9.3-10
9.3.2.3	Safety Evaluation	9.3-15
9.3.2.4	Inspection and Testing Requirements.....	9.3-19
9.3.2.5	Instrumentation Requirements	9.3-19
9.3.2.6	References	9.3-20
9.3.3	Equipment and Floor Drainage System.....	9.3-42
9.3.3.1	Design Bases	9.3-42
9.3.3.2	System Description	9.3-43
9.3.3.3	Safety Evaluation	9.3-46
9.3.3.4	Inspection and Testing Requirements.....	9.3-48
9.3.3.5	Instrumentation Requirements	9.3-48
9.3.3.6	References	9.3-49
9.3.4	Chemical and Volume Control System (Including Boron Recovery System)	9.3-59
9.3.4.1	Design Bases	9.3-59
9.3.4.2	System Description	9.3-61
9.3.4.3	Safety Evaluation	9.3-76
9.3.4.4	Inspection and Testing Requirements.....	9.3-78
9.3.4.5	Instrumentation Requirements	9.3-78
9.3.4.6	References	9.3-80
9.4	Air Conditioning, Heating, Cooling and Ventilation Systems.....	9.4-1
9.4.1	Main Control Room Air Conditioning System	9.4-1

9.4.1.1	Design Bases	9.4-1
9.4.1.2	System Description	9.4-4
9.4.1.3	Safety Evaluation	9.4-11
9.4.1.4	Inspection and Testing Requirements.....	9.4-12
9.4.1.5	Instrumentation Requirements	9.4-13
9.4.1.6	References	9.4-14
9.4.2	Fuel Building Ventilation System	9.4-20
9.4.2.1	Design Bases	9.4-20
9.4.2.2	System Description	9.4-22
9.4.2.3	Safety Evaluation	9.4-28
9.4.2.4	Inspection and Testing Requirements.....	9.4-28
9.4.2.5	Instrumentation Requirements	9.4-29
9.4.2.6	References	9.4-29
9.4.3	Nuclear Auxiliary Building Ventilation System	9.4-32
9.4.3.1	Design Basis	9.4-32
9.4.3.2	System Description	9.4-33
9.4.3.3	Safety Evaluation	9.4-39
9.4.3.4	Inspection and Testing Requirements.....	9.4-39
9.4.3.5	Instrumentation Requirements	9.4-40
9.4.3.6	References	9.4-40
9.4.4	Turbine Island Ventilation Systems	9.4-47
9.4.5	Safeguard Building Controlled-Area Ventilation System	9.4-48
9.4.5.1	Design Bases	9.4-48
9.4.5.2	System Description	9.4-51
9.4.5.3	Safety Evaluation	9.4-60
9.4.5.4	Inspection and Testing Requirements.....	9.4-61
9.4.5.5	Instrumentation Requirements	9.4-63
9.4.5.6	References	9.4-63
9.4.6	Electrical Division of Safeguard Building Ventilation System (SBVSE)	9.4-68
9.4.6.1	Design Bases	9.4-68
9.4.6.2	System Description	9.4-71
9.4.6.3	Safety Evaluation	9.4-79

9.4.6.4	Inspection and Testing Requirements.....	9.4-80
9.4.6.5	Instrumentation Requirements	9.4-81
9.4.6.6	References	9.4-81
9.4.7	Containment Building Ventilation System.....	9.4-87
9.4.7.1	Design Bases	9.4-87
9.4.7.2	System Description	9.4-88
9.4.7.3	Safety Evaluation	9.4-96
9.4.7.4	Inspection and Testing Requirements.....	9.4-96
9.4.7.5	Instrumentation Requirements	9.4-98
9.4.7.6	References	9.4-98
9.4.8	Radioactive Waste Processing Building Ventilation System.....	9.4-107
9.4.8.1	Design Bases	9.4-107
9.4.8.2	System Description	9.4-108
9.4.8.3	Safety Evaluation	9.4-112
9.4.8.4	Inspection and Testing Requirements.....	9.4-112
9.4.8.5	Instrumentation Requirements	9.4-114
9.4.8.6	References	9.4-114
9.4.9	Emergency Power Generating Building Ventilation System.....	9.4-118
9.4.9.1	Design Bases	9.4-118
9.4.9.2	System Description	9.4-119
9.4.9.3	Safety Evaluation	9.4-125
9.4.9.4	Inspection and Testing Requirements.....	9.4-126
9.4.9.5	Instrumentation Requirements	9.4-126
9.4.9.6	References	9.4-127
9.4.10	Station Blackout Room Ventilation System	9.4-129
9.4.10.1	Design Bases	9.4-129
9.4.10.2	System Description	9.4-129
9.4.10.3	Safety Evaluation	9.4-132
9.4.10.4	Inspection and Testing Requirements.....	9.4-132
9.4.10.5	Instrumentation Requirements	9.4-133
9.4.10.6	References	9.4-133

9.4.11	Essential Service Water Pump Building Ventilation System.....	9.4-135
9.4.11.1	Design Bases	9.4-135
9.4.11.2	System Description	9.4-136
9.4.11.3	Safety Evaluation	9.4-139
9.4.11.4	Inspection and Testing Requirements.....	9.4-140
9.4.11.5	Instrumentation Requirements	9.4-141
9.4.11.6	References	9.4-141
9.4.12	Main Steam and Feedwater Valve Room Ventilation System.....	9.4-144
9.4.12.1	Design Bases	9.4-144
9.4.12.2	System Description	9.4-144
9.4.12.3	Safety Evaluation	9.4-146
9.4.12.4	Inspection and Testing Requirements.....	9.4-146
9.4.12.5	Instrumentation Requirements	9.4-147
9.4.12.6	References	9.4-147
9.4.13	Smoke Confinement System	9.4-149
9.4.13.1	Design Bases	9.4-149
9.4.13.2	System Description	9.4-149
9.4.13.3	Safety Evaluation	9.4-151
9.4.13.4	Inspection and Testing Requirements.....	9.4-152
9.4.13.5	Instrumentation Requirements	9.4-152
9.4.13.6	References	9.4-152
9.4.14	Access Building Ventilation System	9.4-154
9.4.14.1	Design Bases	9.4-154
9.4.14.2	System Description	9.4-154
9.4.14.3	System Operation.....	9.4-158
9.4.14.4	Safety Evaluation	9.4-160
9.4.14.5	Testing and Inspection Requirements.....	9.4-160
9.4.14.6	Instrumentation Requirements	9.4-161
9.4.14.7	References	9.4-161
9.5	Other Auxiliary Systems	9.5-1
9.5.1	Fire Protection	9.5-1

9.5.1.1	Design Basis	9.5-1
9.5.1.2	Program Description.....	9.5-4
9.5.1.3	Safety Evaluation – Fire Protection Analysis.....	9.5-28
9.5.1.4	Inspection and Testing Requirements.....	9.5-29
9.5.1.5	Fire Probabilistic Risk Assessment	9.5-29
9.5.1.6	Fire Protection Program	9.5-29
9.5.1.7	References	9.5-38
9.5.2	Communication System.....	9.5-70
9.5.2.1	Design Bases	9.5-70
9.5.2.2	System Description	9.5-75
9.5.2.3	System Operation Communications Stations.....	9.5-79
9.5.2.4	Inspection and Testing Requirements.....	9.5-79
9.5.2.5	References	9.5-80
9.5.3	Lighting System	9.5-84
9.5.3.1	Design Basis	9.5-84
9.5.3.2	System Description	9.5-84
9.5.3.3	Safety Evaluation	9.5-86
9.5.3.4	Inspection and Testing Requirements.....	9.5-87
9.5.3.5	References	9.5-87
9.5.4	Diesel Generator Fuel Oil Storage and Transfer System.....	9.5-90
9.5.4.1	Design Basis	9.5-90
9.5.4.2	System Description	9.5-91
9.5.4.3	System Operation.....	9.5-97
9.5.4.4	Safety Evaluation	9.5-99
9.5.4.5	Inspection and Testing Requirements.....	9.5-100
9.5.4.6	Instrumentation Requirements	9.5-101
9.5.4.7	References	9.5-101
9.5.5	Diesel Generator Cooling Water System.....	9.5-105
9.5.5.1	Design Basis	9.5-105
9.5.5.2	System Description	9.5-106
9.5.5.3	System Operation.....	9.5-108
9.5.5.4	Safety Evaluation	9.5-109

9.5.5.5	Inspection and Testing Requirements.....	9.5-110
9.5.5.6	Instrumentation Requirements	9.5-110
9.5.5.7	References	9.5-111
9.5.6	Diesel Generator Starting Air System.....	9.5-116
9.5.6.1	Design Basis	9.5-116
9.5.6.2	System Description	9.5-117
9.5.6.3	System Operation.....	9.5-119
9.5.6.4	Safety Evaluation	9.5-120
9.5.6.5	Inspection and Testing Requirements.....	9.5-121
9.5.6.6	Instrumentation Requirements	9.5-121
9.5.6.7	References	9.5-122
9.5.7	Diesel Generator Lubricating Oil System	9.5-125
9.5.7.1	Design Basis	9.5-125
9.5.7.2	System Description	9.5-126
9.5.7.3	System Operation.....	9.5-130
9.5.7.4	Safety Evaluation	9.5-131
9.5.7.5	Inspection and Testing Requirements.....	9.5-132
9.5.7.6	Instrumentation Requirements	9.5-132
9.5.7.7	References	9.5-134
9.5.8	Diesel Generator Air Intake and Exhaust System	9.5-137
9.5.8.1	Design Basis	9.5-137
9.5.8.2	System Description	9.5-138
9.5.8.3	System Operation.....	9.5-139
9.5.8.4	Safety Evaluation	9.5-140
9.5.8.5	Inspection and Testing Requirements.....	9.5-140
9.5.8.6	Instrument Requirements	9.5-141
9.5.8.7	References	9.5-141
9A	Fire Protection Analysis.....	9A-1
9A.1	Introduction.....	9A-1
9A.1.1	Regulatory Bases	9A-1
9A.1.2	Defense-In-Depth	9A-2
9A.1.3	Scope	9A-3
9A.2	Fire Protection Analysis Methodology	9A-3

9A.2.1	General Design Criteria.....	9A-3
9A.2.2	Specific Elements.....	9A-4
9A.2.3	Assumptions.....	9A-8
9A.3	Fire Area-by-Fire Area Evaluation	9A-11
9A.3.1	Reactor Building	9A-12
9A.3.2	Safeguard Building Division 1	9A-13
9A.3.3	Safeguard Building Division 2	9A-16
9A.3.4	Safeguard Building Division 3	9A-19
9A.3.5	Safeguard Building Division 4	9A-23
9A.3.6	Fuel Building.....	9A-26
9A.3.7	Nuclear Auxiliary Building.....	9A-30
9A.3.8	Radioactive Waste Processing Building.....	9A-34
9A.3.9	Emergency Power Generating Building Division 1...	9A-37
9A.3.10	Emergency Power Generating Building Division 2...	9A-39
9A.3.11	Emergency Power Generating Building Division 3...	9A-40
9A.3.12	Emergency Power Generating Building Division 4...	9A-41
9A.3.13	Essential Service Water Pump and Cooling Tower Structures Division 1	9A-42
9A.3.14	Essential Service Water Pump and Cooling Tower Structures Division 2	9A-43
9A.3.15	Essential Service Water Pump and Cooling Tower Structures Division 3	9A-43
9A.3.16	Essential Service Water Pump and Cooling Tower Structures Division 4	9A-43
9A.3.17	Access Building	9A-44
9A.4	References	9A-47