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Document Control Desk
U.S. Nuclear Regulatory Commission
Washington, DC 20555

ATTENTION: T. R. QUAY

SUBJECT: TABLE 14.3 INPUT FOR AP600 SSAR CHAPTER 14 INITIAL TEST PROGRAM

Dear Mr. Quay:

Enclosed are the SSAR markups for Tables 14.3-1 through 14.3-7 as requested in RAI 640.27 in your letter dated March 4, 1997 on FOLLOWON QUESTIONS REGARDING THE AP600 INSPECTIONS, TESTS, ANALYSES, AND ACCEPTANCE CRITERIA (ITAAC). These tables provide in tabular form, cross references of the important design information and parameters of various analyses to their treatment in TIER 1. These tables will be incorporated in Section 14.3 of the AP600 SSAR, Revision 14.

If you have any questions regarding these tables, please contact Eugene J. Piplica on (412) 374-5310.

Brian A. McIntyre, Manager
Advanced Plant Safety and Licensing

/ea

Enclosure

E004/1

cc: W. C. Huffman, NRC (Enclosure 1)
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Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 5 1. 2	Safety valves are installed above and connected to the pressurizer to provide overpressure protection for the reactor coolant system.	
Section 5. 1. 2	The RCS has two hot legs and four cold legs.	
Section 5. 1. 2	The RCS has two steam generators and four reactor coolant pumps.	
Section 5. 1. 2	The RCS contains a pressurizer and a surge line connected to one hot leg.	
Section 5. 1. 3. 3	Rotating inertia needed for flow coast-down, is provided.	
Table 5. 1-3	Thermal design flow rate with 10% tube plugging (gpm/loop)	94,800
Table 5. 1-3	Initial rated reactor core thermal power (MWt)	1933
Section 5. 2. 2	Reactor coolant system and steam system overpressure protection during power operation are provided by the pressurizer safety valves and the steam generator safety valves, in conjunction with the action of the PMS.	
Section 5. 2. 2. 1	Safety valve capacity exists to prevent exceeding 110 percent of system design pressure for the following events: -Loss of electrical load and/or turbine trip -Uncontolled rod withdrawal at power -Loss of reactor coolant flow -Loss of normal feedwater -Loss of offsite power to the station auxiliaries	
Section 5. 2. 2. 1	Overpressure protection for the steam system is provided by steam generator safety valves	
Section 5. 3. 2. 3	Non-destructive examination (NDE) of the reactor vessel and its appurtenances is conducted in accordance with ASME Code Section III requirements.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 5. 3. 2. 5	The initial Charpy V-notch minimum upper shelf fracture energy levels for the reactor vessel beltline base metal traverse direction and welds are 75 foot-pounds, as required by Appendix G of 10 CFR 50.	
Section 5. 3. 2. 5	The initial Charpy V-notch minimum upper shelf fracture energy levels for the reactor vessel beltline base metal traverse direction and welds are 75 foot-pounds, as required by Appendix G of 10 CFR 50.	
Section 5. 4. 1. 2. 1	Resistance temperature detectors (RTDs) monitor motor cooling circuit water temperature. These detectors provide indication of anomalous bearing or motor operation. They also provide a system for automatic shutdown in the event of a prolonged loss of component cooling water.	
Section 5. 4. 1. 3. 4	It is important to reactor protection that the reactor coolant continues to flow for a time after reactor trip and loss of electrical power. To provide this flow, each reactor coolant pump has a high-inertia rotor.	
Section 5. 4. 1. 3. 4	A safety-related pump trip occurs on high bearing water temperature.	
Section 5. 4. 5. 2. 3	Power to the pressurizer heaters is blocked when the core makeup tanks are actuated	
Section 5. 4. 6	Automatic depressurization system stage 1, 2 and 3 valves are connected to the pressurizer and discharge via the spargers to the incontainment refueling water storage tank.	
Section 5. 4. 6	Automatic depressurization system stage 4 valves are connected to each hot leg.	
Section 5. 4. 9. 3	In the analysis of overpressure events, the pressurizer safety valves are assumed to actuate at 2500 psia. The safety valve flowrate assumed is based on full flow at 2575 psia, assuming 3 percent accumulation.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference		Design Feature	Value
Section	5. 4. 9. 3	The pressurizer safety valves prevent reactor coolant system pressure from exceeding 110% of system design pressure.	
Table	5. 4-1	Minimum reactor coolant motor/pump moment of inertia (lb-ft^2).	≥ 5,000
Table	5. 4-11	Reactor Coolant System Design Pressure Settings: - Safety valves begin to open (psig)	 2485
Table	5. 4-17	Pressurizer Safety Valves - Design Parameters: - Number - Minimum required relieving capacity per valve (lbm/hr) Set pressure (psig)	 2 ≥400,000 2485± 25
Section	6. 1. 2. 1. 3	The exterior of the containment vessel is coated with the same inorganic zinc as is used inside of the containment.	
Figure	6. 2. 2-1	The passive containment cooling system consists of a water storage tank, cooling water flow discharge path to the containment shell, a water distribution system for the containment shell, and a cooling air flow path.	
Figure	6. 2. 2-1	The minimum duration the PCS cooling water flow is provided from the PCCWST (hours)	≥ 72
Table	6. 2. 2-1	The water coverage of the containment shell exceeds the amount used in the safety analysis.	
Table	6. 2. 2-1	The minimum drain flow rate capacity of the upper annulus drain (gpm).	≥ 450
Table	6. 2. 2-1	The minimum makeup flow rate capability from an external source to the PCS water storage tank (gpm).	≥ 62
Table	6. 2. 2-1	The minimum makeup flow rate capability from the PCS water storage tank to the spent fuel pit (gpm).	≥ 50

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Table 6. 2. 2-1	The minimum PCS water storage tank volume for makeup to the spent fuel pit (non-coincident with PCS operation) (gallons).	≥ 400,000
Table 6. 2. 2-1	The minimum long term makeup capability from the PCCAWST to the PCCWST (days)	≥ 4
Table 6. 2. 2-1	The minimum long term makeup flow capability from the PCCAWST to the PCCWST (gpm)	≥ 62
Table 6. 2. 2-2	The first or top standpipe's elevation above the lowest or bottom standpipe (feet).	21.7 ± 0.25
Table 6. 2. 2-2	The second standpipe's elevation above the lowest or bottom standpipe (feet).	14. 2 ± 0.25
Table 6. 2. 2-2	The third standpipe's elevation above the lowest or bottom standpipe (feet).	6. 7 ± 0.25
Figure 6. 2. 2-3	The minimum passive containment cooling water flow rate with water inventory at a height above the lowest standpipe of 13.55 ± 0.025 ft. (gpm)	≥ 71.5
Figure 6. 2. 2-3	The minimum passive containment cooling water flow rate with water inventory at a height above the lowest standpipe of 23.75 ± 0.25 ft. (gpm)	≥ 442
Figure 6. 2. 2-3	The minimum passive containment cooling water flow rate with water inventory at a height above the lowest standpipe of 20.65 ± 0.25 ft. (gpm)	≥ 122
Section 6. 3	The passive core cooling system provides emergency core decay heat removal during transients, accidents or whenever the normal heat removal paths are lost.	
Section 6. 3	The passive core cooling system provides makeup and boration during transients or accidents when the normal reactor coolant system makeup supply from the chemical and volume control system is unavailable or is insufficient.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 6. 3. 1. 1	The passive core cooling system is designed to provide emergency core cooling during events involving increases and decreases in secondary side heat removal and decreases in reactor coolant system inventory.	
Section 6. 3. 2. 1. 1	The heat exchanger consists of a bank of C-tubes, connected to a tubesheet and channel heat arrangement at the top (inlet) and bottom (outlet). The passive exchanger connects to the reactor coolant system through an inlet line from one reactor coolant system hot and an outlet line to the associated steam generator cold leg plenum (reactor coolant pump suction).	
Section 6. 3. 2. 1. 1	For the passive residual heat removal heat exchanger, the normal water temperature in the inlet line will be hotter than the discharge line.	
Section 6. 3. 2. 1. 2	The actuation of the core makeup tanks following a steam line break provides injection of borated water via water recirculation to mitigate the reactivity transient and provide the required shutdown margin.	
Section 6. 3. 2. 2. 3	The in-containment refueling water storage tank contains one passive residual heat removal heat exchanger.	
Section 6. 3. 2. 2. 6	Automatic depressurization system stage 1, 2 and 3 valves are connected to the pressurizer and discharge via the spargers to the incontainment refueling water storage tank.	
Section 6. 3. 3. 2. 1	For a loss of main feedwater event, the passive residual heat removal heat exchanger is actuated. If the core makeup tanks are not initially actuated, they actuate later when passive residual heat exchanger cooling sufficiently reduces pressurizer level.	
Section 6. 3. 3. 2. 2	For a feedwater system pipe failure event, the passive residual heat removal heat exchanger and the core makeup tanks are actuated.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference		Design Feature	Value
Section	6. 3. 3. 3. 1	For a steam generator tube rupture event, the nonsafety-related makeup pumps are automatically actuated when reactor coolant system inventory decreases and a reactor trip occurs, followed by actuation of the startup feedwater pumps. Makeup pumps automatically function to maintain the programmed pressurizer level. The core makeup tanks subsequently actuate on low pressurizer level, if they are not alrady actuated. Actuation of the core makeup tanks automatically actuates the passive residual heat removal system heat exchanger.	
Section	6. 3. 6. 1	The piping resistances connecting the following PXS components and the RCS are bounded by the resistances assumed in the Chapter 15 safety analysis: - Core makeup tanks - Accumulators - In-containment refueling water storage tank - Containment recirculation - Passive residual heat removal heat exchanger - Automatic depressurization system valves	
Section	6. 3. 6. 1. 3	The bottom of the core makeup tanks are located above the reactor vessel direct vessel injection nozzle centerline (ft).	≥ 7. 5
Section	6. 3. 6. 1. 3	The bottom of the incontainment refueling water storage tank is located above the direct vessel injection nozzle centerline (ft).	≥ 3. 4
Figure	6. 3-1	The passive core cooling system has two direct vessel injection lines.	
Table	6. 3-4	The passive core cooling system has two core makeup tanks, each with a minimum required volume (ft^3)	≥ 2,000
Table	6. 3-4	The passive core cooling system has two accumulators, each with a minimum required volume (ft^3)	≥ 2,000

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference		Design Feature	Value
Table	6. 3-4	The passive core cooling system has an incontainment refueling water storage tank with a minimum required water volume (gallons)	≥ 557,000
Table	6. 3-4	The passive core cooling system has two pH adjustment baskets each with a minimum required volume (ft^3).	≥ 107
Table	6. 3-4	The passive residual heat removal heat exchanger minimum heat transfer rate (BTU/hr)	≥ 106,000,000
Section	7. 1. 2. 11	Isolation devices are used to maintain the electrical independence of divisions and to see that no interaction occurs between nonsafety-related systems and the safety-related system. Isolation devices serve to prevent credible faults in circuit from propagating to another circuit.	
Section	7. 1. 4. 1. 6	The protection and safety monitoring system equipment is seismically qualified to meet design basis earthquake levels.	
Section	7. 1. 4. 1. 6	The ability of the protection and safety monitoring system to initiate and accomplish protective functions is maintained despite degraded conditions caused by internal events such as fire, flooding, explosions, missiles, electrical faults and pipe whip.	
Section	7. 1. 4. 1. 6	The design of the protection and safety monitoring system equipment has additional margin to accommodated a loss of the normal HVAC.	
Section	7. 1. 4. 2. 6	The flexibility of the protection and safety monitoring system enables physical separation of redundant divisions.	
Section	7. 2. 2. 2. 1	The protection and safety monitoring system initiates a reactor trip whenever a condition monitored by the system reaches a preset level.	
Section	7. 2. 2. 2. 8	The reactor is tripped by actuating one of two manual reactor trip controls from the main control room.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 7. 3. 1. 2. 14	The demineralized water system isolation valves close on a signal from the protection and safety monitoring system derived from either a reactor trip signal, a source range flux doubling signal, low input voltage to the 1E dc and uninterruptible power supply battery chargers, or a safety injection signal.	
Section 7. 3. 1. 2. 15	The chemical and volume control system makeup line isolation valves automatically close on a signal from the protection and monitoring system derived from either a high-2 pressurizer level, high steam generator level signal, or a safeguards signal coincident with high-1 pressurizer level.	
Section 7. 3. 1. 2. 2	The incontainment refueling water storage tank is aligned for injection upon actuation of the fourth stage automatic depressurization system via the protection and safety monitoring system.	
Section 7. 3. 1. 2. 3	The core makeup tanks are aligned for operation on a safeguards actuation signal or on a low pressurizer level signal via the protection and safety monitoring system.	
Section 7. 3. 1. 2. 4	The fourth stage valves of the automatic depressurization system receive a signal to open upon the coincidence of a low core makeup tank water level and low reactor coolant system pressure following a preset time delay after the third stage depressurization valves receive a signal to open via the protection and safety monitoring system.	
Section 7. 3. 1. 2. 4	The first stage valves of the automatic depressurization system open upon receipt of a signal generated from a core makeup tank injection alignment signal coincident with core makeup tank water level less than the Low-1 setpoint in either core makeup tank via the protection and safety monitoring system.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 7. 3. 1. 2. 4	The second and third stage valves open on time delays following generation of the first stage actuation signal via the protection and safety monitoring system.	
Section 7. 3. 1. 2. 5	The reactor coolant pumps are tripped upon generation of a safeguards actuation signal or upon generation of a low pressurizer water level signal.	
Section 7. 3. 1. 2. 7	The passive residual heat removal heat exchanger control valves are opened on low steam generator water level or on a CMT actuation signal via the protection and safety monitoring system.	
Section 7. 3. 1. 2. 9	The containment recirculation isolation valves are opened on a safeguards actuation signal in coincidence with low incontainment refueling water storage tank water level via the protection and safety monitoring system.	
Section 7. 3. 2. 2. 1	The protection and monitoring system automatically generate an actuation signal for an engineered safety feature whenever a monitored condition reaches a preset level.	
Section 7. 3. 2 2. 9	Manual initiation at the system-level exists for the engineered safety features actuation.	
Section 7. 4. 3. 1	If temporary evacuation of the main control room is required because of some abnormal main control room condition, the operators can establish and maintain safe shutdown conditions for the plant from outside the main control room through the use of controls and monitoring located at the remote shutdown workstation.	
Section 7. 4. 3. 1. 1	The remote shutdown workstation equipment is similar to the operator workstations in the main control room and is designed to the same standards. One remote shutdown workstation is provided.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 7. 4. 3. 1. 3	The remote shutdown workstation achieves and maintains safe shutdown conditions from full power conditions and maintains safe shutdown conditions thereafter.	
Section 7. 5. 4	The protection and safety monitoring system provides signal conditioning, communications, and display functions for Category 1 variables and for Category 2 variables that are energized from the Class 1E uninterruptible power supply system.	
Section 7. 6. 1. 1	An interlock is provided for the normally closed motor-operated normal residual heat removal system inner and outer suction isolation valves. Each valve is interlocked so that it cannot be opened unless the reactor coolant system pressure is below a preset pressure.	
Section 8. 3. 2. 1. 2	The non-Class 1E dc and UPS system (EDS) consists of the electric power supply and distribution equipment that provides dc and uninterruptible ac power to nonsafety-related loads.	
Section 9. 1. 1. 2. 1	In the unlikely event of a dropping of an unirradiated fuel assembly, accidental deformation of the fuel rack will be determined and evaluated in the criticality analysis to demonstrate that it does not cause criticality criterion to be violated.	
Section 9. 1. 2. 2. 1	In the unlikely event of a dropping of an irradiated fuel assembly, accidental deformation of the fuel rack will be determined and evaluated in the criticality analysis to demonstrate that it does not cause criticality criterion to be violated.	
Section 9. 1. 3. 5	The spent fuel pool is designed such that a water level is maintained above the spent fuel assemblies for at least 7 days following a loss of the spent fuel cooling system using only safety-related makeup water sources (See Table 9.1-4).	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 9. 1. 3. 5	The spent fuel pool cooling system includes safety-related connections to establish safety-related makeup to the spent fuel pool following a design basis event including a seismic event.	
Section 9. 1. 4. 1. 1	In the event of a safe shutdown earthquake (SSE), handling equipment cannot fail in such a manner as to prevent required function of seismic Category 1 equipment.	
Section 9. 3. 6. 3. 7	The chemical and volume control system contains two redundant safety-related valves to isolate the demineralized water system from the makeup pump suction.	
Section 9. 3. 6. 3. 7	The chemical and volume control system contains two safety-related valves to isolate the makeup flow to the reactor coolant system.	
Section 9. 3. 6. 4. 5	The chemical and volume control system contains two safety-related valves to isolate the makeup flow to the reactor coolant system.	
Section 9. 3. 6. 4. 5. 1	The chemical and volume control system contains two redundant safety-related valves to isolate the demineralized water system from the makeup pump suction.	
Section 9. 3. 6. 7	The demineralized water system isolation valves close on a signal from the protection and safety monitoring system derived from either a reactor trip signal, a source range flux doubling signal, low input voltage to the 1E dc and uninterruptible power supply battery chargers, or a safety injection signal.	
Section 9. 3. 6. 7	The chemical and volume control system makeup line isolation valves automatically close on a signal from the protection and safety monitoring system derived from either a high-2 pressurizer level, high steam generator level signal, or a safeguards signal coincident with high-1 pressurizer level.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 10. 1. 2	Safety valves are provided on both main steam lines.	
Section 10. 2. 2. 4. 3	The flow of the main steam entering the high-pressure turbine is controlled by four stop valves and four governing control valves. The stop valves are closed by actuation of the emergency trip system devices.	
Section 10. 3. 1. 1	The main steam supply system is provided with a main steam isolation valve and associated MSIV bypass valve on each main steam line from its respective steam generator.	
Section 10. 3. 1. 1	Main steam isolation valve (MSIV) prevent the uncontrolled blowdown of more than one steam generator and isolate nonsafety-related portions of the system.	
Section 10. 3. 1. 2	Power-operated atmospheric relief valves are provided to allow controlled cooldown of the steam generator and the reactor coolant system when the condenser is not available.	
Section 10. 3. 2. 1	The main steam supply system includes: -One main steam isolation valve and one main steam isolation valve bypass valve per main steam line. -Main steam safety valves. -Power-operated atmospheric relief valves and upstream isolation valves.	
Section 10. 3. 2. 3. 2	In the event that a design basis accident occurs, which results in a large steam line break, the main steam isolation valves with associated main steam isolation bypass valves automatically close.	
Figure 10. 3. 2-1	The steam generator system consists of two main steam, two main feedwater, and two startup feedwater lines.	
Table 10. 3. 2-1	Design data for main steam supply system valves: -Number per main steam line -Minimum relieving capacity per valve at 110% of design pressure (lb/hr)	 3 1,540,000

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Table 10. 3. 2-2	The minimum flow capacity of the steam generator safety valves (lbm/hr)	≥ 4,600,000
Table 10. 3. 2-2	The maximum set pressure of the steam generator safety valves (psig)	≤ 1,195
Section 10. 3. 8. 3	The safety-related portions of the steam generator blowdown system are located in the containment and auxiliary buildings and are designed to remain functional after a safe shutdown earthquake.	
Section 10. 4. 7. 1. 1	Double valve main feedwater isolation is provided via the main feedwater control valve and main feedwater isolation valve. Both valves close automatically on main feedwater isolation signals, an appropriate engineered safety features isolation signal, within the time established with the Technical Specifications, Section 16.1. The startup feedwater control valve also serves as a containment isolation valve.	
Section 10. 4. 7. 1. 1	The condensate and feedwater system provides redundant isolation valves for the main feedwater lines routed into containment.	
Section 10. 4. 7. 1. 1	For a main feedwater or main steam line break (MSLB) inside the containment, the condensate and feedwater system is designed to limit high energy fluid to the broken loop.	
Section 10. 4. 7. 1. 2	The booster/main feedwater pumps are tripped simultaneously with the feedwater isolation signal to close the main feedwater isolation valves.	
Section 10. 4. 7. 2. 1	The main feedwater pumps and booster pumps are tripped with the feedwater isolation signal that closes the main feedwater isolation valves. The same isolation signal closes the isolation valve in the cross connect line between the main feedwater pump discharge header and the startup feedwater pump discharge header.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 10. 4. 7. 2. 2	One MFIV is installed in each of the two main feedwater lines outside the containment and downstream of the feedwater control valve. The MFIVs are installed to prevent uncontrolled blowdown from the steam generators in the event of a feedwater pipe rupture. The main feedwater check valve provides backup isolation. In the event of a secondary side pipe rupture inside the containment, the MFIVs limit the quantity of high energy fluid that enters the containment through the broken loop and limit cooldown. The MFCV provides backup isolation to limit cooldown and high energy fluid addition.	
Section 10. 4. 7. 2. 2	In the event of a secondary side pipe rupture inside the containment, the main feedwater control valves provide a redundant isolation to the MFIVs to limit the quantity of high energy fluid that enters the containment through the broken loop	
Section 10. 4. 7. 3	For a main feedwater line break inside the containment or a main steam line break, the MFIVs and the main feedwater control valves automatically close upon receipt of a feedwater isolation signal.	
Section 10. 4. 7. 3	For a steam generator tube rupture event, positive and redundant isolation is provided for the main feedwater (MFIV and MFCV) with isolation signals generated by the protection and safety monitoring system (PMS).	
Section 10. 4. 8. 2. 2. 7	Blowdown system isolation is actuated on low steam generator water levels. The isolation of steam generator blowdown provides for a continued availability of the steam generator as a heat sink for decay heat removal in conjunction with operation of the passive residual heat removal system and the startup feedwater system.	
Section 10. 4. 8. 3	The safety-related portions of the steam generator blowdown system located in the containment and auxiliary buildings are designed to remain functional after a safe shutdown earthquake.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference		Design Feature	Value
Section	10. 4. 9. 1. 1	Double valve startup feedwater isolation is provided by the startup feedwater control valve and the startup feedwater isolation valve. Both valves close on a startup feedwater isolation signal, an appropriate engineered safeguards features signal, within the time established within the Technical Specifications, Section 16.1.	
Section	10. 4. 9. 1. 1	For a steam generator tube rupture event, positive and redundant isolation is provided for the startup feedwater system (startup feedwater isolation signal and startup feedwater control valve), with isolation signals generated by the protection and safety monitoring system.	
Section	10. 4. 9. 2. 2	In the event of a steam generator tube rupture, the startup feedwater isolation valve and startup feedwater control valve limit overfill of the steam generator by terminating startup feed flow.	
Section	10. 4. 9. 2. 2	In the event of a secondary pipe rupture inside containment, the startup feedwater isolation valve and startup feedwater control valve provide isolation to limit the quantity of high energy fluid that enters the containment.	
Section	10. 4. 9. 2. 2	The startup feedwater isolation valve is provided to prevent the uncontrolled blowdown from more than one steam generator in the event of startup feedwater line rupture. The startup feedwater isolation valve provides backup isolation.	
Table	15. 0-1	Initial core thermal power (MWt)	1933
Table	15. 0-3	Nominal values of pertinent plant parameters used in accident analysis with 10% steam generator tube plugging - Reactor coolant flow per loop (gpm)	9.48 E+04
Section	15. 1. 2. 1	Continuous addition of excessive feedwater is prevented by the steam generator high-2 water level signal trip, which closes the feedwater isolation valves and feedwater control valves and trips the turbine, main fedwater pumps and reactor.	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 15. 1. 4. 1	For an inadvertent opening of a steam generator relief of safety valve, core makeup tank actuation occurs on a safeguards ("S) signal from one of four sources: - Two out of four low pressurizer pressure signals -Two out of four low pressurizer level signals -Two out of four low T_{cold} signals in any one loop -Two out of four low steam line pressure signals in any one loop	
Section 15. 1. 4. 1	After an inadvertent opening of a steam generator relief of safety valve, redundant isolation of the main feedwater lines closes the feedwater control valves and feedwater isolation valves, and trips the main feedwater pumps.	
Section 15. 1. 5. 1	Following a steam line rupture, core makeup tank actuation occurs on a safeguards ("S) signal from one of five sources: - Two out of four low pressurizer pressure signals -Two out of four high-1 containment pressure signals -Two out of four low steam line pressure signals in any loop -Two out of four low T_{cold} signals in any one loop -Two out of four low pressurizer level signals	
Section 15. 1. 5. 1	After a steam line rupture, redundant isolation of the main feedwater lines closes the feedwater control valves and feedwater isolation valves, and trips the main feedwater pumps.	
Section 15. 1. 5. 2. 1	Core makeup tanks and the accumulators are the portions of the passive core cooling system used in mitigating a steam line rupture.	
Section 15. 1. 6. 1	The heat sink for the PRHR heat exchanger is provided by the IRWST, in which the PRHR heat exchanger is submerged.	
Section 15. 2. 6. 2. 1	Following a loss of ac power, the PRHR heat exchanger is actuated by the low steam generator water level (wide range).	

Table 14.3-1

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Design Basis Accident Analysis

SSAR Reference	Design Feature	Value
Section 15. 2. 8. 2. 1	Receipt of a low steam line pressure signal in at least one steam line initiates a steam line isolation signal that closes all main steam line and feed line isolation valves. This signal also gives an "S" signal that initiates flow of cold borated water from the core makeup tanks to the reactor coolant system.	
Section 15. 3. 3. 2. 2	The pressurizer safety valves are fully open at 2575 psia. Their capacity for steam relief is described in Section 5.4.	
Section 15. 4. 6. 2. 2	A safety signal from the protection and safety mpnitoring system automatically isolates the potentially unborated water from the demineralized water transfer and storage system and thereby terminates the dilution	
Section 15. 5. 1. 1	Following inadvertent operation of the core makeup tanks during power operation, the high-3 pressurizer level signal actuates the PRHR heat exchanger and blocks the pressurizer heaters.	
Section 15. 5. 2. 1	The pressurizer heaters are blocked, and the main feedwater lines, steam lines, and chemical and volume control system are isolated.	
Section 18. 8. 3. 2	The main control area includes two reactor operator workstations, the supervisor's workstation, the dedicated safety panel and the wall panel information system.	
Section 18. 8. 3. 2	The human system interface resources available at each workstation are the plant information system displays, the control displays (soft controls), the alarm system support displays, procedure system, and the screen and component selector.	

Table 14.3-2

(Sheet 1 of 1)

Anticipated Transient Without Scram

SSAR Reference	Design Feature	Value
Section 7. 7. 1. 11	The diverse actuation system is a nonsafety-related system that provides a diverse backup to the protection and safety monitoring system.	
Section 7. 7. 1. 11	The diverse actuation system trips the reactor control rods and the turbine on low wide range steam generator water level and on low pressurizer water level.	
Section 7. 7. 1. 11	The diverse actuation system initiates passive residual heat removal on low wide range steam generator water level or high hot leg temperature; actuates core makeup tanks and trips the reactor coolant pumps on low pressurizer water level; and isolates selected containment penetrations and starts passive containment cooling.	
Section 7. 7. 1. 11	The manual actuation function of the diverse actuation system is implemented by wiring the controls located in the main control room directly to the final loads in a way that bypasses the normal path through the control room multiplexers, the engineered safety features actuation cabinets, and the diverse actuation system logic	
Section 7. 7. 1. 11	The diverse actuation system uses a microprocessor board different from those used in the protection and safety monitoring system.	
Section 7. 7. 1. 11	The diverse actuation system hardware implementation is different from that of the protection and safety monitoring system.	
Section 7. 7. 1. 11	The operating system and programming language of the diverse actuation system is different from that of the protection and safety monitoring system.	

Table 14.3-3

(Sheet 1 of 3)

Fire Protection

SSAR Reference	Design Feature	Value
Section 3. 4. 1. 1. 2	The boundaries between mechanical equipment rooms and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 3. 4. 1. 1. 2	Separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables in accordance with the fire areas.	
Section 3. 4. 1. 1. 2	The AP600 arrangement provides physical separation of redundant safety-related components and systems from each other and from nonsafety-related components.	
Section 3. 4. 1. 2. 2	The boundaries between mechanical equipment rooms inside containment and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 3. 4. 1. 2. 2	Boundaries exist to prevent flooding between the following rooms which contain safety-related equipment: PXS valve/accumulator room A, PXS valve/accumulator room B, and chemical and volume control room.	
Section 3. 8. 4. 1. 1	The conical roof supports the passive containment cooling system tank, which is constructed with a stainless steel liner on reinforced concrete walls.	
Section 7. 1. 4. 1. 6	The ability of the protection and safety monitoring system to initiate and accomplish protective functions is maintained despite degraded conditions caused by internal events such as fire and flooding.	

Table 14.3-3

(Sheet 2 of 3)

Fire Protection

SSAR Reference	Design Feature	Value
Section 3. 4. 1. 1. 2	The boundaries between mechanical equipment rooms and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 7. 4. 3. 1	If temporary evacuation of the main control room is required because of some abnormal main control room condition, the operators can establish and maintain safe shutdown conditions for the plant from outside the main control room through the use of controls and monitoring located at the remote shutdown workstation.	
Section 7. 4. 3. 1. 1	The remote shutdown workstation equipment is similar to the operator workstations in the main control room and is designed to the same standards. One remote shutdown workstation is provided.	
Section 7. 4. 3. 1. 3	The remote shutdown workstation achieves and maintains safe shutdown conditions from full power conditions and maintains safe shutdown conditions thereafter.	
Section 8. 3. 2. 2	The four Class 1E battery chargers Class 1E voltage regulating transformers are independent, located in separate rooms, cannot be interconnected, and their circuits are routed in dedicated, physically separated raceways.	
Section 8. 3. 2. 3	Each safety-related circuit and raceway is given a unique identification number to distinguish between circuits and raceways of different voltage level or separation groups.	
Section 8. 3. 2. 4. 2	Cables of one separation group are run in separate raceway and physically separated from cables of other separation groups. Group N raceways are separated from safety-related groups A, B, C, and D. Non-class 1E circuits are electrically isolated by isolation devices, shielding and wiring techniques, physical separation, or an appropriate combination thereof.	

Table 14.3-3

(Sheet 3 of 3)

Fire Protection

SSAR Reference	Design Feature	Value
Section 3. 4. 1. 1. 2	The boundaries between mechanical equipment rooms and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 9. 5. 1. 2. 1. 1	Separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables in accordance with the fire areas.	
Section 9. 5. 1. 2. 1. 5	The standpipe system is supplied with water from the safety-related passive containment cooling system storage tank and normally operates independently of the rest of the fire protection system. The supply line draws water from a dedicated portion of the storage tank, using water allocated for fire protection.	
Section 9. 5. 1. 2. 1. 5	The standpipe system serving areas containing equipment required for safe shutdown following a safe shutdown earthquake is designed and supported so that it can withstand the effects of a safe shutdown earthquake and remain functional.	
Section 9. 5. 1. 2. 1. 5	The volume of the water in the PCS tank is sufficient to supply two hose streams, each with a flow of 75 gallons per minute, for two hours (gal).	≥ 18,000
Section 18. 8. 3. 2	The human system interface resources available at each workstation are the plant information system displays, the control displays (soft controls), the alarm system support displays, procedure system, and the screen and component selector.	
Section 18. 8. 3. 4	The mission of the remote shutdown workstation is to provide the resources to bring the plant to a safe shutdown condition after an evacuation of the main control room.	
Section 18. 12. 3	The controls, displays, and alarms listed in Table 18.12.2-1 are retrievable from the remote shutdown workstation.	

Table 14.3-4

(Sheet 1 of 2)

Flood Protection

SSAR Reference	Design Feature	Value
Section 1. 1.43, Appendix 1-A	The lowest level of the auxiliary building, elevation 66' 6", contains the components of the radwaste system within a common flood zone with watertight floors and walls. This volume of this enclosed flood zone is sufficient to contain the contents of the radwaste system.	
Table 2 -1	Plant elevation for maximum flood level (ft)	≤ 100
Section 3. 4. 1. 1. 1	The seismic category I structures below grade are protected against flooding by waterstops and a waterproofing system.	
Section 3. 4. 1. 1. 2	The boundaries between mechanical equipment rooms and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 3. 4. 1. 2. 2	The boundaries between mechanical equipment rooms inside containment and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 3. 4. 1. 2. 2	Boundaries exist to prevent flooding between the following rooms which contain safety-related equipment: PXS valve/accumulator room A, PXS valve/accumulator room B, and chemical and volume control room.	
Section 3. 4. 1. 2. 2	The AP600 arrangement provides physical separation of redundant safety-related components and systems from each other and from nonsafety-related components.	
Section 3. 4. 1. 2. 2	The safety-related components available for safety shutdown are located in the auxiliary building and inside containment. No credit is taken for operation of sump pumps to mitigate the consequences of flooding.	

Table 14.3-4

(Sheet 2 of 2)

Flood Protection

SSAR Reference	Design Feature	Value
Section 3. 4. 1. 2. 2. 1	The PXS-A compartment, PXS-B compartment and the chemical and volume control system compartment are physically separated and isolated from each other by structural walls such that flooding in any one of these compartments is in the reactor coolant system compartment cannot cause flooding in any of the other compartments.	
Section 3. 6	In the event of a high- or moderate-energy pipe failure within the plant, adequate protection is provided so that essential structures, systems, or components are not impacted by the adverse effects of postulated pipe failure.	
Section 7. 1. 4. 1. 6	The ability of the protection and safety monitoring system to initiate and accomplish protective functions is maintained despite degraded conditions caused by internal events such as fire and flooding.	

Table 14.3-5

(Sheet 1 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Table 2. 3- 3	The components identified under Reactor Systems in Table 3.2-3, as ASME Code Section III are designed and constructed in accordance with ASME Code Section III Requirements.	
Section 3. 2. 1. 3	The Nuclear Island structures include the containment and the shield and auxiliary buildings. These structures are seismic Category I.	
Table 3. 2-3	The Nuclear Island structures include the containment and the Shield and Auxiliary Buildings. These structures are seismic Category I.	
Section 3. 4. 1. 1. 2	The boundaries between mechanical equipment rooms and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 3. 4. 1. 1. 2	The AP600 arrangement provides physical separation of redundant safety-related components and systems from each other and from nonsafety-related components.	
Section 3. 4. 1. 1. 2	Separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables in accordance with the fire areas.	
Section 3. 4. 1. 1. 2	The AP600 arrangement provides physical separation of redundant safety-related components and systems from each other and from nonsafety-related components.	
Section 3. 4. 1. 2. 2	Boundaries exist to prevent flooding between the following rooms which contain safety-related equipment: PXS valve/accumulator room A, PXS valve/accumulator room B, and chemical and volume control room.	

Table 14.3-5

(Sheet 2 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 3.4.1.2.2	The boundaries between mechanical equipment rooms inside containment and the electrical and instrumentation and control equipment rooms of the auxiliary building are designed to prevent flooding of rooms that contain safe shutdown equipment up to the maximum flood level for each room.	
Section 3.4.1.2.2	The safety-related components available for safety shutdown are located in the auxiliary building and inside containment. No credit is taken for operation of sump pumps to mitigate the consequences of flooding.	
Section 3.4.1.2.2.1	The PXS-A compartment, PXS-B compartment and the chemical and volume control system compartment are physically separated and isolated from each other by structural walls such that flooding in any one of these compartments or in the reactor coolant system compartment cannot cause flooding in any of the other compartments.	
Section 3D.6	RXS equipment in Appendix 3D is seismically qualified.	
Section 5.1.3	ADS has four stages. Each stage is arranged into two separate groups of valves and lines. -Stages 1, 2, and 3 discharge from the top of the pressurizer to the IRWST. -Each stage 4 discharges from a hot leg to the RCS loop compartment.	
Section 5.3.1.1	The reactor vessel provides a high integrity pressure boundary to contain the reactor coolant, heat generating reactor core, and fuel fission products. The reactor vessel is the primary boundary for the reactor coolant and the secondary barrier against the release of radioactive fission products.	

Table 14.3-5

(Sheet 3 of 12)

Probabilistic Risk Assessment

SSAR Reference		Design Feature	Value
Section	5. 4. 6	ADS has four stages. Each stage is arranged into two separate groups of valves and lines. -Stages 1, 2, and 3 discharge from the top of the pressurizer to the IRWST. -Each stage 4 discharges from a hot leg to the RCS loop compartment.	
Section	5. 4. 6. 2	Each ADS stage 1, 2, and 3 line contains two normally closed motor-operated valves (MOVs).	
Section	5. 4. 6. 2	Each ADS stage 4 line contains a normally open MOV valve and a normally closed squib valve.	
Section	5. 4. 7	The RNS removes heat from the core and reactor coolant system at reduced RCS pressure and temperature conditions after shutdown.	
Section	5. 4. 7	The normal residual heat removal system (RNS) provides a safety-related means of performing the following functions: - Containment isolation for the RNS lines that penetrate the containment - Long-term, post-accident makeup water to the RCS	
Section	5. 4. 7. 1. 1	The RNS containment isolation and pressure boundary valves are safety-related. The motor-operated valves are powered by Class 1E dc power.	
Section	5. 4. 7. 1. 2. 1	The component cooling water system (CCS) provides cooling to the RNS heat exchanger.	
Section	6. 2. 4	The containment hydrogen control system provides nonsafety-related hydrogen igniters for control of the containment hydrogen concentration for beyond design basis accidents.	
Section	6. 2. 4. 2. 3	At least 64 hydrogen igniters are provided.	
Table	6. 2. 4-2	The minimum passive autocatalytic recombiner depletion rate at 120° F and atmospheric pressure (scfm)	≥ 1

Table 14.3-5

(Sheet 4 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 6. 3	The automatic depressurization system provides a safety-related means of depressurizing the RCS.	
Section 6. 3	The in-containment refueling water storage tank subsystem provides a safety-related means of performing the following functions: - Low-pressure safety injection - Core decay heat sink during design basis events - Flooding of the lower containment, the reactor cavity and the loop compartment by draining the IRWST into the containment. - Borated water	
Section 6. 3. 1	The core makeup tanks provide safety-related means of safety injection of borated water to the RCS.	
Section 6. 3. 1	Passive residual heat removal (PRHR) provides a safety-related means of removing core decay heat during design basis events.	
Section 6. 3. 2	The ADS valves are powered from Class 1E dc power.	
Section 6. 3. 2	There are two CMTs, each with an injection line to the reactor vessel/DVI nozzle. - Each CMT has a pressure balance line from an RCS cold leg. - Each injection line is isolated with a parallel set of air-operated valves (AOVs). - These AOVs open on loss of air. - The injection line for each CMT also has two check valves in series.	

Table 14.3-5

(Sheet 5 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 6. 3. 2	The IRWST subsystem has the following flowpaths: -Two (redundant) injection lines from the IRWST to the reactor vessel/DVI nozzle. Each line is isolated with a parallel set of valves; each set with a check valve in series with a squib valve. -Two (redundant) recirculation lines from the containment to the IRWST injection line. Each recirculation line has two paths: one path contains a squib valve and an MOV, the other path contains a squib valve and a check valve. -The two MOV/squib valve lines also provide the capability to flood the reactor cavity.	
Section 6. 3. 2	There are screens for each IRWST injection line and recirculation line.	
Section 6. 3. 2	PRHR is actuated by opening redundant, parallel air-operated valves. These air-operated valves open on loss of air.	
Section 6. 3. 2. 2	The passive core cooling system (PXS) is composed of the following: - Accumulator subsystem - Core makeup tank (CMT) subsystem - In-containment refueling water storage tank (IRWST) subsystem - Passive residual heat removal (PRHR) subsystem. The automatic depressurization system (ADS), which is a subsystem of the reactor coolant system (RCS), also supports passive core cooling functions.	
Section 6. 3. 2. 2. 2	There are two accumulators, each with an injection line to the reactor vessel/direct vessel injection (DVI) nozzle. Each injection line has two check valves in series.	
Section 6. 3. 2. 2. 2	The accumulators provide a safety-related means of safety injection of borated water to the RCS.	
Section 6. 3. 3	IRWST squib valves and MOVs are powered by Class 1E dc power.	

Table 14.3-5

(Sheet 6 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 6. 3. 3	The CMT AOVs are automatically and manually actuated from PMS and DAS.	
Section 6. 3. 3	The PRHR air-operated valves are automatically actuated and manually actuated from the control room by either PMS or DAS.	
Section 6. 3. 3	The squib valves and MOVs for injection and recirculation are automatically and manually actuated via PMS, and manually actuated via DAS.	
Section 6. 3. 3	The squib valves and MOVs for lower containment and reactor cavity flooding are manually actuated via PMS and DAS from the control room.	
Section 6. 3. 7	The positions of the containment recirculation isolation MOVs are indicated in the control room.	
Section 6. 3. 7	The position of the inlet PRHR valve is indicated in the control room.	
Section 6. 3. 7. 6. 1	The ADS first-, second-, and third -stage valve positions are indicated in the control room.	
Section 7. 1. 1	The diverse actuation system provides a nonsafety-related means of performing the following functions: - Initiates automatic and manual reactor trip - Automatic and manual actuation of selected engineered safety features - Main control room display of selected plant parameters.	
Section 7. 1. 1	The protection and safety monitoring system provides a safety-related means of performing the following functions: - Automatic and manual reactor trip - Automatic and manual actuation of engineered safety features (ESF).	
Section 7. 1. 1	PMS provides for the minimum inventory of fixed position controls and displays in the control room.	

Table 14.3-5

(Sheet 7 of 12)

Probabilistic Risk Assessment

SSAR Reference		Design Feature	Value
Section	7. 1. 2	Each PMS division is powered from its respective Class 1E dc division.	
Section	7. 1. 2	PMS has four divisions of reactor trip and ESF actuation.	
Section	7. 1. 2. 10	PMS automatically produces a safety-related reactor trip or ESF initiation upon an attempt to bypass more than two channels of a function that uses 2-out-of-4 logic.	
Section	7. 1. 2. 15	The PMS hardware and software are developed using a planned design process which provides for specific design documentation and reviews during the design requirement, system definition, development, test and installation phases.	
Section	7. 1. 2. 6	PMS has redundant divisions of safety-related post-accident parameter display.	
Section	7. 1. 4. 1. 6	The ability of the protection and safety monitoring system to initiate and accomplish protective functions is maintained despite degraded conditions caused by internal events such as fire and flooding.	
Section	7. 1. 4. 1. 6	The design of the protection and safety monitoring system equipment has margin to accommodated a loss of the normal HVAC.	
Section	7. 1. 4. 2. 6	The flexibility of the protection and safety monitoring system enables physical separation of redundant divisions.	
Figure	7. 1-8	PMS has redundant divisions of safety-related post-accident parameter display.	
Section	7. 2. 2. 2. 1	The protection and safety monitoring system initiates a reactor trip whenever a condition monitored by the system reaches a preset level.	

Table 14.3-5

(Sheet 8 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 7.3	The PMS allows for the transfer of control capability from the main control room to the remote shutdown room. The minimum inventory of displays and controls in the remote shutdown room is provided.	
Section 7.3.1	The ADS valves are powered from Class 1E dc power.	
Section 7.3.1	The ADS valves are automatically and manually actuated via the protection and safety monitoring system (PMS), and manually actuated via the diverse actuation system (DAS).	
Section 7.3.1	The CMT AOVs are automatically and manually actuated from PMS and DAS.	
Section 7.3.1	The squib valves and MOVs for injection and recirculation are automatically and manually actuated via PMS, and manually actuated via DAS.	
Section 7.3.1	The squib valves and MOVs for reactor cavity flooding are manually actuated via PMS and DAS from the control room.	
Section 7.3.1	The PRHR air-operated valves are automatically actuated and manually actuated from the control room by either PMS or DAS.	
Section 7.3.1	The RNS containment isolation MOVs are actuated via PMS.	
Section 7.6.1.1	An interlock is provided for the normally closed motor-operated normal residual heat removal system inner and outer suction isolation valves. Each valve is interlocked so that it cannot be opened unless the reactor coolant system pressure is below a preset pressure.	
Section 7.7.1.11	The diverse actuation system is a nonsafety-related system that provides a diverse backup to the protection and safety monitoring system.	
Section 7.7.1.11	The diverse actuation system trips the reactor control rods and the turbine on low wide range steam generator water level and on low pressurizer water level.	

Table 14.3-5

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Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 7. 7. 1. 11	DAS manual initiation functions are implemented in a manner that bypasses the signal processing equipment of the DAS.	
Section 7. 7. 1. 11	The DAS automatic actuation signals are generated in a functionally diverse manner from the PMS signals. Diversity between DAS and PMS is achieved by the use of different architecture, different hardware implementations, and different software.	
Section 8. 3. 1. 1. 1	On loss of power to a 4160V diesel-backed bus, the associated diesel generator automatically starts and produces ac power. The source circuit breakers and bus load circuit breakers are opened, and the generator is connected to the bus. Each generator has an automatic load sequencer to enable controlled loading on the associated buses.	
Section 8. 3. 1. 1. 2. 1	Two onsite standby diesel generator units provide power to the selected nonsafety-related ac loads.	
Section 8. 3. 1. 1. 3	The main ac power system distributes non-Class 1E power from onsite sources to selected nonsafety-related loads.	
Section 8. 3. 2. 1	The Class 1E dc and uninterruptible power supply (UPS) system (IDS) provides dc and uninterruptible ac power for the safety-related equipment.	
Section 8. 3. 2. 1. 1. 1	There are four independent, Class 1E 125 Vdc divisions. Divisions A and D are each composed of one battery bank, one switchboard, and one battery charger. Divisions B and C are each composed of two battery banks, two switchboards, and two battery chargers. The first battery bank in the four divisions is designated as the 24-hour battery bank. The second battery bank in Divisions B and C is designated as the 72-hour battery bank.	
Section 8. 3. 2. 1. 1. 1	Battery chargers are connected to dc switchboard buses. The input ac power for the Class 1E dc battery chargers is supplied from onsite diesel-generator-backed low-voltage ac power supplies.	

Table 14.3-5

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Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 8. 3. 2. 1. 1. 1	The 24-hour battery banks provide power to the loads for a period of 24 hours without recharging. The 72-hour battery banks supplies a dc switchboard bus load for a period of 72 hours without recharging.	
Section 8. 3. 2. 1. 2	The non-Class 1E dc and UPS system (EDS) consists of the electric power supply and distribution equipment that provides dc and uninterruptible ac power to nonsafety-related loads.	
Section 8. 3. 2. 1. 2	The non-Class 1E dc and UPS system (EDS) consists of the electric power supply and distribution equipment that provides dc and uninterruptible ac power to nonsafety-related loads.	
Section 8. 3. 2. 1. 2	EDS load groups 1, 2, and 3 provide 125 Vdc power to the associated inverter units that supply the ac power to the non-Class 1E uninterruptible power supply ac system.	
Section 8. 3. 2. 1. 2	Battery chargers are connected to dc switchboard buses. The input ac power for the Class 1E dc battery chargers is supplied from onsite diesel-generator-backed low-voltage ac power supplies.	
Section 8. 3. 2. 1. 2	The onsite standby diesel-generator-backed low-voltage ac power supply provides the normal ac power to the battery chargers.	
Section 8. 3. 2. 1. 3	Separation is provided between Class 1E divisions, and between Class 1E divisions and non-Class 1E cables.	
Section 9. 2. 1	The service water system is a nonsafety-related system that transfers heat from the component cooling water heat exchangers to the atmosphere.	
Section 9. 2. 1. 2. 1	The SWS is arranged into two trains. Each train includes one pump and one cooling tower cell.	
Section 9. 2. 2	The component cooling water system is a nonsafety-related system that removes heat from various components and transfers the heat to the service water system (SWS).	

Table 14.3-5

(Sheet 11 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 9. 2. 2. 2	The CCS is arranged into two trains. Each train includes one pump and one heat exchanger.	
Section 9. 3. 6	The CVS provides a nonsafety-related means to perform the following functions: - Makeup water to the RCS during normal plant operation - Boration following a failure of reactor trip - Coolant to the pressurizer auxiliary spray line.	
Section 9. 3. 6. 1	The chemical and volume control system (CVS) provides a safety-related means to terminate inadvertent RCS boron dilution.	
Section 9. 4. 1	The main control room has its own ventilation system and is pressurized. The ventilation system for the remote shutdown room is independent of the ventilation system for the main control room.	
Section 9. 5. 1. 2. 1. 1	The PMS allows for the transfer of control capability from the main control room to the remote shutdown workstation. The minimum inventory of displays and controls in the remote shutdown room is provided.	
Section 9. 5. 1. 2. 1. 1	Class 1E cables are routed in their respective divisional raceways.	
Section 9. 5. 1. 2. 1. 1	Separation is maintained between Class 1E divisions and between Class 1E divisions and non-Class 1E cables in accordance with the fire areas.	
Section 16. 2. 1	Important reliability assumptions made as part of the AP600 probabilistic risk assessment (PRA) will remain valid throughout plant life.	
Section 18. 8. 3. 2	The main control area includes two reactor operator workstations, the supervisor's workstation, the dedicated safety panel and the wall panel information system.	

Table 14.3-5

(Sheet 12 of 12)

Probabilistic Risk Assessment

SSAR Reference	Design Feature	Value
Section 18. 12. 2	The minimum inventory of instrumentation includes those displays, controls, and alarms that are used to monitor the status of the critical safety functions and to manually actuate the safety-related systems that achieve the critical safety functions. The minimum inventory resulting from the implementation of the selection criteria is provided in Table 18.12.2-1.	

Table 14.3-6

(Sheet 1 of 4)

Radiological Analysis

SSAR Reference	Design Feature	Value
Table 2 -1	Plant elevation for maximum flood level (ft)	≤ 100
Section 2. 3. 4	Atmospheric dispersion factors - X/Q (sec/m^3) - Site Boundary X/Q 0 - 2 hour time interval - Low Population Zone Boundary X/Q 0 - 8 hours 8 - 24 hours 24 - 96 hours 96 - 720 hours	 ≤ 1.0 x 10^{-3} ≤ 1.35 x 10^{-4} ≤ 1.0 x 10^{-4} ≤ 5.4 x 10^{-5} ≤ 2.2 x 10^{-5}
Table 6. 2. 3-1	Containment penetration isolation features are configured as in Table 6.2.3-1	
Table 6. 2. 3-1	Maximum closure time for remotely operated containment purge valves (seconds)	≤ 5
Table 6. 2. 3-1	Maximum closure time for all other remotely operated containment isolation valves (seconds)	≤ 60
Section 6. 4. 2. 3	The minimum storage capacity of each set of storage tanks in the VES (scf)	≤ 122,021
Section 6. 4. 3. 2	The maximum temperature rise in the main control room pressure boundary following a loss on the nuclear island nonradioactive ventilation system over a 72-hour period (° F)	≤ 15
Section 6. 4. 3. 2	The maximum temperature in the instrumentation and control rooms and dc equipment rooms following a loss of the nuclear island nonradioactive ventilation system remains over a 72-hour period (°F).	≤ 125
Section 6. 4. 4	The main control emergency habitability system nominally provides 25 scfm of ventilation air to the main control room from the compressed air storage tanks if one train is delivering, or 50 scfm if both trains are delivering (scfm).	25 ± 2

Table 14.3-6

(Sheet 2 of 4)

Radiological Analysis

SSAR Reference	Design Feature	Value
Section 6. 4. 4	Twenty-five scfm of ventilation flow is sufficient to pressurize the control room to 1/8th inch water gauge differential pressure (WIC).	1/8th
Figure 6. 4-2	The main control room emergency habitability system consists of two sets of emergency air storage tanks and an air delivery system to the main control room.	
Section 6. 5. 3	The passive heat removal process and the limited leakage from the containment result in offsite doses less than the regulatory guideline limits.	
Section 8. 3. 1. 1. 6	Electrical penetrations through the containment can withstand the maximum short-circuit currents available either continuously without exceeding their thermal limit, or at least longer than the field cables of the circuits so that the fault or overload currents are interrupted by the protective devices prior to a potential failure of a penetration.	
Section 9. 4. 1. 1. 1	The VBS isolates the HVAC ductwork that penetrates the main control room boundary on high particulate or iodine concentrations in the main control room supply air or on extended loss of ac power to support operation of the main control room emergency habitability system.	
Section 18. 8. 3. 2	The main control area includes two reactor operator workstations, the supervisor's workstation, the dedicated safety panel and the wall panel information system.	
Section 12. 3. 2. 2. 1	During reactor operation, the shield building protects personnel occupying adjacent plant structures and yard areas from radiation originating in the reactor vessel and primary loop components. The concrete shield building wall and the reactor vessel and steam generator compartment shield walls reduce radiation levels outside the shield building to less than 0.25 mrem/hr from sources inside containment. The shield building completely surrounds the reactor components.	

Table 14.3-6

(Sheet 3 of 4)

Radiological Analysis

SSAR Reference	Design Feature	Value
Section 12. 3. 2. 2. 2	The reactor vessel is shielded by the concrete primary shield and by the concrete secondary shield which also surrounds other primary loop components. The secondary shield is a structural module filled with concrete surrounding the reactor coolant system equipment, including piping, pumps and steam generators. Extensive shielding is provided for areas surrounding the refueling cavity and the fuel transfer canal to limit the radiation levels.	
Section 12. 3. 2. 2. 3	Shielding is provided for the liquid radwaste, gaseous radwaste and spent resin handling systems consistent with the maximum postulated activity. Corridors are generally shielded to allow Zone II access, and operator areas for valve modules are generally Zone II or III for access. Shielding is provided to attenuate radiation from normal residual heat removal equipment during shutdown cooling operations to levels consistent with radiation zoning requirements of adjacent areas.	
Section 12. 3. 2. 2. 4	The concrete shield walls surrounding the spent fuel cask loading and decontamination areas, and the shield walls surrounding the fuel transfer and storage are as are sufficiently thick to limit radiation levels outside the shield walls in accessible areas to Zone II. The building walls are sufficient to shield external plant areas which are not controlled to Zone II.	
Section 12. 3. 2. 2. 5	Shielding is provided as necessary for the waste storage areas in the radwaste building to meet the radiation zone and access requirements.	
Section 12. 3. 2. 2. 7	Shielding combined with other engineered safety features is provided to permit access and occupancy of the control room following a postulated loss-of-coolant accident, so that radiation doses are limited to five rem whole body from contributing modes of exposure for the duration of the accident, in accordance with General Design Criteria 19.	

Table 14.3-6

(Sheet 4 of 4)

Radiological Analysis

SSAR Reference	Design Feature	Value
Section 12. 3. 2. 2. 9	The spent fuel transfer tube is shielded to within adjacent area radiation limits, is completely enclosed in concrete and there is no unshielded portion of the spent fuel transfer tube during the refueling operation.	

Table 14.3-7

(Sheet 1 of 1)

Severe Accident Analysis

SSAR Reference		Design Feature	Value
Section	5. 3. 1. 2	There are no penetrations in the reactor vessel below the core.	
Section	6. 2. 4. 2. 1	The hydrogen concentration monitoring subsystem consists of two groups of eight hydrogen sensors each.	
Section	6. 2. 4. 2. 2	The hydrogen recombination subsystem consists of two passive autocatalytic recombiners installed inside the containment above the operating deck.	
Section	6. 2. 4. 2. 3	The hydrogen ignition subsystem consists of 64 hydrogen igniters strategically distributed throughout the containment.	
Table	6. 2. 4-3	The minimum surface temperature of the hydrogen ignitors (° F).	≥ 1,700
Section	6. 3	The ADS provides a safety-related means of depressurizing the RCS.	
Section	6. 3	The PXS provides a safety-related means of flooding the reactor cavity by draining the IRWST into the containment.	
Section	7. 3. 1. 2. 9	Signals to align the IRWST containment recirculation isolation valves are generated by manual initiation.	
Section	7. 7. 1. 11	Initiation of containment recirculation is a diverse manual function.	