

June 10, 1994 LD-94-040

Docket 52-002

Attn: Document Control Desk U.S. Nuclear Regulatory Commission Washington, D.C. 20555

Subject: Revision to Selected CESSAR-DC Parameters & Assumptions Addressed in Certified Design Material

Reference: Letter, C.B. Brinkman (ABB-CE) to USNRC Document Control Desk, "Selected CESSAR-DC Parameters & Assumptions Addressed in Certified Design Material", LD-93-174, dated December 14, 1993

Dear Sirs:

Via the Reference letter, ABB Combustion Engineering provided a tabulation of selected CESSAR-DC parameters and assumptions which have been addressed in Certified Design Material for the System 80+ Standard Plant Design. Since the original submittal (which was applicable through Amendment U), two CESSAR-DC amendments have been or are about to be issued (Amendments V and W, respectively). In response to your inquiry, there have been no design changes or reanalyses which substantially affect the parameter and assumption tabulations in CESSASR-DC Tables 14.3-1 through 14.3-7. Only three minor modifications have been made to the original tabulation. The changes are indicated by bars in the right hand margin of the updated tabulation; provided in the enclosure to this letter.

If you have any questions please do not hesitate to contact me, or Mr. Stanley Ritterbusch of my staff at (203)285-5206.

Very truly yours,

COMBUSTION ENGINEERING, INC.

C.B. Brinkman, Director Nuclear Systems Licensing

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Enclosure to LD-94-040

ABB Combustion Engineering

System 80+ Standard Plant Design

Revision to Selected CESSAR-DC Parameters & Assumptions Addressed in Certified Design Material

 ABB/CE Nuclear Power
 02-JUN-94 03:25 PM

 Report: TIER_1 ROADMAP
 Selected CESSAR-DC Parameters and Assumptions Addressed in Certified Design Material
 02-JUN-94 03:25 PM

Design Basis Accident Analysis

Paragraph	Assumption/Parameter Description		Related ITAAC
TABLE 5.4.13-1	- The primary safety valves pass the minimum flow rate of 525,000 lbm/hr-valve (saturated steam at		2.3.1
	2575 psia).	2500 +/- 1% psia	2.3.1
	- Pressurizer Safety Valve: Set Pressure	525000 lb/hr minimum	2.3.1
10 The same rate	- Pressurizer Safety Valve: Capacity at accumulation Pressure, each Valve	Jesono regin antitudes	2.8.2
5.4.13.2	 A total MSSV capacity of 19x10'6 lb/hr is required to maintain the peak secondary pressure below 		
	110% of design. - Containment Shell: Containment Atmosphere Design Basis Peak Pressure	53 psig	2.1.1
TABLE 6.2.1-3	· containment shert: containment Admosphere Design basis reak fresses c		2.4.5
TABLE 6.2.1-18	- In-Containment Refueling Water Storage Tank: IRWSI Water Volume	495000 gal minimum	2.4.7
TABLE 6.2.1-19	- Runout Flow Per Safety Injection Train	1232 gpm maximum	2.4.4
TADLE D.C. 1 17	- Runout Flow Per Safety Injection Train	980 gpm minimum	2.4.4
	- Containment Spray Pump: Flowrate Per Pump	6500 gpm maximum	2.4.6
	- Containment Spray Pump: Flowrate Per Pump	5000 gpm minimum	2.4.6
	- Containment Spray Heat Exchanger: Number of Heat Exchangers	2	2.4.6
	- Containment Spray Heat Exchanger: Shell Side Flow	8000 gpm minimum	2.4.6
TABLE 6.2.1-20	- Delay Time from CSAS to Spray Delivery	68 sec maximum	2.8.6
6.2.1.3.3	 Main Feed Water Isolation Valve: MFIV Design Closure Time 	5.0 sec maximum	2.8.2
6.2.1.4	 Main Steam Isolation Valve: MSIV Design Closure Time 	5.0 sec maximum	2.4.2
6.2.3.2	- Annulus Space: Negative Pressure	-0.25 in (water gauge) minimum	C . 4 . C
		INTELED AND	2.1.1
6.2.6.1	 The integrated containment leakage rate is less than 0.5% volume per day. 	0.5 % volume/day maximum	2.1.1
	- Containment Vessel: Leak Rate	0.3 % votuble; day movinion	2.4.4
6.3.3.2.2	* The Engineered Safety Features Actuation System (ESFAS) sends a Safety Injection Actuation Signal		
	(SIAS) to start the SIS pumps and open the SIS valves following a LOCA or transient. The SIAS is		
	generated on low pressurizer pressure or high containment pressure.		2.4.4
	- The SIS consists of four safety injection trains, each consisting of a safety injection pump and a		
	safety injection tank.		2.6.2
	 Diesel generators will provide power on LOAC There are four direct vessel injection points 		2.4.4
	- Delay Time for SI Flow to Reactor Vessel After SIAS	40 sec maximum	2.4.4
6.3.3.3.2	- Emergency Feedwater Storage Tank: Emergency Feedwater Storage Tank Capacity	350000 gal/tank minimum	2.8.8
TABLE 6.3.3.4-1	 SITs can be vented or isolated 		2.4.4
6.3.3.4.2	- Alignment of SIS for hot and cold injection is possible		2.4.4
TABLE 15.0-3	- Reactor Vessel: Coolant Flow Rate (% of 445600 gpm)	95 % miniakan	2.3.1
15.1.2.1	- Steam Generator: Maximum Auxiliary Feedwater Flow to Each Steam Generator	800 gpm maximum	2.8.8
TABLE 15.1.5-10	- Main Steam Line: Blowdown Area for Each Steam Line	1.283 sq ft maximum	2.3.1
TABLE 15.1.5-11	Core: 100% Core Power	3914 MWt	1.2
TABLE 15.1.5-12	 Atmospheric Dispersion Factor, 0-2 Hrs at EAB for SLBFLOPD and SLBZPLOPD Events 	1.0 x 10 3 sec/m 3	5.0
THOLE ISTITUTE	 Atmospheric Dispersion Factor, 0-8 Hr at LPZ for SLBFLOPD and SLBZPLOPD Events 	1.35 x 10 -4 sec/m 3	5.0
TABLE 15.2.3-1	- Main Steam Safety Value: Main Steam Safety Values - Open	1212 psia	2.8.2
TABLE 15.2.8-2	 Emergency Feedwater Pump: Emergency Feedwater Flow Initiated to the Intact Steam Generators 	500 gpm	2.8.8
the second se	- Main Steam Safety Valve: Main Steam Safety Valves - Open	1212 psia	2.8.2
TABLE 15.2.8-3	- Dispersion Data (MDNBR) 2 hr eab	1.0 x 10 3 sec/m 3	5.0
	- Dispersion Data (Over Pressure) 2 hr eab	1.0 x 10-3 sec/m3	5.0

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Design Basis Accident Analysis

Paragnaph	Assumption/Parameter Description		Related [TAAC
and the second second second		A MARK A MARK A CONTRACTOR	5.0
TABLE 15.2.8-3	Dispersion Data (MDNBR) 8 hr lpz	1.35 x 10 -4 sec/m 3	5.0
in the second se	Dispersion Data (Over Pressure) 8 hr lpz	1.35 x 10 -4 sec/m 3	2.8.2
TABLE 15.3.1.1	- Main Steam Safety Valve: MSSV Opening Pressure Setpoint	1212 psia maximum	2.8.8
15.3.1.3	Each of the EFU numes can provide 100% of the required EFW flow		2.8.8
TABLE 15.3.3-1	- Emergency forchater is assumed to be automatically actuated on Steam Generator Low Level LTAS		2.8.2
trees to to to to	An isolation valve (block valve) is located upstream of the ADV. The block valve can be closed		2.0.2
	menually from the control room.		5.0.5
	- Main Steam Safety Valve: MSSV Opening Pressure Setpoint	1212 psia maximum	2.8.2
15.3.3.1	The ADVs are manually operated from the control room		2.8.2
12-2-2-1	Diesel generators provide power to the 4.16 kV safety buses		2.6.2
	An ADV is located downstream of the MSSVs in each steam line		2.8.2
	Each ADV discharges to the atmosphere		2.8.2
15.3.3.3.1	- An isolation valve (block valve) upstream of the ADV exists to be closed in case of the stuck open		2.8.2
12.2.2.2.1	ADV		
	 Reactor trip causes the turbine generator trip 		2.8.1
TADLE 15 / 5.4	- Main Steam Safety Valve: Main Steam Safety Valves - Open	1212 psia	2.8.2
TABLE 15.4.8-1	- Atmospheric Dispersion Factors - LPZ (30 days)	2.2 x 10'-5 sec/m'3	5.0
TABLE 15.4.8-3	- Atmospheric Dispersion Factors - LPZ (1-4 days)	5.4 x 10 -5 sec/m 3	5.0
	 Atmospheric Dispersion Factors - LFC (14 00/37 Containment Vessel: Leak Rate 	0.5 % volume/day maximum	2.1.1
	 Atmospheric Dispersion Factors - EAB (0-2 hr) 	1.0 x 10'-3 sec/m'3	5.0
	A through the Dispersion factors that (0.6 br)	1.35 x 10-4 sec/m-3	5.0
	- Atmospheric Dispersion Factors - LPZ (0-8 hr)	1.0 x 10 4 sec/m 3	5.0
and the second second	 Atmospheric Dispersion Factors - LPZ (8-24 hr) A SIAS actuates safety injection pumps and opens the corresponding discharge valves 		2.4.4
15.5.1.1	A SIAS actuates safety injection paips and opens the corresponding disclibing the formers	1212 psia maximum	2.8.2
TABLE 15.5.2-1	- Main Steam Safety Valve: MSSV Opening Pressure Setpoint	the second s	2.7.16
TABLE 15.6.2-3	- Double ended letdown line break size is assumed (0.01556 ft 2)	0.01556 sq ft	2.7.16
	- Letdown Line: Letdown Line Double Ended Break Size	accurate and to	2.7.16
15.6.2.1	- Three letdown line isolation valves in series are located within the containment		2.7.16
15.6.2.2	- The letdown line orifices are located within the containment downstream of the letdown heat		
	exchanger		2.5.3
	- The hardware for DIAS (Discrete Indication and Alarm System) is seismically and environmentally		Second a set
	qualified	1212 psia maximum	2.8.2
TABLE 15.6.3-7	 Main Steam Safety Valve: MSSV Opening Pressure Setpoint 	TETE PSTO MONTHUM	2.8.1
15.6.3.2.2.1	- The turbine/generator trips on reactor trip		2.8.8
15.6.3.2.2.2	- The minimum capacity of each ENN storage tank of 350,000 gallons is more than enough to maintain the		6.0.0
	plant at hot standby for 8 hours		3.0.0
	- Each EFW storage tank is provided with an atmospheric vent to maintain atmospheric pressure inside		2.8.8
	the tank		2.5.0
	- Emergency Feedwater Tank: Emergency Feedwater Tank Volumetric Capacity	350000 gal minimum	2.8.8
15.6.3.2.3.1	- Emergency feedwater is actuated automatically to recover steam generator water level		2.8.8
15.6.3.3.3.1	- The Emergency Feedwater Actuation signal (EFAS) is generated on low SG level		2.5.1
13.0.3.3.3.3.1	the first first interest discussion in the second se		2.5.2
	- The EFW flow is actuated on EFAS to restore the SG level		2.8.8
15.6.3.3.3.2	- The reactor trip automatically trips the turbine generator		2.8.1
12.0.2.3.3.2	the reactor with normalization is a first one and an and		

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Design Basis Accident Analysis

Paragraph	As	sumption/Parameter Description		Related ITAAC
15.6.3.3.3.2	Ma	in Steam Safety Valve: Maximum Allowable Pressure	110 % of design pressure maximum	2.8.2
15.6.5.2		intainment Leak Rate, Per Day, (during 1st 24 hours of LOCA) Expressed as a Percentage of	0.5 % nominal	2.1.1
15.6.5.3	- Co	ntainment Volume Per Day Intainment Leak Rate, Per Day, (during 1st 24 hours of LOCA) Expressed as a Percentage of	0.5 % nominal	2.1.1
TABLE 15A-10	. 110	xntainment Volume Per Day mfiltered Normal Air Intake Rate xst Accident lodine Filter: Post Accident Intake and Recirculating Iodine Filter Efficiency -	2000 cfm maximum 95 % minimum	2.7.17 2.7.17
	El	lemental ost Accident Iodine Filter: Post Accident Intake and Recirculating Iodine Filter Efficiency -	95 % minimum	2.7.17
	Or	rganic ost Accident Lodine Filter: Post Accident Intake and Recirculating Lodine Filter Efficiency -	99 % minimum	2.7.17
	Pa	articulate ontrol Room: Pressurization	1/8 in (water gauge) nominal	2.7.17

ABB Combustion Engineering Nuclear Power ABB/CE Nuclear Power Page 4 of 32 Selected CESSAR-DC Parameters and Assumptions Addressed in Certified Design Material Probabilistic Risk Assessment Related ITAAC Assumption/Parameter Description Paragraph 2.6.1 * The main power system consists of the main generator, associated isolated phase buses, generator 19.6.3.1 circuit breakers, three single phase unit main transformers, two unit auxiliary transformers, and two reserve auxiliary transformers 2.6.1 * The 4.16 Ky non-class 1E power system consists of four switchgears and a non-class TE alternate AC source. Two of the switchgears (i.e, X - non-safety switchgear and the X -permanent non-safety switchgear) are powered by one of the unit auxiliary transformers, while the other two switchgears (i.e., Y - non-safety switchgear and the Y - permanent non-safety switchgear) are powered by the other unit auxiliary transformer. The permanent non-safety switchgears can also be powered by the reserve auxiliary transformers and the alternate AC source. 2.6.2 * Each division of the 4.16 Kv class 1E power has two switchgear. Both switchgears within a division are typically powered from their associated 4.16 Ky permanen, non-safety 1E switchgear. Both switchgears can also be powered by the emergency diesel generator of the same division. 2.6.3 * Each division of the 120 VAC class 1E power system has three inverters and associated buses. Each inverter within the division is powered from a separate 125 VDC class 1E bus in the same division of the EDS. 2.6.3 * Each division of the 125 VDC class 1E power system has three battery chargers, three batteries, and three distribution centers (buses). Each battery charger is powered from a separate 480 VAC class 1E motor control center within the same division of the EDS. Each battery is sized to supply its emergency loads for a minimum of 2hrs without recharging. 2.6.2 * The emergency diesel generators are physically and electrically isolated from each other. 2.6.2 * Each emergency diesel generator is housed in Seismic Category I structure to guard against earthquakes, fires, and missiles. 2.6.2 * The starting air storage capacity for each emergency diesel generator is sufficient for starting the diesel generator for a minimum of five times. 2.6.2 * Each emergency diesel generator has a complete and separate fuel oil storage system. The storage system has sufficient fuel that allows the emergency diesel generator to operate supplying post DBA-LOCA loads for a time period of no less than seven days. 2.6.2 * Each emergency diesel generator is automatically started and loaded by the Engineered Safety Feature - Component Control System (ESF-CCS). 2.6.1 * The onsite EDS has two separate sources of offsite power. Each offsite power source (circuit) terminates at a separate switchyard. The switchyards are physically separated and electrically independent. The lines of the offsite power circuits are routed, to the extent practicable, such that the likelihood of losing both circuits due to a single event is minimized. 2.6.2 * Each emergency diesel generator is adequately sized to provide power to two 4.16 Kv class 1E buses within the same division of the EDS. 2.6.2 * Each of the 4.16 Ky class 1E switchgears is provided with appropriate incoming feeders from the emergency diesel generator, permanent non-safety switchgear, and the reserve auxiliary transformer. The incoming feed breakers for each 4.16 Kv class 1E bus are therefore interlocked to prevent more than one breaker from being closed at the same time. 2.6.1 * If a plant trip occurs and if offsite power is available, offsite power is supplied to plant components by back-feed through the main transformers.

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Probabilistic Risk Assessment

Probabilistic Kisk A	Assumption/Parameter Description	Related ITAAC
Paragraph		2.6.2
19.6.3.1	* The emergency diesel generators are normally in standby mode when offsite power is available. During loss of offsite power events, the emergency diesel generators start automatically by the ESF- CCS. Following a loss of offsite power event, only one of the two emergency diesel generators is required to bring the plant to cold shutdown conditions and to maintain the plant in this shutdown	
	<pre>condition. * On a LOOP, the AAC automatically starts and is available for automatic connection and loading of the X and/or Y - permanent non-safety loads, if either of the 4.16 Kv permanent non-safety buses become</pre>	2.6.5
	de-energized.	2.4.1
TABLE 19.6.3.1-1	 The RCGVS vent valves are powered from the 125 VDC class 1E power system. The RDS bleed valves are powered from separate 125 VDC class 1E buses. 	2.4.1
	a rol and is more and from a conserve 125 VDL rises if fus	2.8.2
	 COWS components in a division receive electrical power from the class is bases in their division are powered from the 4.16KV Class 1E power system in their The COW pump motors in a division are powered from the 4.16KV Class 1E bus in that division and the dis division and the division and the division and the dis divis	2.7.6
	other CCU many motor is reward from the other Class it DLS in that division.	2.3.2
	 Each SCS division is electrically powered from its assigned Class 1E bus. Each SCS pump motor in each division is powered from one of the two Class 1E 4.16 Kv safety buses for that division. Each SCS pump derives its 125 VDC control power from the Class 1E 125 VDC bus 	2.3.2
	associated with the class 1E 4.16 Kv safety bus that provides its motive power. * The SCS pump motor in a each division is not powered from the same Class 1E 4.16 Kv bus as the CS	2.3.2
	the makes in the statistication	2.8.8
	* The two EFW pump controls in a given EFW division are supplied power from separate 125 VDC buses.	2.8.8
	 The EFW steam supply valves in an EFW division are supplied from the same 125 VDC bus. The EFW steam supply valves in an EFW division are supplied from the same 125 VDC bus. The power operated controls for the EFW turbine pumps, turbine supply and bypass line valves and the 	2.8.8
	 FW Isolation value to the SG are powered from the same 125 VDC class 1E bus. FW Isolation value to the SG are powered from one of the two vital Class 1E 4.16 Kv buses for the CSS pump motor in each division is powered from one of the two vital Class 1E 4.16 Kv buses for that division. Each CSS pump derives its 125 VDC control power from the Class 1E 125 VDC bus 	2.4.6
	associated with the class 1E 4.16 Kv bus that provides its motive power. * The CSS pump motor in a each division is not powered from the same Class 1E 4.16 Kv bus as the SCS	2.4.6
	maker in that division	2.4.6
	* The 480 VAC motor power for CSS valves in a division will be derived from the 430 vac motor and CCS associated with the class 1E 4.16 Kv vital bus that provides power to the pump motor for that	5. c × c 0
	division. * Each SIS division receives emergency 4.16 Kv power from the emergency diesel generator for that	2.4.4
	division	2.4.4
	a real air meter receiver (16 Ky nower from a separate 4, 16 Ky bus.	2.4.4
	* The SIS pump control circuit for a given train is powered from the ica voc bus associated with the	
- 1. 1. 1. 1. 1. Mar.	 4.16 Kv bus which provides motive power to the pump motor. * The SSWS has two redundant and separate safety related divisions with heat dissipation capacity to 	2.7.5
19.6.3.2	achieve and maintain safe shutdown.	3.7.6
	a cost course divisions have two CCU memor nor division	2.7.5
	 Each SSWS division has two saw panys per division. * SSWS components in a division receive electrical power from the class 1E buses in their division. * Manual Start and stop actuation of the SSW pumps is provided from the control room to override automatic actuation. 	2.7.5
	activative decidential	

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Probabilistic Risk Assessment

	Assumption/Parameter Description	Related ITAAC
Paragraph		 2.7.5
19.6.3.2	* The two SSW divisions are physically separated and protected such that a fire or flood in one	
1. U L L L L L L L L L L L L L L L L L L	division will not affect the SSW pumps in the other division. * The COWS has two redundant and separate safety-related divisions with heat dissipation capacity to	2.7.6
19.6.3.3	achieve and maintain safe shutdown.	2.7.6
	+ Full print division has two FOU memory por division.	2.7.6
	a star per a traction curtain picolate the non-satety related portion of the LLWS fullowing or	2.7.0
	accident condition, except cooling for the RCPs, charging pump motor coolers, and charging pump	
	wight have an hand and hand and	2.7.6
	* CDMS components in a division receive electrical power from the class 1E buses in their division.	2.7.6
	 * The CCW pump motors in a division are powered from the 4.16kV Class 1E power system in their division. In a division, one CCW pump is powered from one Class 1E bus in that division and the 	
	other COW pump motor is powered from the other Class 1E bus in that division.	N 10 11
	 Manual Start and stop actuation of the CCW pumps is provided from the control room to override 	2.7.6
	automatic actuation.	2.7.6
	* Each CCWS division has two redundant heat exchangers.	2.1.3
	* the two divisions of FOUS are physically separated.	2.7.10
19.6.3.4	t extining instrumentation is provided in the control room to monitor and control the tho.	2.4.4
19.6.3.6	* The Safety Injection System (SIS) has four redundant pump trains arranged in two independent	
		2.4.4
	 The two SIS divisions are completely physically separated from each other outside containment. The two SIS divisions are completely physically separated reaction and instrumentation. 	2.4.4
	 The two SIS divisions are completely physically separately separately alves, piping, and instrumentation. Each SIS division receives emergency 4.16 Kv power from the emergency diesel generator for that 	2.4.4
		A. A. A.
	division. * Each SIS pump motor receives 4.16 Kv power from a separate 4.16 Kv bus.	2.4.4
	* The SIS pump control circuit for a given train is powered from the 125 VDC bus associated with the	6.4.9
	1 16 Ku bus which provides motive power to the pump motor.	2.4.4
	s reak etc men train has an independent surtion line connection to the IRWSI.	2.4.4
	* Whe Free Free Patienty Englishing Section (FSFAS) sends a safety injection Actuation signat	
	(stas) to start the SIS pumps and open the SIS valves following a LOLA of transferre. The start to	
	represented on low proceduriter pressure or high containgent pressure.	2.5.4
19.6.3.7	* The Alternate Protection System (APS) provides an alternate means of generating a reactor trip	
	<pre>signal and an alternate feedwater actuation signal. * The APS monitors the pressurizer pressure and generates a reactor trip signal if the RCS pressure if apprendix of the pressure and generates a reactor trip signal is generated if</pre>	2.5.4
	* The APS monitors the pressurver pressurve and generates a redwater actuation signal is generated if exceeds a predetermined value. Similarly, an alternate feedwater actuation signal is generated if	
	the stars expension lovel decreases below a predetermined value.	2.8.8
	* The EFWS has two redundant divisions for supplying feedwater to the steam generators for RCS heat	2.0.0
	errored such that chutdown cooling entry conditions can be met.	2.8.8
	* one true division including its water source, supplies teedwater to one steam Generator (su).	2.8.8
	* Fuch EFUE division has fun FEU runns each with a fund driver diverse from the other.	2.8.8
	* In each FFWS division, the two EFW pump discharge pipes are joined together inside containment to a	
	ainels wine that composts to the SG downcomer teedwater line.	2.8.8
	* The EFW pumps in one division can supply feedwater to the SG in the other division through a pipe	
	having at least two normally closed isolation valves installed.	

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Probabilistic Risk Assessment

Paragraph	Assumption/Parameter Description	Related ITAAC
	* The SCS pump motor in a each division is not powered from the same Class 1E 4.16 Ky bus as the CS	2.3.2
19.6.3.9	a meter in that divicing	2.3.2
	 Installed instrumentation provides the capability to monitor the performance of the system and the 	
	enjoy components from the control room	2.3.2
	* The RCS can be brought from hot shutdown to cold shutdown conditions using only one SCS train.	2.4.1
19.6.3.10	 The RCGVS has vent valves to vent the pressurizer and the head of the reactor vessel. The vent paths from the pressurizer and reactor vessel are capable of being discharged to the 	2.4.1
	 The vent paths from the pressurizer and reactor vesset are capable of any second and reactor drain tank or the IRWST. 	2.4.4
	* The prove want wature are nowered from the 125 VDC class 1E power system.	2.4.1
	* The Rapid Depressurization System (RDS) or Bleed System has two separate and redundant trains.	2.4.1
	* Each train of the RDS has two bleed valves in series.	2.4.1
	* The RDS bleed valves are powered from separate 125 VDC class 12 buses.	2.4.1
	* The RDS discharges to the In-Containment Water Storage lank (IKWSI).	2.4.1
	* The RDS is manually initiated from the control room.	2.4.1
	* The SDS valves are remote manually operated.	2.4.1
	* One of the two RDS trains is capable of rapidly depressurizing the RCS.	2.5.1
19.6.3.11	 The Reactor Protection System (RPS) has four redundant channels. The RPS communicates with the Reactor Trip Switchgear System and the Engineered Safety Features - 	2.5.1
	 The RPS communicates with the Reactor Trip satisfies system are mitigating systems when demanded. Component Control System (ESF-CCS) which enables them to actuate mitigating systems when demanded. 	
	* Loss of 120 VAC vital power to two RPS channels causes a plant trip to occur.	2.5.1
	* The RPS has the capability of generating an automatic or manual reactor trip signal.	2.5.1
	Instrumentation is provided to adequately monitor plant parameters.	2.5.1
	A sensition this cional can be menorated using any two of the four KPS chargers.	2.5.4
	* The Alternate Protection System (APS) provides an alternate means of generating a reactor trip	E - 0 - 4
	ing and an alternate tendenter actingion signal	2.5.4
	the and monitone the programmizer products and penerates a reactor (rip signal if the kus pressure	
	exceeds a predetermined value. Similarly, an alternate recovater actual of signat is generated in	
	the steam generator level decreases below a predetermined value.	2.4.5
19.6.3.12	 The Engineered Safety Features Actuation System (ESFAS) has at least two redundant trains to generate the following engineered safety feature signal: Safety Injection Actuation Signal (SIAS), 	2.5.2
	generate the following engineered safety feature signal, safety injection Signal (CIAS), Main Steam Containment Spray Actuation Signal (CSAS), Containment Isolation Actuation Signal (CIAS), Main Steam	
	Isolation Signal (MSIS), Emergency Feedwater Actuation Signal (EFAS).	
	The Forter activation the Engineerod Sofety Features (ESF) systems when demonded.	2.4.5
19.6.3.13	* The Containment Spray System (CSS) has two independent redundant divisions for supplying containment	2.4.6
19.0.3.13	enroy finy	2.4.6
	a much nee division has one CSS are and one CSS heat exchanger.	2.3.2
	 * The CSS pump in each division can be aligned to back up the SCS pump in that division for shutdown 	2.3.2
	sealing approximation	2.3.2
	* The crossover valve between the inlet to the CSS heat exchanger and the SCS heat exchanger in a	2.4.6
	ative division is expense of passing flow in either direction.	2.4.6
	* The CSS pump and heat exchanger in each division can be aligned to discharge back to the IRWST to	
	<pre>provide cooling for the IRWST inventory. * The CSS pump's NPSH is adequate to prevent pump cavitation and failure if the IRWST inventory is</pre>	2.4.6
	saturated.	

02-JUN-94 03:25 PM ABB Combustion Engineering Nuclear Power Page 9 of 32 ABB/CE Nuclear Power Selected CESSAR-DC Parameters and Assumptions Addressed in Certified Design Material Probabilistic Risk Assessment Related **ITAAC** Assumption/Parameter Description Paragraph 2.4.6 * Installed instrumentation provides the capability to monitor CSS flow rates and the performance of 19.6.3.13 major components. This instrumentation provides positive indication that pumps have started and valves have actuated property. 2.4.6 * The CSS pump motor in each division is powered from one of the two vital Class 1E 4.16 Kv buses for

that division. Each CSS pump derives its 125 VDC control power from the Class 1E 125 VDC bus associated with the class 1E 4.16 Ky bus that provides its motive power. 2.4.6 * The CSS pump motor in a each division is not powered from the same Class 1E 4.16 Kv bus as the SCS pump motor in that division. 2.4.6 The 480 VAC motor power for CSS valves in a division will be derived from the 480 VAC MCCs and LCs associated with the class 1E 4.16 Kv vital bus that provides power to the pump motor for that division. 2.4.6 * The CSS pump discharge line in each division has a mini-flow line to prevent damaging the CCS pump in that division by operating it against a closed line. The valves in this line are normally open. 2.4.6 * The CSS pumps are automatically started and the CSS header valves are automatically opened by CSAS. 2.4.6 * The CSS can be manually started for spray operation from the control room. 2.4.6 * Installed instrumentation provides the capability to monitor the performance of the system and the major components from the control room. 2.4.6 * The CSS pumps are provided with heat exchangers in the mini-flow recirculation lines. 2.4.6 * Each CSS pump can provide 100% of the required delivery of borated water from the IRWSI to the containment spray nozzles. 2.4.7 Operator must open the HVI spillway motor-operated valves and the reactor cavity spillway motor-19.6.3.16 operated valves. This is done from the control room. 2.3.2 The SCS has two separate and redundant divisions each with heat removal capacity to cool and 19.6.4.1 maintain the RCS in cold shutdown conditions. 2.3.2 Each SCS division has one CS pump and one SCS heat exchanger. 2.3.2 * The SCS pumps can be aligned to the IRWST. 2.3.2 The SCS discharge values to the RCS are not interlocked on RCS pressure and can be opened when the RCS pressure is less than or equal to the SCS pump shutoff head. 2.3.2 The SCS pump in each division can be aligned to back up the Containment Spray (CS) pump in that 2.4.6 division for containment spray operation. 2.3.2 The valve isolating the SCS pump suction from the IRWST is capable of passing flow in either 2.4.6 direction. 2.3.2 The CSS pump in each division can be aligned to back up the SCS pump in that division to provide 2.4.6 iRWST inventory cooling. 2.3.2 Each SCS division is electrically powered from its assigned Class 1E bus. 2.3.2 * The SCS can be aligned for shutdown cooling operation from the control room. 2.3.2 * The SCS pump motor in each division is powered from one of the two Class 1E 4.16 Kv safety buses for that division. Each SCS pump derives its 125 VDC control power from the Class 1E 125 VDC bus associated with the class 1E 4.16 Kv safety bus that provides its motive power. 2.3.2 The SCS pump motor in a each division is not powered from the same Class 1E 4.16 Ky bus as the CS pump motor in that division. 2.3.2 Installed instrumentation provides the capability to monitor the performance of the system and the

major components from the control room. * The RCS can be brought from hot shutdown to cold shutdown conditions using only one SCS train. 2.3.2

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Probabilistic Risk Assessment

Paragraph	Assumption/Parameter Description	Related ITAAC
19.6.4.2	* The SCS has two separate and redundant divisions each with heat removal capacity to cool and	2.3.2
19.0.4.6	maintain the RCS in cold shutdown conditions.	2.3.2
	* Each SCS division has one SCS pump and one SCS heat exchanger.	2.3.2
	 The SCS pumps can be aligned to the IRWST. The SCS discharge values to the RCS are not interlocked on RCS pressure and can be opened when the 	2.3.2
	ore prevention is lose than or press to the SES DUND shutoff head.	2.3.2
	 The SCS pump in each division can be aligned to back up the Containment Spray (CS) cump in that 	2.4.6
	division for containment chrav aperation.	2.3.2
	* The valve isolating the SCS pump suction from the IRWST is capable of passing flow in either	2.4.6
	<pre>direction. * The CSS pump in each division can be aligned to back up the SCS pump in that division to provide</pre>	2.3.2
	The cas pump in each division can be aligned to each up the too pump in the set of the s	2.4.6
	* Each SCS division is electrically powered from its assigned Class 1E bus.	2.3.2
	* The site can be aligned for shutdown cooling operation from the control room.	2.3.2
	* The SCS pump motor in each division is powered from one of the two class 12 4.10 KV safety dures for that division. Each SCS pump derives its 125 VDC control power from the class 12 125 VDC bus	
	exercises of with the class 15 % 16 EV catery his that provides its motive power.	2.3.2
	* The SCS pump motor in a each division is not powered from the same Class 1E 4.16 KV bus as the CS	
	<pre>pump motor in that division. * Installed instrumentation provides the capability to monitor the performance of the system and the</pre>	2.3.2
	an increase from the control room	2.3.2
	the process has brought from hot shutdown to cold shutdown conditions using only one sus train.	2.8.7
19.6.4.5	* The blowdown line containment isolation valves are closed automatically by ErAS, HSIS, and ETAS,	2.8.2
19.6.4.6	 That MSIVs fail close upon loss of control power. The MSIVs close automatically upon receipt of a Main Steam Isolation Signal (MSIS): 	
	* Each ADV is powered from a separate 125 VDC class 1E bus.	2.8.2
19.7.3.1.1	* & plant Fire Hazards Analysis considers potential fire hazards.	2.7.24
19.7.3.1.5	* A plant Fire Hazards Analysis considers potential fire hazards.	2.3.2
19.7.4.1	* Flood barriers provide divisional and quadrant separation up to the 70' elevation. Failure of largest storage tank within a division will not flood above the 70' level.	2.4.4
	largest storage cank within a division with hot rood above the root costs	2.4.6
	사이트 - 1955 - 1955 전 2월 11일 전 2월 11일 - 1971 - 2월 11일 - 1971 - 1971 - 1972 - 1975 - 197	2.8.8
	* It was assumed that the primary means of flood control in the Nuclear Annex and Reactor Building is	2.4.4
	provided by the divisional wall which serves as a berrier between redundant divisions of sorely	2.4.6
	related equipment.	2.8.2
		2.8.6
		2.8.8
	* The equipment within the Component Cooling Water Heat Exchanger structure was assumed to be divisionally separated by a wall such that a flood in one division will not affect the other	2.1.3
	division.	

02-JUN-54 03:25 PM ABB Contrastion Engineering Nuclear Power Page 11 of 32 ARR/CF Nuclear Power Selected CESSAR DC Parameters and Assumptions Addressed in Certified Design Material Probabilistic Rick Assessment Relateri TTAAC Assumption/Parameter Description Paragraph 2.3.2 * The divisional flood barrier between redundant divisions of safety related equipment is an important 2.4.4 19.7.4.1 design feature which ensures that flooding of both divisions of safety related equipment will not 2.4.6 2.8.2 occur. 2.8.6 288 2.1.3 * The divisional separation of redundant safety related equipment in the Component Cooling Water Heat 23.2 Exchanger structure and the station service water pump structure is also an important design 2.4.6 feature. This ensures that flooding of both divisions of Component Cooling Water Heat Exchangers 2.8.8 and station service water pumps will not occur. 2.7.24 Availability of mitigating equipment following fires can be maximized if separation is maintained 19.8.1.2 between equipment within a quadrant. This will increase the number of success paths available for responding to the event and result in a decrease in risk. 2.7.24 * Propagation of fires between quadrants is assumed to be impossible based on their separation by 10 8 4 3 three hour rated fire barriers. Fire doors between quandrants are three hour rated fire doors and are assumed to be closed during all shutdown operations. These doors specifically include those between Fire Areas 38 and 41 and Fire Areas 39 and 40, as shown in Figure 9.5.1-2. 2.7.24 Propagation of fires between divisions is assumed to be impossible based on their separation by three hour rated fire barriers. The barriers have no communicating openings below 70 feet elevation and all penetrations within the barriers are sealed with assemblies qualified to maintain the integrity of the three hour rating. 2.3.2 It was assumed that the primary means of flood control in the Nuclear Arnex and Reactor Building is 2.4.4 19.8.4.4 provided by the divisional wail which serves as a barrier between redundant divisions of safety 2.4.6 related equipment. 2.8.2 2.8.6 2.8.8 2.1.3 * The equipment within the Component Cooling Water Heat Exchanger structure was assumed to be divisionally separated by a wall such that a flood in one division will not affect the other 2.3.2 division. * The divisional flood barrier between redundant divisions of safety related equipment is an important 2.4.4 design feature which ensures that flooding of both divisions of safety related equipment will not 2.4.6 2.8.2 necur. 2.8.6 2.8.8 2.1.3 * The divisional separation of redundant safety related equipment in the Component Cooling Water Heat 2.3.2 Exchanger structure and the station service water pump structure is also an important design 2.4.6 feature. This ensures that flooding of both divisions of Component Cooling Water Heat Exchangers 2.8.8 and station service water pumps will not occur. 2.3.2 Make SCS pumps interchangeable with containment spray pumps to provide further redundancy. 2.4.6 TABLE 19.84.1-1 2.3.2 * Monitor SCS pump motor current, flowrate, discharge pressure and suction pressure to provide reliable cooling status

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19.8A.2.13

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	Selected CESSAR-DC Parameters and Assumptions Addressed in Certified Design Material	
Probabilistic Risk Ass	essment	
		Related ITAAC
Paragraph	Assumption/Parameter Description	2.1.1
19.15.3.2	 The propagation of a fire from one division to the next is prevented by the divisional separation of redundant safety related equipment with a 3 hour fire barrier which is maintained during power 	2.7.24
19,15.3.3	operation. * It was assumed that the primary means of flood control in the Nuclear Annex and Reactor Building is provided by the divisional wall which serves as a barrier between redundant divisions of safety related equipment.	2.3.2 2.4.4 2.4.6 2.8.2 2.8.6 2.8.8
	 It was assumed that there are no doors or passageways connecting the divisions of safety related equipment up to elevation 70+0. The equipment within the Component Cooling Water Heat Exchanger structure was assumed to be divisionally separated by a wall such that a flood in one division will not affect the other 	2.1.1 2.7.24 2.1.3
	division * The divisional flood barrier between redundant divisions of safety related equipment is an important * design feature which ensures that flooding of both divisions of safety related equipment will not occur.	2.3.2 2.4.4 2.4.6 2.8.2 2.8.6 2.8.8
	 * The divisional separation of redundant safety related equipment in the Component Cooling Water Heat Exchanger structure and the station service water pump structure is also an important design feature. This ensures that flooding of both divisions of Component Cooling Water Heat Exchangers and station service water pumps will not occur. * All safety related structures are designed to withstand the static and dynamic forces of flooding. Therefore, the structural wall between the Nuclear Annex and the Turbine Building will not fail. 	2.1.3 2.3.2 2.4.6 2.8.8 2.1.1 2.1.3 2.1.4
19.15.3.4	* The System 80* class 1E electrical distribution system is provided with protection schemes which conform to the requirements of IEEE STD-741-1986. The protective schemes are designed to isolate faulted equipment from the rest of the system to minimize the effect of the fault and to maximize the availability of the remaining equipment. The basic schemes consist of ground fault protection, instantaneous overcurrent and timed overcurrent protection. In developing the Seismic Margin Assessment models, it was assumed that the seismic failure of equipment in the electrical distribution system were "open circuit" failures. Implicit within this assumption is the assumption that if a "hot short" failure were to occur, the appropriate circuit interrupter(s) would open on overcurrent to prevent "backward" propagation of the fault.	2.6.1 2.6.3

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Shutdown Risk

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Paragraph	Assumption/Parameter Description	Related ITAAC
19.8A.2.7.3.1	 * All fire barriers which provide separation between the two divisions are rated for at least 3 hours. It was argumed that all fire doors and penetrations within the fire barriers are maintained during power operation to prevent the propagation of fire from one area to the next. * The propagation of a fire from one division to the next is prevented by the divisional separation of 	2.1.1 2.7.24 2.8.2 2.8.6 2.1.1
	redundant safety related equipment with a 3 hour fire barrier which is maintained during power operation.	2.7.24
TABLE 19.84.2.8-1	 It was assumed that there are no doors or passageways connecting the divisions of safety related equipment up to elevation 70+0. Monitored Parameter- SCS flowrate, Instrument Type- Flowmeter, Instrument Function- Decay heat 	2.7.24 2.3.2
TABLE 19.04.2.0-1	removal system performance, Range- Bounds SCS pump flow range, Comments- One located in each SLS return line to the RCS. Can be used to measure CSP flow if CSPs are used for SCS.	2.3.2
	* Monitored Parameter- SCS pump/CS pump discharge pressure, Instrument Type- Pressure sensor, Instrument Function- Measures individual pump discharge pressures., Comments- One instrument located at the discharge to each pump. Identifies individual pump status.	6. v. 2 v 10
	 Monitored Parameter- SCS pump/CS pump motor current, Instrument Type- Ammeter, Instrument Function- Measure current drawn by pump motor. Fluctuations show air entrainment., Comments- Confirms pump 	2.3.2
	<pre>status * Monitored Parameter- SCS pump/CS pump suction pressure, Instrument Type- Pressure sensor, Instrument Function- Measure pump suction pressure in each pump., Comment- One instrument located at the</pre>	2.3.2
	<pre>suction of each pump. Identifies individual pump status. * Monitored Parameter- SCHX inlet and return line temperature, Instrumer Type-Temperature sensor, Instrument Function- Measures temperature in the suction and discharge times of the shutdown cooling</pre>	2.3.2
19.8A.2.8.3.2.5.2	heat exchanger, Comments- Temperature indication only available when SCS is sperational. * Individual alarm inputs to the shutdown cooling alarm tiles include: low shutdown cooling pump header pressure, low shutdown cooling flow, higher shutdown cooling heat exchanger outlet	2.3.2
19.8A.2.8.3.2.5.3	<pre>temperature, shutdown cooling pump motor current deviation. * Discrete indicators are provided on the Nuplex 80+ control room stations to provide the operator with information that (1) is frequently used to assess system level performance and (2) allows</pre>	2.5.3
	 continued operation if the data processing system should become unavailable Discrete indicator displays to support shutdown cooling for key parameters are on the engineered safety feature panel. These include: Shutdown Cooling System (per train), Inlet Temperature, 	2.5.3
	Outlet Temperature, Heat Exchanger Inlet Temperature, Heat Exchanger Outlet Temperature, Pump Motor Current, Flow, Pump Header Pressure, Reactor Coolant System, Pressurizer Level, Reactor Coolant System Level, Pressure, Core Exit Temperature, Refueling Cavity Level	
19.84.2.13	 * Flood barriers provide divisional and quadrant separation up to the 70' elevation. Failure of largest storage tank within a division will not flood above the 70' level. 	2.3.2 2.4.4 2.4.6
	* Door closed sensors will be provided on flood doors with indications available at a monitored	2.8.8 2.1.1
19.8A.2.13.3	location.	

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Shutdown Risk			Related ITAAC
Paragraph 19.8A.2.13.3	Assumption/Parameter Description * Flood barriers provide divisional and quadrant separation up to the 70' elevation. Failure of largest storage tank within a division will not flood above the 70' level. * Door closed sensors will be provided on flood doors with indications available at a monitored		2.3.2 2.4.4 2.4.6 2.8.8 2.1.1
	 Note to be a set of a set of a set of a set of the se		2.3.2 2.4.4 2.4.6 2.8.2 2.8.6 2.8.8
19.84.4.1.2 19.84.7.2.7	 Emergency Feedwater Cavitating Venturi: Flowrate, Emergency Feedwater * The integration evident in the Nuplex 80+ displays and Mode dependent alarms contributes to plant safety by reducing the historically common personnel errors during Mode changes and outages 	a00 gpm maximum	2.8.8 2.5.3

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Severe Accident			
Paragraph	Assumption/Parameter Description		Related ITAAC
19.6.3.16	* Operator must open the HVT spillway motor-operated valves and the reactor cavity spillway motor-		2.4.7
19.11.3.4.2 19.11.3.6.2 19.11.3.6.2.6 19.11.3.8.1	<pre>operated valves. This is done from the control room. * At least 80 hydrogen ignitors are provided * The reactor cavity sump has a minimum thickness of 3 feet. * The reactor cavity sump has a minimum thickness of 3 feet. * The reactor cavity sump has a minimum thickness of 3 feet. * Containment Shell: Containment Atmosphere Design Basis Peak Pressure </pre>	53 psig	2.4.3 2.1.1 2.1.1 2.1.1 2.4.5

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Flood Protection			Related ITAAC
Paragraph	Assumption/Parameter Description	أبالتحجيلي	
3.4.1 3.4.2 3.4.4.1	 Maximum Flood Level Below Grade All safety related structures are designed to withstand the static and dynamic forces of flooding. Therefore, the structural wall between the Nuclear Annex and the Turbine Building will not fail. Flood betriers provide divisional and quadrant separation up to the 70' elevation. Failure of 		5.0 2.1.1 2.1.3 2.1.4 2.3.2 2.4.4
	largest storage tank within a division will not flood above the run level.		2.4.6 2.8.8 2.1.1
	 Door closed sensors will be provided on flood doors with indications available at a monitored location. It was assumed that the primary means of flood control in the Nuclear Annex and Reactor Building is provided by the divisional wall which serves as a barrier between redundant divisions of safety related equipment. 		2.3.2 2.4.4 2.4.6 2.8.2 2.8.6
	* The equipment within the Component Cooling Water Heat Exchanger structure was assumed to be divisionally separated by a wall such that a flood in one division will not affect the other division.		2.8.8
	 anvision. The divisional flood barrier between redundant divisions of safety related equipment is an important design feature which ensures that flooding of both divisions of safety related equipment will not occur. 		2.3.2 2.4.4 2.4.6 2.8.2 2.8.6 2.8.6 2.8.8
19.7.4.1	 The divisional separation of redundant safety related equipment in the Component Cooling Water Heat Exchanger structure and the station service water pump structure is also an important design feature. This ensures that flooding of both divisions of Component Cooling Water Heat Exchangers and station service water pumps will not occur. Flood barriers provide divisional and quadrant separation up to the 70' elevation. Failure of largest storage tank within a division will not flood above the 70' level. 		2.1.3 2.3.2 2.4.6 2.8.8 2.3.2 2.4.4 2.4.6 2.8.8
	* It was assumed that the primary means of flood control in the Nuclear Annex and Reactor Building is provided by the divisional wall which serves as a barrier between redundant divisions of safety related equipment.		2.3.2 2.4.4 2.4.6 2.8.2 2.8.6 2.8.8
	* The equipment within the Component Cooling Water Heat Exchanger structure was assumed to be divisionally separated by a wall such that a flood in one division will not affect the other division.		2.1.3

02-JUN-94 03:25 PM ABB Combustion Engineering Nuclear Power Page 20 of 32 ABB/CE Nuclear Power Selected CESSAR-DC Parameters and Assumptions Addressed in Certified Design Material Flood Protection Related ITAAC. Assumption/Parameter Description Paragraph 2.3.2 * The divisional flood barrier between redundant divisions of safety related equipment is an important 2.4.4 19.7.4.1 design feature which ensures that flooding of both divisions of safety related equipment will not 2.4.6 OCCUT . 2.8.2 2.8.6 2.8.8 2.1.3 * The divisional separation of redundant safety related equipment in the Component Cooling Water Heat 2.3.2 Exchanger structure and the station service water pump structure is also an important design feature. This ensures that flooding of both divisions of Component Cooling Water Heat Exchangers 2.4.6 2.8.8 and station service water pumps will not occur. * It was assumed that the primary means of flood control in the Nuclear Annex and Reactor Building is 2.3.2 2.4.6 19.8.4.4 provided by the divisional wall which serves as a barrier between redundant divisions of safety 2.4.6 related equipment. 2.8.2 2.8.6 2.8.8 2.1.3 * The equipment within the Component Cooling Water Heat Exchanger structure was assumed to be divisionally separated by a wall such that a flood in one division will not affect the other division. 2.3.2 The divisional flood barrier between redundant divisions of safety related equipment is an important 2.4.4 design feature which ensures that flooding of both divisions of safety related equipment will not 2.4.6 OCCUP. 2.8.2 2.8.6 2.8.8 2.1.3 * The divisional separation of redundant safety related equipment in the Component Cooling Water Heat 2.3.2 Exchanger structure and the station service water pump structure is also an important design feature. This ensures that flooding of both divisions of Component Cooling Water Heat Exchangers 2.4.6 2.8.8 and station service water pumps will not occur. 2.3.2 * Flood barriers provide divisional and quadrant separation up to the 70' elevation. Failure of 19.8A.2.13 2.4.4 largest storage tank within a division will not flood above the 70' level. 2.4.6 2.8.8 2.1.1 * Door closed sensors will be provided on flood doors with indications available at a monitored location. 2.3.2 * Flood barriers provide di ision and quadrant separation up to the 70' elevation. Failure of 19.84.2.13.3 2.4.4 largest storage tank within a division will not flood above the 70' level. 2.4.6 2.8.8 2.1.1 * Door closed sensors will be provided on flood doors with indications available at a monitored location.

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Flood Protection		Related
Paragraph	Assumption/Parameter Description	[TAAC
:9.8A.2.13.3	 It was assumed that the primary means of flood control in the Nuclear Annex and Reactor Building is provided by the divisional wall which serves as a barrier between redundant divisions of safety related equipment. 	2.4.4 2.4.6 2.8.2 2.8.6 2.8.8
19.15.3.3	* It was assumed that the primary means of flood control in the Nuclear Annex and Reactor Building is provided by the divisional wall which serves as a barrier between redundant divisions of safety related equipment.	2.3.2 2.4.4 2.4.6 2.8.2 2.8.6 2.8.8
	 It was assumed that there are no doors or passageways connecting the divisions of safety related equipment up to elevation 70+0. The equipment within the Component Cooling Water Heat Exchanger structure was assumed to be divisionally separated by a wall such that a flood in one division will not affect the other 	2.1.1 2.7.24 2.1.3
	<pre>division. * The divisional flood barrier between redundant divisions of safety related equipment is an important * The divisional flood barrier between redundant divisions of safety related equipment will not design feature which ensures that flooding of both divisions of safety related equipment will not occur.</pre>	2.3.2 2.4.4 2.4.6 2.8.2 2.8.6 2.8.8
	 The divisional separation of redundant safety related equipment in the Component Cooling Water Heat Exchanger structure and the station service water pump structure is also an important design feature. This ensures that flooding of both divisions of Component Cooling Water Reat Exchangers and station service water pumps will not occur. All safety related structures are designed to withstand the static and dynamic forces of flooding. Therefore, the structural wall between the Nuclear Annex and the Turbine Building will not fail. 	2.1.3 2.3.2 2.4.6 2.8.8 2.1.1 2.1.3 2.1.4

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Fire Protection		and the second se
		Related ITAAC
Paregraph	Assumption/Parameter Description	
IGURE 9.5.1-2	 All fire barriers which provide separation between the two divisions are rated for at least 3 hours. It was assumed that all fire doors and penetrations within the fire barriers are maintained during power operation to prevent the propagation of fire from one area to the next. 	2.1.1 2.7.24 2.8.2 2.8.6 2.1.1
	* The propagation of a fire from one division to the next is prevented by the divisional separation of redundant safety related equipment with a 3 hour fire barrier which is maintained during power	2.7.24
	<pre>operation. * It was assumed that there are no doors or passageways connecting the divisions of safety related</pre>	2.1.1 2.7.24
FIGURE 9.5.1-3	 equipment up to elevation 70+0. * The main control room and the remote shutdown room are located at different elevations and in different fire areas. Since the main control room ventilation system is separate from the ventilation system for the remote shutdown room, and the stainwells connecting these rooms are pressurized, it was assumed that smoke, hot gases, or fire suppressants cannot migrate from one room. 	2.1.1 2.7.24
	 to the next. Both the remote shutdown room and the main control room are protected by 3 hour fire walls and 3 hour fire doors. It is therefore assumed that a fire that originates in an area outside the main control room area will not threaten the habitability of the control room. Only fires that originate 	2.1.1 2.7.24
	inside the control room may force its evacuation. * All fire barriers which provide separation between the two divisions are rated for at least 3 hours. * All fire barriers and that all fire doors and penetrations within the fire barriers are maintained during power operation to prevent the propagation of fire from one area to the next.	2.1.1 2.7.24 2.8.2 2.8.6 2.1.1
	* The propagation of a fire from one division to the next is prevented by the divisional separation of redundant safety related equipment with a 3 hour fire barrier which is maintained during power	2.7.24
FIGURE 9.5.1-5	operation. * All fire barriers which provide separation between the two divisions are rated for at least 3 hours. It was assumed that all fire doors and penetrations within the fire barriers are maintained during power operation to prevent the propagation of fire from one area to the next.	2.1.1 2.7.24 2.8.2 2.8.6
	* The propagation of a fire from one division to the next is prevented by the divisional separation of redundant safety related equipment with a 3 hour fire barrier which is maintained during power	2.1.1 2.7.24
FIGURE 9.5.1-6	<pre>operation. * The main control room and the remote shutdown room are located at different elevations and in different fire areas. Since the main control room ventilation system is separate from the ventilation system for the remote shutdown room, and the stainwells connecting these rooms are </pre>	2.1.1 2.7.24
	pressurized, it was assumed that smoke, hot gases, or fire suppressants cannot migrate from one room	
	to the next. * Both the remote shutdown room and the main control room are protected by 3 hour fire walls and 3 hour fire dours. It is therefore assumed that a fire that originates in an area outside the main control room area will not threaten the habitability of the control room. Only fires that originate	2.1.1 2.7.24
9.5.1.1.2	inside the control room may force its evacuation. - Manual pull stations or individual fire detectors provide fire detection capability and can be used to initiate fire alarms.	2.7.24
9.5.1.7.1		

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ire Protection			
ITE PROCESSION			Relate
aragraph	Assumption/Parameter Description		ITAAC
	Assumption/Parameter Description - The motor-driven fire pump and the diesel-driven fire pump are separated by a three-hour fire rated		2.7.24
5.1.7.1	barriar		2.7.24
	 The electric motor-driven fire pump is powered from a permanent non-safety bus. The diesel and motor-driven fire pumps are designed to meet the largest design demand of any 		2.7.24
	sprinkler, pre-action, or deluge system plus 500 gpm for manual hoses.	T00000	2.7.24
	 Fire Protection Water Supply Tank: volume 	300000 gal 8 hr	2.7.24
	 Diesel Driven Fire Pump: fuel supply duration The standpipe systems in the Nuclear Annex and Reactor Building, along with their back-up water 	9 (m	2.7.24
.5.1.7.4	supply, are classified as Seismic Category 1.	Landson	2.7.2
	- Salemic Fire Water Sumply Tank: capacity	18000 gal 24 hr	2.7.2
.5.1.7.6	tice Detection &larm System Power Supply: Battery Backup Duration	24 10	2.7.2
.5.1.12	 A plant Fire Hazards Analysis considers potential fire hazards. A plant Fire Hazards Analysis considers potential fire hazards. 		2.7.2
9.7.3.1.1	a a level time Haranvia Analysis considers potential tice 0878005.		2.7.2
9.8.4.3	Propagation of fires between quadrants is assumed to be impossible based of the solution of the solution of the barriers. Fire doors between quadrants are three hour rated fire usors and three hour rated fire usors and the solution and to be incord		5,1,5
	between Fire Areas 38 and 41 and Fire Areas 39 and 40, as shown in Figure 7.5.1 c. * Propagation of fires between divisions is assumed to be impossible based on their separation by * Propagation of fires between divisions have no communicating openings below 70 feet elevation		2.7.2
	and all penetrations within the barriers are sealed with assemblies quartified to marrier the		
0.04.0.7.7.1	integrity of the three hour rating. * All fire berriers which provide separation between the two divisions are rated for at leas: 3 hours.		2.1.1 2.7.2
19.8A.2.7.3.1	It use secured that all fire doors and penetrations within the fire beiliers are manner and		2.8.2
	power operation to prevent the propagation of fire from one area to the next.		2.8.6
	* The propagation of a fire from one division to the nexr is prevented by the divisional separation of		2.1.1
	redundant safety related equipment with a 3 hour five barrier which is maintained during power		6.1.6
			2.1.1
	 * It was assumed that there are no doors or passageways connecting the divisions of safety related * It was assumed to alcosting 7000 		2.7.2
19.15.3.2	equipment up to elevation 70+0. * If a fire occurs inside the main control room and the operator determines that the control room		2.5.2
19.13.3.6	should be evacuated, it is assumed that the operator will trip the reactor and transfer control to		
	the Remote Shutdown Room prior to evacuation.		2.1.1
	* The main control room and the remote shutdown room are tocated at different fire areas. Since the main control room ventilation system is separate from the ventilation system for the remote shutdown room, and the stainwells connecting these rooms are pressurized, it was assumed that smoke, hot gases, or fire suppressants cannot migrate from one room		2.7.2
	to the next. * Both the remote shutdown room and the main control room are protected by 3 hour fire walls and 3 hour fire doors. It is therefore assumed that a fire that originates in an area outside the main control room area will not threaten the habitability of the control room. Only fires that originate inside the control room may force its evacuation.		2.1.1 2.7.2

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Fire Protection		Related
Paragraph 19.15.3.2	Assumption/Parameter Description * All fire barriers which provide separation between the two divisions are rated for at least 3 hours. It was assumed that all fire doors and penetrations within the fire barriers are maintained during power operation to prevent the propagation of fire from one area to the next.	1TAAC 2.1.1 2.7.24 2.8.2 2.8.6 2.1.1
	* The propagation of a fire from one division to the next is prevented by the divisional separation of redundant safety related equipment with a 3 hour fire barrier which is maintained during power operation.	2.7.24

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		Relatex ITAAC
Paragraph	Assumption/Parameter Description	N E 2
	- The digital equipment and software used in the PCS/P-CCS are diverse from that used in the PPS and	2.5.4
7.1.1.1.1	THE POP	2.5.1
7.1.2.10	classical indication durings are provided at PPS interfaces with the Power Control System, the	
a Cadea Cor	Bigmath (adjusting and ligen Suctom - Charge) N 200 The Date Processing System and Miser Stre	
	indiates and the Discrete Indication and Alarm System	2.5.4
	- Electrical isolation devices are provided between the PCS/P-CCS and the protection system signal	
	 conditioning equipment for each protection signal provided to them. The four ESF-CCS divisions are physically separated and electrically isolated. 	2.5.2
	the per per and the presence control system interface to the same contextain, crown rout	2.5.2
		2.5.2
	Provident inclusion who provided of ESE-115 Interfaces with the bird H, the bird, the	2.2.2.56
	the control and display interface devices, the master transfer switches, and technological	
	station and among and the OldS-D	2.5.1
.2.1.1	a sto and minister with the Deartor Trin Sultrhapar System and the Englised outcity reductes	
	Commondent Control System (ESE-CCS) which enables them to actuate mitigating systems when a	2.5.1
	 Instrumentation is provided to adequately monitor plant parameters. 	2.5.1
	 A reactor trip signal can be generated using any two of the four RPS channels. A reactor trip signal can be generated using any two of the four RPS channels. The four PPS channels are physically separated and electrically isolated. 	2.5.1
	 The four PPS channels are physically separately and electron requiring a reactor trip, the PPS logic Upon coincidence of two like signals indicating a condition requiring a reactor trip, the PPS logic 	2.5.1
	interested a possible frip	2.5.1
	 Instrumentation is provided to adequately monitor plant parameters and initiate Reactor Trip and 	2.17.1
	Employeered Estaty Esturge Actuation Stonals.	2.5.1
.2.1.1.1.1	e the pack has the constilling of generating an automatic or manual reactor trip signat.	2.5.1
.2.1.1.1.2	* The DDC has the canability of denerating an automatic of manual reactor trip signate	2.5.1
.2.1.1.1.3	* The RPS has the capability of generating an automatic or manual reactor trip signal.	2.5.1
.2.1.1.1.4	 The RPS has the capability of generating an automatic or manual reactor trip signal. The RPS has the capability of generating an automatic or manual reactor trip signal. 	2.5.1
.2.1.1.1.5	* The RPS has the capability of generating an automatic or manual reactor trip signal. * The RPS has the capability of generating an automatic or manual reactor trip signal.	2.5.1
7.2.1.1.1.6	a the pockee the carchitity of generating an automatic of manual reactor tity signal.	2.5.1
.2.1.1.1.7	a the ppc has the conchility of concerting an automatic of menual reduced trup signer.	2.5.1
2.1.1.1.9	* the one has the canability of generating an automatic of menual reducer tip signal.	2.5.
.2.1.1.1.10	* The BDC has the campability of conprating an automatic of merkal reducion tip signar.	2.5.1
.2.1.1.1.11	* The BRE has the conshility of generating an air marile of menual reducer unit argument	2.5.1
	THE REPORT OF THE REPORT AND AND THE PROPERTY AND THE REPORT OF THE REPORT	2.5.4
.2.1.1.2	- The digital equipment and software used in the PCS/P-ULS are diverse in the that used in the ris and	
	ESF-CCS.	2.5.4
.2.1.1.2.1	 Electrical isolation devices are provided between the PCS/P-CCS and the protection system signal Electrical isolation devices are provided between the PCS/P-CCS and the protection system signal 	
	<pre>conditioning equipment for each protection signal provided to them. * A reactor trip signal can be generated using any two of the four RPS channels.</pre>	2.5.1
.2.1.1.3	A Line his shamped happed can be activated in only one charget at a time.	2.5.
.2.1.1.5	 A distable trip channel bypass can be activated in the plant approaches conditions for which the The PPs automatically removes an operating bypass if the plant approaches conditions for which the 	2.5.1
	associated trip function is designed to provide protection.	2.5.1
7.2.1.1.7	* The Reactor Protection System (RPS) has four redundant channels.	2.3.1
7.2.1.1.8		

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Paragraph	Assumption/Parameter Description	Related ITAAC
	The digital equipment and software used in the PCS/P-CCS are diverse from that used in the PPS and	2.5.4
7.2.1.1.8 7.2.1.1.9 7.2.1.1.9.2 7.2.1.1.9.5 7.2.1.1.9.6 7.2.1.1.9.8 7.2.1.1.10 7.2.4	 The digital equipment and software used in the PCS/P-CCS are diverse from that used in the PPS and 	2.5.1 2.5.1 2.5.1 2.5.1 2.5.1 2.5.1 2.5.1 2.5.4
7.3.1.1	ESF-CCS. - The ESF-CCS includes component control logic, signal conditioning equipment, control and display interface devices, master transfer switches and diverse manual actuation switches. The ESF-CCS interfaces to ESF components and associated sensors, the PPS, the P-CCS, the PCS, the DIAS, and the	2.5.2
	<pre>OPS. - Each division of the ESF-CCS has the following elements: - selective 2-out of-4 logic, - component control logic, - process instrumentation, - signal conditioning equipment, - maintenance and test panel, - control and display interface devices,</pre>	2.5.2
	 master transfer switch. The operator interface devices of the ESF-CCS in the MCR provide for automatic and manual control of 	2.5.2
	ESF systems and components. - Each ESF-CCS division's maintenance and test panel provides capability to transfer control from the MCR to the remote shutdown panel for its respective ESF-CCS division and to transfer control back to	2.5.2
	 the MCR for its respective ESF-CCS division. Diverse manual actuation switches are provided as an alternate means for manual actuation of ESF components in two divisions of the ESF-CCS as follows: 2 trains of safety injection, 1 train of ontainment spray, 1 train of emergency feedwater to each steam generator 1 main steam isolation valve in each main steam line, 1 isolation valve in each containment air purge line, 	2.5.2
	 - 1 letdown isolation valve. - Electrical isolation devices are provided at ESF-CCS interfaces with the DIAS-N, the DPS, the P-CCS, the control and display interface devices, the master transfer switches, and between the signal 	2.5.2
	conditioning equipment and the DIAS-P. - Software programmable processors are arranged in primary and standby processor configuration within	2.5.2
	each ESF-CCS division. - ESFAS functions are divided into ESF-CCS distributed segments with two separate multiplexers per	2.5.2
	segment which receive PPS initiation signals. Separation is provided between safety critical ESFAS processing functions and auxiliary functions of man-machine interfaces, data communications, and automatic testing.	2.5.2

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Anticipated Transi	ients Without Scram	Related
		ITAAC
Paragraph	Assumption/Parameter Description	
	 Networks exhibit deterministic performance since all data is updated continuously and not dependent 	2.5.2
7.3.1.1	the stand of a state	2.5.2
	to those in the remote shutdown room. Indication of the transfer steets is provided in	
		2.5.2
	 Prior to transfer of control to the remote shutdown room, control actions in the remote shutdown room do not cause the ESF-CCS to generate the associated control signals. 	25.2
and the second second	- Each division of the ESF-CCS has the following elements:	2.5.2
7.3.1.1.2	- selective 2-out-of-4 logic,	
	- component control logic,	
	process instrumentation,	
	- signal conditioning equipment,	
	- maintenance and test panel,	
	- control and display interface devices,	
	 master transfer switch. The following ESFAS signals can be manually actuated at the Main Control Room: 	2.5.1
7.3.1.1.2.1	 The following ESFAS signals can be monally decoded of the name determined 	
	- Safety Injection Actuation Signal - Containment Spray Actuation Signal	
	- Containment Isolation Signal	
	- Main Steam Isolation Signal	
	Production Anticopy Classes	2.5.2
7.3.1.1.2.2	a par men livining analyzer i changele of thiriarion signals true une rro mitch die processes	
	 Each ESF-LLS division receives 4 chargers of intraction signals for the ESF systems controlled by using selective 2-out-of-4 logic to generate actuation signals for the ESF systems controlled by 	
	that division. - ESFAS functions are divided into ESF-CCS distributed segments with two separate multiplexers per	2.5.2
	- ESFAS functions are divided into the circula distributed seguences with the seguences	25.2
and the second second	segment which receive PPS initiation signals. The ESF-CCS provides control capability and, upon receipt of initiation signals from the PPS,	2.5.2
7.3.1.1.2.3	automatically generates actuation signals to the following non-ESF systems:	
	- annulus ventilation system,	
	- component cooling water system,	
	- onsite power system,	
	- diesel generators,	
	the second s	2.5.2
	 Control complex ventration system. Upon receipt of ESF initiation signals for safety injection, containment spray, or emergency feedwater, the ESF-CCS initiates an automatic start of the diesel generators and automatic load 	
		26.2
	sequencing of ESF loads. - Upon detecting loss of power to Class 1E division buses, the ESF-CCS automatically initiates startup	2.5.2
	of the respective diesel generators, and sequencing to the reloading of safety-related loads to the	
		2.5.2
	Upon ESE actuation the normal load sequence is interrupted and priority is given to loading the	
	- A CALE AND AND ACCOLLATED STATES STATES	2.5.2
	 The diesel loading sequence logic responds to loss of electrical power busses. 	

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Paragraph	Assumption/Parameter Description	Related ITAAC
7.3.1.1.5	 The Engineered Safety Features Actuation System (ESFAS) has at least two redundant trains to generate the following engineered safety feature signal: Safety Injection Actuation Signal (SIAS), Containment Spray Actuation Signal (CSAS), Containment Isolation Actuation Signal (CIAS), Main Steam 	2.4.5 2.5.2
	Isolation Signal (MSIS), Emergency Feedwater Actuation Signal (EFAS). - Each ESF-CCS division is powered from its respective Class 1E bus. - Software programmable processors are arranged in primary and standby processor configuration within	2.5.2 2.5.2
101. L	each ESF-CCS division. - The digital equipment and software used in the PCS/P-CCS are diverse from that used in the PPS and	2.5.4
7.3.1.1.6	ESF-CCS. - Diverse manual actuation switches are provided as an alternate means for manual actuation of ESF components in two divisions of the ESF-CCS as follows: - 2 trains of safety injection, - 1 train of containment spray.	2.5.2
	 1 train of emergency feedwater to each steam generator 1 main steam isolation valve in each mair steam line, 1 isolation valve in each containment air purge line, 	
	 i letdown isolation value. The diverse manual actuation switches provide signals to the lowest level in the ESF-CCS digital equipment. Communication of the signals from the switches is diverse from the software used in the 	2.5.2
	 higher levels of the ESF-CCS. Algorithm execution in Nuplex 80+ control and protection systems is deterministic. Actuation of the switches provides a signal which overrides the higher level signals to actuate the 	2.5.2 2.5.2
	associated ESF component or components.	2.5.2
7.3.1.1.8	 Periodic testing to verify operability of the ESF-CCS can be performed with the reactor at power on the churdren without interfering with the protective function of the system. 	2.5.2
	 Capability is provided for testing all functions from ESF initiating signals received from the PFS theorem to the actuation of protective system equipment. 	
7.3.1.1.8.4	 The ESF-CCS provides control capability and, upon receipt of initiation signals from the PPS, automatically generates actuation signals to the following ESF systems within allocated response times: 	2.5.2
	 safety injection system, containment isolation system, containment spray system main steam isolation, and 	
7.3 1.1.8.5	 emergency feedwater system The ESF-CCS provides control capability and, upon receipt of initiation signals from the PPS, automatically generates actuation signals to the following ESF systems within allocated response times: safety injection system, containment isolation system, containment spray system main steam isolation, and emergency feedwater system. 	2.5.2

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erroreseeres and a second s	p Selected UESSAR UC Parameters and assumptions addressed in derented being historical	
Anticipated Transient	s Without Scram	
		Related
Paragruph	Assumption/Parameter Description	ITAAC
	- The ESF-CCS provides control capability and, upon receipt of initiation signals from the PPS,	2.5.2
7.3.1.1.8.6	automatically generates actuation signals to the following ESF systems within allocated response	
	times:	
	 safety injection system, 	
	- containment isolation system, - containment spray system	
	- main steam isolation, and	
	- emergency feedwater system.	2.5.1
7.3.1.1.8.8	- The PPS initiates reactor trip and ESF system actuations within allocated response times.	2.5.2
	 The ESF-CCS provides control capability and, upon receipt of initiation signals from the PPS, automatically generates actuation signals to the following ESF systems within allocated response 	
	times:	
	- safety injection system,	
	- containment isolation system,	
	- containment spray system - main steam isolation, and	
	- omoroport feedbater system.	2.5.2
7.3.1.1.8.9	the RESPECt provides control canability and upon receipt of initiation signals from the PPS,	6.3.6
	automatically generates actustion signals to the following ESF systems within allocated response	
	times:	
	- safety injection system, - containment isolation system,	
	- containment spray system	
	- main steam isolation, and	
1	 emergency feedwater system. A SIAS actuates safety injection pumps and opens the corresponding discharge valves 	2.4.4
7.3.1.1.10	The recurse provides control canability and upon receipt of initiation signals from the Prs,	2.5.2
	automatically generates actuation signals to the following ESF systems within allocated response	
	times:	
	- safety injection system, - containment isolation system,	
	- containment spray system	
	- main steam isolation, and	
	- emergency feedwater system.	2.5.2
	 The ESF-CCS provides control capability and, upon receipt of initiation signals from the PPS, automatically generates actuation signals to the following non-ESF systems: 	
	 annulus ventilation system, 	
	- component cooling water system,	
	- ansite power system,	
	- diesel generators,	
7.3.1.1.10.1	 control complex ventilation system. * The ESFAS actuates the Engineered Safety Features (ESF) systems when demanded. 	2.4.5
7.3.1.1.10.2	* The ESEAS actuates the Engineered Safety Features (ESE) systems when demanded.	2.4.5
7.3.1.1.10.3	* The ESFAS actuates the Engineered Safety Features (ESF) systems when demanded.	E.4.3

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Paragraph	Assumption/Parameter Description	Related IIAAC
7.3.1.1.10.4 7.3.1.1.10.5	 The ESFAS actuates the Engineered Safety Features (ESF) systems when demanded. The ESFAS actuates the Engineered Safety Features (ESF) systems when demanded. The interiock on the EFW isolation valves automatically closes the isolation valves on high SG 	2.4.5 2.4.5 2.5.2
7.7.1.1.11	<pre>tevels when an Emergency Feedwater Actuation Signal is not present. The Alternate Protection System (APS) provides an alternate means of generating a reactor trip.</pre>	2.5.4
	 signal and an alternate feedwater actuation signal. The APS monitors the pressurizer pressure and generates a reactor trip signal if the RCS pressure exceeds a predetermined value. Similarly, an alternate feedwater actuation signal is generated if 	2.5.4
	the steam generator level decreases below a predetermined value. * The EFWS is actuated by a EFAS and a APS actuation signal (Low SG Water Level). - The DIAS and DPS provide for monitoring:	2.8.8 2.5.3
	 safety-related plant process display instrumentation reactor trip system status engineered safety feature system status 	
	- CEA position - post-accident monitoring of plant safety functions - status of plant operating mode-related bypasses	
	- core cooling status prior to & following an accident - PPS status information - ESF-CCS status information	
	 PCS/P-CCS status information The digital equipment and software used in the PCS/P-CCS are diverse from that used in the PPS and 	2.5.4
	ESF-CCS. - The PCS/P-CCS provide control interfaces for the following control functions: - reactivity control using control element assemblies, - reactor power cutback,	2.5.4
	 power change limiter, pressurizer pressure and level, main feedwater flow, 	
	- steam bypass flow, - boron concentration, - alternate reactor trip actuation, - alternate emergency feedwater actuation.	
	- The circuits used for alternate actuation of reactor trip, turbine trip and emergency feedwater are	2.5.4
	<pre>independent and diverse from the protection system actuation circuits. The PCS/P-CCS provide the following information to the DIAS: alternate reactor trip status, alternate feedwater actuation signal status, pressurizer pressure, and steam generator 1 and 2 levels.</pre>	2.5.4
7.7.1.1.11.1	 The digital equipment and software used in the PCS/P-CCS are diverse from that used in the PPS and 	2.5.4
	 ESF-CCS. Electrical isolation devices are provided between the PCS/P-CCS and the protection system signal conditioning equipment for each protection signal provided to them. 	2.5.4

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Paragraph	Assumption/Parameter Description	ITAAC
7.7.1.1.11.1	- Where the ESF-CCS and the process control system interface to the same component, electrical	2.5.2
	isolation devices are provided between the process control system and the shared component. - Electrical isolation devices are provided at ESF-CCS interfaces with the DIAS-N, the DPS, the P-CCS,	2.5.2
	the control and display interface devices, the master transfer switches, and between the signal conditioning emulament and the DIAS-P.	

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