

TABLE 1  
EVALUATION SUMMARY

TEST GROUP	TESTABLE W/O MODIFICATIONS	POTENTIAL ADVERSE CONSEQUENCES
HPI 1	*	5, 6, 14
HPI 2	*	5, 6, 14
HPI 3	Y	None
LPI 1	Y	8
LPI 2	Y	None
RBC 1	N	1, 2, 4, 9
RBC 2	N	1, 2, 7, 4, 12, 11,
RBC 3	N	1, 7, 11
RBC 4	N	1, 2, 4, 7, 12, 13, 14
RBC 5	N	2, 3, 4, 7, 10, 12

\* If methodology can be developed to prevent closure of MUV-64 these groups can be tested without modifications.

- (1) Interruption of Cooling Flow to Reactor Coolant Pumps.
- (2) Interruption of Seal Injection Flow to Reactor Coolant Pumps, Motors and Seals.
- (3) Interruption of Cooling Flow to Control Rod Drive Motors.
- (4) Thermal Cycling of Primary Heat Exchanges (Letdown, Bleed Tank, etc.).
- (5) Loss of Suction to running Makeup/High Pressure Injection pump.
- (6) Thermal cycling of makeup/high pressure injection nozzles if inadvertently aligned with Borated Water Storage Tank.
- (7) Loss of cooling to Reactor Vessel cavity - potential adverse effects on Nuclear Instrumentation (RPS Input).
- (8) Potential overpressurization of low pressure piping (WASH 1400 Event V Scenerio).
- (9) Loss of Cooling Flow to miscellaneous plant equipment (evaporators, waste gas compressors, seal return coolers, etc.).
- (10) Isolation of RM-A6 (RCS leakage detection primary sensor).
- (11) Cross connection of Industrial Cooling and Nuclear Services Closed Cycle Cooling Water systems.
- (12) Reduction of Reactor Building cooling capacity.
- (13) Isolate Reactor Building Vent header.
- (14) Interruption of normal Reactor Coolant makeup flow.

TABLE 2  
ANALYSIS OF THE EFFECTS OF ES TESTING ON PLANT OPERATIONS

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
HPI-1(A)	MUV-53	MUP minimum flow recirculation valve	Permits recirculation of MUP discharge back to MUT	Closed	M	Stops minimum flow recirculation causing normal duty MUP to overheat if valve fails closed.
HPI-1(A)	MUV-23	HPI line Isolation valve	Permits HPI flow to RCS cold leg	Open	H	Each valve stroke causes potential thermal and mechanical shock to associated HPI nozzle and thermal sleeve.
HPI-1(A)	MUV-24	HPI line Isolation valve	Permits HPI flow to RCS cold leg	Open	H	Each valve stroke causes potential thermal and mechanical shock to associated HPI nozzle and thermal sleeve.
HPI-1(A)	MUV-73	BWST suction valve to MUP-1A(1B)	Aligns HPI pump 1A(1B) to take suction from BWST	Open	M	Testing during Reactor operations causes potential thermal shock to normal makeup nozzle and reactor coolant pump seal packages.
HPI-1(A) HPI-1(B) HPI-2(A) HPI-2(B)	MUV-64	MUT suction valve to MUP-1A(1B, 1C)	Aligns the makeup (HPI) pumps to take suction from the MUT	Closed	H	If valve fails shut during test, all operating makeup (HPI) pumps would be destroyed in a matter of seconds.
HPI-1(A)	EFP-1 trip signal	Motor driven emergency feed pump trip signal	Causes EFP-1 to be tripped so it can be subsequently restarted on the emergency diesel generator 5 seconds after block 4.	Tripped	L	Motor driven emergency feed pump is unavailable for automatic start until test signal is reset

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
HPI-1(B)	MUV-257	MUP minimum flow recirculation valve	Permits recirculation of MUP discharge back to MUT	Closed	M	Stops minimum flow recirculation causing normal duty MUP to overheat if valve fails closed.
HPI-1(B)	MUV-25	HPI line isolation valve	Permits HPI flow to RCS cold leg	Open	H	Each valve stroke causes potential thermal and mechanical shock to associated HPI nozzle and thermal sleeve.
HPI-1(B)	MUV-26	HPI line isolation valve	Permits HPI flow to RCS cold leg	Open	H	Each valve stroke causes potential thermal and mechanical shock to associated HPI nozzle and thermal sleeve.
HPI-1(B)	MUV-58	BWST suction valve to MUP-1C(1B)	Aligns HPI pump 1C(1B) to take suction from BWST	Open	M	Testing during reactor operation causes potential thermal shock to normal makeup nozzle and reactor coolant pump seal packages.
HPI-2(A)	EDG-A Start	Emergency Diesel Generator	Starts diesel generator in anticipation of loss of voltage to ES buses	Running	L	Test starts in addition to required testing on diesels should be minimized to reduce bearing wear.
HPI-2(A)	DHP-1A	Decay heat removal pump/low pressure injection pump	Pump is started on HPI signal in anticipation of a large break LOCA requiring low pressure injection	Running	L	Frequent test starts on these pumps should be avoided to reduce excessive wear. Pump must be placed in a recirculation lineup for this test and is therefore unavailable for ES operation.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
HPI-2(A)	UVLO	480 Volt ES-A bus undervoltage lockout	If an undervoltage condition exists or EDG-B output breaker is closed and an ES signal is present, this UVLO device strips non-essential loads from the 480 volt ES-A bus.	Tripped or reset depending on whether or not a bus undervoltage condition exists or EDG-A output breaker is closed.	L	Spurious actuation during testing could cause loads to be stripped from 480 volt ES-A bus. The following are examples of loads affected: spent fuel cooling pump, BWST heaters, chilled water pump, 480 volt ES bus tie breaker, control complex water chiller, control complex fans.
HPI-2(A)	AHF-1A (Fast Off)	Reactor Building normal and emergency cooling fan	ES signal stops the fan if running in fast speed in anticipation of restarting it in slow speed	Off	L	If fan cannot be restarted in fast speed following test, STS 3.6.1.5 and 3.6.2.3 will force a plant shutdown. RB air temperature may exceed allowable limits.
HPI-2(A) HPI-2(B)	AHF-1C (Fast Off)	Reactor Building normal and emergency cooling fan	ES signal stops the fan if running in fast speed in anticipation of restarting it in slow speed	Off	L	If fan cannot be restarted in fast speed following test, STS 3.6.1.5 and 3.6.2.3 will force a plant shutdown. RB air temperature may exceed allowable limits.
HPI-2(A)	MUP-1A	High Pressure injection pump	ES Signal starts pump to initiate HPI flow	Running	H	Pump start causes flow shock to RCP seals and MU nozzle. If BWST used for suction supply, thermal shock to HPI nozzle and RCP seals is possible. If MUT used for suctions, loss of suction is possible since MUV-64 is tested by the same group. Loss of suction will destroy pump in a matter of seconds.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
HPI-3(A)	RWP-2A	Emergency Nuclear Services SWP	ES signal starts pump to initiate sea water side flow through the Nuclear Services heat exchangers	Running	L	
HPI-3(A)	RWP-3A	Decay heat service sea water pump	ES signal starts pump to initiate sea water side flow through the decay heat exchanger	Running	L	
HPI-3(A)	DCP-1A	Decay heat closed cycle cooling pump	ES signal starts pump to initiate fresh water side flow through the decay heat exchanger	Running	L	
HPI-3(A)	SWP-1A	Nuclear Services closed cycle cooling pump	ES signal starts pump to initiate fresh water side flow through the Nuclear Services heat exchangers	Running	L	The large number of essential heat exchangers served may be subjected to excessive mechanical flow induced transients due to frequent testing.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
HPI-3(A)	AHF-15A	Fan cooler unit for DCP-1A	Provides forced air cooling to the motor of DCP-1A	Running	None	
HPI-3(A)	AHF-1A	Reactor Building normal and emergency duty cooling fan	ES signal, restarts fan in slow speed after stopping it, if it is running in fast	Running	L	If test not properly conducted, both fast and slow windings could be energized, if fan cannot be restarted in fast speed following the test STS 3.6.1.5 and 3.6.2.3 will force a plant shutdown. RB temperature may exceed allowable limits.
HPI-3(A) HPI-3(B)	AHF-1C (slow on)	Reactor Building normal and emergency duty cooling fan	ES signal restarts fan in slow speed after stopping it, if it is running in fast	Running	L	If test not properly conducted, both fast and slow windings could be energized, if fan cannot be restarted in fast speed following the test, STS 3.6.1.5 and 3.6.2.3 will force a plant shutdown. RB temperature may exceed allowable limits.
HPI-3(B)	RWP-2B	Emergency Nuclear Services sea water pump	ES signal starts pump to initiate sea water flow through the Nuclear Services heat exchangers	Running	L	
HPI-3(B)	RWP-3B	Decay heat service sea water pump	ES signal starts pump to initiate sea water side flow through the decay heat exchanger	Running	L	

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
HPI-3(B)	DCP-1B	Decay heat closed cycle cooling pump	ES signal starts pump to initiate fresh water side flow through the decay heat exchanger	Running	L	
HPI-3(B)	SWP-1B	Nuclear Services closed cycle cooling pump	ES signal starts pump to initiate fresh water side flow through the Nuclear Services heat exchangers	Running	L	The large number of essential heat exchangers served may be subjected to excessive mechanical/flow induced transients due to frequent testing.
HPI-3(B)	AHF-15B	Fan cooler unit for DCP-1A	Provides forced air cooling to the motor of DCP-1B	Running	None	
HPI-3(B)	AHF-1B	Reactor Building normal and emergency duty cooling fan	ES signal restarts fan in slow speed after stopping it if it is running in fast	Running	L	If test not properly conducted both fast and slow windings could be energized. If fan cannot be restarted in fast speed following the test, STS 3.6.1.5 and 3.6.2.3 will force a plant shutdown, RB temperature may exceed allowable limits.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
LPI-1(A)	DHV-5	Low Pressure injection valve	LPI signal opens valve to permit LPI flow to the RCS	Open	L	If downstream check valves leak back, there is some potential for overpressurizing DH system or lifting a relief valve. (Wash - 1400, Event V)
LPI-1(A)	DHV-34	BWST suction to LPI pump	LPI signal opens valve to permit LPI pump to take suction from BWST	Open	None	
LPI-2(A)	DHV-6	Low pressure injection valve	LPI signal opens valve to permit LPI flow to the RCS	Open	L	If downstream check valves leak back, there is some potential for overpressurizing DH system or lifting a relief valve. (Wash - 1400, Event V)
LPI-2(A)	DHV-35	BWST suction to LPI pump	LPI signal opens valve to permit LPI pump to take suction from BWST	Open	None	

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-1(A)	BSV-3	BSP-1A discharge Isolation/control valve	Permits flow of building spray to the containment and prevents dump runoff by controlling flow at approximately 1500 gpm	Open/Throttled	M	Opening this valve routinely could increase the admittance of highly borated water to the RB spray header piping which will enhance/promote stress corrosion in the associated piping under stagnant conditions.
RBC-1(A)	MUV-260	RCP-1C seal return Isolation valve	Permits seal return flow from the RCP seal package to the makeup system.	Closed	H	If valve fails shut during test, pressure across all 3 stages of the the seal will equalize thereby placing full system pressure across the last seal stage. Operation under these conditions produces a high probability of catastrophic seal failure.
RBC-1(A) RBC-1(B)	SWV-82	RCP-1C cooling water supply isolation	Provides cooling water flow to the RCP motor and seal package	Closed	H	If valve fails closed during test, RCP failure will result in 5 minutes from overheating.
RBC-1(A) RBC-1(B)	SWV-86	RCP-1C cooling water return isolation	Provides cooling water flow from the RCP motor and seal package	Closed	H	If valve fails closed during test, RCP failure will result in 5 minutes from overheating.
RBC-1(A) RBC-1(B)	SWV-12	Supply header isolation to Auxiliary equipment cooling water	Provides cooling water flow to seal return coolers, RC/miscellaneous waste evaporator and waste gas compressors.	Closed	L	
RBC-1(A)	CAV-1	Pressurizer steam sample isolation valve	Permits primary sample to be drawn from the pressurized steam space.	Closed	L	If valve fails closed, one primary sample means will be terminated.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-1(A)	CFV-11	CFT-1A sample isolation valve	Permits a sample to be drawn from CFT-1A	Closed	L	If valve fails during test, will be unable to sample CFT.
RBC-1(A)	WDV-3	RB sump pump discharge isolation valve	Aligns the RB sump to be pumped to MWST	Closed	None	
RBC-1(A)	MUV-40	MUHE-1A outlet isolation valve	Provides RCS water flow from the letdown cooler to the purification system.	Closed	H	Experience has shown that cycling this valve at power subjects the associated cooler to thermal transients which may result in tube failure/cooler damage, hence a primary to secondary cooling system (SW) leak will occur.
RBC-1(A) RBC-1(B)	CFV-25	Makeup isolation valve to CFT-1A	Provides a means to add primary grade water to the CFT to makeup for leakage.	Closed	None	
RBC-1(B)	BSV-4	BSP-1B discharge isolation/control valve	Permits flow of building spray to the containment and prevents pump runout by controlling flow at approximately 1500 gpm.	Open/Throttled	M	Opening this valve routinely could increase the admittance of highly borated water to the RB spray header piping which will enhance/promote stress corrosion in the associated piping under stagnant conditions.
RBC-1(B)	CFV-29	Combined CFT vent isolation to Waste Gas	Provides a vent path for the CFT's to waste gas	Closed	L	If valve fails during test, will be unable to vent or depressurize CFT's.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-1(B)	WDV-4	RB sump pump discharge isolation valve	Aligns the RB sump to be pumped to MWST	Closed	L	Inability to pump down the sump as a result of valve failure does not present a significant safety concern during power operation.
RBC-1(B)	CAV-2	RCS Combined Sample isolation valve	Permits a primary sample to be taken from the RCS.	Closed	L	Failure of this valve during test will prevent sampling of the RCS. However, this does not present a significant safety concern while on line. Prolonged inability to sample (>24 hrs) will result in the inability to meet tech spec sampling requirements.
RBC-1(B)	MUV-49	Letdown isolation valve	Provides a means of letting down primary coolant to the purifier	Closed	H	Experience has shown that closure of this valve at power subjects the the letdown coolers to thermal transients which may result in tube failure/cooler damage, hence a primary to secondary cooling system (SW) leak will occur.
RBC-2(A)	BSV-12	BSP-1A suction from sodium thiosulphate tank	Align the BSP suction to the sodium thiosulfate tank for injection into the RCS under accident conditions.	Open	None	These valves are no longer required to operate since sodium thiosulfate is no longer used for accident mitigation at this site. These valves should be removed from ESFAS.
RBC-2(A)	MUV-261	RCP-10 seal return isolation valve.	Permits seal return flow from the RCP seal package to the makeup system.	Closed	H	If valve fails shut during test, pressure will equalize across all seal stages thereby placing full system pressure across the last seal stage. Operation under these conditions produces a very high probability of catastrophic seal failure.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-2(A)	CIV-34	Industrial cooling pump 3A supply to reactor cavity cooler.	Containment isolation valve. Supplies cooling water to reactor cavity cooling Unit A.	Closed	M	Reactor cavity cooling units are required during power operation to maintain a suitable environment for operation of excore neutron detectors. Failure of cooling water to these units can result in failed excore detectors.
RBC-2(A) RBC-2(B)	SWV-353	Nuclear Services cooling water supply to RB cooling fans.	ES signal causes RB cooling fans/coolers to swap over from CI to SW cooling. This valve supplies SW to the RB coolers.	Open	None	
RBC-2(A) RBC-2(B)	SWV-81	RCP-1D cooling water supply.	Provides cooling water flow to the RCP motor and seal package.	Closed	H	If valve fails closed during test, RCP failure will result in 5 minutes from overheating.
RBC-2(A) RBC-2(B)	SWV-85	RCP-1D cooling water return	Provides cooling water flow from the RCP motor and seal package.	Closed	H	If valve fails closed during test, RCP failure will result in 5 minutes from overheating.
RBC-2(A)	CAV-3	Pressurizer water space sample isolation valve	Permits primary sample to be drawn from the pressurizer water space.	Closed	L	If valve fails closed during test, one primary sample means will be terminated.
RBC-2(A)	CFV-12	CFT-1B sample isolation valve	Permits a sample to be drawn from CFT-1B	Closed	L	If valve fails during test, will be unable to sample CFT.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-2(A)	WDV-60	RCDT discharge to MWST.	Provides a flow path to pump down the RCDT to MWST	Closed	M	If this valve fails closed during test, no means will be left to remove water from RCDT. Operation under these conditions at power for prolonged periods may result in overfilling the tank with RCS leakage and eventually over-pressurizing the RCDT, hence rupturing the blowout disk.
RBC-2(A)	MUV-41	Letdown cooler 1B outlet isolation valve	Provides RCS flow from the letdown cooler to the purification system.	Closed	H	Experience has shown that cycling this valve at power subjects the associated cooler to thermal transients which may result in tube failure/cooler damage, hence a primary to secondary cooling system (SW) leak will occur.
RBC-2(A) RBC-2(B)	DWV-160	Demineralized water to the RB	Provides flushing water to RCP seal standpipes and serves as fill source for RCDT.	Closed	L	If valve fails closed, RB activity will increase due to seal package leakage emission to RB atmosphere.
RBC-2(A) RBC-2(B)	CFV-26	Makeup isolation valve to CFT-1B	Provides a means to add primary grade water to the CFT to makeup for leakage.	Closed	None	
RBC-2(B)	BSV-11	BSP-1B suction from sodium thiosulphate tank	Align the BSP suction to the sodium thiosulfate tank for injection to the RCS under accident conditions.	Open	None	This valve is no longer required to operate since sodium thiosulfate is no longer used for accident mitigation at this site. These valves should be removed from ESFAS.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-2(B)	CFV-42	Combined CFT sample isolation valve	Provides a means to draw a sample from the CFT's.	Closed	L	If valve fails during testing, will be unable to sample CFT's.
RBC-2(B)	WDV-61	RCDT discharge to MWST	Provides a flow path to pump RCDT to the MWST.	Closed	M	If valve fails closed during test, no means will be available to remove water from RCDT. Operations under these conditions at power for prolonged periods may result in overfilling the tank with RCS leakage and eventual over-pressurizing the RCDT, hence rupturing the blowout disk.
RBC-2(B)	CAV-6	OTSG-1A sample isolation valve.	Permits sampling from OTSG-1A	Closed	L	Failure of this valve during test will prevent the OTSG from being sampled. Prolonged inability to sample will result in tech spec non-compliance and potential forced shutdown.
RBC-3(A) RBC-3(B)	SWV-80	RCP-1A cooling water supply valve.	Provides cooling water flow to the RCP motor and seal package.	Closed	H	If valve fails closed during test, RCP failure will result in 5 minutes from overheating.
RBC-3(A) RBC-3(B)	SWV-84	RCP-1A cooling water return isolation	Provides cooling water flow to the RCP motor and seal package.	Closed	H	If valve fails closed during test, RCP failure will result in 5 minutes from overheating.

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	TAG NO.	DESCRIPTION				
RBC-3(A) RBC-3(B)	SWV-354	Nuclear Services cooling water return from RB cooling fans	ES signal causes RB cooling fans/coolers to swap over from CI to SW cooling. This valve returns SW from the RB coolers.	Open	None	
RBC-3(A) RBC-3(B)	CIV-35	Industrial cooling water return isolation from reactor cavity cooler	Containment isolation valve which returns cooling water from reactor cavity cooling Unit A	Closed	M	Reactor cavity cooling units are required during reactor operation to maintain a suitable environment for the excore neutron detectors. Failure of cooling water to these units can result in failed excore detectors.
RBC-3(A)	BSV-17	Building Spray pump suction isolation	Permits the building spray pump (BSP-1A) to take suction from the DH header.	Open	None	
RBC-3(A) RBC-3(B)	MSV-130	OTSG drain/blowdown line isolation valve	Permits a flow path for OTSG draining or blowdown to the hotwell or atmosphere drain tank	Closed	L	Valve is normally closed and should not be opened during reactor operation for testing. This is a high energy line normally used only for startup and shutdown.
RBC-3(A)	CFV-15	CFT-B vent isolation valve	Provides a vent path for CFT-B to waste gas	Closed	L	If valve fails closed during test, will be unable to vent or depressurize CFT-B. Valve is normally closed and it is considered inappropriate to open to test close feature.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-3(A)	WDV-94	RCDT pump discharge isolation to waste disposal	Permits RCDT contents to be pumped to liquid waste system for processing	Closed	L	If valve fails shut, RCDT will fill slowly due to relief valve leakage/RCP dumpster flow causing plant to shut down to prevent overpressurizing RCDT.
RBC-3(A)	CAV-4	OTSG-1A sample isolation valve	Permits sampling from OTSG-1A	Closed	L	Failure of this valve during test will prevent the OTSG from being sampled. Prolonged inability to sample will result in a tech spec non-compliance and potential forced shutdown.
RBC-3(A)	AHV-1C	RB purge supply isolation valve	Permits a flowpath for outside air supply to RB	Closed	L	Excessive testing of valve causes seal wear. Valve is normally shut during Reactor operation and would be inappropriate to initiate purge (through a release permit) to test closure.
RBC-3(A) RBC-3(B)	CFV-27	Nitrogen supply isolation to CFT-B	Provides a flowpath for maintaining CFT pressure $600 \pm 25$ psig with nitrogen	Closed	L	Testing could cause CFT pressure to exceed specifications. Valve is normally closed and it is considered inappropriate to open to test close feature.
RBC-3(B)	BSV-16	Building spray pump suction isolation	Permits the building spray pump (BSP-1B) to take a suction from the DH header	Open	None	

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	TAG NO.	DESCRIPTION				
RBC-3(B)	WDV-62	RCDDT pump discharge isolation to waste disposal	Permits RCDDT contents to be pumped to liquid waste system for processing	Closed	L	If valve fails shut, RCDDT will fill slowly due to relief valve leakage/RCP dumpster flow causing plant to shut down to prevent overpressurizing RCDDT.
RBC-3(B)	CAV-7	OTSG-1B sample isolation valve	Permits sampling from OTSG-1B	Closed	L	Failure of this valve during test will prevent the OTSG from being sampled. Prolonged inability to sample will result in a tech spec non-compliance and potential forced shutdown.
RBC-3(B)	AHV-1D	RB purge supply isolation valve	Permits a flowpath for outside air supply to RB	Closed	L	Excessive testing of valve causes seal wear. Valve is normally shut during Reactor operation and would be inappropriate to initiate purge (through a release permit) to test closure.
RBC-4(A)	BSV-36	Sodium hydroxide storage tank isolation valve	Valve opens on ES signal to allow sodium hydroxide to mix with low pressure injection flow and building spray flow for pH and iodine control.	Open	L	Improper valve lineup could result in inadvertent sodium hydroxide injection to RCS.
RBC-4(A) RBC-4(B)	CIV-41	Industrial cooling water supply valve to reactor cavity cooler	Containment isolation valve. Supplies cooling water to reactor cavity cooling unit B	Closed	M	Reactor cavity cooling units are required during reactor operation to maintain suitable environment for operation of excore neutron detector. Failure of cooling water to these units can result in failed excore detectors.

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RBC-4(A)	MUV-258	RCP-1A seal return isolation valve.	Permits seal return flow from the RCP seal package to the makeup system.	Closed	H	If valve fails shut during test, pressure across all three stages of the seal will equalize thereby placing full system pressure across the last seal. Operation under these conditions produces a very high probability of catastrophic seal failure.
RBC-4(A)	SWV-151	RB emergency cooling fan CI return isolation valve	ES signal causes RB emergency fan coolers to swap over from CI to SW cooling water. This valve isolates CI return	Closed	H	Closing this valve causes all normal duty RB cooling to be isolated if the valve fails closed, STS 3.6.1.5 and 3.6.2.3 will force a plant shut-down. RB temp may exceed allowable limits.
RBC-4(A) RBC-4(B)	MUV-27	RCS normal makeup isolation valve	ES signal causes valve to close to assure full HPI flow/balanced flow to HPI nozzles	Closed	H	Closing this valve isolates the pressurizer level control valve and the 15 gpm minimum flow to the makeup/HPI nozzle thermal sleeve, each open/closed cycle for testing is a thermal and mechanical shock on this nozzle.
RBC-4(A) RBC-4(B)	SWV-47	SW cooling water supply valve to letdown cooler	Isolates cooling water to letdown cooler which is non-essential equipment during ES actuation	Closed	H	Closing and opening valve for testing during Reactor operation causes thermal and mechanical shock to letdown cooler. Leaks were found in both coolers during Cycle 4 and cycling of these valves during Reactor operation may have contributed to the failure.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
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RBC-4(A) RBC-5(B)	SWV-152	RB emergency cooling fan CI supply isolation valve	ES signal causes RB emergency fan coolers to swap over from CI to SW cooling water. This valve isolates CI supply	Closed	H	Closing this valve causes all normal duty RB cooling to be isolated. If the valve fails closed, STS 3.6.1.5 and 3.6.2 will force a plant shutdown. RB temp may exceed allowable limits.
RBC-4(A) RBC-4(B)	SWV-50	SW cooling water return valve from letdown cooler	Isolates cooling water return from letdown cooler which is non-essential equipment during ES actuation	Closed	H	Closing and opening valve for testing during Reactor operation causes thermal and mechanical shock to letdown coolers. Leaks were found in both coolers during Cycle 4 and cycling of these valves during Reactor operation may have contributed to the failure.
RBC-4(A) RBC-4(B)	SWV-79	RCP-1B cooling water supply valve	Provides cooling water flow to the RCP motor and seal package	Closed	H	If valve fails closed during test, RCP failure will result in 5 minutes from overheating
RBC-4(A) RBC-4(B)	SWV-83	RCP-1B cooling water return isolation	Provides cooling water flow to the RCP motor and seal package	Closed	H	If valve fails closed during test, RCP will fail in 5 minutes from overheating
RBC-4(A)	CAV-5	OTSG-1B sample isolation valve	Permits sampling from OTSG-1B	Closed	L	Failure of this valve during test will prevent the OTSG from being sampled. Prolonged inability to sample will result in a tech spec non-compliance and potential forced shutdown.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-4(A)	AHV-1B	RB purge exhaust isolation valve	Permits RB ventilation purge exhaust to Auxiliary building vent	Closed	L	Excessive testing of valve causes seal wear. Valve is normally closed during Reactor operation and would be inappropriate to initiate purge (through release permit) to test closure.
RBC-4(A) RBC-4(B)	CFV-28	Nitrogen supply isolation to CFT-A	Provides flowpath for maintaining CFT pressure $600 \pm 25$ psig with nitrogen	Closed	L	Testing could cause CFT pressure to exceed specifications. Valve is normally closed and seems inappropriate to open to test close feature.
RBC-4(A)	CFV-16	CFT-A vent isolation valve	Provides a vent path for CFT-A to waste gas	Closed	L	If valve fails closed during test, will be unable to vent or depressurize CFT-A. Valve is normally closed and it is considered inappropriate to open to test close feature.
RBC-4(A)	WDV-406	RB vent header isolation to waste gas	Provides a flow path to vent various components located inside the RB to the waste gas system	Closed	L	Failure of valve in closed position could result in gaseous release inside RB or potential (long term) rupture of RCDT rupture disk.
RBC-4(A) RBC-4(B)	MSV-148	OTSG drain/blowdown line isolation valve	Permits a flow path for OTSG draining or blowdown to the hotwell or atmospheric drain tank	Closed	L	Valve is normally closed and should not be opened for testing during reactor operation. This is a high energy line normally used only for startup and shutdown.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-4(B)	BSV-37	Sodium hydroxide storage tank isolation valve	Valve opens on ES signal to allow sodium hydroxide to mix with low pressure injection flow and building spray flow for ph and iodine control	Open	L	Improper valve lineup could result in inadvertent sodium hydroxide injection to RCS.
RBC-4(B)	SWV-355	RB emergency cooling fan CI return isolation valve	ES signal causes RB emergency fan coolers to swap over from CI to SW cooling water. This valve isolates CI return.	Closed	H	Closing this valve causes all normal duty RB cooling to be isolated. If the valve fails closed, STS 3.6.1.5 and 3.6.2.3 will force a plant shutdown. RB temperature may exceed allowable limits.
RBC-4(B)	AHV-1A	RB purge exhaust isolation valve	Permits RB ventilation purge exhaust to Auxiliary building vent	Closed	L	Excessive testing of valve causes seal wear. Valve is normally closed during Reactor operation and would be inappropriate to initiate purge (through release permit) just to test closure.
RBC-4(B)	WDV-405	RB vent header isolation to waste gas	Provides a flow path to vent various components located inside the RB to the waste gas system	Closed	L	Failure of valve in closed position could result in gaseous release inside the RB or potential (long term) failure of the RCDT rupture disk.
RBC-5(A)	WSV-3	RB Atmosphere sample supply isolation to RMA-6	Provides a flow path to sample reactor building atmosphere for RCS leak detection	Closed	L	Failure closed could cause RMA-6 sample pump to overheat. Failure closed would also put plant into an immediate shutdown (6 hours to hot standby) per STS 3.4.6.1.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-5(A)	MUV-259	RCP-1B seal return isolation valve	Permits seal return flow from the RCP seal package to the makeup system	Closed	H	If valve fails shut during test, pressure across all 3 stages of the seal will equalize thereby placing full system pressure across last stage seal. Operation under these conditions produces a high probability of catastrophic seal failure.
RBC-5(A) RBC-5(B)	CIV-40	Industrial cooling water return isolation from reactor cavity cooler	Containment isolation valve which returns cooling water from reactor cavity cooling Unit B	Closed	M	Reactor cavity cooling units are required during reactor operation to maintain a suitable environment for the excore neutron detectors. Failure of cooling water to these units can result in failed excore detectors.
RBC-5(A)	WSV-5	RB atmosphere sample return from RMA-6	Provides a flowpath to return reactor building atmospheric samples to the RB	Closed	L	Failure closed could cause RMA-6 sample pump to overheat. Failure closed would also require plant to shut down (6 hrs to hot standby) STS 3.4.6.1.
RBC-5(A)	3ESAR	ES Actuation Relay	Places control room ventilation into emergency operation mode on receipt of an ES signal	Recirculation	L	Operators must manually start emergency control room vent fans. Failure to start these fans could cause equipment to overheat.
RBC-5(A) RBC-5(B)	SWV-48	SW cooling water supply valve to letdown cooler	Isolates cooling water to letdown cooler which is non-essential equipment during ES actuation	Closed	H	Closing and opening valve during Reactor operation causes thermal and mechanical shock to letdown coolers. Leaks were found in both coolers during Cycle 4 and cycling of these valves during reactor operation may have been a contributor.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-5(A) RBC-5(B)	SWV-109	SW cooling water supply isolation to control rod drives	Provides flowpath for SW cooling to control rod drives	Closed	H	Failure closed isolates cooling to all control rod drives. Prolonged failure requires a reactor trip, increasing the potential for an additional transient.
RBC-5(A) RBC-5(B)	SWV-110	SW cooling water return isolation from control rod drives	Provides flowpath to return cooling water from control rod drives	Closed	H	Failure closed isolates cooling to all control rod drives. Prolonged failure requires a reactor trip, increasing the potential for an additional transient.
RBC-5(A) RBC-5(B)	SWV-49	SW cooling water return valve from letdown cooler	Isolates cooling water return from letdown cooler which is non-essential equipment during ES actuation	Closed	H	Closing and opening valve for testing during reactor operation causes thermal and mechanical shock to letdown coolers. Leaks were found in both coolers during Cycle 4 and stroking of these valves during reactor operation may have been a contributor.
RBC-5(A)	CAV-126	RCS letdown sample isolation	Permits primary sample to be drawn from letdown line	Closed	L	If valve fails closed during test, one primary sample means will be terminated.
RBC-5(B)	WSV-4	RB atmosphere sample supply isolation to RMA-6	Provides a flowpath to sample RB atmosphere for RCS leak detection	Closed	L	Failure closed could cause RMA-6 sample pump to overheat. Failure closed would also put plant into action statement of STS 3.4.6.1 requiring hot standby in 6 hours.

TEST GROUP	ACTUATED EQUIPMENT		FUNCTION	ES CONDITION	LEVEL OF RISK (1)	DESCRIPTION OF POTENTIAL ADVERSE CONSEQUENCE (2)
	TAG NO.	DESCRIPTION				
RBC-5(B)	MUV-253	Combined seal return isolation valve for all four RCP's	Permits seal return flow from all four RCP's to the makeup system	Closed	H	Of the seal return isolation valves, this valve has the most significant impact if it fails closed since it affects seal return flow for all four RCP's simultaneously. If valve fails closed, pressure across all three seal stages will equalize with the RCS placing full system pressure on the last stage. Staging and unstaging of the seals in this fashion results in a high probability of seal failure.
RBC-5(B)	WSV-6	RB atmosphere sample return from RMA-6	Provides a flowpath to return reactor building atmospheric samples to the RB	Closed	L	Failure closed could cause RMA-6 sample pump to overheat. Failure closed would also require plant to shut down (6 hrs. to hot standby) per STS 3.4.6.1.
RBC-5(B)	3ESAR	ES actuation relay	Places control room ventilation into emergency operating mode on receipt of an ES signal.	Recirculation	L	Operators must manually start emergency control room vent fans. Failure to start these fans could cause equipment to overheat.

(1) This column represents the subjective judgement of appropriate staff as to whether the seriousness and/or probability of the identified consequences are high, moderate or low (H, M, or L).

(2) This does not include wear associated with a high frequency of testing to meet tech spec, ASME XI, or other testing requirements.

## ACRONYMS USED IN TABLE 2

AHF	-	Air Handling Fan
AHV	-	Air Handling Valve
BSP	-	Building Spray Pump
BSV	-	Building Spray Valve
BWST	-	Borated Water Storage Tank
CAV	-	Chemical Addition Valve
CFT	-	Core Flood Tank
CFV	-	Core Flood Valve
CI	-	Industrial Cooler Water
CIV	-	Industrial Cooler Water Valve
DCP	-	Decay Heat Closed Cycle Cooling Pump
DH	-	Decay Heat
DHP	-	Decay Heat Pump
DHV	-	Decay Heat Valve
DWV	-	Demineralized Water Supply Valve
EDG	-	Emergency Diesel Generator
EFP	-	Emergency Feedwater Pump
ES	-	Engineered Safeguards
HPI	-	High Pressure Injection
LOCA	-	Loss of Coolant Accident
LPI	-	Low Pressure Injection
MSV	-	Main Steam Valve
MUHE	-	Makeup Heat Exchanger
MUP	-	Makeup Tank
MUV	-	Makeup Valve
MWST	-	Miscellaneous Waste Storage Tank
OTSG	-	Once Through Steam Generator
RB	-	Reactor Building
RBC	-	Reactor Building Isolation & Cooling
RCDT	-	Reactor Coolant Drain Tank
RCP	-	Reactor Coolant Pump
RCS	-	Reactor Coolant System
RWP	-	Nuclear Service to Decay Heat Sea Water Pump
SW	-	Nuclear Service Closed Cycle Cooling
SWP	-	Nuclear Service Closed Cycle Cooling Pump
SWV	-	Nuclear Service Closed Cycle Cooling Valve
UVLO	-	Under Voltage Lockout
WDV	-	Waster Disposal Valve
WSV	-	Containment Monitoring Valve