FINAL AS ADMINISTERED NRC-AUTHORED

SCENARIOS

FOR THE D. C. COOK INITIAL EXAMINATION - MAY 2001

Facility: _DC Cook_____ Scenario No.: ___1____ Op-Test No.: _2001301___

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: _(IC-911) 100% power, The East RHR pump is OOS for a motor bearing repair and is expected back in 10 hours (21 hours of 72 hours) Tech Spec 3.5.2.d_____

_____

Provide a marked-up copy of STP.027.CD for shutting down the diesel generator.___

Turnover: _Diesel generator CD is at 900 kW. STP.027.CD has just been completed to step 4.26.11 of Attachment 1 and the diesel generator is ready to be unloaded and shutdown. Both units are at 100% power. The East CCP is in service. A load reduction has been authorized to 95% for core physics testing.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Unload and secure the CD D/G for the completion of the STP
2	RCO3 [10%]	Minor	Small RCS Leak (30 gpm) with no ramp
**		~~C(BO)~~	~~As a Turbine begins load decrease auto EH control fails~~
3		R	Power decrease using boration
4	CV30A	C(RO)	East CCP shaft shear
5	RX27	I(BO)	Feedwater flow controller fails low at 50%
6	CV12	I(RO)	Charging pump flow controller fails low at 10% open
7	RC01	Major	Large break LOCA [75% with 5 minute ramp]
8	ED05A	C(BO)	Vital bus T21A fails
9	RP13A	C(RO)	Auto Phase A does not occur

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

** Removed because DC Cook operates turbine in manual for power changes

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __1___ Page _1_ of ___

Event Description: Normal – Unload and Secure DGCD per 02-OHP.4030-STP-027CD

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to shutdown the DG and maintain overview of operations
	BO	Using Attachment 1 Step 4.26.11
		Reduce diesel load to 500 kW and hold for approximately 2 minutes
		As applicable, open the following diesel generator output breakers: T21D8 T21C3
		Adjust diesel speed to 60 Hz
		Verify DG2CD START GEN & 69/4KV VOLTMETER SEL switch in - OFF
		Using Step 4.26.12 Verify the following breaker – OPEN, DG2CD 4kV CB T21C3
		Verify diesel UNLOADED for approximately 2 minutes

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __1___ Page _2_ of ___

Event Description: Normal – Unload and Secure DGCD per 02-OHP.4021.032.001CD

Time	Position	Applicant's Actions or Behavior
	BO	Stop DG2CD using ANY of the following methods: Place DG2CD Stop-Run Control switch to STOP Press Emergency trip pushbutton in Control Room Verify green target at DG2CD Stop-Run Control switch Independently verify the following breakers are OPEN: DG2CD 4kV CB T21D8 DG2CD 4kV CB T21C3
	RO	Monitor boards

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __2___ Page _3_ of ___

Event Description: RCS Leak (10 %), Malfunction RC03, 30 gpm

Time	Position	Applicant's Actions or Behavior
	RO	Acknowledge Annunciator Panel 207 Drop 99, 'RX VESSEL HD LINE FLOW DETECTED'
	SRO	Direct actions per Panel 207, Drop 99 - Verify Vessel head vents closed and check containment leakage detection indications
	SRO	Perform RCS leak test per 02-OHP.4030.STP.16 and check T.S. 3.4.6.2 and 3.4.12.1
	SRO	Enters procedure 02-OHP.4022.002.020 'EXCESSIVE REACTOR COOLANT LEAKAGE' and begins leak rate calculation. Leak is approximately 30 gpm
	SRO, RO,	Begins checks for leak location and indications Indications lead to leak inside of containment Restore letdown per procedure 02-OHP.4021.003.001, section 4.1, 'Re-establishing Normal Letdown' • Place 2-QRV-302, cold letdown path select, in DIVERT • Verify charging >75 gpm • Verify letdown orifice valves closed • Verify CCW from letdown Hx outlet control valve OPEN • Adjust 2-QRV-301, letdown pressure control, to 50% • Open one of the letdown orifice valves • Adjust 2-QRV to maintain a nominal pressure of 160-350 psig • Place 2-QRV-301 in AUTO • Position control switch 2-QRV-303 to AUTO • Null 2-CRV-470 controller and place in AUTO

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __3___ Page _4_ of ___

Event Description: Power decrease using boration

Time	Position	Applicant's Actions or Behavior
	SRO	Determine to begin plant shutdown per 02-OHP.4021.001.003 'POWER REDUCTION'
	RO	Begin shutdown by boration
	RO	Begin Turbine shutdown in manual
	SRO	Refer to Tech Spec 3.4.6.2. a & .b (RCS leakage) LCO is 1 gpm unidentified and no pressure boundary leakage. Must be in Hot Standby in 6 hours.
	SRO	Direct power reduction using procedure 02-OHP.4021.001.003 section 4
	SRO	Direct RO to verify AUTO Rod Control Mode
	RO	Verify Auto Rod Control Mode on the Full Length Bank Selector Switch
		Commence manual load reduction using the load-limiter
		Use boration to maintain T_{AVE} (Add 60 gallons per batch IAW shift turnover sheet)
	BO	Maintain Main Generator parameters throughout use of this procedure using 02-OHP.4021.059.001 and 02-OHP.4021.080.003

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __4___ Page _5_ of ___

Event Description: East CCP shaft shears, Malfunction CV30A

Time	Position	Applicant's Actions or Behavior
	RO	Recognize CCP shaft shear, RCP seal flow low alarm, letdown isolation, CCP pump East motor amps low.
	SRO	Direct RO to start 'W' CCP, investigate and determine cause of trip and refer to Tech Specs. 3.5.2.a (72 hour LCO)
	RO	Lockout the East CCP
	BO	Monitor boards
	SRO, RO, BO	Dispatch AO to investigate problem and contact maintenance for support
	RO	Restore letdown per procedure 02-OHP.4021.003.001, section 4.1, 'Re-establishing Normal Letdown' • Place 2-QRV-302, cold letdown path select, in DIVERT • Verify charging >75 gpm • Verify letdown orifice valves closed • Verify CCW from letdown Hx outlet control valve OPEN • Adjust 2-QRV-301, letdown pressure control, to 50% • Open one of the letdown orifice valves • Adjust 2-QRV to maintain a nominal pressure of 160-350 psig • Place 2-QRV-301 in AUTO • Position control switch 2-QRV-303 to AUTO • Null 2-CRV-470 controller and place in AUTO Remove Excess Letdown from service

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __5___ Page _6_ of ___

Event Description: Feedwater Pump DP controller failure, RX27, failure of DP controller to 50%

Time	Position	Applicant's Actions or Behavior
	BO	Recognize the low DP and shift the controller to manual and place the feed pump turbine speed controller in manual. Feedwater DP will then be the responsibility of the BO during the continuation of the shutdown
	SRO	Check the Tech Specs – none required
	RO	Monitor boards for changes due to FW changes
	SRO, RO, BO	Dispatch AO to investigate problem and contact maintenance for support

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __6___ Page _7_ of ___

Event Description: Centrifugal charging pump flow control valve failure, Malfunction CV12, valve fails at 50% open

Time	Position	Applicant's Actions or Behavior
	RO	Recognize that QRV-251 'Charging Pump Flow Controller" has failed. RCP seal flow low alarm, PZR level low, regenerative heat exchanger outlet temperature high
		Try to manually operate QRV-251
		Throttle QRV-200 to shift flow to seals
	SRO	Check Tech Specs for charging Tech Specs. 3.5.2.a (This is second train of ECCS therefore 3.0.3 is applicable)
	BO	Stop ramp to minimize PZR level changes
	RO/BO	Match T_{AVE} and T_{REF} to minimize PZR level changes using rods or turbine
	SRO/RO/ BO	Dispatch AO to investigate problem and contact maintenance for support

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __7, 8, 9_ Page _8_ of ___

Event Description: Large break LOCA, Malfunction RC01 'RCS cold leg loop rupture' at 75%. Malfunction ED05E 'Loss of 4160 V Bus T21A', Malfunction RP13A 'Failure of containment isolation Phase A to actuate automatically, Train A'

Time	Position	Applicant's Actions or Behavior
	RO/SRO **CRITICAL STEP**	**Recognize indications of a LOCA, Loss of PZR level, increasing Charging flow, increasing containment pressure, humidity and temperature**
	SRO	May direct manual reactor trip.
	BO	Turbine trip, electrical bus transfer occurs, vital bus T21A does not energize. (event 8)
	SRO	Begin 02-OHP.4023.E-0, 'Reactor Trip or Safety Injection'
	Crew	Crew perform immediate actions of E-0
	RO	Auto Phase A does not occur, manually initiate Phase A (event 9)
	Crew	Crew notes the following equipment not operating: 2S SI Pump W CCP W CS Pump W RHR Pump W ESW Pump W CCW Pump W AFW Pump

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __7, 8, 9_ Page _9_ of ___

Event Description: Large break LOCA, Malfunction RC01 'RCS cold leg loop rupture' at 75%. Malfunction ED05E 'Loss of 4160 V Bus T21A', Malfunction RP13A 'Failure of containment isolation Phase A to actuate automatically, Train A'

Time	Position	Applicant's Actions or Behavior
	BO	Complete Attachment 'A' of E-0
	RO	Stop RCPs
	BO	Attempt to re-energize T21A using 02-OHP.4023.Sup.009 or Sup.012 'Restoration of 4kV Buses from EP' - investigation reveals: A dropped overcurrent relay that can be reset Restore power to the bus per Attachment 'G' Step 6 • Check Panel 219, Drop 75 '4kV Bus T21A CB T21A9 Trip' annunciator CLEAR • Check Panel 219, Drop 88 'TR21A Differential Operated' annunciator CLEAR • Place T21A11, DG2AB supply to bus T21A, control switch in PULL TO LOCKOUT • Verify the following breakers OPEN WITH GREEN TARGET: • T21A9, Bus 2A supply to bus T21A, • T21A6, 4kV supply to TR21PHA

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: _7, 8, 9_ Page _10_ of ___

Event Description: Large break LOCA, Malfunction RC01 'RCS cold leg loop rupture' at 75%. Malfunction ED05E 'Loss of 4160 V Bus T21A', Malfunction RP13A 'Failure of containment isolation Phase A to actuate automatically, Train A.

Time	Position	Applicant's Actions or Behavior

	BO	• Place the following control switches in PULL TO LOCKOUT:
		  • West MDAFW pump
		  • West CCP
		  • South SI pump
		  • West CTS pump
		  • West CCW pump
		  • West ESW pump

	Critical Step	• **Close T21A12, 4kV EP Supply to Bus T21A** • Restore loads as necessary while maintaining EP less than 42 Amps for One Unit or 78 Amps for Both Units
	SRO	Transition to E-1
	STA	Initiate monitoring of Critical Safety Function Status Tree
	SRO	Transition to FR.P-1
	RO	Reset SI Reset Containment Isolation Phase 'A' and 'B'
	SRO	Transition to E-1
		Termination of Scenario

Facility: _DC Cook_____ Scenario No.: ___1A____ Op-Test No.: _2001301___

Examiners: _____ Operators: _____

Initial Conditions: _(IC-911) 100% power, The East RHR pump is OOS for a motor bearing repair and is expected back in 10 hours (21 hours of 72 hours) Tech Spec 3.5.2.d_____

Provide a marked-up copy of STP.027.CD for shutting down the diesel generator.___

Turnover: _Diesel generator CD is at 900 kW. STP.027.CD has just been completed to step 4.26.11 of Attachment 1 and the diesel generator is ready to be unloaded and shutdown. Both units are at 100% power. The East CCP is in service. A load reduction has been authorized to 95% for core physics testing.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Unload and secure the CD D/G for the completion of the STP
2	RCO3 [10%]	Minor	Small RCS Leak (30 gpm) with no ramp
**		~~C(BO)~~	~~As a Turbine begins load decrease auto EH control fails~~
3		R	Power decrease using boration
4	CV30A	C(RO)	East CCP shaft shear
~~5~~	~~RX27~~	~~I(BO)~~	~~Feedwater flow controller fails low at 50%~~***
~~6~~	~~CV12~~	~~I(RO)~~	~~Charging pump flow controller fails low at 10% open~~***
7	RC01	Major	Large break LOCA [75% with 5 minute ramp]
8	ED05A	C(BO)	Vital bus T21A fails
9	RP13A	C(RO)	Auto Phase A does not occur

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
** Removed because DC Cook operates turbine in manual for power changes
*** Removed failures not needed to complete evaluation of applicants

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __1___ Page _1_ of ___

Event Description: Normal – Unload and Secure DGCD per 02-OHP.4030-STP-027CD

Time	Position	Applicant's Actions or Behavior
	SRO	Direct BOP to shutdown the DG and maintain overview of operations
	BO	Using Attachment 1 Step 4.26.11
		Reduce diesel load to 500 kW and hold for approximately 2 minutes
		As applicable, open the following diesel generator output breakers: T21D8 T21C3
		Adjust diesel speed to 60 Hz
		Verify DG2CD START GEN & 69/4KV VOLTMETER SEL switch in - OFF
		Using Step 4.26.12 Verify the following breaker – OPEN, DG2CD 4kV CB T21C3
		Verify diesel UNLOADED for approximately 2 minutes

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __1___ Page _2_ of ___

Event Description: Normal – Unload and Secure DGCD per 02-OHP.4021.032.001CD

Time	Position	Applicant's Actions or Behavior
	BO	Stop DG2CD using ANY of the following methods: Place DG2CD Stop-Run Control switch to STOP Press Emergency trip pushbutton in Control Room Verify green target at DG2CD Stop-Run Control switch Independently verify the following breakers are OPEN: DG2CD 4kV CB T21D8 DG2CD 4kV CB T21C3
	RO	Monitor boards

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __2___ Page _3_ of ___

Event Description: RCS Leak (10 %), Malfunction RC03, 30 gpm

Time	Position	Applicant's Actions or Behavior
	RO	Acknowledge Annunciator Panel 207 Drop 99, 'RX VESSEL HD LINE FLOW DETECTED'
	SRO	Direct actions per Panel 207, Drop 99 - Verify Vessel head vents closed and check containment leakage detection indications
	SRO	Perform RCS leak test per 02-OHP.4030.STP.16 and check T.S. 3.4.6.2 and 3.4.12.1
	SRO	Enters procedure 02-OHP.4022.002.020 'EXCESSIVE REACTOR COOLANT LEAKAGE' and begins leak rate calculation. Leak is approximately 30 gpm
	SRO, RO,	Begins checks for leak location and indications Indications lead to leak inside of containment Restore letdown per procedure 02-OHP.4021.003.001, section 4.1, 'Re-establishing Normal Letdown' • Place 2-QRV-302, cold letdown path select, in DIVERT • Verify charging >75 gpm • Verify letdown orifice valves closed • Verify CCW from letdown Hx outlet control valve OPEN • Adjust 2-QRV-301, letdown pressure control, to 50% • Open one of the letdown orifice valves • Adjust 2-QRV to maintain a nominal pressure of 160-350 psig • Place 2-QRV-301 in AUTO • Position control switch 2-QRV-303 to AUTO • Null 2-CRV-470 controller and place in AUTO

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __3___ Page _4_ of ___

Event Description: Power decrease using boration

Time	Position	Applicant's Actions or Behavior
	SRO	Determine to begin plant shutdown per 02-OHP.4021.001.003 'POWER REDUCTION'
	RO	Begin shutdown by boration
	RO	Begin Turbine shutdown in manual
	SRO	Refer to Tech Spec 3.4.6.2. a & .b (RCS leakage) LCO is 1 gpm unidentified and no pressure boundary leakage. Must be in Hot Standby in 6 hours.
	SRO	Direct power reduction using procedure 02-OHP.4021.001.003 section 4
	SRO	Direct RO to verify AUTO Rod Control Mode
	RO	Verify Auto Rod Control Mode on the Full Length Bank Selector Switch
		Commence manual load reduction using the load-limiter
		Use boration to maintain T_{AVE} (Add 60 gallons per batch IAW shift turnover sheet)
	BO	Maintain Main Generator parameters throughout use of this procedure using 02-OHP.4021.059.001 and 02-OHP.4021.080.003

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __4___ Page _5_ of ___

Event Description: East CCP shaft shears, Malfunction CV30A

Time	Position	Applicant's Actions or Behavior
	RO	Recognize CCP shaft shear, RCP seal flow low alarm, letdown isolation, CCP pump East motor amps low.
	SRO	Direct RO to start 'W' CCP, investigate and determine cause of trip and refer to Tech Specs. 3.5.2.a (72 hour LCO)
	RO	Lockout the East CCP
	BO	Monitor boards
	SRO, RO, BO	Dispatch AO to investigate problem and contact maintenance for support
	RO	Restore letdown per procedure 02-OHP.4021.003.001, section 4.1, 'Re-establishing Normal Letdown' • Place 2-QRV-302, cold letdown path select, in DIVERT • Verify charging >75 gpm • Verify letdown orifice valves closed • Verify CCW from letdown Hx outlet control valve OPEN • Adjust 2-QRV-301, letdown pressure control, to 50% • Open one of the letdown orifice valves • Adjust 2-QRV to maintain a nominal pressure of 160-350 psig • Place 2-QRV-301 in AUTO • Position control switch 2-QRV-303 to AUTO • Null 2-CRV-470 controller and place in AUTO Remove Excess Letdown from service

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __5___ Page _6_ of ___

Event Description: Feedwater Pump DP controller failure, RX27, failure of DP controller to 50%

Time	Position	Applicant's Actions or Behavior
	BO	Recognize the low DP and shift the controller to manual and place the feed pump turbine speed controller in manual. Feedwater DP will then be the responsibility of the BO during the continuation of the shutdown
	SRO	Check the Tech Specs – none required
	RO	Monitor boards for changes due to FW changes
	SRO, RO, BO	Dispatch AO to investigate problem and contact maintenance for support

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __6___ Page _7_ of ___

Event Description: Centrifugal charging pump flow control valve failure, Malfunction CV12, valve fails at 50% open

Time	Position	Applicant's Actions or Behavior
	RO	Recognize that QRV-251 'Charging Pump Flow Controller" has failed. RCP seal flow low alarm, PZR level low, regenerative heat exchanger outlet temperature high
		Try to manually operate QRV-251
		Throttle QRV-200 to shift flow to seals
	SRO	Check Tech Specs for charging Tech Specs. 3.5.2.a (This is second train of ECCS therefore 3.0.3 is applicable)
	BO	Stop ramp to minimize PZR level changes
	RO/BO	Match T_{AVE} and T_{REF} to minimize PZR level changes using rods or turbine
	SRO/RO/ BO	Dispatch AO to investigate problem and contact maintenance for support

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __7, 8, 9_ Page _8_ of ___

Event Description: Large break LOCA, Malfunction RC01 'RCS cold leg loop rupture' at 75%. Malfunction ED05E 'Loss of 4160 V Bus T21A', Malfunction RP13A 'Failure of containment isolation Phase A to actuate automatically, Train A'

Time	Position	Applicant's Actions or Behavior
	RO/SRO **CRITICAL STEP**	**Recognize indications of a LOCA, Loss of PZR level, increasing Charging flow, increasing containment pressure, humidity and temperature**
	SRO	May direct manual reactor trip.
	BO	Turbine trip, electrical bus transfer occurs, vital bus T21A does not energize. (event 8)
	SRO	Begin 02-OHP.4023.E-0, 'Reactor Trip or Safety Injection'
	Crew	Crew perform immediate actions of E-0
	RO	Auto Phase A does not occur, manually initiate Phase A (event 9)
	Crew	Crew notes the following equipment not operating: 2S SI Pump W CCP W CS Pump W RHR Pump W ESW Pump W CCW Pump W AFW Pump

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: __7, 8, 9_ Page _9_ of ___

Event Description: Large break LOCA, Malfunction RC01 'RCS cold leg loop rupture' at 75%. Malfunction ED05E 'Loss of 4160 V Bus T21A', Malfunction RP13A 'Failure of containment isolation Phase A to actuate automatically, Train A'

Time	Position	Applicant's Actions or Behavior
	BO	Complete Attachment 'A' of E-0
	RO	Stop RCPs
	BO	Attempt to re-energize T21A using 02-OHP.4023.Sup.009 or Sup.012 'Restoration of 4kV Buses from EP' - investigation reveals: A dropped overcurrent relay that can be reset Restore power to the bus per Attachment 'G' Step 6 • Check Panel 219, Drop 75 '4kV Bus T21A CB T21A9 Trip' annunciator CLEAR • Check Panel 219, Drop 88 'TR21A Differential Operated' annunciator CLEAR • Place T21A11, DG2AB supply to bus T21A, control switch in PULL TO LOCKOUT • Verify the following breakers OPEN WITH GREEN TARGET: • T21A9, Bus 2A supply to bus T21A, • T21A6, 4kV supply to TR21PHA

Op-Test No.: 2001301_ Scenario No.: __1__ Event No.: _7, 8, 9_ Page _10_ of ___

Event Description: Large break LOCA, Malfunction RC01 'RCS cold leg loop rupture' at 75%. Malfunction ED05E 'Loss of 4160 V Bus T21A', Malfunction RP13A 'Failure of containment isolation Phase A to actuate automatically, Train A.

Time	Position	Applicant's Actions or Behavior

	BO	• Place the following control switches in PULL TO LOCKOUT:
		  • West MDAFW pump
		  • West CCP
		  • South SI pump
		  • West CTS pump
		  • West CCW pump
		  • West ESW pump

	Critical Step	• **Close T21A12, 4kV EP Supply to Bus T21A** • Restore loads as necessary while maintaining EP less than 42 Amps for One Unit or 78 Amps for Both Units
	SRO	Transition to E-1
	STA	Initiate monitoring of Critical Safety Function Status Tree
	SRO	Transition to FR.P-1
	RO	Reset SI Reset Containment Isolation Phase 'A' and 'B'
	SRO	Transition to E-1
		Termination of Scenario

Facility: DC COOK Scenario No.: 2 Op-Test No.: 2001301

Examiners: _____ Operators: _____

Initial Conditions: 100% power. A tube leak on S/G #2 (5 gpm) requires a T.S. shutdown. East ESW Pump is running. Boron is at 1194 ppm.

Turnover: Unit 1 is at 75%power, Unit 2 is at 100% power. A tube leak on S/G #2 requires a T.S. shutdown. Tech Spec 3.4.6.2.c limits leakage to < 1gpm or shutdown in 6 hours. Procedure 02-OHP.4022.002.021 has been completed to step 9 and leak rate has been confirmed by chemistry.

Event No.	Malf. No.	Event Type*	Event Description
1		R	Decrease reactor power/ turbine load
2		N	Restore Letdown
3	RX17F	I(BO)	S/G pressure transmitter fails high (100)
4	RX05A	I(RO)	Pressurizer level channel fails low (0)
5	RC11B	C(RO)	RCP #2 vibration high (7 mils with 2 min ramp; 15 mil instant)
6	RC23B	Major	Steam generator #2 tube rupture (400 gpm)
7	ZDI101 FMO22 (Open)	C(BO)	East MDAFW throttle valve (FMO-222) will not close from the control room
8	RP20C	C(RO)	K610B relay failure, pumps do not start in automatic
9	RP10A &B	I(RO)	No automatic SI

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: _1_ Page _1_ of ___

Event Description: Power reduction to comply with Tech Spec requirements

Time	Position	Applicant's Actions or Behavior
	SRO	Direct power reduction using procedure 02-OHP.4021.001.003 section 4
		Direct RO to verify AUTO Rod Control Mode
	RO	Verify AUTO Rod Control Mode on the Full Length Bank Selector Switch
	RO	Commence manual load reduction using the load-limiter
	RO	Use boration to maintain T_{AVE}
	BO	Maintain Main Generator parameters throughout use of this procedure using 02-OHP.4021.059.001 and 02-OHP.4021.080.003

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: __3___ Page _2_ of ___

Event Description: Malfunction RX17F, 'Steam Generator pressure transmitter failure (MPP-222)' fails to 100%.

Time	Position	Applicant's Actions or Behavior
	BO	Recognize the failed transmitter by the indications: S/G #2 pressure indication failed high S/G #2 PORV opens
	SRO	Implement procedure 02-OHP.4022.013.012
	BO	Manually close S/G #2 PORV
	SRO	Recognize that there is a radioactive release in progress and check reportability requirements per procedure PMP-7030.001.001
	SRO	Trip bistables per attachment B-3 2-PS/526C (Loop 2 to loop 3 press SG2 low) 2-PS/526D (Loop 2 to loop 3 press SG3 low) Refer to Tech Specs 3.3.1.1, 3.3.2.1, & 3.3.3.1 (1hour LCO) Tech Specs 3.3.3.5 & 3.3.3.6 (30 day LCO)
	RO	Monitors primary plant

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: __4___ Page _3_ of ___

Event Description: Malfunction RX05A, 'Pressurizer level transmitter failure (LT-459)' fails to 0%

Time	Position	Applicant's Actions or Behavior
	RO	Recognize level transmitter failure: • Pressurizer level indication low • Charging flow increase and QRV-251, 'Charging flow control valve' opens • Letdown isolates by closing QRV-112 at 17% • Pressurizer heaters de-energize
	SRO	Check Tech Specs –3.3.1.1 & 3.3.2.1 (1 hour LCO), Tech Specs 3.3.3.5, 3.3.3.5.1, & 3.3.3.6 (30 day LCO) Implement procedure 02-OHP.4022.013.010, 'Malfunction of Pressurizer Level Instrument'
	RO	Select non-failed channel as the controlling channel • Place PZR level control in manual • Place PZR level CTRL selector switch in channel 2 & 3 position

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: __2& 4__ Page _4_ of ___

Event Description: Malfunction RX05A, 'Pressurizer level transmitter failure (LT-459)' fails to 0%

Time	Position	Applicant's Actions or Behavior
	RO	Restore letdown per procedure 02-OHP.4021.003.001, section 4.1, 'Re-establishing Normal Letdown' • Place 2-QRV-302, cold letdown path select, in DIVERT • Verify charging >75 gpm • Verify letdown orifice valves closed • Verify CCW from letdown Hx outlet control valve OPEN • Adjust 2-QRV-301, letdown pressure control, to 50% • Open one of the letdown orifice valves • Adjust 2-QRV to maintain a nominal pressure of 160-350 psig • Place 2-QRV-301 in AUTO • Position control switch 2-QRV-303 to AUTO • Null 2-CRV-470 controller and place in AUTO When letdown temperature is stable, then place 2-QRV-302 in NORMAL Trip bistables per Attachment 'A' 2-LS/459A 9 (High Level Rx Trip) Hang caution tags on level CTRL selector and level REC selector switch
	BO	Monitor panels

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: __5___ Page _5_ of ___

Event Description: Malfunction RC11B, 'Reactor coolant pump #2 high vibration'. Increases to 7 mils in 2 minutes and then increase to 15 mils instantly

Time	Position	Applicant's Actions or Behavior
	RO	Recognize indications of RCP HI vibration: • Annunciator 207, drop 52, 'RCP VIBRATION HIGH' –LIT
	SRO	Enters procedure 02-OHP.4022.002.001, 'Malfunction of a reactor coolant pump'
	RO	Verify that RCP#2 operating parameters are within limits Recognize indications of RCP HI-HI vibration: • Annunciator 207, Drop 51, 'RCP VIBRATION HI-HI' – LIT
	SRO Critical Step	**Go to step 16 and manually trips the reactor and instruct the RO to trip RCP#2.** Transition to 02-OHP.4023.E-0, 'Reactor trip or safety injection'
	Crew	Perform immediate actions
	RO	Trip RCP#2

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: _6, 7, 8 & 9_ Page _6_ of ___

Event Description: Steam generator #2 tube rupture occurs when reactor trip occurs, Malfunction RC23B, 'Steam generator tube rupture' at 400 gpm. Malfunction ZDI101 FMO222(OPEN), 'East MDAFW throttle valve (FMO-222) will not close from the CR. The West ESW pump does not start in automatic, malfunction RP20C, K610B relay failure, train B pumps will not start. Malfunction RP10A&B, 'Failure of Safety Injection to Actuate-Automatic', SI will actuate manually

Time	Position	Applicant's Actions or Behavior
	RO	(Event 9) Recognize that SI has not actuated and is required per E-0 step and manually initiates SI
	Crew Critical Step	**Recognize SGTR in Step 7.b.3) level in S/G#2 increasing faster that the others and by radiation monitors**
	BO	Isolate AFW to affected S/G when level is > 13% • (Event 7) FMO-222 will not close from the Control Room • Either trip the East MDAFW pump or send an AO to manually close the valve
	BO	Recognize that the train B ECCS pumps did not start in automatic and manually start the pumps (Event 8)
	BO	Implement Attachment 'A' of E-0
	RO	Stop RCPs if RCS pressure is < 1300 psig
	SRO	Transition to E-3, 'Steam Generator Tube Rupture'

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: __6___ Page _1_ of ___

Event Description: Steam generator #2 tube rupture occurs when reactor trip occurs, Malfunction RC23B, 'Steam generator tube rupture' at 400 gpm.

Time	Position	Applicant's Actions or Behavior
	SRO/RO	Identify Ruptured S/G as #2 by the following indications: • Unexpected rise in #2 narrow range level • High radiation on #2 sample • High radiation from #2 PORV monitor (2-MRA-2701)
	RO/BO	Isolate the ruptured SG: • Adjust the PORV controller setpoint to 1040 psig • Check PORV (2-MRV-223) CLOSED • Close steam supply (2-MCM-221) to TDAFW • Check blowdown (2-DCR-320) and sample valve (2-DCR-302) isolated • Place 2-DRV-407, SG stop valves drain valve in CLOSED • Trip SG stop valve (2-MRV-220) CLOSED • Verify dump valve (2-MRV-221 & 222) CLOSED • Isolate feed flow to SG#2 when level is >13% Check SG#2 pressure >430 psig
	SRO/RO/ BO	Initiate RCS Cooldown

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: __6___ Page _1_ of ___

Event Description: Steam generator #2 tube rupture occurs when reactor trip occurs, Malfunction RC23B, 'Steam generator tube rupture' at 400 gpm.

Time	Position	Applicant's Actions or Behavior
	SRO/RO	Determine core exit temperature required based on SG#2 pressure
	RO/BO	Cooldown the RCS to the agreed temperature using the intact S/Gs at maximum rate: • If condenser available use condenser steam dumps • Use the PORV's from the intact S/Gs if condenser is not available At P-12: • Bypass steam dump low-low T_{AVE} interlock if dumping to condenser • Block Steamline SI Stop the cooldown and maintain the desired RCS temperature
	RO	Reset SI and Containment Isolation Phase A Establish instrument air to containment: • Check control air pressure >85 psig • Open control air to containment valves (2-XCR-100, 101, 102, & 103)
	RO	Stop RHR pumps if RCS pressure is > 300psig Check SG#2 pressure stable or rising

Op-Test No.: 2001301_ Scenario No.: __2__ Event No.: __6___ Page _1_ of ___

Event Description: Steam generator #2 tube rupture occurs when reactor trip occurs, Malfunction RC23B, 'Steam generator tube rupture' at 400 gpm.

Time	Position	Applicant's Actions or Behavior
	RO	Check RCS subcooling based on core exit TCs > 56° F
	RO/BO	Depressurize RCS to minimize break flow and refill PZR: • If normal spray is available, then spray the PZR • If NOT available us the PORV Depressurize until: • RCS pressure less that SG#2 and PZR level > 19% • PZR level > 72% • RSC subcooling less than 36° F
	Crew	Stabilize plant **TERMINATE SCENARIO**

Facility: DC Cook Scenario No.: 3 Op-Test No.: 2001301

Examiners: _____ Operators: _____

Initial Conditions: [IC-913] 80% power with the North Heater Drain Pump secured, rods in auto.

Turnover: Maintain power at 80%. Start the North Heater Drain Pump and secure the Middle Heater Drain Pump.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Swap North and middle heater drain pump
2	NI10B	I(RO)	Power range channel (NI-42) fails high (100%)
3		R	Power increase to restore power
4	RX23H	I(BO)	Steam generator #3 controlling level channel fails low
5	MS02C	Major	Steam line #3 break inside containment (100%)
6	RP03A &B	C(RO)	Reactor trip failure (ATWS) [trip MG sets 3 min after call]
7	RP09A	C(BO)	Feedwater isolation does not occur in automatic
8	FW48C	C(BO)	TDAFW pump does not start in auto
~~9~~	~~NI01B~~	~~C(RO)~~	~~Source range NI-32 does not automatically re-energize~~ **

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor
** Failure not needed and does not contribute to evaluation

Op-Test No.: 2001301_ Scenario No.: __3__ Event No.: __1___ Page _1_ of ___

Event Description: Swap North and middle heater drain pumps per procedure 02-OHP.4021.060.014, 'Operation of the Heater Drain Pump', Attachment 3.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct and monitor the BO to remove the middle heater drain pump from service and place the North heater drain pump in service
	BO	Verify the North heater drain pump is pre-warmed Place 2-CRV-252, 4A normal level control, controller in HAND and match the auto setpoint with the auto setpoint of the controller for 2-CRV-253, 4A or 4B normal level control Cycle 2-CRV-252 to ensure proper operation Place 2-CRV-253 controller in HAND Start the North heater drain pump Slowly close 2-CRV-253 WHILE slowly opening 2-CRV-252 to control heater 4A level WHEN 2-CRV-253 is CLOSED, then stop the middle heater drain pump Place 2-CRV-252 controller in AUTO Close 2-LPD-349N, warm-up bypass around2-CRV-255 Open 2-LPD-349M, warm-up bypass around 2-CRV-256
	RO	Monitor panels

Op-Test No.: 2001301_ Scenario No.: __3__ Event No.: __2 & 3___ Page _1_ of ___

Event Description: Malfunction NI09B, 'Power Range Channel N42 Failure', fails to 0.5 milliamps.

Time	Position	Applicant's Actions or Behavior

	RO	Recognize the rods are inserting and takes the rods to MANUAL
	RO	Verify that the AFD is still within the operating band
	SRO	Implement OHP.4022.013.004, 'Power range malfunction'
	RO	Select N42 on the Rod Stop Bypass Selector
	RO/BO	Restore plant to equilibrium conditions by reducing turbine load to match T_{AVE} and T_{REF} within 2 ^{0} F and then pull rods to match T_{AVE} and $T_{REF.}$ (Event 3) Remove N42 from service for the following: • Comparator channel defeat • Upper section detector current comparator defeat • Lower section detector current comparator defeat • Power mismatch bypass selector
	BO	Monitor panels
	SRO	Refer to Tech Specs 3.3.1.1 (1 hour LCO to trip bistables)
	STA	Refer to PMI-4031 event #9 for the failed PR detector
	SRO	Trip bistable Per (Attachment B) within an hour of N42 failure • 2-TS/421C, 2-TS/421D (OTΔT trip and runback) • Disconnect plug P312 from jack at rear of 2-N-42 drawer or pull the control and instrument fuses

Op-Test No.: 2001301_ Scenario No.: __3__ Event No.: __4___ Page _1_ of ___

Event Description: Malfunction RX23H, 'Steam Generator Level Transmitter (BLP-131) LT-539 Failure' on S/G #3 fails to 0%

Time	Position	Applicant's Actions or Behavior
	BO	Recognize S/G #3 level indicator failure: • LI-539 failed low • S/G water level low alarm • Feed flow increase • Actual S/G level increase Place the S/G level controller 1-FRV-230 in manual
	SRO	Implement 02-OHP.4022.013.013, 'Steam Generator Level Instrument Malfunction' Contact maintenance to trip bistables for failed instrument • 1-LS-539A (Loop 3 Hi-Hi Turbine Trip) • 1-LS-539B (Loop 3 Low-Low Level Rx Trip)
	SRO	Refer to Tech Specs 3.3.1.1 (1 hour LCO to trip the channel), 3.3.2.1 (1 hour LCO to trip the channel), & 3.3.3.5 (restore in 30 days)
	BO	Restore plant to equilibrium conditions
	RO	Monitor panels

Op-Test No.: 2001301_ Scenario No.: __3__ Event No.: _5, 6, 7, & 8__ Page _1_ of ___

Event Description: Malfunction MS02C, 'Main Steam Line Break at Steam Generator Exit Before Flow Restrictor' at 100%, malfunction RP03A&B, 'Reactor Trip Failure', fails to trip, malfunction RP09A, 'Failure of Feedwater Isolation Train A Trip to Occur', malfunction FW48C, 'TDAFW Pump Auto Start Failure' it will start in manual

Time	Position	Applicant's Actions or Behavior
	Crew Critcal Step	**(Event 6) Recognize that the reactor did not trip and manually trip the reactor**
	SRO	Enter E-0 and perform immediate actions Transition to FR.S-1
	RO **Critcal Step**	**Manually insert control Rods**
	BO	Manually actuate AMSAC
	BO	(Event 8) Recognize TDAFW pump is not running and is manually started. • Manually open the FMOs or the MDAFW pumps • Manually close the S/G blowdown isolation valves • Manually close the MDAFW pump test valves
	RO	Initiate Emergency Boration of RCS • Start both boric acid pumps in FAST • OPEN 2-QMO-420 and check > 44gpm flow Isolate Dilution paths Place both primary water pumps in OFF • CLOSE 2-QRV-500, primary water blender valve • Place 2-QRV-500demin bypass, to RC FILTER position

Op-Test No.: 2001301_ Scenario No.: __3__ Event No.: _5, 6, 7, & 8_ Page _1_ of ___

Event Description: Malfunction MS01C, 'Main Steam Line Break at Steam Generator Exit Before Flow Restrictor' at 100%, malfunction RP01A&B, 'Reactor Trip Failure', fails to trip Auto, malfunction RP09A, 'Failure of Feedwater Isolation Train A Trip to Occur', malfunction FW48C, 'TDAFW Pump Auto Start Failure' it will start in manual

Time	Position	Applicant's Actions or Behavior
	BO	(Event 7) Recognize that feedwater isolation did not occur, manually close valves FMO-202 and 203, Feedwater isolation valves
	Crew	Identify S/G #3 as faulted inside containment
	SRO	Recognize that a steam line isolation is required and manually trip closed all steamline isolation valves
	BO	Isolate S/G#3 as follows: • Check or close 2-FRV-230 and 2-FMO-203 (MFW) • Check or close 2-FMO-231 and 2-FMO-232 (AFW) • Check TDAFW steam supply , 2-MCM-231 closed • Check or close S/G blowdown closed, 2-DCR-330 • Check of close S/G sample closed, 2-DCR-303 • Place 2-DRV-407, S/G stop valves drain valve in close • Determine that the S/Gs are not ruptured • Check PORV NRV-233 closed
	SRO	Transition to E-0 and perform actions
	BO	Implement Attachment A
	SRO	Transition to E-2 'Faulted Steam Generator Isolation' -Note that task has already been accomplished.

Op-Test No.: 2001301_ Scenario No.: __3__ Event No.: _5, 6, 7, & 8_ Page _1_ of ___

Event Description: Malfunction MS01C, 'Main Steam Line Break at Steam Generator Exit Before Flow Restrictor' at 100%, malfunction RP01A&B, 'Reactor Trip Failure', fails to trip Auto, malfunction RP09A, 'Failure of Feedwater Isolation Train A Trip to Occur', malfunction FW48C, 'TDAFW Pump Auto Start Failure' it will start in manual

Time	Position	Applicant's Actions or Behavior
	SRO	Transition to 02-OHP.4023.E-1, 'Loss of Reactor Coolant or Secondary Coolant' or 02-OHP.4023.ES-1.1 'SI Termination"
	RO	Reset SI Reset containment Phase A
	SRO	Direct Chemistry to sample S/Gs **TERMINATE THE SCENARIO**

Facility: _DC Cook_____ Scenario No.: ___4____ Op-Test No.: _2001301__

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: [IC-921] 49% Power BOL, Boron 1317, EMFP, MSRs being placed in service, Xe Steady. West CCP out of service for seal replacement. Entered T.S. 3.5.2 about 12 hours ago.

Provide 02.OHP.4021.001.006 Power escalation data sheet 3 and 9.

Turnover: Power escalation in progress to 100%. Fuel is conditioned to 100%. The West MFW is at 3500 rpm ready to placed in service per 02-OHP.4021.055.003 step 4.6.19. The MFW hold has been 20 minutes. Currently perform Step 4.63 of 02-OHP 4021.001.006, Power Escalation step 4.61 has been completed.

Event No.	Malf. No.	Event Type*	Event Description
1		N	Power Escalation to 100% / Start West MFW pump
2		R	Positive Reactivity change while diluting the RCS to maintain Tavg - Tref
3	RX19A [120]	I(RO)	Turbine impulse pressure instrument (MPC-253) fails HIGH
4	RX11B [50]	C(BO)	SG #22 PORV controller fails OPEN (50%)
5	RX29 [1400]	I(BO)	Main feedwater discharge pressure (FPC-250) fails HIGH (Ramp 3 minutes)
6	RC10B [20] RP10A/B	Major I(RO)	Small Break LOCA in containment (NO auto SI) – {400 gpm with 5 min ramp}
7	TC03	C(BO)	Main turbine fails to trip in automatic
8	RD0439 RD0414		TWO rods fail to drop (H14, G13)
9	CV13A	C(RO)	East CCP trips on overcurrent {NO CCP capability}

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: _____ Scenario No.: __4___ Event No.: __1/2__ Page _2_ of _9_
Event Description: Power increase to 100%; Start the West MFW pump.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct actions in 02-OHP 4021.001.006, Power Escalation, at step 4.63 • Raise power to approx. 60% and hold. • Implement Reactivity Management Program – PMI 4015, 3.7.3, and OHI 4000, 4.2.
	RO	Maintain Tave – Tref mismatch within band (+ 1.0) by diluting the RCS or raising control rods.
	BOP	Place the West MFW pump in service using Attachment 4 of 02-OHP 4021.055.003, at Step 4.6.12.

Op-Test No.: _____ Scenario No.: __4___ Event No.: __3__ Page _3_ of _9__

Event Description: Turbine impulse pressure instrument (MPC-253) fails HIGH

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis Failure => Rods move OUT in AUTO; Tref indicates HIGH ANN – Panel 211 Drop 20: Tave LO: Tave < Tref deviation
	SRO	Direct action per 02-OHP 4024.211, 02-OHP 4022.012.003 and 02-OHP 4022.013.016 Rod Control to MANUAL. AMSAC Bypass/Test switch in BYPASS/TEST. Steam Dump control in OFF. Verify compliance with T.S. 3.3.2.1 action: • Trip B/S within one hour. Trip bistables for 2-MPC-253.
	RO	Place Rod Control bank selector switch in MANUAL. Restore Tave to normal band. Place AMSAC Bypass/Test switch in BYPASS/TEST. Place Steam Dump control switch in OFF.
	BOP	Monitor secondary plant conditions. Perform actions as directed by the US: • Verify Bistable tripping on 2-SML-19E and 2-SML-17 • Hang Caution Tags on AMSAC and Steam Dump

Op-Test No.: _____ Scenario No.: __4___ Event No.: __4__ Page _4_ of _9__

Event Description: Steam Generator #22 PORV controller fails OPEN [50%]

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis event => Steam Flow/Feed Flow mismatch on #22 SG; Rods moving OUT in AUTO ANN – Panel 214 Drop 22: 2-MRV-223 OP or HSD2 Panel OVRD
	SRO	Direct actions per Annunciator Response Procedure Verify MRV-223 is CLOSED. Enter T.S. 3.3.3.1 Table 3.3-6 actions: • Declare Rad Monitor MRA-2701 Inoperable – 7 day LCO
	BOP	Take MANUAL control of MRV-223 and CLOSE the valve. Monitor SG levels and restore to normal band, as required.
	RO	Monitor primary plant parameters. Take action as directed by the US.

Op-Test No.: _____ Scenario No.: __4___ Event No.: __5__ Page _5_ of _9__

Event Description: Main feedwater discharge pressure (FPC-250) fails HIGH

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => Lowering MFP speed and SG level ANN – Panel 213 Drop 3/33: SG 1-2 Water Level LOW Dev. ANN - Panel 214 Drop 3/33: SG 3-4 Water level LOW Dev.
	SRO	Direct actions per Alarm Response Procedure Verify a Steam flow and Feed flow mismatch. Direct manual control of SG level controller, as required.
	BOP	Take MANUAL control of MFP Master Controller and stabilize unit. Verify SG water level control is maintaining programmed level.
	RO	Monitor primary plant conditions. Perform actions as directed by the US:

Op-Test No.: _____ Scenario No.: __4__ Event No.: _6/7/8__ Page _6_ of _9__

Event Description: Small Break LOCA in containment with NO auto SI available. Reactor trip required. Failure of the Main Turbine to AUTO trip. TWO control rods are stuck out requiring emergency boration per 02-OHP 4023.ES-0.1 Step 6, IAW 02-OHP 4021.005.007. Loss of High Head Injection capability – East CCP trips.

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => PZR level lowering / Charging flow rising ANN – Panel 208 Drop 4: PZR Level LOW Deviation Failure of the Main Turbine to trip in AUTO. Failure of TWO control rod to insert.
	SRO	Direct actions per 02-OHP 4022.002.020 • Adjust Charging Flow to maintain 6 gpm to 12 gpm RCP seal injection • Isolate Letdown • Start Second CCP Enter T.S. 3.4.6.2 – Excessive RCS Leakage MANUAL reactor and MANUAL SI Enter 02-OHP 4023 E-0, Reactor Trip or Safety Injection
	RO	Adjust charging flow to maintain RCP seal injection Isolate Letdown Manually trip the reactor Manually insert SI
	BOP	Monitor Secondary parameters. Manually trip the turbine

Op-Test No.: _____ Scenario No.: __4__ Event No.: _6/7/8__ Page _7_ of _9__

Event Description: Small Break LOCA in containment with NO auto SI available. Reactor trip required. Failure of the Main Turbine to AUTO trip. TWO control rods are stuck out requiring emergency boration per 02-OHP 4023.ES-0.1 Step 6, IAW 02-OHP 4021.005.007. Loss of East CCP due to an overload trip.

Time	Position	Applicant's Actions or Behavior
	SRO **CRITICAL STEP**	Direct actions per 02-OHP 4023.E-0: **Verify Immediate Action (Steps 1 – 4)** **Acknowledge MANUAL turbine trip required** **Continue in E-0 actions**
	RO	Perform MANUAL Reactor Trip Report TWO stuck out rods [H14, G13] Perform MANUAL SI actuation Perform actions as directed by US:
	BOP	Perform MANUAL Turbine Trip Verify Power to AC Emergency Buses Perform actions as directed by US:

Op-Test No.: _____ Scenario No.: __4__ Event No.: _6/7/8__ Page _8_ of _9_

Event Description: Small Break LOCA in containment with NO auto SI available. Reactor trip required. Failure of the Main Turbine to AUTO trip. TWO control rods are stuck out requiring emergency boration per 02-OHP 4023.ES-0.1 Step 6, IAW 02-OHP 4021.005.007. Loss of East CCP due to an overload trip.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct actions per 02-OHP 4023.E-0: Verify operator actions Implement Attachment A
	CRITICAL STEP	**Verify RCS is NOT Intact (Step 23)** **Transition to E-1, Loss of Reactor or Secondary Coolant.**
		Direct actions per 02-OHP 4023.E-1: Stop RCPs when RCS pressure is 1300 psig Verify adequate RCS subcooling (> 36°F) Verify CTS pumps NOT running Verify EDGs should be STOPPED Direct Chemistry to initiate Post Accident Sampling Transition to ES-1.2, Post LOCA C/D and Depressurization.
	RO/BOP	Perform actions as directed by the US: Stop the running EDGs

Appendix D Operator Actions Form ES-D-2

Op-Test No.: _____ Scenario No.: __4__ Event No.: _6/7/8__ Page _9_ of _9_

Event Description: Small Break LOCA in containment with NO auto SI available.. Reactor trip required. Failure of the Main Turbine to AUTO trip. TWO control rods are stuck out requiring emergency boration per 02-OHP 4023.ES-0.1 Step 6, IAW 02-OHP 4021.005.007. Loss of East CCP due to an overload trip.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct actions per 02-OHP 4023.ES-1.2: Verify SI Reset and Phase A/B Reset Verify Control Air Established to Containment Initiate RCS cooldown to Cold Shutdown condition De-energize PZR heaters
	RO	Perform actions as directed by the US: Reset SI and Phase A/B Monitor RCS Cooldown rate (< 100°F per hour)
	BOP	Perform actions as directed by the US: Establish Control Air to the Containment Establish RCS Cooldown using Steam Dumps
		TERMINATE Scenario after establishment of C/D.

Facility: DC Cook Scenario No.: 5 Op-Test No.: 2001301

Examiners: _____ Operators: _____

Initial Conditions: [IC-922] 55% Power, Boron is 1303 ppm. Power reduction in progress.

Turnover: Unit is stable at 55% power and continuing a power reduction to take the unit off line. All preparations have been completed to take the West MFW pump off line per 02-OHP 4021.055.004, Attachment 2. Currently performing Step 4.9.2 of 02-OHP 4021.001.003, Power Reduction.

Event No.	Malf. No.	Event Type*	Event Description
1		R	Negative Reactivity change while borating the RCS to maintain Tave - Tref control.
2		N	Power Reduction to 0% / Stop West MFW pump
3	CV16A [0]	I(RO)	VCT level instrument (QLC-451) fails LOW (5% indicated)
4	RFP RCR [10]	I(BO)	Steam flow channel (MFC-140)fails LOW (Controlling)
5	RC17C [5]	C(RO)	Pressurizer PORV (NRV-152) leaking (requires isolation) – 5% leak
6	RC16 [100]	C(RO)	PZR steam space leak (300 gpm, ramp 5 minutes)
7	RC23D [60]	Major	Steam Generator #4 tube rupture (600 gpm {60%} – ramp over 300 sec)
8	MS06D [80]	C(BO)	Steam Generator safety valve (SV2B-4) opens – 80%

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: _____ Scenario No.: _5__ Event No.: __1 / 2__ Page _2_ of _9__

Event Description: Power Reduction to 0% and Stop the West MFW pump.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct actions in 02-OHP 4021.001.003, Power Reduction. • Continue power reduction
	RO	Maintain Tave – Tref mismatch within band (+ 1.0) by borating the RCS or raising control rods.
	BOP	Stop the West MFW pump using Attachment 2 of 02-OHP 4021.055.004 starting at Step 4.1. • Start the lube oil and control oil pump • Place the speed controller and DP controller in manual • Increase the east pump speed and decrease the west pump speed • When east pump is carrying the load and the west pump is unloaded, secure the west pump

Op-Test No.: _____ Scenario No.: __5__ Event No.: __3__ Page _3_ of _9__

Event Description: VCT level instrument (QLC-451) fails LOW

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => QLC-451 level at 5% ANN – Panel 209 Drop 49: VCT Level Low
	SRO	Direct actions per 02-OHP 4022.013.017 Verify QLC-451 failed low Enter T.S. 3.1.2.2 action – One hour to trip B/S Perform Att A to trip Bistables
	RO	Secure Auto MAKEUP mode Maintain VCT level (452) > 14% with manual Makeup Verify Bistable LS-112B is tripped
	BOP	Monitor secondary plant conditions Perform actions as directed by the US

Op-Test No.: _____ Scenario No.: __5__ Event No.: __4__ Page _4_ of _9__

Event Description: Steam flow channel (MFC-140) fails LOW (Controlling)

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => SG Levels Lowering ANN – Panel 214 Drop 42: SG 24 FW Flow HIGH ANN - Panel 214 Drop 33: SG 24 Level LOW Dev.
	SRO	Direct actions per 02-OHP 4022.013.014 Verify SG 24 level is stable or trending to 44%. Enter T.S. 3.3.1.1 and 3.3.2.1 action – One hour to trip B/S Use Att D-1 to trip bistables. • 2-FS/542B: 2-SML-19E Drop 67 • 2-FS/540A: Panel 214 Drop 42 • 2-FS/540B: 2-SML-19C Drop41
	BOP	Take MANUAL control of FRV-240 and restore level to program • Place SF selector switch (2-FS-542C) in CH 2 position • Place SG 24 level control in NULL then AUTO Verify Bistables are tripped.
	RO	Monitor primary plant conditions Perform actions as directed by the US

Op-Test No.: _____ Scenario No.: __5__ Event No.: __5__ Page _5_ of _9__

Event Description: Pressurizer PORV (NRV-152) leak by (requires isolation) – 5% open

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => Discharge Pipe Temp rising ANN – Panel 208 Drop 24: PZR PORV DISCH TEMP HIGH ANN - Panel 208 Drop 45: ACCOUSTIC MONITOR FLOW DET
	SRO	Direct actions per 02-OHP 402.002.009 Verify isolation of leaking ALL PORVs Determine leaking PORV {NRV-152} Enter T.S. 3.4.11 action – One hour to Close leaking PORV's block valve
	RO	Close ALL PZR PORV Block valves Monitor PRT status Isolate leaking PORV {NRV-152} – Close NMO-152 Place Caution Tags on NMO-152 control switch
	BOP	Monitor secondary plant conditions Perform actions as directed by the US

Op-Test No.: _____ Scenario No.: __5__ Event No.: __6___ Page _6_ of _9__

Event Description: Malfunction RCS16 Pressurizer steam space leakage (unisolable - Rx trip required) at 300 gpm

Time	Position	Applicant's Actions or Behavior
	Crew RO	Diagnosis the event =>
	CRITICAL STEP	**Perform a MANUAL Reactor Trip** **Perform a MANUAL SI actuation** Perform actions as directed by the US:
	BO	Verify Turbine Trip Verify Power to AC Emergency Buses Perform actions as directed by the US:

Op-Test No.: _____ Scenario No.: __5__ Event No.: __7/8__ Page _7_ of _9__

Event Description: Steam generator #4 tube rupture (600 gpm) – 60% ramped; SG Safety Valve (SV2B-4) fails open – 80% after reactor trip. Ruptured and Faulted SG requiring entry into E-3/ECA 3.1.

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => Blowdown Rad Monitor Alarm ANN – Panel 238 Drop 12: R19 SG Blowdown Sampling
	SRO	Direct actions per 02-OHP 4022.002.020 and 02-OHP 4022.002.021: Verify isolation of SG Blowdown Transfer Auxiliary Loads to Unit 1 Verify unable to maintain PZR level with ONE CCP • Direct a MANUAL Reactor Trip and SI • Enter 02-OHP 4023.E-0 actions

Op-Test No.: _____ Scenario No.: __5__ Event No.: __7/8__ Page _8_ of _9__

Event Description: Steam generator #4 tube rupture (600 gpm) – 60% ramped; SG Safety Valve (SV2B-4) fails open – 80% after reactor trip. Ruptured and Faulted SG requiring entry into E-3/ECA 3.1.

Time	Position	Applicant's Actions or Behavior
	Crew **CRITICAL STEP**	**Diagnosis the event => Steam Flow on #24 SG PORV**
	SRO	Direct actions per 02-OHP 4023.E-0: Verify Immediate Action (Steps 1 – 4) Verify CTS NOT required Verify adequate AFW flow Implement Attachment A Verify PZR PORVs and Sprays closed
	RO	Verify Reactor Trip Verify SI initiation Perform actions as directed by the US
	BOP	Verify Turbine Trip Verify Power to AC Emergency Buses Perform actions as directed by the US Identify/Report Steam Flow on #24 SG to environment

Op-Test No.: _____ Scenario No.: __5__ Event No.: __7/8__ Page _9_ of _9__

Event Description: Steam generator #4 tube rupture (600 gpm) – 60% ramped; SG Safety Valve (SV2B-4) fails open – 80% after reactor trip. Ruptured and Faulted SG requiring entry into E-3/ECA 3.1.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct actions per 02-OHP 4023.E-2: Close ALL SG Stop Valves Determine Secondary Radiation NOT normal Transition to E-3, SGTR Direct actions per 02-OHP 4023.E-3: Isolate AFW to #24 SG Transition to ECA-3.1, SGTR with Loss of Reactor Coolant
	SRO	Direct actions per 02-OHP.4023.ECA-3.1
	RO	Perform actions as directed by the US Reset SI and Phase A/B Re-establish air to containment Trip ALL PZR heaters
	BOP	Perform actions as directed by the US Do not establish feed to ruptured steam generator **TERMINATE Scenario upon establishment of C/D.**

Facility: _DC Cook_____ Scenario No.: ___6____ Op-Test No.: _2001301_

Examiners: _____ Operators: _____

_____ _____

_____ _____

Initial Conditions: [IC-923] 55% Power, 2MFP, MSR In service. East MDAFW pump OOS. [IRF FWR61 RO]; Unit 1 is in Mode 6 with its CST drained [T.S. 3.7.1.2 entry – 7 day LCO]

Turnover: Stable at 55% power preparing to reduce power to 0% and rods are in auto. Boron is 1303 ppm. The East MDAFW pump has been out of service to perform motor replacement for 73 hours. The unit is shutting down and the reactor must be in Mode 3 within the next 4 hours. Unit 1 is in Mode 6 with fuel being off-loaded. Currently in Step 4.9 of 02-OHP 4031.001.003, Power Reduction.

Event No.	Malf. No.	Event Type*	Event Description
1	RX02C [650]	I(RO)	RCS T_{hot} instrument (NTP-131) fails HIGH
2		N	Reduce Turbine load and Stop the West main feedwater pump
3		R	Negative Reactivity change while borating the RCS to maintain Tave - Tref control.
4	ZDI101QRV421 CLOSE	C(RO)	Normal boric acid control valve {QRV-421} fails closed (0)
5	RX26A [40]	I(BO)	East main feedwater pump speed controller fails LOW (in AUTO) (Ramp 15 minutes)
6	FW05A FW46B FW52C	Major	Trip of East MFP and Loss of ALL Feedwater West MDAFW pump trip TDAFW Pump Steam Binding
7	EG10A	C(BO)	Diesel Generator AB fails to start in AUTO (clear after 30 sec)
8	ED05E	C(BO)	Bus T21A fails to re-energize
9	RX14A [0]	C(RO)	Steam dump master controller fails, Dumps must be open from individual controller

* (N)ormal, (R)eactivity, (I)nstrument, (C)omponent, (M)ajor

Op-Test No.: _____ Scenario No.: __6__ Event No.: __1__ Page _2_ of _7_

Event Description: RCS T_{hot} instrument (NTP-131) for Loop 3 fails HIGH {TE-431A}

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => ANN – Panel 211 Drop 6: Tave High ANN - Panel 211 Drop 15: Tave/Tref Deviation Various other ANN alarms
	SRO	Direct actions per 02-OHP 4022.013.007 Initiate 02-OHP 4030.STP.021: Event Initiated Surveillance Enter T.S. 3.3.1.1 action – One hour to trip B/S Perform Att C for Bistable tripping
	RO	Take MANUAL control of control rods Minimize Tave-Tref deviation Defeat Loop 3 Tave, Delta T, and Recorder Verify bistables tripped per Att C.
	BOP	Monitor secondary plant conditions Perform actions as directed by the US

Op-Test No.: _____ Scenario No.: __6__ Event No.: __2 / 3__ Page _3_ of _7_

Event Description: Power Reduction to 0% and Stop the West MFW pump.

Time	Position	Applicant's Actions or Behavior
	SRO	Direct actions in 02-OHP 4021.001.003, Power Reduction.
	RO	Maintain Tave – Tref mismatch within band (+ 1.0) by borating the RCS or inserting control rods.
	BOP	Secure the West MFW pump using Attachment 2 of 02-OHP 4021.055.004 starting at Step 4.1.

Op-Test No.: _____ Scenario No.: __6__ Event No.: __4__ Page _4_ of _7_

Event Description: Normal Boric Acid control valve fails CLOSED during boration.

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => Failure to Borate Normally ANN – Panel 209 Drop 39: BA Flow Deviation
	SRO	Direct actions per 02-OHP 4021.005.001: Enter T.S. 3.1.2.2 – Boration Path Continue power reduction with control rods
	RO	Follow-up with trouble shooting: • Try to restart boration • Figure out how to borate • Figure out if they can shutdown just using rods
	BOP	Monitor secondary plant conditions Perform actions as directed by the US

Op-Test No.: _____ Scenario No.: __6__ Event No.: __5__ Page _5_ of _7_

Event Description: East Main Feed pump speed controller fails LOW (40) with a 15 minute ramp

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => SG Level LOW deviation; FW Flow lowering ANN – Panel 213 Drop 3/33: SG 1-2 Water Level LOW Dev ANN – Panel 214 Drop 3/33: SG 3-4 Water Level LOW Dev
	SRO	Direct actions per Alarm Response Procedure Manual control of SG Level as required to stabilize level
	BOP	Take MANUAL control of MFP and stabilize unit
	RO	Monitor primary plant conditions Perform actions as directed by the US

Op-Test No.: _____ Scenario No.: __6___ Event No.: __6/7/8/9__ Page _6_ of _7_

Event Description: Loss of ALL Feedwater – requires use of condensate feed to establish heat sink. DG 2AB fails to AUTO start (manual start available after 30 sec). Loss of Bus T21A. Steam Dump master controller fails to 0 requiring manual operation.

Time	Position	Applicant's Actions or Behavior
	Crew	Diagnosis the event => Trip of ONLY running Main Feedwater Pump and the turbine driven AFW pump
	SRO	Direct actions per 02-OHP 4023.E-0: Verify Immediate Actions (Steps 1 – 4)
	RO	Perform actions as directed by the US Verify Reactor Trip Verify SI NOT required
	BOP	Perform actions as directed by the US Verify Turbine Trip Verify Power to AC Emergency Buses

Op-Test No.: _____ Scenario No.: __6___ Event No.: __6/7/8/9__ Page _7_ of _7__

Event Description: Loss of ALL Feedwater -- requires use of condensate feed to establish heat sink. DG 2AB fails to AUTO start (manual start available after 30 sec). Loss of Bus T21A. Steam Dump master controller fails to 0 requiring manual operation.

Time	Position	Applicant's Actions or Behavior
	Crew **CRITICAL STEP**	**Diagnosis the event => No AFW Feed available** **Transition to FR-H.1 required upon entry into ES-0.1**

	SRO	Direct actions per 02-OHP 4023.FR-H.1:
		• Verify Secondary Heat Sink is required
		• Verify Bleed and Feed is NOT required {at least 2 SG (WR) level >15%}
		• Verify AFW Flow NOT available to any SG
		• Stop ALL RCPs
		• Verify Condensate System IN service
		• Verify Feedwater Flow NOT available
		• If main feedwater flow can not be established then:
		  • Depressurize ONE SG to less than 230 psig
		  • Verify Condensate aligned to feed SG
		• Or Establish Main Feewwater
		Transition to ES-0.1

	RO	Perform actions as directed by the US Stop ALL RCPs
	BOP **CRITICAL STEP**	Perform actions as directed by the US • **Open FW isolation valves** • **Open circuits 11 & 5 behind the panels** • **Dump Steam to condenser at MAXIMUM rate from ONE SG** • **Establish MFW pump Flow**